The Economic Interrelationships of Tourism: A Computable General Equilibrium Analysis

Part II

by

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Part II

Chapter's 5, 6, 7, 8 and Appendices

Chapter 5

A Computable General Equilibrium Model of the Spanish Economy

5.1 Overview

The purpose of this Chapter is to evaluate the wider economic effects of Foreign Direct Investment (FDI) inflows on a recipient economy. There is significant literature on the impacts of FDI on economic growth and the determinants of FDI. However, these approaches tend to overlook the second round effects of FDI on key economic variables such as the real exchange rate and the labour market. FDI may well have many productive impacts on the recipient economy and useful spillover and growth effects, yet little is known about the mechanism by which this achieved or the associated relative magnitudes. For example, de Mello (1996) finds a positive relationship between FDI and output growth and FDI and capital accumulation in a cross country panel analysis. While such relationships are rarely disputed in the literature, the subsequent impact of FDI on important issues such as the recipient sector, other competing sectors which may well be of strategic importance to the recipient economy, domestic investment, international trade and employment are overlooked. The aim of this Chapter is to highlight the relative importance of these important issues in order to give insights as to the broader impacts of FDI.

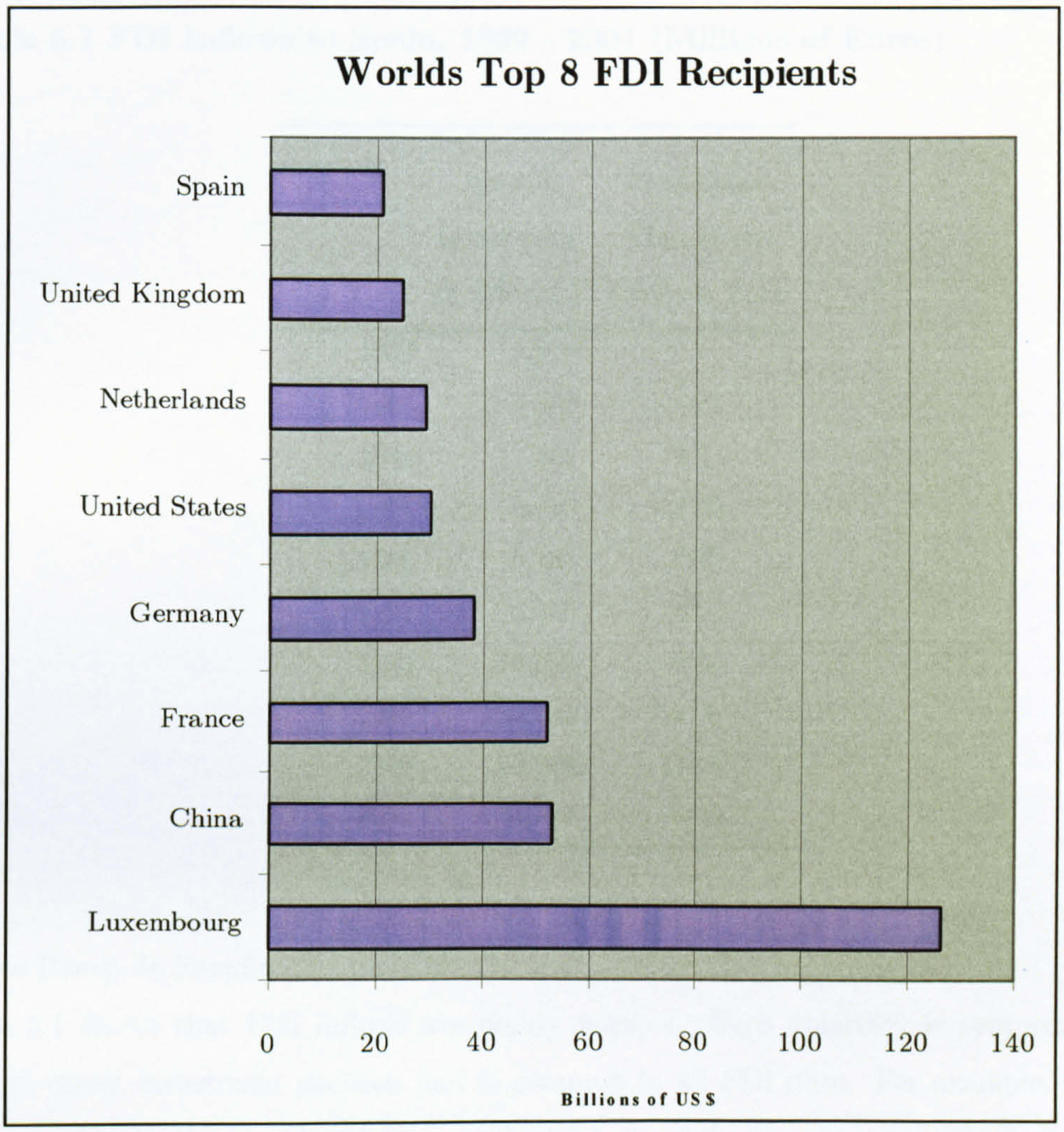
A CGE model is a suitable tool for this type of analysis as it can incorporate structural inter-linkages and evaluate impacts from a multi-sectoral perspective that are not within the remit of partial equilibrium, or issue specific FDI studies. Previous CGE studies have either not modelled FDI explicitly or are based on data which have been taken from a range of estimates which do not have CGE modelling in mind. In order to improve on previous studies, a CGE model has been especially constructed to incorporate some of the nuances of international investment and detailed data have been gathered relating to the stock of foreign capital and the scale of FDI inflows. The details of this model have already been given in the previous Chapter.

As stated in Chapter 3, FDI plays a particularly important role in tourism trade due to the nature of tourist movements and the need for tourism providers to be located in the tourism destination. However, only a few studies have attempted to model the impact of FDI in a CGE framework and none has tried to look at the combined effects of the two. The interaction between FDI and tourism is important as both are sensitive to changes in the real exchange rate. No study has yet attempted to examine the interactions between foreign tourism and FDI on a recipient economy.

5.2 FDI Flows in Spain

Spain has consistently been ranked in the world's top ten FDI recipients. UNCTAD sources show that in 2002 Spain was ranked eighth in the world in terms of FDI inflows, and received foreign investment worth around US$22 billion. Since the early 1990s Spain has had a net FDI outflow ($US 37 billion in 2002). This has primarily been due to MNEs using Spain as an investment platform into the USA (Ramon, 2001).

Figure 5.1 World's Top 8 FDI Recipients (2002)



Source: UNCTAD, FDI/TNC database. http://www.unctad.org/fdistatistics

In the 1990s, the Spanish government introduced new legislation to make the country more attractive to foreign investors. Since 1999, most FDI has been allowed freely into the country and is subject only to ex-post notification. No specific restrictions exist for the tourism sector. The UNCTAD World Investment Report for 2003 notes that Spain has eliminated foreign currency and capital controls. Remittances of profits, debt service, capital gains, royalties from intellectual property and capital repatriation are allowed freely at market prices (UNCTAD, 2003). Further to this, following a dip in FDI flows in the aftermath of the events of September

11th 2001 and a continued decline in 2002, the UNCTAD report predicts that the tourism sector (coupled with the communications sector) is likely lead any recovery that might occur.

Table 5.1 FDI Inflows to Spain, 1992 - 2001 (Millions of Euros)

	Inward Investment (€ Millions)	Percentage Change on Previous Year
1992	8,216	-
1993	7,320	-11%
1994	7,468	2%
1995	4,710	-37%
1996	5,193	10%
1997	5,620	8%
1998	10,592	88%
1999	14,791	40%
2000	40,728	175%
2001	24,340	-40%

Source Banco de España

Table 5.1 shows that FDI inflows are highly volatile. Such volatility is symptomatic of the foreign direct investment decision and is common in all FDI data. For example, data for the year are 2000 is distorted by Volkswagen's purchase of the car company SEAT. Otherwise from 1997 onwards FDI has grown by approximately €4-5 billion Euros per annum. Data on sectoral inflows published by the Banco de España for the years 1998-2001 shows that the volatility of FDI inflows varies significantly between sectors. In large industrial sectors such as communications or manufacturing, the FDI series can be quite volatile due to large one-off takeovers like the Volkswagen example. However, data for services, agriculture, construction and tourism are less volatile and exhibit a more constant growth rate of around 5% per annum. Due to these large sectoral distortions, FDI shocks are not modelled in the manufacturing or communications sector and a base year of 1999 is chosen where there are not large takeovers apparent in the dataset.

Table 5.2 gives details of FDI inflows into Spain and their relationship to Gross Fixed Capital Formation (GFCF) taken from the Supply Use Table (SUT) for Spain. It was noted in Chapter 4 that the GFCF data include foreign capital formation as well as domestic capital formation. Therefore the sectoral FDI inflow data are subtracted from the GFCF data in the CGE model to give domestic and foreign investment. GFCF data include information on investment in the following asset types, plant and machinery, transport equipment, buildings and intangible assets (i.e. brands, goodwill etc.).

Table 5.2 FDI Inflows to Spain in relation to Gross Fixed Capital Formation, 1999 (Millions of Euros)

	Gross Fixed Capital Formation (GFCF)	FDI Inflows	FDI/GFCF
1 Agriculture	517	23	4.4%
2 Manufacturing	70,575	10,946	15.5%
3 Hotels	913	207	22.7%
4 Hostels	3		0.0%
5 Camp Sites	1	0	0.0%
6 Other Accomodation	1,214		0.0%
7 Restaurants	1,413	183	13.0%
8 Air Transport	99	49	49.7%
9 Land Transport	1,937	249	12.9%
10 Sea Transport	17	3	18.0%
11 Travel Agents	2	0	2.4%
Passenger Transport			
12 Supporting Services	66	8	12.2%
13 Car Rental	109	28	25.7%
14 Leisure	1,285	256	19.9%
15 Public Sector	0	0	0.0%
16 Other Services	14,943	2,838	19.0%
Total	93,092	14,791	15.9%

Table 5.2 shows that for the whole economy, FDI inflows account for approximately 15.9% of GFCF in the year 1999. In the hotel sector the ratio is slightly higher at 22.9%, while in the restaurants sector it is slightly lower at 13.0%. It is these data that are shocked directly in the FDI counterfactual used in this chapter. The FDI data presented above are combined with the calibrated foreign capital stock data presented in chapter 4. The level of GFCF represents new investment in each period.

5.3 Model Structure

The issues to be examined in this chapter relate specifically to the combined impacts of tourism and FDI on a recipient economy. A CGE model is constructed especially to capture the economic characteristics of both of these phenomena. Two alternative models are used in this chapter. A model with perfect competition and constant returns to scale, this is referred to as the CRTS model and is compared to a model with imperfect competition and increasing returns to scale (IRTS) in all sectors apart from the 'public' sector. Both models have 16 sectors and are dynamic.

The underlying equations of the model are identical to those given in Chapter 4. The economy wide growth rate is set at 2% per annum as this is the average growth rate for the Spanish economy over the last 20 years (see chapter 2 for discussion). This is the parameter g, which is the steady state growth rate as described in Chapter 4. The real rate of return (the parameter r in the CGE model) is calibrated so that it equals 5%. This figure is based on the long-run central bank interest rate of thce Banco de España. The same parameter value is used in the Canaries model. Using data on returns to capital and the value of r capital stocks are calibrated using equation 4.66 in chapter 4. r may vary endogenously and should not be confused with the per unit price of capital goods, which may also vary. This parameter was defined as $PK_{i,t}$ in equation 4.69. Note that the relationship between these variables and parameters is that r equals the rental rate of each unit of capital divided by the price of each unit of capital $PK_{i,t}$.

Using the calibration of Rutherford *et al.* (1996) the depreciation rate is set at 0.06%. Initial elasticity parameters are presented in Table 4.10.

The next section presents the results of the first set of simulations relating to a 10% increase in FDI in the hotel, restaurant, air transport, sea transport, travel agent, car rental and leisure sectors for the periods 1999-2005. Results are compared for the CRTS and IRTS models to illustrate the magnitude of imperfectly competitive effects on the simulation outcome. A sensitivity test is then undertaken on the conjectural variation parameter to give insight regarding the extent to which assumptions relating to this component influence the outcomes of the model. In addition to this assumptions relating to profit repatriation and capital productivity parameters are also tested.

5.4 Model Results: An Increase in Foreign Direct Investment

5.4.1 The FDI Counterfactual

As with the majority of CGE applications a simulation based approach is undertaken (Condon *et al.* 1987). Exogenous variables are changed from their base or reference path levels and the resulting values of the endogenous variables are compared with their base run counterparts. Simulations are designed to analyse the impact of different national and regional scenarios and are combined with sensitivity analysis of key elasticity parameters in the model to test robustness.

The first set of simulations examine the impact of a 10% increase in foreign capital inflow in each period in the model on the sectors which provide the core of Spanish tourism services. The 10% increase is modelled in tourism charcteristic sectors that receive FDI in the benchmark. These are the sectors for which the foreign capital stock is 'calculated' rather than calibrated. Of the 16 sectors specified in the model these are the hotels, restaurants, air transport, travel agents, car rental and leisure sectors. For the purposes of convenience these sectors are referred to as the 'FDI recipient sectors'. The benchmark FDI flows are increased by 10% in these 7 sectors in the first 5 periods of the model's time horizon, the years 1999 to 2004. The hostel, camping and 'other accommodation' sectors do not receive FDI in the benchmark data set. Therefore the sectors that are chosen to receive additional FDI as part of the counterfactual make up the majority of FDI activity in the Spanish tourism sector. The FDI shock is not designed to be permanent so that any adjustment effects after the shock has subsided can be observed. The shock is also in the first period of the model, so adjustment effects are instantaneous as the shock is unanticipated. This is thought to be more realistic as FDI is not neccsarily announced in advance to protect MNEs commercial position.

The total value of FDI in FDI recipient sectors is 972 million Euros; the size of this shock is therefore 97.2 million Euros in 1999, which is a little more than 1.2% of annual exports, 1% of annual GFCF and 0.019% of GDP.

This FDI shock is first analysed using constant returns to scale (CRTS) model specification so that the core effects of the adjustment process can be provided. The scenario is then run again using an alternative model specification with increasing returns to scale (IRTS) and imperfect competition. For convenience, throughout this thesis, this is referred to as the IRTS model. The results of the CRTS and IRTS models are then compared in order to establish the influence of imperfect competition and increasing returns to scale on the policy scenario under investigation.

In the base case IRTS model conjectural variation parameters are set at $\mu_i = \mu_i^M = 0$ i.e. there is no conjectural reaction by either foreign firms to the actions of domestic firms in the domestic market or vice versa[1], these can be varied at level 2 of the demand system presented in Figure 4.5. While it has already been noted that the conjectures are fixed and do not converge to the Nash equilibrium, it is possible to vary these conjectural variation parameters to investigate potential outcomes relating to changes in competitive behaviour. Consider the following possible example. When FDI inflows occur in the Spanish economy, foreign firms that might normally export their goods or services to Spain are actually establishing a physical presence in Spain themselves. This makes them less likely to export to Spain. Alternatively, if a rival exporter invests in a Spanish firm, it may make its competitor less likely to attempt to export goods to Spain due to the fact that it knows that there is now increased competition in the sector. Based on this hypothesis, a sensitivity test is undertaken involving firm level conjectures. The sensitivity test involves varying the conjectured reaction of foreign firms to the domestic firm's action in the domestic market, i.e. the rate of change of output of the domestic firm anticipated by the foreign firm in response to its own change. This is the parameter and is defined in section 4.4.5. This parameter is set exogenously at -1 so $\mu_i = \partial M_i / \partial D_i = -1$. Consequently, if the

[1]For a detailed interpretation of the parameters μ_i or μ_i^M, see section 4.4.5 in chapter 4.

domestic firm increases its own output, then the foreign firm will reduce imports into Spain. Conversely, if the domestic firm reduces output then the foreign firm will increase imports into Spain. For purposes of comparison, this scenario will be referred to as the IRTS alternative case as compared to the IRTS base case.

As well as comparing the CRTS and IRTS scenarios, a range of sensitivity tests are undertaken. Sensitivity analyses are undertaken using the CRTS model so that the magnitudes of the effects of changing the parameters in question are not clouded by the IRTS effects. In the initial scenario modelled the level of profit repatriation is set at zero. This means that the returns to foreign capital, as defined by equation 4.75 in chapter 4, remain in the host economy and are not returned to the source economy. The level of profit repatriation has important implications for the recipient economy. When profit repatriation is zero this implies that there will be reinvestment of MNE profits, either directly by the MNE itself, or indirectly if funds are retained in a holding account. If there is full profit repatriation, this will at the very least limit the growth effects attributable to FDI. The level of profit repatriation has potentially significant implications for the real exchange rate, so it is addressed in a sensitivity test. Governments actively intervene in the level of profit repatriation; currently the Spanish economy is free of qualitative restrictions relating to profit repatriation. However, differing tax rates on capital mean that MNEs often hold profits overseas until the tax conditions are favourable. Governments also actively encourage MNEs to reinvest profits in their host country, even going so far as to offer them tax incentives.

Further, a second separate sensitivity test is undertaken whereby a productivity shock is introduced to foreign capital. Given the rationale for FDI given by the OLI paradigm discussed in chapter 3 and the associated innovation transfer that is widely hypothesised by authors such as Glass and Saggi (2002) the effects of increased productivity of foreign capital are modelled. It is not known how much more productive FDI is in the Spanish tourism sector. Therefore the effects of different levels of increased productivity of foreign as opposed to domestic capital are modelled so as to give insights into the wider implications of this supposed phenomenon. The productivity shock is modelled in conjunction with the 10% increase in foreign capital in each period. It is not known how much more productive foreign capital is than domestic capital; this simulation is designed solely to illustrate the magnitude that an associated productivity gain can have.

5.4.2 Results from the CRTS Model

Results are presented in Figures 5.2 through to 5.16. Following the method of Go (1994), each plot represents the relative deviation from the benchmark value expressed in percentage terms. All changes are real as opposed to nominal adjustments unless explicitly stated.

The process of foreign investment can be described as follows. In period $t = 0$, MNEs invest in Spain and purchase assets. This is simulated through a 10% increase in the amount of Gross Fixed Capital Formation (GFCF) as shown in Table 5.2. This increase in new investment can be used to purchase a range of capital assets. However, These assets can take several forms, for example, they might purchase financial instruments i.e. acquire a stake in an existing company or set-up a new company, buildings (existing or new), or machinery and equipment (existing or new). In the benchmark simulation FDI is exogenously allocated to these sectors. This is measured in real terms. As the investment driven demand for these capital goods rises, their price rises and margins of return will fall. This leads to an increase in the domestic price level. However, firms that receive FDI will have more capital goods at their disposal; this means that their production costs will fall (once the new capital goods are successfully operationalised) and this allows firms that receive FDI to increase output. The rise in the domestic price level will lead to an appreciation in the real exchange rate, particularly in the short-term during the period of the FDI inflow, which in turn leads to increased demand for imports and a fall in demand for exports.

In the next period, $t = 1$, MNEs will either reinvest these profits or repatriate them (or some combination of the two). If MNEs re-invest etheir profits they may allocate them in the same sector, or they may reallocate their entire investment, or some portion of it to another sector where the rate of return to capital is higher. Capital is assumed to be mobile between sectors. Movement in capital is dictated by the capital adjustment cost function described in chapter 4. For example, a MNE investing in the hotel sector cannot simply reallocate its investment to another unrelated sector of the economy without incurring a cost.

In this simulation no profit repatriation is assumed i.e. profits attributable to FDI are held in the recipient economy. The term profit repatriation does not refer to the withdrawal of FDI, but to the allocation of profits attributable to FDI, that are the economic rents attributable to the activity of the MNE. There are three possible options for MNEs that do not repatriate their profits:

1. MNEs may re-invest their profits in the same company in an attempt to expand output still further.

2. MNEs may re-invest their profits in an alternative company, possibly in another sector, either for strategic reasons or because the rate of return is higher.

3. Where no suitable investment opportunities exist, MNEs may retain their profits in a holding account where interest will accrue.

For the purposes of this particular simulation, options 1) and 2) are selected for MNE profits. As profits are re-invested, this means that more assets are purchased and the domestic price level will increase still further.

As well as asset purchase, in order to undertake FDI MNEs must also acquire the currency of the country in which they wish to invest. In a small country, that is not part of a currency union, the purchase of foreign currency associated with the investment inflow can drive up the nominal exchange rate[2]. However, this effect is marginal in Spain as it is part of the European Monetary Union (EMU) and therefore the nominal exchange rate will largely be unaffected by FDI inflows. This point is particularly relevent as large portions of the FDI received by Spain are sourced in the Euro region. This reinforces the use of a flexible real exchange rate closure in the model as adjustments in the trade deficit occur via changes in the relative prices of domestic and imported goods, rather than fluctuations in the nominal exchange rate.

Consequently the results of this counterfactual indicate a rise in output for FDI recipient sectors, a rise in the domestic price level and an appreciation in the real exchange rate. The magnitudes of these effects are shown later in this section. Such results are commonly found in CGE models. To illustrate this point and show in more detail the general equilibrium adjustments that occur following the imposition of the counterfactual the stylized approach of Devarajan *et al.* (1990) is referred to.

[2]Such a phenomena has been widely noticed by the IMF and the World Bank in the context of aid inflows.

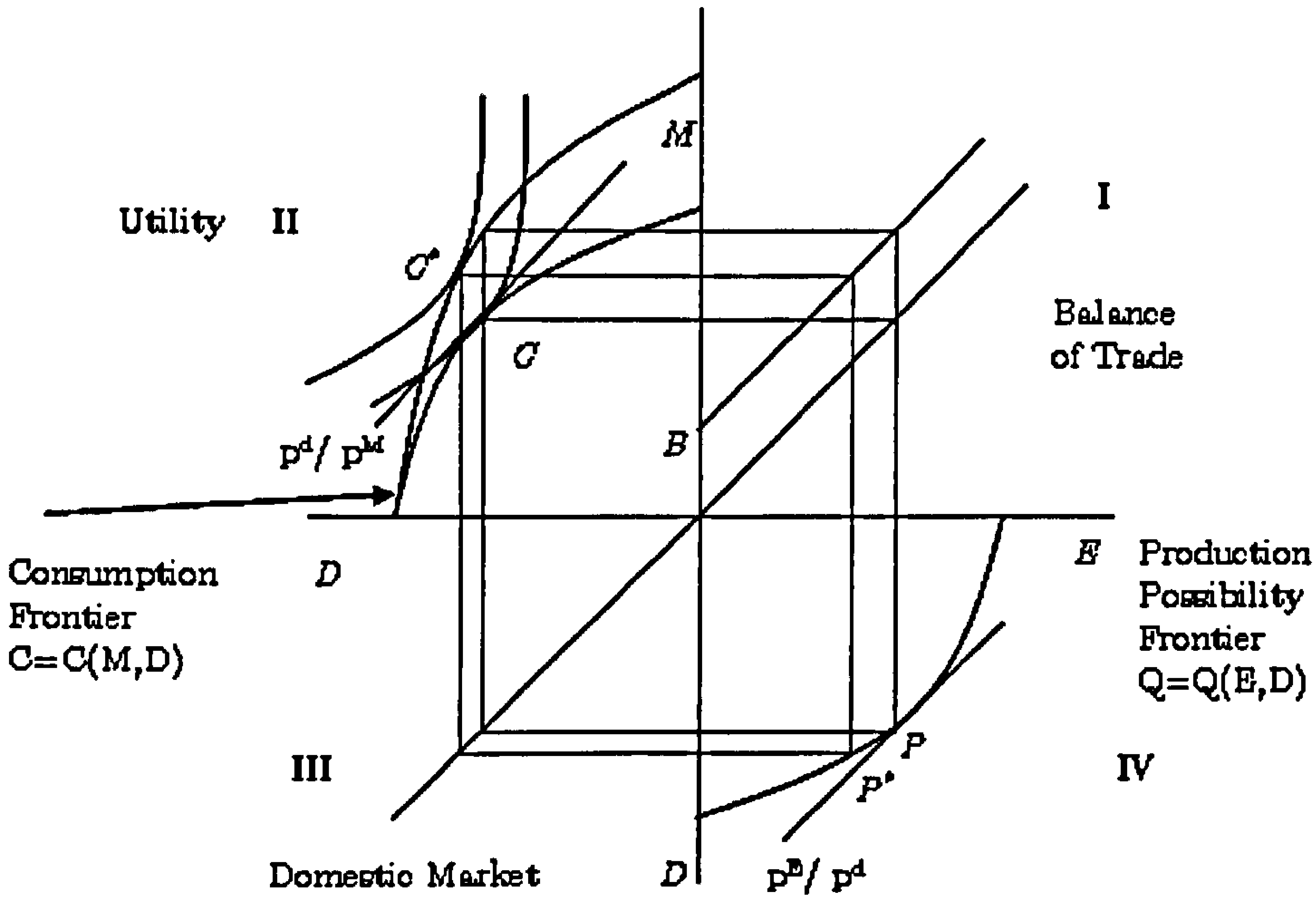
Devarajan, *et al.* (1990) use a basic model with 1 country, 2 production sectors and 3 goods[3] (commonly referred to in the CGE literature as the 1-2-3 model) to examine the impact of an increased foreign capital inflow. This highly stylised model provides useful insights as to the core effects of a foreign capital inflow that are likely to occur in a CGE model based on the typical CES family of functions and the Walrasian solution mechanism. While the structure of this model is simplistic, the results can be compared to the model used in this thesis. The 1-2-3 model is a simple programming model that can yield highly intuitive general equilibrium results which apply as a subset to the results generated by larger model.

The model illustrates the mechanisms that re-equilibriate key markets and can be described in basic terms as follows. Quadrant IV presents the domestic production possibilities (or output transformation) frontier, which gives the maximum possible combinations of Domestic goods (D) and Exports (E) that the economy can produce. Q defines aggregate production and is fixed given the assumption that all primary factors inputs are fully employed and that there are no intermediate inputs in this model. The ratio p^E/p^d gives the efficient ratio of exports to domestic output expressed as a ratio of relative prices. The point of tangency of p^E/p^d with the output transformation frontier determines the amount of the domestic and exported goods that are produced. Analogous to the production possibilities frontier is the consumption frontier in quadrant II. The economy produces at point P and consumes at point C. The relation between the consumption frontier and the production possibilities frontier is determined by Quadrants I and III and is explained as follows: at point P, exports are exchanged via the foreign exchange market in Quadrant I for imports (M) and domestic production is delivered to consumers via the domestic markets (Quadrant III). The equilibrium is then determined at point C and is dependent on the tangent between the utility curve and the consumption possibility frontier. This tangency determines the equilibrium relative price of domestic goods and imports (p^d/p^M) and it can be seen in Quadrant II that consumers consume a combination of D and M at point C. In the benchmark, foreign capital inflows are zero, so the production of E determines the consumption of M. World prices are assumed equal to unity, so the slope of the line in Quadrant 1 is unity (45 degrees). When capital inflows (B) are zero, the only source of foreign currency is exports. When trade is balanced and world prices are equal in the benchmark, the production

[3] The factors of production, the government and firms are ignored in this approach.

possibilities frontier and the consumption frontier are identical.

Figure 5.2a: The Devarajan, Lewis and Robinson 1-2-3 Approach - Short-Term Impact

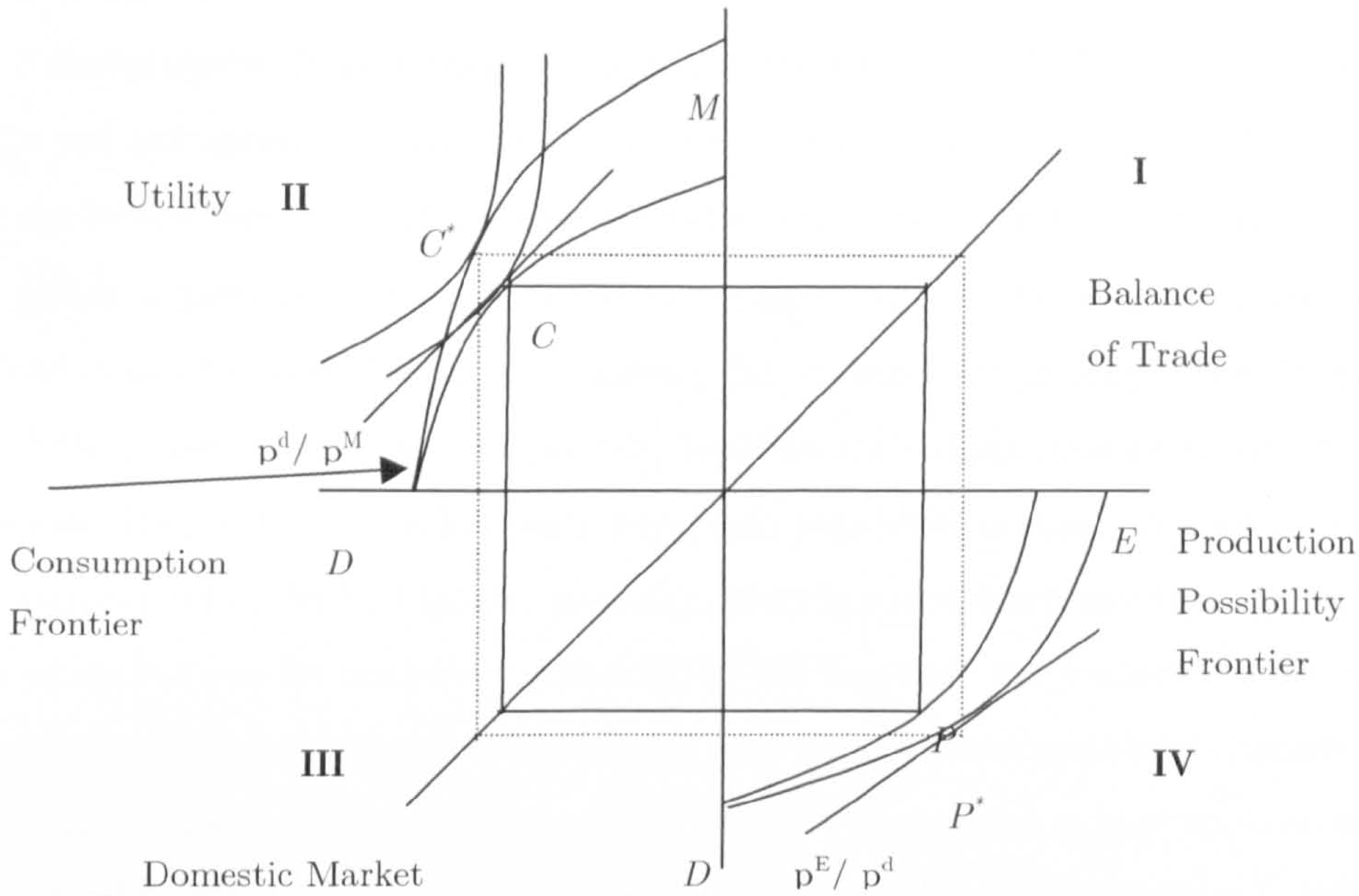


Source: Adapted from Devarajan, *et al.* (1990).

Figure 5.2a shows the short-term effects of the foreign capital inflow. If foreign capital inflows increase to some value $B > 0$, the direct effect is to shift the balance of trade line upwards by the amount of increase in B. The new equilibrium is dependent on the consumers' preference for imports[4], the new equilibrium shifts from $C$to $C*$, demand for both D and M increase and p^d rises. In quadrant IV the relative price has shifted in favour of the domestic good and against exports, which represents an increase in the real exchange rate.

[4]Devarjan, *et al.* (1990) consider two extreme cases which define the range of possible equilibria. If the Armington elasticity is infinite the new equilibrium would lie directly above the initial equilibrium C. Consumption of D will remain unchanged, while all of the extra foreign exchange will go towards purchasing M. The real exchange rate is unchanged. If the Armington elasticity is zero and the indifference curves are Leontief, equal amounts of both D and M will be consumed and the new equilibrium will lie on some higher point on a ray passing through the origin and C. The price ratio p^d/p^M will have risen: as p^M is fixed by definition in the numéraire therefore pd will have increased which constitutes a real appreciation in the exchange rate. So under these two extreme cases the real exchange rate will either appreciate or remain unchanged. The range of intermediate outcomes indicates an appreciation in the real exchange rate.

Figure 5.2b: The Devarajan, Lewis and Robinson 1-2-3 Approach - Long-Term Impact



Source: Adapted from Devarajan, *et al.* (1990).

In the mdeium to long-run, if foreign capital inflows increase, the direct effect is to increase domestic production capacity in the export sector. This shifts the production possibilites frontier outwards and there is a new equilibrium at $P^*$and more export goods can be produced. The consumption possibilities frontier expands upwards so that more imports can be consumed for any given level of domestic consumption, again there is a new equilibrium at C^*. The result of this will be to increase consumption of imports and production of exports. With particularly high elasticity of substitution between imports and domestic goods, consumption and production of domestic goods will fall, but otherwise consumption and production of domestic goods will increase. Domestic goods will become more expensive relative to imports and exports, following an appreciation of the real exchange rate.

This simple model has given several insights as to the general equilibrium implications of foreign capital inflows. Despite the differences in scale between the 1-2-3 model and the model used in this thesis, the key results emerging from the 1-2-3 model are mirrored in the results found in this thesis and are discussed below. What is of particular interest is the relationship between FDI in the tourism sector and its interaction with foreign tourism demand in its role as a non-traditional export good. This is explored later in this section.

Figure 5.3 shows output from a range of sectors in the CGE model. The full set of sectoral output results are not shown due to space constraints. Of particular interest are the output responses of the leisure sector, which is predominantly consumed by domestic tourists, and the hotel sector which is predominantly consumed by foreign tourists. Both are tourism characteristic sectors. It can be seen that there is a sharp fall in hotel sector output for the periods in which the FDI inflow occurs. In later periods, hotel sector output rises to about 1% above benchmark levels. Hence the FDI inflow with zero profit repatriation causes output to contract during the actual period of the FDI inflow. However, there is a sustained long-term output gain. This pattern of output can be explained primarily by the fact that the majority of the output of the hotel sector is consumed by foreign tourists[5], so it is highly susceptible to changes in the real exchange rate. This is a demand driven effect. Such a result may appear counterintutive, given that the foreign investment is actually arriving in the hotel sector. However, as predicted by the Devarajan, *et al.* (1990) the real exchange rate rises due to the foreign capital inflow and consequently foreign tourism declines despite the increases in capactiy associated with the FDI. This result illustrates that with high levels of FDI and relatively unchanged levels of tourism demand, FDI could potentailly harm the sector it is designed to benefit.

[5]Output purchase shares are given in Table 4.5. It can be seen that 51% of hotel sector output is consumed by foreign tourists as compared to only 32% in the leisure sector, whereas 58% of leisure sector output is consumed by domestic tourists and non-tourists, while this figure is only 39% in the hotel sector.

Figure 5.3: Impact of an Increase in FDI on Sectoral Output – CRTS Model

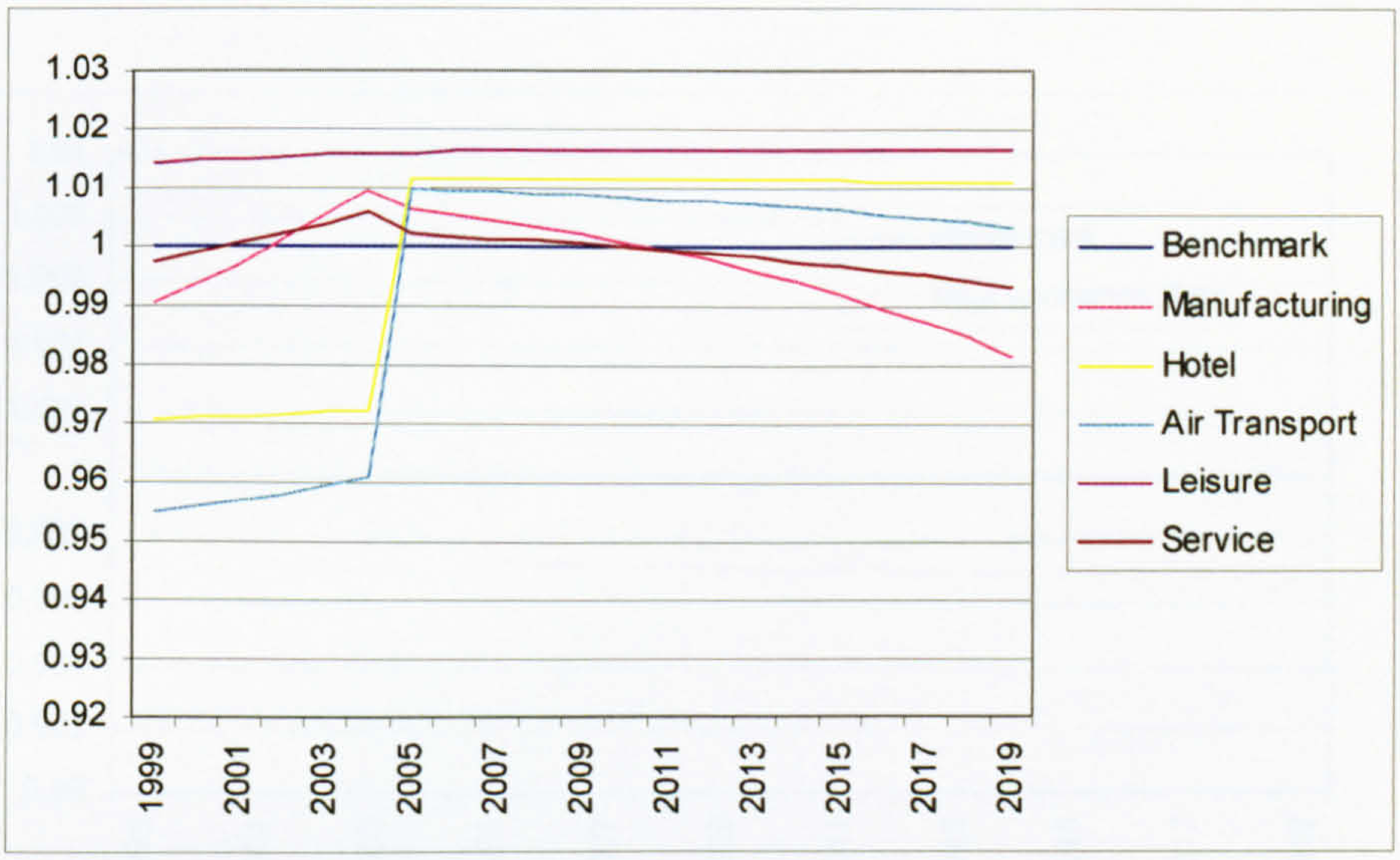
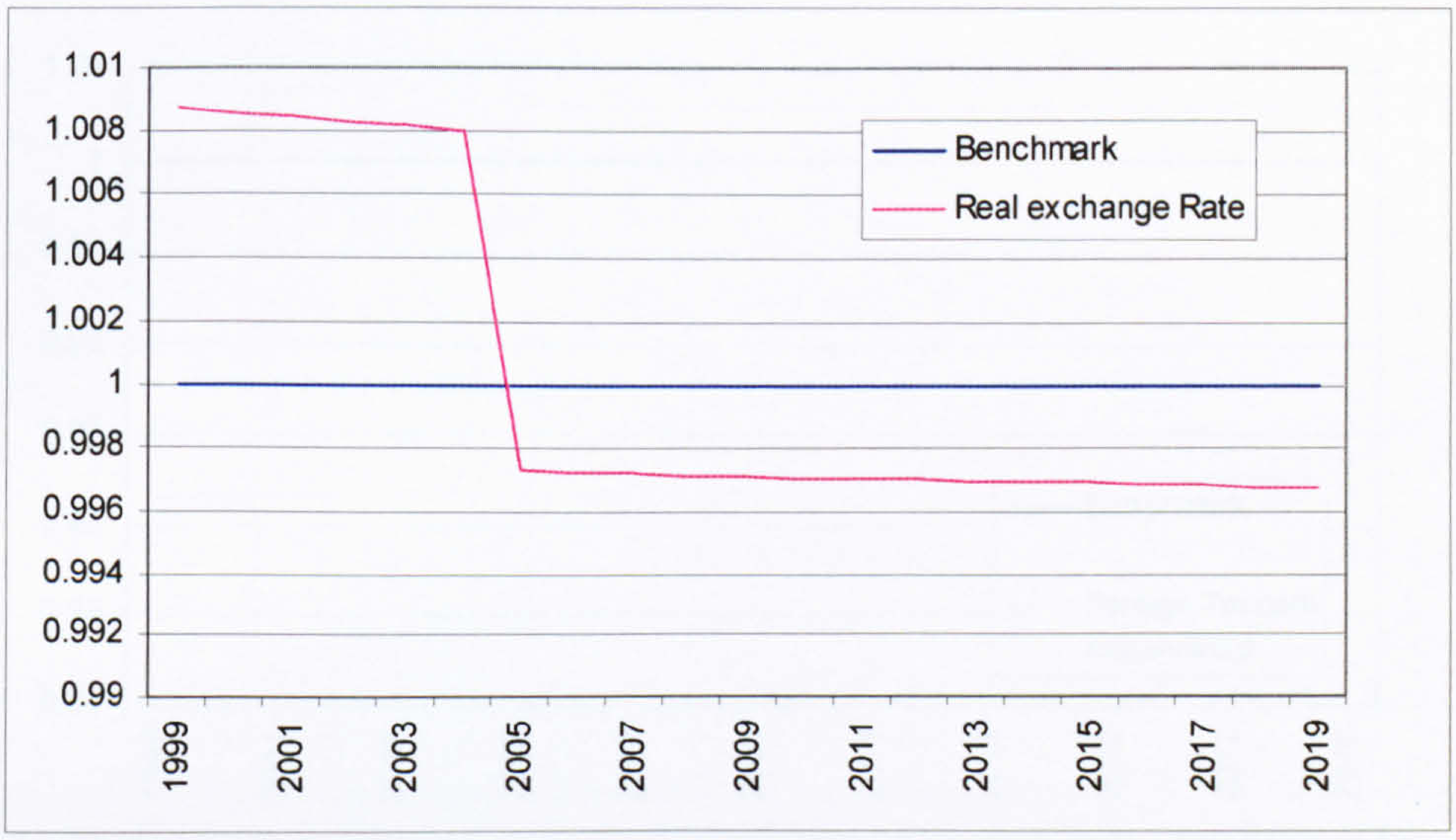


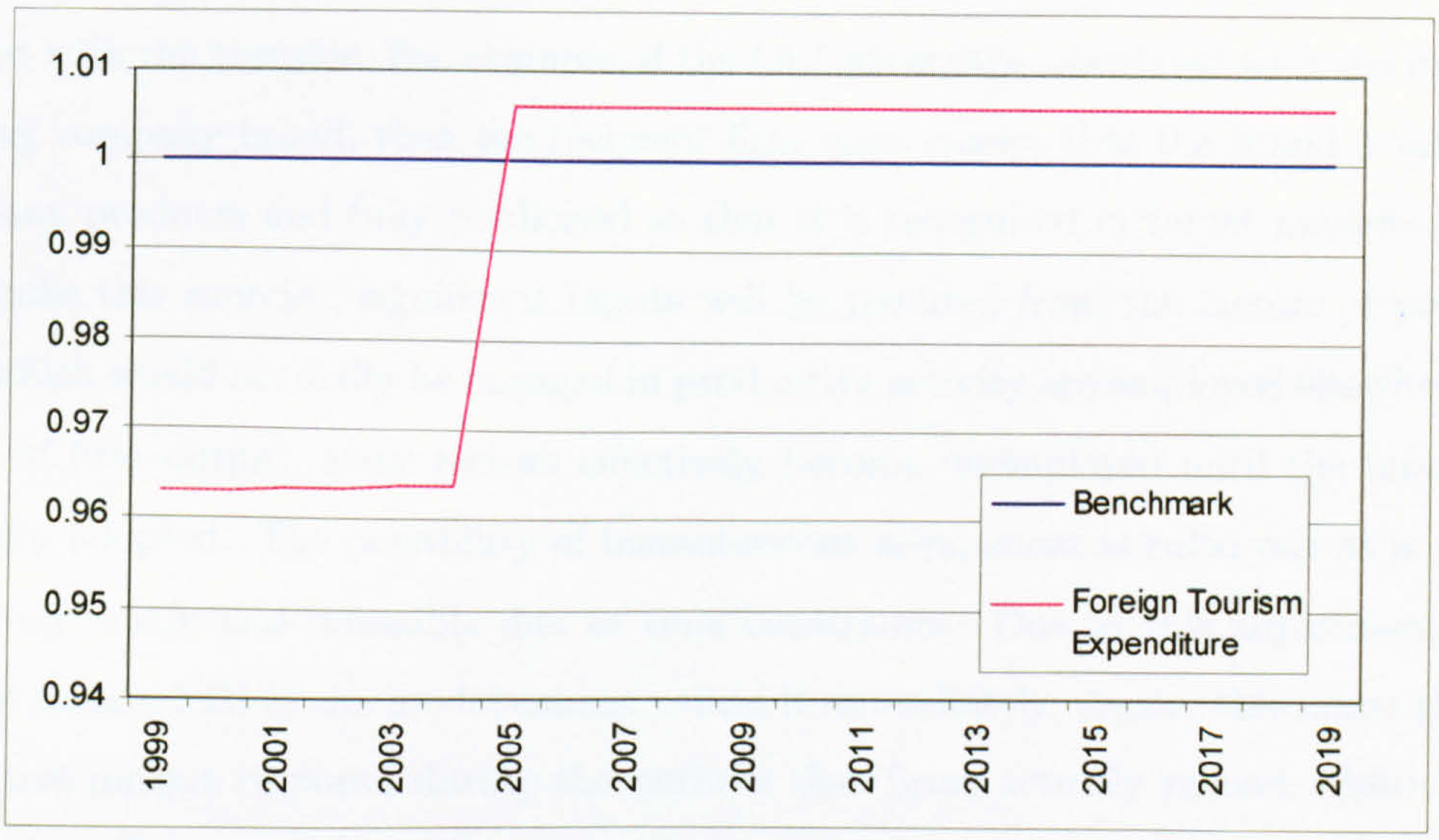
Figure 5.4 shows the change in the real exchange rate following the output shock. It can be seen that when FDI is arriving in the economy between 1999 and 2004, the real exchange rate appreciates by approximately 0.85%, subsequently stabilising at approximately 0.3% above benchmark levels. The real exchange rate is a measure of the price of domestic goods relative to foreign goods. As a result of the FDI, the domestic price level has risen due to the increased purchase of capital goods, which drives up their price. Consequently, domestic goods have become more expensive relative to foreign goods. This has short-term implications for foreign tourism demand in the Spanish economy. In the long-run the real exchange rate falls below the benchmark in later periods of the model due to declines in production costs due to the increased availability of capital. Figure 5.5 gives details of the pattern of foreign expenditure.

Figure 5.4 Impact of an Increase in FDI on the Real Exchange Rate – CRTS Model



The pattern of foreign tourism expenditure is almost the inverse of the real exchange rate. During the period in which the real exchange rate appreciates, foreign tourism expenditure declines to approximately 4% below benchmark levels. This is due to two key factors: foreign tourism has become more expensive during the FDI inflow and the price elasticity for foreign tourism is elastic. However, once the FDI inflow returns to the benchmark, the level of foreign tourism expenditure stabilises at around 0.01% above the benchmark level.

Figure 5.5: Impact of an Increase in FDI on Foreign Tourism Expenditure – CRTS Model



It has been noted that the appreciation in the real exchange rate and the consequent fall in foreign tourism expenditure drive the decline in hotel sector output during the periods in which the increased FDI inflow is imposed on the model. Hotel sector output can be seen to fall by approximately 3% during this period. However, as previously stated, the adjustment costs function also plays a key role in interpreting the results. In the Ramsey model firms are assumed to have perfect foresight. Consequently they know that the boom in FDI will only last for five years. Hence they also know that the real exchange rate will also only be at such a high level for those years, and that in later years foreign tourism will stabilize above benchmark levels as there is now more capacity in the sector due to the increased investment. Consequently, firms that are highly dependent on foreign tourism will restrict output during the period of the FDI inflow and devote resources to investment so as to be able to take full advantage of the increase in foreign tourism expenditure in later periods.

It is important to note that whether firms receive additional investment, either domestically from other sectors or via FDI, they are subject to an adjustment cost[6]. The rationale for this

[6]A discussion of the adjustment cost mechanism is given in section 4.4.16.

is as follows: in order to successfully incorporate an innovation transfer associated with FDI or portfolio investment firms, must re-organise their factors of production. If the production methods of the firm remain unchanged, then it is assumed that firms cannot utilise the benefits associated with the transfer. For example, if the OLI advantage associated with the investment is a strong company brand, then the recipient firm must ensure that the brand is adopted on all company products and fully publicised so that it is recognised in target markets. In order to undertake this exercise, significant inputs will be required from the factors of production. Factors which would normally be engaged in productive activity are employed elsewhere. Thus, in terms of firm output, some factors effectively become unemployed until the innovation is successfully adopted. The possibility of instantaneous adjustment is ruled out as it would be prohibitively costly and infeasible due to time constraints. Due to this adjustment process, firms that receive FDI in the model cannot utilize it immediately. Again, this limits the extent of a positive output response during the periods that firms actually receive additional FDI, although this effect is much smaller.

So a combination of three effects: the fall in foreign tourism demand, the restricting output and increase in investment until the real exchange rate stabilises, and the adjustment costs of FDI mean that the output of the hotel sector contracts in the early periods of the model. Although, it should be clear that the demand-side effects dominate this result. The supply-response from hotel firms is minimal. A similar effect is observed in the air transport sector which is also heavily reliant on foreign tourism demand. However, Figure 5.3 also shows that the output of the leisure sector expands in all time periods. The leisure sector also receives FDI as part of the counterfactual and is also a tourism characteristic sector. However, the observed output effect in this sector is quite different. It has already been noted that leisure sector output is much more reliant on domestic tourism consumption which accounts for 45.8% of final demand[7]. Therefore, its output is not as susceptible to fluctuations in the real exchange rate. The increase in FDI in this sector means that the sector can expand output and produce goods more cheaply as capital costs have fallen. Therefore, domestic tourism becomes cheaper following the FDI shock and demand increases.

Two examples of sectors which contract as a result of the FDI shock are the service sector

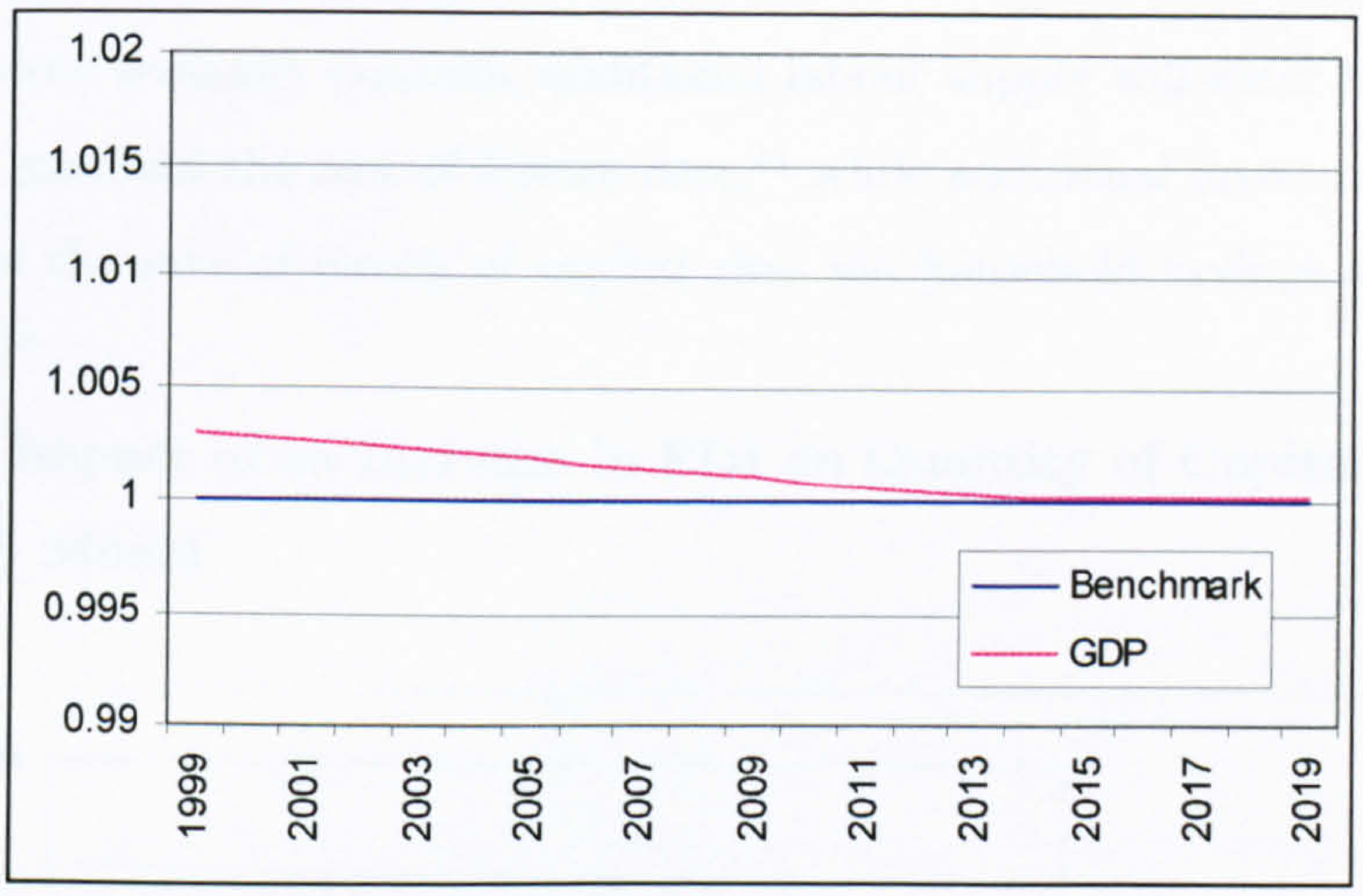
[7]See table 4.5 for details.

and the manufacturing sector. Both sectors see output decline as a result of the FDI inflow. This is also shown in Figure 5.3. Of particular interest is the kinked shape of the output trajectories resulting from the FDI shocks in these sectors. This is because of the nature of the reduction in output associated with those sectors that are heavily reliant on foreign tourism (for example, the hotel and air transport sectors) where output falls following the FDI shock. Due to the reduction in output in these sectors, factors will flow out of these sectors into the wider economy. This benefits those sectors that are not direct recipients of the additional FDI specified in the counterfactual and allows them to increase output. However, when the real exchange rate appreciation subsides and those FDI recipient sectors that are reliant on foreign tourism are able to increase output, then output will again contract in the non-FDI recipient sectors as resources are drawn back into the expanding sectors.

In the neoclassical model of the type devised by Solow (1956), the impact of FDI on long-run growth is limited. The conventional neoclassical model states that long-run growth can only occur via technological progress and/or growth in the population/labour force. The impact of FDI on output would only be observed in the short-term; long-term gains do not occur due to diminishing returns to capital inputs, as the recipient economy returns to the steady state. A similar effect is observed in this simulation. A particular feature of this simulation is that there is no productivity gain associated with FDI. In endogenous growth models (as we shall see later in this chapter), productivity gains associated with FDI drive economic growth[8]. Figure 5.6 shows that the overall output effect of the FDI inflow is positive. There is an initial 0.04% increase in total GDP as a result of the FDI shock. This is due to the fact that the increased capital in the economy allows firms to increase output. However, it can be seen that in the long-run, GDP returns to benchmark levels due to the diminishing returns to investment.

[8]However, this particular simulation does not show these features, for reasons given in Section 5.2.

Figure 5.6: Impact of an Increase in FDI on GDP – CRTS Model



Figures 5.7 and 5.8 show the impact of the two counterfactuals on the use of capital and labour in the production process. It can be seen that in sectors where output increases, the quantity of capital and labour used increases, while where output falls, in the manufacturing sector for instance, use of labour and capital fall. As previously noted, the Spanish economy is predominantly labour abundant[9]. As the sectors that receive additional FDI in the counterfactual seek to expand, they will need more factor resources and will try to attract more labour and capital. This is the *resource movement* effect[10], as described by Corden and Neary (1982). In order to attract these factor resources, the expanding sectors must bid up factor returns in order to induce movement of the labour and capital. As output expands in the FDI recipient sectors, the marginal value product of factor resources increases and factor returns are bid up until they equate with the marginal value product.

The magnitude of the factor movements are affected by a number of phenomena. These are explained as follows. The importance of factor intensity and abundance has already been noted and the fact that the tourism characteristic sectors are labour intensive. Both sets of factors have relative rigidities and adjustment functions. It is not easy to say which factor is

[9]It should be noted that sectors vary in their factor intensities and some sectors are capital intensive. These issues have been discussed in Chapter 4.

[10]Quantity values of labour and capital in value added are shown throughout thesis thesis becuase we are interested in observing the influence of the *resource movement* effect on the structure of the economy.

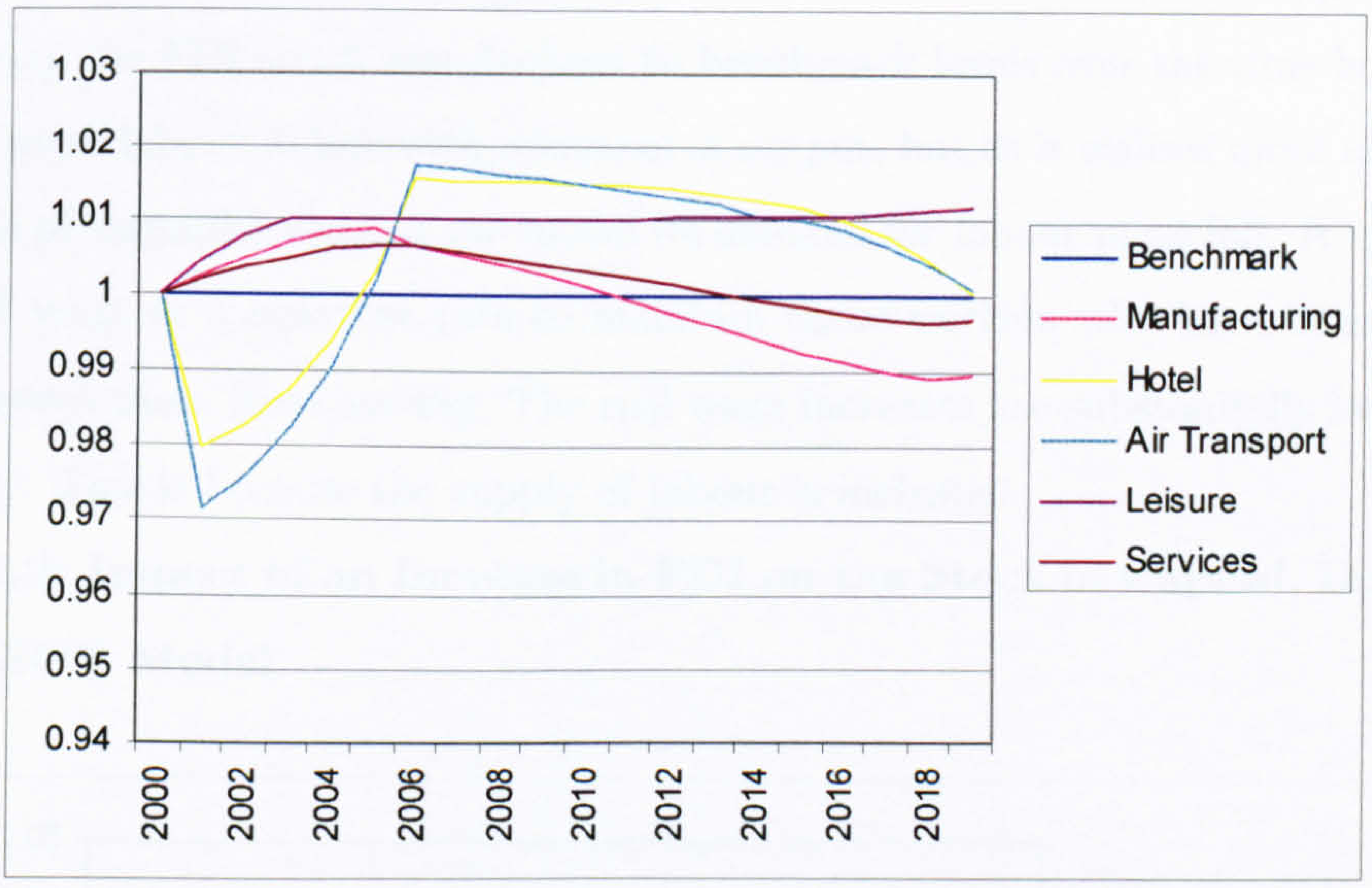
the most rigid in its adjustment as the adjustment processes are designed to be quite different, reflecting the different nature of the factor resources and the way in which they are employed in the economy. As the economy expands, additional labour supply will enter the labour market as the real wage rises and the cost of leisure rises,[11] while additional investment will enter the capital market as the rate of return of capital rises via household savings and endogenously determined FDI.[12]

Figure 5.7: Impact of an Increase in FDI on Quantity of Capital Used in Value Added – CRTS Model

[11] Leisure time, not the output of the 'leisure sector'.

[12] In addition to what is specified in the FDI counterfactual.

Figure 5.8: Impact of an Increase in FDI on Quantity of Labour Used in Value Added – CRTS Model



Figures 5.7 and 5.8 show that the volume of capital used by those sectors where output rises more rapidly than the use of labour. This is becuase firms endowments of capital have increased so more of it is used in the production process. Take the hotel sector for instance, the quantity of capital rises by approximately 2.7% per annum above benchmark in the periods following the FDI inflow, while the quantity of labour peaks at approximately 1.6% in 2005.

Both the costs of capital and labour rise in the simulation. The reasons for increased capital costs have already been discussed. The FDI recipient sectors are predominantly labour intensive; when they expand they will demand proportionally more labour than capital. A certain degree of capital labour substitution will take place. However, the increased demand bids up the real wage the costs of labour increase. The increases in the real wage are shown in Figure 5.11. In the leisure sector for instance, the real wage rises by 4.1% per annum while in the hotel sector it rises by 3.8% per annum. The real wage even rises in sectors where output contracts, such as the manufacturing and services sectors. The reason for this is that these sectors bid up wages in order to retain workers and prevent them from either working in another sector or leaving the labour market altogether.

The rise in the real wage induces new workers to enter the labour market as the opportunity cost of not working has become more expensive. The increase in labour supply as measured by the reduction in leisure is shown in Figure 5.11. It can be seen that labour supply increases by 0.03% following the FDI shock and declines to benchmark levels over the time horizon. Firms will demand more labour in line with increases in output, but as it utilises more units of labour from the pool of unemployment in the model its demand for labour must fall. It must however, keep the real wage at a constant rate to maintain those workers who have been enticed into work and prevent them from leaving. The real wage increases are substantially larger than the labour supply. This is because the supply of labour is inelastic.

Figure 5.9: Impact of an Increase in FDI on the Stock of Capital, Domestic and Foreign - CRTS Model

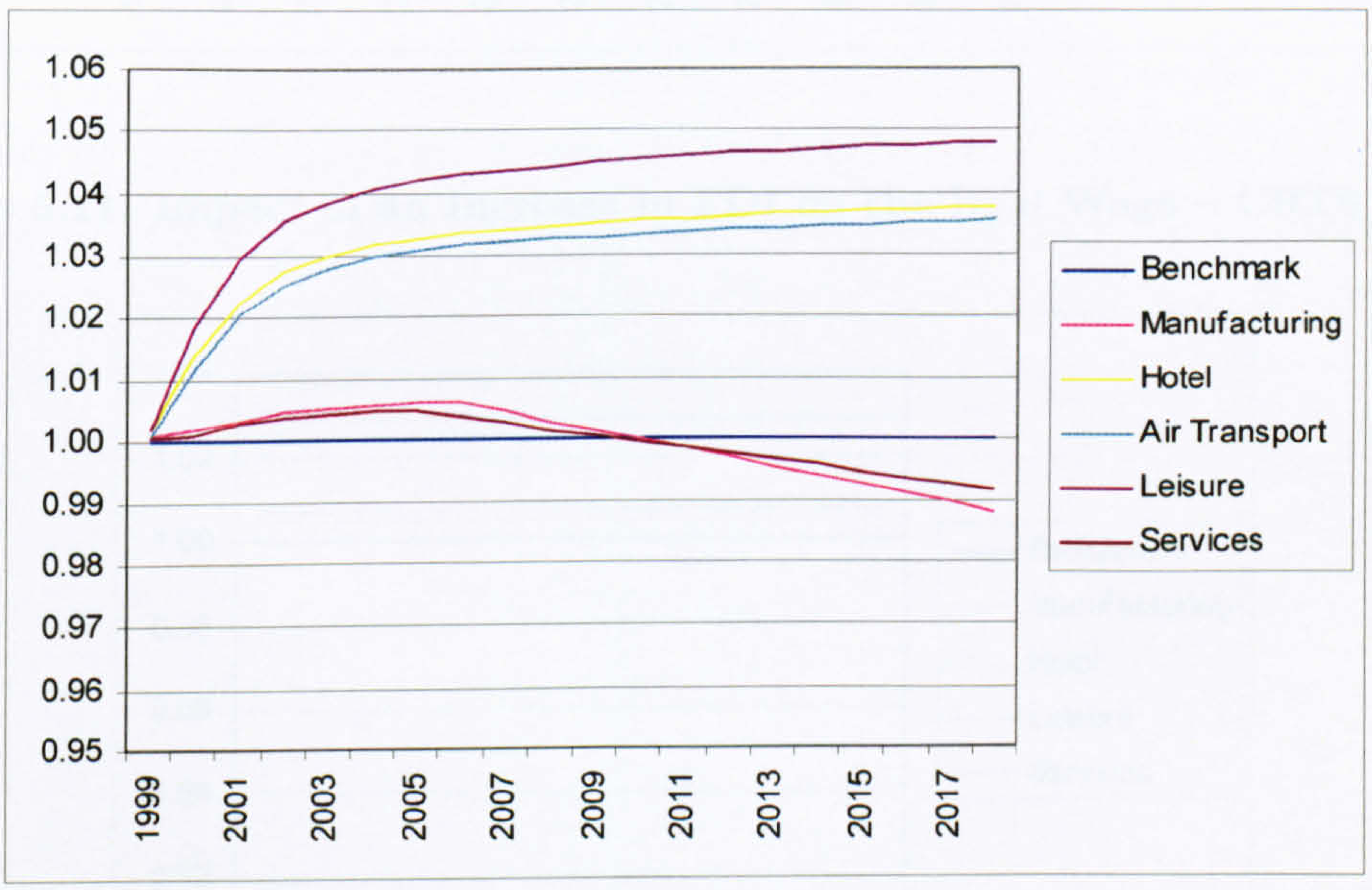
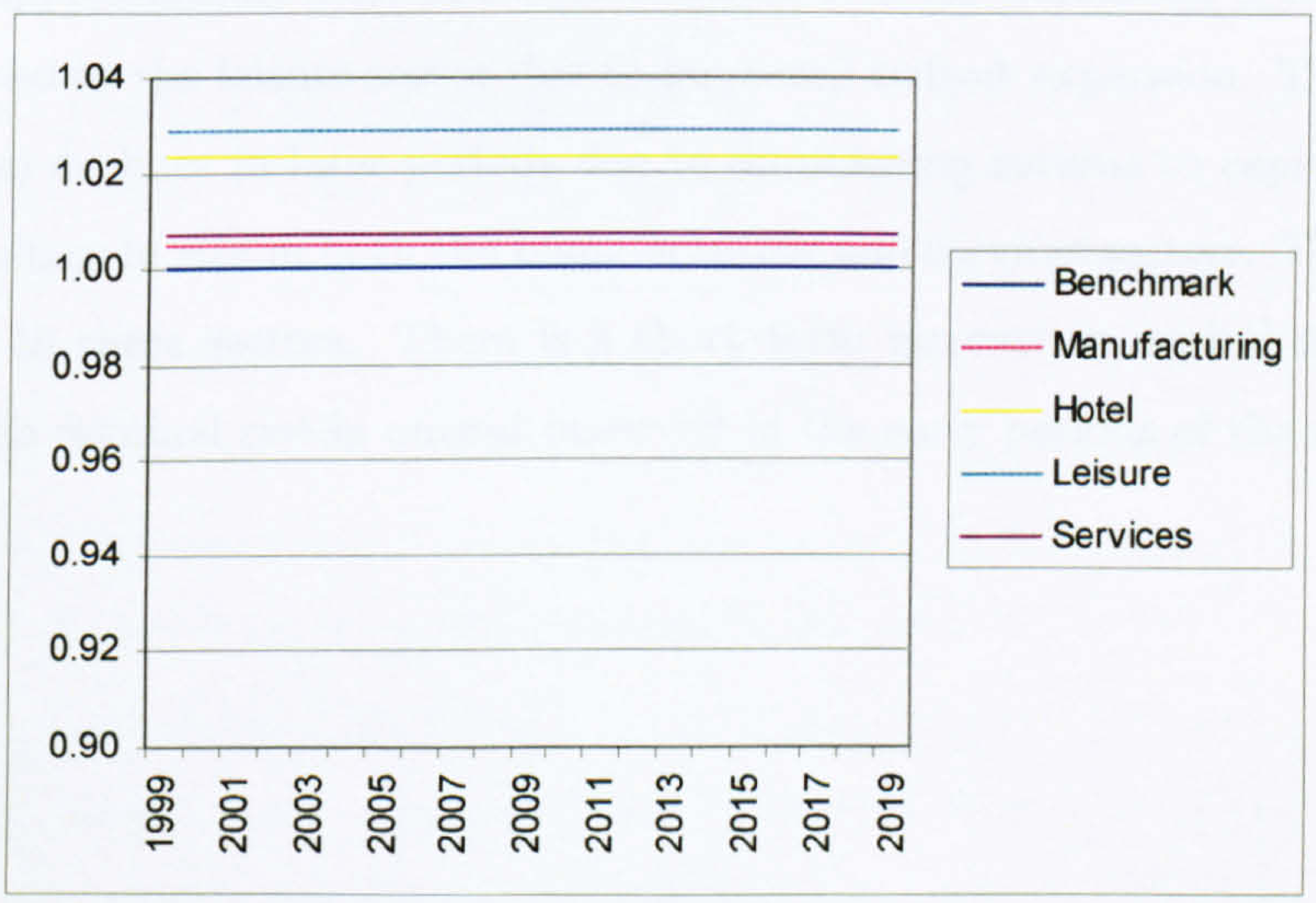


Figure 5.10: Impact of an Increase in FDI on the Earnings per Unit of Capital, Domestic and Foreign - CRTS Model

Figure 5.11: Impact of an Increase in FDI on the Real Wage – CRTS Model

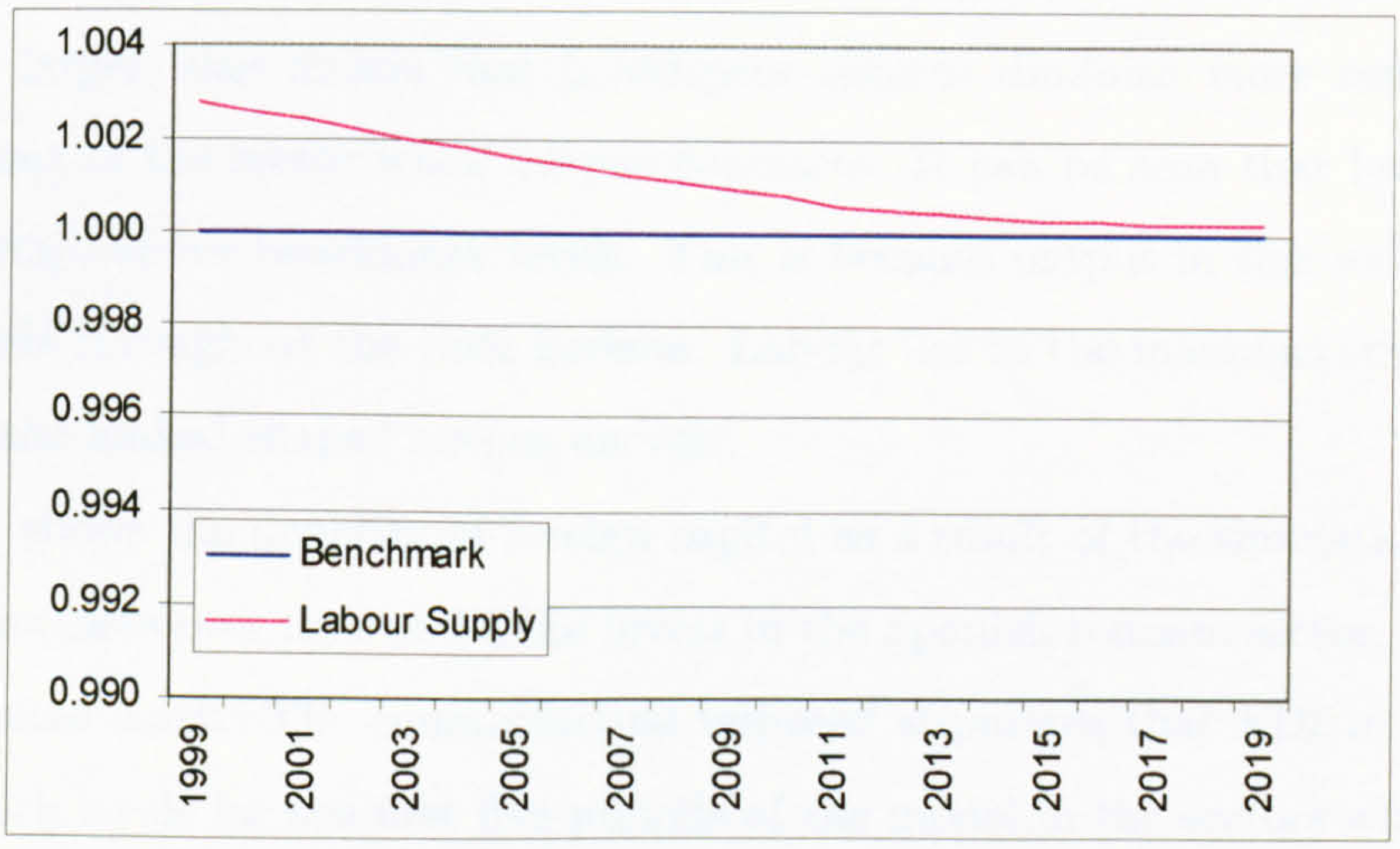


The stock of labour is fixed in the model, households can choose to reduce leisure time and enter the labour market, but the population is assumed constant. However, the skill base of the labour force can accumulate and is dictated by the equations given in chapter 4, section

4.4.10. Conversely, the stock of capital can increase[13]. This means that the shapes of the real wage curve and the real returns to capital curve are different. It can be seen in Figures 5.10 and 5.11 that the real wage curves are horizontal, while the capital earnings curve is downward and then upward sloping. The reason for this relates to the accumulation of the capital stock. The supply of capital has increased due to the inflow of FDI this drives up the cost of capital goods and in turn means that earnings per unit will fall. The rate of return to capital is set exogenously at 5%. Rises in costs mean that actual earnings are somewhat lower and consequently they fall below benchmark levels. However, as output expands following the FDI shock, more capital inputs will be demanded and earnings per unit of capital will increase as the excess supply is absorbed. As there is increased supply of capital in the market following the FDI shock, the supply of new investment declines until the capital is absorbed and earnings return to benchmark levels. This means that the growth in the capital stock slows significantly following rapid growth during the periods of the FDI inflow. The capital stock is shown to be upward sloping, due to the output expansion in the model. However, growth subsides after the FDI inflow has returned to benchmark levels. This can be observed in Figure 5.9. The capital stock grows by approximately 3.8% in the hotel sector over the simulation horizon, while larger growth is observed in the leisure sector due to increased output expansion. The growth of the capital stock also declines in later periods due to diminishing returns to capital. Further, the capital stock declines in size in both the manufacturing and services sectors. This reflects lower levels of output in these sectors. There is a short-term increase in capital earnings in these sectors due to the nominal rise in output observed in the early periods of the model.

[13]In the benchmark, the stock of capital will grow according to the long-run steady state growth rate as specified in equation 4.67. The counterfactual will cause deviations in this growth rate. Both capital and the skill base will depreciate at the exogenously calibrated rate δ.

Figure 5.12: Impact of an Increase in FDI on Labour Supply – CRTS Model



The pattern of labour accumulation is somewhat different, which affects its rate of return. In the same way as capital, the returns to labour must rise in order to attract more labour into the sector, but the stock of labour does not accumulate. The contribution of labour to value added will diminish as more labour arrives in the expanding sector. However, as has already been noted the stock of labour is fixed in absolute terms. It is felt that this assumption is realistic because, as noted in chapter 2, the working population in Spain is actually decreasing and there is a prospective pensions crisis and an increasing dependency ratio. The supply of labour can, of course, fluctuate with variations in the real wage leading to reductions in unemployment. If firms want to attract enough labour to expand output to meet the increased demand they must fix the real wage at the required level; wages cannot be lowered as workers will leave the sector. This means that the real wage curve is horizontal in Figure 5.12.

Following the increase in FDI, there is more capital in the hotel sector and, as output declines, the firm sheds labour resources. This is shown in Figure 5.8, where the quantity of labour used by the hotel sector declines significantly following the FDI shock. In 2001, the quantity of labour used in the hotel sector falls by approximately 2%. It only recovers above benchmark levels when output expands in the hotel sector after the FDI shock has ended. When the FDI inflow stops and output expands, labour is drawn back into the sector to facilitate the increase in output.

A similar effect to the hotel sector is observed in the air transport sector where the output effect is stronger. Larger proportional amounts of FDI accrue in this sector as inflows are proportionally larger, this means that investment returns diminish more rapidly and more labour moves out of the sector when output contracts. It can be seen that labour use in the leisure sector stays above benchmark levels. This is because output in this sector stays above benchmark levels throughout the time horizon. Labour use in the manufacturing and services sectors mirror the kinked shaped output curves.

Figure 5.14 shows the quantity of foreign capital as a result of the simulation. The foreign capital stock increases over time as MNEs invest in the Spanish tourism sector. However, clear sectoral differences exist. The counterfactual imposed stipulates that FDI increases by 10% above benchmark levels for the first five periods of the model in the sectors where the foreign capital stock has been estimated. However, it can be seen that the net FDI position in the leisure sector is significantly higher than in the hotel sector. The foreign capital stock stabilises at a level of approximately 2% above the benchmark in the leisure sector as opposed to only 1% in the hotel sector. A key factor driving this result is the additional earnings that accrue to the leisure sector. This particular simulation assumes zero profit repatriation, so all earnings from FDI are reinvested in the Spanish economy. It is shown in Figure 5.3 that output expansion is considerably larger in the leisure sector than in the hotel sector. Therefore the earnings that are attributed to foreign capital will be larger and more will be reinvested in the next period.

Figure 5.13: Impact of an Increase in FDI on Quantity of FDI or Net FDI position, Net of Depreciation – CRTS Model

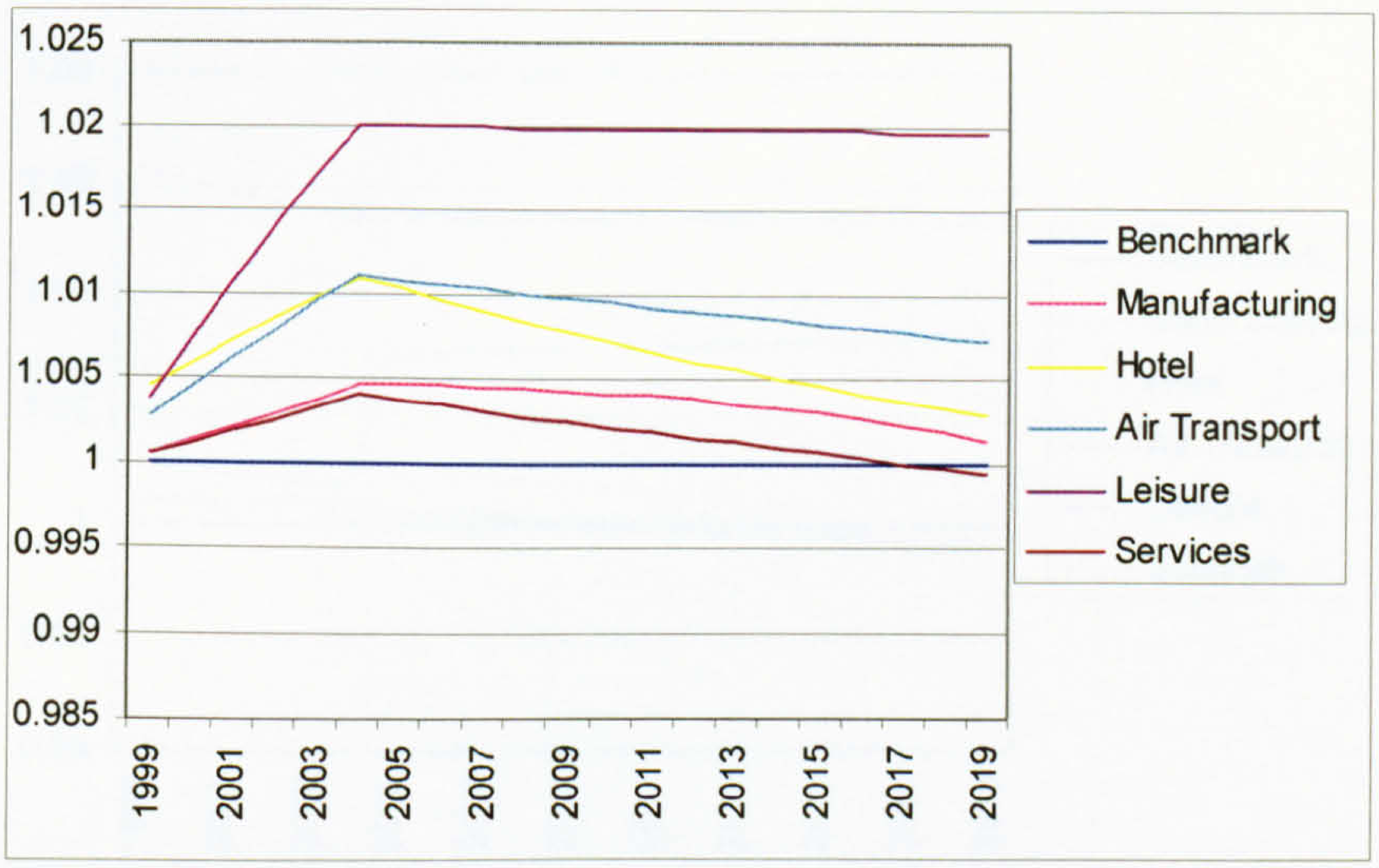


Figure 5.14 shows the earnings attributable to foreign capital in value added. The earnings from foreign capital increase by approximately 5.5% - 6% in the leisure sector. While smaller FDI earnings are observed in the hotel sector (2-4%). The pattern of FDI earnings in the hotel sector mimics that of the terms of trade and is explained by the same effects that drive output. The earnings attributable to foreign capital expand as the net FDI position increases and the ratio of foreign to domestic capital increases.

Figure 5.14: Impact of an Increase in FDI on the Earnings Attributable to Foreign Capital – CRTS Model

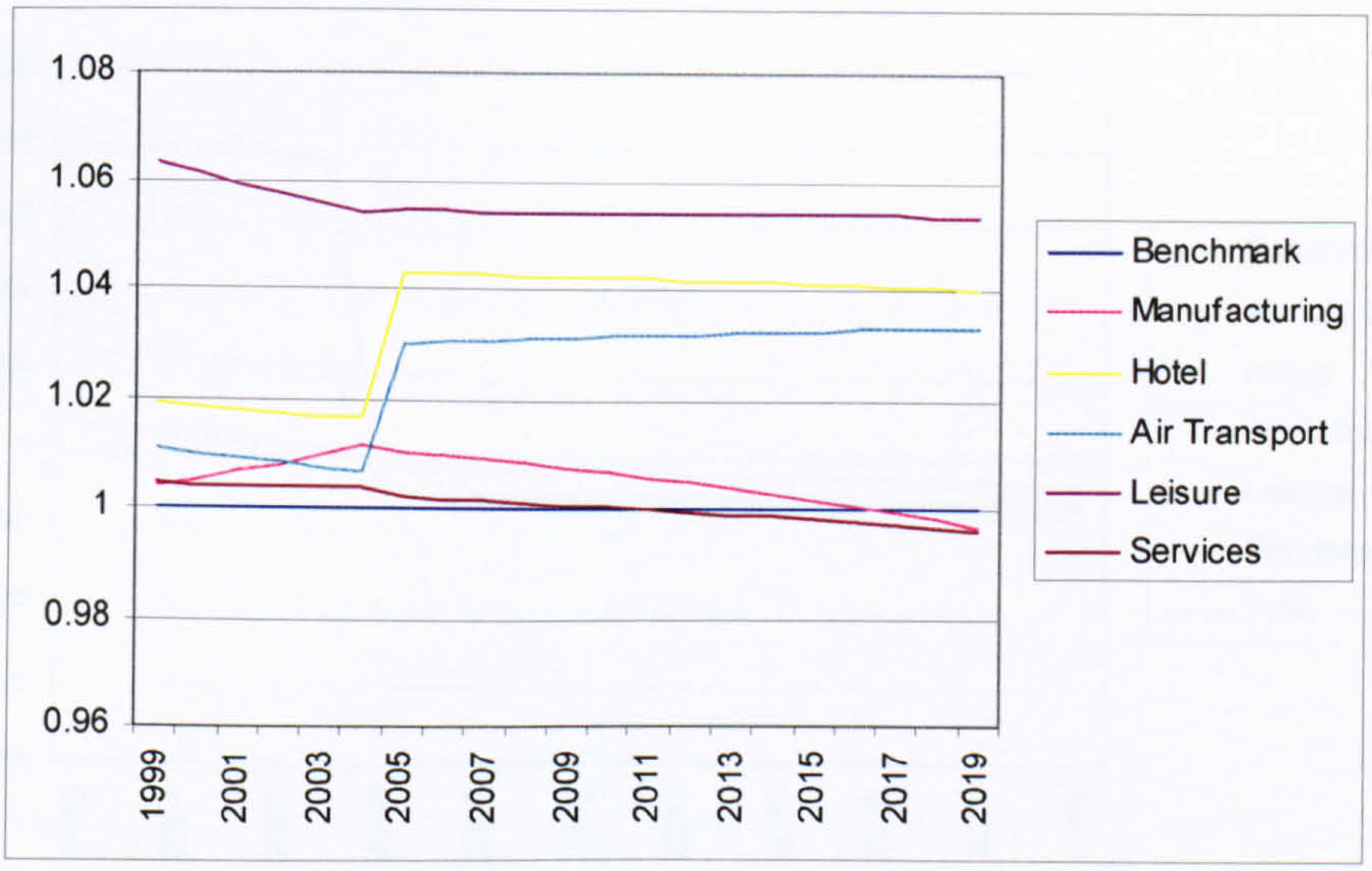


Figure 5.15 shows the changes in the domestic price level. As previously noted, the domestic price level rises above benchmark levels due to the increased demand for capital goods driving up asset prices. The sectors which expand the most due to the acquisition of assets will experience the largest relative price changes. It can be seen that the leisure sector experiences the largest price rise of approximately 5.5% per annum following the 10% rise in FDI. It can be seen that in all sectors that receive the additional FDI, the domestic price level rises significantly during the periods in which the additional FDI arrives. However, the increase in FDI does not account for all of the appreciation in the domestic price level. The increases in the real wage and consequent increases in household and domestic tourism consumption also contribute to the increases. Following the inflow of FDI the domestic price level falls below benchmark levels in all sectors as production costs are now cheaper due to the increased availability of capital. This is because the increased demand for capital goods has now subsided and the capital goods are fully utilised. This is consistent with the explanation of Devarajan *et al.* (1990).

Figure 5.15: Impact of an Increase in FDI on the Domestic Price Level – CRTS Model

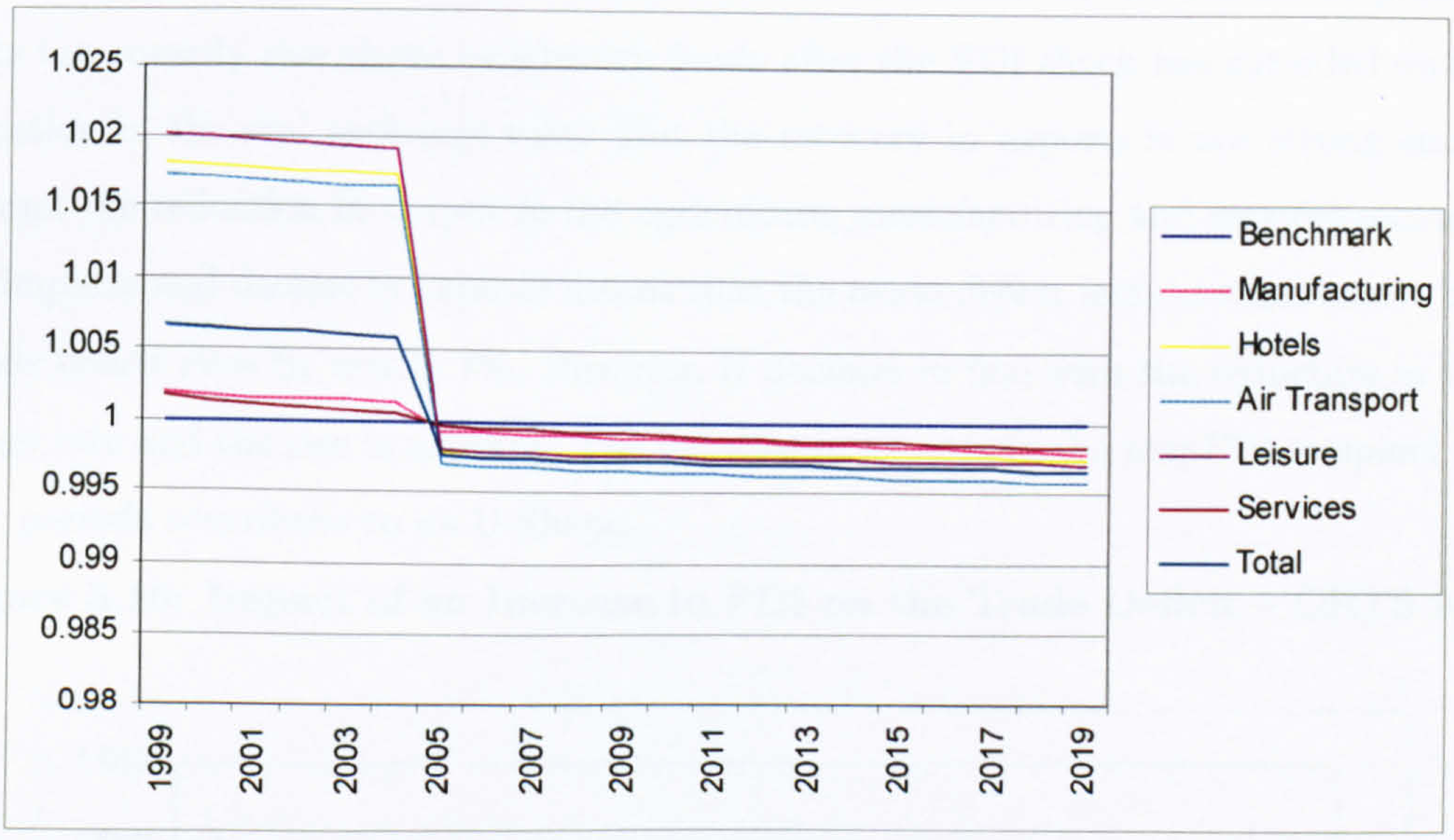
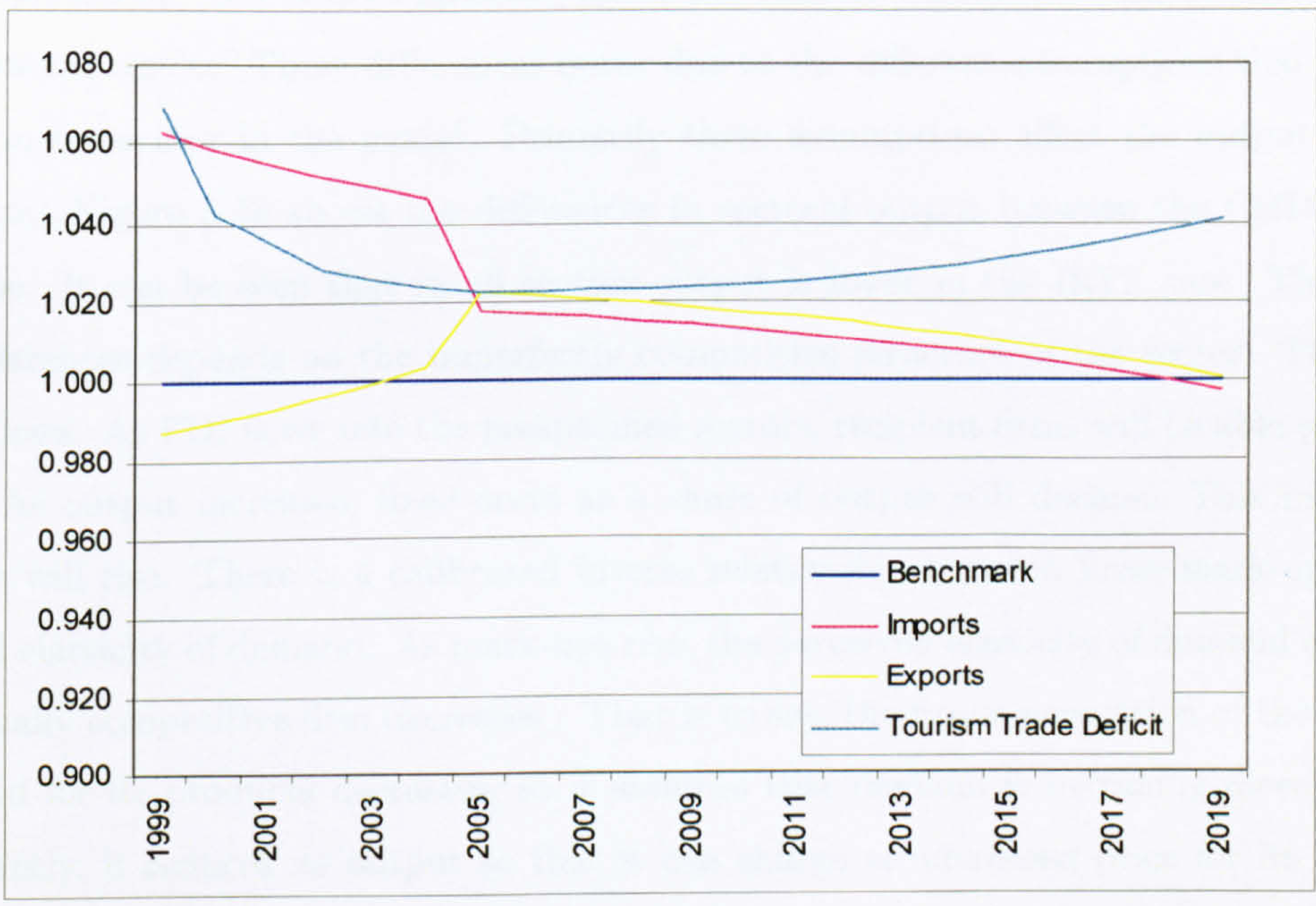


Figure 5.16 shows the impact of the FDI shock on the trade deficit. As predicted by the 1-2-3 model, imports rise and exports fall in the short-term. This is due to the increase in the real exchange rate shown in Figure 5.4. The pattern of changes in imports and exports are dictated by the changes in the real exchange rate and this is evident by their kinked shape. Changes in imports and exports are substantial relative to changes in the real exchange rate. This is attributed to a number of reasons. Firstly, the Armington elasticities are greater than 1 in all sectors. This means that imports and domestically produced goods are to some extent, substitutes. Therefore an appreciation in the real exchange rate will lead to a disproportionate increase in import consumption. Secondly, the reduction in output in key import competing sectors such as manufacturing means that domestic consumers will be forced to switch to import consumption. There is also an *income effect*, household incomes rise as a result of the FDI inflow, some of this will be spent on import consumption. Less influential, but still interesting concurrent effects include the increased import demand attributed to domestic household and foreign tourism consumption and the fact that the expanding sectors use imported intermediate goods. The tourism characteristic sectors in the model do not generally export goods or

services in the traditional sense. The majority of exports are comprised from the output of the agriculture, manufacturing and services sectors. The output of these sectors is seen contract in the simulation due to the nature of the resource movement of the factors of production. Exports temporarily rise above benchmark levels after the FDI shock has subsided due to the depreciation in the real exchange rate. But the recovery in exports is not strong enough to counteract the reduction in output in the agriculture, manufacturing and services sectors. The rise in imports and decline in exports means that the trade deficit increases increases. Initially the trade deficit rises by nearly 7%. However, it declines in line with the reduction in the real exchange rate and the rise in exports. The increase in exports in the non-FDI recipient sectors in later periods contribute to its U-Shape.

Figure 5.16: Impact of an Increase in FDI on the Trade Deficit – CRTS Model



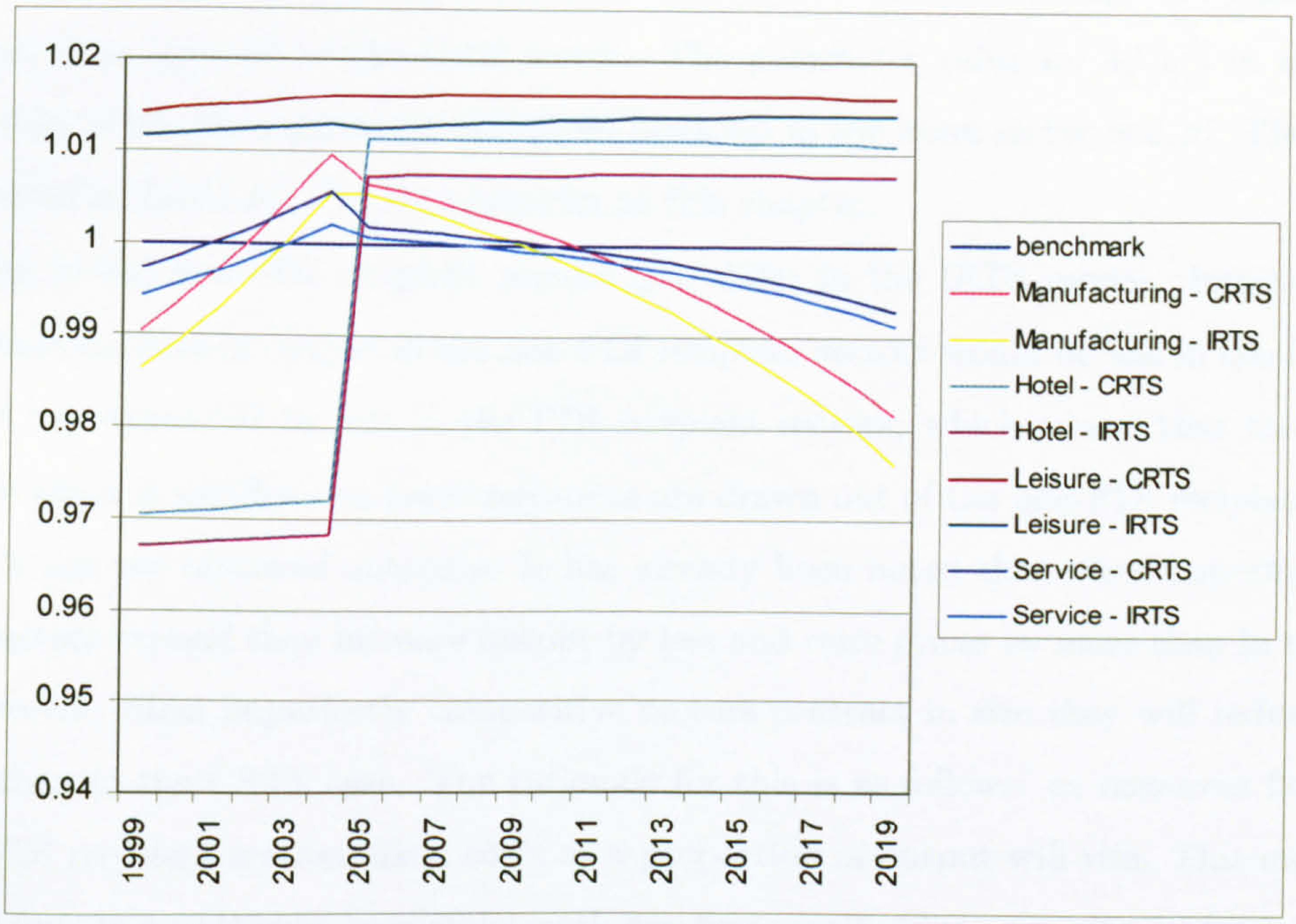
The model in this section has been based on the assumption of constant returns to scale (CRTS) and perfect competition. While such assumptions allow valuable insights to be inferred from the model results, and can give a good approximation of economic behaviour, not even the most competitive economy can accurately be modelled in this way. It is important to compare the results with a model specified with increasing returns to scale (IRTS) and imperfect competition. An IRTS specification has been chosen and described in Chapters 3 and 4. This next section presents the results from this model.

5.4.3 Results from the IRTS Model

The same simulation as defined in section 5.5.1 is undertaken, this time using a version of the Spain model with increasing returns to scale and imperfect competition specified. We refer to this model as the IRTS model. The results are compared with those of the CRTS model presented in section 5.4.2 and are presented in Figures 5.17-5.24.

Observable differences between the CRTS models and IRTS models do occur. The imposition of the IRTS structure does not change the fundamental nature of the results or the main policy implications. But it does however, affect the relative magnitudes, particularly in terms of the sectoral results. These differences occur due to the different assumptions that are made about firm behaviour in the model. Primarily these assumptions affect the output decisions of the firm. Figure 5.18 shows the differences in sectoral output between the CRTS and the IRTS case. It can be seen that in all sectors output is lower in the IRTS case. The scale of these differences depends on the imperfectly competitive structure of the sector. The drivers are as follows. As FDI flows into the prespecified sectors, recipient firms will be able to increase output. As output increases, fixed costs as a share of output will decline. This means that mark-ups will rise. There is a calibrated inverse relationship between firms mark-ups and its perceived elasticity of demand. As mark-ups rise, the perceived elasticity of demand of the monopolistically competitive firm decreases . That is to say, the firm's perception of the elasticity of demand for its products decreases, so it assumes that demand is becoming more inelastic. Consequently, it reduces its output so that it can charge an increased price for its products, thus making more profit per unit of output. So in the IRTS scenario, prices rise by more in the FDI recipient sectors. Due to the increased prices in this scenario, demand is lower and increases in output are smaller. This result can quite clearly be observed in the leisure sector where output is approximately 0.18% lower than in the CRTS case. Otherwise the drivers of the output expansion are the same in the leisure sector. The FDI inflow allows the leisure sector to increase output and this leads to increased consumption by domestic residents, domestic tourists and foreign tourists.

Figure 5.17 Impact of an Increase in FDI on Sectoral Output – CRTS, IRTS Comparision



A similar effect is observed in the hotel sector. The magnitude and drivers of the result differ only slightly. In the later periods of the model, when output rises following the FDI inflow in the CRTS model, a smaller output increase is again observed in the IRTS case due to firms exercising market power and raising prices by more than the CRTS case. Output is also lower in the IRTS model during the periods when the additional FDI inflow is occurring in the counterfactual. As in the CRTS case, output declines due to the impact of the real exchange rate appreciation on foreign tourism demand and the firm reorganising resources away from productive activity to accommodate the innovation transfer associated with the FDI. However, the monopolistically competitive firm under the assumption of Cournot imperfect competition has the power to set output. It restricts output with the aim of being able to charge a higher price for it. This characteristic is still apparent when foreign tourism demand has fallen in the sector and the firm is diverting resources away from output for re-organisation purposes.

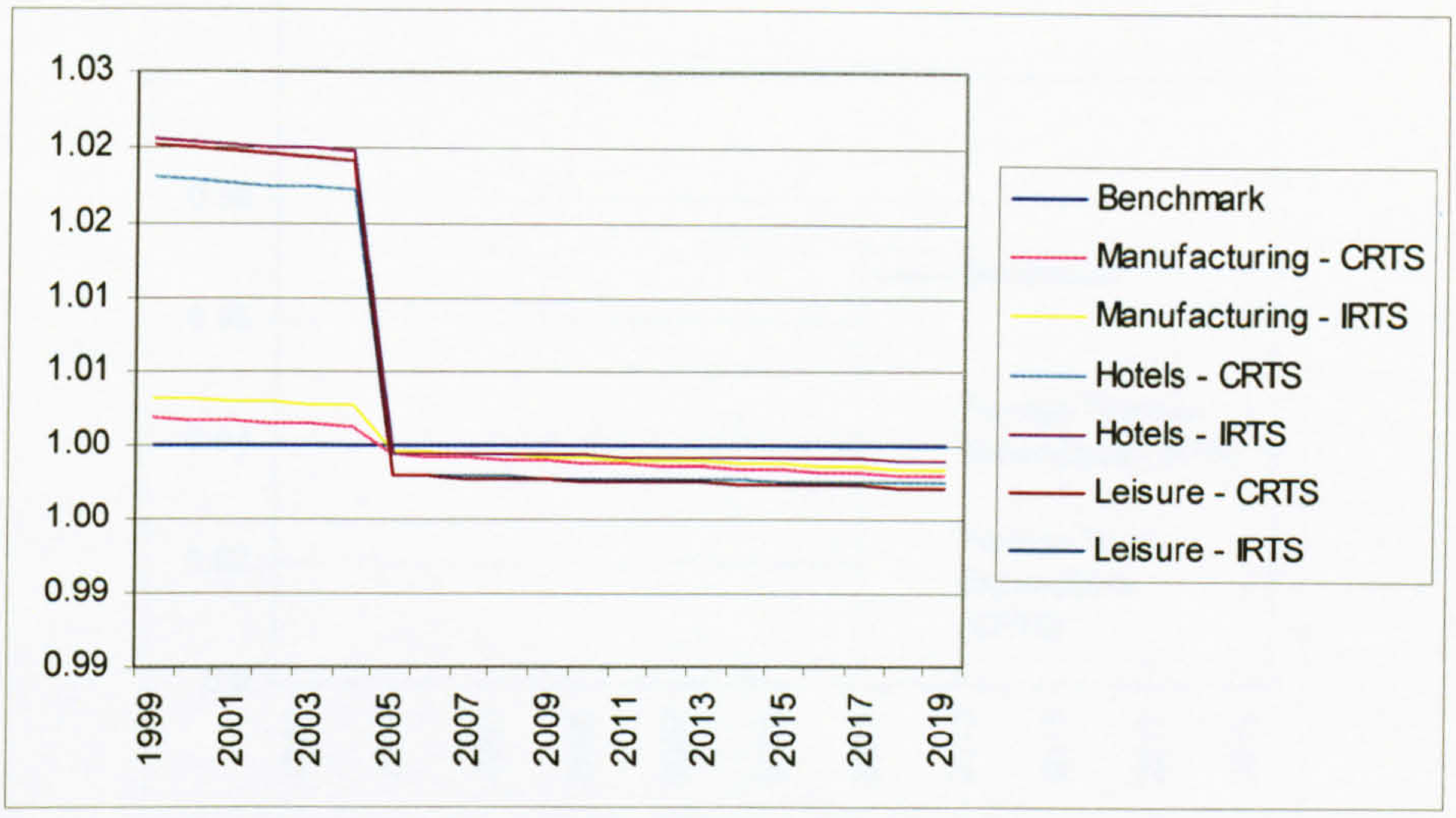
Output is approximately 0.16% lower in each period in the hotel sector, whereas it is observed that output is approximately 0.18% lower in the leisure sector. Therefore, it is inferred that the IRTS effects are marginally stronger in the leisure sector. Closer inspection of the model's calibrated parameter values reveals that the calibrated mark-ups are higher in the leisure sector as opposed to the hotel sector. The parameter value for $1/\left|\varepsilon_i^d\right|$ in the leisure sector is 0.31, while the equivalent calibrated mark-up in the hotel sector is 0.26. These values are presented in Table A5.2 in the appendix to this chapter.

Results in the non-FDI recipient sectors also differ in the IRTS model. Intuition would indicate that declines in output in the non-FDI recipient sectors would be less in the IRTS case as output has expanded by less in the FDI recipient sectors, which means that the resource movement effect is smaller and fewer resources are drawn out of the non-FDI recipient sectors. But this is not the observed outcome. It has already been noted that when imperfectly competitive sectors expand they increase output by less and raise prices by more than in the CRTS case. However, when imperfectly competitive sectors contract in size they will reduce output by more than in the CRTS case. The rationale for this is as follows: as resources flow out of the non-FDI recipient sectors, fixed costs as a proportion of output will rise. This means that mark-ups fall. In an attempt to sustain mark-ups firms, will reduce output still further so that they can charge a higher price given the level of demand.

Two key second round effects also contribute to the lower levels of output in the non-FDI recipient sectors. Firstly, as output expansion in the FDI recipient sectors is smaller in the IRTS case and output contraction is larger in the non-FDI recipient sectors, the overall output level is lower in the IRTS case. This means that the income effects associated with the FDI expansion are smaller, so second round increases in aggregate demand and hence consumption and output are smaller than the CRTS case. Secondly, downstream demand effects for intermediates from the non-FDI recipient sectors will be smaller in the IRTS case as expansion in the upstream FDI recipient sectors is smaller.

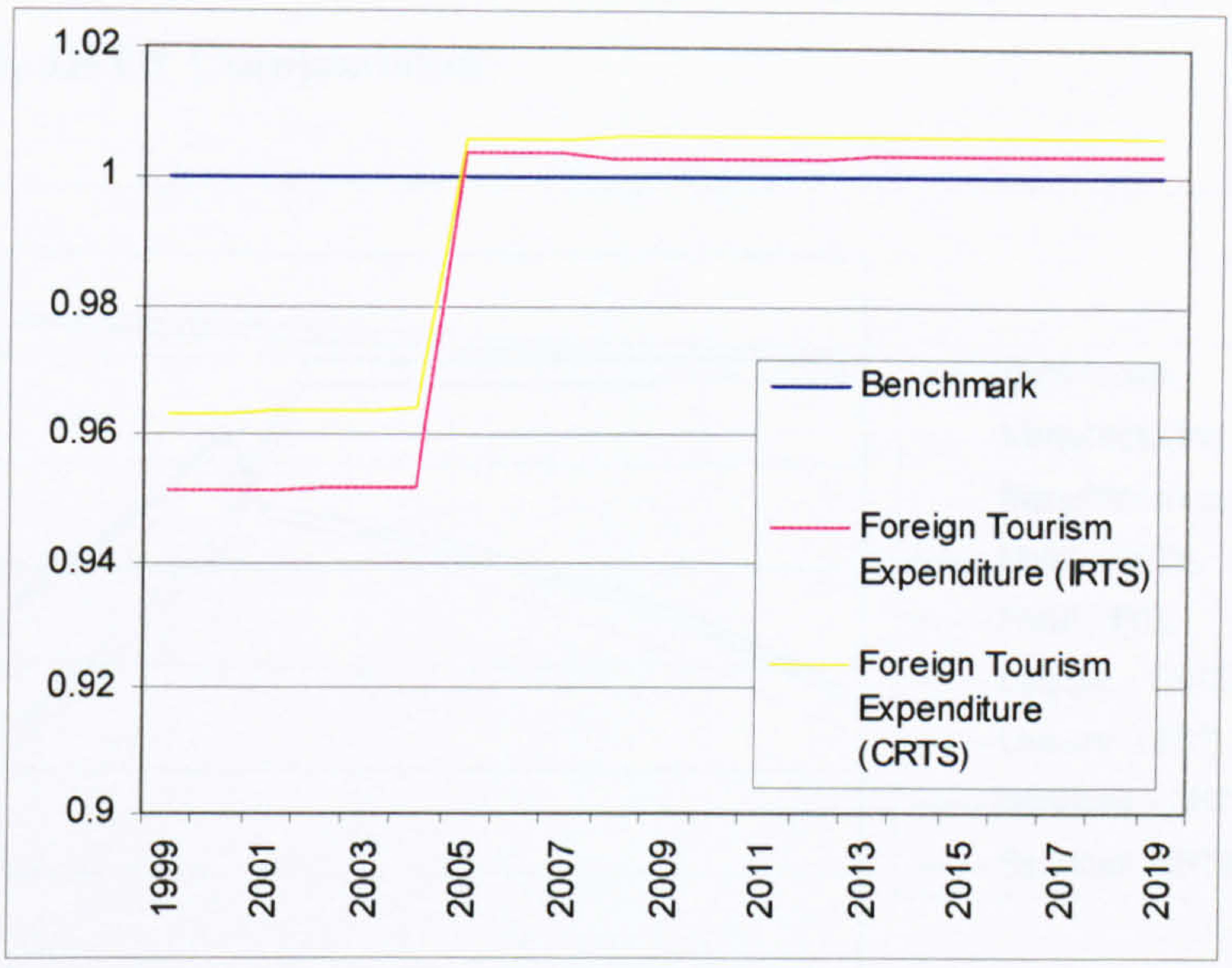
The firm's output decision means that the domestic price level increases by more in the IRTS case than in the CRTS case. This is shown in Figure 5.18. In the leisure, sector for example, the domestic price level increases by approximately 0.5% above the CRTS level. A similar result is observed in the hotel sector, where the domestic price level rises by 0.4% more than the CRTS level. Higher price levels are also observed in the manufacturing and service sectors for reasons mentioned in the previous paragraph.

Figure 5.18: Impact of an Increase in FDI on the Domestic Price Level – CRTS, IRTS Comparision



The domestic price level and the real exchange rate are inextricably linked. As the domestic price level rises by more in the IRTS case than the CRTS case, the real exchange rate will also appreciate by more in the IRTS case. This has direct implications for the level of foreign tourism demand. Figure 5.19 shows the level of foreign tourism expenditure in the IRTS case. The pattern of foreign tourism expenditure is identical to that of the CRTS case. The key drivers of the result are also the same: the real exchange rate appreciates during the FDI inflow, so foreign tourism expenditure declines. However, once the FDI shock has subsided, foreign tourism expenditure rises above benchmark levels due to the increase in supply from the FDI recipient sectors. Therefore, the level of foreign tourism expenditure is approximately 0.05% lower in each period than in the IRTS case once the FDI inflow has subsided.

Figure 5.19: Impact of an Increase in FDI on Foreign Tourism Expenditure – CRTS, IRTS Comparision



In terms of the use of factor resources the primary drivers of the results in the IRTS model are the same as in the CRTS model. In sectors where output expands, the use of capital and labour will increase, while in sectors where output contracts, the use of capital and labour will fall. Those sectors that receive FDI are the sectors that expand and they increase demand for both labour and capital. In order to attract factor resources to move into the expanding sectors, factor returns must rise. This means that both wages and the cost of capital rise. This is shown quite clearly in Figures 20 and 21 and the movements of both capital and labour match the movements in the CRTS case. But as with all of the other results presented in this scenario, a fundamental difference between the two sets of the results exists. This difference relates to the firm's output decision. As the firm chooses to produce less output in the IRTS specification, the resource movement effect is smaller. Take the hotel sector for example; the level of output is around 0.4% lower in the IRTS case. This means that less capital is needed to facilitate the expansion in the hotel sector. Figure 20 shows that the returns accruing to hotel sector capital in the IRTS scenario are also approximately 0.4% lower in each period and a similar proportion is observed in terms of earnings accruing to labour. Comparison of figures 5.17, 5.20 and 5.21

reveals that differences in returns accruing to the factors of production are largely proportional to the differences in output between the CRTS and IRTS models.

Figure 5.20: Impact of an Increase in FDI on Quantity of Capital Used inValue Added – CRTS, IRTS Comparision

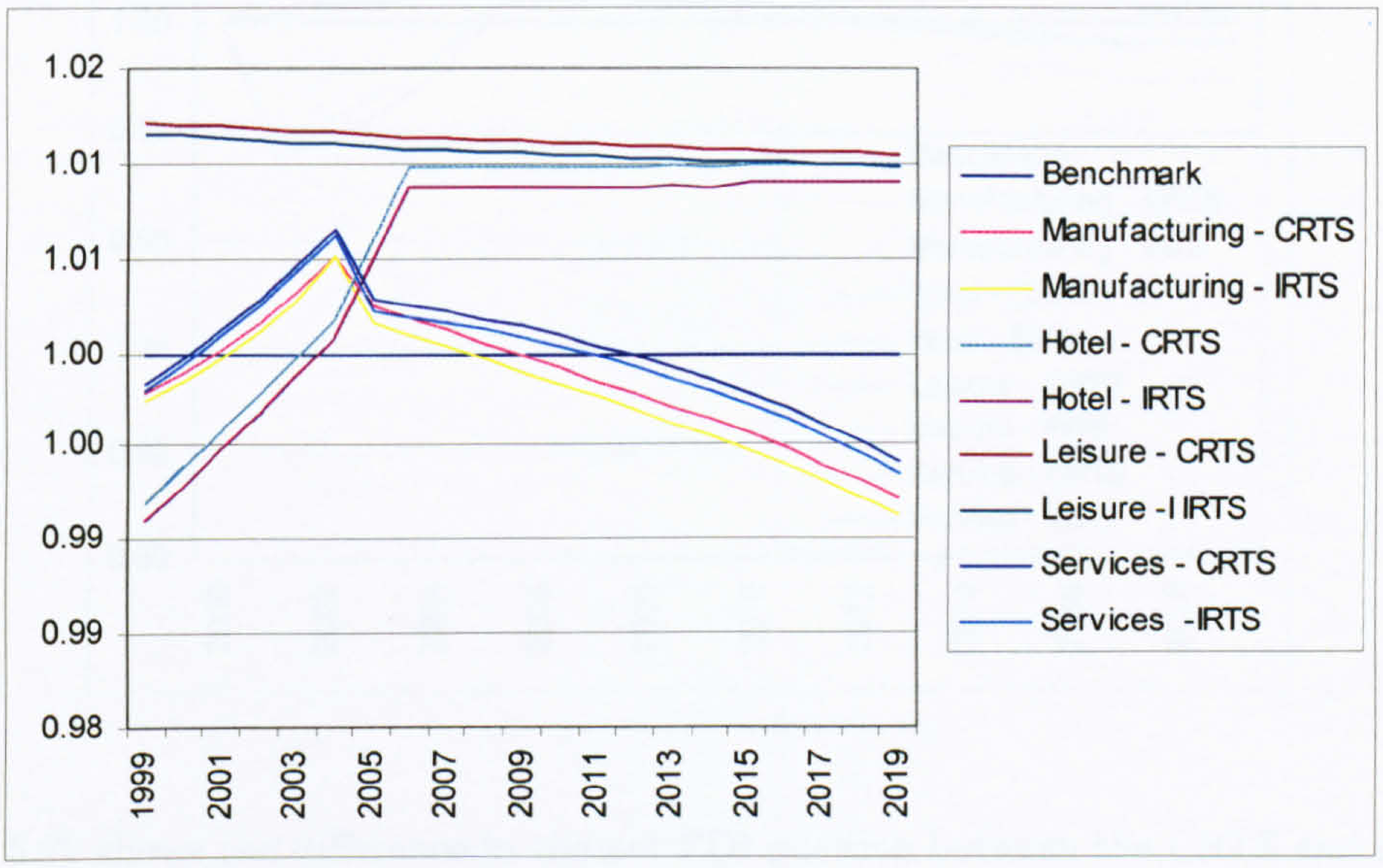


Figure 5.21: Impact of an Increase in FDI on Quantity of Labour – IRTS Model

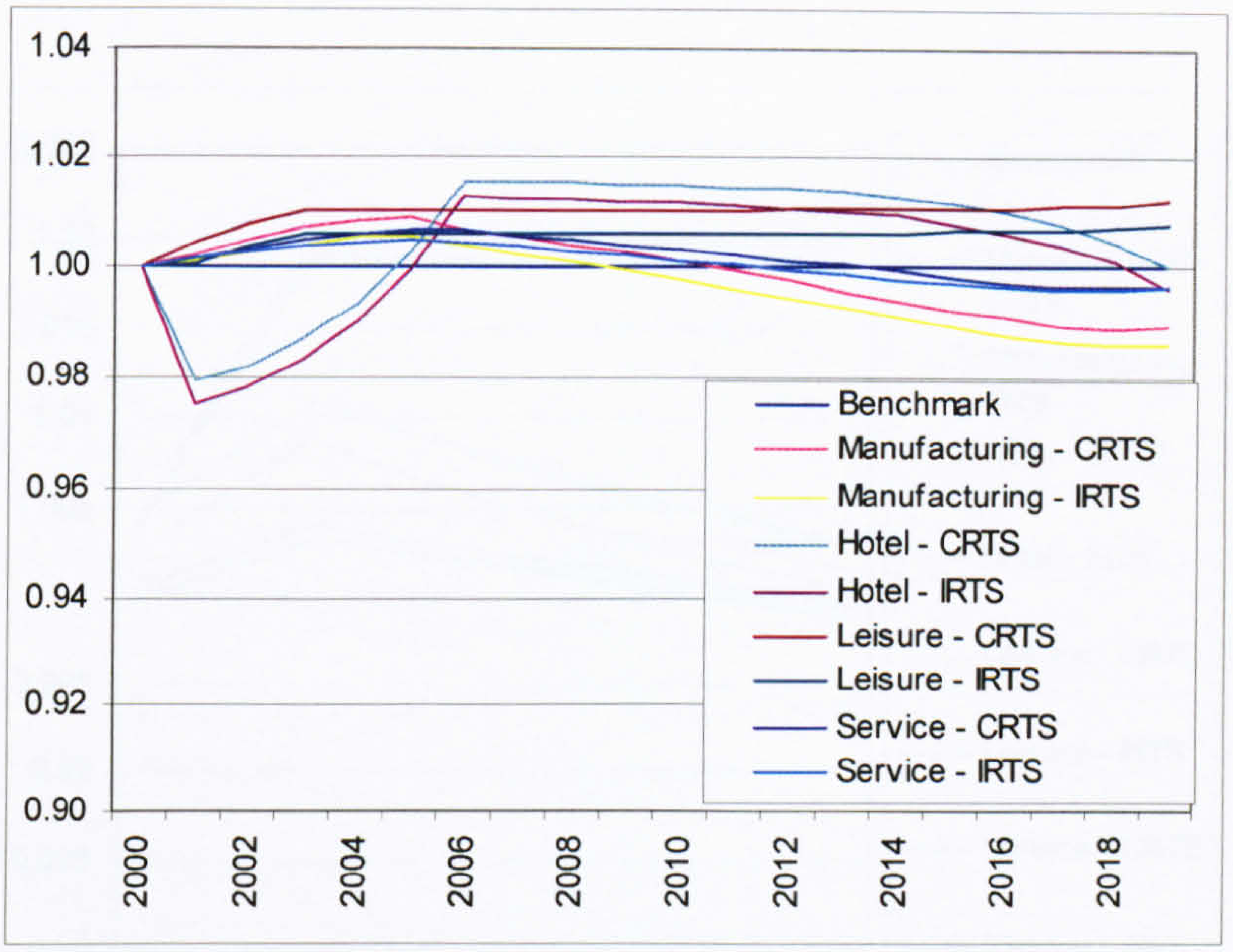
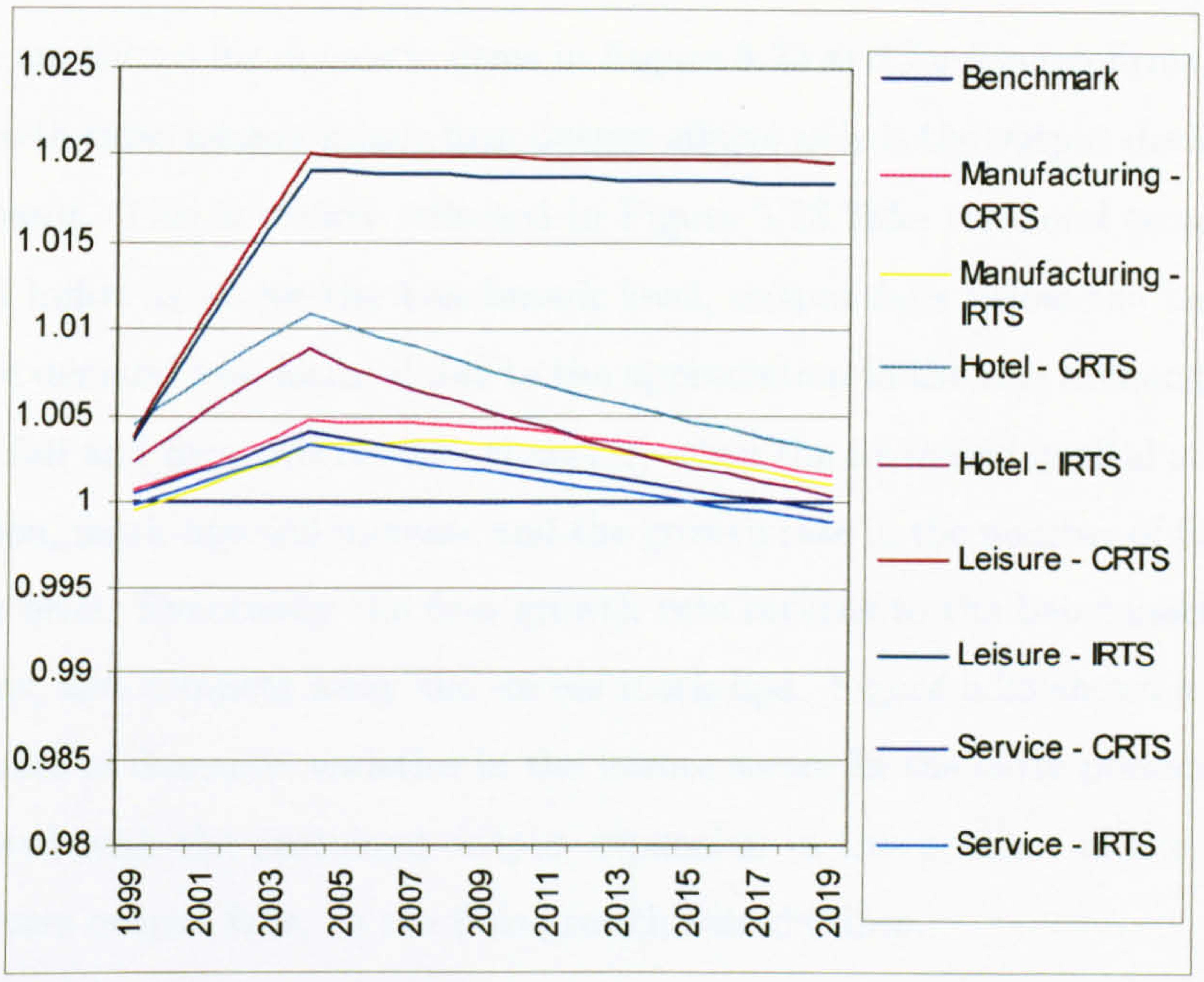


Figure 5.22 shows the difference in the net FDI position between the CRTS and IRTS case. As would be expected, the accumulation of FDI is less in the IRTS case. There are two reasons for this difference. Firstly, the lower levels of output in the IRTS case mean that the returns accruing to FDI will be less. Secondly, the fact that the real exchange rate appreciates by a larger amount in the IRTS case also has an impact on this variable. The higher level of the real exchange rate means that the purchasing power of foreign capital is reduced as compared to the CRTS case. This means that the strength of the FDI shock in the counterfactual is diffused.

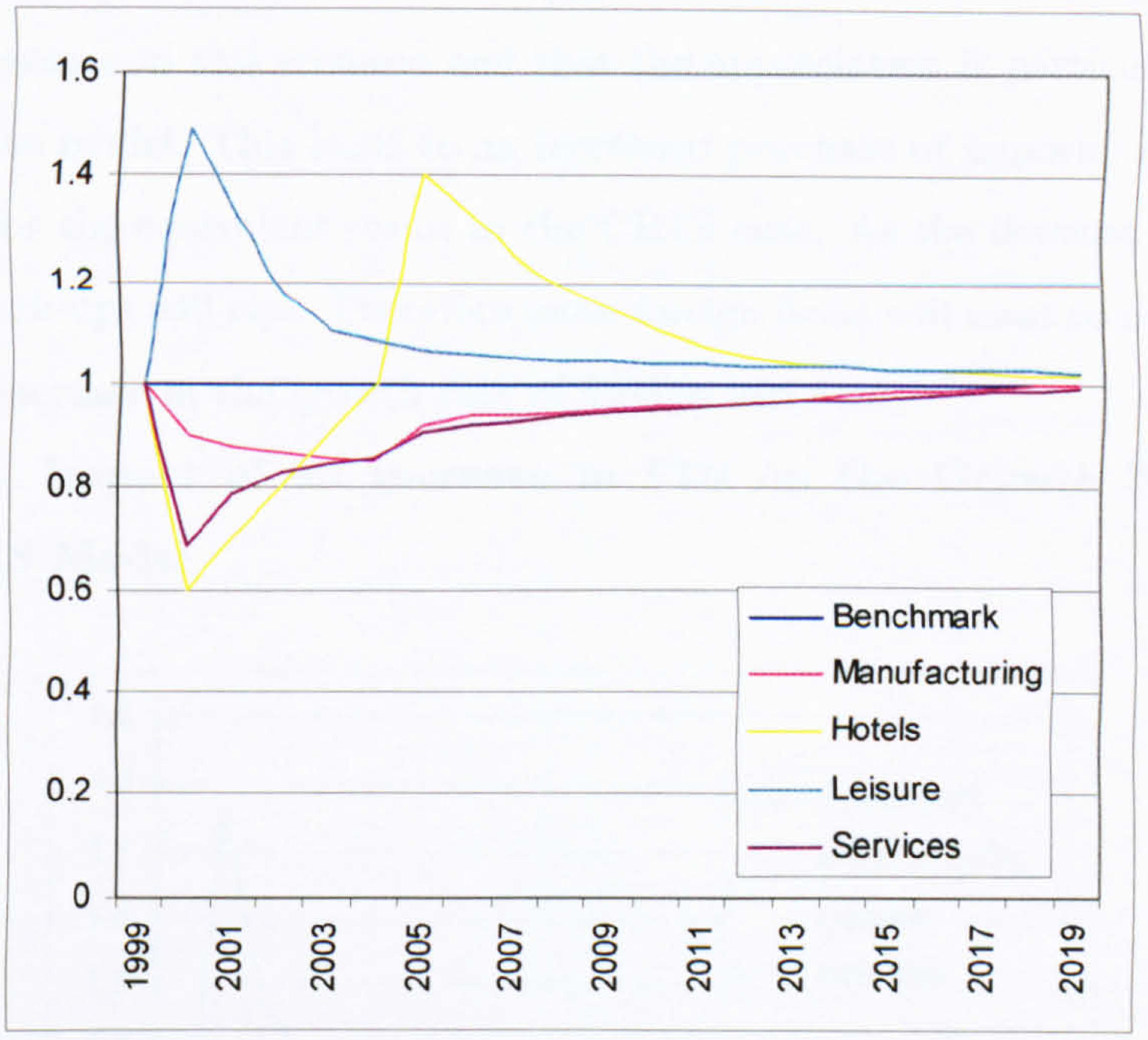
Figure 5.22: Impact of an Increase in FDI on Quantity of FDI or Net FDI position – CRTS, IRTS Comparision



It has already been noted that assumptions relating to firm behaviour account for the differences in results between the CRTS and IRTS models. A key behavioural effect underlying these differences is the firm's decision to contest the market. The change in FDI will lead to a change in firms' cost functions and in turn this will affect their mark-ups. As mark-ups deviate from the benchmark level, the firm's decision to contest the market is changed. In sectors where output contracts, mark-ups will decline, firms will exit the market either as their business becomes an unviable proposition or they believe that they can achieve higher returns in other sectors. When firms leave a sector, the market share of the remaining firms will increase and their mark-ups will return to the benchmark level. Firm exit will continue until mark-ups return to the calibrated benchmark level. Conversely, in sectors where output increases mark-ups will increase. Firms, either newly set-up or existing in other sectors, will seek to enter the expanding sector in order to contest these higher mark-ups. Firms will continue to enter the expanding sector until the excess mark-ups are competed back down to the benchmark level. The rate of entry/exit is dependent on the rate of output expansion/contraction. In the imperfect competition specification used in this thesis, each firm represents a variety and the two terms are used interchangeably in the literature. The growth rates in the number of firms/varieties are shown for domestic firms in Figure 5.23 and for foreign firms in Figure 5.24.

Variety growth rates largely mimic firm output effects as it is the output decision that drives the mark-up result. This is clearly reflected in Figure 5.23.Take the hotel sector for instance. When the FDI inflow is above the benchmark level, output falls below the benchmark level. Foreign tourism demand has declined due to the appreciation in the real exchange rate meaning that mark-ups fall and firm exit occurs. However, when the increased capital stock triggers an output expansion, mark-ups will increase and the growth rate in the number of firms rises above the benchmark level. Eventually the firm growth rate returns to the benchmark level as firms enter the market and compete away the excess mark-ups. Figure 5.23 shows a sharp increase in the growth rate of domestic varieties in the leisure sector in the early periods of the model. This is associated with the sustained output expansion in this sector. In the manufacturing and service sectors output falls, so the firm growth rate declines.

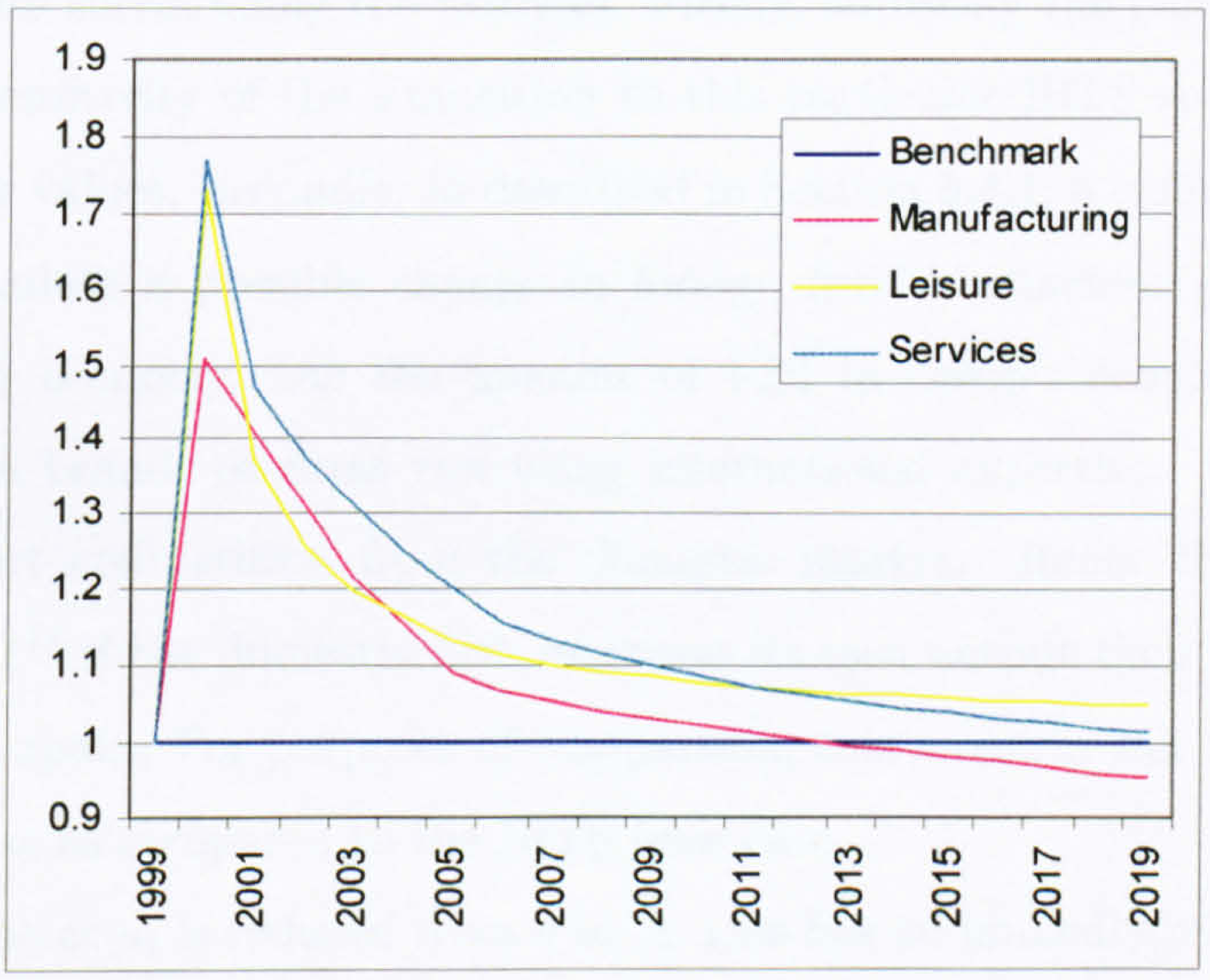
Figure 5.23: Impact of an Increase in FDI on the Growth Rate of Domestic Varieties – IRTS Model



The parameter λ_i^D affects the magnitude of the change in the growth rate. This parameter can be interpreted as the conjectured reaction of rival domestic firms. Details of the interpretation of this parameter are given in Chapter 4 and details of its calibrated values are given in Table A5.1 in the appendix to this chapter. In the case where $\mu_i = \mu_i^M = 0$, the parameter $\lambda_i^D = 0.13$ in the hotel sector and $\lambda_i^D = 0.08$ in the leisure sector. This means that firms expect their changes in output to be followed to a lesser extent, implying corresponding changes in rivals' prices are assumed to be smaller. Thus, when output is expanding in the hotel sector, if firm s increases its output by 1%, then it would expect rival firm t to increase output by 0.13%. Calibrated mark-ups are higher in the leisure sector (0.31 as compared to 0.26 in the hotel sector), so firms perceive they have more market power. This means that they conjecture that their rival's output response will be lower. This makes it more likely that firms will wish to enter the leisure sector than the hotel sector, as mark-ups are higher and the conjectured reaction of rival firms is lower. This is reflected in Figure 5.23, where the growth of leisure firms is higher than that of hotel firms. However, the primary influence on this result is the fact that output expands by more in the leisure sector.

Similar results are observed for the number of foreign varieties. It is known that the real exchange rate increases in this scenario and that the appreciation is particularly strong in the early periods of the model. This leads to an increased purchase of imports; in Figure 5.16 this can be observed for the equivalent result in the CRTS case. As the demand for imports rises, overseas firms' mark-ups will rise. Therefore more foreign firms will want to contest the market. This leads to an increase in the growth rate of foreign varieties.

Figure 5.24: Impact of an Increase in FDI on the Growth Rate of Foreign Varieties – IRTS Model



This section has compared the IRTS model to the CRTS model and has found that differences in assumptions relating to firm level output decisions have a significant impact on the relative magnitude of the results but not the overall direction. The IRTS specification of this model allows the exogenously set parameters μ_i and μ_i^M to be varied. This allows the impact of changes in the magnitude of firm's behavioural response to be evaluated in light of a policy shock. The importance of this parameter is examined in the next section.

5.4.4 Impact of a Change in the Conjectural Variation Parameter

This next subsection considers a change in the conjectural variation parameter μ_i.In the previous subsection, the Cournot assumption was used whereby $\mu_i = \mu_i^M = 0$ is assumption implies that conjectures relating to rival foreign and domestic firms are Cournot, that is, domestic firms do not believe that that a change in their output will have an impact on the output of overseas industries, while foreign firms do not believe that that a change in their output can have an impact on the output of the domestic industry.

It has been noted in chapter 4 that the conjectures used in this model are constant. There is no convergence to the Nash equilibrium as economic theory associated with conjectural variations would imply. While this assumption is clearly not ideal, this simulation is undertaken to evaluate two issues surrounding the analysis. Firstly, adjusting the parameter μ_i allows the assessment of the sensitivity of the simulation to this particular IRTS specification and prior choices of parameter values. Secondly, as described in Section 5.4.1, a change in this parameter can be used to simulate a possible change in foreign firm's behaviour given an increase in FDI in the Spanish economy. As the amount of FDI in Spain's economy increases, there will be more foreign brands or firms run using international expertise. This will mean that there is more import competition from the domestic market. Hence the parameter choice $\mu_i = \partial M_i/\partial D_i = -1$[14] if the domestic firm increases its own output then the foreign firm will reduce imports into Spain. For purposes of comparison, this scenario will be referred to as the IRTS alternative case as compared to the IRTS base case.

When the parameter μ_i is reduced from 0 to -1, this has an immediate impact on the firm's calibrated mark-ups and conjectures. These changes in parameter values are given in Table A5.1 in the appendix to this chapter. It can be seen that when $\mu_i = -1$ both the calibrated mark-ups and conjectures of rival domestic firms increase. Domestic firms expect rival foreign firms to reduce their imports into Spain as they expand. Such a conjecture does not favour the arrival of new foreign brands into the economy. Consequently, domestic firms will set their mark-ups higher, as they perceive less competitive pressure from overseas varieties. As mark-ups and the domestic firm's perception of its own market power increases, so too does the conjectured

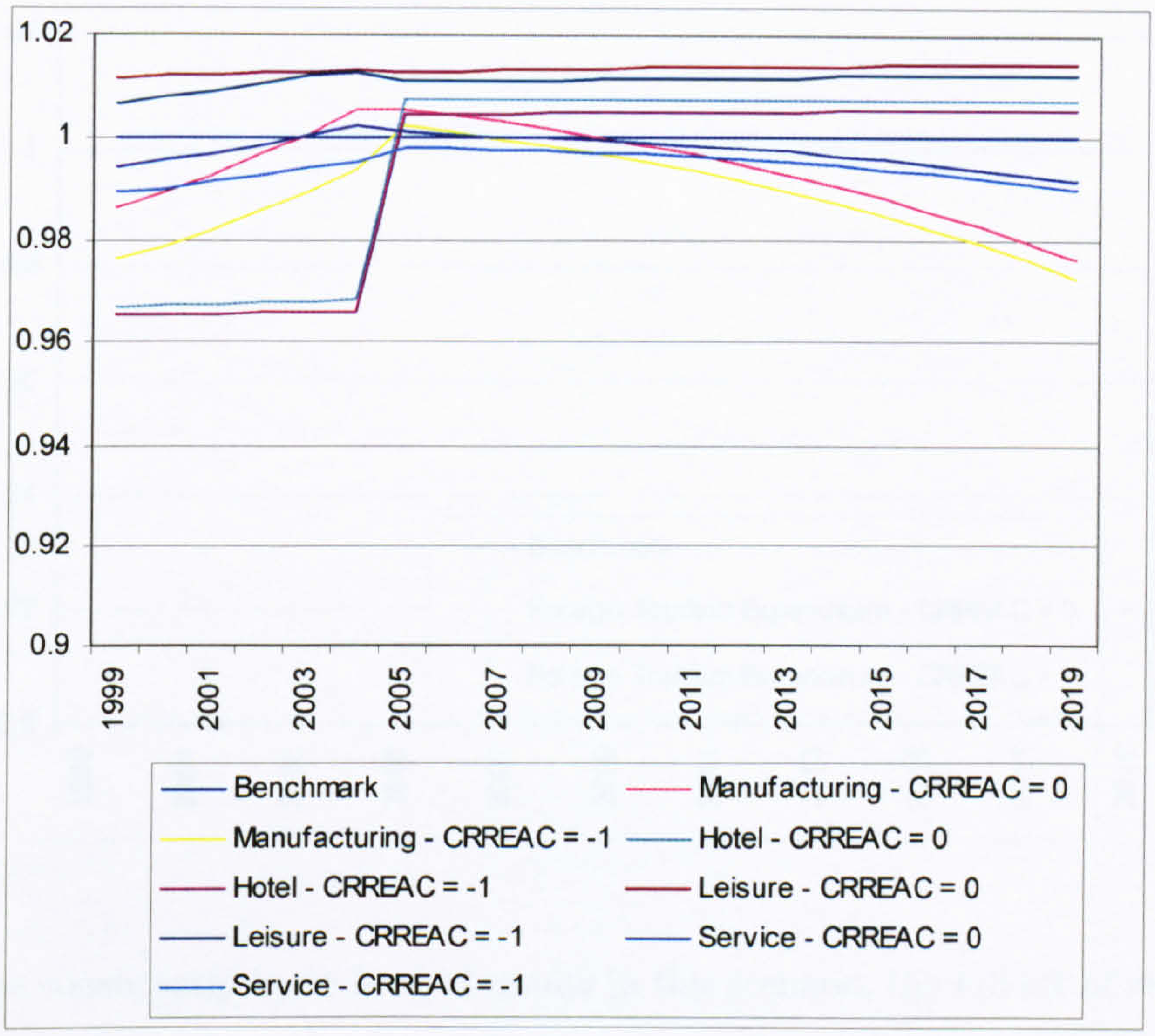
[14]The parameter value -1 is chosen so that the magnitude of the calibrated parameter can be compared to a similar simulation undertaken by De Santis (2001), although the nature of the simulations are different.

reaction of rival domestic firms.

This change in domestic firms' perception of their market power has a direct influence on their output decision. It was shown in the previous subsection that under the IRTS specification when there is an increase in FDI inflows and recipient firms are in the position to increase output, fixed costs as a proportion of output decline and mark-ups rise. The firm's perception of its own market power increases and it restricts the output expansion in order to be able to charge higher prices. However, under this alternative IRTS specification, the firm's perception of its own market power is higher. So when it is able to increase output, it actually increases output by less than the IRTS base case in order to charge a higher price. This result is clearly observed in Figure 5.25[15] In the hotel sector, for example, output is approximately 0.01% lower in each period when $\mu_i = -1$ A similar effect is observed in the leisure sector. As in the IRTS base case output in the non-FDI recipient sectors is lower than in the CRTS case. However, as all firms have higher mark-ups in this scenario, firms will reduce output to sustain these mark-ups. The fact that mark-ups are higher when $\mu_i = -1$ means that output must be restricted by more to sustain them. This can be observed by comparing the results for the manufacturing and service sectors in Figure 5.25. Output is around 0.05% lower in the manufacturing sector, and 0.03% lower in the service sector.

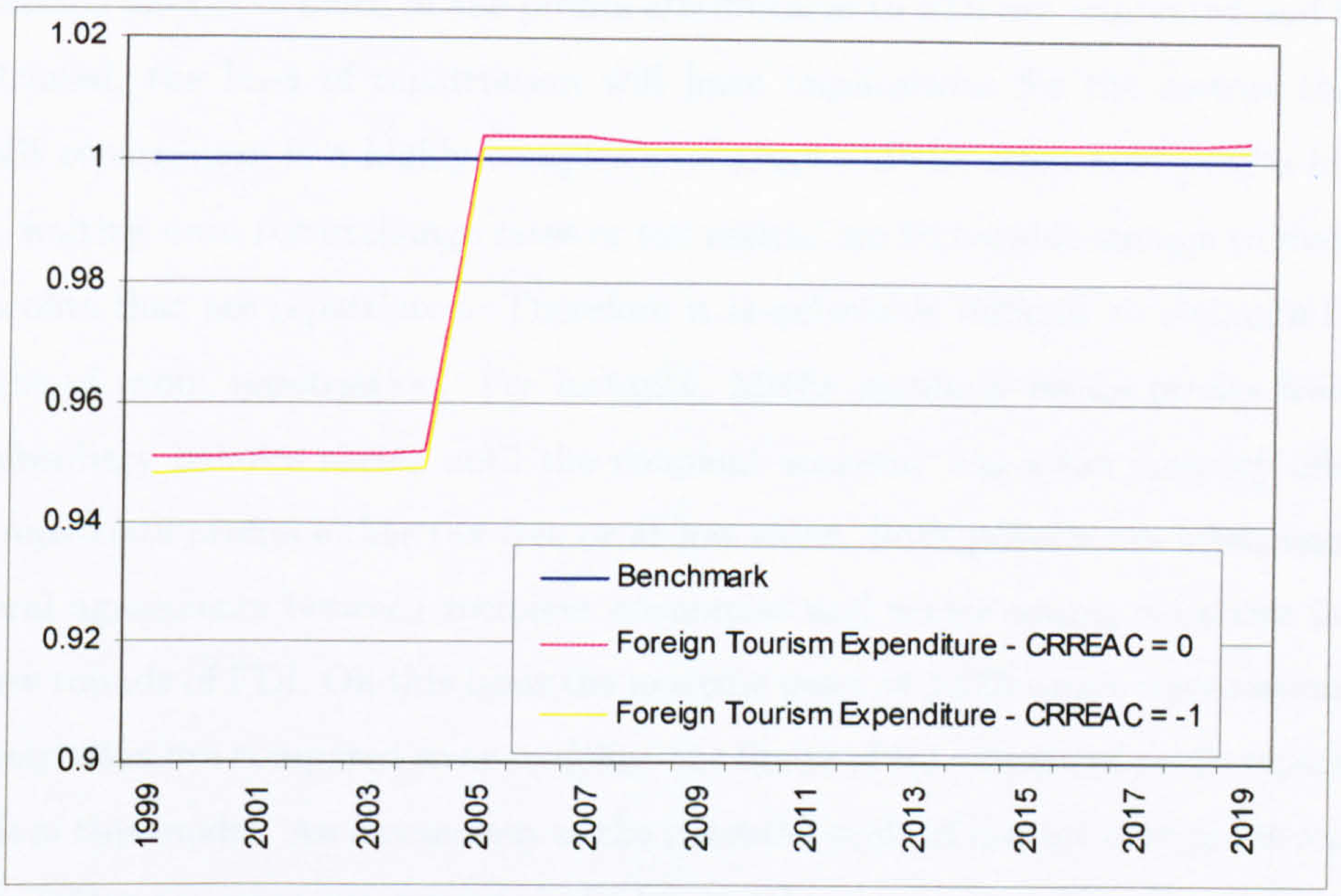
[15]In this figure, alternative values of the conjectural reaction parameter μ_i are termed CRREAC, which is their equivalent label in MPSGE.

Figure 5.25: Impact of an Increase in FDI on Sectoral Output – IRTS Model, Conjectural Variation Comparison



These lower levels of output pass through to all the other results in the model. Take foreign tourism expenditure, for example. The higher domestic price level and lower levels of output mean that the level of foreign tourism expenditure is lower $\mu_i = -1$ This is shown in Figure 5.26 below. It can be seen that foreign tourism expenditure is approximately 0.1% lower in each period in the IRTS alternative case.

Figure 5.26: Impact of an Increase in FDI on Foreign Tourism Expenditure – IRTS Model, Conjectural Variation Comparison



Due to the consistently lower level of results in this scenario, the full set of results for this simulation is not shown, but can be supplied on request. It can be concluded that a change in the assumptions relating to the parameter values of firms' mark-ups and conjectures does have an impact on the relative magnitude of the results. These assumptions do not appear to affect the direction of the results or the core inferences that are made from this analysis.

Both the CRTS and IRTS analyses have produced results that are largely consistent with the Devarajan, Lewis and Robinson (1991), stylised 1-2-3 model. It has been shown that the price level rises, returns to capital increase and the trade deficit worsens following an FDI shock. However, a number of assumptions have been made relating to the model's construction. It is useful to compare some of these key assumptions in sensitivity test to gain further insights for policy purposes and to test the model's usefulness. The next section goes on to test assumptions relating to profit repatriation and the productivity of foreign capital

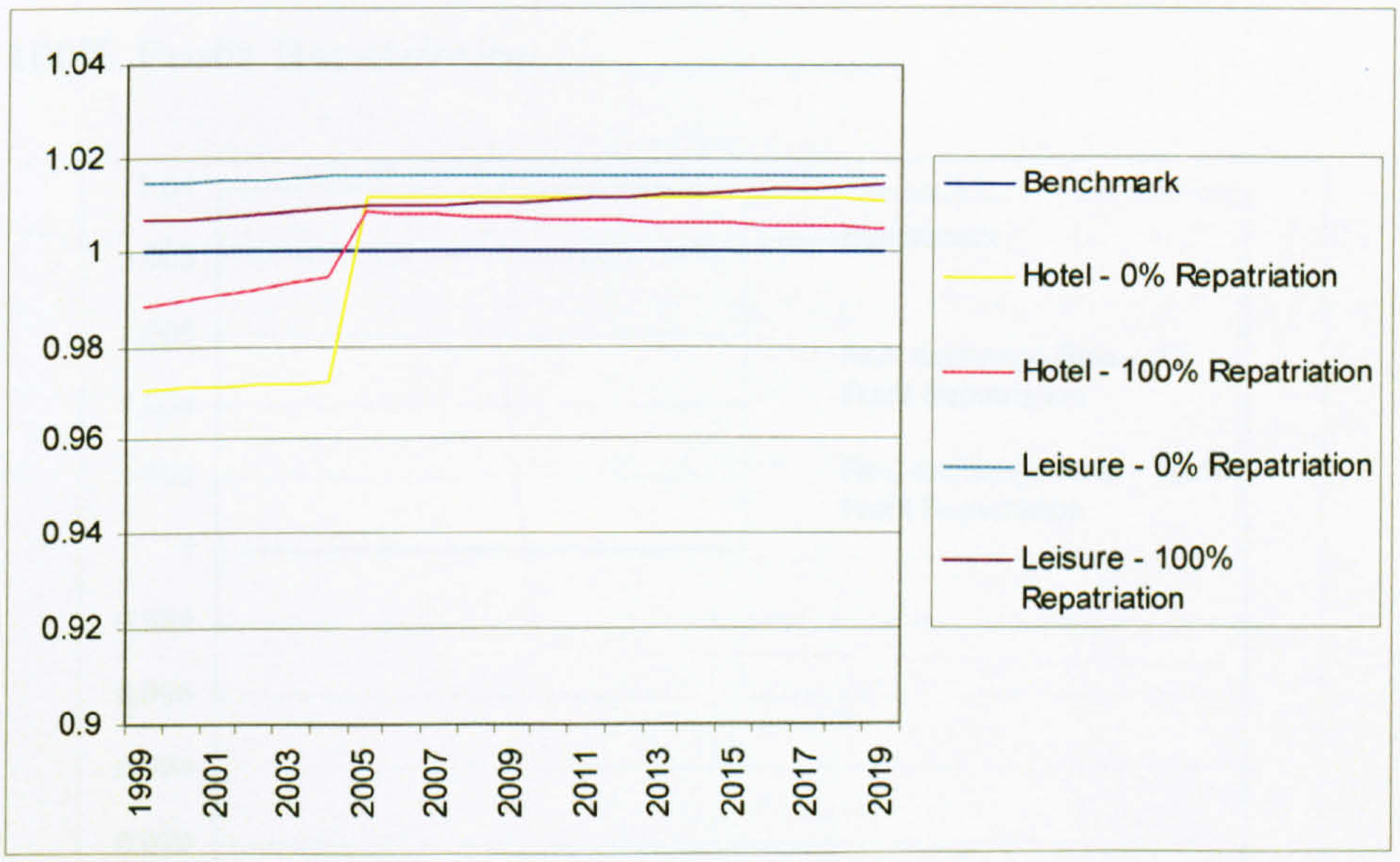
5.4.5 Sensitivity Analysis – Full Profit Repatriation

In the previous simulation zero profit repatriation was assumed. While it is not apparent from published data how much of the profits attributable to FDI are reinvested and how much are repatriated, the level of repatriation will have implications for the sectors that receive FDI. Profit repatriation is a highly complex procedure. MNEs often hold profits in suspense accounts, waiting until the exchange rates or tax regime are favourable enough to maximise the level of profits that are repatriated. Therefore it is extremely difficult to estimate the timing and volume of profit repatriation. For instance, MNEs regularly retain profits from FDI on foreign subsidiary balance sheets until the recipient economy has a tax amnesty allowing the MNE to repatriate profits either tax free or at low rates. Such policies are often implemented via bilateral agreements between recipient economies and major source countries in order to attract new rounds of FDI. On this basis the extreme cases of 100% profit repatriation and zero profit repatriation are compared so as to define the limits of the impact of profit repatriation on the results of this model. An assessment of the potential scale of impact that profit repatriation has on the wider economy can provide valuable insights concerning the potential impact of a repatriation amnesty.

The process of profit repatriation has been described previously: in $t = 0$ MNEs invest in Spain via FDI, in period $t = 1$ MNEs choose either to repatriate the profits associated with their investment or re-invest them in the recipient economy (either in the current investment project or elsewhere). Results showing the estimated impact of full profit repatriation on sectoral output are given in Figure 5.27. In the zero profit repatriation case, key contrasting results were observed in the hotel and leisure sectors. The implications of zero and 100% are thus compared. It can be seen from Figure 5.27 that the implications of 100% profit repatriation in the hotel sector change the pattern of results quite significantly. The sharp decline in hotel output that occurs in the early periods of the model during the period of FDI inflow is not observed to the same extent when profits are fully repatriated. In the zero repatriation case, hotel sector output falls by approximately 3% during the FDI inflow, however, in the 100% case output only declines by 1%. When profits are repatriated, they are not used to purchase capital assets in $t = 1$, so the demand for capital assets is lower in the 100% case. This means that the rise in price in capital assets is lower than in the zero case. In turn, this means that the rise in the domestic price level is smaller in this instance and consequently the observed appreciation in the real exchange rate will be less substantial. This phenomenon drives most of the difference in results between the zero and 100% case.

The impact of profit repatriation on the leisure sector is somewhat different. It can be seen from Figure 5.27 that output is lower in all periods of the model in the 100% case. While the diversion of output still occurs in the leisure sector, the sharp drop in output during the FDI inflow that is observed in the hotel sector does not occur in the leisure sector, as it is insulated from foreign tourism demand shocks by the fact that most of its output is sold to domestic tourists or for non-tourism consumption. However, output in the 100% case remains lower than in the zero repatriation case due to the impact that the lack of reinvestment has on sectoral capacity.

Figure 5.27: Impact of an Increase in FDI on Sectoral Output – CRTS Model, 100% Profit Repatriation



The consequent impact on the real exchange rate is given in Figure 5.28. It can be seen that there is an approximate 0.2% reduction in the real exchange rate when full profit repatriation is assumed. The fact that the appreciation in the real exchange rate is smaller has implications for the level of foreign tourism demand in the model. Results for foreign tourism expenditure are given in Figure 5.30. It can be seen that due to the 0.2% smaller appreciation in the real exchange rate, foreign tourism demand only falls by approximately 1% in the 100% profit repatriation case as opposed to 3.5% in the zero repatriation case during the periods of the FDI inflow. Several factors affect the magnitude of this result. It has already been noted that the rise in the domestic price level will be lower in the 100% repatriation case as profits are not re-invested to purchase capital assets. This is shown in Figure 5.29, in the 100% profit repatriation case the domestic price of hotels only increases by around 0.8% as opposed to 2% in the zero repatriation case. There is still diversion of resources away from output as new foreign capital is installed, but this occurs to a lesser extent. This is reflected in the output result in Figure 5.27. As there is more supply in this instance, the rise in the domestic price level is smaller. As well as these two factors, it is also known that foreign tourism demand is elastic in this model , so any increase in the price of tourism is met by a larger than proportional fall in foreign tourism demand.

Figure 5.28: Impact of an Increase in FDI on the Real Exchange Rate – CRTS Model, 100% Profit Repatriation

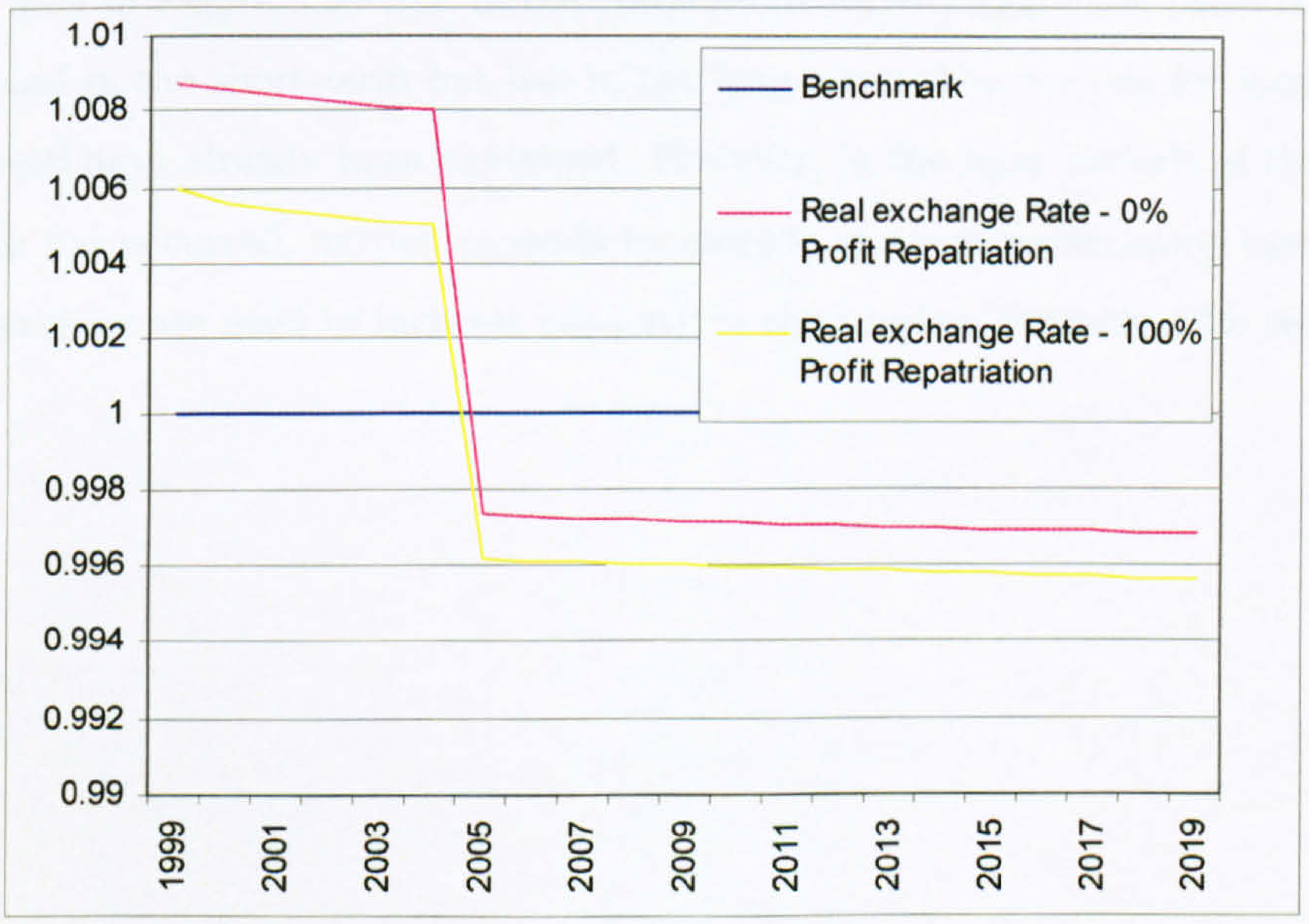
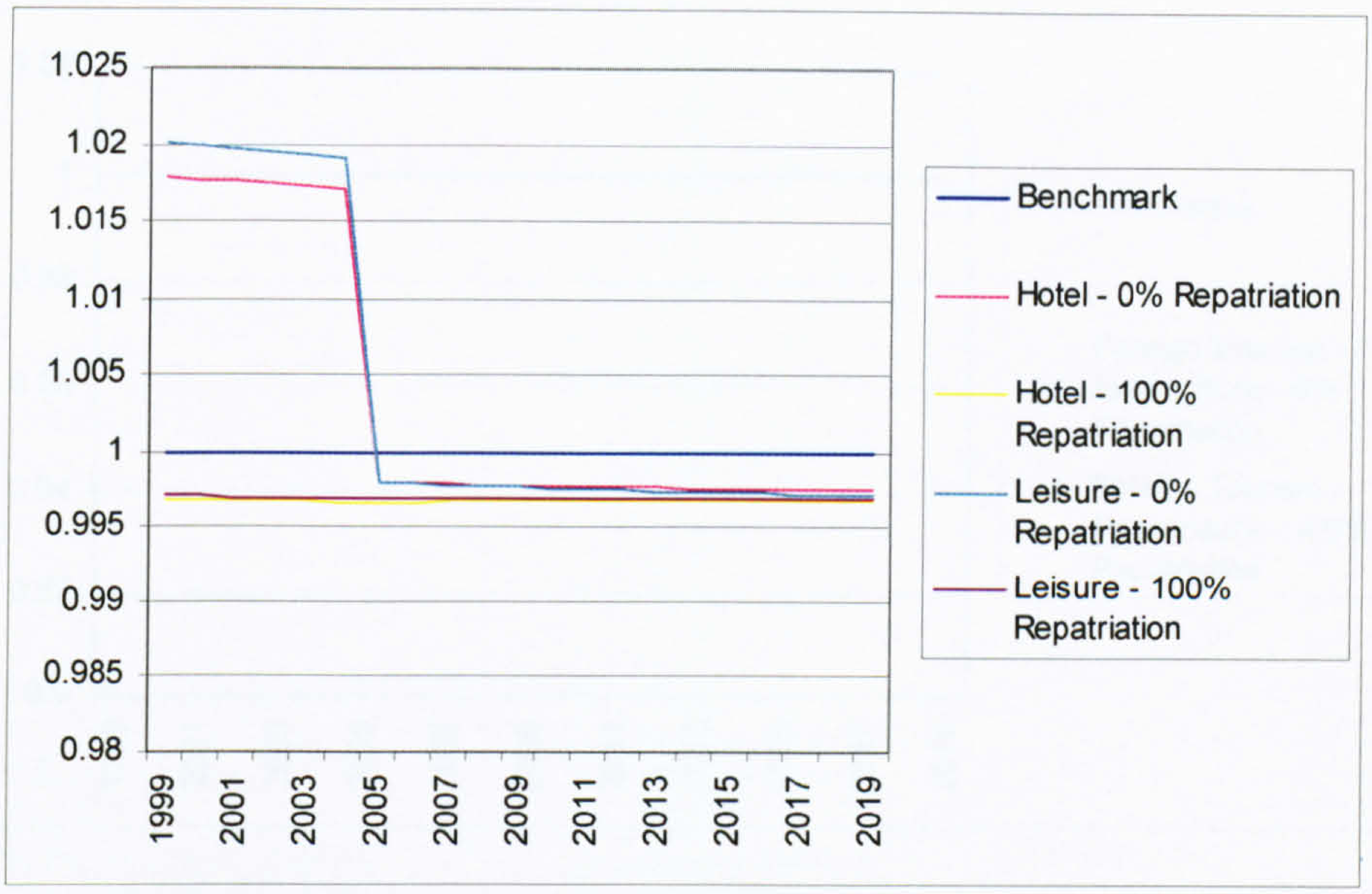
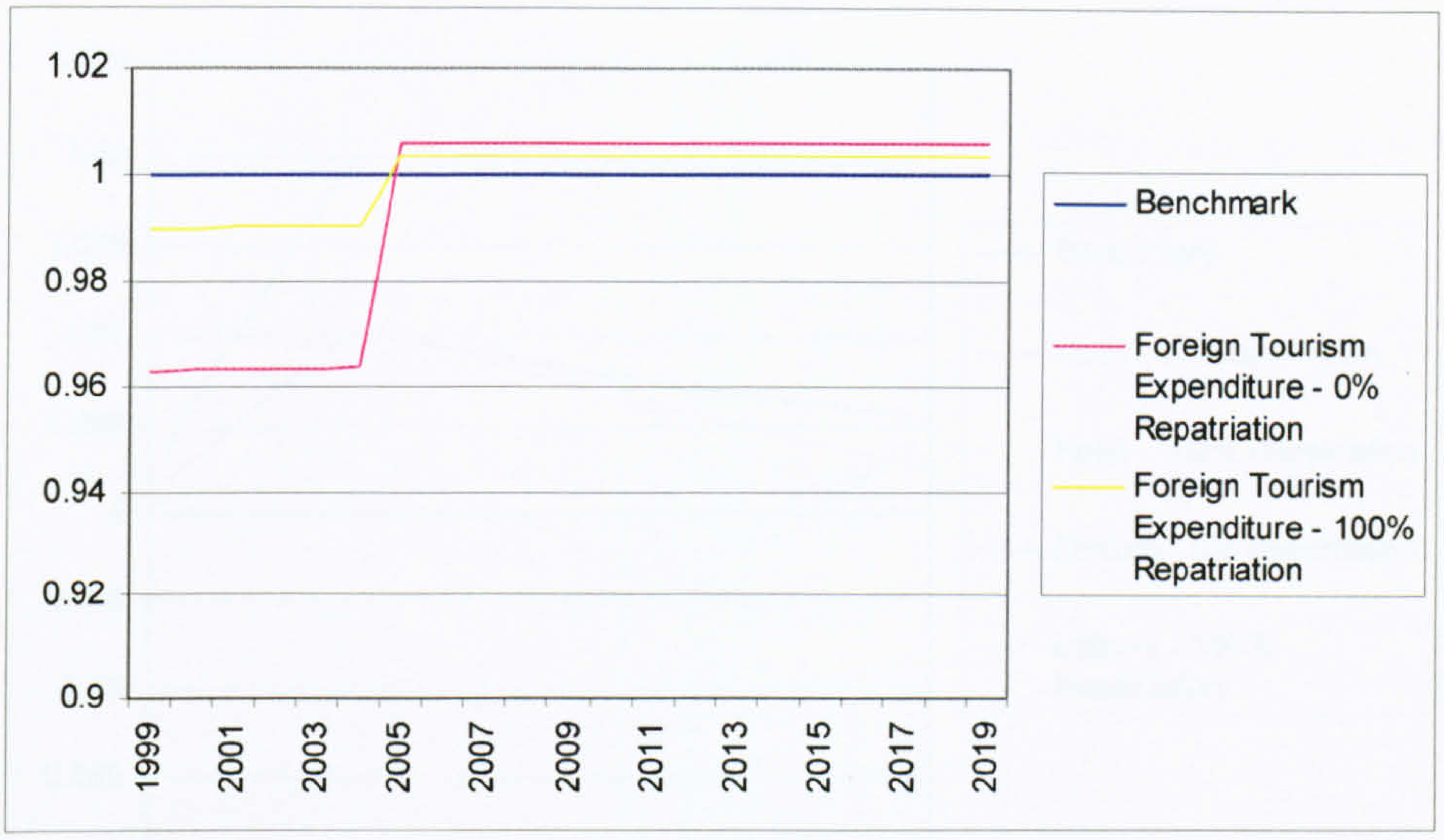


Figure 5.29: Impact of an Increase in FDI on the Domestic Price Level – CRTS Model, 100% Profit Repatriation



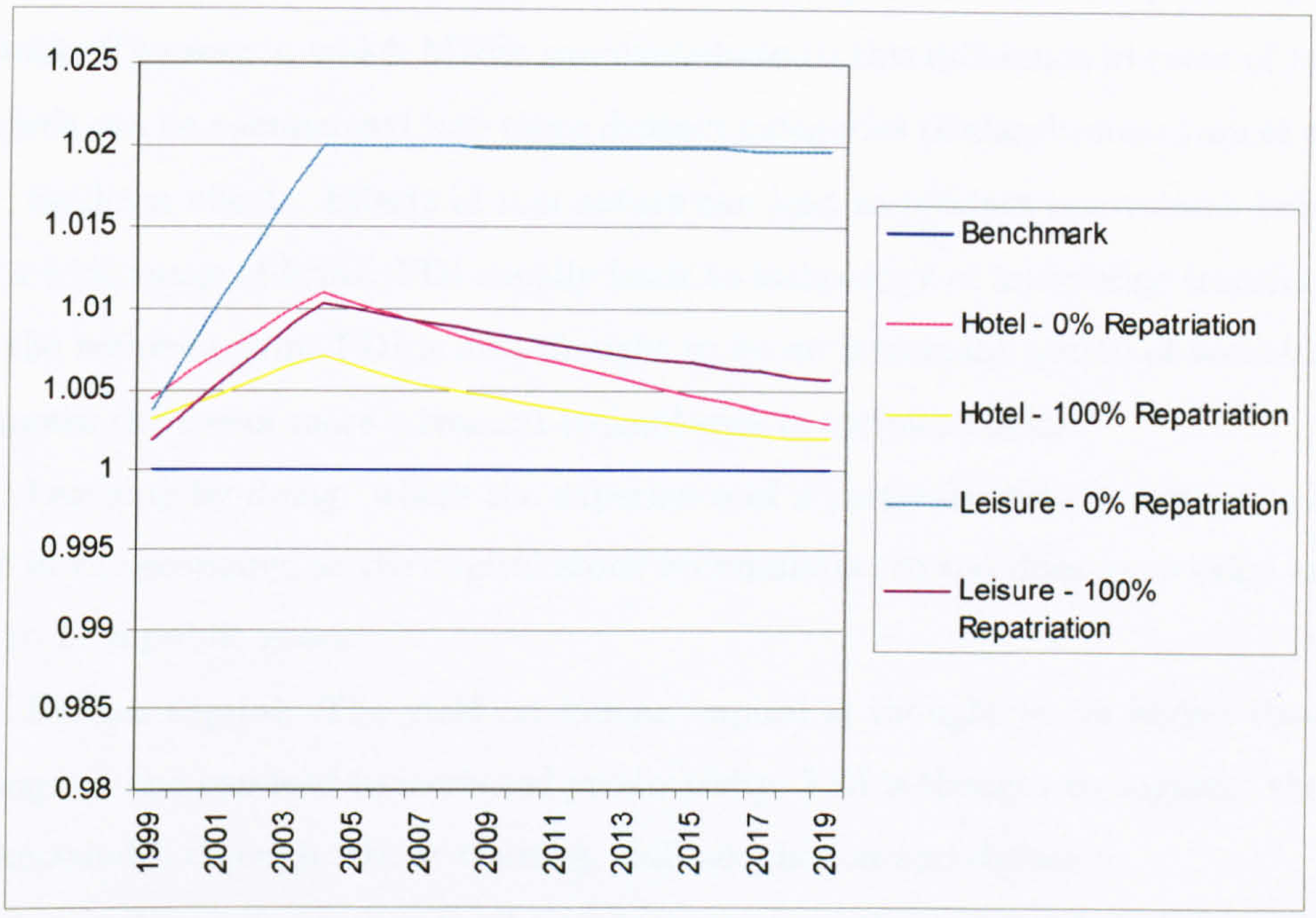
It can be seen in Figure 5.30 that in the 100% profit repatriation case, there is more foreign tourism demand in the short-term but less in the long-term. The reasons for increased foreign tourism demand have already been explained. However, in the later periods of the model after the FDI shock has occurred, output expands by more in the zero repatriation case because the re-invested earnings are used to increase capacity in the tourism characteristic sectors.

Figure 5.30: Impact of an Increase in FDI on Foreign Tourism Expenditure – CRTS Model, 100% Profit Repatriation



The repatriation of earnings does not have a large long-run impact on the Spanish economy. This is because profits are only a proportion of the total investment, whereas much of the FDI is taken up in costs. In addition to this, the proportion of foreign capital stock barely exceeds 30% in any of the tourism characteristic sectors in the model's dataset. In conjunction with this, labour is the factor to which most returns accrue in the tourism sector, so the direct influence of FDI on output is limited. The net FDI position is shown in Figure 5.31. The stock of foreign capital will be smaller if returns accruing to FDI are repatriated rather than reinvested. It can be seen that profit repatriation has a much larger impact on the leisure sector than on the hotel sector. This is because of the increased profitability of FDI in the leisure sector due to its higher levels of output. Profit repatriation does not make a substantial difference to the foreign capital stock in the hotel sector. This is due to the sector's reliance on foreign tourists' consumption, which is highly sensitive to changes in the real exchange rate.

Figure 5.31: Impact of an Increase in FDI on the Net FDI Position – CRTS Model, 100% Profit Repatriation



5.4.6 Sensitivity Analysis – Productivity of Foreign Capital

As has been shown in section 5.4.2, FDI does not affect GDP growth in the long-run, due to the impact of diminishing returns to capital. This outcome is consistent with the neoclassical growth model developed by Solow (1956). However, endogenous growth theory establishes channels by which FDI can promote long-run economic growth. When growth is endogenised, changes in growth enhancing variables can lead to long-run structural changes in the economy. When FDI is considered in endogenous growth models, it usually consists of a bundle of capital and innovation technology (Balasubramanyam et al., 1996). Endogenous growth models focus on endogenising the growth rate of GDP. In turn, this requires investment to be endogenised, as growth is measured by factor accumulation. Individual acts of investment will obviously diminish, and diminishing returns to the aggregate stock of capital will mean that the economy does not grow. However, if these returns can be sustained, then increases in the capital stock will lead to long-run growth. For this position to be sustained, the social rate of return to investment must exceed the private rate of return. The cause of this difference is that private investments are assumed to add to the stock of knowledge and hence the productivity of the capital stock. The way in which MNEs can contribute to this difference in rates of return and affect growth can be summarised into three distinct categories (Balasubramanyam et al., 1996).

1) Spillover effects: Effects of this nature can lead to product innovations being shared amongst a wide range of firms. FDI usually leads to technology or knowledge transfer from the MNE to the recipient firm. FDI is also thought to be an important source of technical change as it promotes the use of more advanced technologies in recipient firms.

2) Learning by doing: where the experience of a particular firm is related to the stock of capital in the economy, as the capital stock accumulates, so too does knowledge and this is assumed to be a public good.

3) Human capital: The yield on human capital is thought to be higher than that of physical capital and can lead to increased productivity. FDI is thought to augment the existing stock of knowledge through labour training, skill acquisition and diffusion.

Therefore it is apparent that in the endogenous growth model if FDI is expected to be growth enhancing, a combination of these various externalities will mean that capital does not diminish so long as the marginal product of foreign capital can be kept above the depreciation rate as the stock of foreign capital increases (De Mello and Sinclair, 1995). In a CGE model effect can be proxied via an increase in total factor productivity (TFP). Previous studies in this area, and the FDI literature itself, have focused on efficiency stimulus associated with FDI and have interpreted the efficiency gain as Harrod-neutral labour augmenting technical progress proxied by increasing the productivity of labour. This is a reasonable assumption given the nature of the spillover, learning by doing and human capital effects described above i.e. much of the gain realised through FDI will be realised by augmented labour gains. Indeed this is true in the tourism sector as well. MNEs may bring in new management programs or working processes that will enhance productivity. However, given the nature of the sectors in which the FDI inflow occurs in the counterfactual ruling out increased capital productivity would be unreasonable. Take the hotel sector for instance. Most MNEs will often refurbish a resort when they take it over, or alternatively will build a new one altogether. Similarly in the restaurant sector, most FDI takes place in the large corporate chains, Pizza Hut, MacDonald's etc. where again major refurbishment takes place. Therefore, an increase in TFP is thought to be more accurate as essentially FDI shifts the production possibilities frontier outwards.

The FDI shock is identical to that in section 5.4.2 and zero profit repatriation is assumed. The simulation is set so that for the length of its natural life, foreign capital per unit is 10% more productive than domestic capital and that the proportion of labour associated with it is also 10% more productive.[16] In practical terms this would mean that a 1% increase in foreign capital would raise technical progress in the sector by 1.1%, whereas a domestic capital increase does not yield technical progress. The same principle applies to labour associated with foreign capital.[17]Foreign and domestic capital will have the same natural life as each other, only during their existence, foreign capital is more productive. The results of the increased TFP are then compared to those in Section 5.4.2 where the increased productivity of foreign capital and labour is not assumed.

Figure 5.32 shows the impact of an increase in FDI on sectoral output. It is clear that the observed increase in output in the tourism characteristic sectors, as represented by the hotel and leisure sectors, is larger when the additional productivity shock is introduced. In the hotel sector, the TFP increase has a substantial impact on output in the early periods of the model. In the no-productivity case, output falls by approximately 2.5% during the FDI inflow, while in the increased productivity case, output declines by less than 1% over the same period. It

[16]This is approximated by allocating the equivalent proportion of labour to the foreign capital stock given the capital labour ratio and shocking it accordingly. Therefore, the proportion of the labour force working in MNEs is estimated. A separate MNE sector is not identified, but as earnings attributable to foreign capital increase/decrease the associated use of labour will increase/decrease accordingly. As labour becomes associated/disassociated with the foreign capital it becomes more/less productive.

[17]Another option for the treatment of labour and capital in this simulation is to increase the share of labour and capital that is shocked with the efficiency gain by the proportion of output that is influenced by foreign capital. For example, if a joint venture between a foreign and domestic firm is undertaken then the proportion of foreign capital invested may be as little as 10% of the whole firms value. However, theoretically the influence of the MNE would be across the whole firm and the whole of the joint venture would benefit from the MNEs expertise. While it is practically feasible to adjust counterfactual to incorporate this phenomenon given the structure of the dataset used in this thesis, it is not formulated to account for this. The rationale underlying this decision relates to the lack of knowledge relating to the spread of expertise in the tourism sector. Take the restaurant sector for example, is a kitchen porter in a foreign restaurant franchise more productive than a kitchen porter in a small local catering establishment? The answer to this is not clear. However, it is likely that the senior managers of the foreign restaurant franchise are more productive and have incorporated expertise provided by the foreign firm in their day to day activity. Therefore it is not assumed that all labour attributable to a joint venture or the like becomes more productive following the introduction of FDI. Likewise a similar adjustment could be made for domestic capital tied up in the joint venture, but for the same reasons the adjustment is not made.

was noted that the cost of capital rises during periods of FDI inflow due to increased demand for assets. However, when foreign capital is more productive, this effect is countered to some extent as the hotel sector can now produce its products more cheaply due to the efficiency gains associated with foreign capital. Once the increased FDI inflow has subsided, output rises by about 0.5% more than the less productive case in 2005 and in later periods output rises by nearly 2% than the less productive case. A similar, but smaller effect is observed in the leisure sector, as compared to the less productive case output is approximately 0.25% higher in the productive case. Output in the manufacturing sector is actually lower in the more productive case. The same effect is observed in other non-FDI recipient sectors, this is because more resources are drawn towards the FDI recipient sectors.

Figure 5.32: Impact of an Increase in FDI on Sectoral Output – CRTS Model, Productivity Increase

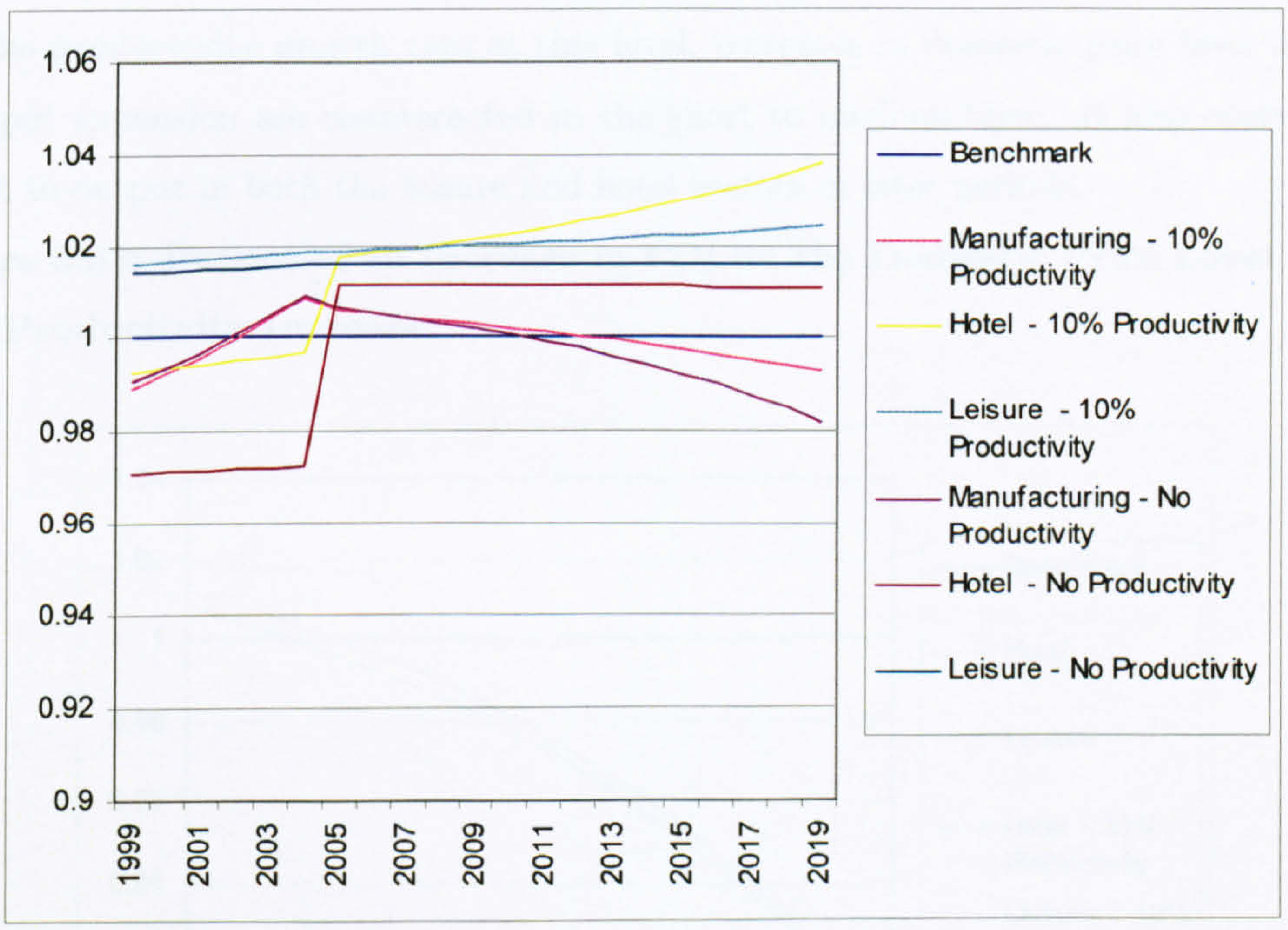
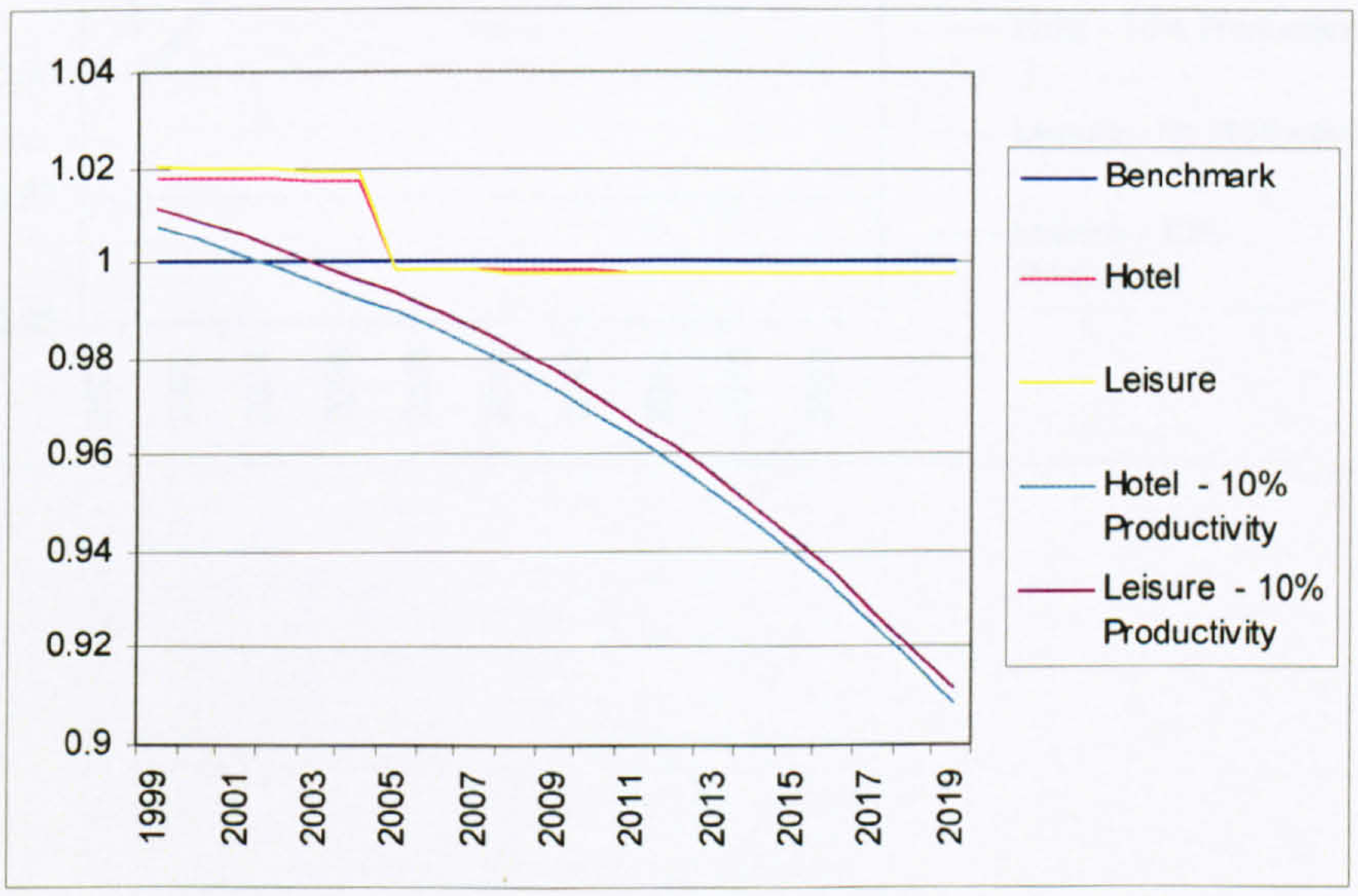


Figure 5.33 shows how the increased productivity affects the domestic price level. In the productivity case the relative domestic price level in those sectors that actually receive FDI declines significantly. In the hotel sector for example, the relative domestic price level falls by as much as 8% over the models time horizon. The domestic price level still rises above benchmark

levels during the periods of the FDI inflow. This is due to the same reasons observed in the previous simulations relating to asset purchase bidding up the cost of capital. However, the productivity increases associated with foreign capital drive down costs and hence prices.

The steep downward sloping nature of the curve reflects the accumulation of FDI in the sector. When the counterfactual is imposed, it increases the share of foreign capital used by the recipient firm and its overall productivity. As foreign capital is more productive, more earnings will accrue to it and due to the assumption of zero profit repatriation, they will be reinvested. Thus foreign capital accrues in an almost exponential fashion and the effects on the domestic price level and output are amplified over the time horizon. A similar effect is observed in the leisure sector. While the domestic price level initially rises by around 1% due to the domestic tourism driven output expansion observed in this sector, the domestic price level declines considerably in later periods as foreign capital accumulated. It appears that by setting the productivity growth rate at this level, increases in domestic price level associated with output expansion are counteracted in the short to medium-term. It also contributes to the boost to output in both the leisure and hotel sectors in later periods.

Figure 5.33: Impact of an Increase in FDI on the Domestic Price Level – CRTS Model, Productivity Increase



When the productivity shock is introduced, the quantity of both capital and labour rise in the FDI recipient sectors. This can be seen in Figure 5.33 and 5.34. Factor earnings rise by approximately 1% in both the hotel and leisure sectors. This is unsurprising given the increases in output observed in Figure 5.32. However, earnings will fall in the non-recipient sectors such as manufacturing, due to the increased resource movement effect described earlier. What is interesting about this particular result is that the increases observed in the labour supply in section 5.4.2 are smaller in this simulation. This is because labour is now used more productively by firms. This result occurs despite the higher levels of output in this simulation. In addition to this, the growth rate of new investment increases by a lesser amount than the non-productive case as less capital resource is required to meet demand.

Figure 5.34: Impact of an Increase in FDI on Quantity of Labour in Value Added – CRTS Model, Productivity Increase

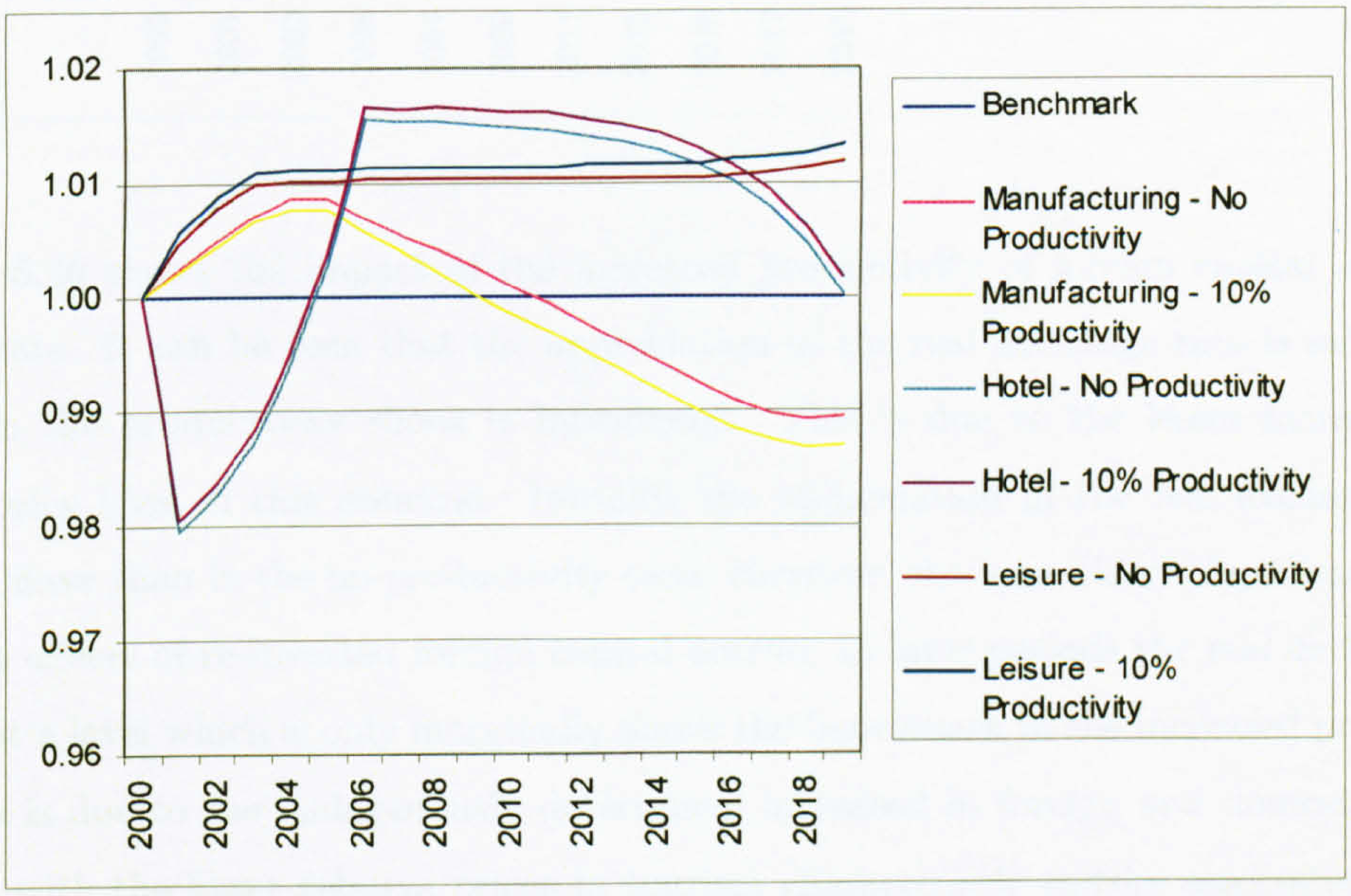


Figure 5.35: Impact of an Increase in FDI on Quantity of Capital in Value Added – CRTS Model, Productivity Increase

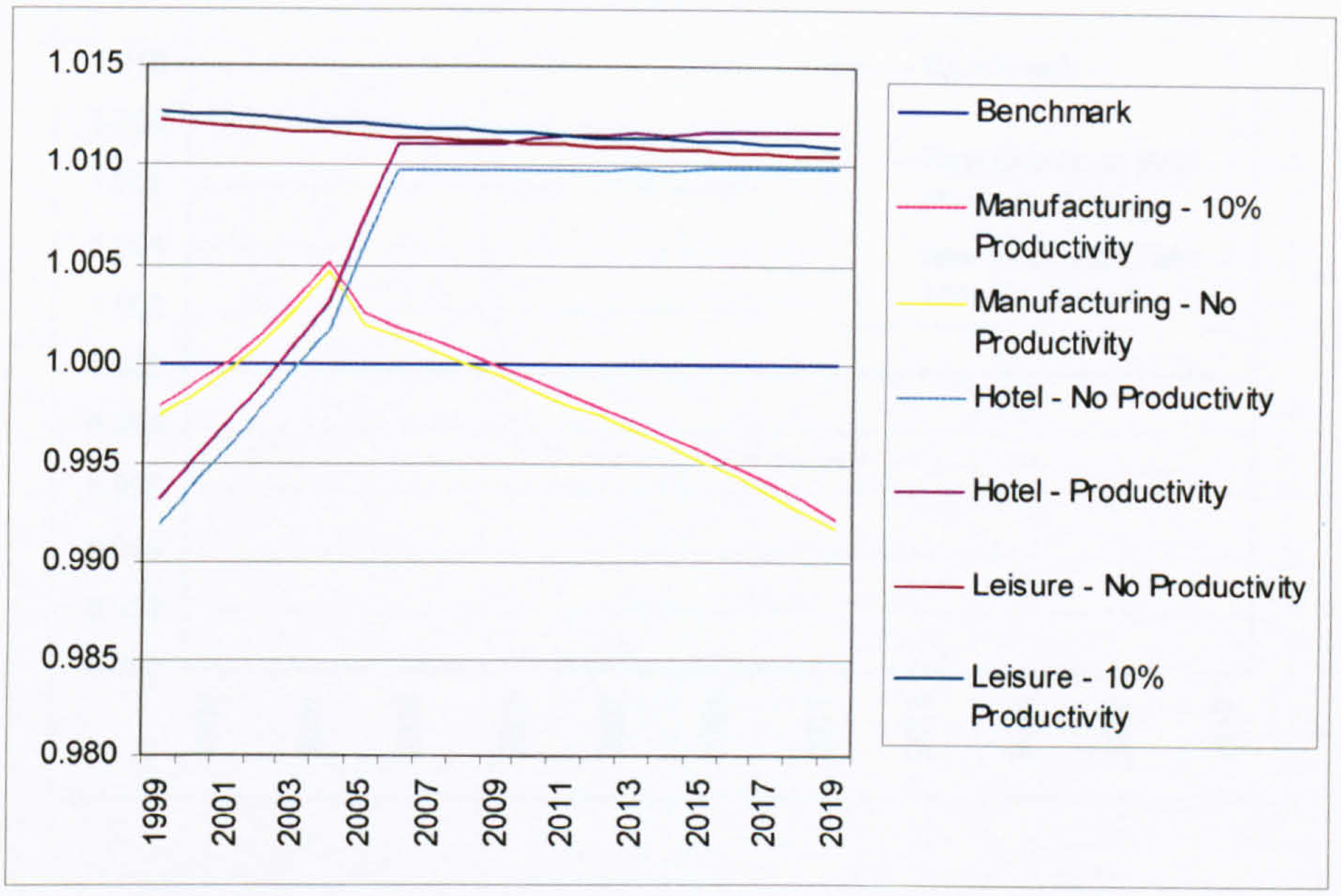


Figure 5.36 shows the impact of the increased productivity of foreign capital on the real exchange rate. It can be seen that the appreciation of the real exchange rate is substantially lower when the productivity shock is introduced. This is due to the lesser increase in the domestic price level in this scenario. Initially, the appreciation in the real exchange rate is only 0.1% lower than in the no-productivity case. However, this gap widens significantly as the cumulative effects of re-invested foreign capital accrue. In later periods the real exchange rate stabilises at a level which is only marginally above the benchmark in the increased productivity case. This is due to the endogenously determined increased in foreign and domestic tourism associated with the lower relative prices in tourism characteristic sectors associated with the FDI inflow.

Figure 5.36: Impact of an Increase in FDI on the Real Exchange Rate – CRTS Model, Productivity Increase

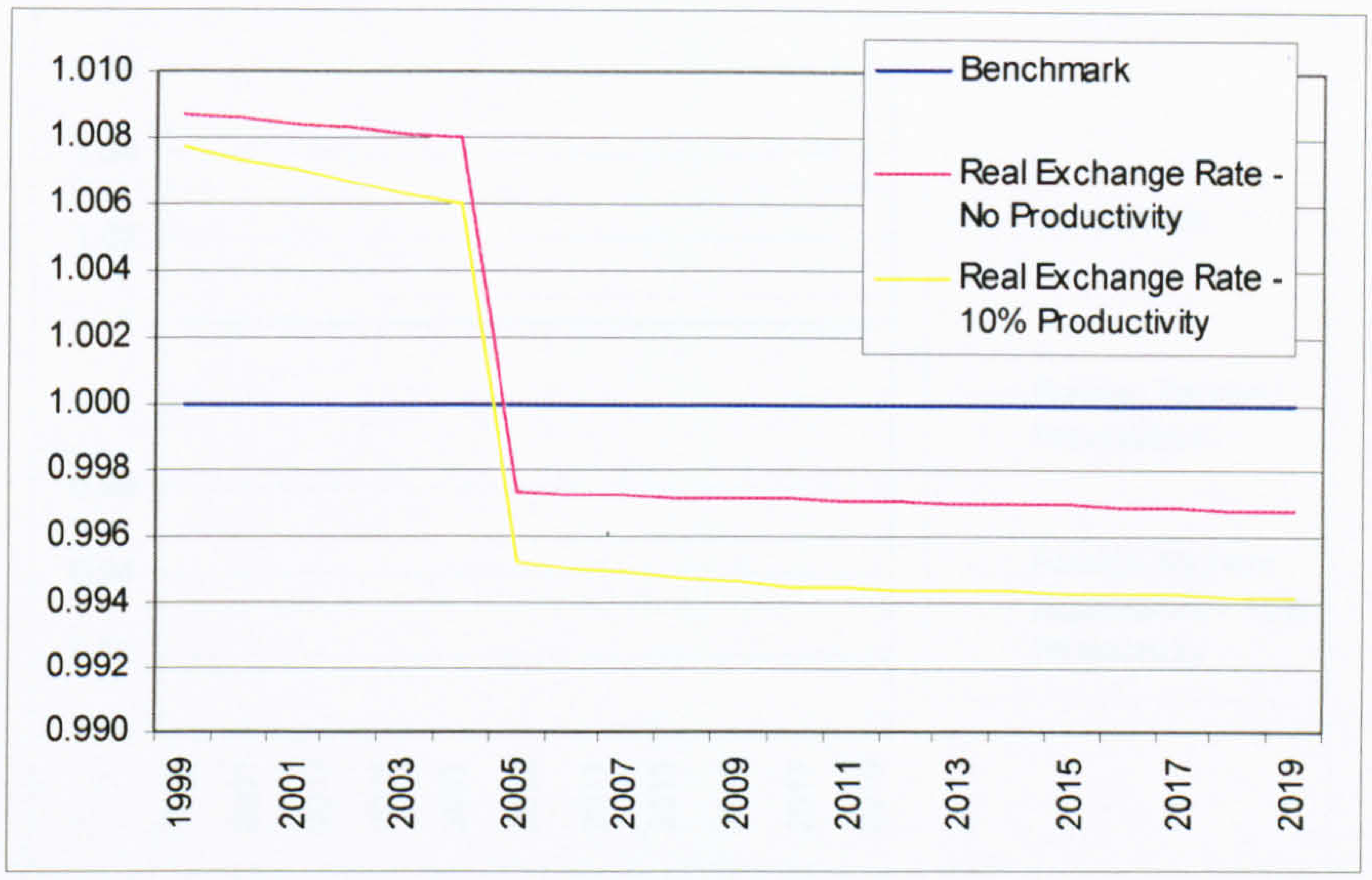
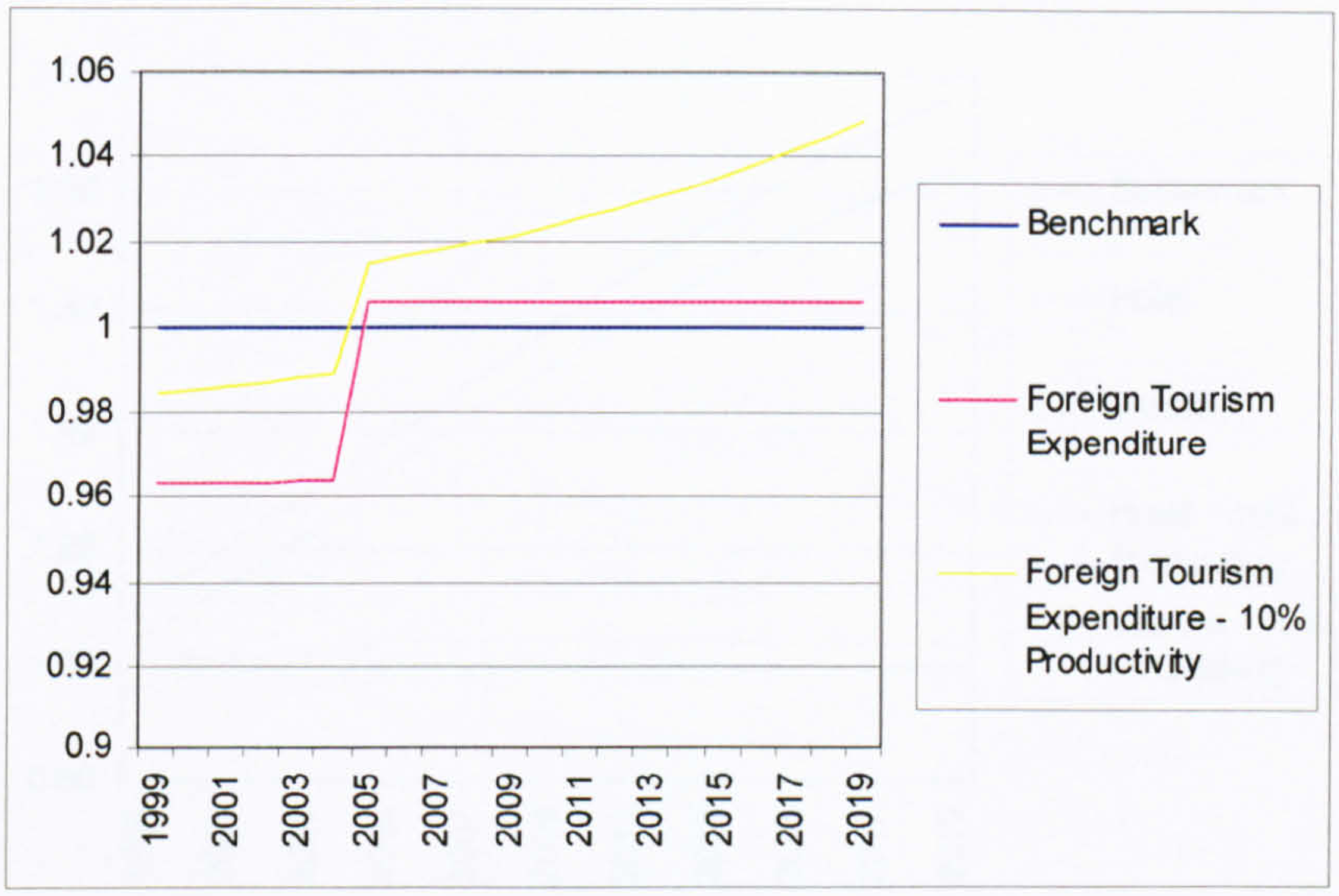


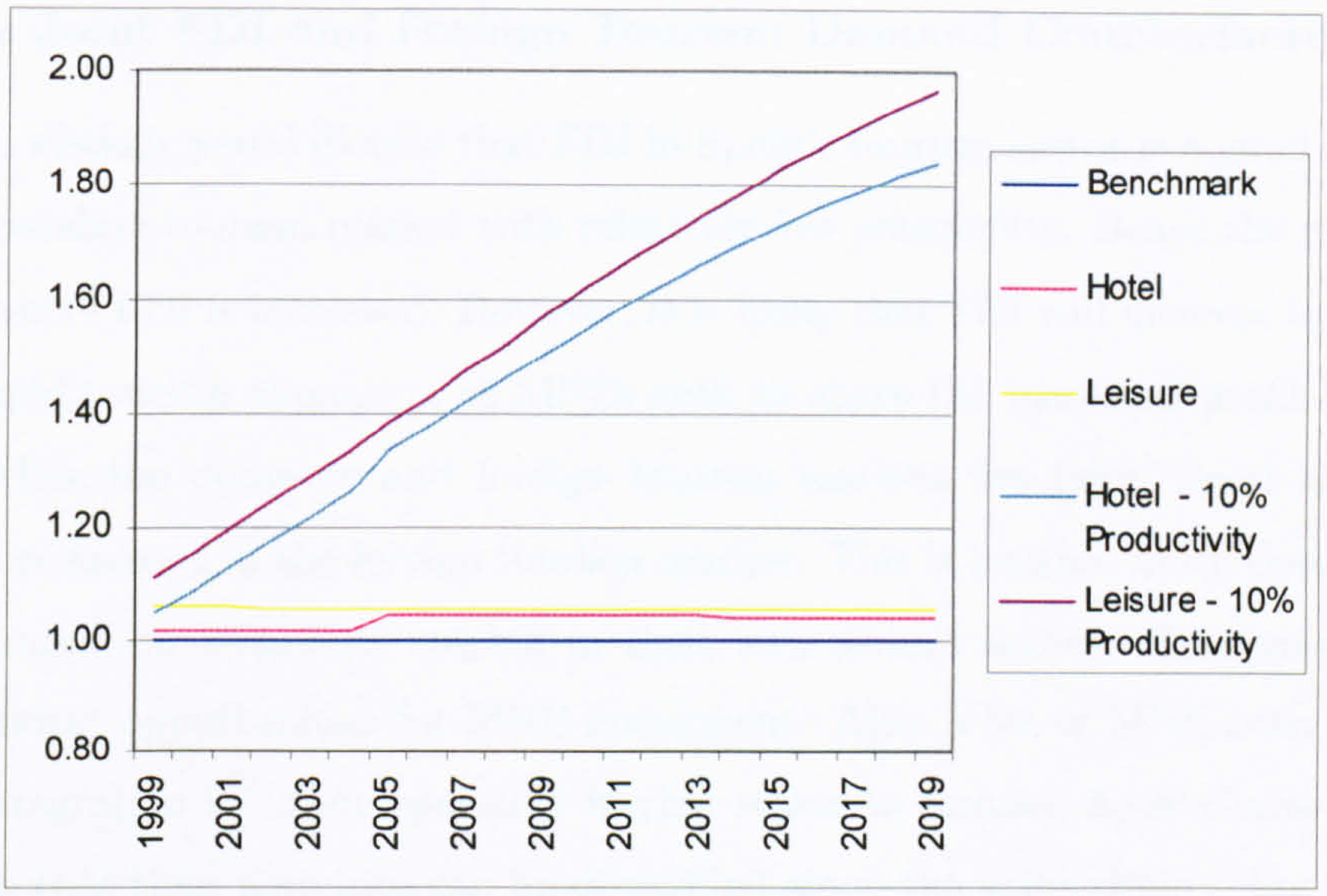
Figure 5.35 shows how foreign tourism expenditure reacts to the increase in FDI and foreign capital productivity. As is observed in the no-productivity case the pattern of foreign tourism expenditure is the inverse of the real exchange rate. Foreign tourism expenditure again declines during the periods of the FDI inflow, but this decline is lower due to the smaller increase in the domestic price level observed in this scenario. It can be seen in later periods that there is significant growth in foreign tourism expenditure above the no-productivity case, in some periods this is in excess of 2%. The decline in the price of tourism products associated with the productivity shock in the FDI recipient sectors generates a mini tourism boom.

Figure 5.37: Impact of an Increase in FDI on Foreign Tourism Expenditure – CRTS Model Productivity Increase



As foreign capital is more productive in the counterfactual more earnings will accrue to it. This is evident in Figure 5.38 which shows the earnings attributable to foreign capital. Large increases in foreign capital earnings are observed in all sectors that receive additional FDI in the counterfactual. In the leisure sector for instance foreign capital earnings nearly double over the time horizon. A similar effect is observed in the hotel sector, although the effect is slightly smaller as output increases by less in this sector. The magnitude of this effect is unsurprising given the scale of the productivity shock, the level of re-investment and the relatively small amount of foreign capital in the benchmark.

Figure 5.38: Impact of an Increase in FDI on Earnings Attributable to Foreign Capital – CRTS Model, Productivity Increase



This section has shown that by assuming that FDI is more productive than domestic capital significant changes in the structure of the model results occur. Of particular interest is the observed result whereby the foreign capital inflow endogenously generates a tourism mini-boom. Again the fundamental structure of the results are unchanged by the introduction of the productivity shock, but it can be seen quite clearly that the increased total factor productivity has a significant impact on the relative magnitude of the results and is an important parameter to try and quantify.

5.5 Model Results: Comparing an Increase in FDI and Foreign Tourism Expenditure

It was observed in the previous section that the output of some tourism characteristic sectors and foreign tourism expenditure actually fall when the model is shocked with an exogenous increase in tourism related FDI. A primary motivation for FDI in the Spanish tourism sector would be the fact that the sector is growing rapidly and MNEs want to share in the increased profits available. Therefore the combined effects of increased FDI and increased foreign tourism demand are compared.

5.5.1 The Joint FDI and Foreign Tourism Demand Counterfactual

Conventional wisdom would dictate that FDI in Spain's tourism sector is a good idea. It has a large and expanding tourism market with relatively low seasonality. Hence the previous set of simulations where FDI is increased. However, it is likely that FDI will increase by more during periods of rapid tourism expansion as MNEs seek to share the increased profit opportunities available. While the domestic and foreign tourism markets are fairly equal in size. MNE activity is more focused in the foreign tourism market. This is because much domestic tourism activity is focused on Spaniards staying in their own second homes. This market does not present significant opportunities for MNE investment. Also, a lot of MNE activity is focused on vertical integration i.e. tour operators buying stakes in airlines, hotel chains and hire car companies, so that their activities can be diversified along the value chain . On this basis the dual effects of an increase in foreign tourism demand and the increase in FDI specified in the first simulation are compared. Both foreign tourists and MNEs will have to purchase Spanish currency in order to be able to visit or invest in Spain, so the combined effects of increased FDI and foreign tourism demand on the real exchange rate will be of interest.

For the purposes of this comparison the counterfactual is designed so that the FDI shock occurs in the years 1999-2005, while the concurrent foreign tourism demand shock is permanent and is assumed to be constant in all periods at the level of 10% above the benchmark. The FDI counterfactual is identical to the one used throughout this Chapter.

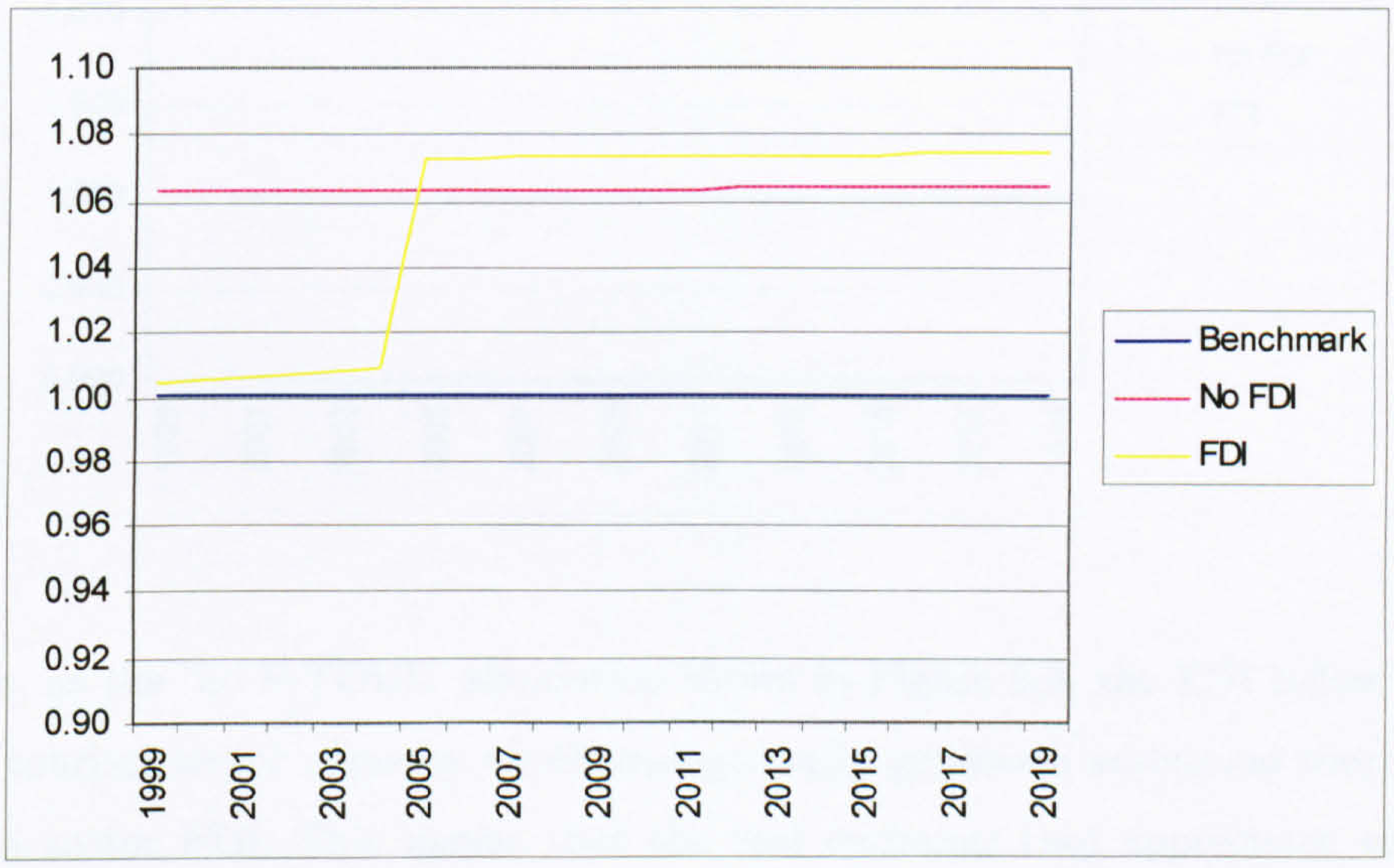
The capacity effects that the increased FDI generates can be evaluated on the foreign tourism inflow in terms of foreign tourism expenditure. So as to be able to determine the influence of increased FDI on the foreign tourism demand shock, two alternative situations are compared. Firstly, the impact of the increased foreign tourism demand shock is evaluated in a counterfactual without additional FDI. This is then compared to a dual scenario with both increased foreign tourism demand and increased FDI. For convenience and purposes of comparison these two scenarios are referred to as the 'no FDI' and the 'FDI' case. It is also useful to compare the results of this analysis with those in the previous section where an FDI shock is considered without any additional foreign tourism demand. For convenience this case is referred to as the no foreign tourism case or 'no F-TOUR'.

5.5.2 Results from the CRTS Model

Results for this section are presented in Figures 5.39 through to 5.49 as in the previous section each plot represents the relative deviation from the benchmark value expressed in relative value terms.

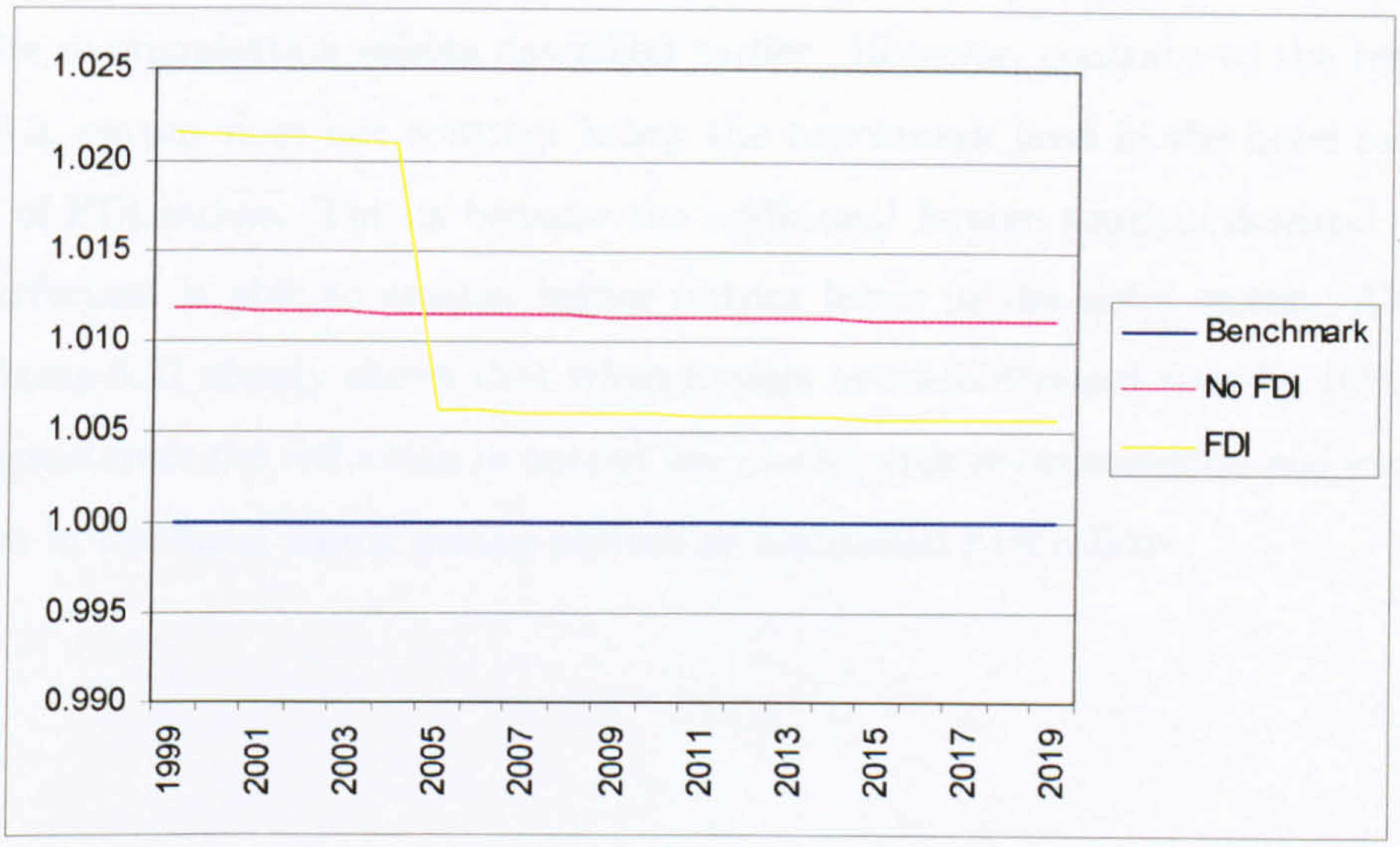
Figure 5.39 shows the impact of these simulations on foreign tourism expenditure. Results for both the foreign tourism demand shock without FDI and the foreign tourism demand shock with FDI are compared. In the no FDI case it can be seen that a foreign tourism demand shock of 10% above benchmark levels per annum yields a steady 6% increase in foreign tourism expenditure per annum. The reason that foreign tourism expenditure does not rise by 10% is because of an appreciation in the real exchange rate. This effect is termed the diffusion effect, since the full benefits of the tourism demand shock are diffused and do not reach the recipient economy. The diffusion effect is observed throughout this thesis and can be explained as follows. As foreign tourists demand more Spanish goods and services, consumption increases and their price will rise. This leads to a rise in the domestic price level and an appreciation in the real exchange rate. An appreciation in the real exchange rate implies that foreign goods have become less expensive relative to domestic goods and that the purchasing power of foreign currency has declined. This means that holidays in Spain become more expensive for foreign tourists and they will substitute away from the region and the full impact demand shock is diffused. What can also be seen in Figure 5.37 is that when the dual shock is imposed on the model, during the periods of the FDI inflow the foreign tourism demand shock is almost completely diffused. However, this does represent a significant improvement on the almost 4% decline observed in Figure 5.5. Effectively the increased tourism demand inflow neutralises the short-term adverse effects that the FDI inflow has on foreign tourism expenditure. However, the scale of the foreign tourism demand shock is larger than the FDI shock, so it would be expected that a larger compensatory effect would occur during periods of dual increased foreign tourism and FDI flows. But this is not the observed effect, foreign tourists effectively experience increased prices due to FDI inflows and competition with other tourists for tourism products. Therefore the real exchange rate appreciates by more and the higher price rise during these periods translates into an even larger diffusion effect. While the result is intuitive, it shows that a substantial increase in foreign tourism demand is needed to counter the adverse effects that an FDI inflow has on foreign tourism expenditure. In the counterfactual both the increase in foreign tourism and the increase in FDI are of an equivalent percentage size. Therefore it is possible to infer that percentage increases in foreign tourism demand must be in line with percentage increases in tourism sector FDI for foreign tourism expenditure gains to be realised. Although it can also be inferred from Figure 5.39 that during the periods following the FDI shock or during periods in which foreign tourism demand growth is larger than tourism FDI growth, the gains to foreign tourism expenditure are significant.

Figure 5.39: Comparing increases in FDI and Foreign Tourism Demand on Foreign Tourism Expenditure – CRTS Model



The effects of FDI complicate this explanation a little. The effects of FDI on the real exchange rate have been noted in the previous section. FDI inflows lead to an appreciation in the real exchange rate since foreign investors drive up the price of domestic capital goods which in turn leads to a rise in the domestic price level. The combined effects of additional FDI inflows and foreign tourism demand on the real exchange rate mean that the appreciation is greater than where separate FDI or foreign tourism demand shock are imposed on the model. This is shown in Figure 5.40 where the real exchange rate level increases by around 0.5% when the foreign tourism demand shock is combined with the FDI shock. As is the case in the 'no F-TOUR' example in the previous section, during the periods in which FDI is arriving in the economy between 1999 and 2004 the real exchange rate appreciates by an additional 0.85%. Again the magnitude of the appreciation declines in later periods of the model when the FDI inflow subsides.

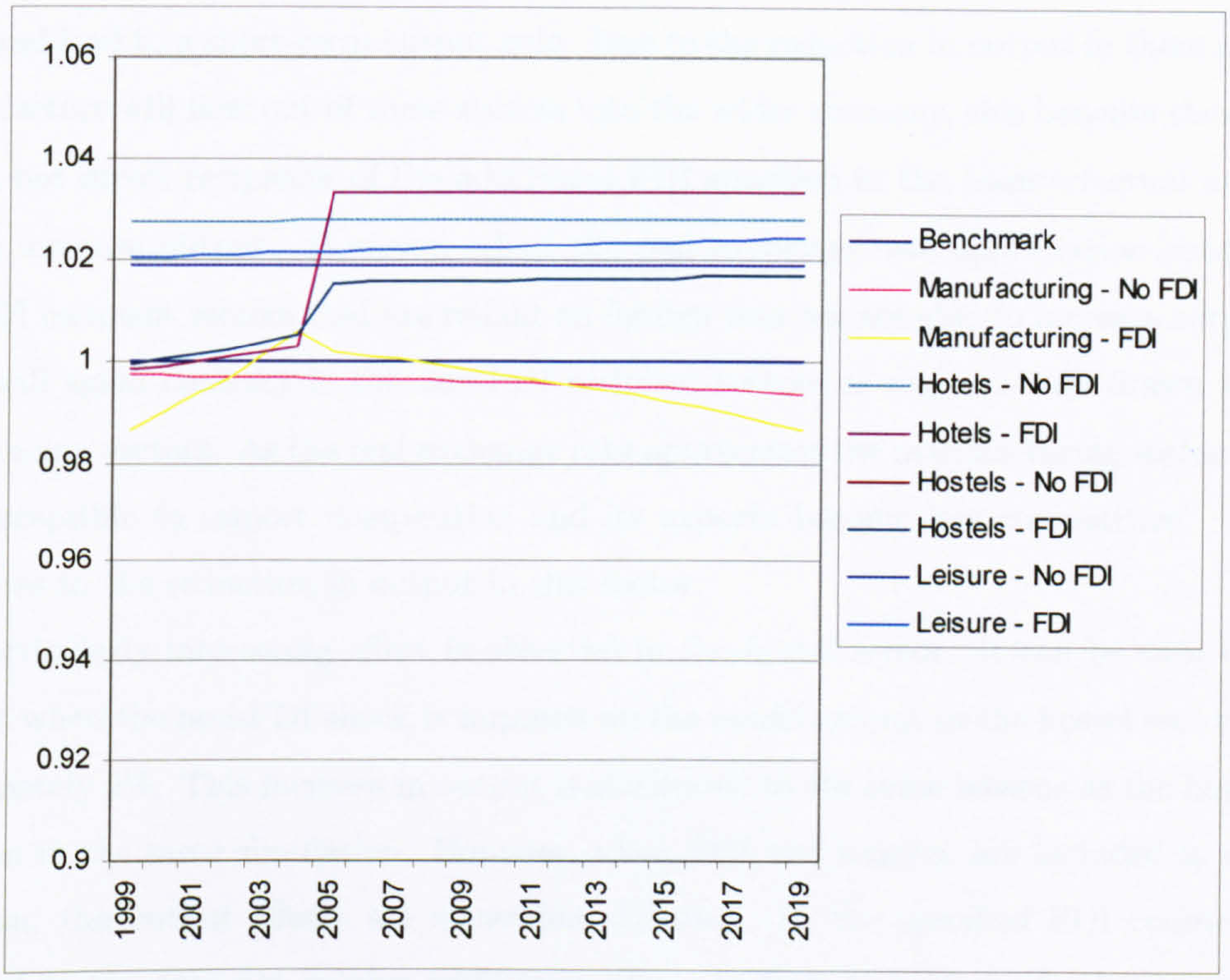
Figure 5.40: Comparing increases in FDI and Foreign Tourism Demand on the Real Exchange Rate – CRTS Model



However, as the 'no F-TOUR' simulation shows in Figure 5.3, the FDI inflow leads to an increase in tourism sector capacity which endogenously generates additional tourism demand and tourism sector FDI. This means that the real exchange rate appreciates still by more when the FDI and foreign tourism demand shocks are combined. The value of the additional endogenously determined foreign tourism expenditure attributable to the FDI can be seen in Figure 5.39 as leads to an additional 0.8% of foreign tourism consumption. This means that the diffusion effect is smaller in the FDI case after the FDI inflow has subsided.

Figure 5.41 shows the impact of the tourism and FDI shocks on sectoral output. As foreign tourism demand has increased in both of the scenarios evaluated in this section, output in the tourism characteristic sectors expands. This is as predicted by both Corden and Neary (1982), Copeland (1991) and the Dutch Disease literature. In the case of the foreign tourism expenditure shock with no additional FDI the 6% increase in foreign tourism expenditure translates into an approximate 2.8% rise in hotel output. When the foreign tourism and FDI shocks are combined and additional 0.5% of hotel output is generated above the 'no FDI' case in the later periods of the model when FDI shock has subsided after the year 2005. This is due to the additional capacity in the hotel sector that the FDI creates. As in the earlier FDI simulations, when additional FDI is introduced into the model there is a deviation in steady state output expansion due to the impact that the additional FDI has on the appreciation of the real exchange rate and the re-organisation effects described earlier. However, contrary to the results shown in Figure 5.3, output does not contract below the benchmark level in the hotel sector during the period of FDI inflow. This is because the additional foreign tourism demand specified in this counterfactual is able to sustain higher output levels in the hotel sector. Although the result in Figure 5.41 clearly shows that when foreign tourism demand rises by 10% this is not enough to counteract the reduction in output associated with re-organisation and exchange rate appreciation in the hotel sector during periods of additional FDI inflow.

Figure 5.41: Comparing increases in FDI and Foreign Tourism Demand on Sectoral Output – CRTS Model



Another effect observed in previous set of simulations and in the "Dutch Disease" literature referenced in chapter 3 is the *resource movement* effect whereby the demand expansion in the boom sector will raise the marginal product of associated mobile factors. The consequence of this is that these factor resources will be "drawn out" of the less profitable sectors with low levels of tourism consumption and into the higher more productive tourism characteristic sectors.

Evidence of the resource movement effect can be observed by examining the output of the manufacturing sector, which is shown to contract by around 0.3% below the benchmark level in the case of the no FDI foreign tourism demand shock. When FDI is introduced to the model the effect is somewhat different. In this scenario manufacturing output mirrors the result in Figure 5.3 and the output trajectories have the same kinked shape. The explanation for the results does not differ and the result is driven by the decline in output in the those sector with high levels of foreign tourism consumption, which experience a decline in output due to the appreciation in the real exchange rate this causes resources to flow into the non FDI recipient sectors and lead to a short-term output gain. Due to the reduction in output in these particular sectors, factors will flow out of these sectors into the wider economy, this benefits those sectors that are not direct recipients of the additional FDI specified in the counterfactual and allows them to increase output. However, when the real exchange rate appreciation subsides and those FDI recipient sectors that are reliant on foreign tourism are able to increase output, then output will again contract in the non-FDI recipient sectors as resources are drawn back into the expanding sectors. As the real exchange rate appreciates the manufacturing sector becomes more susceptible to import competition and its exports become less competitive. This also contributes to the reduction in output in this sector.

A particularly interesting effect is observed in the hostel sector. It can be seen in Figure 5.41 that when the non-FDI shock is imposed on the model output in the hostel sector rises by approximately 2%. This increase in output is attributed to the same reasons as the hotel sector expansion in the same simulation. However, when FDI and tourism are included in the same simulation, the output effects are somewhat different. In the specified FDI counterfactual, the hostel sector does not receive additional FDI – in fact, there is no foreign capital stock specified in the benchmark dataset.[18] The structure of the hostel and hotel sector are quite similar, both are heavily reliant on foreign tourism consumption. The same real exchange rate driven output effects are observed in the early periods in the hostel sector. However, when the FDI inflow subsides, output is actually lower in the FDI case as opposed to the no-FDI case. While Figure 5.26 shows that this effect is marginal, the nature of the result is still of interest. Those tourism characteristic sectors that receive additional FDI in the counterfactual are able to draw resources from other sectors more effectively due to their additional purchasing power associated with the FDI. This has an adverse effect on the hostel sector as it is outbid for factor resources and this limits its expansion.

The ordering of the results with regard to the leisure sector is also of interest. In the 'no-FTOUR' case shown in Figure 3, leisure sector expansion is much larger than hotel sector

[18] Foreign capital is however free to spillover from the recipient sector and flow into any sector of the economy, whether it has a foreign capital stock or not.

expansion. This is largely because of the fact that the leisure sector is insulated from the appreciation in the real exchange rate. However, when the foreign tourism demand shock is introduced to the counterfactual, the hotel sector benefits significantly due to the higher level of foreign tourism consumption in final demand. The impacts on the leisure sector are much lower as it has a much lower level of foreign tourism consumption.

Figure 5.42: Comparing increases in FDI and Foreign Tourism Demand on GDP Growth – CRTS Model

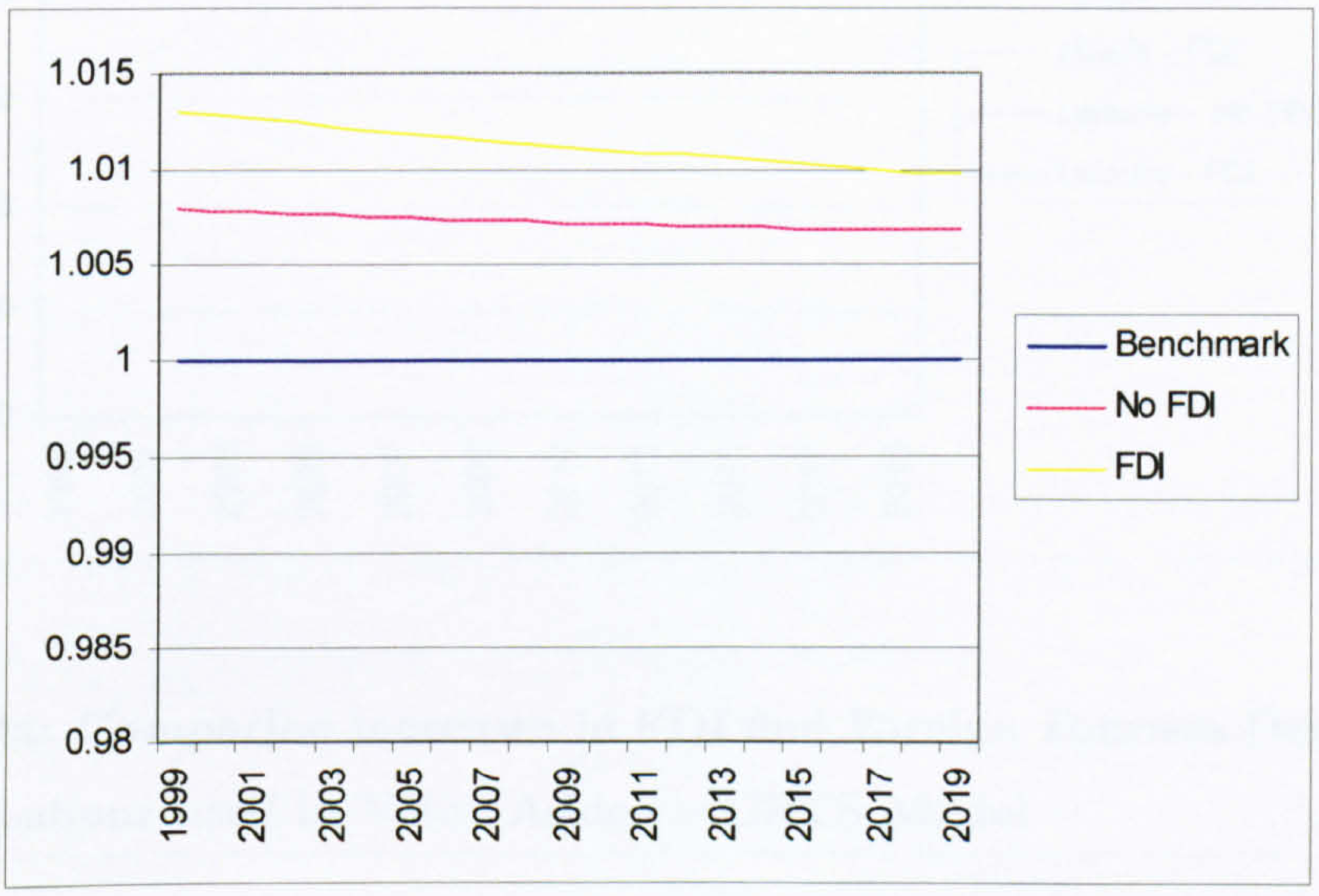


Figure 5.42 gives details of the FDI and non-FDI foreign tourism demand counterfactuals on GDP growth. It can be seen that in non-FDI foreign tourism demand counterfactual GDP grows at approximately 0.08% per annum above benchmark levels. This growth rate reflects the constant nature of the tourism demand shock. In the FDI case a larger GDP growth is observed, this is partly because of the extra capital inflow contributing to value added and the extra capacity that the FDI creates. Evidence of diminishing returns to capital are present due to the downward sloping nature of the GDP trajectory.

Figure 5.43: Comparing increases in FDI and Foreign Tourism Demand on the Quantity of Capital used in Value Added – CRTS Model

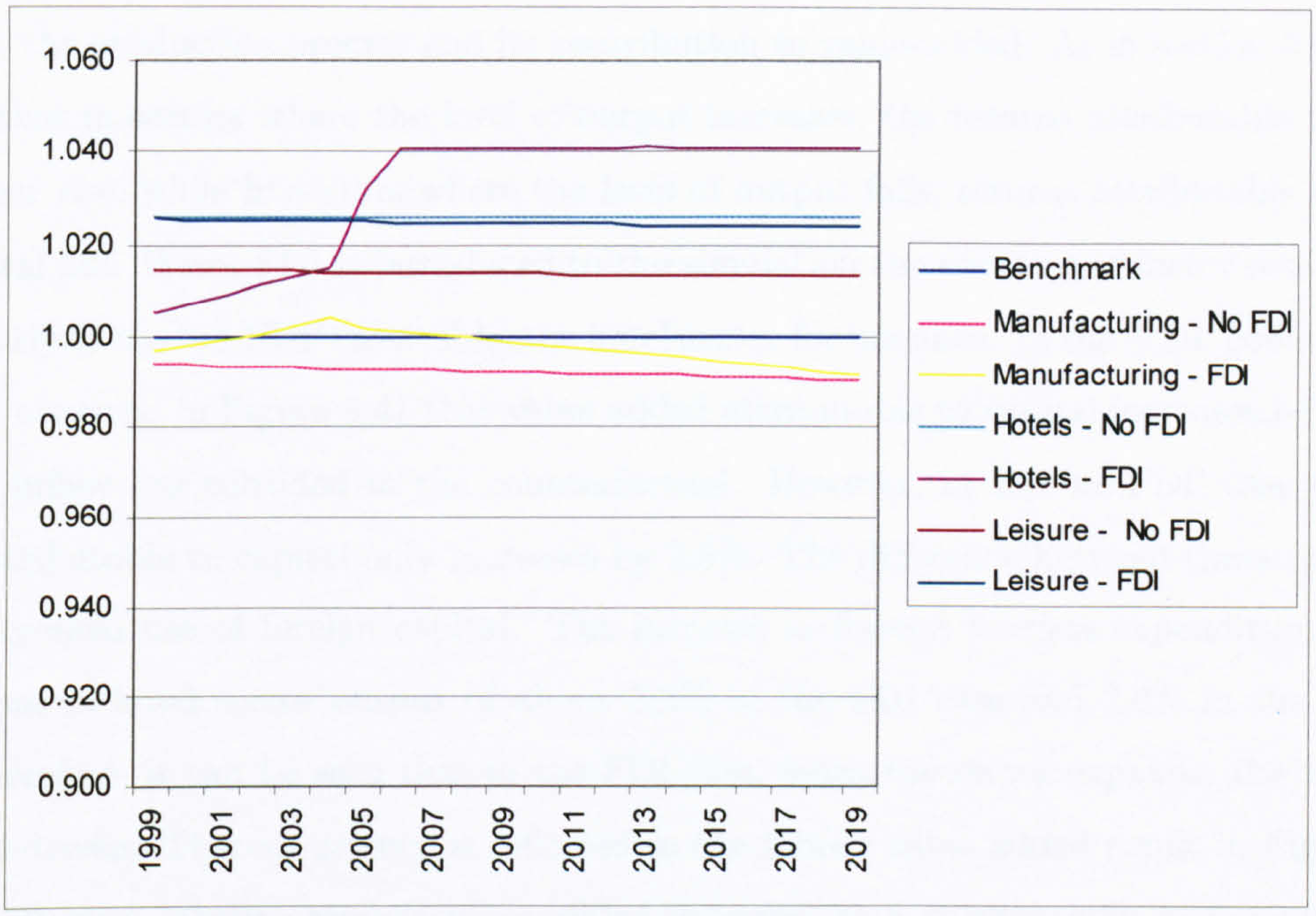
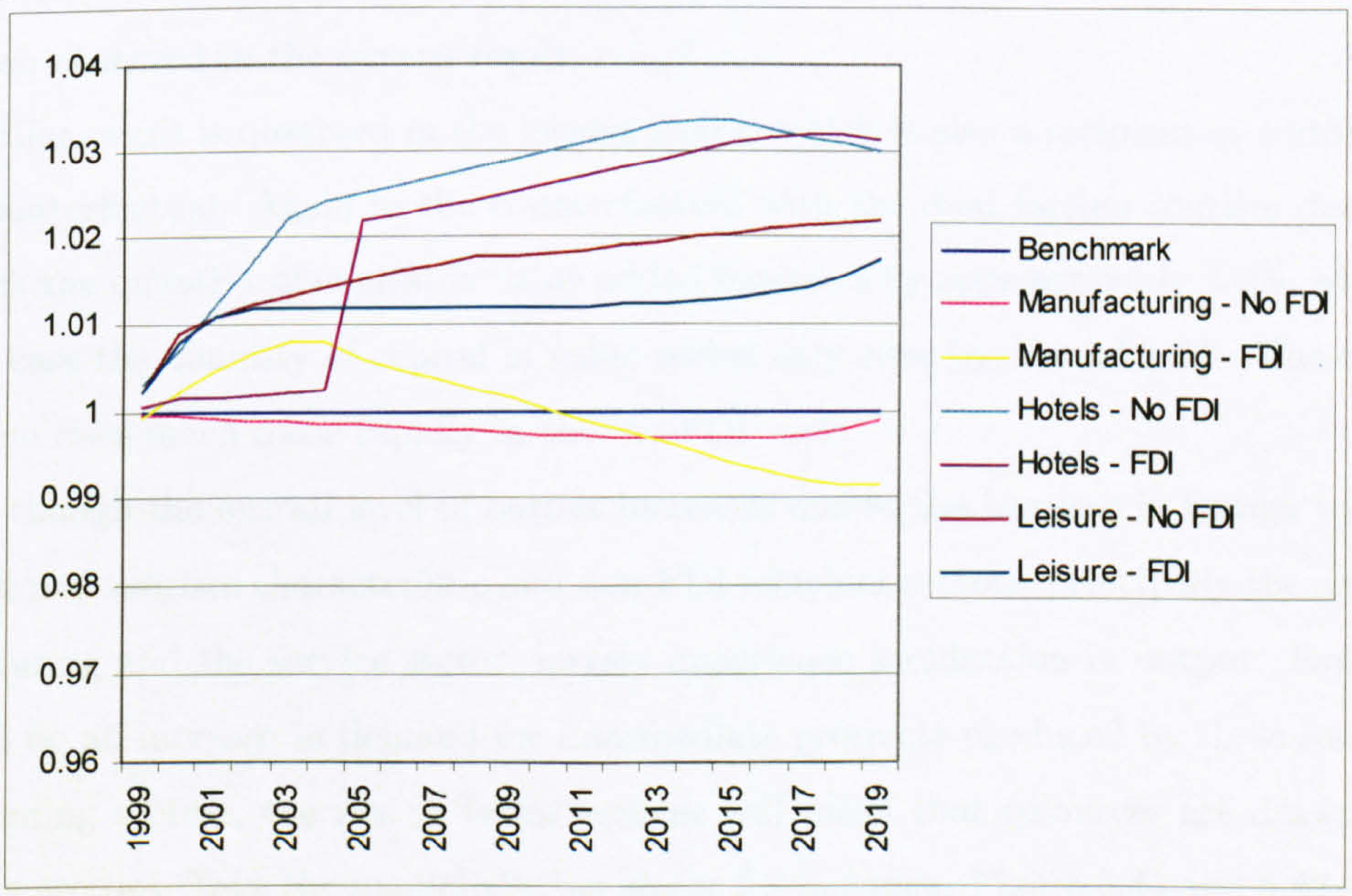


Figure 5.44: Comparing increases in FDI and Foreign Tourism Demand on The Quantity of Labour used in Value Added – CRTS Model



Figures 5.43 and 5.44 show the impact of the two counterfactuals on the use of capital and labour in the production process and its contribution to value-added. As in section 5.4.2 it can be seen that in sectors where the level of output increases, the returns attributable to capital and labour rise, while in sectors where the level of output falls, returns attributable to labour and capital fall. When FDI is introduced to the simulation the patterns of factor returns differ significantly to the 'no-FDI' case. Take the hotel sector for instance. In the 'FDI' counterfactual it can be observed in Figure 5.41 that value added attributable to capital increases by 4% after the FDI inflow has subsided in the counterfactual. However, in the 'no-FDI' case the value added attributable to capital only increases by 2.5%. The difference between these two results is the increased use of foreign capital. The increase in foreign tourism expenditure leads to an increase in hotel sector output of about 3.3% in the FDI case and 2.8% in the 'no-FDI' case. Therefore, it can be seen that in the FDI case, when the sector expands, the expansion is capital driven. This occurrence is reflected in the labour value added result in Figure 5.44. In the FDI case, labour earnings value added increases as a substantially higher rate in the 'no-FDI' case than the 'FDI case', even though hotel sector output expands by more in the FDI case. Again in the FDI case the trajectory for the quantiy of capital in value added has the kinked shaped characteristic of the real exchange rate appreciation and the re-organisation of production observed in the output result.

A similar result is observed in the leisure sector, which is also a recipient of additional FDI in the counterfactual. Again in the counterfactual with the dual foreign tourism demand and FDI shock the quantity of capital in value added increases by approximately 2.8%, while in the 'no FDI' case the quantity of capital in value added only rises by around 1.6%. The quantiy of labour also rises much more rapidly in the 'no-FDI' case.

Even though the overall level of output increases due to the increase in foreign tourism expenditure non-tourism characteristic and non-FDI recipient sectors, principally the agriculture, manufacturing and the service sector, largely experience a reduction in output. Even though there will be an increase in demand for intermediate products produced by these sectors from the expanding sectors, the rise in factor returns will mean that resources are drawn into the expanding sectors. Take the manufacturing sector for instance. Figure 5.41 and 5.42 show that in the no-FDI case the sectors use of both labour and capital declines as factors leave the sector to earn the higher returns offered in the expanding sector.

As in the previous simulations, the capital stock increases (decreases) when there is an observed increase (decline) in output following the counterfactural. In the same way, earnings per unit of capital will increase (decrease) when there is an observed increase (decline) in output. In the 'no-FDI' case the capital stock will increase by less than in the FDI case in the tourism characteristic sectors. The can be seen in Figure 5.46; the capital stock increases by around 1.5% less in the 'no-FDI' case. The reason for this is that there is not the capacity driven expansion associated with the FDI inflow. However, in sectors where output contracts, the capital stock is seen to decline by more in the 'no-FDI' case as well. This is because there is less capital in the economy than in the 'FDI' case. In the manufacturing sector, the pattern of output is also different in the 'FDI' case due to the increase observed in 2004.

When additional tourism demand is introduced to the scenario, there is increased demand for tourism characteristic products. It has already been shown that output increases in tourism characteristic sectors. The consequence of this outcome for asset prices is that they increase by more than when foreign tourism is **not** included in the model as there is more demand for capital products to assist the demand driven expansion. The supply of investment will increase to help meet this demand and the marginal value product of capital in the factors of production will increase also. Therefore, payments to capital as a factor of production will also increase. The net effect of this outcome on per unit capital earnings is that they will be higher in the 'FDI' scenario, than those observed in section 5.4.2. Earnings in the non–FDI recipient sectors such as the manufacturing sector will decline still further in this scenario due to the higher level of capital asset prices. In the 'no-FDI' scenario, earnings per unit of capital will, in general, rise by less than in the 'FDI' scenario. The increase in asset prices is lower in this scenario. However, this is outweighed by the lower quantiy of capital due to smaller output expansion.

Figure 5.45 Comparing increases in FDI and Foreign Tourism Demand on Capital Earnings – CRTS Model

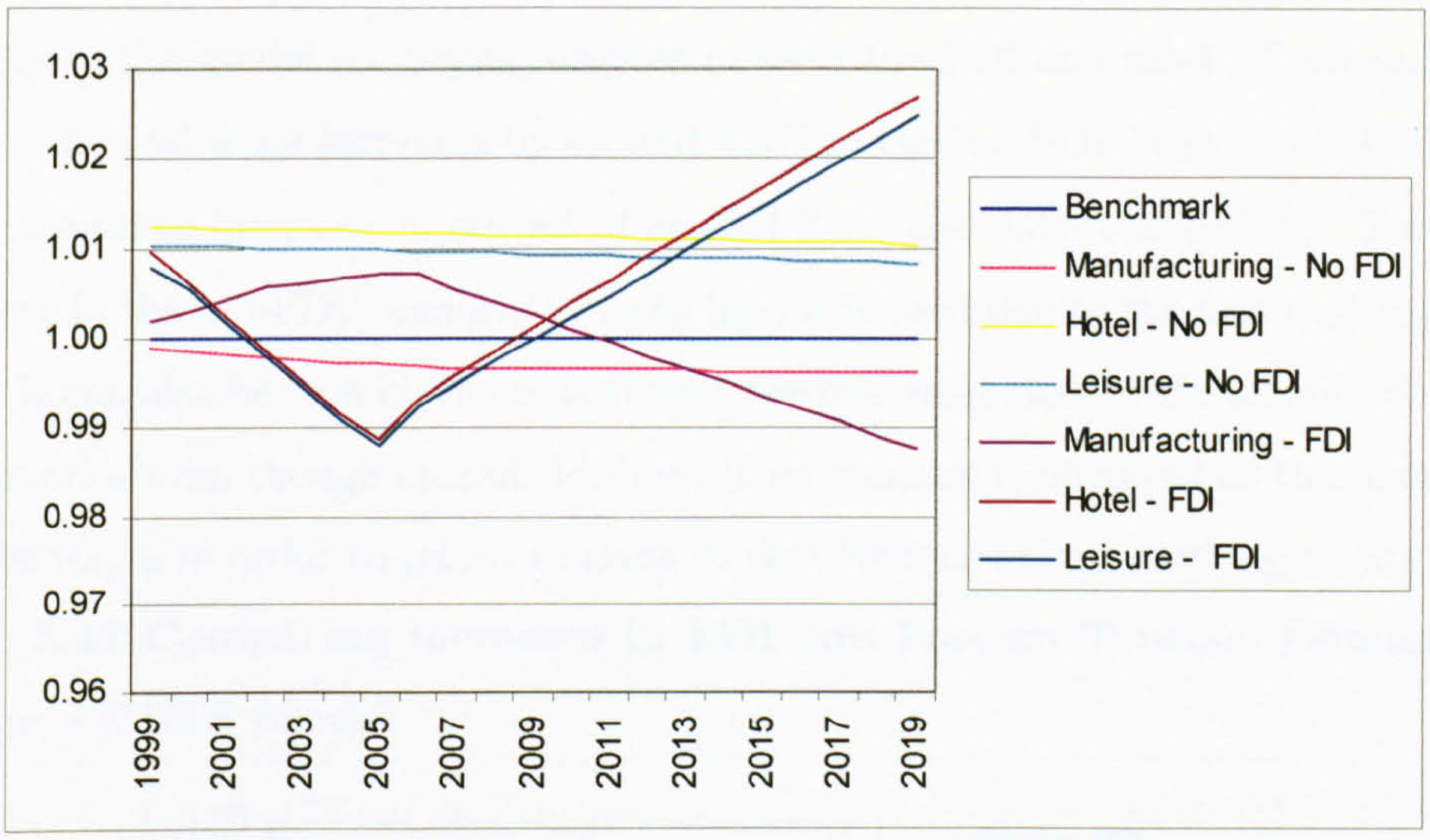
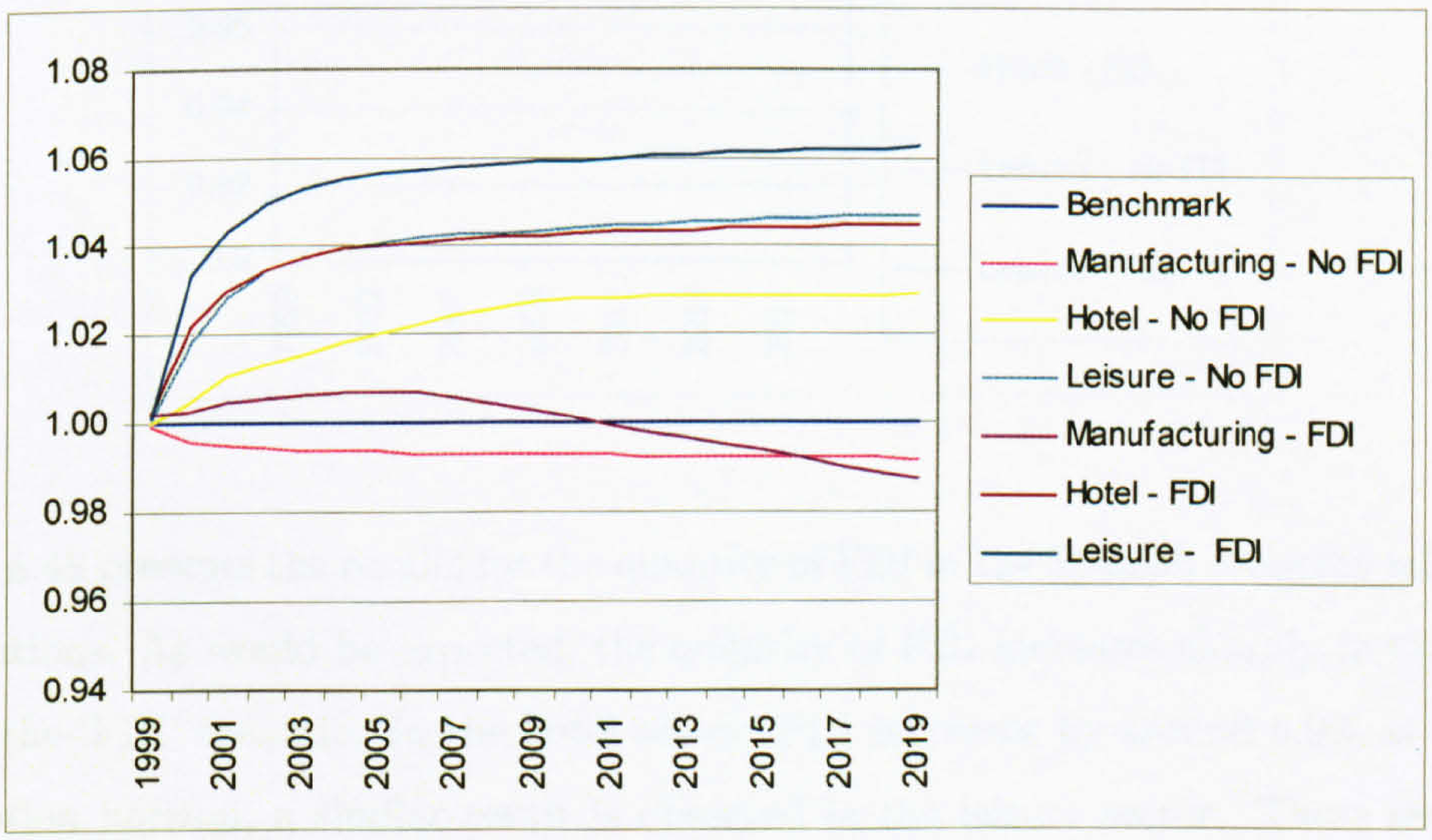


Figure 5.46 Comparing increases in FDI and Foreign Tourism Demand on the Capital Stock – CRTS Model



It has been seen in Figure 5.44 that the use of labour in value added increases in the FDI-recipient and/or tourism characteristic sectors. As has been seen in the other simulations in this Chapter, in order to attract labour resources to move into an expanding sector the returns to labour must rise relative to other sectors. This is shown in Figure 5.47, the real wage rises in all sectors in the model to varying degrees in both the FDI and 'no-FDI' scenarios. In the hotel sector the real wage increases by around 4.2% in the 'no-FDI' case and 3.9% in the FDI case as compared to increases in output of around 2.8% and 3.3% respectively. The real wage rises by more in the 'no-FDI' scenario as more labour is used due to the fact that capital is less abundant. It can also be seen in Figure 5.47 that the real wage rises in the manufacturing sector in both scenarios even though output declines. This increase is observed as the manufacturing sector raises wages in order to retain workers so that its output can meet aggregate demand.

Figure 5.47 Comparing increases in FDI and Foreign Tourism Demand on the Real Wage – CRTS Model

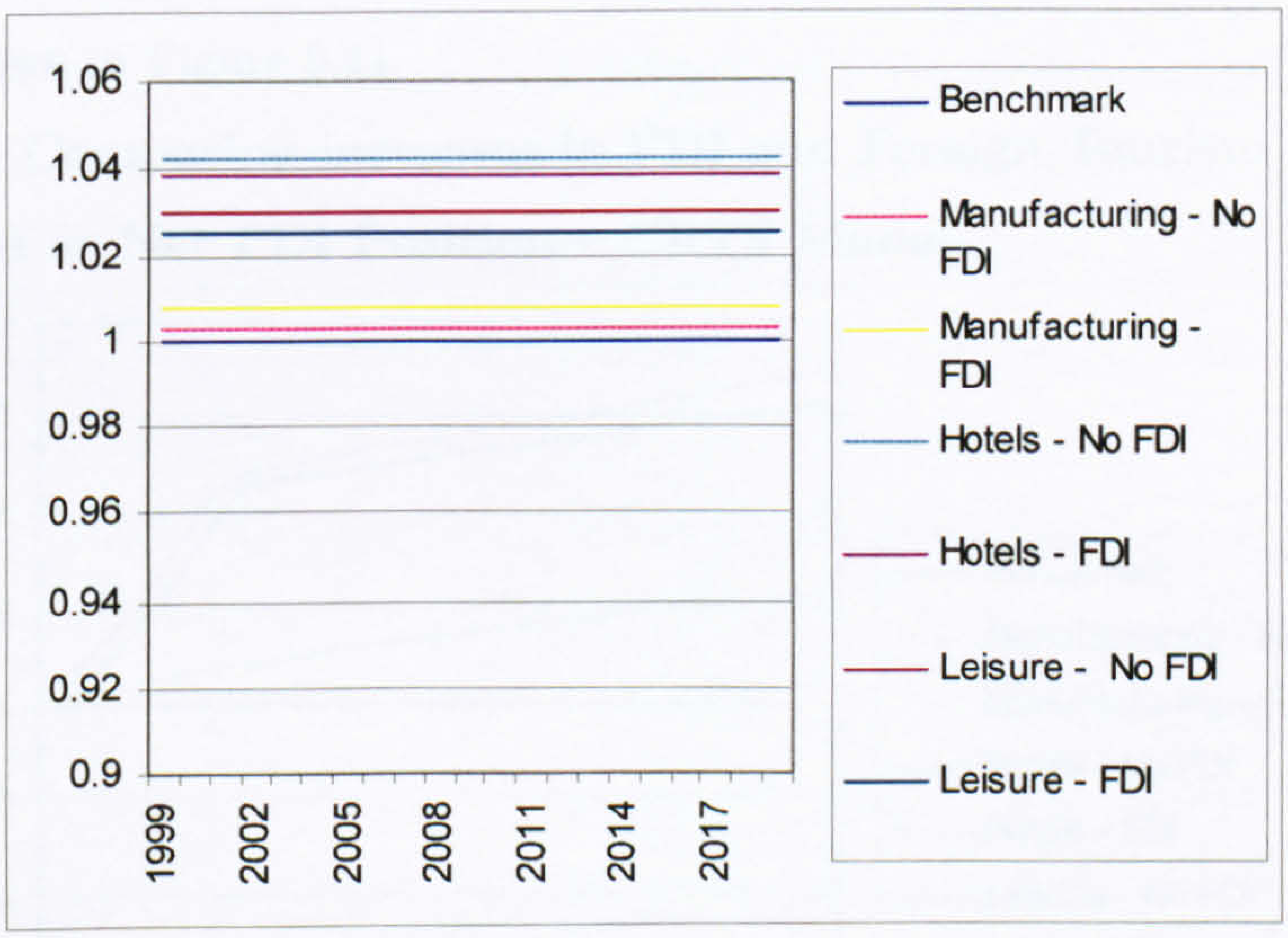
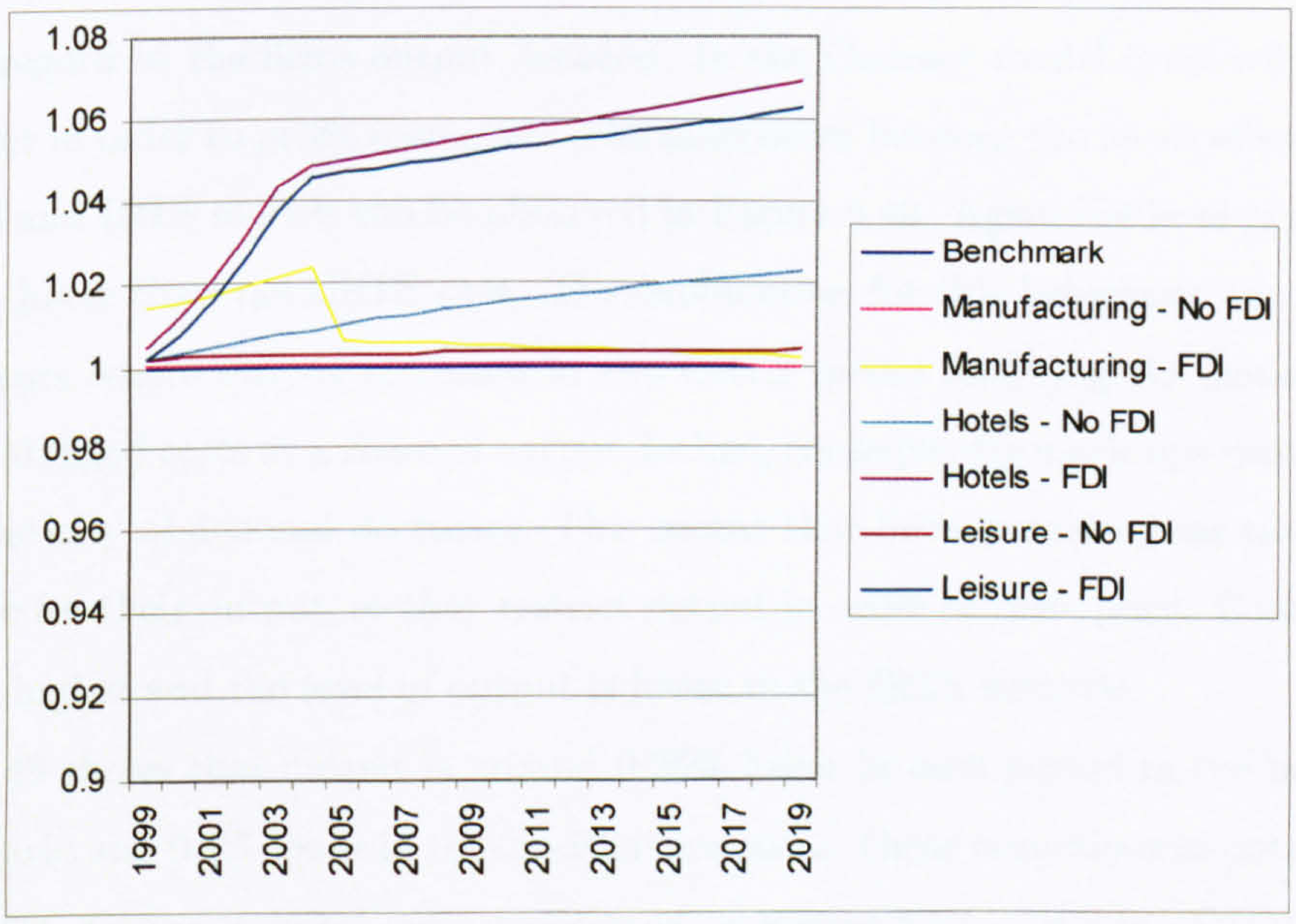


Figure 5.48 presents the results for the quantity of FDI in the Spanish economy following the two simulations. As would be expected, the quantity of FDI increases sharply in the recipient sectors in the 'FDI' scenario. In the hotel sector, FDI increases by around 6.9% at the end of the simulation horizon, a similar result is observed in the leisure sector. These results differ significantly from the result presented in Figure 5.13 where the quantity of FDI only increases by around 2% in the leisure sector and less than 1% in the hotel sector. However, the result in Figure 5.13 does not include an increase in foreign tourism. Take the hotel sector for example,

when only an FDI increase is included in the counterfactual output increases by only 1%, whereas when the foreign tourism demand shock is added to the counterfactual output rises by 3.2%. Therefore it is unsurprising that the quantiy of both domestic and foreign capital will rise by more. It is also noted that the increase in the quantity of FDI in the hotel sector is around 6% in later periods of the model, which is approximately twice the size of the output increase. This similar ratio also applies in the 'no-FTOUR' example.

Figure 5.48 also shows moderate increases in FDI in the 'no-FDI' scenario in both the hotel and leisure sectors. This foreign investment inflow is endogenously induced by the increase in foreign tourism demand and hence tourism characteristic output. In order to increase output new investment will be required, and some of this is met through the overseas financial market. Figure 5.48 also shows that there is an increase in the quantity of foreign investment in the manufacturing sector in the FDI scenario. This is linked to the output expansion observed in this sector, as shown in Figure 5.41.

Figure 5.48: Comparing increases in FDI and Foreign Tourism Demand on the Quantity of FDI or Net FDI Position – CRTS Model



So it is observed in this section that combining FDI and foreign tourism expenditure shocks leads to a larger increase in the real exchange rate than singular shocks of each type in the short-term. However, in the medium to long-term, output will increase by more in those sectors that recieive both additional FDI and foreign tourism expenditure due to higher capacity levels and lower costs of production. This result is unsurprising, but does have implications for sectoral output and factor use particularly in those sectors which are heavily reliant on foreign tourism and receive FDI in the counterfactual. The next section compares those impacts found in the CRTS model, to those of the IRTS model where firms can decide their level of output.

5.5.3 Results from the IRTS Model

The simulations for the FDI and 'no-FDI' cases that were undertaken in section 5.5.2 are repeated using the version of the Spain model with imperfect competition and increasing returns to scale. This is the same model that was used in section 5.4.3 and is again referred to as the IRTS model. Results are also compared to the CRTS model.

The primary drivers of the pattern of sectoral output are the same in the IRTS case as the CRTS case, but as was noted in section 5.4.3 the fundamental difference between the CRTS model and the IRTS model is the nature firms behavioural response. The behavioural response differs with regard to the firms output decision. In the Cournot model firms will choose their level of output in order to profit maximise. The differences between the levels of sectoral output in the CRTS and IRTS models can be observed in Figure 5.49. Again the level of output in the IRTS case is lower than the CRTS case. The explanation for this behaviour has not changed. In those sectors where output increases in the CRTS model following the imposition of the counterfactual, fixed costs as a share of output decline, consequently mark-ups rise and the firms perceived elasticity of demand decreases. This means that firms perceive that they can charge a higher price for their output, so they restrict output in order to raise price. Consequently the price level is higher and the level of output is lower in the IRTS scenario.

Figure 5.48 shows that output is around 0.25% lower in each period in the hotel sector in the FDI scenario and 0.2% lower in the 'no-FDI' scenario. These reductions in output are larger than the 0.16% decline in hotel output observed in Figure 5.17 in the 'no-FTOUR' scenario. This is unsurprising as in both the FDI and 'no-FDI' scenarios the level of aggregate demand for tourism characteristic products is higher, consequently mark-ups and firms perception of output rises. The diffusion effect is smaller in the FDI case due to the additional capacity that the FDI is able to provide. This means that the reduction in aggregate demand is lower hence the reduction in output is larger between the CRTS and IRTS cases in the FDI scenario.

Output is seen to decline by more than the CRTS model in the non-FDI recipient sectors. This is the same result that is observed in section 5.4.3 in the 'no-FTOUR' case. It can be seen that manufacturing output is around 0.28% lower than the CRTS case in the 'no-FDI' scenario and 0.30% lower in the FDI scenario. Again this result is intuitive given the structure of the model. The resource movement effect is larger in the FDI scenario due to the dual nature of the counterfactual so more resources flow out of the manufacturing sector, and firms will restrict output by more in order to sustain mark-ups.

Figure 5.49: Comparing increases in FDI and Foreign Tourism Demand on Sectoral Output – IRTS Model

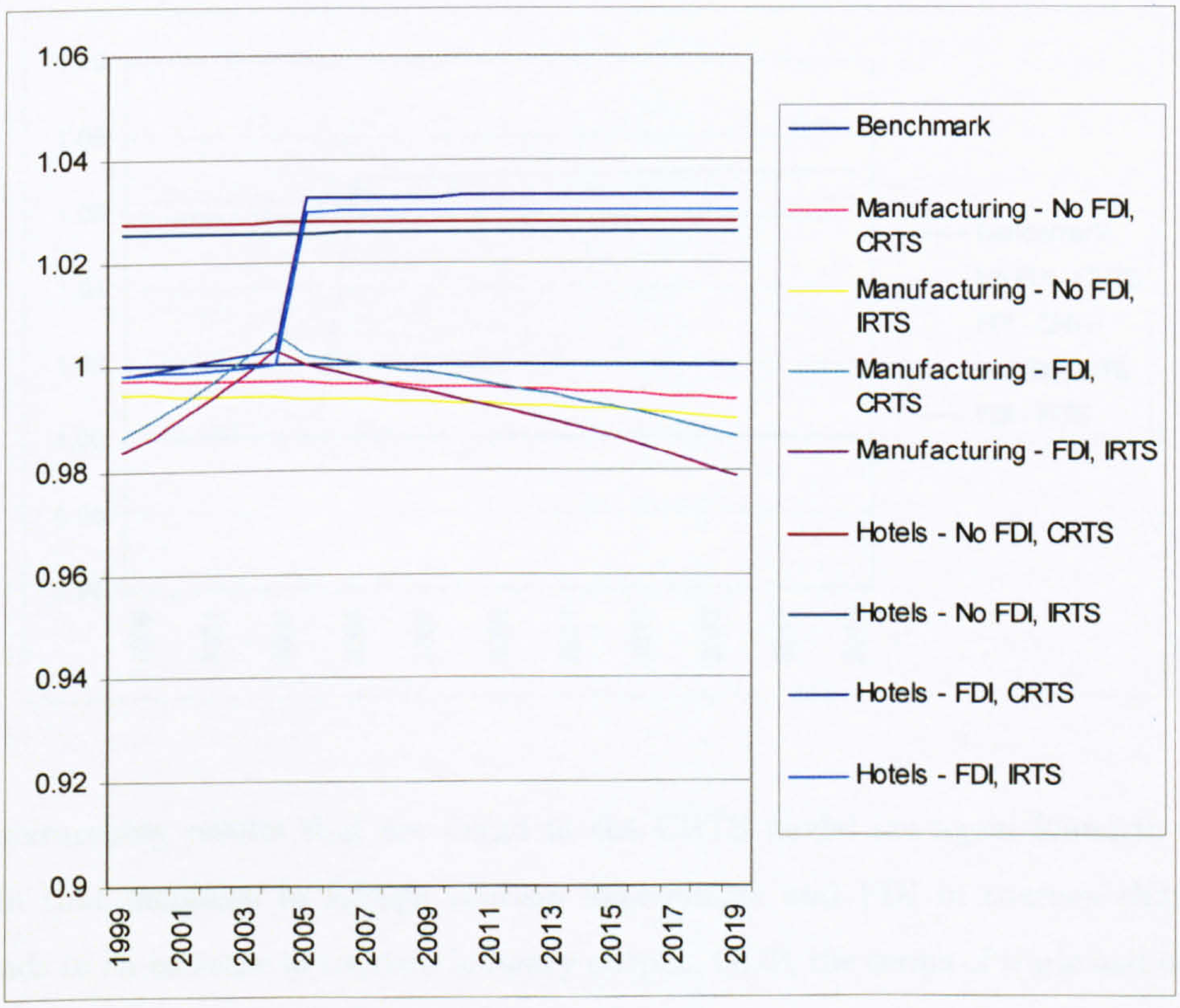
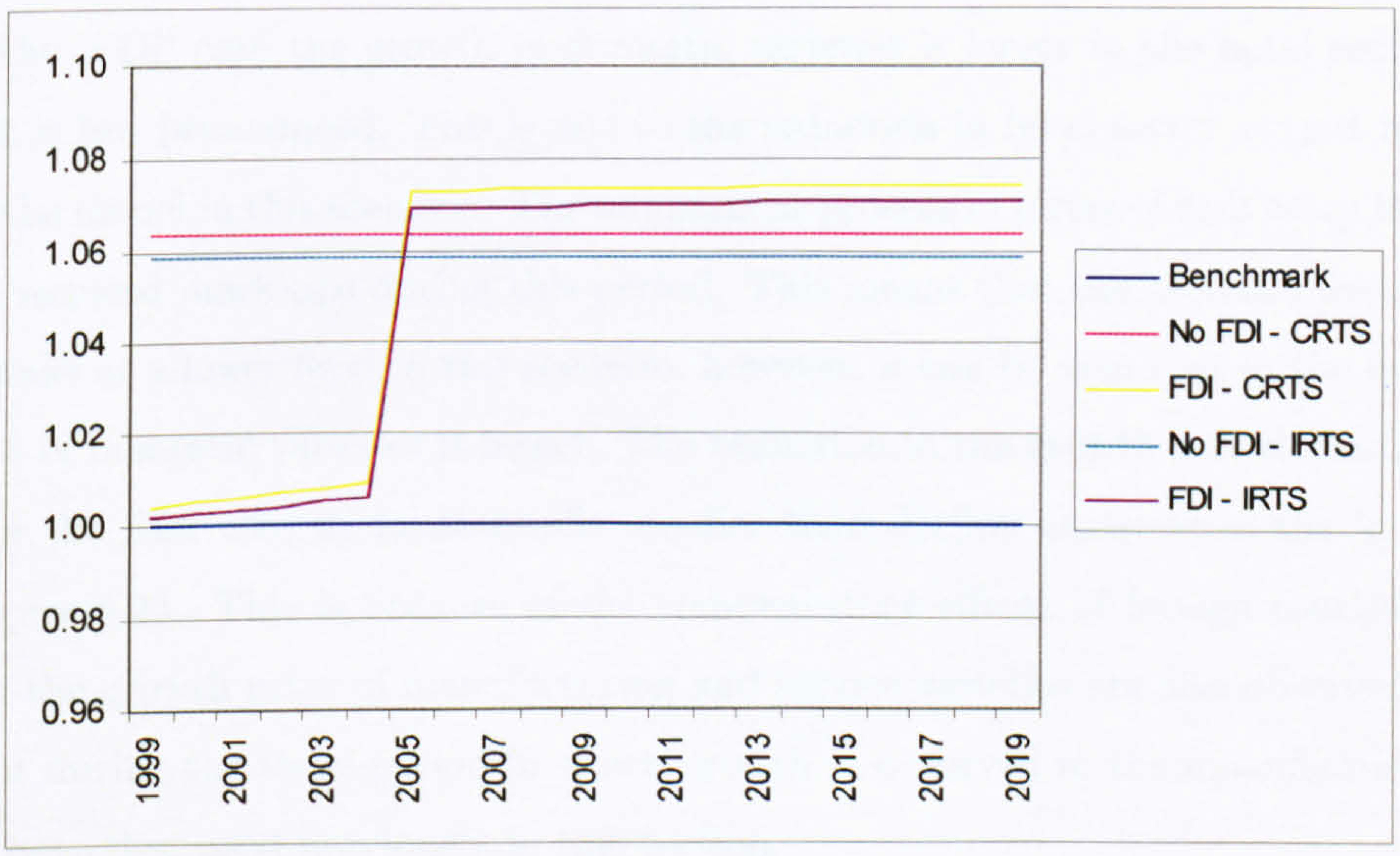


Figure 5.50 shows the differences between the CRTS and IRTS models for foreign tourism expenditure for the FDI and 'no-FDI' scenarios. Foreign tourism expenditure is around 0.5%

lower in the IRTS model in the 'no-FDI' scenario and 0.40% lower in the FDI scenario than the CRTS case. The drivers of this result are the same as those reported in section 5.4.3. It is known that the domestic price level rises by more in the IRTS model, which leads to a larger appreciation in the real exchange rate than in the CRTS model. This in turn means that foreign tourism becomes more expensive for overseas travellers in the IRTS model and hence the increase in foreign tourism expenditure associated with the foreign tourism expenditure shock or the increase in FDI are diffused by more in the IRTS case. Again the reason that the difference between the CRTS and IRTS models are larger in the 'FDI' counterfactual is due to the fact that the differences in the levels of output between the two models are larger in this scenario.

Figure 5.50: Comparing increases in FDI and Foreign Tourism Demand on Foreign Tourism Expenditure – IRTS Model

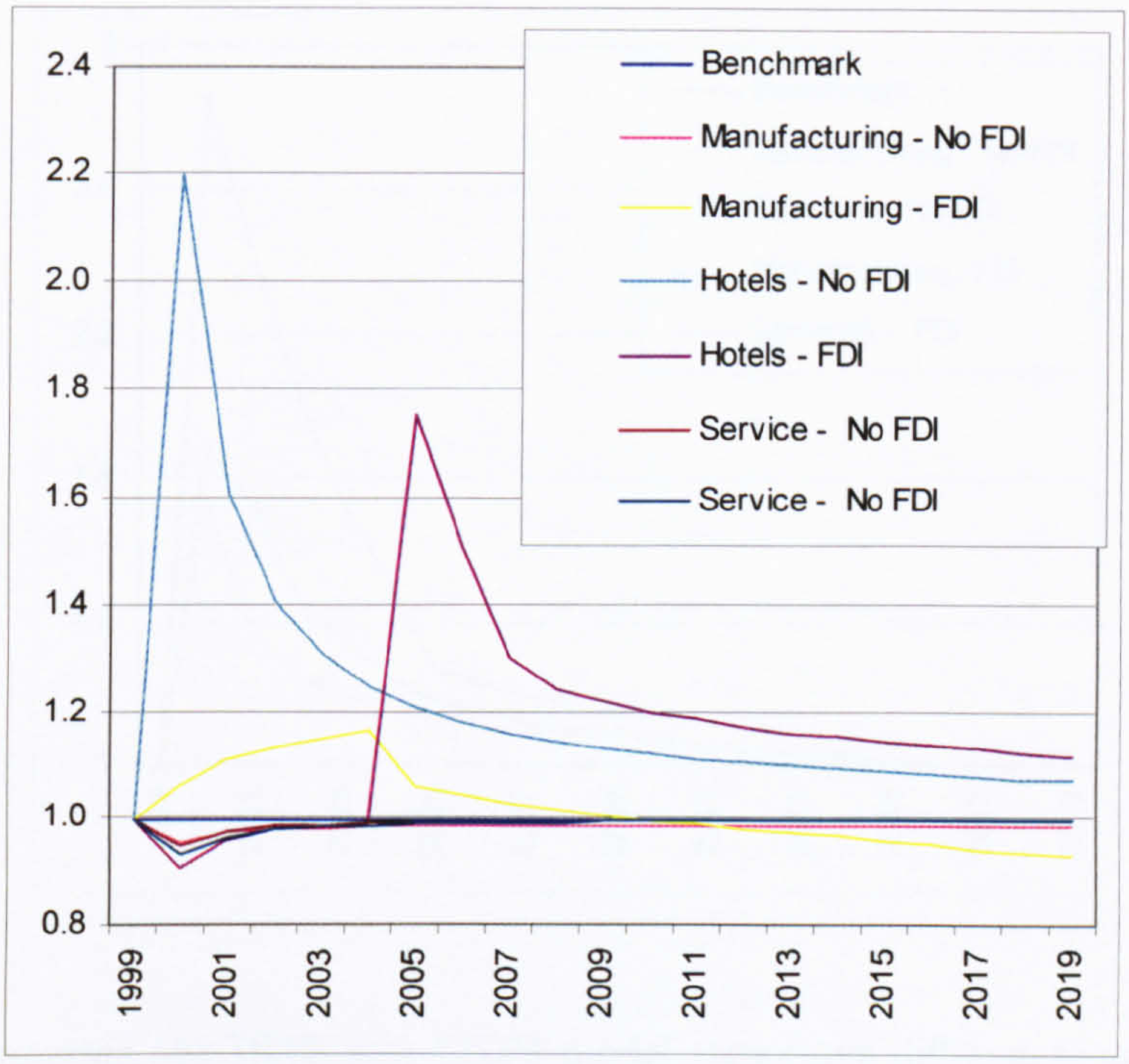


The overarching results that are found in the CRTS model are again found in the IRTS model. In that increases in foreign tourism expenditure and FDI in tourism characteristic sectors leads to an increase in tourism industry output, GDP, the terms of trade and investment are also found in the IRTS model. Effectively the results are replicated, only the magnitudes of increase are smaller due to the additional rise in prices observed in the IRTS model. Therefore the full set of results for the IRTS model are not shown here. The unique result that the

IRTS specification can provide though is an insight into the impact of the counterfactual on the number of domestic and foreign varieties in the model. This is shown in Figures 5.51 and 5.52.

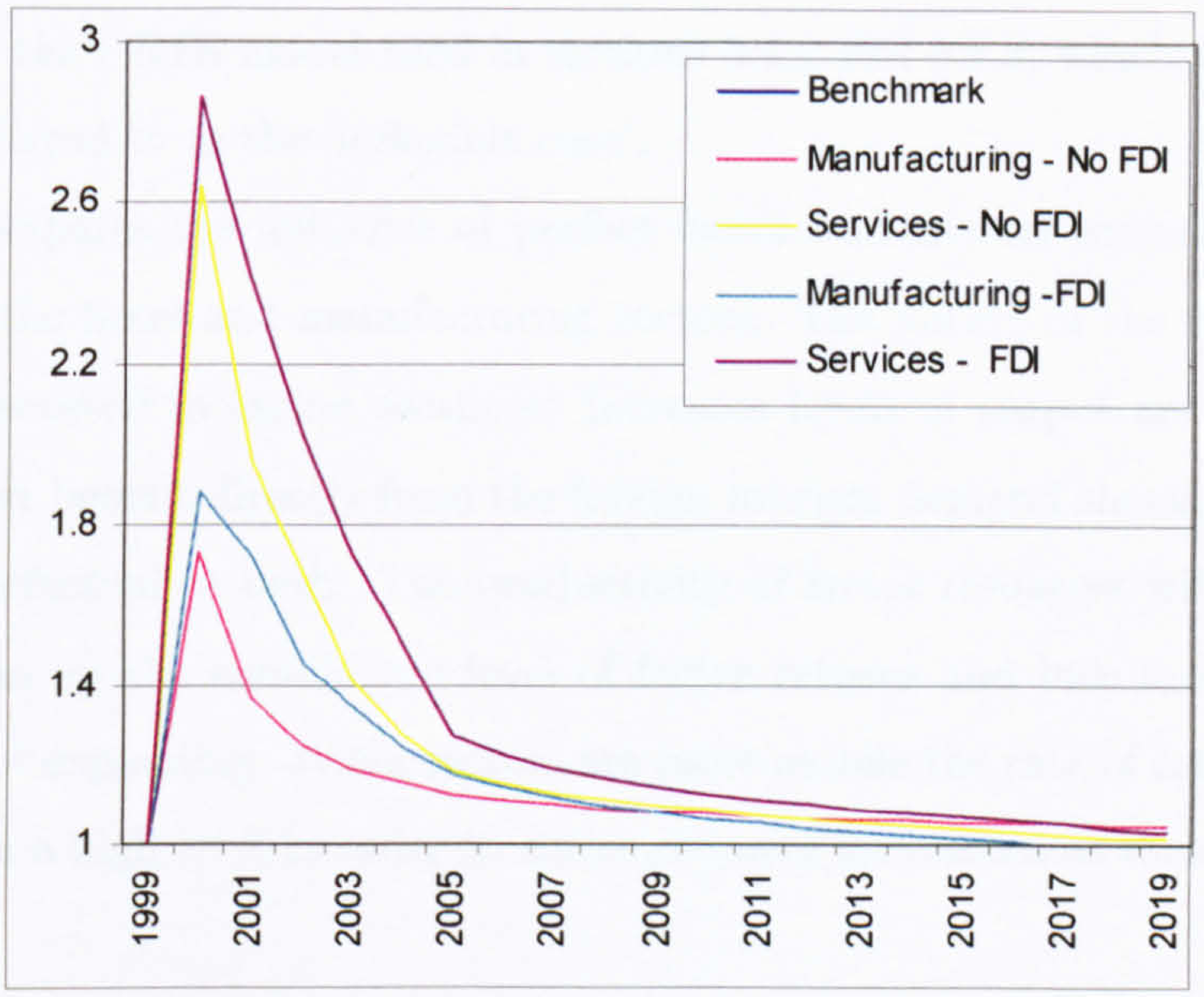
The drivers of variety growth have already been discussed in section 5.4.3 with regard to changes that the counterfactual induces in firms cost functions and hence mark-ups. Deviations in mark-ups from the benchmark level the mean that the firms decision to contest the market is altered. Changes in the level and direction of variety growth are consistent with changes in output. Figure 5.50 shows that in the 'no-FDI' case the increase in the growth rate of domestic hotel varieties is around 2.2% above the benchmark level in the initial period following the foreign tourism demand shock. The increase in foreign tourism demand is permanent in this scenario from the first period of the model onwards, this generate a early rush of firms wishing to contest the higher current and future profits that a rise in foreign tourism expenditure will bring. In the 'FDI' case the growth in domestic varieties is larger in the hotel sector but the adjustment is less pronounced. This is due to the reduction in hotel sector output in the early periods of the model in this scenario. The adjustment process in terms of firm entry takes longer due to the reduced mark-ups during this period. This means that the growth rate of domestic varieties peaks at a lower level in this scenario, however, it can be seen that in the long-run the growth rate of domestic varieties is larger. The reduction in the growth rate domestic varieties observed in the FDI case in substantially smaller than decline observed in the 'no-FTOUR' case in Figure 5.23. This is because of the compensatory effects of foreign tourism demand. Declines in the growth rates of manufacturing and service varieties are also observed in Figure 5.51, except during the short-period in which growth in observed in the manufacturing sector, which has been discussed previously in this section.

Figure 5.51: Comparing increases in FDI and Foreign Tourism Demand on the Growth Rate of Domestic Varieties – IRTS Model



It has been widely discussed that in both the FDI and 'no-FDI' the real exchange rate appreciates largely due to either the increased purchase of products supplied by tourism characteristic sectors and where simulated the purchase of capital goods. This means that the price of imported goods falls relative to domestic goods and the volume of imports rises. This leads to an increase in the number of countries willing to export to Spain and an increase in the number of foreign varieties. This can be observed in Figure 5.52 where the growth in both foreign manufacturing and service varieties are seen to increase in both the FDI and 'no-FDI' scenarios. The growth rates are larger in the service sector as mark-ups are higher than in the manufacturing sector and more firms will want to contest this expanding market. While overall growth in foreign varieties is higher in the FDI case as the dual nature of the shock means that increase in the real exchange rate is higher.

Figure 5.52: Comparing increases in FDI and Foreign Tourism Demand on the Growth Rate of Foreign Varieties – IRTS Model



Again by comparing the IRTS and CRTS model structures differences are revealed. The nature of these differences stems from the different assumption with regard to the firms output decision in the two models. As is the case in section 5.4.3, the IRTS structure has influence on the magnitude of the results, but their general direction or the key CGE outcomes.

All of the scenarios evaluated in this chapter so far have been done so under assumptions of factor market rigidity. The next subsection seeks to evaluate the influence that these assumptions have on the model results.

5.5.4 Sensitivity Analysis: Testing Factor Market Restrictions

The scenario evaluated in this section removes all rigidity from the factor markets in the CRTS model. Effectively this model implies that factors are perfectly mobile between sectors. In the capital market, the putt-clay capital adjustment cost function is removed, so capital goods are perfectly transferable between sectors. In the labour market, the labour supply elasticity is set at unity, the parameter β^S which determines the proportion of the labour force that will leave the current firm and find employment in the same sector is set to zero and ϑ, which accounts for the fact that labour loses a proportion of its skill level as it moves between sectors, is set to 1 (i.e. no skill depreciation). We refer to this as the 'flexible' case. The 'flexible' case in then compared to the CRTS model used in sections 5.4.2 and 5.5.2, which for the purposes of convenience, is referred to as the 'inflexible case'.

Figure 5.53 compares the influence of perfect factor mobility on sectoral output. Results are presented for the hotel and manufacturing sectors. The nature of the resource movement effect has been discussed in earlier sections. Increases levels of output are observed in those sectors which either benefit directly from the foreign tourism demand shock, receive additional FDI in the counterfactual or both. The productivity of factor resources will increase in these sectors, this pushes up the equilibrium level of factor returns and bids mobile factors out of sectors that are not expanding. When factors are more mobile the rate of return does not need to increase by such a high level in order to entice resource movement as there is less rigidity in factor markets.

An increase in resource movement has significant implications for the results of this analysis at a range of levels in the model results. For instance, the fact that factor returns do not need to rise by as much in order to attract resources to move between sectors means that prices will rise by less. This means that the diffusion effect associated with the increase in foreign tourism demand will be smaller as now Spanish firms are able to provide products at lower costs to foreign tourists. It also means that the appreciation in the real exchange rate will be less, which means that import substitution effects will be smaller. This means that overall the effects of either the increase in FDI or foreign tourism expenditure will be amplified in the flexible factor markets case. This is shown in Figure 5.53, where is can be seen that output in the hotel sector which is representative of the FDI recipient/tourism characteristic sectors output expands by more in the 'flexible' case. In both the FDI and 'no-FDI' scenarios output is seen to increase by around 0.5% more than the 'inflexible' case. This means that the level of output has increased by an additional 30% in relative terms between the two scenarios. Similarly, Figures 5.54 and 5.55 show that capital and labour in value added also increase by similar amounts.

It can also be observed in the Figure's below that output declines are larger in the manufacturing sector in the 'flexible' case. When factors are flexible in their movement, they will leave sectors where output is not expanding at a more rapid rate. This means that sectors such as the manufacturing sector, which is neither tourism characteristic or a recipient of additional FDI, are forced to reduce output by increased amounts as more factors resources flow out of them. This increased contraction in output is smaller (0.3%) than the expansion observed in the 'flexible' case (0.5%) due to the scale of the manufacturing sector relative to other sectors in the model, increased levels of investment observed in later periods of the model and increased labour market entry.

Although it has been said that the nature of the assumptions regarding factor rigidity differ between labour and capital due to the alternative treatments of these factor resources in the model removing them does not appear to have a substantial difference in the relative magnitudes of the results in the "flexible" case. It does not lead to strong capital labour substitution effects.

Figure 5.53: Comparing increases in FDI and Foreign Tourism Demand on Sectoral Output– CRTS Model, Flexible vs. Inflexible Assumptions

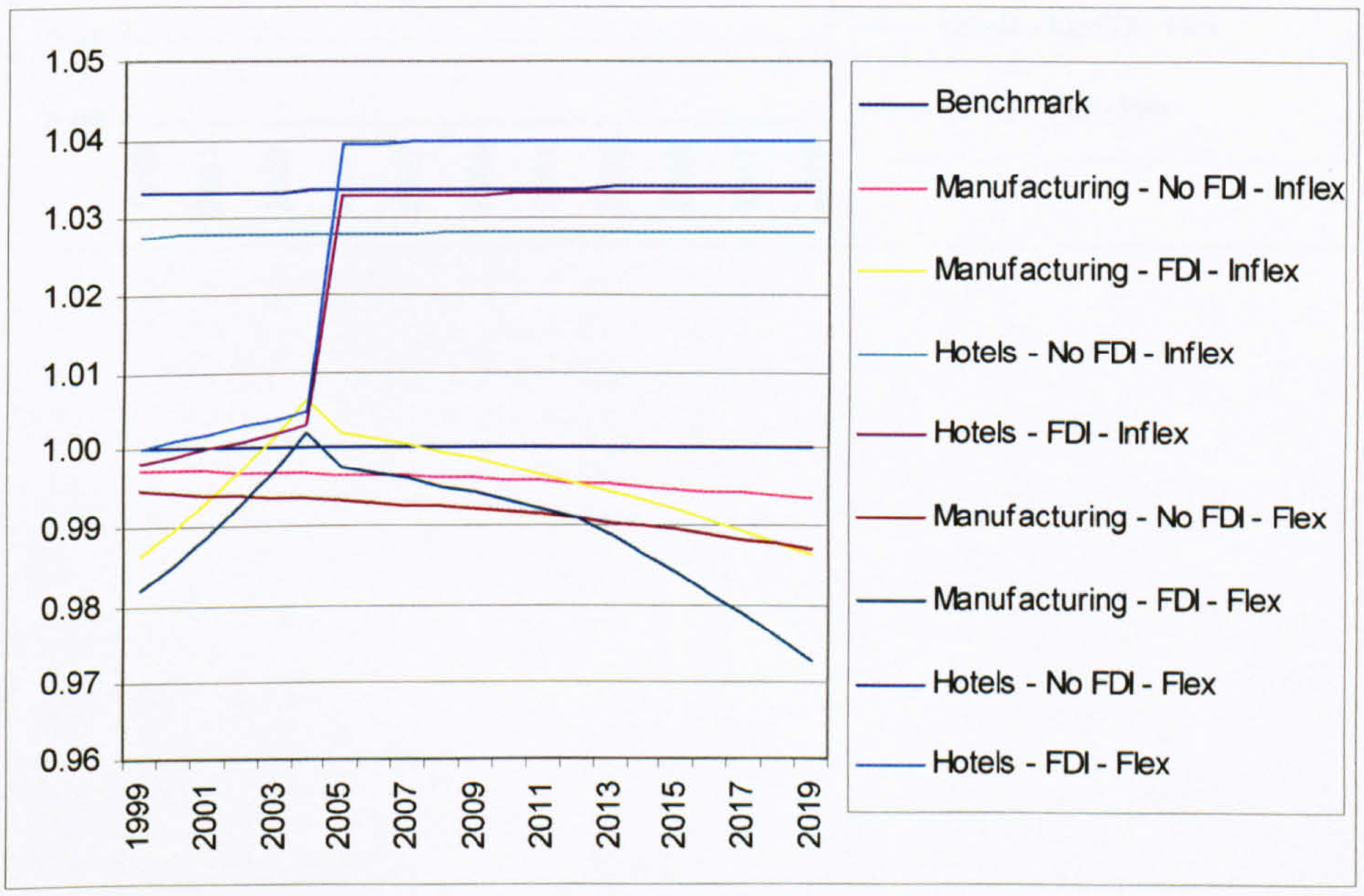


Figure 5.54: Comparing increases in FDI and Foreign Tourism Demand on Quantity of Labour used in Value Added – CRTS Model, Flexible vs. Inflexible Assumptions

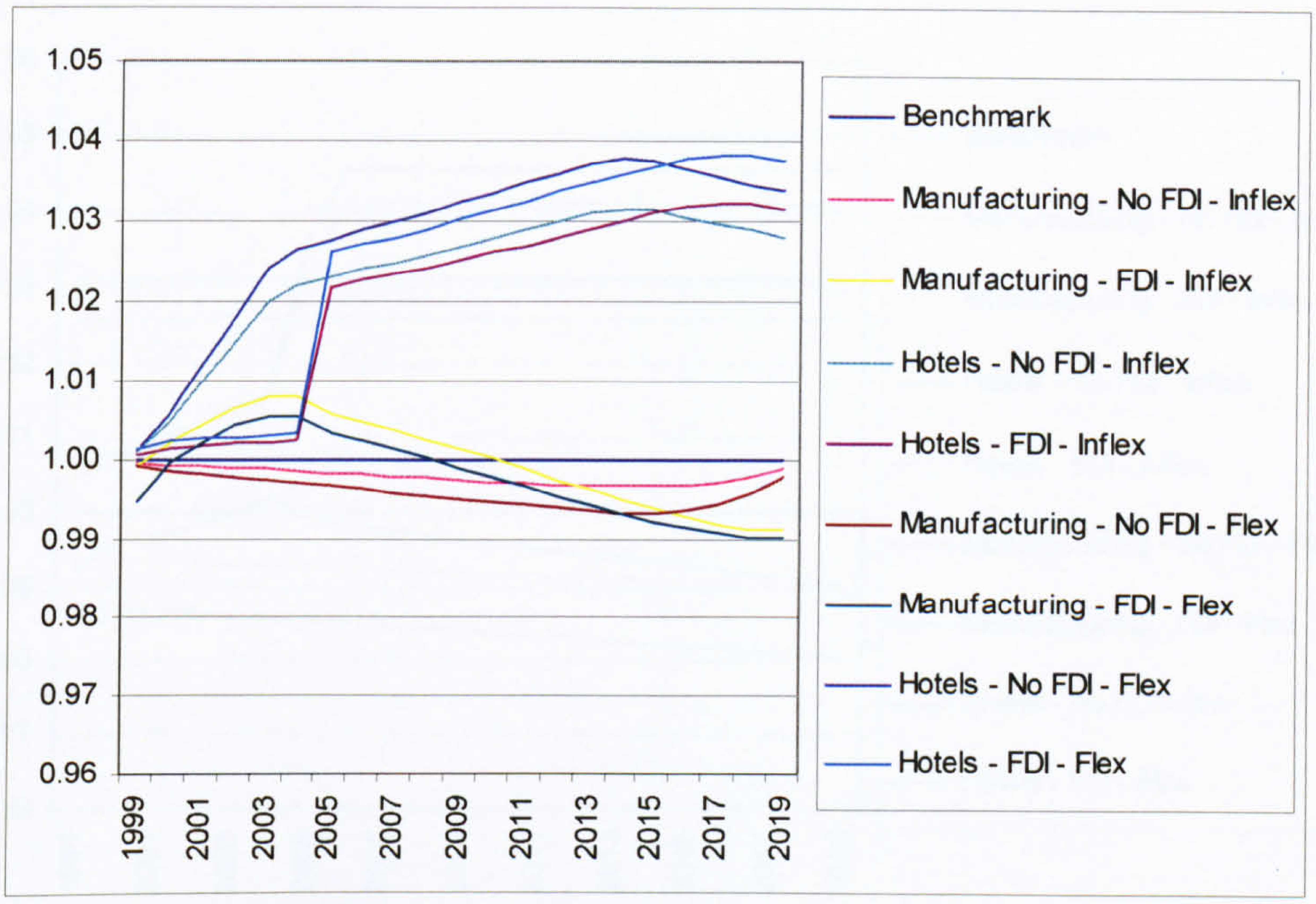
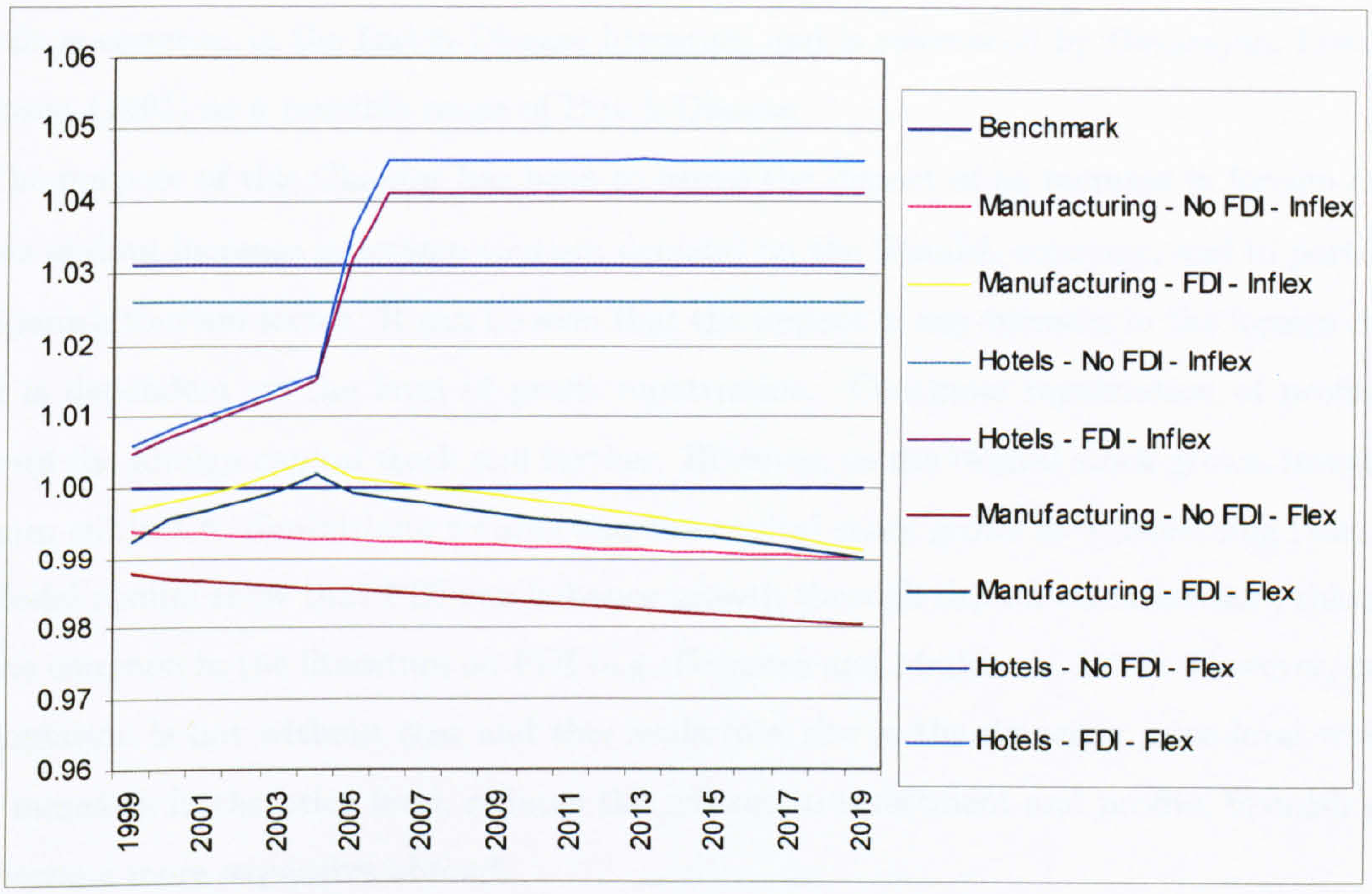


Figure 5.55: Comparing increases in FDI and Foreign Tourism Demand on Quantity of Capital Value Used in Added – CRTS Model, Flexible vs. Inflexible Assumptions



5.6 Conclusion

This chapter has sought to provide some insights as to the wider economic implications of an increase in FDI for the recipient economy. The results of the CGE model used in this chapter are consistent with the Devarajan, Lewis and Robinson (1991) stripped down 1-2-3 model. Further nuances such as the influence of imperfect competition and factor market rigidity, the productivity of foreign capital and the level of profit repatriation have been added to the model to give further insight as to the magnitude of the likely impacts on the recipient economy.

The impact of foreign investment flows into the tourism sector have wide ranging implications both for the tourism sector itself and for sectors that have associated economic linkages. When foreign capital flows into the economy this drives up the price of capital goods and the overall price level in the economy rises. Effectively the inflow of foreign capital is similar to a mini-commodity boom and many of the results presented relating to this set of simulations are similar to those experienced when foreign tourism demand increases are evaluated on their own. Therefore it is inferred that the increased FDI inflow can cause Dutch-Disease type effects, such a result is common in the Dutch-Disease literature and is referenced by Devarajan, Lewis and Robinson (1991) as a possible cause of Dutch Disease.

The purpose of this Chapter has been to assess the impact of an increase in foreign capital inflows and an increase in foreign tourism demand on the Spanish economy, and in particular, the Spanish tourism sector. It can be seen that the impact of any increase in the foreign capital stock is dependent on the level of profit repatriation. Continual repatriation of profits will drive up the foreign capital stock still further. However, as the capital stock grows, investment becomes subject to diminishing returns and the capital stock grows at a decreasing rate.

Model results show that FDI can enhance growth through capital accumulation, this result is quite common in the literature on FDI (e.g. Feenstra and Markusen, 1994). However, capital accumulation is not without cost and this leads to a rise in the domestic price level which in turn, increases in the price level, reduces the returns to investment and profits, Spanish goods also become more expensive abroad.

Results from the IRTS model reveal that CRTS models may overstate the gains to a recipient economy in terms of output expansion. The IRTS model is characterised by Cournot imperfect competition whereby firms set the level of output in order to maximise profits. Sectors which expand following the imposition of a counterfactual, expand by less in the IRTS model, while sectors that contract, contract by more also. These differences are driven by the firms output decision which in turn has impacts on the other results in the model. In particular, prices rise by more in the IRTS model which has implications for the terms of trade and expansion of output. Comparing the CRTS and IRTS cases can reveal the gains that increased competition can have on the Spanish economy. The current IRTS specification indicates that these gains may not be large as differences between the CRTS and IRTS models are often marginal. However, such findings are consistent with the CGE literature on imperfect competition discussed in Chapter 3. They are also symptomatic of the fact that many components of the tourism sector might be highly competitive already. The IRTS model also highlights that there are also substantial variety effects observed in the model results which may well have long-run implications. The number of domestic and imported varieties changes sharply in the various simulations and this will have long-run structural implications for the economy. Also, changing assumptions relating to firm behaviour will have a significant impact on the results. For example, changing the level a firms conjectures with regard to rivals output will alter its perception the elasticity of demand for its products and this in turn will affect its output decision. However, even in the extreme case of non-convergence to the Nash equilibrium assumed in this model, such assumptions only have a small impact on the overall level of results.

While the level of efficiency gains through pro-competitive effects are shown to be quite small, the CGE model does highlight areas where efficiency gains in the economy can be made. In particular such gains can be made through the increased flexibility of factor markets, where output gains are shown to be unto 0.5% larger in some expanding sectors.

The CGE model also provides insights as to the impact that some key model assumptions can have on the magnitude of the results. The affects of changing these assumptions are important and provide useful policy insights. Take the assumption of profit repatriation for example. Profit repatriation is an area where governments, through changes in tax law or investment policy can have a significant impact. The results show that when no profits are re-invested by MNEs output expansion is approximately 20% less in FDI recipient sectors. So there are significant payoffs for governments to encourage MNEs to reinvest their profits.

Another important assumption in the model relating to standard neo-classical growth models assume that growth can only result from exogenous population or technological shocks. FDI is only considered to have a short-run effect on growth due to diminishing returns to capital. There is no permanent long-term impact associated with foreign capital inflows. However, FDI can also lead to product innovations and technological change via improving the technologies of existing domestic firms (Krugman, 1979), firms engaging in FDI might be seeking new opportunities to exploit successful innovations. This can lead to the use of new intermediate inputs and technologies which can lead to productivity gains and positive spillovers. The model has shown that when foreign capital is assumed to be more productive that domestic capital the gains from FDI are much more significant than those predicted by the standard neo-classical growth model.

It has been shown throughout this Chapter that those sectors which are heavily reliant on foreign tourists may not necessarily benefit during periods of large sectoral FDI inflows due appreciation of the real exchange rate and the re-organisation effects associated with FDI. In fact there is a significant chance that output might decline in the recipient sectors. Such a result is unsurprising in sectors whose output his heavily reliant on the level of the real exchange rate. However, in the long-term, once the FDI shock has subsided, then output gains will be larger. This adverse outcome can be somewhat countered, when foreign capital is more productive, or when full profit repatriation is assumed or when the FDI inflow is coupled with increased tourism expenditure.

The dual effects of an increase in foreign tourism demand and FDI are also investigated. When FDI shocks are coupled with foreign tourism shocks similar exchange rate appreciation effects occur, although they are on a larger scale due to the dual nature of the shock. It is also observed that the tourism shock enables the foreign capital stock to grow at a quicker rate due to increases in demand leading to increased output and increased returns to capital. While the decline in tourism output and tourism firms that were seen in singular FDI related simulations are either reversed or significantly diffused in the wake of the foreign tourism demand shock.

Chapter 6

A Regional Computable General Equilibrium Model of Tourism in Spain

6.1 Overview

Spain is highly dependent on its tourism sector but within Spain the size and characteristics of the tourism sector differ greatly among regions. Tourism expenditure is highly concentrated on just a few regions in the South of Spain and the Canary and Balearic Islands. In some regions tourism is the main source of economic growth and job creation, while in others, it barely registers. Therefore, the impact of any change in tourism demand or policy will not be homogenous across Spain. Previous studies such as Adams and Parmenter (1995) have shown that the appreciation in the real exchange rate brought about by increases in foreign tourism demand may have harmful effects on regions with high levels of non-tourism related export earnings. Further, other non-tourism regions may benefit through changes in relative prices brought about by a consumption boom in a particular region. It is important for regional planners to understand the wider impacts of tourism growth outside the recipient region as, while it is possible that positive spillover effects will occur, changes to key macroeconomic variables may have a positive or harmful effects on regions with low tourism consumption. As yet, there has been no in-depth analysis of these issues in the Spanish economy despite the Spanish government's commitment to promoting the tourism industry. It may be the case that the promotion of this particular industry has detrimental effects on other policy areas designed to enhance other sectors of the economy. It may also have impacts on regional growth and the public finances. Divergence exists between regional growth rates and levels of household income. It is widely thought that tourism, through active promotion policies, can become a tool for integrating less developed regions or giving them equal access to the fruits of growth.

The existence of regional input-output tables and regional components of the Spanish national accounts provides a unique opportunity for the construction of a CGE model that is able to capture the characteristics of the different Spanish regions. Because tourism is a multi-sector activity, CGE modelling is an appropriate means for examining the impact of tourism. As yet, a regional CGE model has not been constructed for Spain despite this relative abundance of data. The CGE model used in this chapter takes the publicly available input-output tables for Spain and merges them with regional tourism data to create a modelling framework suitable for giving insights as to the regional and national economic implications of different aspects of tourism policy. CGE models have been applied to various issues at the regional level; for a detailed discussion see Partridge and Rickman (1998). However, as yet, only the Australian model of Adams and Parmenter (1995) has attempted to assess the impacts of regional tourism policy. The application of this model was limited to demand shocks, so little is known about the regional implications of other aspects of tourism policy.

The regional CGE model constructed in this chapter is applied to two issues. The first issue relates to the impacts of increased tourism expenditure on the Spanish economy and the differences in results between those regions with high tourism intensity and low tourism intensity. The second issue relates to the impacts of changes in consumption taxation on tourism products. Because of the autonomous nature of regional government in Spain, there is ongoing debate as to how far regional governments can tax tourism, and what effects taxation in one region has on other regions. A general equilibrium approach can provide useful insights as to the effects of tourism taxation because of the way in which changes in tax rates affect the tax base; a CGE model can also account for inter-relationships between sectors and regions that are taxed and those that are not.

6.2 Issues Relating to Tourism Taxation

Taxation is a growing issue in thetourism industry. The rationale for taxing foreign tourists is that they are often thought by policy makers to be "free money", particularly as foreign tourists are not voters. However, very little is known about the magnitude or nature of its economic impact. Currently it is not known how much the tourism sector contributes to the Spanish economy in-terms of tax revenue. Much of the contribution of tourism to Spain's tax yield is "hidden" within the yields obtained from taxes on goods and services purchased by both local tourists and residents. Sources of taxation revenue attributable to tourism are wide ranging. For instance, revenue can be earned from taxing the products that tourists consume, income taxes and national insurance contributions from those working in the tourism sector, or government sales of goods and services consumed by tourists. There are also indirect sources of tax revenue.

At the environmental level tourism is considered to be a negative externality. The general view is one whereby mass tourism causes capacity problems in the recipient destination giving rise to long-term external effects (for example, pollution, congestion and crime). The uncontrolled growth of tourism can lead to a decline in the regions' heritage, the quality of life of its residents, the congestion of transport networks, other businesses activities might be forced to relocate because of these excessive problems. This deterioration in the tourism environment occurs when the price of tourism services is too low, as the current price does not account for the environmental impact (i.e. negative externalities).

While this appears to be an optimal response to the problem, levying such a tax is not straightforward. If the tax is set too high then this will detract disproportionately large amounts of tourists from visiting the region; if set too low significant negative externalities will continue. Therefore, analysis needs to be undertaken that relates changes in tourism expenditure following the implementation of the tax and changes in government revenues.

An attempt has been made to tax tourists in Spain at the regional level before. In 2001 the Balearic Islands issued a €1 per person per night ecotax on stays in hotel accommodation. The rationale behind the tax was to earmark the revenue to pay for environmental damage caused by tourists. According to Palmer and Riera (2003) the tax raised in excess of €50m. However, despite its good intentions, the tax was deeply unpopular with both the local industry and visiting tourists and was abolished after only 8 months. Issues relating to the tax are discussed below.

The hotel sector was thought to be a suitable sector to tax as it would be relatively easy to collect (as opposed to the use of second homes) and it is large enough to generate significant revenues to ensure that the tax is worthwhile, particularly in terms of administration. Further, taxation of sector such as air transport would be passed on to tourists before they arrive in Spain. Tour operators often feel that taxes of this nature deter tourists from entering the country, while hotel taxes are usually paid on departure. Taxes on transport sectors in general do not specifically tax the activities of tourists and much of the burden will be bourne by households or businesses. However, when this was attempted in the Balearics several difficulties were encountered. The hotels collected the tax and then transferred the money to the local tax authorities, thus acting as a substitute for the tax-payer. So the substitute became responsible for the settlement, paying in and submitting of the declaration in the place and within the time limit established by the legislation. This would probably seem the most sensible way to administer the tax. However, members of the industry were already opposed to the tax, and the fact that they were liable for fines if it was not administered effectively just increased animosity between local business and government. Many hoteliers simply did not pay.

The issue of administration and the fact that 25% of tourists stayed in exempt unlicensed accommodation (i.e. apartments) led to the downfall of the tax in the Balearics. The relatively small tax base meant that only small amounts of revenue were raised and the tax had little impact. It also raised the cost of a family (2 adults, 2 children) holiday in the Balearics by €56 (approximately £40 at the time), which hit the budget market quite hard. Some hoteliers tried to absorb the tax by issuing vouchers for spending in the hotel and the tax soon became known as the "lemonade tax".

Due to the fact that the tax was only levied on hotels, there was a significant substitution towards staying in apartments. Total visitor numbers only fell by 5% in 2002 (the year of the tax),[1] but, visitors staying in hotels fell by 30%. Thus the ecotax triggered a major shift in tourism consumption patterns. During the time of the decline in visitor numbers the global

[1]Apparently, 20% was the figure widely reported by competitor destinations and in the British press, where it was alleged that the downfall in visitor numbers was over emphasized by competitors to make the destination less appealing. The Balearics became labelled the "Costa more".

downturn in world tourism associated with the events of September 11th occurred and also the Balearics came under significant price competition from new Eastern European resorts. Nonetheless, the industry blamed their misfortune entirely on the ecotax.

Prior to the implementation of the tax very little analysis was undertaken in order to quantify the externalities of the ecotax. Despite its failure, similar options are still regularly debated in Spain and across the EU. Local residents and local government frequently request and/or support such taxes, yet are perhaps somewhat short-sighted with regard to its economic impact. Regional CGE analysis is a practical and ideal tool for evaluating such issues and it can show the wider impacts of the tax on the whole economy. As yet no CGE related research has been undertaken on this issue.

6.3 Regional CGE Modelling

6.3.1 Principle Literature

CGE models have been used for both the analysis of policies that affect a single region with little or no connection to other regions, or polices which affect several regions simultaneously. The implementation of such models depends upon their orientation (Plassman and Tideman, 1999). Models examining income tax changes require many agents belonging to different income groups; alternatively trade models describing the effects of tariffs on consumption require more detailed knowledge of the number of sectors and the extent to which imports are used as substitutes for domestic goods. Some models have assumed that output is produced solely from agents' original factor endowments, while other models assumes that production requires the use of intermediate inputs. The detail which a regional model may incorporate is dictated by the availability of data. In many cases, the availability of data at the regional level is virtually non-existent. Problems have also been encountered due to unresolved issues of regional specification (Partridge and Rickman 1998). The extent of such difficulties goes some way in explaining the relatively slow start of regional CGE modelling. Partridge and Rickman (1998) provide an extensive review of the literature associated with regional CGE models. Although they conclude that there are significant problems associated with quantitative accuracy, such models still represent an advancement in the field of regional economic analysis.

Since the mid 1980s, the implementation of regional CGE models has become more widespread. Regional models permit the analysis of differing regional policies. It is also possible to evaluate the outcome of such policies at a regional rather than a national level. Models may be orientated to look at the regional affects of a national model ('top-down models'), see for example Higgs and Powell (1990) who use the Australian ORANI model to forecast the impact of national agricultural policy. A more common technique is to construct a model which explicitly incorporate more than one region ('bottom-up' models). Regional CGE models differ from their national counterparts in several respects. Most of these differences stem from the fact that regions are relatively more open economies than nations (Schriener et al., 1999). Regions are more open in terms of commodity trade, and resources are mobile. For example, regional households and entrepreneurs are more able switch investment between regions where higher rates of return are available. National CGE models require savings to be equal to investment, while regional models permit excess savings to flow out of the region and vice versa. The general formulation of model used in most regional studies follows closely that of national models although some studies have attempted to increase the complexity.

6.3.2 The Regional CGE Model

For definitional purposes in this chapter and throughout this thesis the terms regional and multi-regional are used to distinguish between two different types of CGE models. The term regional is used to describe CGE models that incorporate a number of different territories within a country, as used by authors such as Adams and Parmenter (1995) who model states such as Victoria and Queensland within the country of Australia. The term multi-regional describes CGE models that include multiple countries either to proxy the behaviour of a trading blocks, for example, Hertel (1997) or Harrison Rutherford and Tarr (1997c). This distinction is reflected in the literature to a limited extent, see for example, the article by Partridge and Rickman (1998).

The model implemented in this thesis is a regional model. Regional CGE (R-CGE) models are generally ordered in the same way as their national equivalents i.e. nesting structures are equivalent throughout except for the regional dimension. Profit maximisation is assumed throughout, therefore firms minimise costs, and factor demands are responsive to factor prices.

Households are assumed to maximise their utility functions in their consumption decision, according to price differentials in goods and services. However, R-CGE models are more complicated than national models because of the openness of the regional economy (Partridge and Rickman, 1998). Labour is more likely to be mobile between regions than between countries, while savings in the region are less likely to influence investment in the region. This may create a divergence between the place of factor employment and the place of factor income. Further, there is also potential for interactions to occur between federal and regional taxation and expenditure policies.

The R-CGE model for Spain is a 5 region, 16 sector static model. The underlying model equations are similar to those give in chapter 4, although structural differences are incorporated to account for inter-regional trade. Each of the five regions identified within the model has production and consumption relationships determined in a manner similar to single-country CGE models of the Arrow-Debreu style. Production processes take primary inputs (labour and capital) and intermediate inputs and transform them into finished goods and services, which are sold to other sectors as intermediate inputs into other processes, to consumers, or are exported. Two alternative model structures are compared: one in which the market exhibits constant returns to scale and a second in which increasing returns to scale and imperfect competition following the method described in chapter 4 are modeled. Prices adjust to clear all markets simultaneously, and consumers choose their consumption to maximise utility given prices and income constraints.

The choice of factor market closure is more complex. Factors of production are assumed to be mobile between sectors and regions. It was noted in chapter 2 that despite reforms, Spain is still characterised by a significant amount of structural unemployment. There is also low labour mobility between regions due to the high level of owner-occupied housing, the fact that most new jobs are temporary rather than permanent, and Spanish society's emphasis on 'family'. Moreover much of the migration in Spain, such as rural urban migration between Andalucía and Cataluña occured during a significantly earlier period during the 1950s and 1960s (Tamames, 1973; Wright, 1978). The rationale behind choosing a labour market closure without unemployment was discussed in chapter 3. It is assumed that wages adjust to clear the factor markets at a level where unemployment is at its "natural" level. Migration is not explicitly modeled as the analysis is more concerned with the short-term and as is previously stated, much of the inter-regional migration occured during the earlier period of industrialisation. However, a degree of rigidity is assumed in the labour market. Following Blake *et al.* (2002) in the wake of an exogenous shock a proportion (0.3) of the labour force is "sticky" i.e. it does not move to other sectors or regions in the economy, but it will leave its current firm and seek employment within the same regional sector. This assumption is consistent with the strongly rooted regional identification and allegence of much of the Spanish population (Acosta España *et al.*, 1981) The remainder of labour is mobile between sectors and regions based on a constant elasticity of substitution of 2[2]. Both the elasticity of substitution parameter value and the "sticky" labour force parameter have been tested extensively prior to using this model. These parameter choices give reasonable outcomes relative to changes in capital and output in test simulations[3].

A degree of rigidity is also assumed in capital markets. In the capital market, the putty clay adjustment cost method of Phelps (1963) is implemented, wherein the elasticity of substitution between old capital and other factor inputs is zero, while the elasticity of substitution between new capital and other factors is 1. Adjustment costs occur because the production technology of the typical firm is fixed in the short-run. As in other models, the ratios proposed by Lau, Pahlke and Rutherford (1997) are used, the proportion of "old" immobile capital is fixed at 90% and the remainder of new mobile capital is a residual at 10%. Otherwise all new investment is perfectly mobile between all regions.

International trade occurs in each region of the economy, with imports from outside Spain being qualitatively different goods to those produced domestically, according to the Armington assumption. Exports are also differentiated goods produced for the domestic market. In both import and export markets, Spain is assumed to be too small a country to influence world prices. The dollar-price of imports and exports are therefore fixed. The capital account of the balance of payments is described by a fixed dollar-value of foreign currency investment transfers. This macroeconomic closure rule assumes that net foreign investment is a macroeconomic

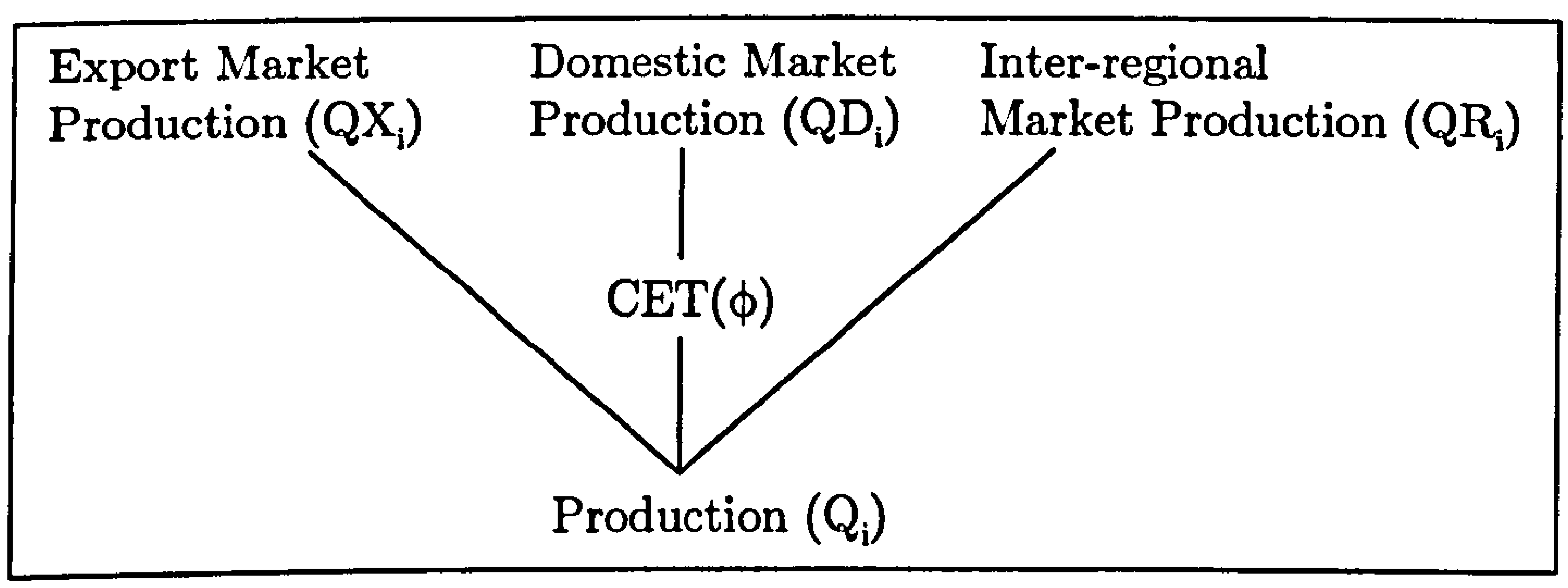
[2]While this parameter choice is arbitrary, it does not reflect perfect factor mobility, neither does it reflect a high degree of rigidity. Estimates of the elasticity of supply of labour in regional CGE models range significantly and are rarely based on empirical estimates. Examples include Goodman (2003), where the elasticity is 5 or Ferguson *et al.* (2004) where the estimate is nearer 7.

[3]These results are available on request.

phenomenon that will not be affected by the intersectoral changes in the CGE model. In the majority of single-country CGE models, the trading system would be completely described by these conditions, but here there are two additional model element: tourism and inter-regional trade. Tourism is modelled in the same way as in the Spanish national model. Each region distinguishes between domestic and foreign tourism demand. Foreign tourism demand is linked explicitly to the price of foreign exchange, while domestic tourism is linked to the regional price level. The elasticity of foreign tourism demand is set at 2, based on the estimates by de Mello et al. (1999). It is the same value that is used in all chapters throughout this thesis. The same value is also applied to domestic tourism demand. Further, the elasticity of substitution of regional tourism, i.e. the willingness of tourists to substitute between alternative regions in Spain, is set at 4, on the basis that it is more likely that tourists would visit another region in Spain in the wake of a rise in a regions prices, than visit another country.

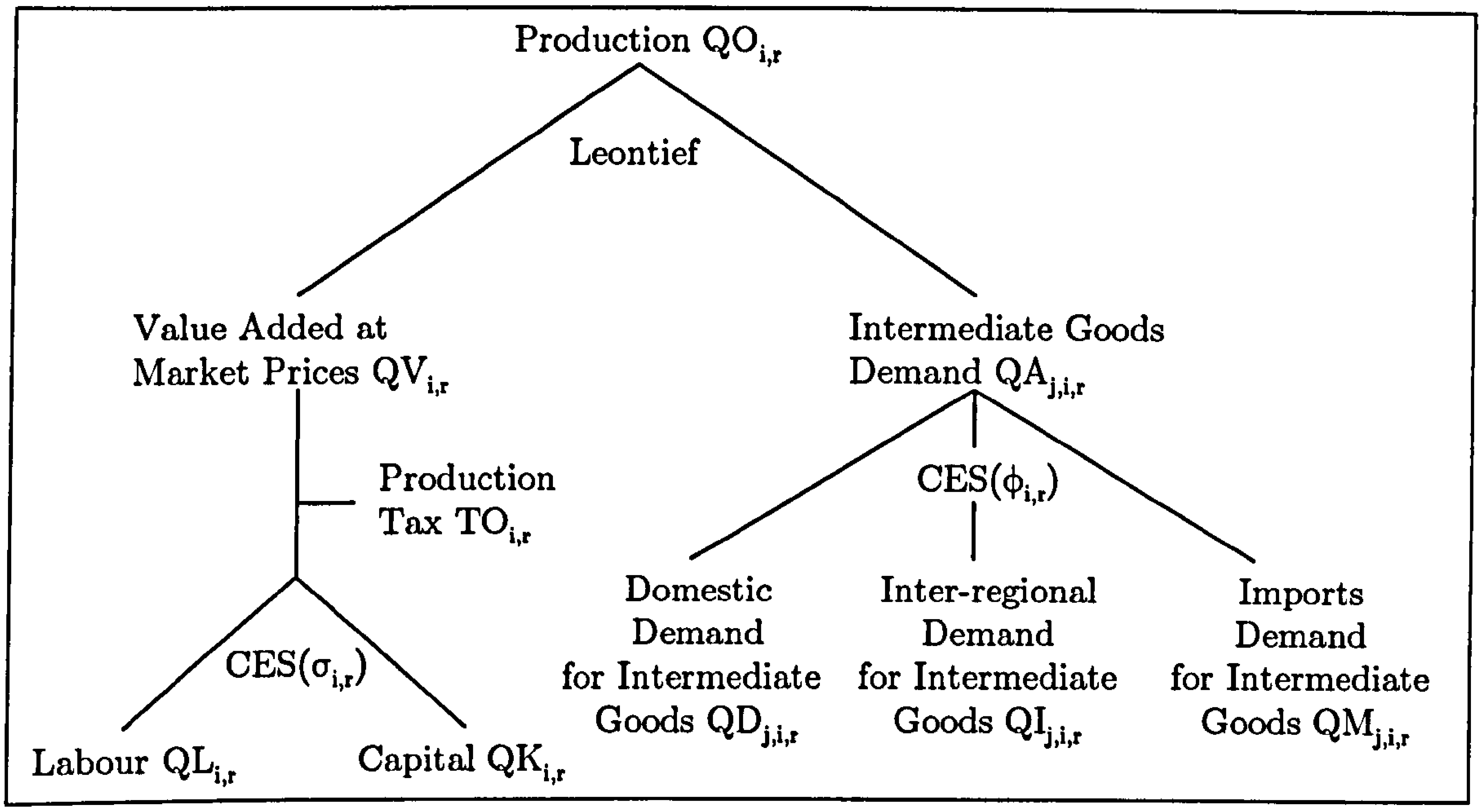
In order to incorporate inter-regional trade the Constant Elasticity of Transformation (CET) function is implemented to incorporate exports to other regions in Spain. Similarly consumers in Spain differentiate between imports from domestic regions. Although explicit trade linkages are not defined between each region, a rise in a particular regions price level relative to the national price level will adversely effect its terms of trade. The augmentation of the CET function is presented in Figure 6.1 below, and now effectively becomes a 3 good, rather than a two good function.

Figure 6.1: The Adjusted CET Function



In a similar way the production block is augmented to incorporate intermediate imports from other regions. As mentioned above, labour is region specific, but capital is free to flow between regions. The associated changes are presented in Figure 6.2 below:

Figure 6.2: The Adjusted Production Block



6.4 The Regional Input-Output Tables

Summary data from the five input-output tables used in the R-CGE model are presented in the appendices to this chapter in Tables A6.1 through to A6.6. These data give proportions that are key to the interpretation of the model results. While aggregate figures and macro balances are presented in Table 4.2. A full discussion of the composition and structure of these tables is given in chapter 4, section 2.3.

In terms of shares of total national output the four regions accounted for approximately 40% of Spanish GDP. Of the regions that are explicitly modelled, Madrid has the largest regional economy, approximately 16.5% of total GDP, while the Canaries have the smallest, approximately 4.6% of GDP. Column 1 of Tables A6.1-A6.5 shows the sectoral composition of GDP. In general the agriculture, manufacturing and services sectors tend to have the largest shares of regional GDP. This is because they are the most highly aggregated for purposes of modelling. As already discussed, the Canaries and Andalucía are the most tourism intensive regions. Castilla y León is the region with the largest regional share of manufacturing, accounting for approximately 35.7% of its regional GDP. Madrid and Andalucía have the second largest manufacturing sectors, 37.8% and 33.1% in terms of shares of regional GDP respectively. Table A6.4 shows that Madrid has the largest service sector of all the regions (42.7% of regional GDP), while in terms of regional shares Castilla y León has the second largest 29.8%.

Out of all the regions the Canaries has the largest share of foreign tourism consumption (23.5%), and 27% of foreign visitors. Andalucía has the second largest amount of foreign tourism consumption (16.0%) but with a smaller foreign visitor share (8.11%), implying that visitors to this region are higher spending. In terms of GDP shares, foreign tourism consumption in the Canaries is very high, it accounts for 33.9% of regional GDP. This is unsurprising, in 2001 foreign tourists spent a combined total of more than 82 million nights in the Canaries when the population is estimated to be 1.8 million.

Further inspection of the shares of products that foreign tourists consume, yields some interesting information. Foreign tourists spend most of their money on accommodation based products. However, different products are preferred in different regions. For instance in Andalucía, the "other accommodation" sector is the largest of all the accommodations sectors, 6.5% of regional GDP, while hotels make up only 4.1% of GDP. While in Madrid for instance, hotels and "other accommodation" account for similar relative proportions of consumption but only 9.6% of "other accommodation" output is consumed by foreign tourists as opposed to 50.6% of hotel output. In terms of the tourism characteristic sectors unsurprisingly the Canaries have the largest share in regional GDP. Of particular interest is the large share of restaurants in GDP (6.8%) and the high tourism consumption ratios. These ratios are given in Columns 5 and 6 and show the proportions of foreign and domestic tourism in final consumption. Some products are almost exclusively tourism based for example, in the Canaries 91% of camp-site products are consumed by foreign tourists the remaining 9% are consumed by domestic tourists. There is no domestic non-tourism household consumption recorded in the benchmark dataset. In terms of accommodation, most forms are dominated by foreign tourism consumption. In the Andalucía for example, 51.1% of "other accommodation" is consumed by foreign tourists, only 13.2% is consumed by domestic tourists. Conversely, 50.9% of total hotel consumption is attributed to domestic tourism activity, as opposed to only 23.2% for foreign tourists. The remainder is consumed by non-tourism activities. This consumption structure largely reflects the visitor numbers figures given in chapter 2 Tables 2.8 and 2.9. In Andalucía foreign tourists actually prefer to stay in various types of "other accommodation". In Madrid the hotel sector is the main form of accommodation product, of which 50.6% is consumed by foreign tourists and 37.7% is consumed by domestic tourists. These consumption shares play a key role in the outcome of the results of the CGE model and are discussed throughout this chapter.

As stated throughout this thesis the Spanish economy is predominantly labour abundant i.e. there is more labour resource used in the production process than capital and there is more labour available, given relatively high levels of unemployment in the Spanish economy. Columns 2,3 and 4 show the intensity of factor use. Where the capital labour ratio given in column 4 is less than 1, this indicates that the sector is labour intensive. The majority of tourism characteristic sectors are labour intensive, for example the hotels sector in Andalucía has a capital labour ratio of 0.56. The general exception to this rule is the 'other accommodation' sector. This type of accommodation is predominantly self-catering, rented villas are usually cleaned by the occupants, thus there is no need for a large labour force, the majority of the returns accrue to the capital inputs i.e. the buildings themselves. Other sectors that are characterised by capital intensity in the benchmark data set are the agriculture sector and the air transport sector. The air transport sector by its nature is capital intensive i.e. the main factor of production is expensive airplanes. Similarly in the Agriculture sector most returns accrue to the land or machinery used in farming.

Columns 7-10 provide details of the trade structure in each region. Column 7 shows the proportion of exports as a component of final demand. In most regions the agriculture and manufacturing sectors make up the main source of export goods. In Castilla y León 18.8% of manufacturing production is exported, while in the Canaries, 24.8% of agricultural production is exported. The food production industry is very important in the Canaries and a significant proportion of its manufacturing sector is orientated towards food processing. Recall from chapter 3 that tourism characteristic products are not exported as tourists have to cross international borders to consume them. Of the regions that are specifically modelled all regions have a trade deficit apart from Madrid. The Canaries, due to its small Island status has the largest trade deficit, -23.9%.[4] Andalucía also operates with a significant trade deficit (-7.3% of GDP). Andalucía tends to import more from other Spanish regions than from overseas, for example, 17.2% of its final demand of manufactures comes from other Spanish regions as opposed to 6.8% from overseas.

Column 11 presents the average effective tax rate on consumption. In virtually all regions there is a net subsidy to the agricultural sector, but some outputs are taxed too. In some regions transport sectors also receive large subsidies too. The average effective VAT rate represents the total VAT receipts for the sector divided by the VAT base, which in this instance is Gross Value Added. The headline VAT rate in Spain in 1999 was 16%, although effective rates are always lower as not all components of value added have VAT levied on them and some products and services are zero-rated. The taxation of tourism characteristic sectors is investigated in detail in section 6.6 below.

6.5 Model Results: Increase in Foreign Tourism Demand

6.5.1 The Tourism Demand Counterfactual

The first set of scenarios seeks to investigate the regional effects of an increase in national tourism demand. Tourism is highly concentrated on just a few regions of Spain: the southern coastline of Valencia, Andalucía and Catalonia, and the Islands of the Balearics and the Canaries are the main regions which attract tourists. While these regions have benefited significantly from tourism revenues, what are the implications for the regions that have not? We have seen in chapter 5 that positive foreign tourism demand shocks increase the domestic price level and leads to an appreciation of the real exchange rate. This poses the question as to how the indirect effects from foreign tourism demand shocks affect regional economies where tourism is not as important?

In order to evaluate this proposition, the R-CGE model is shocked with a 10% increase in tourism demand in each region. Throughout the 1990s travel receipts have grown at an average of 7%,[5] so the counterfactual is designed to analyse the effects of a foreign tourism boom.

[4]The nature of this trade deficit is discussed in more detail in the next Chapter, which deals explicitly with the Canaries economy.

[5]Calculation based on growth of travel receipts from IMF Balance of Payments Statistics, various years.

The demand shock is simulated across all regions simultaneously and is designed to show how different regions in Spain with different regional characteristics will respond to international growth in tourism demand.

Sensitivity analysis is also undertaken to evaluate the impact of the elasticity parameters relating to foreign tourism and the model's conjectural variation parameters. The reasons for doing this are explained at the beginning of section 4.4.5 in chapter 4. In brief, within a CGE modelling context, the use of an imperfectly competitive modelling framework constitutes an improvement relative to the common application solely of a perfect competition set-up. In addition, the former is more a reflection of the emphasis of the Spanish economy than the latter. As in the previous chapter, examination of the senstivity of the results to the specific assumption mande in relation to the conjectural variation parmaeters provides new knowledge in the field of CGE modelling and indicates the empirical importance of the theoretical assumptions that are made.

The main results are presented in Table 6.1 through to Table 6.15. As in the previous chapter, results are presented as percentage changes from the benchmark values.

6.5.2 Results from the CRTS Model

The counterfactual imposes a demand shock of a 10% increase in the value of foreign tourism expenditure in all regions. The same effect is observed as in the previous chapter, the transmission effects are imperfect and the quantity of foreign tourism does not increase by 10% in any region. The increase in foreign tourism demand drives up the price of foreign tourism and, in turn, the real exchange rate. Consequently there is diffusion of the demand shock.

The region that experiences the largest diffusion effect is the ROS. However, this result should not be taken too literally. Effectively the ROS is a residual region comprised of all other regions in Spain for which data could not be obtained. Within the ROS region, the effects of the tourism demand shock will vary significantly depending on the structure of the tourism characteristic sectors in the particular autonomous communities. Some regions such as the Balearics, have high foreign tourism demand ratios, other regions, like Rioja, only have small ratios. If the region were to be sufficiently disaggregated, the volume of the shock would be identical and the aggregate macro impacts the same.

There are two key features of the dataset driving this result. Firstly, in the ROS region, there is a high concentration of tourism consumption on a small number of products. This is particularly apparent in the hotel and leisure sectors which account for nearly 40% of all foreign tourism consumption in this region. Secondly, in some sectors the foreign tourism consumption ratios very are high. For example, in the hotel sector, foreign tourism consumption accounts for 55.6% of final demand, a ratio higher than the Canaries which is the most tourist intensive region. Consequently, when foreign tourism demand increases in this region, the concentration of foreign tourism consumption in just a few sectors means that the foreign tourism price rises disproportionately to other regions. Therefore, it can be seen in Table 6.1 that the price of foreign tourism rises by 3.76%, the largest of all the regions in the model, and the actual quantity of foreign tourism consumption only increases by 5.04%. The price of foreign tourism in this model represents the consumption price of Spanish tourism products in units of foreign currency. Closer inspection reveals two concurrent effects occurring in the results. While the diffusion effect can be seen to be highly prominent a substitution effect can also be observed. As foreign tourism demand rises, the price of products supplied to both domestic and foreign tourists rises. Consequently, potential visitors to the ROS region will substitute to other regions where tourism products are relatively cheaper.

So instead we focus our attention on the other regions in the R-CGE model. The region with the next largest diffusion effect is the Canaries, where a 10% rise in tourism demand only translates into a 5.61% increase in foreign tourism expenditure, this is closely followed by Andalucía (5.87%). Castilla y León, however, has the smallest diffusion effect (7.93%). It is clear that foreign tourism prices do not rise at the same rate as consumption. The relationship between prices and consumption is inverse, and as already noted, the demand for foreign tourism is elastic. In all regions the price increases are less than the diffusion of the demand shock indicating elastic demand.

Table 6.1: Impact of a Foreign Tourism Demand Shock - Aggregate Results from CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.08%	0.64%	0.13%	0.38%	0.33%
Output	-0.01%	1.83%	0.02%	0.09%	0.08%
Trade Balance	0.07%	3.15%	1.24%	1.93%	1.85%
Exports	-0.04%	-0.14%	0.13%	-0.07%	-0.05%
Imports	0.40%	1.54%	0.41%	0.47%	0.37%
Inter-Regional Imports	0.74%	0.56%	0.81%	1.21%	1.15%
Household Income	0.99%	1.77%	0.62%	1.45%	1.25%
Regional Domestic Price level	3.03%	4.33%	1.88%	2.87%	2.70%
Price of Foreign Tourism	3.15%	3.39%	1.95%	3.13%	3.76%
Quantity of Foreign Tourism	5.87%	5.61%	7.93%	6.05%	5.04%
Price of Domestic Tourism	0.91%	1.01%	0.16%	0.69%	0.82%
Quantity of Domestic Tourism	1.52%	0.97%	0.51%	1.09%	1.11%
Government Revenue	2.97%	6.33%	1.81%	2.65%	2.05%

It has been noted that of the regions specifically modelled, the Canaries experiences the largest diffusion effect. The reason for this is that the Canaries has the highest intensity of foreign tourism consumption in their regional economy, approximately 33.9% of regional GDP as compared to 8.3% in Andalucía which is the second largest tourism region in the model. This level of intensity means that tourism consumption ratios are generally higher in the Canaries, for example, by comparing Tables A6.1 and A6.2 in the Appendices is can be seen that in the Canaries 5% of manufacturing output is consumed by foreign tourists, the equivalent figure for Andalucía is 1%. This feature is reflected in the overall increase in the domestic price level which increases by 4.33% in the Canaries and only 3.03% in Andalucía. Results for the domestic price level are given in Table 6.2. Increases in consumption and hence output drive up the domestic price level, in turn this leads to an increase in the real returns to factors of production and hence household incomes. This leads to an induced second round income effect, where increased earnings are then spent in the expanding economy, driving up the domestic price level still further.

Table 6.2 also shows that the regional domestic price rises of key tourism products are also larger in the Canaries. Take the 'other accommodation sector' for example, this is the most popular accommodation choice for visitors to Andalucía, yet the price rise is larger in the Canary Isles, 4.86% as compared to 3.52%. Therefore, substitution effects are inevitable. To test the extent of this substitution effect the results are compared to a model where there is no substitution between regions. The results for this counterfactual are given in section 6.5.6. Of particular interest are the results for the ROS region. The largest price rise of all regions is observed in the hotel sector. This result in particular drives the substantial foreign tourism price rise observed in this region and discusses in the opening paragraphs to this section.

Table 6.2: Impact of a Foreign Tourism Demand Shock on the Regional Domestic Price Level – CRTS Model.

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Regional Domestic Price Level	**3.03%**	**4.33%**	**1.88%**	**2.87%**	**2.70%**
Agriculture	0.61%	0.41%	0.66%	0.84%	0.38%
Manufacturing	0.42%	0.55%	0.81%	0.60%	0.53%
Hotels	2.46%	5.08%	2.36%	2.57%	5.86%
Hostels	3.94%	4.69%	2.25%	3.02%	3.32%
Other Accommodation	3.52%	4.86%	1.14%	1.82%	0.93%
Restaurants	2.68%	3.89%	1.35%	1.51%	0.87%
Service Sector	0.73%	0.35%	0.19%	0.01%	0.47%

The overall effect of the increase in foreign tourism demand on household incomes is positive. The largest rise in household income is observed in the Canaries (1.77%). Household incomes are determined by several factors. Firstly, as foreign tourism consumption increases so too does the output of the tourism sector. This leads to increases in income from labour and capital. Secondly, there will be indirect and induced effects relating to the increase in foreign tourism demand. For instance, the rise in the domestic price level reduces the value of real incomes while increased demand from tourism characteristic sectors will drive up demand for intermediate inputs in downstream sectors. The large impact in the Canaries is attributed to the scale of tourism earnings in household income. Table 6.1 shows that the combination of some of these effects is particularly large in Madrid, where the second largest increase in household income is observed; this is because there is a significant rise in output in this region (0.35%) on a relatively large base (approximately 16.8% of national GDP). The foreign tourism diffusion effect is smaller than other regions and there is a significant increase in domestic tourism demand and the balance of trade.

As real incomes have risen following the demand shock, consumption rises and domestic tourism demand also increases. The regions with the largest shares of domestic tourism demand are Andalucía (13.8%) and Madrid (8.6%). It is due to these larger volumes that the price of domestic tourism rises by increased amounts. For instance, in Andalucía the price of domestic tourism rises by 0.91%, while in Castilla y León it only rises by 0.16%. However, what drives the domestic tourism result is the proportion of domestic tourism in total household consumption; i.e. when incomes rise and domestic tourism consumption increases, where the share of domestic tourism consumption is a higher proportion of total household consumption, more of the increase in incomes will be allocated to domestic tourism. This is what leads to the observed outcome in the Canaries. The Canaries has a smaller national share of domestic tourism consumption (6.8%), but it constitutes a larger share of GDP (10.1%). This means that the price of domestic tourism actually rises by the most in the Canary Islands (1.01%), although demand rises by less than Madrid and Andalucía. This is partly due to a regional diffusion effect relating to the price rise, and a substitution effect as domestic tourists move to cheaper regions.

As the domestic price level in Spain rises, the purchasing power of foreign currency is reduced and the real exchange rate appreciates. Imports become cheaper and exports are less competitive. This is observed in all regions, the volume and value of imports rises and the quantity of exports decreases. The largest increases in the value of imports are in the Canaries (1.54%). This relates to the relative proportions of imported goods in GDP, imported goods in final demand comprise 33% of GDP in the Canaries. The rise in the domestic price level also drives up the cost of imports from other regions in Spain; hence their value rises also. Here the largest rise is seen in Castilla y León, where the value of inter-regional imports rises by 1.21%. This is unsurprising as Castilla y León has a high proportion of inter-regional imports in GDP (33.0%). The drivers of this result relates to the use of products in the expanding sectors in the

Castilla y León region. Most of the tourism characteristic sectors have relatively low levels of inter-regional import use or content in final demand, but in non-tourism characteristic sectors such as manufacturing this level is higher. As the manufacturing sector expands in Castilla y León, the intermediate import content rises accordingly.

Overall, the trade balance can be seen to improve across all regions due to the influx of foreign currency attributed to the demand shock. The Canaries exhibits the largest trade deficit improvement of all regions (3.15%) due to its intensity of foreign tourism consumption in relation to the trade deficit. A somewhat counterintuitive result is observed in Castilla y León, where the value of exports in the regional economy actually rises, in spite of the depreciation in the real exchange rate for importers of Spanish goods and services. This is related to the increase in output of manufactured goods in this region and is explained later in this section.

Government revenue can also be seen to increase following the foreign tourism demand shock. As tourists increase their consumption in the economy and aggregate demand rises, so too will the amount of tax they pay. The effects of this phenomenon on the public finances are substantial, with the Canaries, Andalucía and Madrid reporting respectively 6.33%, 2.97% and 2.65% rises in tax income. Larger rises in these regions are observed because of the scale of tourism activities and the higher effective tax rates observed in tourism characteristic sectors.[6] For example, in Andalucía and the Canaries it relates to the absolute size of the tourism demand shock and the domestic tourism income effect. While in Madrid, effective tax rates appear to be marginally higher across most sectors and there is a significant rise in manufacturing output in this region.

Welfare is seen to increase in all regions. It is particularly interesting to examine the case of Andalucía. Although output falls in this region, rises in the real wage and real capital rental rate, plus substantial increases in household income (1.77%) and a marginal improvement in the regional trade deficit are all observed. The net effect of these impacts are substantial enough to generate a small welfare gain (0.08%). Larger welfare gains are seen in the Canaries (0.64%) and Madrid (0.38%). This is because the foreign tourism demand shock has a positive effect on regional output in both cases, while the same positive factors that are observed in Andalucía are also observed in these regions. However, Table 6.4 also shows that growth in the real returns

[6]See column 11 in Tables A6.1 through A6.5 for details.

to factors are higher in the Canaries than in Madrid and the growth in household income is also substantially larger.

Table 6.3 shows the response of output, labour and capital usage following the tourism demand shock. Due to the large volume of results that the model generates, the impact of the shock on all sectors is not shown. Instead the focus of the results presentation is determined by the sectors on which the tourism demand shock has a direct effect and those sectors which are particularly important to the specific regional economies. The Canaries experiences by far the largest output gain of all the regions in the model. This is unsurprising given the scale of foreign tourism activity in the region. In this region a 5.61% increase in foreign tourism expenditure and a 0.97% increase in domestic tourism expenditure translate into output growth of 1.83%.

The effect of the tourism demand shock on sectoral output is more variable. Due to the simulated increase in foreign tourism demand, output in the accommodation and restaurant sectors is generally seen to rise. However, across the board increases in tourism characteristic output in all regions are not observed. In Andalucía, output in the hotel sector falls (-0.11%). This result appears to be somewhat counter intuitive as these are all sectors that are characteristic in foreign tourism consumption. It would be expected that as foreign tourism demand rises, output in these sectors would rise also. However, closer inspection of the data reveals that in these particular sectors, domestic tourism consumption is greater than foreign tourism consumption. In Andalucía 50.9% of hotel consumption is by domestic tourists, as compared to only 23% of hotel output being consumed by foreign tourists. Further, hotels are not the preferred accommodation choice of foreign tourists; "other accommodation" accounts for 37.3% of total foreign tourism consumption as opposed to 12.0% for hotels. Therefore, hotel accommodation becomes less profitable as compared to apartments and villas, and resources move into the "other accommodation" sector where returns are higher. This sector expands (2.62%) at the expense of the hotel sector . There is also a substitution effect. The price of hotels has risen by 2.46% in this region for both domestic and foreign tourists, as hotel products become more expensive in the Andalucía region, both domestic and foreign tourists will substitute away to other regions and products. This effect is particularly strong for domestic tourists, whose status quo is disturbed by the counterfactual. There will be some sort of compensatory effect from domestic tourists as their demand rises via the income effect described above. However, this is does not drive up the rate of return to a similar extent to the foreign tourism demand shock.

However, the compensating expansion of the "other accommodation" is quite small considering that the initial foreign tourism demand shock is 10%. As previously shown, the demand shock is significantly diffused by the appreciation of foreign currency. Further, the 'other accommodation' sector is not entirely dependent on foreign tourism consumption; 51.3% of final demand is attributed to foreign tourism consumption in the 'other accommodation' sector, the remainder is attributed to domestic tourism and non-tourism household consumption, much of which is second homes usage by Andalucían residents. Similar effects occur across the range of tourism characteristic sectors due to the diffusion effect and the fact that foreign tourists do not consume 100% of the output of tourism characteristic sectors.

Table 6.3 Impact of a Foreign Tourism Demand Shock on Sectoral Output and Labour and Capital Value Added – CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	**-0.01%**	**1.83%**	**0.02%**	**0.09%**	**0.08%**
Agriculture	-0.01%	-0.09%	0.06%	0.15%	-0.02%
Manufacturing	-0.06%	-0.05%	0.20%	0.08%	-0.05%
Hotels	-0.11%	2.42%	0.57%	1.59%	1.89%
Hostels	2.98%	3.63%	0.38%	1.66%	2.02%
Other Accommodation	2.62%	3.04%	0.42%	0.61%	0.47%
Restaurants	1.50%	2.96%	0.33%	0.83%	0.44%
Service Sector	-0.04%	-0.02%	-0.10%	-0.16%	-0.01%
Value Added – Labour	**0.00%**	**2.21%**	**0.06%**	**0.15%**	**0.13%**
Agriculture	-0.03%	-0.14%	0.11%	0.17%	-0.03%
Manufacturing	-0.12%	-0.25%	0.32%	0.11%	-0.11%
Hotels	-0.18%	2.67%	0.81%	2.09%	2.03%
Hostels	3.25%	3.91%	0.61%	2.17%	2.31%
Other Accommodation	1.81%	3.22%	0.62%	0.49%	0.32%
Restaurants	1.16%	3.14%	0.45%	1.12%	0.53%
Service Sector	-0.12%	-0.38%	-0.23%	-0.31%	-0.01%
Value Added – Capital	**0.00%**	**1.64%**	**0.03%**	**0.13%**	**0.08%**
Agriculture	0.00%	-0.02%	0.04%	0.03%	-0.01%
Manufacturing	-0.02%	-0.03%	0.25%	0.09%	-0.02%
Hotels	-0.02%	1.95%	1.12%	1.24%	1.67%
Hostels	2.28%	3.37%	0.97%	1.16%	1.85%
Other Accommodation	3.11%	3.19%	0.69%	0.74%	0.71%
Restaurants	1.16%	2.20%	0.26%	0.42%	0.23%
Service Sector	-0.02%	-0.05%	-0.03%	-0.03%	0.00%

Another key observation from the model results is the reduction in output in the non-tourism characteristic sectors. Following the tourism demand shock, total output across the Spanish economy is seen to rise, but in the agriculture, manufacturing, transport and services sectors, it falls. This is partly due to increased competition from imported goods due to the appreciation in the real exchange rate and due to other sectors competing away factor resources. In addition, these are all sectors where the proportion of tourism demand in final consumption is less than non-tourism/household and export consumption. There are, however, two concurrent counteracting effects. Firstly, the income effect associated with the tourism demand shock means that there will be more direct demand for other sectors' output; for example, in the Canaries foreign tourists consume 6.8% of service sector output, while tourism characteristic sectors will also demand more intermediate inputs from downstream industries. Both of these effects will have a positive effect on output in non-tourism characteristic sectors, but they are not substantial enough to reverse the sign of the output contraction as they are second round impacts.

The decline in output discussed above is not observed in Castilla y León, where output is seen to rise in both the agriculture and the manufacturing sector. Castilla y León has the lowest intensity of foreign tourism receipts of all the regions in this model (0.8% of GDP). Therefore, it experiences the lowest rise in the domestic price-level (1.88%) resulting from the shock and in turn becomes cheaper relative to the other regions. The manufacturing sector dominates the regional economy in Castilla y León, accounting for 35.7% of regional GDP.[7] This sector also imports a large volume of imported intermediate goods from other regions in Spain. A rise in domestic prices is observed in this specific sector, but closer inspection and decomposing the source of the price change reveals that it is not attributed to the rise in the domestic price level resulting from the tourism demand shock. This sector has virtually no direct links with foreign tourism consumption. Instead, an alternative, concurrent effect dominates. As has already been shown, there is a rise in the price of imported goods from other Spanish regions. This leads to a substitution effect away from more expensive inter-regional imports towards cheaper own region goods. Also, as manufactures in Castilla y León become the cheaper relative to other regions in Spain due to the lower price level, they are able to export more to other regions and abroad. This leads to an expansion in both domestic and exported manufactures in the region. Due to the high proportion of manufactured exports in final demand in this region (18.8%), this effect leads to an expansion in total exports from the region as observed in Table 6.1. The same result holds for the agriculture sector in Castilla y León and the manufacturing sector in Madrid, although in the Madrid case, the output gain is less than half that observed in Castilla y León due to the lower proportion of imported intermediates, which gives less scope

[7] The largest share for all the regions in the model.

for a substitution effect.

Table 6.3 also details the use of the two factors of production, labour and capital in value added. A basic examination of the results show that as output rises, the usage of both labour and capital rise and vice versa if output falls. The underlying mechanism driving this adjustment is the same as in the previous chapter. As output expands (contracts) in a particular sector, the marginal value product of the factors of production will rise (fall) and the demand for factors will increase (decline). In turn, in order to attract workers or investors to allocate their resources to an expanding sector then the real returns to capital and labour must rise relative to the other sectors in the economy. In sectors which experience a loss in factor resources, output will fall.

The scale of increases/decreases in value added from a particular factor relate directly to its real rate of return, as can be seen by comparing Table 6.3 and 6.4. For example, the largest increase in value added attributed to labour is observed in the hostel sector in the Canaries (3.91%). This is associated with the largest increase in the real wage (3.72%). This is because of high intensity of foreign tourism consumption observed in this sector (91.0%). What is particularly interesting about these results are the relative magnitudes in changes in the real price of capital and labour. It can be seen that increases in the real wage are predominantly larger than increases in the capital rental rate. The capital rental rate only increases by 3.35% in the Canaries hostel sector. The same phenomenon exists in almost all sectors of the economy. The tourism characteristic sectors are predominantly labour intensive, so when they expand they will demand additional labour. This of course drives up the real wage more rapidly than the returns to capital, as expanding sectors will need to bid higher wages in order to entice factors. Both sectors exhibit factor market rigidity, in that there is an adjustment cost associated with the movement of capital and labour. This means that factor returns will increase to a higher level than a model with perfect factor mobility. There is evidence of increased investment to meet rising demands for capital, but the nature of this result differs from some of the results given in the dynamic models used in this thesis. The accumulation of investment between periods is treated explicitly in the dynamic model, while intra-period investment behaviour is only proxied in the static model. The static model does account for increased provision of investment as the returns to capital rise. However, this effect is much smaller in the static model as savings are fixed and cannot be endogenously increased to meet the rising demand for capital. This means that capital accumulation is smaller in the static model and capital labour substitution effects are weaker as increased investment would stave off increases in the real wage by supplying more capital as a substitute. This effectively means that capital use would increase more rapidly in a dynamic model. In this example, even when capital intensive sectors expand the increase in the real wage is still higher than the increase in the capital rental rate. This is because the expanding capital intensive sectors are competing with the labour intensive sectors for labour resources.

Table 6.4: **Impact of a Foreign Tourism Demand Shock on the Cost of Value Added – CRTS Model**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Real Wage – Total	**0.01%**	**2.42%**	**0.04%**	**0.26%**	**0.08%**
Agriculture	-0.42%	-0.11%	0.03%	0.07%	-0.01%
Manufacturing	-0.08%	-0.37%	0.03%	0.01%	-0.03%
Hotels	-0.13%	2.56%	1.10%	0.93%	1.44%
Hostels	1.79%	3.72%	1.02%	1.08%	1.63%
Other Accommodation	1.07%	3.45%	0.27%	0.32%	0.22%
Restaurants	0.64%	3.02%	-0.13%	0.34%	0.17%
Service Sector	-0.15%	-0.14%	-0.07%	-0.66%	-0.00%
Real Capital Rental Rate – Total	**-0.03%**	1.88%	**0.01%**	**0.17%**	**0.04%**
Agriculture	-0.05%	-0.04%	0.02%	0.01%	-0.01%
Manufacturing	-0.16%	-0.01%	0.01%	0.04%	-0.01%
Hotels	-0.06%	2.22%	0.72%	0.78%	0.97%
Hostels	0.96%	3.35%	0.63%	0.63%	1.19%
Other Accommodation	0.24%	3.06%	0.38%	0.74%	1.09%
Restaurants	0.91%	2.71%	-0.14%	0.23%	0.11%
Service Sector	-0.08%	-0.02%	-0.01%	-0.02%	0.00%

This section has shown that the impacts of a foreign tourism demand shock vary significantly across regions. The primary driver of this result is the magnitude of the diffusion effect caused by the associated rises in the regional domestic price levels. Changes in the domestic price level are affected by output and consumption decisions which in turn drive the real exchange rate and the relative prices between regions. All regions benefit from the tourism demand shock, but benefits are realised in different ways. Andalucía experiences a decline in output driven by price level rises in the hotel sector deterring domestic tourists. However, the terms of trade improvement contributes to a welfare gain.

6.5.3 Results from the IRTS Model

As throughout this thesis the effects of the simulations are evaluated under alternative model structures i.e. imperfect competition and increasing returns to scale (IRTS) and perfect competition and constant returns to scale (CRTS). The same result occurs as in the previous chapter: the impacts of all simulations are larger in the CRTS case than in the IRTS case. The underlying reason is no different than before. As tourism demand increases, mark-ups rise and the perceived elasticity of demand by the monopolistically competitive firm decreases and their prices rise and output falls. Consequently, the price of foreign tourism rises at a greater rate than in the CRTS case and the impact of the tourism demand shock is diffused to a greater extent. This effect is particularly noticeable in Madrid where the price of foreign tourism increases from 3.13% to 3.41% (a total of 33 percentage points), suggesting that the tourism industry in Madrid is less competitive that the other regions. Referring back to Table 6.2, this is a particularly substantial rise in the domestic price level considering that in the CRTS case, the rise in the price of foreign tourism was less than in Andalucía (3.15%) and it is now more substantial. The reordering of this result can be attributed to the higher tourism industry mark-ups observed in the Madrid region, (see Table A6.6 for details). For example, Madrid has the highest mark-ups in the hotels, hostels and restaurants sectors. Higher mark-ups mean that the calibrated perceived elasticity of demand is lower for these firms and they will raise prices by larger amounts accordingly.

Table 6.5: Foreign Tourism Demand Shock: Aggregate Results from the IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.02%	0.69%	0.08%	0.24%	0.22%
Output	-0.03%	1.71%	0.02%	0.06%	0.06%
Trade Balance	-0.02%	2.49%	1.13%	1.52%	1.41%
Exports	-0.08%	-0.18%	0.00%	-0.12%	-0.11%
Imports	0.46%	1.72%	0.48%	0.63%	0.46%
Inter-Regional Imports	0.61%	0.49%	0.73%	1.13%	1.09%
Household Income	0.86%	1.58%	0.54%	1.03%	0.98%
Regional Domestic Price level	3.48%	4.59%	2.43%	3.21%	3.10%
Price of Foreign Tourism	3.36%	3.43%	2.11%	3.41%	3.94%
Quantity of Foreign Tourism	5.61%	5.39%	7.42%	5.59%	4.81%
Price of Domestic Tourism	0.93%	1.14%	0.18%	0.77%	0.91%
Quantity of Domestic Tourism	1.41%	0.88%	0.49%	0.98%	0.99%
Government Revenue	2.90%	6.24%	1.78%	2.79%	1.92%

The increased diffusion of the tourism demand shock carries through to the other results in the model. The same core economic movements that were observed in the CRTS model are also observed in the IRTS model, but the scale varies. Following the tourism demand shock, the price and quantity of domestic tourism still increase due to the income effect, although as the earnings from the increase in foreign tourism are reduced, so too are the observed increases in household income and in turn domestic tourism consumption. The regional domestic price level rises by more in the IRTS model due to the increased rise in foreign tourism prices attributed to the demand shock. This effect occurs despite the fact that the overall level of output and consumption in the economy falls, which, in practice, drives down the domestic price level in the CGE model. Again, this effect is particularly noticeable in Madrid, where the domestic price level rises from 2.87% in the CRTS model to 3.41% in the IRTS model.

As the domestic price level rises by more in the IRTS case, the terms of trade worsen. This means that under this scenario the quantity of imports rises by more than in the CRTS case. Again this effect is particularly noticeable in the Canaries, where the increase in the quantity of imports rises from 1.54% in the CRTS case to 1.72% in the IRTS case. In turn the more substantial rise in the domestic price level has an adverse effect on the competitiveness of exports and increases the cost of inter-regional trade. In Castilla y León for example, a net positive increase in the quantity of exports was observed in the CRTS case, but is now no longer observed in the IRTS case. As the cost of inter-regional imports rises, the quantity demanded falls so there is less inter-regional trade in the IRTS model.

When comparing the output effects of the foreign tourism demand shock between the two models, substantial differences are observed. As well as the national and region specific effects described in the previous section, the calibrated mark-ups have a significant influence on the results. It has been noted that when foreign tourism demand rises in the IRTS case, tourism characteristic firms will restrict output and raise prices. It can be seen by comparing Tables 6.6 and 6.3 that in all instances where output rose in tourism characteristic sectors in the CRTS case, increases in output are lower. These changes in output are related to the calibrated mark-ups. Take the hotel sector in Madrid, for example, where the growth in output falls from 1.59% in the CRTS case to 1.27% in the IRTS case, the largest regional contraction in hotel sector output. The calibrated mark-up for this regional sector is 0.38, which is the highest of all of the regions in Spain. The sector already experiences a substantial price rise as compared to other regions due its high intensity of foreign tourism consumption (see Table 6.2 for details of the domestic price rise in the CRTS case). Coupled with this relatively high level of anti-competitive behavior it is unsurprising that there are substantial differences between the CRTS and IRTS results. Further, the conjectured reactions of domestic rivals are also small in this case (0.13) as shown in Table A6.8 in Appendix A. This means that domestic firms will increase output by a lesser amount following a change in output from a rival, a less competitive scenario. Compare this to the hotel sector in the Canaries where the difference in output is much smaller, 2.42% in the CRTS case as compared to 2.26% in the IRTS case. In this sector firms mark-ups are lower, at 0.30 and rival firms' conjectures are larger at 0.26.

It can also be seen by comparing Table 6.6 and Table 6.3 that the observed declines in output are larger in the non-tourism characteristic sectors in the IRTS case. This is counterintuitive to the CRTS model where we would expect output to fall by less in these sectors due to the smaller reallocation effects associated with the smaller rise in tourism characteristic output. Thus, as tourism characteristic output rises by a lesser amount in the IRTS case, there is a smaller appreciation in factor returns in these sectors so less factors will flow into them. However, in the IRTS model when imperfectly competitive sectors expand, they restrict output and raise prices disproportionately. When they contract, they reduce output by more and keep prices higher. This effect, coupled with two further concurrent factors override the expected CRTS result. Firstly, the income effect associated with the foreign tourism demand shock is smaller in the IRTS case so the indirect consumption effects will be smaller. Secondly, as output growth is lower in the tourism characteristic sectors, there will be less downstream intermediate demand for sectors that supply goods to these sectors. The combined impact of these effects can be quite large. Take the service sector in Madrid, for example; in this sector, the contraction in output is -0.18% in the IRTS case as opposed to -0.16% in the CRTS case. It has already been seen that in general, mark-ups in Madrid are higher than in other regions of the economy. Therefore it is expected that the effects associated with the IRTS model will be the largest in this region.

In the CRTS model it was also observed that agriculture and manufacturing grow in Castilla y León and Madrid. These output gains are smaller in the IRTS model due to the same reasons given in the preceding paragraph and are even smaller in Madrid due to its relative lack of competition. This also explains why there is no longer an increase in exports observed in Castilla y León.

Table 6.6: **Impact of a Foreign Tourism Demand Shock on Sectoral Output – IRTS Model**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	**-0.03%**	**1.71%**	**0.02%**	**0.06%**	**0.06%**
Agriculture	-0.03%	-0.10%	0.04%	0.10%	-0.03%
Manufacturing	-0.10%	-0.07%	0.17%	0.05%	-0.07%
Hotels	-0.12%	2.26%	0.60%	1.27%	1.53%
Hostels	2.46%	3.55%	0.41%	1.35%	1.72%
Other Accommodation	2.05%	2.94%	0.44%	0.46%	0.39%
Restaurants	1.25%	2.81%	0.35%	0.62%	0.35%
Service Sector	-0.08%	-0.02%	-0.15%	-0.18%	-0.02%

As in the CRTS model, movements in factor markets are similar to changes in output. They are directly proportional to the reduced levels of output in this model, while the directional changes are the same. Therefore they are not reported in this section.

The observed welfare effects are significantly different in the IRTS model this is probably due in some part to the Dixit-Stiglitz love of variety function. Welfare falls in each region in the IRTS model as there are lower levels of output in each sector and the income effect following the foreign tourism demand shock is smaller. However, the consumers love of variety is also a factor in the welfare function and this can either compound the adverse welfare effect or compensate the region. The variety impacts as represented by the number of firms are given in Table 6.7.

It can be seen that firm growth effects largely mimic output effects. In sectors where output growth occurs there is an observed variety increase and vice versa where output is seen to decline. For example, the number of hotel firms in Andalucía falls by 0.18%, while the number of manufacturing varieties in Castilla y León increases by 0.09%. When output rises, the mark-up of the oligopolist will increase and firms will enter the market to contest it. However, when output falls then marginal revenue falls and average costs rise relative to output, so that profits fall. Firms will then leave the market. The scale of firm entry effects are larger when there is a higher mark-up to be contested. The scale of firm exit effects are higher when mark-ups are lower as firms can more easily realise higher mark-ups by producing alternative products. Consequently the largest rises and falls relative to changes in output are observed in Madrid. In all instances, the number of imported varieties rises as the volume of imports increases following the worsening of the terms of trade.

Table 6.7: Foreign Tourism Demand Shock: Impact on the Number of Firms

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Firms	**-0.08%**	**0.21%**	**0.08%**	**0.10%**	**0.09%**
Agriculture	-0.07%	-0.14%	0.06%	0.08%	-0.08%
Manufacturing	-0.15%	-0.21%	0.09%	0.03%	-0.13%
Hotels	-0.18%	1.81%	-0.84%	0.76%	0.91%
Hostels	1.66%	2.99%	-0.74%	0.72%	0.88%
Other Accommodation	1.35%	1.52%	-0.21%	0.27%	0.24%
Restaurants	0.77%	2.24%	-0.43%	0.39%	0.24%
Service Sector	-0.12%	-0.06%	-0.21%	-0.26%	-0.07%
Imports Firms	**0.36%**	**0.23%**	**0.31%**	**0.21%**	**1.15%**
Agriculture	0.03%	0.35%	0.39%	0.78%	1.39%
Manufacturing	0.34%	0.55%	0.37%	0.96%	1.30%
Services	0.09%	0.02%	0.11%	0.38%	0.14%

As in Willenbockel (2004), when values of the Dixit Stiglitz elasticity parameters ν_i and ν_i^m are low, agents' love of variety is high. Under these circumstances a relatively a small change in the number of varieties will translate into a larger welfare gain. Even though values of ν_i and ν_i^m are set at 2 times and 3 times the Armington elasticity respectively, these are still 'low' as compared to the calibrated values of Willenbockel (2004) where values for can reach in excess of 100. In the IRTS case, both output and real incomes rise by less, which in practice puts downward pressure on welfare results. The increased varieties resulting from the change in output are unable to reverse this increased downward pressure on welfare. However, differences between the these results are subtle, no fundamental directional changes are observed and the pattern of results are the same.

As noted in chapter 3, sensitivity tests were carried out regarding the value of the elasticity parameters and the number of firms in the model. Increasing the elasticity values ν_i and ν_i^m

reduces the perceived elasticity of demand and vice versa, while reducing the number of firms increases mark-ups and vice versa. Results are not presented as they are not directly policy relevant and serve more to test the robsutness of the model. However, in general movements are marginal although and are as expected given the resulting calibrated mark-ups.

6.5.4 Impact of a Change in the Conjectural Variation Parameter

This next subsection considers an alternative scenario relating to the conjectured reactions of domestic firms to foreign firms' activity in the domestic market and vice versa. As opposed to the Cournot assumption used in the previous section whereby $\mu_i = \mu_i^M = 0$, in this alternative scenario $\mu_i = \mu_i^M = 6$, the conjectured reaction of domestic firms' to the foreign firms action in the domestic market is assumed to be positive, i.e. a 1% increase in the output of foreign firms will lead to a 6% increase in output of domestic firms and vice versa

The rationale for assuming a conjecture of this manner relates to previous findings from the CRTS model. It is shown that imports rise following the tourism demand shock due to the appreciation in the real exchange rate. The level of domestic output increases also, although not generally in the non-tourism characteristic sectors. The conjecture implies that if firm s plans to increase output it expects rival firm t to drop price by more so as to increase output by more and gain market share. While if firm s decides to reduce output, then it conjectures that firm t will reduce output by more and the market will operate as if it is becoming less competitive. Increasing μ_i and μ_i^M has the effect of **reducing** calibrated mark-ups. The corresponding calibrated conjectures and mark-ups are given in the appendicies to this chapter, Tables A6.6 through to A6.9. Take the hotel sector in the Canaries, for example, the calibrated mark–up is 0.3 in the IRTS base case and 0.24 in the IRTS alternative case. Reducing the mark-up has the direct effect of reducing firms perceived elasticity of demand and hence their perception of market power. It was shown in the IRTS base case, that increasing tourism demand means that more firms will contest the tourism characteristic sectors, therefore mark-ups will fall. A similar outcome is observed in the overseas sector where output increases. However, in the non-tourism characteristic sectors where output contracts, firms restrict output in order to protect mark-ups, although mark-ups will fall as aggregate demand falls and hence fixed costs rise as a proportion of output. So based on these observed outcomes, the parameters μ_i and μ_i^M are increased to test the sensitivity of the model results to changes in the value of the conjecture. Reducing the mark-up has the direct effect of reducing firms perceived elasticity of demand and hence their perception of market power. However, in addition to the conjectured reactions between rival domestic firms and rival foreign firms, the parameters λ_i and $\lambda_i^m$are smaller[8]. Therefore, firms conjecture that rivals output response will be smaller than their own. These outcomes determine the choice of change in the conjectural variation parameters for the purposes of this sensitivity test. The choice of conjecture is designed to impose conditions where perceived output response from rivals is larger

[8]i.e. the conjectured reaction of domestic firm to a rival's action in the domestic market is smaller. Lower mark-ups mean lower perceived elasticities of demand and lower perceived market power. This implies that firm s will increase output by a lower amount following an increase in output by rival firm t.

Table 6.8: Foreign Tourism Demand Shock: Aggregate Results from the IRTS Model where $\mu_i = \mu_i^M = 6$

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.03%	0.67%	0.10%	0.29%	0.27%
Output	-0.02%	1.75%	0.02%	0.07%	0.07%
Trade Balance	0.02%	2.73%	1.18%	1.63%	1.59%
Exports	-0.06%	-0.16%	0.06%	-0.09%	-0.08%
Imports	0.49%	1.64%	0.46%	0.58%	0.43%
Inter-Regional Imports	0.68%	0.53%	0.76%	1.15%	1.11%
Household Income	0.93%	1.67%	0.57%	1.18%	1.13%
Regional Domestic Price level	3.21%	4.51%	2.21%	3.06%	2.97%
Price of Foreign Tourism	3.30%	3.39%	2.06%	3.36%	3.88%
Quantity of Foreign Tourism	5.72%	5.48%	7.47%	5.70%	4.92%
Price of Domestic Tourism	0.92%	1.09%	0.17%	0.79%	0.87%
Quantity of Domestic Tourism	1.45%	0.92%	0.50%	1.05%	1.07%
Government Revenue	2.93%	6.30%	1.80%	2.62%	1.96%

As mark-ups are lower under this scenario, firms have less market power to raise price following the tourism demand shock. Therefore the price of foreign tourism rises by less than in the IRTS case with Cournot conjectures. However, these differences are quite small. For example, in Madrid in the Cournot IRTS case the price of foreign tourism rose by 3.41%, but in the alternative IRTS case it rises by 3.36%, a difference of only 0.05%. This is the same for all regions in the model, suggesting that the model is relatively insensitive to changes in this parameter.

Table 6.8a: Foreign Tourism Demand Shock: Impact on Sectoral Output, for the IRTS Model where $\mu_i = \mu_i^M = 6$

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	**-0.02%**	**1.75%**	**0.02%**	**0.07%**	**0.07%**
Agriculture	-0.03%	-0.10%	0.04%	0.11%	-0.03%
Manufacturing	-0.09%	-0.07%	0.18%	0.06%	-0.07%
Hotels	-0.12%	2.29%	0.62%	1.33%	1.60%
Hostels	2.56%	3.57%	0.43%	1.41%	1.78%
Other Accommodation	2.16%	2.96%	0.45%	0.49%	0.41%
Restaurants	1.30%	2.84%	0.36%	0.66%	0.37%
Service Sector	-0.07%	-0.02%	-0.14%	-0.18%	-0.02%

Table 6.8a gives details of the sectoral output effects from this simulation. It has already been noted that mark-ups and hence the firms perceived elasticity of demand has declined in this scenario. In all instances the level of output is higher, as would be expected in such a scenario. However, differences in output results are small as compared with the IRTS base case. However, in all instances output is higher. Take the restuarant sector in the Canaries for example, output increases by 2.84%, as opposed to 2.81% in the IRTS base case and 2.96% in the CRTS model. Therefore, it is inferred that the impact of changing the assumptions relating to the conjectures from Cournot to an alternatice scenario in this instance is small.

As expected, household incomes and domestic tourism demand rise by more under this scenario as there is less diffusion of the demand shock. The domestic price level also rises by less due to the lower perceived elasticities in the model. As foreign firms mark-ups are now lower, the supply of imported goods increases as their perceived elasticity of demand is lower. Thus, the quantity of imports increases by more than in the IRTS base case even though the impact on the terms of trade is smaller due to the reduced impact on the domestic price level. Foreign firms mark-ups are reduced following the calibration and in turn their prices respond less to the increased demand following the depreciation in the real exchange rate.

In the next three subsections key elasticity parameters and the structure of the tourism demand function are tested. These tests are carried out with the CRTS model used in section

6.5.2. This is referred to as the 'base case' and results from the base case are compared with the sensitivity tests in order to establish the importance and policy implications of testing these parameters.

6.5.5 Sensitivity Analysis: Doubling the Elasticity of Substitution Between Regions

The first sensitivity test is designed to give insights with regard to the effects of increased substitution between regions. The elasticity of substituion between regions is an important parameter as it dictates the extent of tourism flows between regions. Understanding the relative importance of this parameter is important as it can give insights as to the influence of regional tourism policy tools. Given the high concentration of tourism demand in the South Coast region of Spain and its focus on beach related holiday's, it would make policy sense to try to diversify the tourism product and spread tourism demand out amongst the regions. The value of the substitution parameter is currently set at 4, indicating quite a high level of substitutability. For the simulation the parameter is doubled to 8, the rationale for this is that such a large increase in the elasticity parameter could demonstrate what significant policy change in this area might achieve. Results are given in Table 6.9.

What can immediately be seen that there is a substantial substitution effect between the ROS region and the other regions in the model. The increase in the quantity of foreign tourism is only 4.18% in this scenario as compared to 5.04% in the base case. The reason why foreign tourism flows out of this region is because this is the region which experiences the largest rise in tourism price. As tourists have increased willingness to substitute in this version of the model then they will prefer to move to cheaper regions. The region that benefits the most is Castilla y León the quantity of foreign tourism demand increases by more than the 10% specified in the initial demand shock. This is due to that fact that the initial demand stimulus is reinforced by substitution away from regions that are more tourism-intensive and which therefore experience higher price increases.

Differences between this alternative case and the base case are relatively large. As well as the sharp rise in Castilla y León, other regions gain as well. For instance, in Madrid the quantity of foreign tourism rises to 6.40% as opposed to 6.05% in the base case. Results of this nature reflect both the importance of this calibrated parameter and the practicalities of increased substitutability as a policy tool. Otherwise results follow the same pattern as the base case; differences reflect the relative magnitudes of the tourism demand shock.

Due to the increased volume of tourism in the economy, the increase in the domestic price level is greater under this scenario than in the base case. The region with the largest relative increase is Castilla y León (a rise of 1.88% is observed in the base case as opposed to 2.13% in this alternative scenario). However, this is not enough to reverse the beneficial effect on manufacturing output observed in the base case as rises in the domestic price level are observed in all regions except ROS. This does mean that the volume of inter-regional imports falls due to their increasing price. Due to worsening of the terms of trade, the volume of imports rises and exports decrease. Output increases in all regions apart from the ROS due to the increased substitution. However, the effects are small, the net effect of increased tourism consumption cancels out increased reductions from the worsening terms of trade.

Table 6.9: Impact of a Foreign Tourism Demand Shock - Aggregate Results from CRTS Model, with Increased Substitution between Regions.

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.06%	0.66%	0.13%	0.39%	0.31%
Output	-0.01%	1.89%	0.04%	0.10%	0.07%
Trade Balance	-0.73%	3.58%	0.54%	1.70%	1.85%
Exports	-0.06%	-0.16%	0.08%	-0.08%	-0.04%
Imports	0.39%	1.55%	0.42%	0.48%	0.34%
Inter-Regional Imports	0.72%	0.53%	0.81%	1.20%	1.09%
Household Income	1.01%	1.79%	0.65%	1.47%	1.14%
Domestic Price level	3.07%	4.41%	2.13%	2.92%	2.57%
Price of Foreign Tourism	3.23%	3.27%	2.25%	3.21%	3.30%
Quantity of Foreign Tourism	6.27%	5.76%	11.52%	6.40%	4.18%
Price of Domestic Tourism	0.92%	1.01%	0.18%	0.70%	0.71%
Quantity of Domestic Tourism	1.52%	0.98%	0.52%	1.09%	1.12%
Government Revenue	3.05%	6.35%	2.02%	2.68%	1.94%

As the total quantity of foreign tourism is larger in this set of scenarios, it is suggested that it would be beneficial to the Spanish economy as a whole to increase the degree of tourism substitutability between regions. Although this possibility is limited to some extent by permanent regional characteristics (not all of the Autonomous communities have a coastline), by diversifying the tourism product offered, and consequently increasing the variety of reasons for which tourists might make a trip to Spain, more of the benefits of the tourism demand shock can be realised. A policy of this type would enable regions such as Castilla y León, that to some extent have lost out in the scenarios investigated, to benefit more from the tourism demand shock. This type of policy is already being actively pursued in Spain and efforts are being undertaken to diversify the tourism product. However, results show that in order for a policy of this type to work effectively, given the current structure of the Spanish economy, a significant amount of diversification would need to occur in order to reverse welfare losses in regions with less tourism intensity.

6.5.6 Sensitivity Analysis: No Substitution Between Regions

This next of simulation is designed to provide some information about the scale of substitution effects between regions. Regions are assumed to be imperfect substitutes in this scenario and the substitution elasticity is set to zero. These results are then compared to the base case, to shed light on the extent of inter-regional foreign tourism substitution. Domestic tourism is still free to move between regions. Results are shown in Table 6.10.

It can be seen that the increases in the quantity of foreign tourism are significantly lower under this scenario as compared with the base case. Taking Castilla y León for example, the increase in foreign tourism demand is only 6.27% as opposed to 7.93% in the base case, indicating that a significant portion of its gain in foreign tourism consumption is earned via substitution from other regions. The quantity of foreign tourism in the economy is less under this scenario and the rise in the domestic price level is less in all regions except ROS. This is particularly noticeable in Castilla y León, where the domestic price level rises by 1.88% in the base case and 1.70% in the alternative case. This does have a beneficial knock-on effect in terms of output, which increases by 0.13% in the alternative case as opposed to 0.12% in the base case.

The region that benefits most in real terms is the ROS region, which is the region that experiences the largest rises in the price of foreign tourism in the base case. Here, the quantity of foreign tourism rises from 5.04% to 5.33%, nearly a half percent gain. From this we conclude that substitution effects between regions are substantial and that gains can be made from policies which encourage tourism diversification. The Canaries is now the region with the largest diffusion effect (5.27%), this result is driven by the intensity of foreign tourism consumption in the region.

The lower domestic price level generally has beneficial effects for output in the economy. However, these effects are at best marginal. The output effect on ROS is neutral. The increase in foreign tourism consumption is cancelled out by the deterioration in the terms of trade. Output in the Canaries falls relative to the base case due to the intensity of foreign tourism consumption in this region. A particularly interesting result is observed in Andalucía, where the decline in output that was caused by the crowding out of domestic tourism is observed to a lesser extent, meaning that the effect of the foreign tourism demand shock on this region is output neutral. This leads to increases in household incomes and a rise in welfare in the region as compared to the base case.

Table 6.10: Foreign Tourism Demand Shock: Aggregate Results from CRTS Model – No Substitution Between Regions

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.10%	0.58%	0.12%	0.37%	0.35%
Output	0.00%	1.70%	0.01%	0.07%	0.08%
Trade Balance	1.06%	2.46%	1.77%	2.20%	1.85%
Exports	-0.03%	-0.10%	0.17%	-0.06%	-0.06%
Imports	0.40%	1.53%	0.40%	0.46%	0.41%
Inter-Regional Imports	0.76%	0.59%	0.82%	1.23%	1.21%
Household Income	1.01%	1.75%	0.59%	1.43%	1.36%
Domestic Price level	3.06%	4.21%	1.70%	2.89%	2.95%
Price of Foreign Tourism	2.36%	2.43%	1.54%	2.39%	3.52%
Quantity of Foreign Tourism	5.59%	5.27%	6.27%	5.63%	5.53%
Price of Domestic Tourism	0.88%	1.00%	0.14%	0.67%	0.95%
Quantity of Domestic Tourism	1.52%	0.95%	0.50%	1.09%	1.09%
Government Revenue	2.87%	6.26%	1.66%	2.62%	2.18%

This sensitivity test and the previous test where the elasticity of substitution was doubled provide useful insights as to the magnitude of the regional substitution effect. The results show, as expected, that regions with low foreign tourism densities have the most to gain from increased regional substitution. Those regions that experience large relative foreign tourism price rises will loose the most from increased substitution.

6.5.7 Sensitivity Analysis: Doubling the Price Elasticity of Foreign Tourism Demand

The next simulation supposes that foreign tourism demand is far more elastic than previous estimates have suggested. As previously stated, the parameter value for the price elasticity of foreign tourism demand (PEFTD) are taken from an empirical study by de Mello et al. (2002) and valued at 2. In this simulation the value is doubled to 4. Results are given in Table 6.11.

In all scenarios the increases in the quantity of foreign tourism are lower, as tourists are more sensitive to the corresponding rise in the domestic price level and the consequent depreciation of real exchange rate. Again, the region with the greatest loss is Castilla y León in which the quantity increase of foreign tourism falls from 7.93% in the base case to 6.27% when the PEFTD is increased. Although in volume terms the Canaries experiences the largest fall, seeing foreign tourism consumption fall from 5.61% in the base case to 4.78% in this scenario. This large decline is due to the disproportionately large price rise observed in the Canaries due to the previously mentioned intensity of foreign tourism consumption. The rise in the price of foreign tourism is also considerably lower in this scenario, in Castilla y Leon for instance the price now rises by only 0.86%. Foreign tourism price rises are approximately two-thirds of the CRTS base case in most regions. This is because Spanish firms know that the demand for their tourism products is highly elastic so they will increase prices by a lesser amount in the face of increased demand to minimise the diffusion effect. This also means that the domestic price level rises by less in this scenario. Following the lesser increase in foreign tourism consumption, the impact on household income and domestic tourism consumption associated with the tourism boom are smaller too. Again the sign of the output change is the reverse in Andalucía, due to reasons explained in the previous section.

Table 6.11: **Impact of a Foreign Tourism Demand Shock – Aggregate Results from CRTS Model with Increased Elasticity of Foreign Tourism Demand**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.05%	0.55%	0.14%	0.17%	0.09%
Output	-0.01%	1.28%	-0.01%	0.06%	0.08%
Trade Balance	-1.21%	1.42%	0.23%	-1.37%	0.32%
Exports	-0.01%	-0.08%	0.11%	-0.03%	-0.04%
Imports	0.20%	1.28%	0.21%	-0.08%	-0.24%
Inter-Regional Imports	-0.56%	-0.49%	-0.27%	-0.18%	-0.38%
Household Income	-0.01%	0.80%	0.26%	0.28%	-0.49%
Domestic Price level	1.51%	2.01%	0.81%	1.41%	0.97%
Price of Foreign Tourism	1.58%	1.69%	0.85%	1.57%	2.44%
Quantity of Foreign Tourism	5.30%	4.68%	6.27%	5.29%	4.97%
Price of Domestic Tourism	0.44%	0.96%	0.07%	0.28%	-0.63%
Quantity of Domestic Tourism	0.99%	0.65%	0.25%	0.34%	0.84%
Government Revenue	2.45%	6.13%	1.73%	2.43%	1.88%

6.5.8 Sensitivity Analysis: An Alternative Demand Structure

The next set of simulations investigates an alternative foreign tourism demand structure. As previously stated, one of the assumptions underpinning the version of the R-CGE model presented in this chapter is that when foreign tourists demand holidays in Spain they will choose a particular region directly. For example, a tourist might choose the Canaries as a preferred destination, but if there were increased demand in this region and prices rose they might find that it becomes too expensive and in turn substitute for another region or even another country. Under the alternative demand structure foreign tourists will first choose Spain as a destination depending on its relative price with other countries. They then choose a region within Spain based on second round preferences. The former structure is thought to be more realistic and in-line with the consumer decision making process, hence its application in earlier sections. However, not all consumers go through the same decision making process, hence its application in earlier sections. Therefore the two alternative structures are compared.

For the purposes of comparison this alternative simulation the CRTS model is again shocked with a 10% increase in foreign tourism demand. The results are given in Table 6.12. Comparing the effects on the quantity and price of foreign tourism with Table 6.1 the appreciation in the price of foreign tourism is lower than the base case. This relates directly to the choice mechanism involved in the tourism demand process. As foreign tourists first choose Spain as a destination the linkage between foreign tourism consumption and the regional foreign tourism price is no longer as direct. So the relative regional intensities of foreign tourism consumption do not have as much influence on price. This is particularly beneficial for regions that only have a small quantity of foreign tourism consumption in the benchmark. For example, in Castilla y León the increase in foreign tourism demand has a smaller impact on regional prices. Consequently, this region experiences very little demand diffusion under this scenario and a 9.23% gain in foreign tourism consumption is observed. However, in the case of the Canaries, which have in the previous simulations experienced disproportional diffusion because of its relative intensity of foreign tourism consumption, the difference between the two model structures is only marginal. The observed rise in the price of foreign tourism is only 0.12% more than the base case. Aggregate macro results are also largely unaffected and baring the Canaries where the impact of the shock is much larger, differences in output and welfare are only noticeable at the second decimal place. Therefore it is concluded that in this instance that the results are relatively insensitive to this form of model structure and are more sensitive to the choice of elasticity parameters.

Table 6.12: **Impact of a Foreign Tourism Demand Shock - Aggregate Results from CRTS Model with Alternative Demand Structure**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.08%	0.59%	0.13%	0.40%	0.35%
Output	-0.01%	1.74%	0.02%	0.10%	0.08%
Trade Balance	0.08%	3.45%	1.28%	2.10%	1.95%
Exports	-0.04%	-0.14%	0.13%	-0.08%	-0.05%
Imports	0.41%	1.56%	0.42%	0.50%	0.41%
Inter-Regional Imports	0.83%	0.63%	0.89%	1.31%	1.25%
Household Income	1.05%	1.80%	0.64%	1.53%	1.37%
Domestic Price level	3.13%	4.32%	1.95%	2.97%	2.82%
Price of Foreign Tourism	3.26%	3.51%	2.02%	3.24%	3.89%
Quantity of Foreign Tourism	6.10%	5.73%	9.23%	6.18%	5.09%
Price of Domestic Tourism	0.94%	1.00%	0.16%	0.71%	0.93%
Quantity of Domestic Tourism	1.56%	0.99%	0.53%	1.14%	1.12%
Government Revenue	3.07%	6.41%	1.87%	2.75%	2.17%

6.5.9 Sensitivity Analysis: An Alternative Demand Structure with Regional Nesting

The redefinition of the demand structure used in the previous section does not necessarily give an accurate representation of the preference structure of foreign tourists. It assumes for example that foreign tourists will be willing to substitute a beach holiday in Andalucía with a 'city break' in Madrid. While this might be true to some extent, particularly for tourists making shorter trips, it is not the case for package tourists seeking sun, sea and sand or those seeking a 'cultural' holiday. Therefore, an alternative nesting structure is imposed on the regions of Spain. Under this structure tourists can choose between three types of destination. A sun, sea and sand destination out of either the Canaries or Andalucía. An inland destination from either Castilla y León or Madrid. Or, another region in the 'rest of Spain' which is unspecified in this model.

Thus the model is redefined again to allow for these alternative structures. Specifically it is assumed that the same level of substitution exists between the Canaries and Andalucía as in the base case, i.e. the elasticity of substitution between regions is 4. Castilla y León and Madrid are assumed to be less good substitutes due to the preponderance of 'business' and 'capital' tourism in Madrid . The elasticity of substitution between these regions is set at 1. The sun, sea, sand destinations (Canaries and Andalucía) are imperfect substitutes as compared to Castilla y León and Madrid and the elasticity of substitution is set at 0.5.

Results for this simulation are given in Table 6.13. Under this scenario a significant reduction in the quantity of foreign tourism relative to the base case is observed in Castilla y León (5.02%) due to its lack of substitutability between other regions. The Canaries and Andalucía however, benefit from the fact that they are imperfect substitutes to Madrid and Castilla y León. The quantity of foreign tourism expenditure rises from 5.97% in the base case to 6.12% under this alternative scenario. More foreign tourists are retained in this region under this specification. It also shows that there is merit in considering alternative demand mechanisms when modelling foreign tourism demand.

Table 6.13: Impact of a Foreign Tourism Demand Shock - Aggregate Results from CRTS Model with Alternative Demand and Nesting Structure

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.03%	0.69%	0.11%	0.38%	0.37%
Output	-0.01%	1.98%	0.06%	0.09%	0.06%
Trade Balance	0.96%	3.67%	2.58%	3.09%	1.88%
Quantity of Exports	-0.07%	-0.30%	0.34%	-0.08%	-0.12%
Quantity of Imports	0.39%	1.54%	0.58%	0.58%	0.45%
Quantity of Inter-Regional Imports	0.92%	0.66%	1.13%	1.52%	1.39%
Household Income	1.06%	1.78%	0.67%	1.57%	1.56%
Domestic Price level	3.00%	4.36%	1.91%	2.79%	3.00%
Price of Foreign Tourism	2.94%	2.99%	1.95%	2.87%	3.97%
Quantity of Foreign Tourism	6.12%	5.96%	5.02%	5.52%	5.93%
Price of Domestic Tourism	0.90%	1.00%	0.17%	0.65%	1.03%
Quantity of Domestic Tourism	1.60%	0.98%	0.55%	1.25%	1.21%
Government Revenue	3.04%	6.41%	1.96%	2.88%	2.42%

6.5.10 Sensitivity Analysis: Factor Market Mobility

In this final sensitivity test restrictions on the movement of both capital and labour are completely removed and factors are allowed to move freely between regions and sectors. The rigidity of factor markets in the Spanish economy has already been noted in chapter 2. This scenario evaluates the extent of the influence of these calibrated restrictions on the model results and the scale of prospective gains that could be realised if factor market restrictions are removed. This structure also gives some insight as to the potential long-run implications of a foreign tourism demand shock in some of the Spanish regions.

Table 6.14 Impact of a Foreign Tourism Demand Shock – Aggregate Results from the CRTS Model with Perfect Factor Mobility

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	-0.08%	0.51%	0.20%	0.44%	0.32%
Output	-0.04%	1.98%	0.08%	0.11%	0.08%
Trade Balance	-1.95%	6.26%	2.00%	2.46%	1.87%
Exports	-0.23%	-0.83%	0.37%	-0.14%	-0.11%
Imports	0.29%	1.47%	0.65%	0.63%	0.37%
Inter-Regional Imports	0.79%	0.41%	1.15%	1.55%	1.25%
Household Income	1.03%	1.79%	0.71%	1.62%	1.30%
Domestic Price level	2.84%	3.73%	2.13%	2.77%	2.68%
Price of Foreign Tourism	2.61%	2.79%	2.19%	2.48%	3.55%
Quantity of Foreign Tourism	6.81%	6.66%	7.34%	6.92%	5.35%
Price of Domestic Tourism	0.87%	1.00%	0.19%	0.64%	0.72%
Quantity of Domestic Tourism	1.61%	0.99%	0.57%	1.30%	1.26%
Government Revenue	3.18%	6.36%	2.22%	3.03%	2.13%

Table 6.15 Impact of a Foreign Tourism Demand Shock – Impact on Factor Returns for the CRTS Model with Perfect Factor Mobility

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	**-0.04%**	**1.97%**	**0.04%**	**0.11%**	**0.10%**
Agriculture	-0.05%	-0.16%	0.12%	0.19%	-0.09%
Manufacturing	-0.09%	-0.09%	0.31%	0.14%	-0.17%
Hotels	-0.13%	2.68%	0.71%	1.87%	2.27%
Hostels	3.21%	3.87%	0.51%	1.91%	2.37%
Other Accommodation	2.89%	3.18%	0.56%	0.87%	0.71%
Restaurants	1.76%	3.11%	0.48%	1.04%	0.65%
Service Sector	-0.08%	-0.06%	-0.17%	-0.22%	-0.03%
Real Wage	**-0.10%**	**0.23%**	**0.00%**	**0.15%**	**0.03%**
Real Capital Rental Rate	**-0.08%**	**0.19%**	**0.04%**	**0.05%**	**0.01%**

In each region the price of foreign tourism can be seen to rise by less than the base case. For instance in the Canaries the price of foreign tourism rises by 2.79% which is 0.4% less than the base case. The lower price of foreign tourism means that there is less diffusion of the foreign tourism demand shock and the quantity of foreign tourism rises by more than the base case. In the Canaries this reduced price of foreign tourism translates into an additional 1.05% increase in foreign tourism demand above the base case. But why do prices rise by a lesser amount? When sectors expand in response to the increased demand associated with the shock they require additional factors of production to meet this additional demand and they bid up the price of labour and capital in order to attract factors into the sector. However, as there is no structural rigidity in factor markets in this model the expanding sectors do not need to bid up the price by such a high amount as the base case in order to attract resources into their sector. Therefore the appreciation in the cost of the factors of production is lower under this scenario and not only can expanding sectors employ more of them but they can increase output at a faster rate as well due to the smaller diffusion effect. This can be observed by comparing Tables 6.15 and 6.3. Take the hotel sector in the Canaries for instance in the base case where there is structural rigidity output grows by 2.42%, however, when factors can move freely between sectors, output expands by 2.68%, more than double the base case. Hence, it can be seen that this assumption has a significant impact on the results.

In fact what is actually observed is that under this scenario sectors which contract under the base case contract by more and sectors which expand under the base expand by more. This is due to the concurrent effects described in the previous paragraph. The diffusion effect is smaller due to the fact that tourism characteristic output now costs less to produce and factors can now move more freely out of contracting sectors. So the overall effect is that tourism characteristic sectors expand by more and non-tourism characteristic sectors contract by more. Across the whole of Spain economy there is a net expansion in output that is greater than the base case.

However, the net effects are not the same. In general it can be seen from Table 6.15 that in the regions where there is a decline (rise) in output, the real wage and the real returns to capital fall (rise). This is because factors will move out of regions that are less competitive (i.e. ROS and Andalucía) and into regions where output is expanding. The increased decline in output is particularly poignant in Andalucía and somewhat unexpected. While there is significant growth in the tourism characteristic sectors (barring the hotel sector for reasons explained previously). The net decline in non-tourism characteristic output due to resources moving to cheaper regions i.e. Castilla y León and Madrid outweighs the gains in tourism characteristic output. However, closer inspection of this result reveals that if the hotel sector result in this region were reversed then the region would experience a net gain in output. This represents the importance of this result for Andalucía and the importance for hotels to react in a highly competitive fashion when faced with significant foreign tourism demand growth.

However, changes in the real wage and the real returns to capital are not always consistent with this explanation. This can be seen in Table 6.15 where the real rental rate of capital in Castilla y León declines despite a rise in output in the region. This decline in the rental rate reflects the fact that the returns to capital do not rise by as much as the domestic price level in the region.

Welfare effects differ significantly between this alternative scenario and the base case. In Andalucía a significant welfare loss is now observed, this is attributed largely to the increased decline in regional output observed in this scenario. Welfare is seen to rise in the Canaries; this is due to the fact that the foreign tourism demand shock leads to an increase in regional output, factor returns and hence household income. A similar effect is observed in Castilla y León and

Madrid, although this is more to with the consequent expansions in non-tourism characteristic output.

This section has investigated the regional implications of an increase in foreign tourism demand in the Spanish economy. It has shown that the regions which benefit most relative to the benchmark are those with lower intensities of foreign tourism consumption. However, in absolute value terms those regions with the largest values of foreign tourism receipts have the most to gain. Such an expansion in foreign tourism leads to a rise in the domestic price level, this has beneficial effects for those regions that do not have high foreign tourism intensities and can lead to expansion of non-tourism characteristic sectors. However, those tourism characteristic sectors with higher intensities of domestic tourism expenditure will suffer. The nest section looks at the economic impacts of an increase in tourism commodity taxation.

6.6 Model Results: Regional Taxation

6.6.1 Model Scenarios

It has already been noted that the governments of the autonomous communities in Spain have regional tax setting powers. The potential implications that this might have are evaluated in the second set of scenarios that are investigated in this model. Tourism appears to be a potential saviour for governments faced with budgetary constraints and pressures to decrease their reliance on income and corporate taxes as sources of revenue. Revenues generated from tourism taxation can be used to benefit the public by such means as increasing the provision of public services; however, they may also reduce welfare and act as a disincentive to tourism demand (Gooroochurn and Sinclair, 2003). Issues relating to a tax on the hotel sector have already been discussed in the context of the Balearics 'ecotax'. The majority of the autonomous communities have the power to raise taxation in this way, and despite the abject failure of the 'ecotax' several regions are discussing proposals to implement tourism taxes.[9] Regions may wish to exploit possible tax handles for a wide range or reasons, to protect the environment, limit the impact of tourism externalities or simply just to make money while the opportunity is

[9] Other countries in Europe are considering similar proposals. For instance, at the time of writing, an equivalent 'bed tax' is being considered in the U.K.

available. However, as previously stated, virtually nothing is known about the impacts of these types of tourist taxes. Hence the application in this thesis.

The potential for these effects to occur are investigated in the second set of scenarios. The simulations that are devised are undertaken separately for two different regions the Canaries and Madrid. The Canaries are chosen as this is the region with the highest intensity of foreign tourism consumption, while Madrid is chosen because of its relative dependence on hotel accommodation as compared to other accommodation types. In the both regions the impact of a 5 percentage point increase in the level of consumption taxation[10] in the hotel sector is investigated i.e. the effective tax rates on consumption in both regions increase by 5 percentage points. Based on considerations relating to the ecotax revenues reported for the Balearics by Palmer and Riera (2003), the number of visitor nights per region and the current effective tax rates in the regional IO tables; this simulation is designed to approximate a similar scale of shock to that of the Balearics when the ecotax was introduced. The hotel sector is chosen as it is generally the product that tourists consume most of in the Spanish regions and it would also be easier to administer the tax in this sector than say the "other accommodation sector" as it can be collected by hoteliers.

By comparing Tables A6.2 and A6.4 in the appendix to this chapter, it can be seen that Madrid has a lower effective consumption tax rate (8.7%) than the Canaries (9.7%) in the hotel sector. Following the increase in the effective tax rate the new rates will be 13.7% for Madrid and 14.7% for the Canaries. Whether the change in effective tax rates is 1% or 10% the same relative scale of impact between the two regions will still apply. Therefore an equivalent € amount tax shock is ruled out.

Each of the simulations in this section are undertaken separately for the regions of Madrid and the Canary Isles. Results for these Simulations are given in Tables 6.16 through to 6.6.41. Again all results are shown as relative deviations from the benchmark. As in the previous set of simulations results for the CRTS and IRTS models are compared. Additional sensitivity analyses are undertaken to compare key elasticity parameters in the model.

[10]The Spanish value added tax - VAT (impuesto sobre el valor añadido - IVA) system is similar to that established in other countries of the EU. The IVA is an indirect and general consumption tax assessed on the value added to goods and services. The IVA is not applicable in the Canary islands, Ceuta and Melilla, where another equivalent tax, the IGIP, is applicable.

6.6.2 Results from the CRTS Model

The two alternative counterfactuals impose a 5 percentage point increase in the level of consumption taxation in the hotel sectors in Madrid and the Canaries. Aggregate results for the two counterfactuals are given in Tables 6.16 and 6.17 and are compared below. Substantial differences exist between the two set of results and reflect the structure of taxation and tourism expenditure in these regions. Although differences exist in the scale of the counterfactuals, the larger counterfactual in Madrid does not explain the full range of differences between the model results. The relative tourism demand structures also have substantial impact.

With regard to total foreign and domestic tourism consumption, a much higher proportion of this consumption is spent in the hotel sector in the Madrid region as compared to other tourism products. Hotel accommodation accounts for approximately 21.9% of total foreign and domestic tourism consumption. The provision of substitutes is not as large or diverse as in other more tourism orientated regions. While in the Canaries the situation is more diverse, hotels account for only 16.7% of total foreign and domestic tourism consumption. Further, higher proportions of foreign tourism consumption are observed in the "other accommodation" sector in this region. In Madrid hotel output is much more orientated towards foreign tourists: 26.4% of total consumption as opposed to only 15.13% in the Canaries. Therefore it is noted that in Madrid the hotel sector is the primary source of accommodation and accounts for more than a fifth of foreign tourism consumption. However, it is also noted that the situation in the Canaries is more diverse. Hotels have a smaller share in total tourism consumption and hotel consumption shares between domestic and foreign tourists are more even.

On the basis of these observations we observe the following demand phenomena. In Madrid, Table 6.16 shows that total foreign tourism consumption falls by 2.63%. In the Canaries, where the share of foreign tourism consumption of hotel products is lower, Table 6.17 shows that total foreign tourism consumption only falls by 0.87% due to the more diverse elements of the regional tourist economy. However, the fall in domestic tourism consumption is larger in the Canaries: 1.78% this can be attributed to two key factors:

1) There is a higher proportion of household income spent on domestic tourism consumption in this region, domestic tourism accounts for 10.2% of GDP. Household income falls as a result of the tax shock across most regions.

2) Hotels comprise 21.75% of domestic tourism consumption in the region. Therefore a price rise for this product will have a greater influence on the overall tourist price.

So in the Canaries the tax burden is actually higher for domestic rather than foreign tourists.

Table 6.16: A 5% Increase in Hotel Sector Taxation in Madrid: Aggregate Results from the CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.00%	0.00%	0.00%	0.05%	0.00%
Output	0.00%	0.00%	0.00%	-0.04%	0.00%
Trade Balance	-0.23%	0.41%	-0.04%	1.23%	-0.04%
Exports	-0.01%	-0.06%	0.00%	0.12%	0.00%
Imports	-0.01%	-0.01%	0.00%	-0.01%	-0.01%
Inter-Regional Imports	-0.02%	-0.07%	-0.02%	-0.11%	-0.02%
Household Income	-0.01%	-0.01%	0.00%	-0.05%	-0.01%
Domestic Price level	-0.02%	-0.01%	-0.01%	-0.10%	-0.02%
Price of Foreign Tourism	-0.01%	0.01%	-0.01%	0.71%	-0.01%
Quantity of Foreign Tourism	0.06%	0.13%	0.08%	-2.63%	0.08%
Price of Domestic Tourism	0.01%	0.01%	-0.01%	0.53%	-0.01%
Quantity of Domestic Tourism	0.00%	-0.02%	0.02%	-0.93%	0.00%
Government Revenue	0.00%	-0.03%	-0.01%	1.85%	-0.01%

Table 6.17: A 5% Increase in Hotel Sector Taxation in the Canaries: Aggregate Results from the CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.02%	0.00%	0.00%	0.00%
Output	0.00%	0.03%	0.00%	0.00%	0.00%
Trade Balance	-0.74%	-2.64%	-0.14%	-0.10%	-0.13%
Exports	-0.02%	0.58%	-0.01%	0.00%	-0.01%
Imports	-0.01%	0.09%	-0.01%	-0.01%	-0.02%
Inter-Regional Imports	-0.06%	0.18%	-0.06%	-0.02%	-0.07%
Household Income	-0.02%	-0.02%	-0.02%	-0.01%	-0.03%
Domestic Price level	-0.02%	-0.18%	-0.03%	-0.02%	-0.04%
Price of Foreign Tourism	-0.01%	0.23%	-0.03%	-0.01%	-0.03%
Quantity of Foreign Tourism	0.22%	-0.87%	0.30%	0.08%	0.27%
Price of Domestic Tourism	0.02%	0.40%	-0.04%	0.01%	0.03%
Quantity of Domestic Tourism	-0.01%	-1.78%	0.05%	0.00%	-0.01%
Government Revenue	0.01%	13.83%	-0.03%	-0.01%	-0.02%

The simulation effectively seeks to drive a price wedge in the form of a 5% increase in the average effective tax rate on hotel product consumption. In practice the hotel tax raises the cost of hotel products by 5%. The formal incidence of VAT is on the producer as it is from them that the tax is collected, but is the tax borne by the consumer or the producer? In principle it is known that the demand for hotel products is elastic, so it would be expected that the producer would bear much of the cost. But the hotel sectors supply decision is also important in the decision making process. In the R-CGE model, firms will seek to maximise profits, they will base this decision on more factors than simply the tourists consumption function. For example, firms could choose to absorb the full impact of the VAT increase. However, this means that their real profits will be reduced, they may be forced to pay their workers less and their gross operating surplus will decline. Rather than do this, firms will choose to collectively set price in order to profit maximise. A key influence on this decision is the availability of substitutes. In Madrid, due to the concentration of tourism consumption in the hotel sector, the availability of substitutes is more narrow than that of the Canaries. The high concentration of hotel consumption in this region means that tourists do not consider other products suitable substitutes otherwise there would be more diversity in consumption. Hotel suppliers in this region know that if they raise prices substitution effects will be weak, and tourists will simply consume less of their product than a substitute. Consequently they choose to pass more of the tax on in this region and let total earnings decline, rather than let earnings per unit of output decline. However, in the Canaries, where there are a higher level of substitutes available, suppliers know that if they raise prices they will loose more in terms of substitution. This principle drives different magnitudes of the results in Madrid and the Canaries. Tables 6.18 and 6.19 show that In Madrid, virtually all of the VAT increase is passed through in terms of higher prices (4.46%). While in the Canaries a significantly larger proportion of the VAT increase is absorbed by the producer and prices only rise by 3.63%.

Table 6.18: Impact of a 5% Increase in Hotel Sector Taxation in Madrid on the Regional Domestic Price Level: CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Price Level	-0.02%	-0.01%	-0.01%	-0.10%	-0.01%
Agriculture	-0.02%	-0.03%	-0.01%	-0.31%	-0.02%
Manufacturing	-0.01%	-0.01%	-0.02%	-0.24%	-0.02%
Hotels	0.00%	0.01%	0.01%	4.46%	0.00%
Hostels	0.01%	0.03%	0.00%	0.31%	0.00%
Other Accommodation	0.01%	0.03%	0.01%	0.32%	0.01%
Restaurants	0.00%	0.04%	0.01%	0.38%	0.01%
Service Sector	-0.01%	0.00%	-0.01%	-0.28%	-0.02%

Table 6.19: **Impact of a 5% Increase in Hotel Sector Taxation in the Canaries on the Regional Domestic Price Level: CRTS Model**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Price Level	-0.02%	-0.18%	-0.03%	-0.02%	-0.04%
Agriculture	-0.05%	-0.60%	-0.03%	-0.02%	-0.05%
Manufacturing	-0.04%	-0.32%	-0.05%	-0.02%	-0.05%
Hotels	0.00%	3.63%	0.01%	0.01%	0.01%
Hostels	0.04%	0.53%	0.01%	0.01%	0.00%
Other Accommodation	0.02%	0.56%	0.04%	0.01%	0.02%
Restaurants	0.01%	0.50%	0.02%	0.01%	0.03%
Service Sector	-0.03%	-0.49%	-0.05%	-0.02%	-0.06%

It can be seen in Tables 6.18 and 6.19 that in both the Canaries and Madrid scenarios the domestic price level falls by -0.10% and -0.18% respectively. The fall in both domestic and foreign tourism demand in these regions means that there is less output from their respective tourist sectors. Therefore the factors that are employed in these sectors will be less productive and their marginal value product will fall. This is shown in Tables 6.21 and 6.23 where the real returns to labour in the hotel sector fall by 6.11% and 5.22% and the real returns to capital fall by 4.53% and 3.75% in Madrid and the Canaries respectively. Larger falls in the returns to labour as opposed to capital are observed as both regional economies are labour abundant.

The reduction in foreign and domestic tourism demand has a secondary effect in that it is not just hotel consumption that falls. In Madrid, where agriculture has significant upstream linkages to the hotel sector, output is seen to fall by 0.15%. Nonetheless, while the cost of hotel stays rises significantly, other tourism products that are viewed as substitutes will directly benefit. For example in the Madrid tax shock scenario output increases in both the hostels and the 'other accommodation' sector by 0.65% and 0.44% respectively. Similar effects are observed in Table 6.22 for the Canaries where hostel output rises by 0.63% and 'other accommodation' output rises by 0.66%. The reason why the combined effect of these rises in output is so much smaller than the equivalent reductions in hotel output is that these types of accommodation are imperfect substitutes for each other. A businessman travelling to Madrid would not want to be put up in a 1* hostel for example.

Despite the adverse impacts on the hotel sector in the Canaries and Madrid other sectors in these regions will benefit from the falling costs of labour and capital. Output in both the manufacturing and services sectors in particular is seen to expand. Factors move out of the tourism characteristic sectors where returns are declining and into manufacturing and services where returns are relatively higher, although initially still below the benchmark levels. Firms will use the cheaper factors to increase output at the expense of other relatively more expensive regions. Eventually factor returns will re-equate to their marginal products. An example of this is in the manufacturing sector in the Canaries, output grows by 0.61% and the real returns to capital and labour rise by 0.11% and 0.29% respectively.

In Madrid the net effect of this combination of events is that total regional output falls by 0.04% as a result of the shock while in the Canaries it rises by 0.03%. This is linked directly to the reduction in the price level in each region. The hotel sector is larger relative to the size of the regional economy in the Canaries so the fall in the price of this product has more impact on the regional price level. This fall in the regional price level means that both regions will experience a terms of trade improvement and depreciation of the real exchange rate. Hence, the cost of imports as compared to the cost of domestic goods increases. This translates into a fall in import demand of 0.01% in the Madrid scenario and a rise in export sales of 0.12%. In the Canaries case this outcome is more complex. While a substantial increase in exports of 0.58% is observed there is also a rather counterintuitive increase in imports of 0.09%. This is because of the density of import use in intermediate production in this small island economy. The high use of imported intermediates in manufacturing (43.4%) means that in order for manufacturing output to expand imports must rise.

In fact the domestic price level falls in all regions in both tax scenarios, the reasons for this are discussed later in this section. In turn, this leads to an economy wide terms of trade improvement which makes exports more competitive in all regions. But Tables 6.16 and 6.17 show that in fact exports only increase in the regions where the tax shock occurs (exports in Madrid increase by 0.12% and by 0.58% in the Canaries). This is due to concurrent reductions in output which are also discussed later in this section.

Table 6.20: **Impact of a 5% Increase in Hotel Sector Taxation in Madrid on Sectoral Output and Labour and Capital Value Added: CRTS Model**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	0.00%	0.00%	0.00%	-0.04%	0.00%
Agriculture	-0.01%	-0.08%	-0.01%	-0.15%	-0.02%
Manufacturing	-0.01%	-0.05%	-0.01%	0.18%	-0.01%
Hotels	0.02%	0.06%	0.03%	-4.90%	0.04%
Hostels	0.04%	0.07%	0.03%	0.65%	0.03%
Other Accommodation	0.04%	0.09%	0.04%	0.44%	0.04%
Restaurants	0.03%	0.07%	0.01%	0.60%	0.04%
Service Sector	0.00%	0.00%	0.00%	0.10%	0.00%
Value Added – Labour	0.00%	0.00%	0.00%	0.00%	0.00%
Agriculture	-0.01%	-0.08%	-0.01%	-0.15%	-0.02%
Manufacturing	-0.01%	-0.05%	-0.01%	0.19%	-0.01%
Hotels	0.02%	0.05%	0.03%	-4.89%	0.04%
Hostels	0.04%	0.07%	0.03%	0.64%	0.03%
Other Accommodation	0.03%	0.07%	0.01%	0.43%	0.03%
Restaurants	0.03%	0.07%	0.01%	0.68%	0.02%
Service Sector	0.00%	0.00%	0.00%	0.11%	0.00%
Value Added – Capital	0.00%	0.00%	0.00%	0.00%	0.00%
Agriculture	-0.01%	-0.08%	-0.01%	-0.16%	-0.02%
Manufacturing	-0.01%	-0.05%	-0.01%	0.17%	-0.01%
Hotels	0.02%	0.06%	0.03%	-4.91%	0.04%
Hostels	0.04%	0.07%	0.03%	0.66%	0.03%
Other Accommodation	0.03%	0.07%	0.01%	0.60%	0.04%
Restaurants	0.03%	0.07%	0.02%	0.71%	0.02%
Service Sector	0.00%	0.00%	0.00%	0.10%	0.00%

Table 6.21: Impact of a 5% Increase in Hotel Sector Taxation in Madrid on the Cost of Value Added: CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Real Wage – Total	-0.01%	-0.01%	-0.01%	-0.05%	-0.01%
Agriculture	-0.01%	-0.04%	0.00%	0.06%	-0.02%
Manufacturing	0.00%	-0.01%	-0.01%	0.11%	-0.01%
Hotels	0.01%	0.01%	0.01%	-6.11%	0.02%
Hostels	0.02%	0.01%	0.01%	0.30%	0.01%
Other Accommodation	0.01%	0.01%	0.01%	0.30%	0.01%
Restaurants	0.01%	0.01%	0.00%	0.32%	0.02%
Service Sector	0.00%	0.00%	0.00%	0.13%	0.00%
Real Capital Rental Rate – Total	0.00%	0.00%	0.00%	-0.04%	0.00%
Agriculture	-0.01%	-0.02%	-0.01%	0.08%	-0.01%
Manufacturing	-0.01%	-0.01%	-0.01%	0.12%	-0.01%
Hotels	0.01%	0.01%	0.02%	-4.53%	0.02%
Hostels	0.01%	0.02%	0.01%	0.06%	0.00%
Other Accommodation	0.02%	0.03%	0.01%	0.05%	0.01%
Restaurants	0.01%	0.02%	0.01%	0.05%	0.01%
Service Sector	0.00%	0.00%	0.00%	0.26%	0.00%

Table 6.22: Impact of a 10% Increase in Hotel Sector Taxation in the Canaries on Sectoral Output and Labour and Capital Value Added: CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	0.00%	0.03%	0.00%	0.00%	0.00%
Agriculture	-0.05%	0.65%	-0.04%	-0.01%	-0.08%
Manufacturing	-0.02%	0.61%	-0.01%	-0.01%	-0.02%
Hotels	0.06%	-3.85%	0.10%	0.04%	0.12%
Hostels	0.14%	0.63%	0.10%	0.03%	0.11%
Other Accommodation	0.13%	0.66%	0.13%	0.02%	0.12%
Restaurants	0.11%	0.22%	0.04%	0.03%	0.12%
Service Sector	0.00%	0.16%	-0.01%	0.00%	0.00%
Value Added – Labour	0.00%	0.00%	0.00%	0.00%	0.00%
Agriculture	-0.05%	0.65%	-0.04%	-0.01%	-0.08%
Manufacturing	-0.02%	0.62%	-0.01%	-0.01%	-0.03%
Hotels	0.05%	-3.84%	0.10%	0.04%	0.12%
Hostels	0.13%	0.62%	0.09%	0.03%	0.11%
Other Accommodation	0.10%	0.61%	0.04%	0.03%	0.12%
Restaurants	0.10%	0.04%	0.05%	0.04%	0.07%
Service Sector	-0.01%	0.18%	-0.01%	0.00%	-0.01%
Value Added – Capital	0.00%	0.00%	0.00%	0.00%	0.00%
Agriculture	-0.05%	0.65%	-0.04%	-0.01%	-0.08%
Manufacturing	-0.01%	0.59%	0.00%	-0.01%	-0.02%
Hotels	0.06%	-3.87%	0.11%	0.04%	0.13%
Hostels	0.14%	0.55%	0.10%	0.04%	0.11%
Other Accommodation	0.11%	0.54%	0.05%	0.03%	0.13%
Restaurants	0.11%	0.01%	0.06%	0.04%	0.08%
Service Sector	0.00%	0.15%	0.00%	0.00%	0.00%

Table 6.23: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries on the Cost of Value Added: CRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Real Wage – Total	-0.02%	-0.04%	-0.01%	-0.01%	-0.01%
Agriculture	-0.02%	0.40%	-0.03%	-0.01%	-0.02%
Manufacturing	-0.02%	0.31%	-0.02%	-0.01%	-0.02%
Hotels	0.01%	-5.22%	0.03%	0.02%	0.02%
Hostels	0.01%	0.47%	0.02%	0.01%	0.00%
Other Accommodation	0.00%	0.50%	0.03%	0.01%	0.02%
Restaurants	0.03%	0.04%	0.02%	0.01%	0.02%
Service Sector	-0.01%	0.12%	-0.01%	0.00%	-0.01%
Real Capital Rental Rate – Total	-0.01%	-0.04%	0.00%	0.00%	-0.01%
Agriculture	-0.04%	0.58%	-0.03%	-0.01%	-0.04%
Manufacturing	-0.03%	0.29%	-0.04%	-0.01%	-0.04%
Hotels	0.00%	-3.75%	0.02%	0.02%	0.01%
Hostels	0.03%	0.39%	0.01%	0.01%	0.00%
Other Accommodation	0.02%	0.33%	0.04%	0.01%	0.02%
Restaurants	0.01%	0.08%	0.02%	0.01%	0.03%
Service Sector	0.00%	0.14%	-0.04%	0.00%	0.00%

The impact of the tax shocks on output in other regions varies. In all regions where the tax shock does not occur the price of foreign tourism can be seen to decline while its quantity rises. We have already discussed the fact that the domestic price level falls in all regions and the terms of trade improve. This is obviously beneficial for foreign tourists as it makes Spain cheaper for them to visit. There will also be benefits for regions not experiencing a tax shock in that foreign tourists will substitute away from the regions where taxes are imposed to other cheaper regions in Spain. The combined impact of these effects are particularly large in the Canaries. While the relative reduction in hotel output is smaller in the Canaries as compared to Madrid, in absolute value terms it is larger as the absolute size of the hotel sector is larger in the Canaries. This means that inter-regional substitution will be larger when the tax is applied to the Canaries. For example, when the tax is imposed in Madrid, the quantity of foreign tourism increases by 0.06% in Andalucía and 0.08% in Castilla y León. Equivalent increases for the Canaries taxation case are valued at 0.20% in Andalucía and 0.30% in Castilla y León. Consequently, beneficial effects for tourism characteristic output in regions that do not experience a tax rise are observed. Table 6.22 for instance shows that in the Canaries tax shock scenario hotel output in Madrid increases by 0.04% labour and capital usage increase both by 0.04% which causes the real returns to capital and labour to rise both rise by 0.02%. In fact across all regions of Spain that do not experience a tax shock, output rises in tourism characteristic sectors. However, the outcome is somewhat different in non-tourism characteristic sectors. It has already been noted that in the regions that experience the tax shock, real wages fall and output expands in non-tourism characteristic sectors. Non-tourism characteristic output can now be produced more cheaply in these regions and they become more competitive relative to other regions in Spain. Consequently non-tourism characteristic output expands in these regions at the expense of the other regions in the model. For example, it can be seen in Table 6.20 that manufacturing output the Canaries rises by 0.61% and falls by around 0.01%-0.02% in the other regions in the model. Of course as manufacturing output rises in the Canaries factors of production will be drawn into the sector and their marginal value product will rise. Hence the real wage and real returns to capital rise in this sector by 0.39% and 0.29% respectively. However, these effects are not large enough to reverse the decline in the domestic price level or the overall decline in output observed in the tax shock regions.

The combined effects on the non-tax shock regions of an increase in tourism characteristic output and a decline in non-tourism characteristic output are largely neutral. However, there is a net output loss for the whole of Spain economy and the real wage is shown to fall across all regions in both scenarios. Consequently household incomes fall. The largest reductions are observed in the tax shock regions themselves, Table's 6.16 and 6.17 show that household incomes fall by 0.05% in Madrid and 0.02% in the Canaries. The fall in household incomes means that there is less money to spend on domestic tourism. However, the fall in household incomes is less than the fall in the domestic price level due to compensatory output effects caused by the terms of trade reduction hence domestic tourism demand increases.

Government revenue increases in the tax shock regions following the rise in the effective tax rate. Table's 6.16 and 6.17 show that in Madrid an increase of 1.85% occurs while in the Canaries a rise of 13.83% is observed. These differing levels of growth represent the relative importance of tourism and the hotel industry in particular in the Canaries and Madrid. For example, comparing Tables A6.2 and A6.4 the size of the hotel sector in the Canaries is 7.4% of GDP and in Madrid is only 0.9% of GDP. Also, the second round tax effects relating to the expansion of the non-tourism characteristic sectors and the contraction of the tourism characteristic sectors has a positive net effect on tax revenue in the Canaries due to the overall output gain. However, this is not the case in Madrid where output is seen to contract. Nonetheless the volume of revenue raised in Madrid is substantially larger as it has a larger tax base and a higher effective tax rate in the simulation. It just represents a smaller proportion of the total tax revenue.

This rise in government revenue contributes to welfare gains in both regions. In Madrid welfare rises by 0.05% despite the fall in output, while in the Canaries a smaller 0.02% rise is observed. These net gains also occur despite a fall in the real wage and household income. As well as the increases in government revenue, the drivers of the welfare gain in Madrid are the growth in exports and improvement in the trade deficit associated with the increase in the terms of trade. The story in the Canaries is somewhat different. Despite a substantial increase in tax revenue and a positive output gain the change in welfare is quite small. This can be largely attributed to the increase in the trade deficit of 2.64% in the region. While exports increase because of the terms of trade improvement, imports from overseas and other regions of Spain increase also to provide resources for the increase in non-tourism characteristic output. In other regions the effects of the tax shock are largely welfare neutral, the increase in foreign tourism consumption tends to cancel out declines in the real wage and household income.

6.6.3 Results from the IRTS Model

It has already been shown that output falls in the hotel sector in the CRTS case following the increase in taxation. However, when Cournot imperfect competition is introduced into the model firms have the power to set output. The direct result of this is that output is reduced by more in the hotel sector in this model as firms seek to protect supernormal profits from the tax shock. This can be seen by comparing Tables 6.20 and 6.24 for Madrid and Tables 6.22 and 6.25 for the Canaries. In Madrid output in the hotel sector falls by -0.59% more than in the CRTS case to -5.49% . While in the Canaries the decline is less, hotel output falls by -0.34% to -4.19%. While Table 6.30 shows that in Madrid the price of hotel accommodation rises by 4.96% as compared to 4.46% in the CRTS case, an increase of 0.50%. While Table 6.31 shows that in the Canaries hotel prices rise by 3.93% in the IRTS model as compared to the 3.63% in the CRTS case, an increase of 0.30%. In both regions output falls by more than prices rise, hence there is a greater loss of revenue in the IRTS case. The reasons that the change in output and prices is lower in the Canaries is two-fold. Firstly, as previously noted the size of the counterfactual is smaller in the Canaries case. Secondly mark-ups are lower and the perceived elasticity of demand of demand for hotel firms is higher in the Canaries than Madrid, so they reduce output by a lower amount .

Table 6.24: Impact of a 10% Increase in Hotel Sector Taxation in Madrid on Sectoral Output: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	-0.01%	-0.01%	0.00%	-0.06%	-0.01%
Agriculture	-0.02%	-0.10%	-0.02%	-0.20%	-0.02%
Manufacturing	-0.02%	-0.06%	-0.02%	0.20%	-0.01%
Hotels	0.03%	0.07%	0.03%	-5.49%	0.04%
Hostels	0.05%	0.09%	0.03%	0.77%	0.04%
Other Accommodation	0.05%	0.11%	0.05%	0.56%	0.04%
Restaurants	0.03%	0.09%	0.01%	-0.77%	0.04%
Service Sector	-0.01%	0.00%	-0.01%	0.11%	0.00%

Table 6.25: Impact of a 10% Increase in Hotel Sector Taxation in the Canaries on Sectoral Output: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Output	-0.01%	0.00%	-0.01%	-0.01%	-0.01%
Agriculture	-0.06%	0.74%	-0.05%	-0.02%	-0.09%
Manufacturing	-0.03%	0.64%	-0.01%	-0.01%	-0.03%
Hotels	0.06%	-4.19%	0.13%	0.05%	0.15%
Hostels	0.16%	0.67%	0.12%	0.04%	0.13%
Other Accommodation	0.15%	0.73%	0.17%	0.03%	0.15%
Restaurants	0.12%	-0.26%	0.06%	0.04%	0.15%
Service Sector	-0.01%	0.18%	-0.01%	-0.01%	-0.01%

Table 6.26: Impact of a 5% Increase in Hotel Sector Taxation in Madrid on the Regional Domestic Price Level: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Price Level	-0.01%	-0.01%	-0.01%	-0.08%	-0.01%
Agriculture	-0.01%	-0.03%	-0.01%	-0.33%	-0.01%
Manufacturing	-0.01%	-0.01%	-0.02%	-0.26%	-0.01%
Hotels	0.00%	0.01%	0.01%	4.96%	0.00%
Hostels	0.01%	0.04%	0.01%	0.38%	0.00%
Other Accommodation	0.01%	0.05%	0.01%	0.39%	0.01%
Restaurants	0.01%	0.04%	0.01%	-0.40%	0.01%
Service Sector	-0.01%	0.00%	-0.01%	-0.31%	-0.02%

Table 6.27: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries on the Regional Domestic Price Level: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Price Level	-0.02%	-0.25%	-0.04%	-0.02%	-0.04%
Agriculture	-0.05%	-0.70%	-0.03%	-0.02%	-0.05%
Manufacturing	-0.04%	-0.34%	-0.05%	-0.02%	-0.05%
Hotels	0.01%	3.93%	0.03%	0.01%	0.01%
Hostels	0.05%	0.54%	0.04%	0.01%	0.00%
Other Accommodation	0.03%	0.58%	0.06%	0.01%	0.02%
Restaurants	0.02%	-0.50%	0.03%	0.01%	0.03%
Service Sector	-0.05%	-0.50%	-0.05%	-0.02%	-0.07%

As in the CRTS case, due to the rise in hotel prices both the quantity of domestic and foreign tourism declines in the tax shock regions. However, as the price of the hotel commodity rises by more in the IRTS case the respective declines in tourism demand are larger. Table 6.30 shows that In Madrid foreign tourism demand falls by -3.08% and domestic tourism demand falls by -1.32%, which is -0.45% and -0.39% more than the CRTS case. While Table 6.31 shows that in the Canaries foreign tourism demand falls by an additional -0.15% to -1.02% and domestic tourism by an additional -0.14% to -1.92% in the IRTS scenario. Again, declines in Madrid are larger reflecting the scale of imperfectly competitive behavior and the counterfactual.

The sectoral output effects in this simulation are inevitably larger. It has already been noted that hotel output falls by more in the IRTS scenario. In turn, this leads to a stronger set of second round effects. It has already been noted in the CRTS case that returns to capital and labour will fall in the hotel sector and factors will leave in search of higher returns elsewhere. This effect is compounded in the IRTS case. The real wage and real returns to capital both fall by more than the CRTS case. This is shown in Tables 6.28 and 6.29 where in Madrid for instance the real wage falls by -0.27% (-6.38% to -6.11%) more in the IRTS case and the real returns to capital fall by an additional -0.43% (-4.96% to -4.53%). Lesser orders of magnitude are observed for the Canaries where the real wage falls by an additional -0.25% (-5.47% -5.22%) and the real returns to capital fall by an additional -0.27% (-4.02% to -3.75%). So as output falls by more in the IRTS case the marginal value product of the factors of production in the hotel sector is reduced by a greater amount and this means that there will also be a larger decline in the real returns to factors. This means that more factors will move out of the hotel sector and in turn will become cheaper for other sectors to employ as their increased availability drives down their price. This allows other sectors to increase output more cheaply than in the CRTS model and hence by a greater amount . This effect can be seen to occur in non-tourism characteristics sectors in the tax shock regions. For example comparing the CRTS and IRTS models in the Canaries it can be seen that Agricultural output rises by an additional 0.09% to 0.74%, manufacturing output rises by 0.03% to 0.64% and service sector output rises by 0.02% to 0.18%. This is not to say that the allocation of resources is more efficient when increasing returns to scale and imperfect competition are incorporated into the CGE model. On the contrary, the price rise and reduction in output in the hotel sector that is caused by imperfectly competitive behavior means that in both tax shock regions total output is lower than the CRTS case. The compensatory reallocation of resources caused by reductions in the real wage is not sufficient to counteract the reduction in hotel output. Further, a second round effect occurs in the expanding non-tourism characteristic sectors in that as they are now able to produce goods more cheaply and output consequently expands at the expense of output in other regions. This means that mark-ups will increase in these sectors and new firms will enter to contest them accordingly (see discussion below). However, these are still IRTS sectors, the amount output is raised by is still less than would be the case an equivalent CRTS sector. So despite the larger increase in output of these sectors in the IRTS scenario, the response of these firms is sub-optimal.

As the price of hotel accommodation rises by more in the IRTS model the substitution effects into other types of accommodation in the tax shock regions are inevitably larger. For example, in the CRTS model output in the hostels sector under the Madrid tax shock rises by 0.65%, whereas in the IRTS model it rises by 0.77%.

Table 6.28: **Impact of a 5% Increase in Hotel Sector Taxation in Madrid on the Cost of Value Added: IRTS Model**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Real Wage - Total	-0.02%	-0.01%	-0.01%	-0.05%	-0.01%
Agriculture	-0.01%	-0.05%	-0.01%	0.07%	-0.02%
Manufacturing	0.00%	-0.02%	-0.02%	0.14%	-0.01%
Hotels	0.00%	0.01%	0.01%	-6.38%	0.01%
Hostels	0.00%	0.01%	0.01%	0.32%	0.00%
Other Accommodation	0.00%	0.00%	0.01%	0.32%	0.01%
Restaurants	0.01%	0.01%	0.01%	-0.36%	0.01%
Service Sector	0.00%	0.00%	-0.01%	0.17%	0.00%
Real Capital Rental Rate - Total	-0.01%	0.00%	0.00%	-0.04%	0.00%
Agriculture	0.01%	-0.03%	0.01%	0.30%	0.01%
Manufacturing	0.01%	-0.02%	0.01%	0.26%	0.01%
Hotels	0.00%	0.01%	0.01%	-4.96%	0.00%
Hostels	-0.01%	0.02%	0.01%	0.26%	0.00%
Other Accommodation	-0.01%	0.03%	0.01%	0.28%	0.01%
Restaurants	0.01%	0.01%	0.01%	0.29%	0.01%
Service Sector	0.01%	0.00%	0.01%	0.31%	0.01%

Table 6.29: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries on the Cost of Value Added: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Real Wage – Total	-0.02%	-0.04%	-0.01%	-0.01%	-0.01%
Agriculture	-0.02%	0.50%	-0.04%	-0.02%	-0.02%
Manufacturing	-0.02%	0.12%	-0.02%	-0.01%	-0.03%
Hotels	0.01%	-5.47%	0.04%	0.02%	0.02%
Hostels	-0.01%	0.07%	0.03%	0.02%	0.01%
Other Accommodation	0.00%	0.12%	0.03%	0.01%	0.03%
Restaurants	0.04%	0.06%	0.02%	0.01%	0.02%
Service Sector	-0.02%	0.13%	-0.02%	-0.01%	-0.01%
Real Capital Rental Rate – Total	-0.01%	-0.04%	0.00%	0.00%	-0.01%
Agriculture	-0.05%	0.68%	-0.03%	0.02%	-0.04%
Manufacturing	-0.04%	0.31%	-0.05%	0.01%	-0.04%
Hotels	0.00%	-4.02%	0.02%	0.01%	0.01%
Hostels	0.04%	0.49%	0.02%	0.01%	0.00%
Other Accommodation	0.02%	0.52%	0.04%	0.01%	0.02%
Restaurants	0.02%	0.44%	0.03%	0.01%	0.03%
Service Sector	-0.01%	0.45%	-0.05%	0.02%	0.00%

The net effects of introducing imperfect competition and increasing returns to scale on the real wage and real returns to the factors of production is negligible at the regional level, this can be seen by comparing Tables 6.28 and 6.21 for Madrid and Tables 6.29 and 6.23 for the Canaries. Differences do occur and in general the returns to factors fall across all regions by more in the IRTS case. Two concurrent effects seem to cancel each other out. Firstly, it has already been noted that following the tax shock there is a resource movement between sectors following the reduction in output in the hotel sector and that non-tourism characteristic sectors in the tax shock regions benefit the most from this and increase output accordingly. It was also noted that this has adverse effects on the non-tourism characteristic sectors in the non-tax shock regions. The reductions in the real wage mean that the non-tourism characteristic sectors in the tax shock regions are able to produce goods more cheaply relative to competitors in other regions. These combined effects are of course larger in the IRTS case as, the initial effect that triggers this chain of events, the reduction in hotel output, is larger. This means that output in the non-tourism characteristic sectors in the non-tax shock regions falls by more in the IRTS case. For example, in the Madrid scenario output in the Canaries manufacturing sector falls by –0.05% in the CRTS model and –0.06% in the IRTS model. The returns to both labour and capital both fall by an additional -0.01% in the IRTS model. As this is an IRTS model, the Canary Isles manufacturer will reduce output by more under the IRTS scenario than the CRTS scenario due to its anti-competitive behavior. The second effect relates to the increased substitution away from the tax shock regions by foreign and domestic tourists following the increased price rise in hotel products in the IRTS scenario. Demand for tourism characteristic products can be seen to increase by more in non-tax shock regions in the IRTS model. For example, in the Madrid scenario hotel output in Castilla y León increases by an additional 0.03% in the IRTS model. The former of these two effects appears to dominate, as output is lower in virtually all IRTS simulations. Comparing Tables 6.24 and 6.20 for instance, in the Madrid tax shock scenario output in Andalucía, Canaries and the ROS are all 0.01% lower in the IRTS case.

In both the tax shock regions output is also lower in the IRTS case. Madrid for example sees total output fall by 0.02% to -0.06% in the IRTS case. While the output gain of 0.03% observed in the Canaries case is now reduced to a neutral 0.00%. Again the reasons behind this can be largely attributed to the dominance of events described in the preceding paragraphs: reduced output in the hotel sector, a relatively smaller output response from sectors gaining from the resource movement effect and increased substitution away from the more expensive tax shock region by tourists.

Table 6.30: A 5% Increase in Hotel Sector Taxation in Madrid: Aggregate results from the IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.00%	0.01%	0.00%	0.05%	0.00%
Output	-0.01%	-0.01%	0.00%	-0.06%	-0.01%
Trade Balance	-0.24%	0.49%	-0.04%	1.43%	-0.05%
Exports	-0.01%	-0.07%	0.00%	0.13%	0.00%
Imports	-0.01%	-0.01%	0.00%	-0.02%	-0.01%
Inter-Regional Imports	-0.02%	-0.07%	-0.02%	-0.13%	-0.02%
Household Income	-0.02%	-0.02%	0.00%	-0.06%	-0.02%
Domestic Price level	-0.01%	-0.01%	-0.01%	-0.08%	-0.01%
Price of Foreign Tourism	0.00%	0.01%	-0.01%	0.83%	-0.01%
Quantity of Foreign Tourism	0.07%	0.15%	0.10%	-3.08%	0.09%
Price of Domestic Tourism	-0.01%	0.01%	-0.01%	0.62%	-0.01%
Quantity of Domestic Tourism	0.00%	0.00%	0.00%	-1.32%	-0.01%
Government Revenue	0.01%	-0.03%	-0.01%	1.80%	-0.01%

Table 6.31: A 5% Increase in Hotel Sector Taxation in the Canaries: Aggregate results from the IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.02%	0.00%	0.00%	-0.01%
Output	-0.01%	0.00%	-0.01%	-0.01%	-0.01%
Trade Balance	-0.85%	-3.06%	-0.16%	-0.11%	-0.16%
Exports	-0.02%	0.64%	-0.01%	0.00%	-0.01%
Imports	-0.02%	0.08%	-0.01%	-0.01%	-0.03%
Inter-Regional Imports	-0.06%	0.19%	-0.07%	-0.02%	-0.08%
Household Income	-0.03%	-0.03%	-0.02%	-0.01%	-0.04%
Domestic Price level	-0.02%	-0.25%	-0.04%	-0.01%	-0.04%
Price of Foreign Tourism	-0.02%	0.27%	-0.04%	-0.01%	-0.03%
Quantity of Foreign Tourism	0.26%	-1.02%	0.36%	0.10%	0.32%
Price of Domestic Tourism	-0.02%	0.45%	-0.04%	-0.01%	-0.04%
Quantity of Domestic Tourism	-0.01%	-1.92%	-0.01%	-0.01%	-0.02%
Government Revenue	0.02%	13.79%	-0.03%	-0.01%	-0.02%

There are other effects that will also have an impact on these results. The reduced output levels in all regions means that the domestic price levels are lower in the IRTS case. This leads to a larger deterioration in the terms of trade and reduced levels of imports in the IRTS model. Exports also fall, but this is due to the reduction in output of traded goods sectors in the model. Further, the larger deterioration in the terms of trade means that the price of foreign tourism falls by more and the quantity of foreign tourism increases. This is the case in all regions, apart from those experiencing the tax shock. In the Madrid scenario for example Table 6.31 shows that foreign tourism demand increases by 0.07% in Andalucía (0.01% more than the CRTS case) and falls by –3.08% in Madrid (-0.45% more than the CRTS case) due to the increased price rises in the hotel sector. Household income tends to fall by larger amounts in the IRTS case due in particular to the declines in the real wage discussed above. While increases in tax revenue are smaller due to the reduced output effects.

Tables 6.26 and 6.27 show the domestic price levels by sector under the two shocks. Movements in the price level mirror those of output shown in Tables 6.25 and 6.26. Under the IRTS scenario in sectors where output expands, price level rises are larger as imperfectly competitive firms seek to restrict output and drive up its price. This is in evidence particularly in the tourism characteristic sectors in the non-tax regions, where output expands due to substitution away from the tax shock region and the deterioration in the terms of trade. In sectors where output contracts, the increases in non-tourism output in the tax shock region means that the reductions in output in non-tax shock regions are larger and hence prices fall by more in the IRTS model.

Tables 6.32 and 6.33 show the impact of the tax shocks on the number of firms. As in the tourism demand scenario firm growth effects largely mimic output effects. Under the Madrid tax shock the number of hotel firms is seen to decline by 4.60% and in the Canaries a similar decline of 3.05% is observed. The same principles as always drive the model, as output falls in these sectors marginal revenue falls and average costs rise relative to output meaning profits fall and firms leave the market. More firms leave under the Madrid scenario, as mark-ups are higher and the equivalent output effect is larger. In general, the number of foreign varieties declines as the terms of trade deteriorate. Although the number of imported varieties actually rises in the Canaries by 0.04% under the tax shock scenario as additional imported intermediaries are needed in production to meet the additional foreign demand generated by the terms of trade reduction.

Table 6.32: Impact on the Number of Firms of a 5% Increase in Hotel Sector Taxation in Madrid: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Firms	0.01%	0.02%	0.01%	-0.45%	0.01%
Agriculture	-0.01%	-0.03%	0.00%	-0.16%	-0.01%
Manufacturing	-0.01%	-0.05%	-0.01%	0.11%	0.00%
Hotels	0.02%	0.05%	0.02%	-4.60%	0.03%
Hostels	0.04%	0.06%	0.02%	0.54%	0.03%
Other Accommodation	0.03%	0.08%	0.01%	0.50%	0.03%
Restaurants	0.02%	0.06%	0.01%	-0.59%	0.02%
Service Sector	0.00%	-0.01%	0.00%	0.01%	0.00%
Imports Firms	0.00%	-0.02%	0.00%	-0.20%	0.00%
Agriculture	-0.01%	-0.03%	0.00%	-0.22%	-0.01%
Manufacturing	-0.01%	-0.01%	0.00%	0.00%	-0.01%
Service Sector	-0.01%	-0.01%	0.00%	-0.06%	-0.01%

Table 6.33: Impact on the Number of Firms of a 5% Increase in Hotel Sector Taxation in the Canaries: IRTS Model

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Domestic Firms	0.03%	-0.04%	0.04%	0.01%	0.04%
Agriculture	-0.05%	0.32%	0.00%	-0.01%	-0.04%
Manufacturing	-0.02%	0.59%	-0.01%	0.00%	0.00%
Hotels	0.06%	-3.05%	0.09%	0.03%	0.12%
Hostels	0.15%	0.01%	0.09%	0.03%	0.12%
Other Accommodation	0.12%	0.02%	0.03%	0.02%	0.12%
Restaurants	0.08%	-0.08%	0.05%	0.03%	0.07%
Service Sector	-0.01%	0.16%	-0.01%	-0.01%	0.00%
Imports Firms	-0.01%	0.04%	-0.01%	0.00%	-0.02%
Agriculture	-0.02%	0.20%	-0.01%	0.00%	-0.03%
Manufacturing	-0.01%	0.08%	-0.01%	-0.01%	-0.03%
Service Sector	-0.02%	0.14%	-0.01%	0.00%	-0.02%

This section has shown that the impacts of a tax shock are amplified in the IRTS model as compared to the CRTS model. As has been shown in other IRTS applications the general direction of the results is the same as the CRTS model, it is just the magnitudes of the results that differ. The next sections go on to test key elasticity parameters and the structure of the tourism demand function. Again tests are carried out using the CRTS model discussed in section 6.6.2, which is also referred to as the base case.

6.6.4 Sensitivity Analysis: Doubling the Price Elasticity of Tourism Demand

As in subsection 6.5.7 with the foreign tourism demand shock, the sensitivity of the price elasticity of foreign tourism demand (PEFTD) is tested. Although due to the high proportion of hotel usage by domestic tourists the price elasticity of domestic tourism demand (PEDTD) is also simultaneously tested. Both parameters are doubled from their original estimate. As previously stated the PEFTD is taken from an empirical estimate by de Mello *et al.* (2002) and is valued at 2. While the PEDTD is taken from (Sampol and Perez, 2000) and is also valued at 2.

Comparing Tables 6.34 and 6.35 with the base case, it can be seen that the price of hotels rises by a lesser amount. In Madrid the price rise is 4.31% as compared to 4.46% in the base case while in the Canaries a similar proportional change is seen (3.50%-3.63%). Firms seek to maximise profits so the price rise of hotel products rises by less following the introduction of the tax in this scenario. Tourists are more price elastic in this scenario and are more sensitive to the price rise and quantity of both foreign and domestic tourism demand fall by more than the base case. In the Madrid scenario for example, foreign tourism demand falls -2.63% in the base case and -2.89% when the elasticity in increased, while in the Canaries domestic tourism demand falls from -1.78% to -1.99%. These changes are actually quite small, given the large changes in the tourism demand elasticities. This is most likely to do with the fact that the price of hotel accommodation does not differ by a very large amount when the elasticities are doubled. A direct consequence of this reduction in tourist demand is that hotel output falls by more in this scenario: -5.01% to -4.90% in Madrid and -3.90% to -3.85% in the Canaries.

As hotel output has fallen by more in the tax shock regions there will be more resource movement into other sectors in the region. This means that the tax shock regions become relatively cheaper than other regions and that output in these regions falls by a larger amount than the base case . This also means that the domestic price level and household incomes fall by more in the sensitivity tests in the non-tax regions. In turn, the price of domestic and foreign tourism rises by less, although corresponding rises in foreign tourism are smaller. The quantity of domestic tourism contracts by more than the base case as household income falls. Further, the larger reduction in the domestic price level leads to a greater deterioration in the terms of trade than the base case and imports increase. Exports rise by more in the tax shock regions, but fall by more in non-tax shock regions due to the reduction in output. Government revenue falls by more than the base case in all regions. In the tax shock regions this is driven by the fact that there is less tourism demand in the region while in the non-tax shock regions it can be attributed to the fact that there is less output in the region.

Table 6.34: Impact of a 5% Increase in Hotel Sector Taxation in Madrid: Aggregate Results from the CRTS Model with Increased Elasticity of Foreign Tourism Demand

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.00%	0.00%	0.00%	0.05%	0.00%
Output	0.00%	-0.01%	-0.01%	-0.04%	0.00%
Hotel Output	0.01%	0.04%	0.03%	-5.01%	0.03%
Trade Balance	-0.21%	0.29%	-0.04%	0.98%	-0.05%
Exports	-0.01%	-0.04%	-0.01%	0.13%	0.00%
Imports	-0.01%	-0.01%	-0.01%	-0.04%	-0.01%
Inter-Regional Imports	-0.03%	-0.09%	-0.03%	-0.16%	-0.03%
Household Income	-0.02%	-0.01%	-0.01%	-0.09%	-0.03%
Domestic Price level	0.00%	-0.02%	0.01%	-0.12%	0.00%
Price of Hotels	-0.03%	0.01%	-0.02%	4.31%	-0.02%
Price of Foreign Tourism	-0.01%	-0.02%	-0.01%	0.64%	-0.02%
Quantity of Foreign Tourism	0.05%	0.08%	0.05%	-2.89%	0.07%
Price of Domestic Tourism	-0.01%	-0.02%	-0.01%	0.45%	-0.02%
Quantity of Domestic Tourism	0.00%	-0.01%	0.00%	-1.12%	-0.01%
Government Revenue	0.00%	-0.05%	-0.01%	1.78%	-0.02%

Table 6.35: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries: Aggregate Results from the CRTS Model with Increased Elasticity of Foreign Tourism Demand

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.02%	0.00%	0.00%	0.00%
Output	0.00%	0.03%	-0.01%	-0.01%	0.00%
Hotel Output	0.07%	-3.90%	0.11%	0.03%	0.10%
Trade Balance	-0.73%	-2.32%	-0.16%	-0.11%	-0.17%
Exports	-0.01%	0.61%	-0.02%	0.00%	-0.01%
Imports	-0.02%	0.07%	-0.02%	-0.01%	-0.04%
Inter-Regional Imports	-0.09%	0.16%	-0.09%	-0.03%	-0.11%
Household Income	-0.04%	-0.02%	-0.02%	-0.02%	-0.09%
Price of Hotels	-0.05%	3.50%	-0.05%	0.01%	-0.08%
Domestic Price level	0.00%	-0.22%	0.01%	-0.02%	0.01%
Price of Foreign Tourism	-0.04%	0.19%	-0.05%	-0.02%	-0.07%
Quantity of Foreign Tourism	0.17%	-0.94%	0.19%	0.06%	0.26%
Price of Domestic Tourism	-0.04%	0.36%	-0.05%	-0.02%	-0.07%
Quantity of Domestic Tourism	-0.03%	-1.99%	-0.02%	-0.01%	-0.03%
Government Revenue	-0.01%	13.79%	-0.05%	-0.02%	-0.06%

6.6.5 Sensitivity Analysis: Doubling the Elasticity of Substitution between Regions

We have seen in all simulations so far that the price of both foreign and domestic tourism rise in the tax shock regions. This next sensitivity test looks at what would happen if tourists are more willing to substitute between different regions of the economy. As in the previous section this involves doubling the elasticity of substitution between regions from 4 to 8.

As with the previous sensitivity test, where the price elasticity of demand was doubled, when comparing Tables 6.36 and 6.37 with Tables 6.16 and 6.17 the base case, it can be seen that the price of hotels rises by a lesser amount. In Madrid the effects are very similar to the previous sensitivity test, the hotel price rise is 4.30% as compared to 4.46% in the base case while in the Canaries a similar proportional change is seen (3.55%-3.63%). However, changes in the quantity of foreign tourism in the tax region are much larger due to increased willingness to substitute. In Madrid for example, the quantity of foreign tourism declines to –3.77% as opposed to –2.63% in the base case and -2.89% when the PEFTD is doubled. Similar effects can be seen in the Canaries where a decline of –1.08% is observed as opposed to –0.87% in the base case and –0.94% when the PEFTD is doubled. However, other regions will benefit from this increased willingness of consumers to substitute. For example, following the Madrid tax shock foreign tourism demand rises by 0.39% in Andalucía as opposed to 0.22% in the base case. Such an outcome is not unrealistic, the tax shock might actually lead to consumers changing their preferences and being more willing to substitute away from the tax shock region.

As in the scenario where the price elasticity of tourism demand was increased, the increased decline in hotel output means that there will be more resource movement and again the price level in the tax shock regions will fall by more relative to other regions. In Madrid for instance, the domestic price level falls by –0.12% as opposed to –0.10% in the base case. In turn, household incomes in the non-tax regions fall by more. However, the net effect of the increase in the elasticity of substitution means that the increased revenues from tourism actually lead to a net increase in household income. This positive household income effect means that there is a positive effect on domestic tourism. Not only does domestic tourism rise in non-tax shock regions as consumers substitute away from the more expensive tax shock regions but also due to the increases in household income. For example, in the Madrid scenario base case a decline in domestic tourism consumption of –0.02% is observed in the Canaries while Table 6.36 shows that in the sensitivity test this result is reversed into a 0.01% gain.

Overall these effects do not lead to a change in headline output, or welfare. It appears that the increased resource movement into the non-tourism characteristic sectors in the tax shock regions leads is countered by the increase in tourism consumption in the non-tax shock regions.

Table 6.36: **Impact of a 5% Increase in Hotel Sector Taxation in Madrid: Aggregate Results from the CRTS Model with Increased Substitution between Regions.**

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.00%	0.00%	0.00%	0.05%	0.00%
Output	0.00%	-0.01%	0.00%	-0.05%	0.00%
Hotel Output	-0.26%	0.08%	-0.05%	-5.40%	-0.04%
Trade Balance	0.02%	0.65%	0.04%	1.79%	0.04%
Exports	-0.01%	-0.08%	0.00%	0.15%	0.00%
Imports	0.00%	-0.01%	0.00%	-0.04%	0.00%
Inter-Regional Imports	-0.01%	-0.06%	-0.01%	-0.14%	-0.01%
Household Income	0.00%	0.01%	0.00%	-0.11%	0.00%
Domestic Price level	0.00%	0.04%	0.00%	-0.12%	0.00%
Hotel Price	0.01%	0.05%	0.00%	4.30%	0.01%
Price of Foreign Tourism	0.01%	0.05%	0.01%	0.56%	0.01%
Quantity of Foreign Tourism	0.09%	0.22%	0.16%	-3.77%	0.10%
Price of Domestic Tourism	0.00%	0.04%	0.00%	0.39%	0.00%
Quantity of Domestic Tourism	0.00%	0.01%	0.00%	-0.23%	-0.01%
Government Revenue	0.02%	-0.01%	0.00%	1.72%	0.00%

Table 6.37: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries: Aggregate Results from the CRTS Model with Increased Substitution between Regions.

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.02%	0.00%	0.00%	0.00%
Output	-0.01%	0.03%	0.00%	0.00%	-0.01%
Trade Balance	0.08%	-3.25%	0.18%	-0.10%	0.19%
Hotel Output	-1.10%	-3.92%	-0.20%	0.06%	-0.16%
Exports	-0.03%	0.65%	-0.01%	0.00%	-0.01%
Imports	-0.02%	0.09%	0.00%	0.00%	-0.02%
Inter-Regional Imports	-0.04%	0.20%	-0.05%	-0.01%	-0.06%
Household Income	0.00%	-0.03%	-0.01%	0.00%	-0.02%
Domestic Price level	0.01%	-0.25%	-0.02%	0.00%	0.00%
Price of Foreign Tourism	0.03%	0.15%	0.02%	0.00%	0.05%
Hotel Price	0.02%	3.55%	-0.01%	0.00%	0.02%
Quantity of Foreign Tourism	0.39%	-1.08%	0.68%	0.12%	0.43%
Price of Domestic Tourism	0.02%	0.32%	-0.02%	0.00%	0.01%
Quantity of Domestic Tourism	0.00%	-0.04%	-0.01%	0.00%	-0.02%
Government Revenue	0.07%	13.79%	-0.02%	0.00%	0.02%

6.6.6 Senstivity Analysis: An Alternative Demand Structure

As in section 6.5.5.4 the model is tested to investigate the impact of an alternative demand structure. Recall that under this structure tourists first choose Spain as a destination and then a particular region based on second round preferences. As opposed to choosing a region and then substituting either to another region or country based on events in that region. Results for this simulation are shown in Tables 6.38 and 6.39.

It can be seen that under this set of scenarios that the price of hotels rises by less than the base case and hotel output falls by more. In Madrid the price rise is 0.12% less than the base case (4.38%) and output falls by 0.11% more than the base case (-5.01%). A similar effect is observed in the Canaries the price rise is 0.07% less than the base case (3.58%) and output is

0.05% lower (-3.85%). This means that the price of foreign tourism rises by less than the base case and that the quantity of foreign tourism falls by less in the tax shock regions. The reason that less of the increase in taxation is passed onto tourists is due to the alternative nature of their preference structure. In this alternative scenario regions are forced to compete in a pool where tourism consumption is based on direct competition with other regions. This alternative demand makes regions more competitive as compared to the demand structure used in the other sections whereby regions compete directly with the tourist.

Table 6.38: Impact of a 5% Increase in Hotel Sector Taxation in Madrid: Aggregate Results from CRTS Model with Alternative Demand Structure

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.00%	0.00%	0.00%	0.04%	0.00%
Output	0.00%	0.00%	0.00%	-0.04%	0.00%
Hotel Output	0.02%	0.05%	0.04%	-5.01%	0.04%
Trade Balance	-0.21%	0.30%	-0.04%	0.98%	-0.05%
Exports	-0.01%	-0.06%	-0.01%	0.13%	0.00%
Imports	-0.01%	-0.01%	-0.01%	-0.04%	-0.01%
Inter-Regional Imports	-0.03%	-0.09%	-0.03%	-0.16%	-0.03%
Household Income	-0.01%	-0.01%	-0.01%	-0.09%	-0.02%
Domestic Price level	-0.02%	-0.02%	-0.01%	-0.06%	-0.02%
Hotel Price	-0.01%	0.00%	-0.01%	4.38%	-0.01%
Price of Foreign Tourism	-0.01%	-0.02%	-0.01%	0.64%	-0.02%
Quantity of Foreign Tourism	0.05%	0.08%	0.05%	-2.51%	0.07%
Price of Domestic Tourism	-0.01%	-0.02%	-0.01%	0.46%	-0.02%
Quantity of Domestic Tourism	-0.01%	0.07%	0.00%	-1.50%	-0.01%
Government Revenue	0.00%	-0.05%	-0.01%	1.78%	-0.02%

Table 6.39: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries: Aggregate Results from CRTS Model with Alternative Demand Structure

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.02%	0.00%	0.00%	-0.01%
Output	0.00%	0.03%	0.00%	0.00%	-0.01%
Hotel Output	0.08%	-3.90%	0.13%	0.04%	0.13%
Trade Balance	-0.73%	-2.31%	-0.16%	-0.11%	-0.17%
Exports	-0.02%	0.61%	-0.02%	0.00%	-0.01%
Imports	-0.02%	0.09%	-0.02%	-0.01%	-0.04%
Inter-Regional Imports	-0.09%	0.18%	-0.09%	-0.03%	-0.11%
Household Income	-0.03%	-0.02%	-0.02%	-0.02%	-0.03%
Domestic Price level	-0.03%	-0.21%	-0.04%	-0.02%	-0.04%
Hotel Price	0.00%	3.58%	-0.02%	-0.02%	-0.04%
Price of Foreign Tourism	-0.04%	0.19%	-0.05%	-0.01%	-0.06%
Quantity of Foreign Tourism	0.17%	-0.76%	0.20%	0.06%	0.26%
Price of Domestic Tourism	-0.04%	0.36%	-0.05%	-0.02%	-0.07%
Quantity of Domestic Tourism	0.09%	-1.86%	0.16%	-0.01%	0.01%
Government Revenue	-0.01%	13.79%	-0.05%	-0.02%	-0.06%

As the price of foreign tourism rises by less in the tax shock regions under this scenario there is less substitution towards other regions. Hence the quantity of foreign tourism rises by less in the non-tax shock regions. This effect is more noticeable in the Canaries rather than Madrid due to the scale of foreign tourists consumption of hotel products. For example, the quantity of foreign tourism only increases by 0.17% in Andalucía as opposed to 0.22% in the base case. Of course, as hotel output has fallen by more in the tax shock regions the movement of resources into non-tourism characteristic sectors in the tax shock region increases. As in other scenarios this affects the competitiveness of the non-tourism characteristic sectors in the non-tax shock regions. However, this effect is not strong enough to affect output so that it differs significantly from the base case at the aggregate level. The combined impact of these effects has an adverse impact on household income and hence the domestic price level, which are all lower than the base case in the non-tax shock regions. Further, lower amounts of household income means that domestic tourism demand falls by more in the non-tax shock regions.

6.6.7 Senstivity Analysis: An Alternative Demand Structure with Regional Nesting

As previously stated in section 6.5.5.5 the redefinition of the demand structure does not necessarily give an accurate representation of the preference structure of foreign tourists. Considering this alternative structure is particularly relevant with regard to taxation as tourists will visit Spain for different reasons and this will affect their willingness to substitute between regions. Recall the pattern of substitution under this specification. Madrid is assumed to be an imperfect substitute to other regions in the model due to its importance as the Capital of Spain. While the Canaries as a destination are still highly substitutable with Andalucía but is an imperfect substitute for Castilla y León and Madrid. Results for these simulations are given in Tables 6.40 and 6.41.

Changing the structure of consumer preferences in this way has a significant impact on the results. In the previous sensitivity test it was shown that the price of hotels rose by less and hotel output fell by more than the base case due to that fact that under the alternative model structure regions now compete with each other in a more direct way for foreign tourism consumption. However, when imperfect substitution between regions is imposed this level of competition is reduced. For example, in this scenario the largest increases in the hotel price are observed in any of the CRTS scenarios. In Madrid the hotel price rises by 4.71% as compared to 4.46% in the base case and 4.38% in the scenario where there is a higher level of substitution between regions. Similar results are observed in the Canaries. The hotel price rises by 3.7% as compared to 3.58% in the base case and 3.63% when there is a higher level of substitution between regions. Notable differences exist in hotel output between regions. In Madrid for example, the reduction in hotel output (-4.08%) is less than the price increase (4.71%), this differs from the previous examples where hotel output falls by more than the price. A similar effect is observed in the Canaries, but it is of a much lower order of magnitude due to the willingness of consumers to substitute to Andalucía.

The reduction in foreign tourism demand is also much lower under this specification. For example, in the Madrid scenario the quantity of foreign tourism only falls by −0.79% as opposed to −2.63% in the base case. Similarly in the Canaries, the quantity of domestic tourism only falls by -0.41% as opposed to −1.78% in the base case. As the reduction in tourism demand is less under this scenario results change accordingly. For example output in the hotel sector only falls by 4.08% in Madrid as opposed to 4.9% in the base case.

Table 6.40: Impact of a 5% Increase in Hotel Sector Taxation in Madrid: Aggregate Results from CRTS Model with Alternative Demand and Nesting Structure

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.00%	0.00%	0.09%	0.00%
Output	0.00%	0.00%	0.00%	-0.03%	0.00%
Hotel Output	0.03%	0.00%	0.01%	-4.08%	0.02%
Trade Balance	-0.49%	-0.10%	-0.03%	0.33%	-0.04%
Exports	-0.02%	-0.02%	0.00%	0.06%	0.00%
Imports	-0.01%	-0.01%	-0.01%	0.03%	-0.01%
Inter-Regional Imports	-0.02%	-0.08%	-0.03%	-0.06%	-0.03%
Household Income	0.00%	-0.02%	-0.01%	0.10%	-0.03%
Domestic Price level	0.00%	-0.06%	-0.02%	0.21%	-0.03%
Hotel Price	0.01%	-0.06%	-0.02%	4.71%	-0.03%
Price of Foreign Tourism	0.01%	-0.06%	-0.02%	0.97%	-0.03%
Quantity of Foreign Tourism	0.17%	-0.05%	-0.01%	-0.79%	0.04%
Price of Domestic Tourism	0.00%	0.00%	0.00%	0.21%	-0.02%
Quantity of Domestic Tourism	0.00%	-0.01%	-0.01%	-0.11%	-0.01%
Government Revenue	0.03%	-0.05%	-0.02%	2.07%	-0.03%

Table 6.41: Impact of a 5% Increase in Hotel Sector Taxation in the Canaries: Aggregate Results from CRTS Model with Alternative Demand and Nesting Structure

	Andalucía	Canaries	Castilla y León	Madrid	Rest of Spain
Welfare	0.01%	0.03%	0.00%	0.00%	-0.01%
Output	0.00%	0.02%	0.00%	0.00%	0.00%
Hotel Output	0.02%	-3.80%	0.03%	0.01%	0.01%
Trade Balance	-0.21%	-2.12%	-0.10%	-0.08%	-0.10%
Exports	-0.01%	0.53%	-0.01%	0.00%	0.00%
Imports	-0.01%	0.09%	-0.01%	-0.01%	-0.04%
Inter-Regional Imports	-0.08%	0.16%	-0.08%	-0.03%	-0.09%
Household Income	-0.05%	0.01%	-0.02%	-0.03%	-0.10%
Domestic Price level	-0.07%	-0.12%	-0.05%	-0.03%	-0.10%
Hotel Price	-0.06%	3.70%	-0.05%	-0.03%	-0.10%
Price of Foreign Tourism	-0.07%	0.29%	-0.05%	-0.03%	-0.10%
Quantity of Foreign Tourism	-0.03%	-0.69%	-0.04%	0.00%	0.01%
Price of Domestic Tourism	-0.02%	0.02%	0.00%	-0.01%	-0.08%
Quantity of Domestic Tourism	-0.03%	-0.41%	-0.02%	-0.02%	-0.02%
Government Revenue	-0.06%	13.87%	-0.03%	-0.03%	-0.09%

6.7 Conclusions

The model presented here is an innovative attempt to examine regional tourism issues in a CGE modelling framework. The availability of regional input-output tables with data on the demand and supply of goods to other Spanish regions (although not bilaterally between each regional pair) has allowed the construction of a model that includes much inter-regional detail. The inclusion of tourism data from a tourism input-output table, a tourism satellite account and other supplementary data sources has enabled detailed modelling of tourism issues.

The results from the first simulations show that the consequences of a tourism boom are not spread evenly across regions. Small regions, such as the Canaries, in which tourism is large relative to other sectors of the economy, can experience significant diffusion effects. These are caused by increased foreign tourism demand driving up prices in the recipient region and, in turn, leading to an appreciation of the real exchange rate. It is also shown that in regions where the levels of tourism expenditure are small relative to the size of the regional economy, diffusion effects are much smaller. This result highlights the fact that regions like Castilla y León will benefit more in relative terms from an increase in tourism expenditure. These price appreciation effects highlight an important point for policy makers in that if the diffusion of increased tourist demand is to be reduced then tourists should be encouraged to choose more diverse areas of Spain, rather than the traditional resorts. When a sensitivity test was undertaken to show the benefits of increased substitution between regions, the value of foreign tourism expenditure increased by more than the counterfactual in Castilla y León due to the minimal price appreciation in this region. Foreign tourists' preferences for less tourism orientated regions such as Castilla y León could be increased by increased marketing of the regions and better tourism infrastructure including regional airports and sightseeing networks.

When foreign tourism demand increases significantly output gains are not necessarily observed in all regions, particularly when the increased foreign tourism expenditure crowds out domestic tourism expenditure. This is the observed outcome in Andalucía, where output is seen to decline following the foreign tourism demand shock. The increase in the regional price level associated with the increased foreign tourism expenditure drives up the cost of visiting a region for domestic tourists. While positive income effects associated with the increased earnings that higher levels of foreign tourism expenditure yield tend to dominate these outcomes, in sectors where the ratio of domestic to foreign tourism consumption is higher for domestic tourists negative output effects are observed. This might seem counterintuitive given that it would be expected that tourism characteristic sectors would experience an increase in output in the wake of a foreign tourism demand increase. However, the relative importance of domestic and foreign tourism consumption also plays a crucial role in the outcome of the result.

When outcomes from the CRTS model are compared with the IRTS model, the scale of the results also changes. The scale of these differences is shown to vary between regions. In Madrid, where mark-ups are higher relative to other regions, the impacts of introducing the IRTS model are large enough to re-order some of the results from the CRTS model. As in the previous chapter, the IRTS model shows that the CRTS model may overstate some of the benefits from a tourism demand shock, particularly as the diffusion effect is larger in the IRTS model. Differences in the model results may appear small at face value, but changes in relative values may differ by as much a 5-10% in some regions. For example, the rise in the quantity of foreign tourism consumption in Madrid in the IRTS case is 5.59%, which is 7.6% lower in absolute terms than the gain of 6% in the CRTS model. Results in the Canaries are much more modest, the equivalent figure is only 4%. Higher levels of diffusion mean that substitution effects are smaller, so regions such as Castilla y León do not gain as much in this model. Output gains in non-tourism characteristic sectors brought about by changes in relative regional price levels are also smaller. The specification choice of imperfect competition, is of course, important to the outcome of the results. When the conjectural variation parameters are changed so that $\mu_i = \mu_i^M = 6$ and mark-ups are reduced, only small differences are noted in the results. This suggests that the model results are more sensitive to the introduction of imperfect competition and increasing returns to scale per se than the specification choice. Such findings are consistent with Willenbockel (2004).

The model is shown to be sensitive to the price elasticity of foreign tourism demand and the structure of the foreign tourism demand decision. Having an R-CGE model allows the latter model variation to be tested explicitly. Such alternative specifications show that the potential gains realised via the diffusion and substitution effects for regions with low tourism intensity might not be as large as first thought, particularly as regions like Castilla y León might not be thought to be suitable substitutes for the main destinations. This outcome presents an important lesson for policy makers in that increasing the substitution between regions, while good in principle might actually be quite difficult.

The R-CGE model is also applied to the issue of accommodation taxation. Tourism taxation is often thought as "free money" for taxation authorities, as little of the burden is placed on domestic residents. The issue of tourism taxation has not been investigated in an R-CGE model before. Blake (2000) assesses tourism taxation in Spain, but only at the national level. Model results tend to be indicative with regard to expected outcomes when consumption taxes are increased. However, the structure of the taxed sector and the availability of substitutes plays a key role in the magnitude of the results. In Madrid where hotel accommodation is a key product in the tourists' consumption function, increases in taxation do not lead to large substitution effects, given the tourists' preferences. However, this means that hotel firms need to do less to mitigate these effects and will pass more of the tax on rather than bear the cost themselves, as the distortion to their profits will be smaller. In the Canaries, where the pattern of tourism consumption is more diverse substitution effects will be stronger and firms are forced to absorb more of the tax rise. While hotel output falls by more in the Madrid scenario than the Canaries scenario the results to indicate that Madrid might benefit more from a hotel tax than the Canaries. However, across the board comparison yields different results. For example, in the Canaries tax revenues that are captured by the model[11] rise by nearly 14%. This yields a significant gain to the Canaries fiscal position.

The magnitude of the result is substantially larger in the Canaries due to the scale of tourism activity in the region. The decline in hotel output, although smaller in percentage terms than in Madrid, is substantially larger in terms of its real value. This means that the value of substitution effects will be larger in this scenario, indicating that other regions in Spain have more to gain from a tourism tax in the Canaries than Madrid.

Increases in the level of tax revenues are welfare improving in both regions. However, overall welfare gains come about for different reasons. A key determinant of these welfare gains is realised via net reductions in the domestic price level and increases in exports. What the model does not necessarily show are the reductions in negative externalities realised by lower levels of tourism activity. This is often the rationale for introducing tourism taxes. Nonetheless, what is important to note is that the introduction of the tax reduces real income. The incidence of the tax is not just limited to tourists. Residents in both the Canaries and Madrid both consume hotel products. Any rise in prices associated with increases in hotel taxation will reduce the purchasing power of households in the tax regions. In addition to this, the tourism tax will have direct impacts on producer surplus and the firm's output decision. Any reduction in output will have knock-on effects in terms of earnings from labour and capital, and this will also cause reductions in household income. While reducing the welfare improvement, it is shown that reductions in household income do not reverse the result.

The results of this model are again amplified in the IRTS case and sensitivity tests show that this may mean that the level of output is reduced by more than the size of the tax shock

[11] Taxes on production and taxes on products.

as firms seek to preserve mark-ups. Similarly, if the elasticity of substitution between regions is increased or an alternative demand structure is imposed on the model, then output could also fall by more than the size of the tax shock. Such results imply that prior to implementing tourism taxes, significant research needs to be undertaken to accurately quantify substitution elasticities between tourism products and regions. The CGE model is able to highlight areas of incidence and relative changes under certain conditions, but changes in tourism behaviour are often dynamic and difficult to predict particularly when a tax concept is new and untested.

Chapter 7

A Computable General Equilibrium Model of a Small Island Economy

7.1 Chapter Overview

Small Island Economies (SIEs) are traditionally characterised as being highly trade dependent in terms of both imports and exports. This is largely due to conflicts between optimum plant size and the domestic market and a limited diversity in raw materials (Streeten, 1993). Consequently, SIEs have tended to concentrate economic activity on traded goods in which they have a comparative advantage and/or significant resource abundance and have subsequently become dependent on them. A production structure of this type implies that exogenous trade shocks will have significant implications for SIE economic performance. Correspondingly the majority of SIEs have tried to diversify their foreign exchange earnings and import suppliers in an attempt to insulate against such shocks. One avenue of diversification that has been pursued by a number of SIEs has been to develop the tourism sector. This policy is evident in a wide range of SIEs: for instance Jamaica has diversified into tourism from minerals and bananas (Atkins, 1999), while Mauritius has diversified from sugar (Gooroochurn, 2003) and Malta from textiles. In many SIEs, tourism revenues have become the main source of foreign currency.

This chapter is concerned with quantifying the effects that terms of trade and aggregate demand shocks can have on a trade dependent SIE. It seeks to extend the analysis already undertaken in chapters 5 and 6 at the single region level. The Canary Islands are chosen as the region for analysis. The underlying reason for this is the Canaries increased reliance on tourism as compared to other regions in Spain and also due to its relative economic independence from the rest of Spain.

The problem is approached from a tourism perspective and addresses two key issues. Firstly, in the light of the high degree of trade exposure, the impact of an adverse terms of trade shock is assessed both in terms of the tourism sector and the economy as a whole. Secondly, the impact of a tourism commodity boom is simulated to illustrate how it will affect key macro aggregates and the structure of the economy. Both trade and aggregate demand shocks will impact directly on economic performance and will have significant policy implications.

These issues are discussed in the context of the Canary Isles, a small island economy affiliated to mainland Spain, yet which still retains a significant degree of autonomy. In primary commodity terms, the Canary Isles are not a resource abundant economy and prior to the development of tourism on The Island they acted largely as a trade gateway to Latin America. However, they do have a comparative advantage in terms of the characteristics that are traditionally consistent with the mass-market tourism destination, i.e. close proximity to a major consumer source and a suitable natural environment. Since the introduction of charter flights in the late 1950s, tourism has played a key role in the development of the Canary Isles and the modern Canaries economy is heavily reliant on tourism .

The chapter is comprised as follows. Firstly a brief discussion of the Canaries economy is provided. The Canaries form a fairly typical small island economy with a small domestic production base and a high import content, both in intermediate use and final demand. However, the trade exposure of the islands is compounded by the significant portion of the economy that is dependent on the consumption of foreign tourists. It is these two factors that determine the nature of the scenarios that are evaluated in the Canaries CGE model, as it is economic shocks in these areas which are most likely to cause fluctuations or even structural change in the wider economy. The first set of simulations investigates the impact of a permanent increase in the price of imported goods on a range of different variables in the economy. The second set of simulations undertakes a similar pattern of analysis for two alternative types of tourism demand shocks; one anticipated, the other unanticipated. For both sets of simulations a range of sensitivity tests are undertaken to assess the influence of various assumptions on the results of the simulations.

The analysis of the import price shock reveals a persistent counterintuitive effect in that the demand for imports falls by a lesser amount than import prices when the Armington elasticity is greater than unity. However, sensitivity analysis reveals that this weak import substitution effect is dependent on the extent of the shock and the overall intensity of imports in a particular sector of the economy. In scenarios where the import content is relatively low and the import shock is temporary, domestic consumption will grow at the expense of import consumption over time. The key driver of the results is found to be the extent to which the import price shock reduces real incomes and hence domestic purchasing power. The tourism demand shock shows key differences in the responses of the economy to an anticipated and unanticipated foreign tourism demand shock.

7.2 A Brief Overview of the Canary Islands Economy

7.2.1 Economic and Fiscal Regime

The Canary Islands are an archipelago consisting of seven main islands located approximately 1,000 kms from the south-west coast of Spain. It was officially declared an autonomous community of Spain in August 1982 under the Statute of Autonomy. As a result the Canaries were given higher levels of jurisdiction than other autonomous regions over areas such as health and education; other delegated responsibilities include infrastructure and the environment. Financial autonomy is ensured by a separate tax system and EU Objective 1 status [1], i.e. they are eligible for EU Regional Development Funds and Inter-territorial Compensation Funds at the domestic level.

Since its initial association with Spain in the 15th Century, the Canary Islands have had a different tax and trading system from mainland Spain, largely due to their island aspect and remoteness. These factors still play an important role in the current economic and fiscal regime and were recognised in Spain's accession to the EU. The ultra-peripheral status of the islands means that special fiscal incentives have been adopted to offset costs associated with

[1] To qualify for Objective 1 Status per capita income must be less than 75% of the EU average.

the remoteness of the Islands. These incentives largely take the form of indirect investment and operating aid for companies located in the Canary Islands.

7.2.2 The Import Content

Until the 1980s the Canaries had few barriers to free trade, its economy being considered more open than that of Spain. Integration with the EU throughout the 1980s saw Spain open up more to external economic interchanges with the EU. While the Canaries did not correspondingly intensify their already high flows of imports they did change in terms of their origin, and mainland Spain became the main source of imports. The customs union between the Canaries and Spain has caused a growing trade diversion from other EU countries towards Spain.

The extent of this change of trade re-orientation was that the rate of openness[2] of the Spanish economy was 47.3% in 1999, for the Canary Islands this figure was only 19.2%. However, if the openness of the Canaries economy was recalculated to include transactions with mainland Spain as foreign trade, then this figure would rise to 55.7% (Hernandéz Martin, 2003). It is therefore clear that the level of trade openness in international markets has declined significantly, but the Canaries are still highly dependent on Spain for both imports and exports.

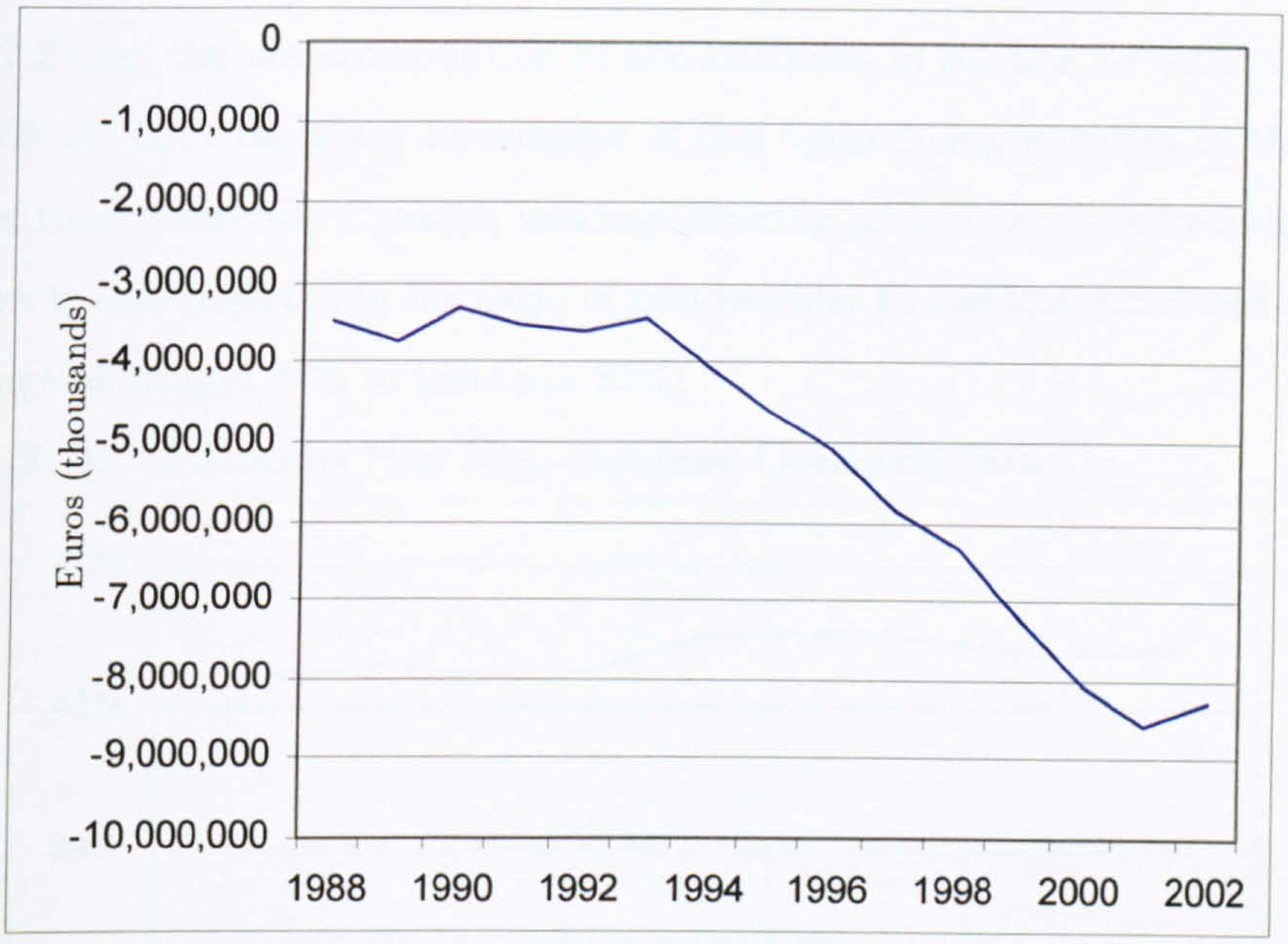
Coupled with a high intensity of trade flows, the Canaries economy is characterised by a severe balance of payments disequilibrium. Figure 7.1 highlights a persistent and worsening balance of payments deficit for the Canary Isles. It can be seen that the problems have worsened in conjunction with Spain's increasing integration with the EU.

These problems can largely be attributed to four key factors typically associated with the 'small island problem' (Hernandéz Martin, 2003). Firstly, exports largely come from a specialised domestic production base which limits the scope of international demand. Secondly, the domestic market is small in size and there is a lack of the competition that would drive efficiency adjustments or product development. Thirdly, small market size also makes it difficult for domestic firms to achieve economies of scale. Finally, due to a lack of raw materials and a wide manufacturing base, the Canaries have traditionally been dependent on large quantities of imported raw, intermediate, capital and consumer goods. Results of this nature are unsurprising and are consistent with neoclassical trade theory and the Heckscher-Ohlin model, it is

[2] Measured as the sum of exports to and imports from abroad relative to GDP.

generally expected that small open economies will be specialised in production and have high imports of consumption goods.

Figure 7.1 The Canary Islands Balance of Trade Deficit



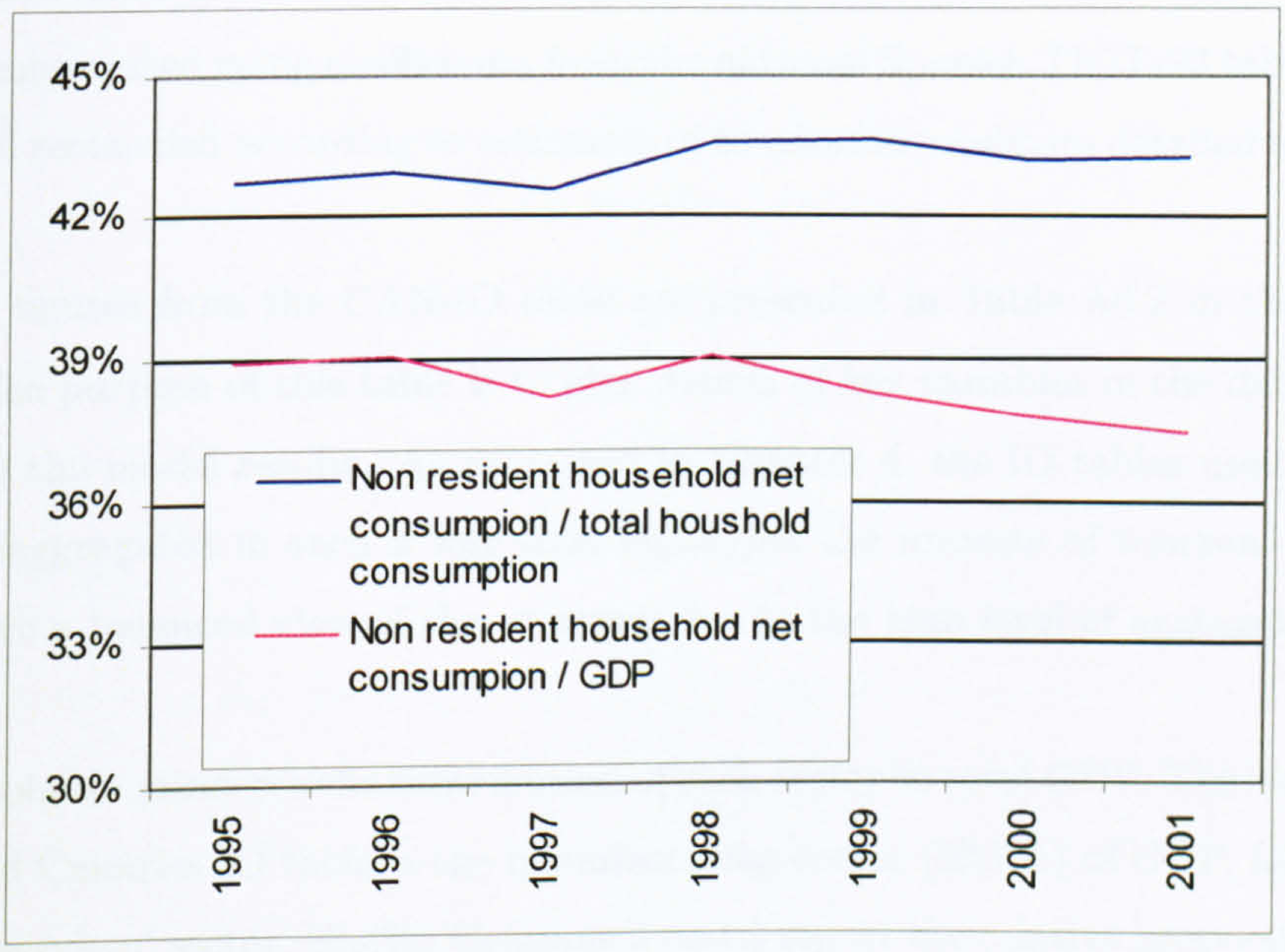
Source: Instituto Canario de Estadistica (ISTAC) various years up to 2002

7.2.3 Non-Resident Consumption in the Canaries

An additional explanatory factor relating to a severe balance of payments deficit not traditionally associated with the small island problem is the phenomenon of tourism consumption on the Canary Islands. As discussed in Chapter 3, tourists consume a wide range of goods in the economy, and there has been a sustained growth in tourist inflows into the Canaries since the 1950s. It is hypothesised by Hernandez Martin (2003) that this consumption will have a direct effect on import flows in the Canaries. Foreign tourists are net suppliers of foreign currency, however, they frequently demand goods not traditionally associated with the Canaries domestic production base for example, hire cars, champagne. This hypothesis is supported by changes in the commercial coverage rates for the Islands. In 1999 the commercial coverage rate for the domestic economy was 74.1%, while for international trade the figure was only 30.9% i.e. only 30.9% of the Canaries economy is made up of traded goods. This traded goods coverage rate has been in persistent decline and it is noted by Hernandez Martin (2003) that this coincides with a period of persistent tourism expansion on the Islands.

Using regional accounting data for Spain compiled by the INE, Hernandez Martin (2003) makes a provisional estimate of non-resident consumption in the Canary Isles. It can be seen from Figure 7.2 that the net consumption of non-residents in relation to GDP varies between around 20-25% of GDP, the lower boundaries of this figure being recorded in the years 1990-1993 during a time where the Canaries was experiencing an economic and tourism downturn. This downturn is also reflected in the ratio of non-resident to resident consumption, which fell from an average of around 40% to less than 32%.

Figure 7.2: Evolution of Net Non-resident Consumption



7.3 A Computable General Equilibrium Model of the Canary Islands

7.3.1 The Data

The basic data source for the model is the 1992 input-output table for the Canary Islands (CAN-IO)[3]. The original table identified 59 sectors, but has been aggregated to the same 16 sectors used in the two previous chapters and updated to the year 1999. The details of this process are given in Chapter 4. Additional data to support tourism consumption shares is provided by Instituto Canario de Estadistica (ISTAC); however, these additional data do not distinguish between the activities of domestic and foreign tourists. In order to make this distinction, the data were disaggregated using coefficients from the national Spanish TIOT-92 table discussed in Chapter 4 and reconciled according to estimates of tourism expenditure detailed in the previous section.

Summary figures from the CAN-IO table are presented in Table A6.2 in the appendix to Chapter 6. The purpose of this table is to give details of key variables in the data set that are likely to drive the model results. As explained in Chapter 4, the IO tables used in this thesis have been disaggregated in such a way that highlights the impacts of tourism. They do not necessarily give a balanced view of the economy due to the high level of aggregation of certain sectors.

The first column measures the contribution of each sector to total GDP. The largest sector in the aggregated Canaries IO table is the manufacturing sector (26.9%) of GDP, followed closely by the 'other services' sector, 23.4%. Columns 2 and 3 report the relative proportions of capital and labour used in each sector. The entries in this column are based on the compensation of employees (returns to labour) and gross operating surplus (returns to capital) rows in the CAN-IO matrix. The capital:labour ratio is given in column 4, a figure of less than 1 implies that the sector is labour intensive, while a figure greater than 1 implies capital intensity. From this it can be seen that the economy is predominantly labour intensive. The 'other services'

[3]The IO table was published by the Instituto Canario de Estadistica which is the statistical agency of the Canaries regional government. Methods for updating and reaggregating the table are discussed in more detail in Chapter 4.

sector includes the business services and communications subsectors which are characterised by high investment returns, hence the capital intensity in this sector.

Column 5 shows the sectors that are heavily reliant on foreign tourism demand. For example, 91% of final consumption of camp sites output is attributed to foreign tourism. However, this figure is much lower in the hotels sector (52.0%). This is because of the growing range of services provided by hotels (see discussion of tourism proportions in Chapter 4). The largest spending proportion for domestic tourists (column 6) is on restaurants. This reflects the natural geography of the Islands, although significant interisland tourism flows do occur.

Columns 7-10 reflect the outward orientated nature of the Canaries economy. A large part of traded goods activity is concentrated in just a few of the sectors in the model. The tourism characteristic sectors are non-traded (i.e. they don't import or export final demand goods, although significant amounts of foreign currency are earned from tourists), this implies that the influence of the terms of trade shock discussed later in this chapter may have a more indirect influence on tourism. However, the tourism sector, like all sectors, does use imported intermediate products; ranging from 1.6% of intermediates in the travel agents sector to 43.2% in the manufacturing sector.

7.3.2 Model Structure

Two models are used in this Chapter, both have 16 sectors and are dynamics. The first model assumes constant returns to scale (CRTS) in all sectors, while the second assumed imperfect competition and increasing returns to scale (IRTS) in all sectors, apart from the 'public' sector. The underlying equations of the model are identical to those given in Chapter 4, except that equations relating to foreign direct investment are removed from the model given that the underlying data is not available for the Canary Islands. As with every dynamic CGE model there are two crucial parameters in the calibration process, the growth rate of GDP (g) and the rate of return to capital (r). The growth rate of GDP is assumed to be 2% per annum and is sourced from the average growth rate for the Canary Isles over the 20 year period 1983-2003. This data set is published annually as part of the Spanish regional accounts (Contabilibad Regional de España), by the Spanish national statistical agency (INE). Real returns to capital (r), as in chapter 5, are calibrated endogenously so that they equate to 5%. Estimates for this parameter are taken from long-run data sourced from the Spanish central bank, the Banco de España.

Using the calibration method of Rutherford *et al.* (1996) the depreciation rate is set at 0.06%. Information for the sectoral number of firms is taken from published data at the regional level by the INE. Initial elasticity parameters are also assumed to be the same as in the national Spain model and are also presented in Table 4.2. Given the relative paucity of data in this area and the proxies used by other modelers, this may be considered to be a reasonable assumption for the Canary Islands.

7.4 Model Results: Terms of Trade Shock

7.4.1 The Terms of Trade Counterfactual

We begin our analysis by looking at the effects of an adverse terms of trade shock on the world price of imports. This scenario is designed to highlight the possible risks relating to the Canary Isles' dependence on imports and their consequent trade exposure. The price rise considered in the counterfactual is a 10% rise in the cost of all import purchases relative to the benchmark, and although initially unanticipated, is permanent in nature. The shock does not increase in size annually; it is constant relative to the benchmark. Under the small country assumption the foreign price level is exogenous.

Terms of trade shocks vary significantly in their nature and impact. They may be permanent or temporary, affect a single commodity or many. In the case of a permanent, real 10% rise in the price of imported goods across all commodities this would be likely to represent structural change in the major import supplier, which in this case is Spain and the EU. It is possible that such a price rise could be attributed to a number of reasons, for example, a global oil price shock, a rise in transport costs or a rise in export restrictions in overseas suppliers. Alternatively, it could be caused by a resource boom in a key trade partner that causes its domestic price level to rise. This is a likely scenario for the Canary Islands due to their open trade orientation and reliance on Spain as a supplier of imported commodities.

A key question relating to the nature of the shock is its scale. The model has a 20 year time horizon. Therefore a permanent terms of trade shock implies that it would last for at least

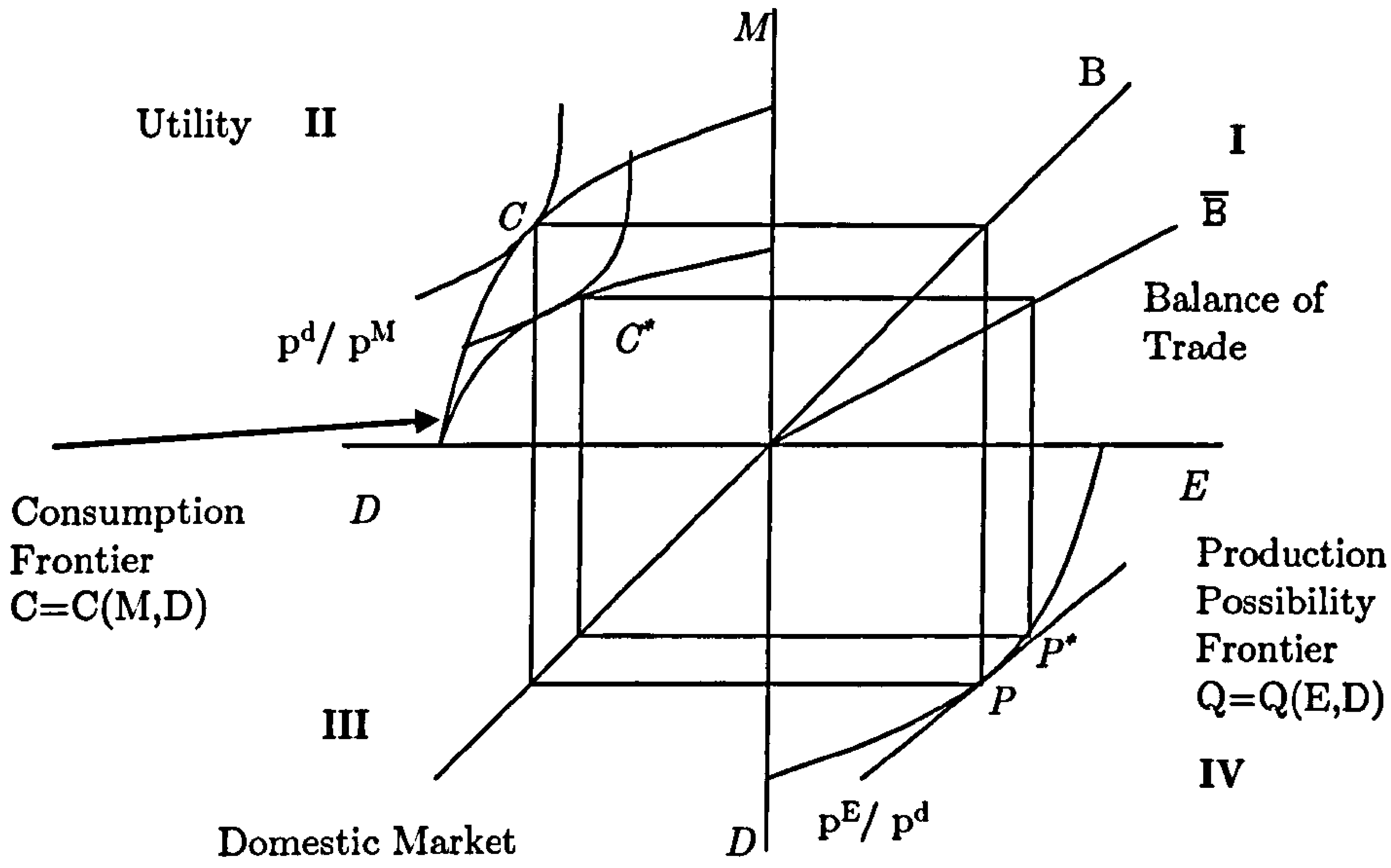
20 years. This would suggest that the size of the shock is large. However, while this may be the case, the key issue here is in understanding how the Canaries economy reacts to a shock of this nature. The nature of the issue being investigated is that the shock is long-term and therefore would require a response in the production structure of the Canaries. The shock is designed to highlight the reliance of the Canaries economy on imports and the consequent risks. However, to assess the robustness of the results, a sensitivity analysis of the scale of the shock is undertaken in order to establish whether it affects key results in the model.

The dynamic effects of this shock are summarised in Figures 7.3 to 7.23.As in Chapter 5 the method of Go (1994) is used to present the results. The graphs show a time series of the results from the dynamic CGE model, each plot represents the relative deviation from the benchmark value expressed in percentage terms. Initially analysis is undertaken within the context of the CRTS dynamic model, these results are compared to a dynamic IRTS model, and sensitivity analysis of key model parameters is also undertaken.

7.4.2 Results from the CRTS Model

Results from the CRTS model are presented in Figures 7.3 through to 7.11. In Chapter 5 the simple 1-2-3 programming model of Devarajan, Lewis and Robinson (1990) was used to illustrate the impact of an increase in a foreign investment inflow. The same model can also be used to illustrate the basic impacts of an adverse terms of trade shock. A graphical representation of the model is given in Figure 7.3 below.

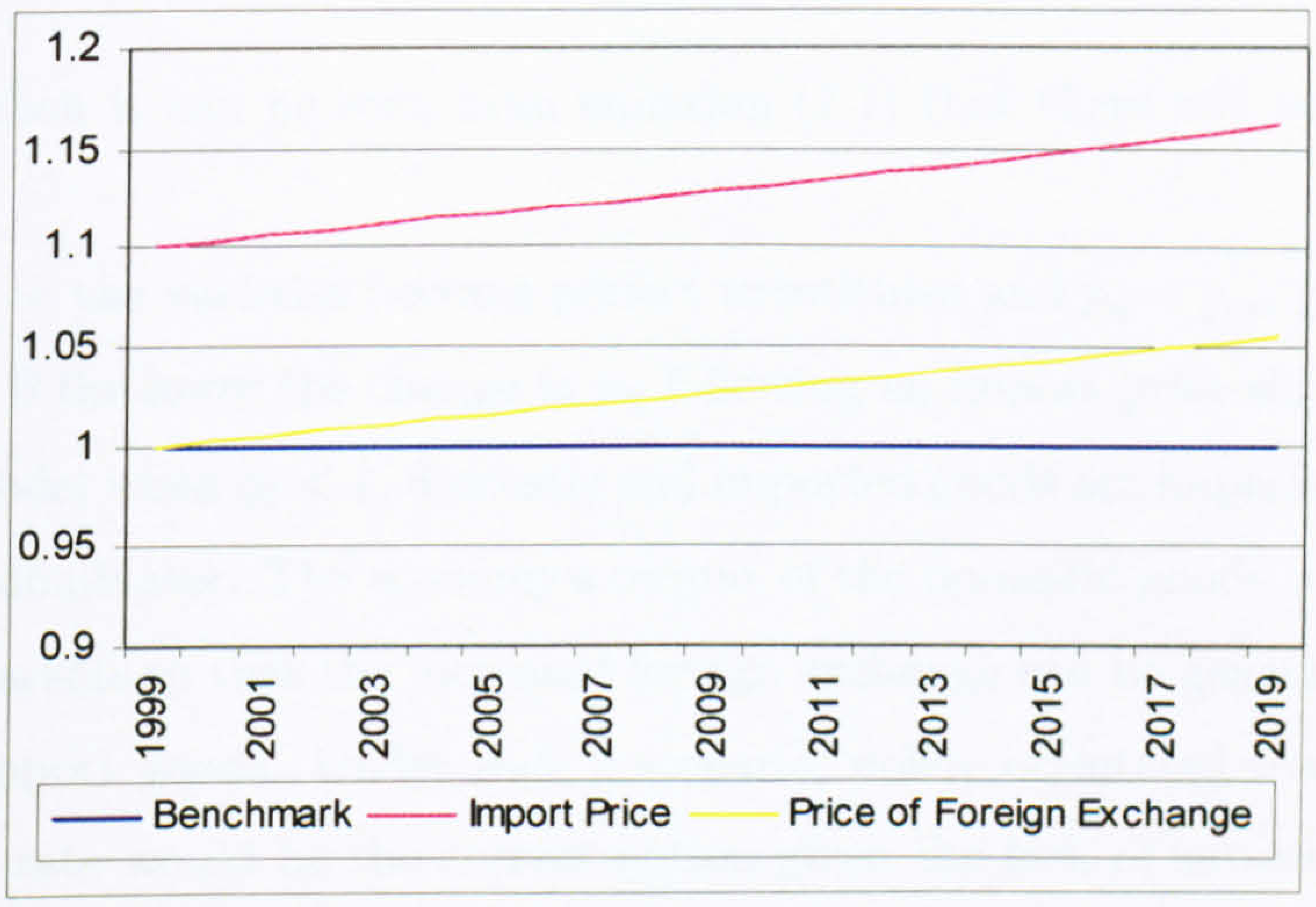
Figure 7.3: The Devarajan, Lewis and Robinson 1-2-3 Model



An increase in the world price of imports is represented by a clock-wise rotation of the balance of trade line from B to $\bar{B}$. Tracing the results through the model it can be seen that there is a new equilibrium at P^* on the production possibility frontier. Exports have increased in order to generate the increased foreign exchange needed to buy imports, which have now become more expensive. The ratio p^E/p^D has also increased to attract resources away from domestic production and towards export production. There has been a depreciation in the real exchange rate, this means that exports will become more competitive in overseas markets. The consumers utility function has rotated inwards on the M axis. There is a new equilibrium at point C^* with less consumption of both domestic goods and imports.

A similar process of adjustment is observed in the Canaries CGE model. The nature of the simulation undertaken in this section is to effectively drive a wedge between the domestic price of goods and services and the associated import price. In period $t = 0$ the counterfactual is imposed, the world price of imports rises by 10% and the price of domestic goods relative to imported goods increases and the real exchange rate depreciates. The depreciation in the real exchange rate is represented in Figure 7.4 via the price per unit of foreign exchange. The depreciation of the real exchange rate means that foreign currency becomes more expensive for the Canaries to purchase. It can be seen over the models time horizon that foreign currency becomes more than 5% more expensive to purchase. The purchasing power of foreign currency translates directly into the price for imports that the Canaries economy faces. It can be seen that following the counterfactual imports the Canaries immediately face a 10% import price rise, the price then rises at the same rate of the purchasing power of foreign exchange. What is particularly interesting about the shape of foreign exchange curve is its upward sloping nature. The causes of this upward sloping effect are described below.

Figure 7.4: Impact of an Adverse Terms of Trade Shock on the Import Price and Price of Foreign Exchange – CRTS model



When the price of imports rises in an economy the Devarajan, Lewis and Robinson (1990) model predicts two effects:

1. *An income effect*: the fall in real incomes leads to a decline in aggregate demand which puts downward pressure on domestic prices.

2. *A substitution effect*: people will switch away from more expensive imported goods to domestic goods.

The size of these two effects are dependent on the Armington elasticity. Changes in the Armington elasticity will lead to changes in the degree of price transmission of any import shock. The substitution effect dictates that if cheaper domestic substitutes are available, consumers will switch accordingly. This would lead to increased demand in the domestic market and drive up the price of domestic goods. The rise in the price of domestic goods is dependent on the domestic supply elasticity - the lower the domestic supply elasticity, the greater the increase in domestic prices that occurs. Thus the degree of substitutability between imports and domestic goods affects the degree of transmission. This can be shown by looking at the relative price index of domestic and imported goods which are derived in Appendix A and presented below:

$$\widehat{PD} = \frac{\phi_i}{\phi_i + \beta_i}\widehat{PM} \tag{7.1}$$

where β_i denotes the domestic supply elasticity and ϕ_i is the Armington elasticity. Two extreme cases occur:

1. if $\phi_i = 0$ then it can be seen from equation (7.1) that there will be no change in p_d, ($\hat{p}_d = 0$)

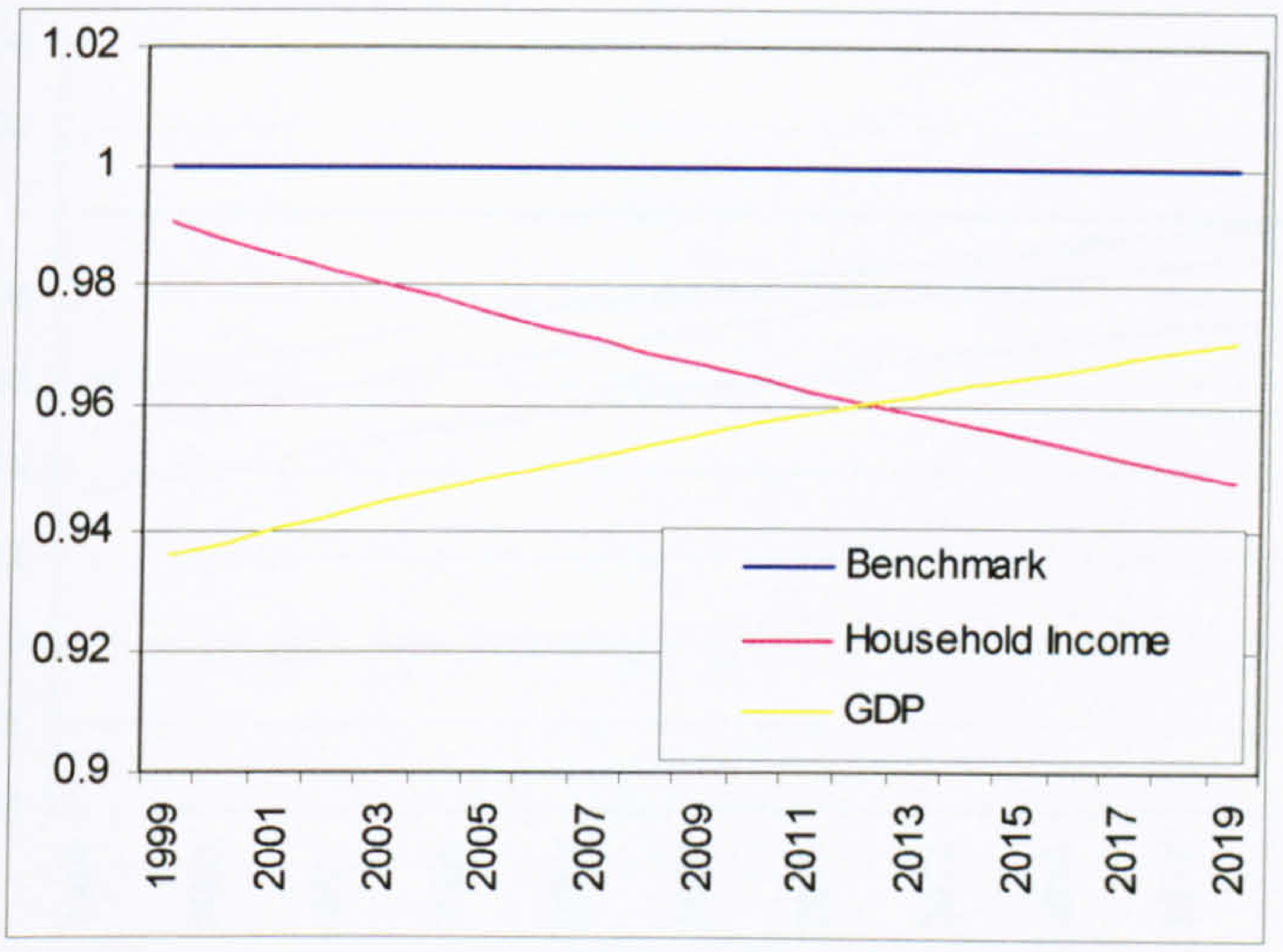
2. when $\phi_i \rightarrow \infty$ the varieties become perfect substitutes and $p_d = p_m$, ($\hat{p}_d = \hat{p}_m$) so the closer $\phi_i = 0$ the lower the change in p_d following an import price shock.

In the 1-2-3 model when $\phi_i < 1$, domestic and imported goods are imperfect substitutes and the income effect dominates. The economy's output of the domestic goods contracts and shifts towards export markets so that the increased foreign exchange can be generated to pay for the more expensive import goods. Under such a scenario, policy orientated towards depreciating the real exchange rate would be the correct option given the lack of substitutability between domestic and imported goods. However, when $\phi_i > 1$ the substitution effect will dominate. The economy will reduce its exports and its imports and produce more of the domestic good. In the Canaries model values of the Armington elasticity are greater than 1 and are given in Table 4.10 . Thus we would concur with the 1-2-3 model and expect that the substitution effect would dominate in the Canaries model.

However, this is not the observed outcome in the Canaries model. The graphical representation of the 1-2-3 model ignores the composition of intermediate inputs and while their empirical model accounts for imported intermediates, they are only small (2%) in the stylised SAM used in their model. It has been noted that SIEs are often characterised by a high degree of trade openness. The Canaries is no exception and has a high level of imported intermediate inputs. This leads to an additional factor that must also be taken into account in conjunction with the income and substitution effects. For convenience this is termed the *intermediates effect.* A rise in the price of these imported goods puts upward pressure on the domestic price level. Take the service sector for example, this is the largest sector in the Canaries IO table used in this model. It accounts for 32.2% of GDP, 38.8% of its intermediate products are imported either from other Spanish regions or overseas. Much higher ratios are observed in the manufacturing sector and the proportion of intermediate inputs is high across most sectors. With such high proportions it is difficult for sector to find enough alternative domestic inputs when prices rise. Therefore the substitution effect is week, despite the Armington elasticity being greater than 1. Consequently, much of the terms of trade shock is absorbed by firms and passed on to households in the form of higher prices.

This has major implications for the results and helps explain the downward sloping real exchange rate curve. Following the depreciation in the real exchange rate in period $t = 0$ the real exchange rate depreciates and the income, substitution and intermediate effects will transpire. However, the observed effect is not an increase in domestic output. The price of domestic goods relative to imported goods declines as the import price increases. However, this decline is actually quite small, this is due to the high volumes of imported intermediates in the Canaries economy. While domestic producers seek to increase their output, they are hampered by the rising cost of imported intermediates. This significantly reduces the magnitude of the substitution effect and means that the income effect dominates. This means that overall output falls in the Canaries. This is observed in Figure 7.5, which shows that in the first year of the trade shock, GDP falls by more than 6%.

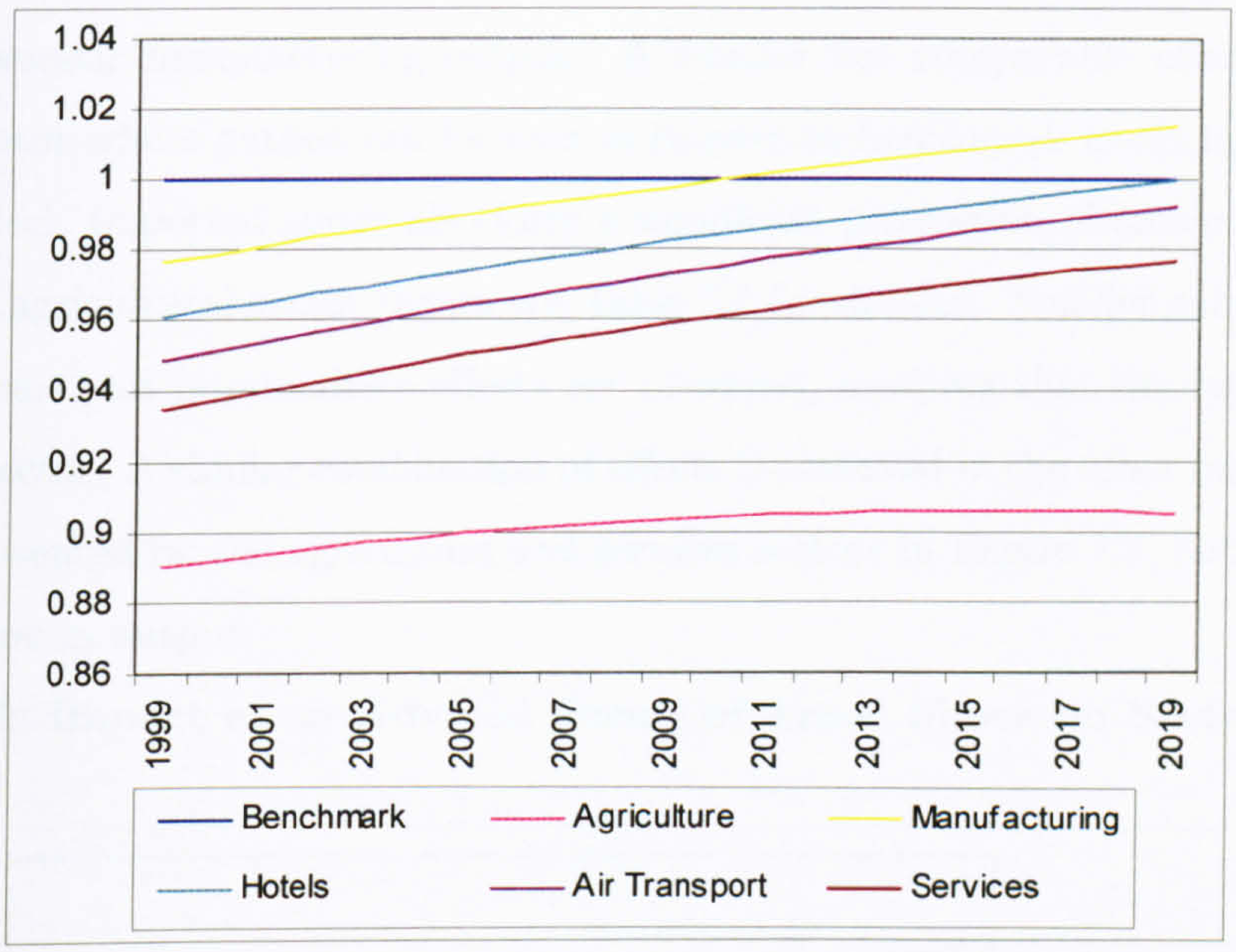
Figure 7.5: Impact of an Adverse Terms of Trade Shock on Household Income and GDP – CRTS model



Due to the dominance of the income effect, incomes are observed to be lower in period $t = 1$. The domestic price level has fallen due to the decline in aggregate demand, but this is not enough to compensate for the increase in the world price of imports. As domestic output has fallen, household income has also fallen and aggregate demand declines. In a second round effect the economy contracts and the domestic price level falls still further. So domestic prices actually decline still further relative to the price of imported goods and the real exchange rate declines by more than the value of the shock. Hence its downward sloping shape. For convenience this observed phenomena is referred to as the *compounding effect.*

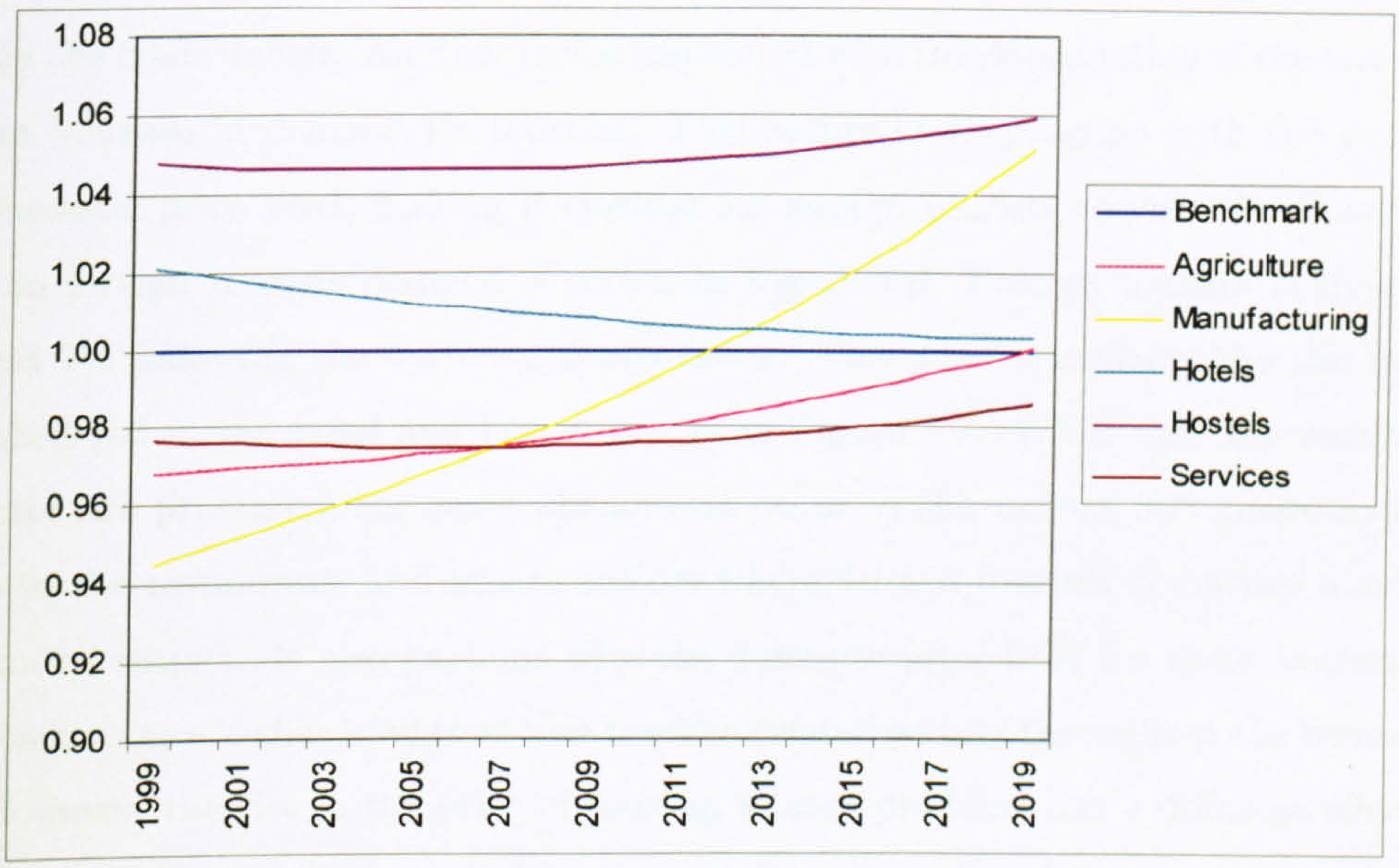
Figure 7.6 shows at the sectoral level the magnitude of the declines in the domestic price level. It can be seen that the domestic price level falls in all sectors of the model. However, there is recovery in later periods of the model, this is particularly noticeable in the manufacturing sector where prices rise above benchmark levels. The largest fall in price is observed in the agricultural sector. This is due to the fact that the income elasticity of substitution is much lower in the agricultural sector relative to other sectors. Hence, if demand falls by 1%, then the corresponding change in income must be substantially larger so that the price level falls by a larger amount.

Figure 7.6: Impact of an Adverse Terms of Trade Shock the Domestic Price Level – CRTS model



The impact of the adverse terms of trade shock on sectoral output is given in Figure 7.7. The sector with the most significant variation in output following the terms of trade shock is the manufacturing sector. It can be seen that output declines in this sector by almost 6% in 1999, but recovers to a level in excess of 5% of the benchmark level at the end of the simulation horizon. Table A6.2 shows that 57% of the manufacturing sector's intermediate inputs are imports, while 22.1% of final demand is imports. Therefore, it is apparent that while manufacturing makes up a significant portion of the Canaries economy, it is also extremely exposed to trade fluctuations. This information contributes to our understanding of the result. It has already been shown that real incomes and aggregate demand fall in the simulation; thus it is unsurprising that output falls. This effect is observed in all non-tourism sectors of the economy (sectors that are characterised by large foreign tourism consumption shares experience increases in output, these are discussed later in this section). Why however, does output recover to above benchmark level in the manufacturing sector and not in the other non-tourism sectors? The underlying reason for this effect can be attributed to the scale of the substitution effect in the manufacturing sector. With such a large portion of final and intermediate demand consisting of imports, a small proportional change in the orientation of final and intermediate demand towards domestic goods will have a large effect on the volume of domestic output. Hence we observe a significant recovery in domestic manufacturing output. A smaller but comparable effect occurs in the agricultural sector where output can be seen to recover to benchmark levels by the end of the simulation period. Imported goods also form a significant proportion of intermediate and final demand in the agricultural sector (again see Table 7.1 for details). Smaller substitution effects and larger income and intermediate effects are observed, meaning that the recovery is not as strong in this sector. A similar combination of effects is observed in the other import competing sectors as represented by the agriculture and services sectors in Figure 7.7, but the net overall effect is a decline in output.

Figure 7.7: Impact of an Adverse Terms of Trade Shock on Sectoral Output – CRTS model

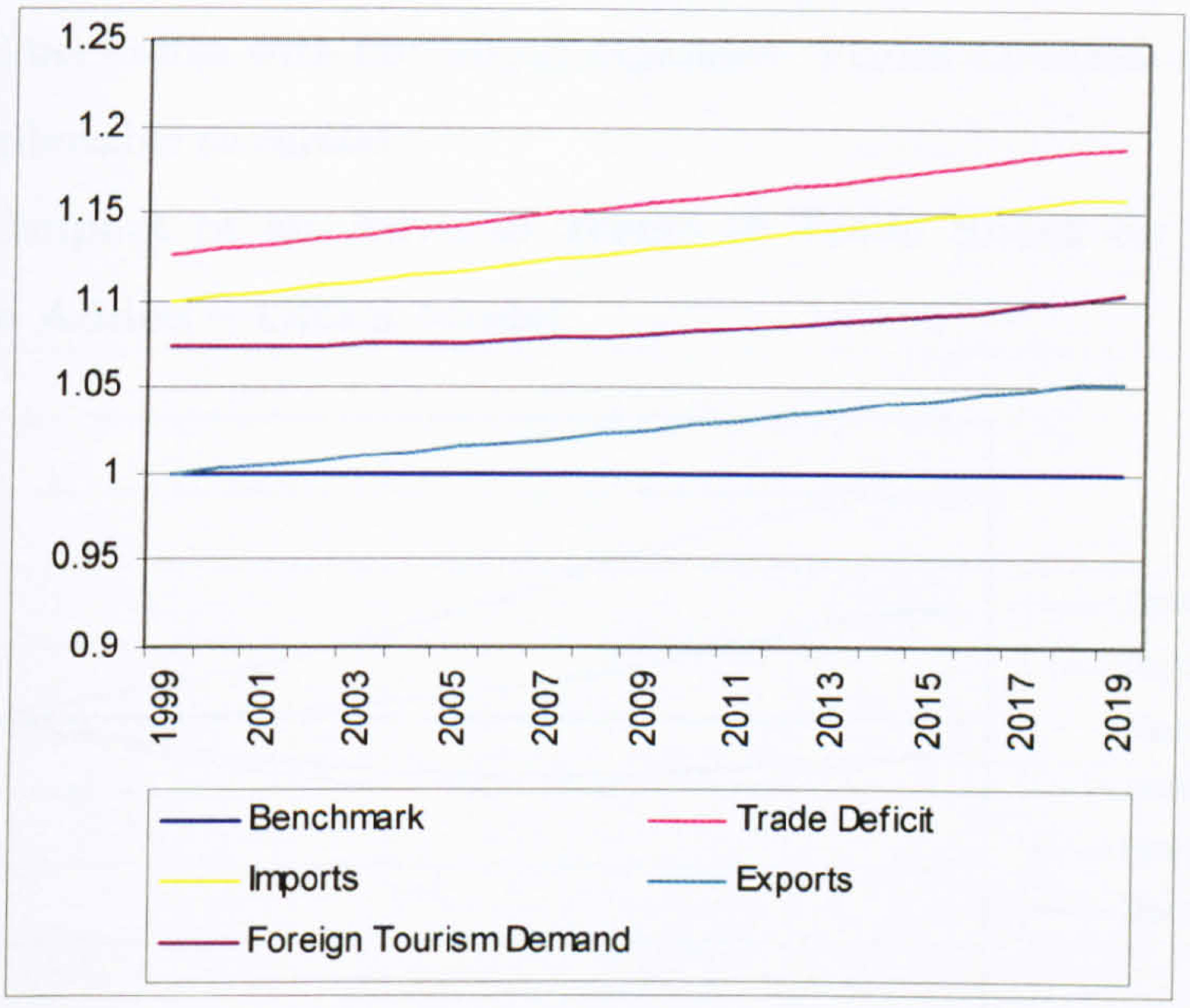


The 1-2-3 model predicts that import demand will fall following the terms of trade shock. This is in fact observed, but it is by a lesser amount than the import price rise, meaning that the overall value of imports rises. This can be observed in Figure 7.8 which shows the impact of the terms of trade shock on the structure of the trade deficit and foreign tourism demand. The value of imports rises by 10% in the first period of the model and continue to rise thereafter as their relative price increases. Since values for the Armington elasticity are greater than 1 in all sectors we would expect that the opposite effect would occur i.e. import demand would fall by a greater amount than the price rise. However, the reason for this effect is the 'weak' substitution effect and the dominant income and intermediates effects that have been described earlier. This growth in the value of imports drives the deterioration of the trade deficit in Figure 7.8. It can be seen that the trade deficit worsens by approximately 13% above the benchmark level in the period following the terms of trade shock. It deteriorates still further over the models time horizon due to the increasing value of imports in the economy. Other concurrent factors can be seen to have a positive impact on the balance of trade, but they are not strong enough to reverse the deterioration. These are discussed as follows.

The depreciation in the real exchange rate means that exports become more competitive and overall export value increases. This is again shown in Figure 7.8. This, of course, has a positive impact on the trade deficit. Another factor associated with the depreciation of the real exchange rate is an increase in demand for tourism. This occurs in conjunction with the depreciation in the domestic price level, making it cheaper for foreign tourists to visit the Canaries. The increase in foreign tourism demand is shown in Figure 7.8. Foreign tourism is shown to rise by around 7% following the currency depreciation. This growth explains the rise in sectoral output observed in the hotel and hostel sectors in Figure 7.7. While only the results for the hotel sector are presented, the same phenomena occur in the various accommodation sectors and also in the restaurants and leisure sectors where foreign tourism comprises a substantial proportion of output. It also explains why the domestic price level for these tourism related sectors remains at a higher level than non-tourism related sectors throughout the terms of trade shock. However, the rise in the price of tourism related products has a diffusion effect on the level of tourism demand (i.e. as tourism demand rises, the price of the tourism good rises and a portion of this demand is diverted elsewhere). In conjunction with this, there is a significant decline in domestic tourism demand associated with the reduction in real incomes. The net effect of this is that output in the hotel sector can be seen to be decreasing over the simulation horizon despite early increases. This is due to the significant portion of domestic consumption of hotel output, either for tourism or non-tourism purposes. This phenomenon is not observed in those tourism sectors, which are much more dependent on foreign tourism consumption e.g.

hostels.

Figure 7.8: Impact of an Adverse Terms of Trade Shock on the Trade Deficit and Foreign Tourism Demand – CRTS Model



Figures 7.8 and 7.9 show the impact of the terms of trade shock on the use of labour and capital in value added. The Canaries economy is predominantly labour abundant, although sectoral variations in factor intensities do exist, these can be observed in Table A6.2. As with all previous simulation in this thesis, the *resource movement* effect is of course evident. In sectors that experience an expansion in output there will be an increase in the marginal product of the factors of production that are used in that industry and resources will flow into them accordingly. Take the hotel sector for example, output increases by approximately 2% following the terms of trade shock, although declines significantly over the time horizon and stabilises at a level marginally above the benchmark. Over the time horizon the returns to labour in value added increases by in excess of 2%, while returns to capital in value added decline by approximately 1%. Initially the hotel sector attracts capital resources to assist its expansion, but the use of capital declines over the time horizon in line with the gradual decline in hotel output and the increase in labour use. The decline in capital use is apparent in all sectors and is discussed in the next paragraph.

Similar effects are observed across all sectors. In the manufacturing sector, output declines significantly in the periods immediately after the terms of trade shock. So too does the use of labour and capital. However, while Figure 7.8 shows a recovery in the returns attributable to labour in value added in-line with the output expansion, Figure 7.9 shows a continued decline in the returns attributable to capital.

Figure 7.9: Impact of an Adverse Terms of Trade Shock on the Quantity of Labour in Value Added – CRTS Model

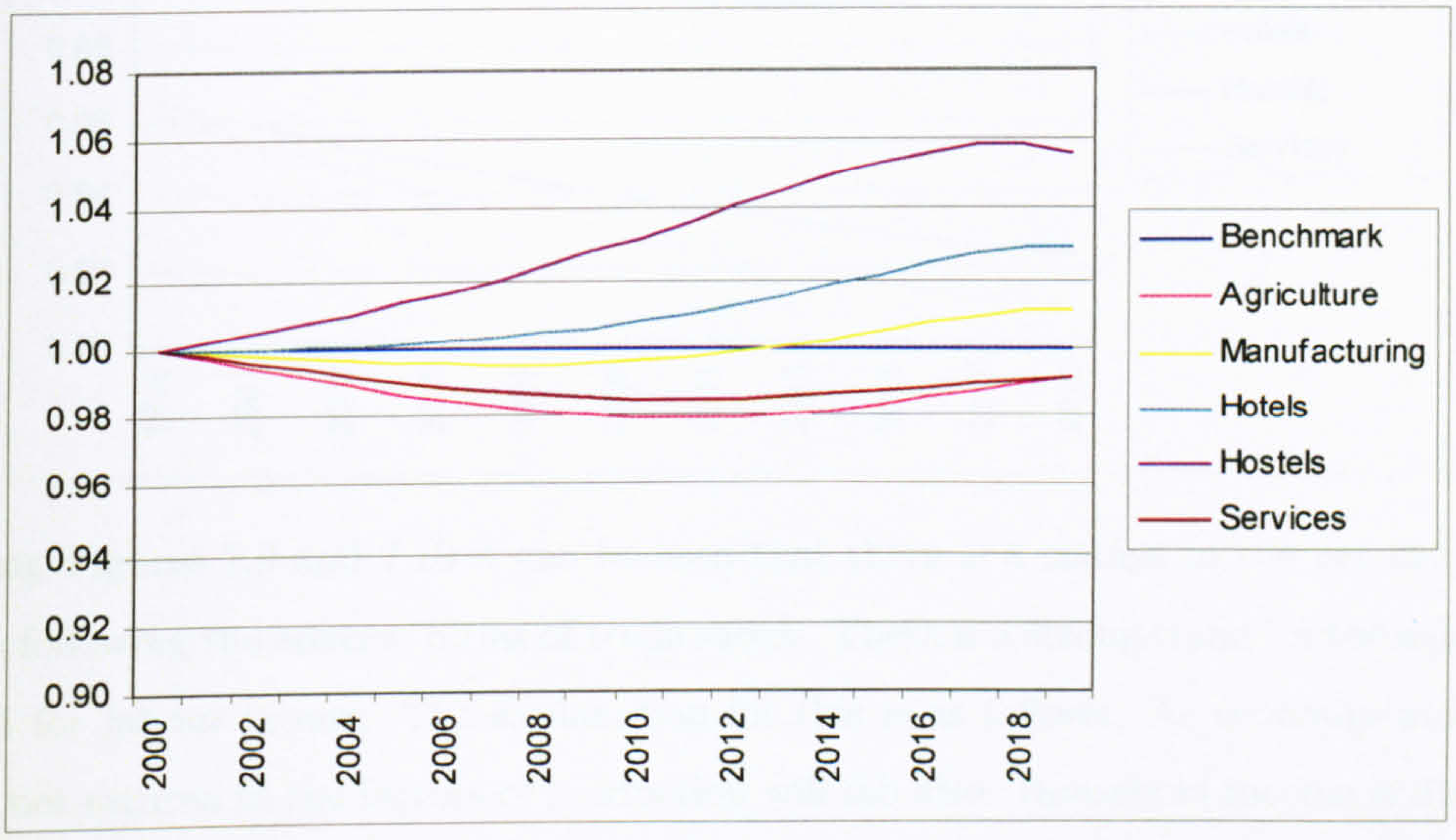
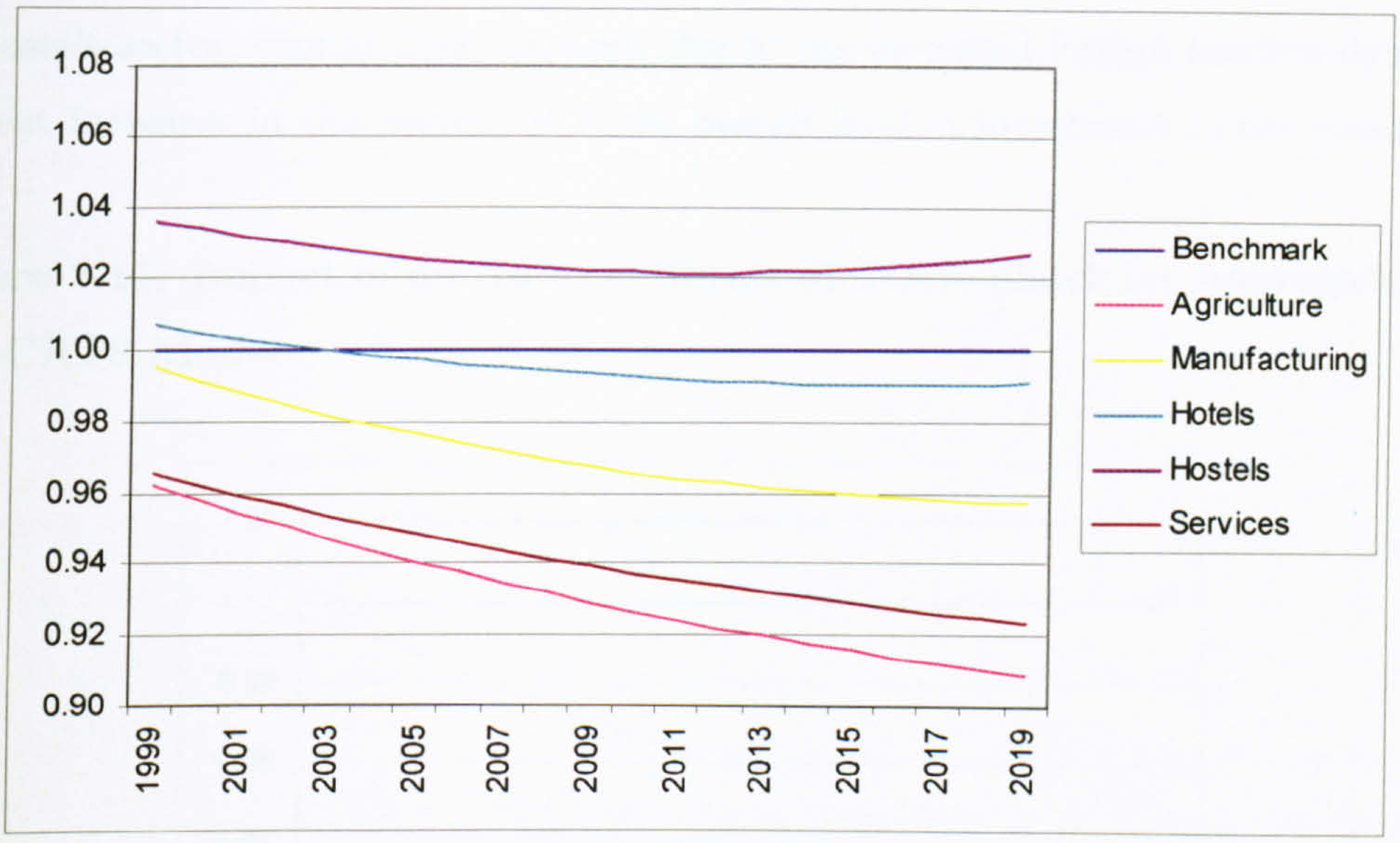


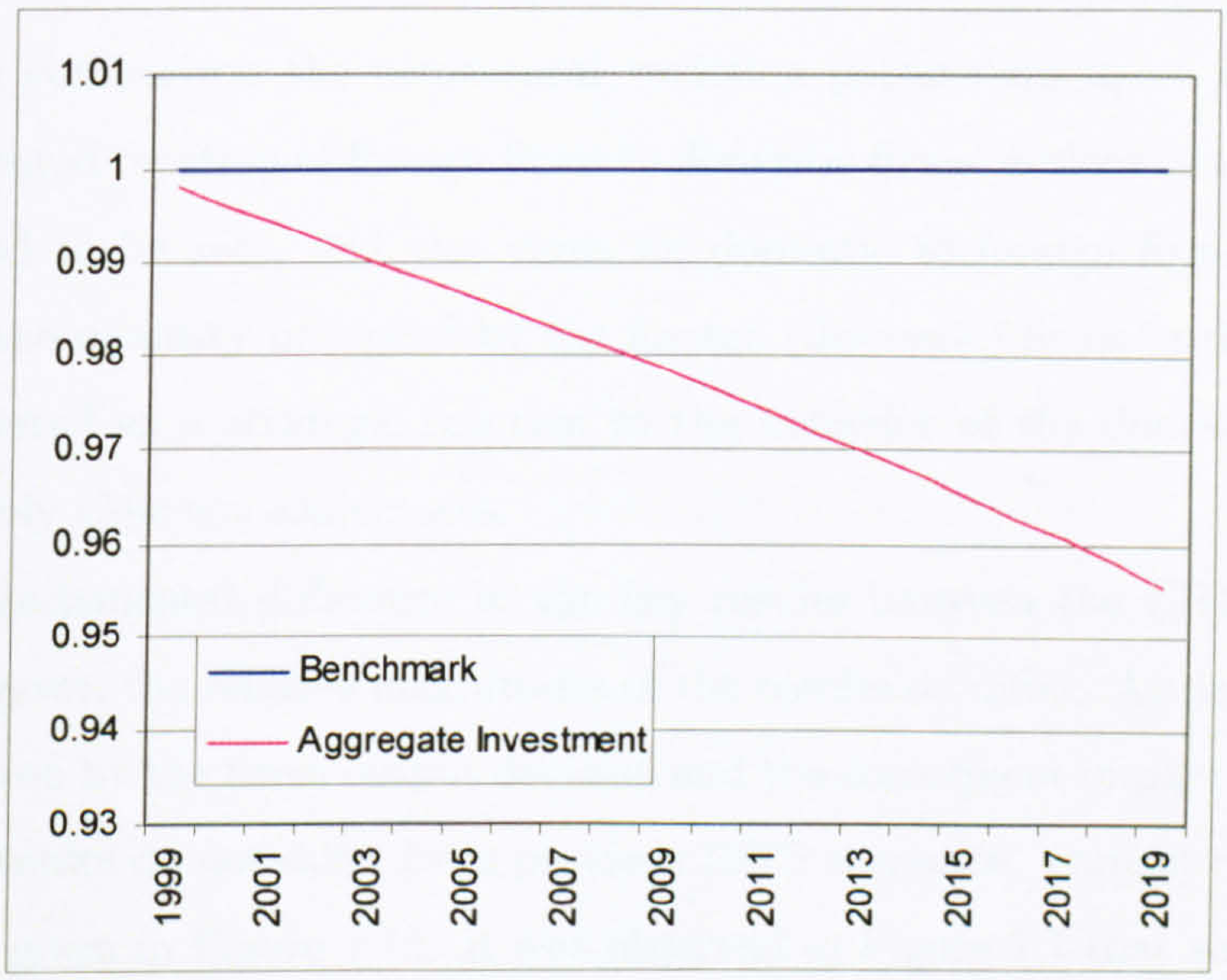
Figure 7.10: Impact of an Adverse Terms of Trade Shock on the Quantity of Capital in Value Added – CRTS Model



Comparing Figures 7.9 and 7.10 it can be seen that there is a change in the net use of factor resources following the adverse terms of trade shock. There is a strong trend for the substitution of capital for labour inputs. The explanation for this is as follows. As economy-wide output falls, the net returns to the factors of production will fall also. Household income is determined both by income from labour and income from capital (returns to savings) and Figure 7.5 shows a downward trend. Figure 7.9 shows a predominant trend for labour income rising as a share of value added. This implies that household earnings from non-labour sources must be declining, such an outcome is consistent with Figure 7.10. However, what triggers the capital labour substitution effect? As household incomes fall both consumption and savings will fall. The amount of household consumption is determined via the LES minimum requirements as explained in Chapter 4. The nature of the minimum requirement determines that when household income falls savings will decline at a more rapid rate than consumption. Savings are the primary source of new investment in the CGE model, lower levels of saving means that sources of investment are more scarce and that drives up the cost of capital relative to labour. The scarcity and higher price of capital inputs relative to labour inputs means that labour becomes cheaper relative to capital and more of it is used in the production process.

The decline in investment associated with the fall in savings is shown in Figure 7.11. At the end of the time horizon investment has fallen by nearly 4.5% below the benchmark level. This is not to say that investment does not increase in some expanding sectors. For example, in the hostels sector, capital usage expands due to the increased foreign tourism demand and investment increases in this sector. It is the overall level of investment in the economy that declines.

Figure 7.11: Impact of an Adverse Terms of Trade Shock on Aggregate Investment - CRTS Model



This analysis has attempted to highlight the areas in which an adverse terms of trade shock will have the most impact on the economy. The most important result from this section is the contradiction of the Devarajan, de Melo and Robinson (1990) 1-2-3 model which states that when $\phi_i > 1$ the *substitution effect* will dominate the *income effect* and the economy will reduce its exports and its imports and produce more of the domestic good in response to an adverse terms of trade shock. However, the 1-2-3 model is only the "bare bones" of a CGE model and does not include intermediates. The Canaries CGE model has shown that the predictions of the 1-2-3 model may not be correct when an economy has a high imported intermediates content and few resources of its own.

So far the analysis has been undertaken using a model which assumes Constant Returns to

Scale (CRTS). The next section repeats the analysis but with a model that assumes Increasing Returns to Scale (IRTS) and imperfect competition. The specification of this model is the same as that derived for the Spanish model in Chapter 4. Again for convenience this model is referred to as the IRTS model.

7.4.3 Results from the IRTS Model

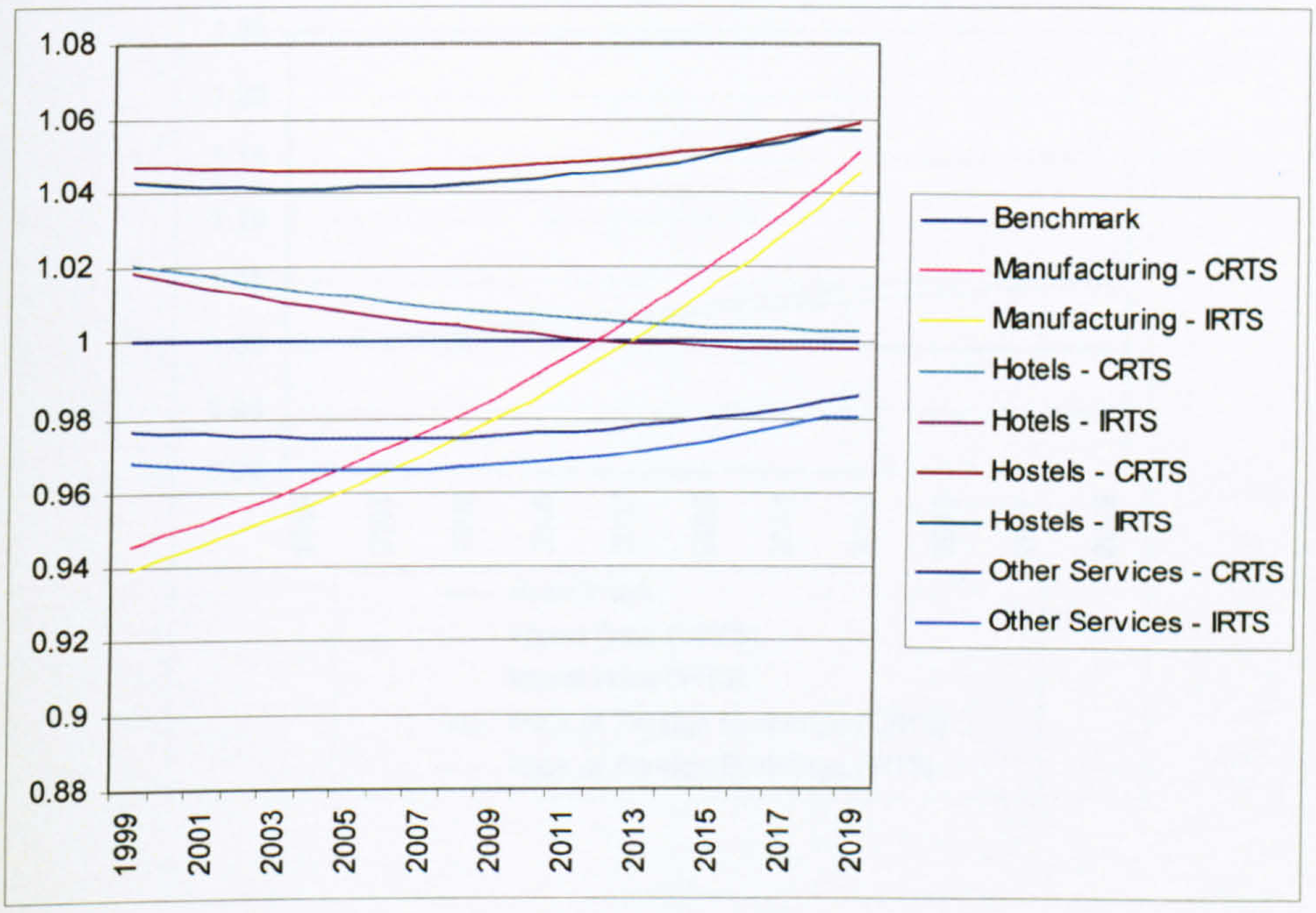
The IRTS model differs primarily from the CRTS model in that it incorporates additional nuances relating to the behaviour of foreign and domestic firms with regard to their output decision. In this comparison the conjectural variation parameters $\mu_i = \mu_i^M = 0$, thus the calibrated conjectured reaction of foreign firms to domestic firms' actions in the domestic firms' market is assumed to be zero, and vice versa for domestic to foreign firms; i.e. there is no change in either the quantity produced by the foreign (domestic) firms in the model that can be directly attributed as a strategic reaction to the behavior of the domestic (foreign) firm. These are effectively Cournot conjectures.

There is no fundamental difference in the key results between the CRTS model and the IRTS model. However, the relative magnitudes of the results do differ. Again the differences in the results are driven by the firms output decision and the consequent impact on relative prices, in this sense the results do not differ from previous IRTS scenarios. Output results for selected model sectors are given in Figure 7.12. It was observed in Figure 7.7 that sectors with a large proportion of foreign tourism consumption experience a net output gain following the terms of trade shock. In the IRTS model, as output in these sectors expands above benchmark levels, fixed costs as a share of output decline and mark-ups rise. This means that the firms perceived elasticity of demand will rise and it will restrict output so that it can charge a higher price for its products. This behaviour is apparent in both the hotel and hostel sectors and the level of output can be seen to be lower in the IRTS model. Differences between CRTS and IRTS output are approximately 0.3% of the change in output in both sectors. The differences in the observed level of output are similar as calibrated mark-ups and conjectures are of a similar order in both sectors.

The level of output declines in the IRTS model for the same underlying reasons as the CRTS model. The income effect has dominated the substitution effect, so aggregate demand has fallen. However, as in other versions of the IRTS model used in this thesis, when output contracts in an IRTS sector it will contract by more than its CRTS counterpart.

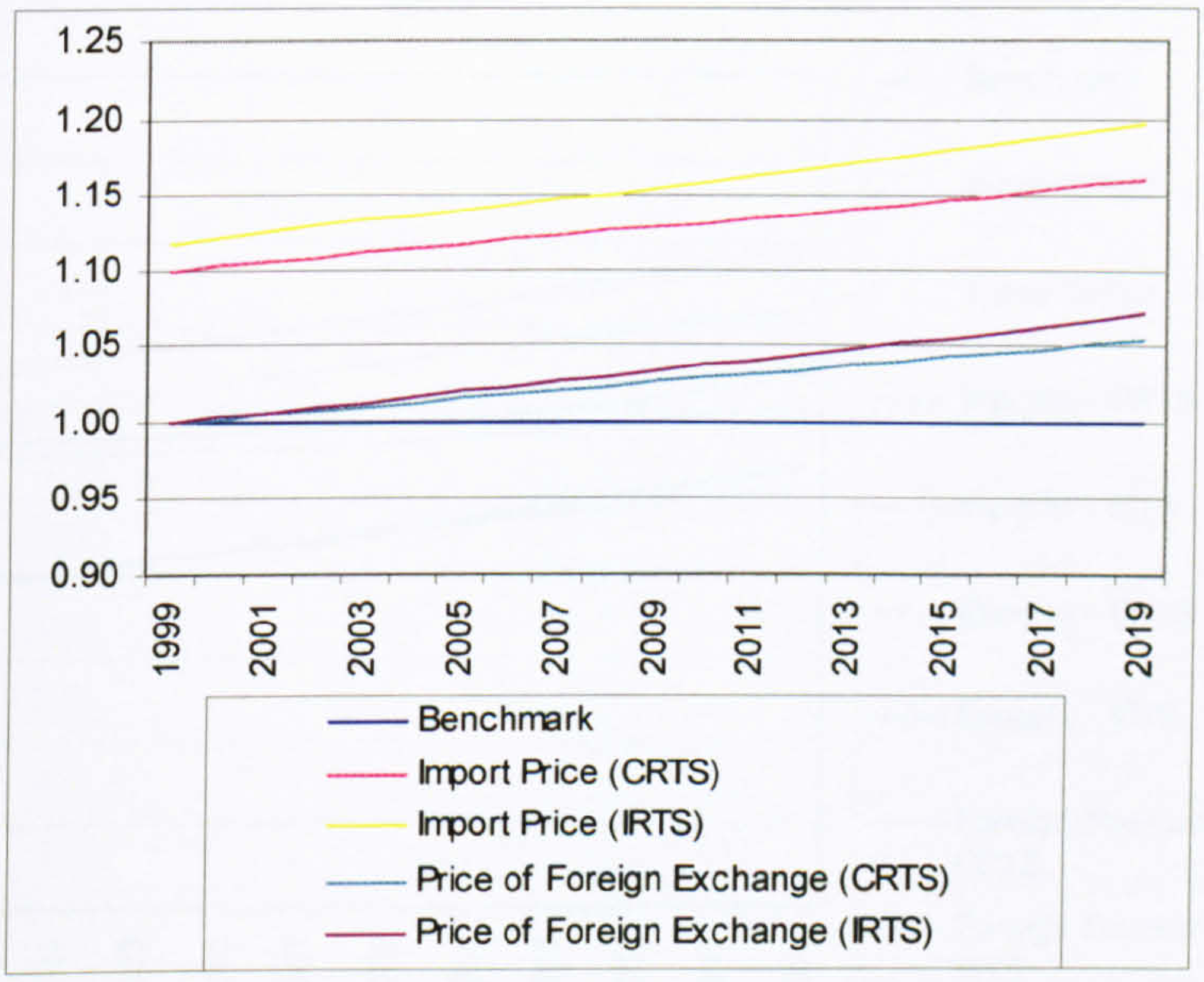
The reason for this is that when output falls in IRTS sectors fixed costs as a proportion of output rise and mark-ups decline. In an attempt to sustain mark-ups firms will restrict output still further in order to drive up prices. This behavioural effect can be observed in the manufacturing and services sectors in Figure 7.13 where output in the IRTS model falls by more than the CRTS model.

Figure 7.12: Impact of an Adverse Terms of Trade Shock on Sectoral Output: IRTS Model



As domestic prices have risen by more in the IRTS case, it would be expected that the real exchange rate as measured by the price of foreign goods relative to domestic goods has depreciated by less in the IRTS scenario. However, this is not the case, the terms of trade shock is amplified in the IRTS case. This is shown in Figure 7.13. Both the import price and the price of foreign exchange increase at a greater rate in the IRTS case. Again this result is driven by the firms output decision, but this time of foreign firms. As foreign firms are able to charge higher prices for their products, they will raise their mark-ups in conjunction with their perceived elasticity of demand falling. Table A7.2 shows that calibrated mark-ups are higher in overseas markets in the Canaries case. Consequently foreign firms perceive that they have more market power than domestic firms. The adverse terms of trade shock means that demand for imports will fall. As the demand for imports falls foreign firms mark-ups fall and they restrict output so that they can charge a higher price. This effect cancels out the higher domestic prices in the IRTS model that have been previously been noted and means that the real exchange rate depreciates by more in the IRTS model.

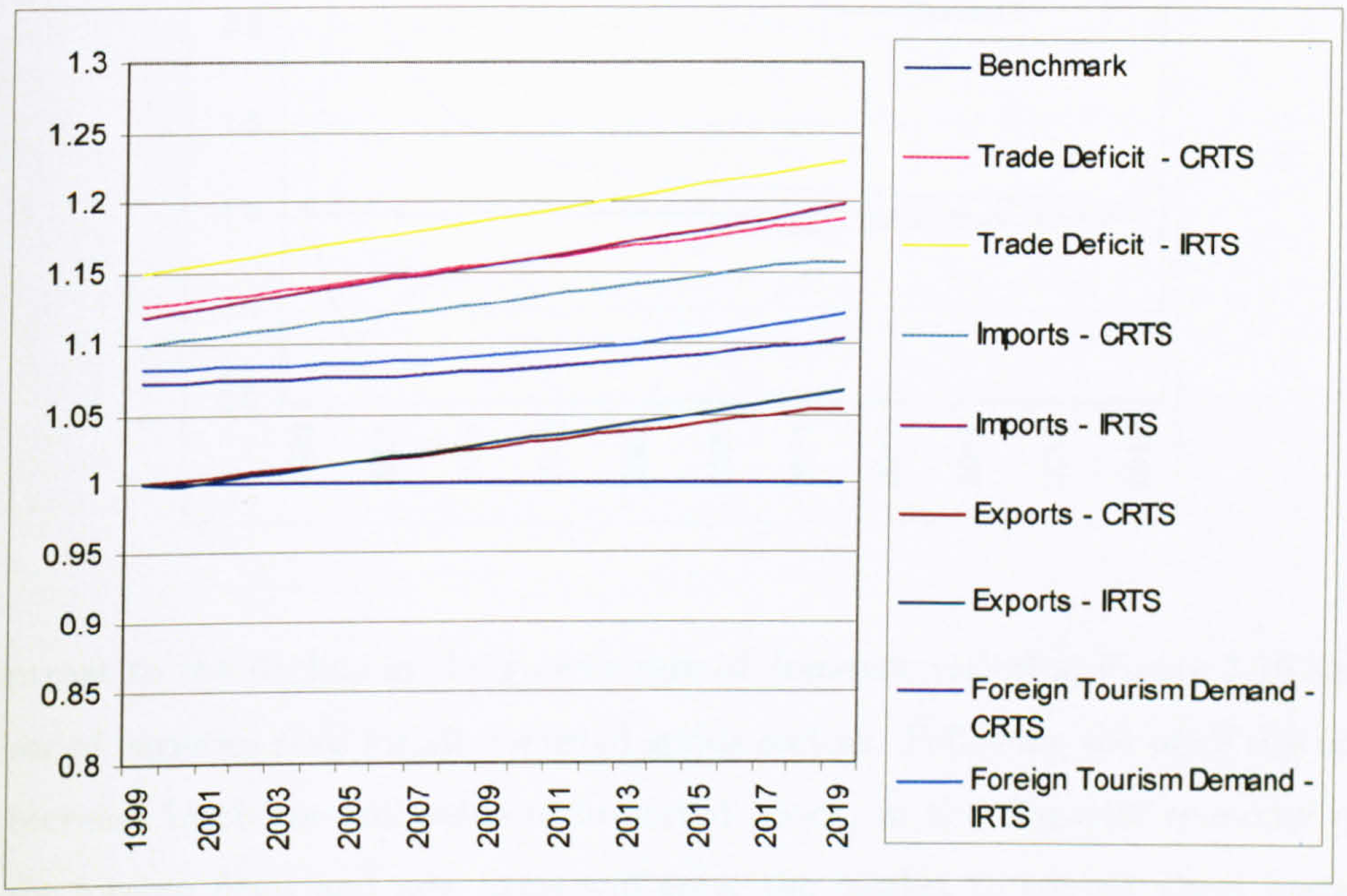
Figure 7.13: Impact of an Adverse Terms of Trade Shock on the Import Price-IRTS Model



The fact that there is a larger depreciation in the real exchange rate traces through to other results in the model. The strength of the rise in the import price means that there is a re-ordering of the results between the CRTS and IRTS models. For example, it can be observed in Figure 7.14 that the increases in foreign tourism and exports are larger in the IRTS model when the depreciation in the real exchange rate is larger although it should be remembered that the restriction of output by domestic firms in the IRTS framework will dampen these effects. The higher level of foreign tourism expenditure that is be associated with the larger exchange rate depreciation does not translate into increased output in the tourism characteristic sectors in the IRTS model relative to the CRTS model. The behaviour of firms in the IRTS model and the increased magnitude of the income effect mean that there is a greater decline in demand from domestic tourists and non-tourism consumers. So despite the increased level of foreign tourism demand, output in tourism characteristic sectors in the IRTS model is still lower.

Figure 7.14 also shows that the trade deficit worsens and imports increase under the IRTS case. This is due to the increased price charged by foreign firms for their products and the weaker substitution effect driven by the domestic firms output decision.

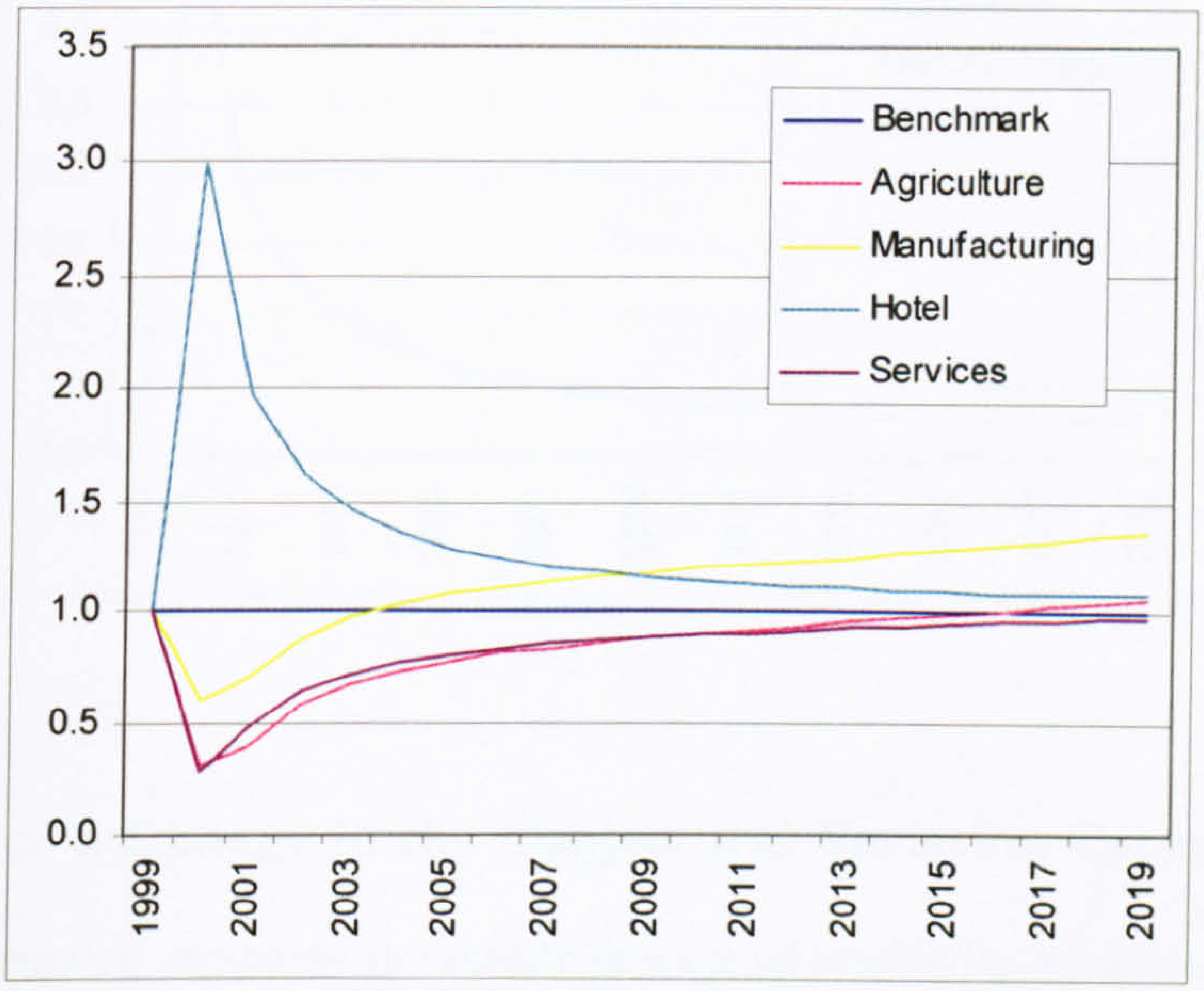
Figure 7.14: Impact of an Adverse Terms of Trade Shock on the Trade Deficit and Foreign Tourism Expenditure - IRTS Model



Due to the inclusion of the Dixit-Stiglitz love of 'variety' function and the endogeneity of the number of firms, the IRTS model also gives additional information on the numbers of domestic and foreign firms in the economy. Figure 7.15 shows that the growth rate in the number of domestic firms can be seen to decrease in all sectors where output contracts following the terms of trade shock. Sharp rises are observed in sectors where there are no import competing goods and tourism consumption is relatively intense. It can be seen that the growth rate of hotel varieties nearly triples above the benchmark level. In the benchmark, firm growth is calibrated to the level of output growth g, so if the growth rate of hotel varieties increases by 300%

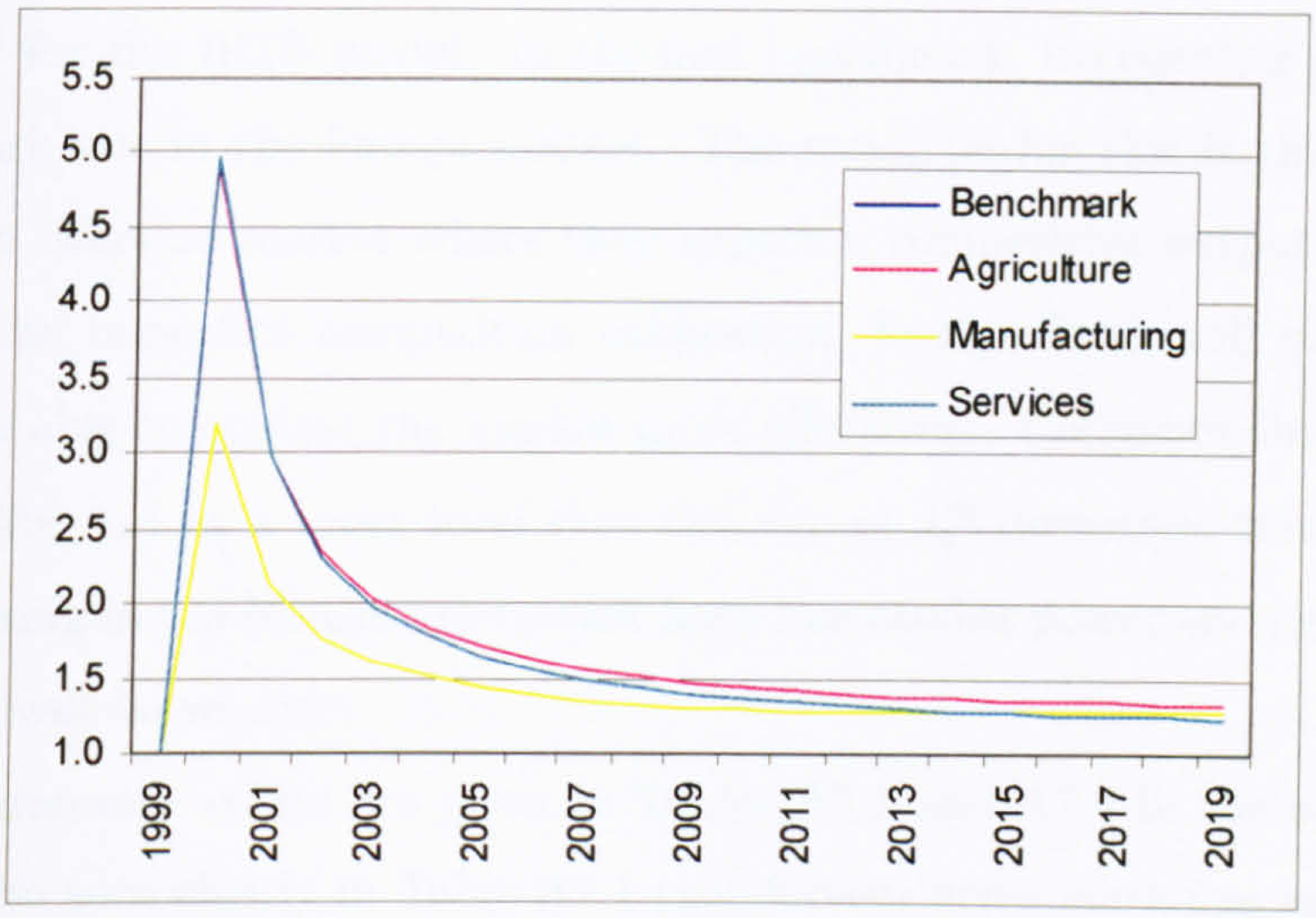
then actual growth will increase to around 6%. Of particular interest is the growth rate in manufacturing firms which rises marginally above benchmark levels following the recovery in output observed in this sector in Figure 7.12.

Figure 7.15: Impact of an Adverse Terms of Trade Shock on the Growth Rate of Domestic Varieties – IRTS Model



In contrast to the decline in the growth rate of domestic varieties, Figure 7.16 shows that the number of varieties rises for all imported goods sectors. Following the price rise of imports and the increase in the overall value of imported goods, in the Canaries economy mark-ups will rise for foreign firms and new firms will enter the market to contest these mark-ups. It can be seen in early periods of the model that increases in the growth rate are substantial, in some sectors nearly five times the benchmark level. This growth in new firms will subside as the excess mark-ups are competed away and will returns to marginally above benchmark levels over the simulation horizon. Growth in new firms remains marginally above the benchmark due to the permanent nature of the import price shock.

Figure 7.16 Impact of an Adverse Terms of Trade Shock on the Growth Rate of Imported Varieties – IRTS Model



7.4.4 Impact of a Change in the Conjectural Variation Parameter

The next set of scenarios compares the results of a set of sensitivity analyses on the parameter μ_i^M. In the previous set of simulations the conjectural reaction of domestic firms to the foreign firms action in the domestic market is assumed to be zero (i.e. Cournot). However, given the nature of the terms of trade shock, it is interesting to investigate possible outcomes whereby foreign firms base their output decisions on an assumption as to how the recipients of their exports might react. Therefore the calibrated conjectured reaction of domestic firms is varied under the assumption that it is constant in all periods of the model which, in turn, implies that it does not lead to a global Nash equilibrium among all firms in the market. It has already been noted that such an approach is not consistent with classical oligopoly theory, however, it can provide insights as to the extent to which the conjectural variation parameter affects the results of the model. In addition to this, given the nature of the Cournot result and the non-convergence to the Nash equilibrium, this specification of the IRTS model can provide insights, given constant conjectures, as to what the upper limit will be with regard to a positive foreign conjectured output reaction in the face of an adverse terms of trade shock. On this basis four different values of μ_i^M are investigated, where $\mu_i^M = 0, 1, 6$ and 10.

As μ_i^M increases in size, foreign firms conjecture that domestic firms will increase their output by a greater amount following a change in their own output. Effectively there is a new benchmark[4] for the IRTS model. In the new benchmark, **increasing** μ_i^M has the effect of **reducing** mark-ups in the foreign market. The rationale for this is that if foreign firms are to contest an overseas market where they expect a competitive output response, in this specification of the imperfect competition calibration, foreign firms will set their mark-ups lower so as to be able to contest the market more effectively. Correspondingly, if benchmark mark-ups are calibrated at a lower level then the size of λ_i^m decreases, this is because those foreign firms existing in the benchmark market have less market power and perceive their rivals firms conjectures will be smaller.

Calibrated parameter values are given in Tables A7.1 and A7.2 in the appendices to this Chapter. It can be seen clearly in Table A7.1 that foreign firms mark-ups are declining in all sectors. Two alternative outcomes are observed with regard to the size and sign of λ_i^m:

1. If $0 < \lambda_i^m < 1$, then firms expect their changes in output to be followed to a lesser extent, implying corresponding changes in rivals prices are assumed to be smaller. Under this scenario, if firm s decides to increase its output it conjectures that rival firm t will increase its output but by a smaller amount. This is effect is observed in the agriculture, manufacturing and 'other services' sectors

2. If $-1 < \lambda_i^m < 0$, firms expect that rival firms will respond to a change in their output in the opposite fashion and by a lesser amount. When λ_i^m is negative this represents an uncompetitive scenario, following an increase in the output of firm s, firm s will conjecture that its rival firm t will reduce its output. Consequently, firm s's conjectures regarding the reduction in output of firm t are reduced. This is the case observed particularly in the transport sectors (air, land and sea). In Table A7.2 when $-1 < \lambda_i^m < 0$ and μ_i^M is increasing then λ_i^m tends to 0 because rival firm s perceives its rivals market power is decreasing.

Results for the import price in the alternative scenarios are presented in Figure 7.17. While the general direction of the results is the same, it can be seen that as compared to the scenario

[4] Recall that calibrated conjectures are independent of the counterfactual.

where $\mu_i^M = 0$ (CRREAC 0[5] in Figure 7.17) increasing the value of μ_i^M reduces the impact of the terms of trade shock. This is intuitive given the discussion in the previous paragraph and is driven by the lower mark-ups and hence lower perceived elasticities of demand which are observed in conjunction with falling values of μ_i^M. Figure 7.17 does show that the impact of the change in the conjectural variation parameter in this instance is marginal. It does appear that the the model is more sensitive to a change in the sign of μ_i^M from 0 to $+ve$ as opposed to a change in its size as the magnitude of the deviation of the import price with successive increases in μ_i^M is hardly noticeable in this diagram.

Figure 7.17: Impact of an Adverse Terms of Trade Shock on the Import Price – IRTS model, Conjectural Variation Comparison

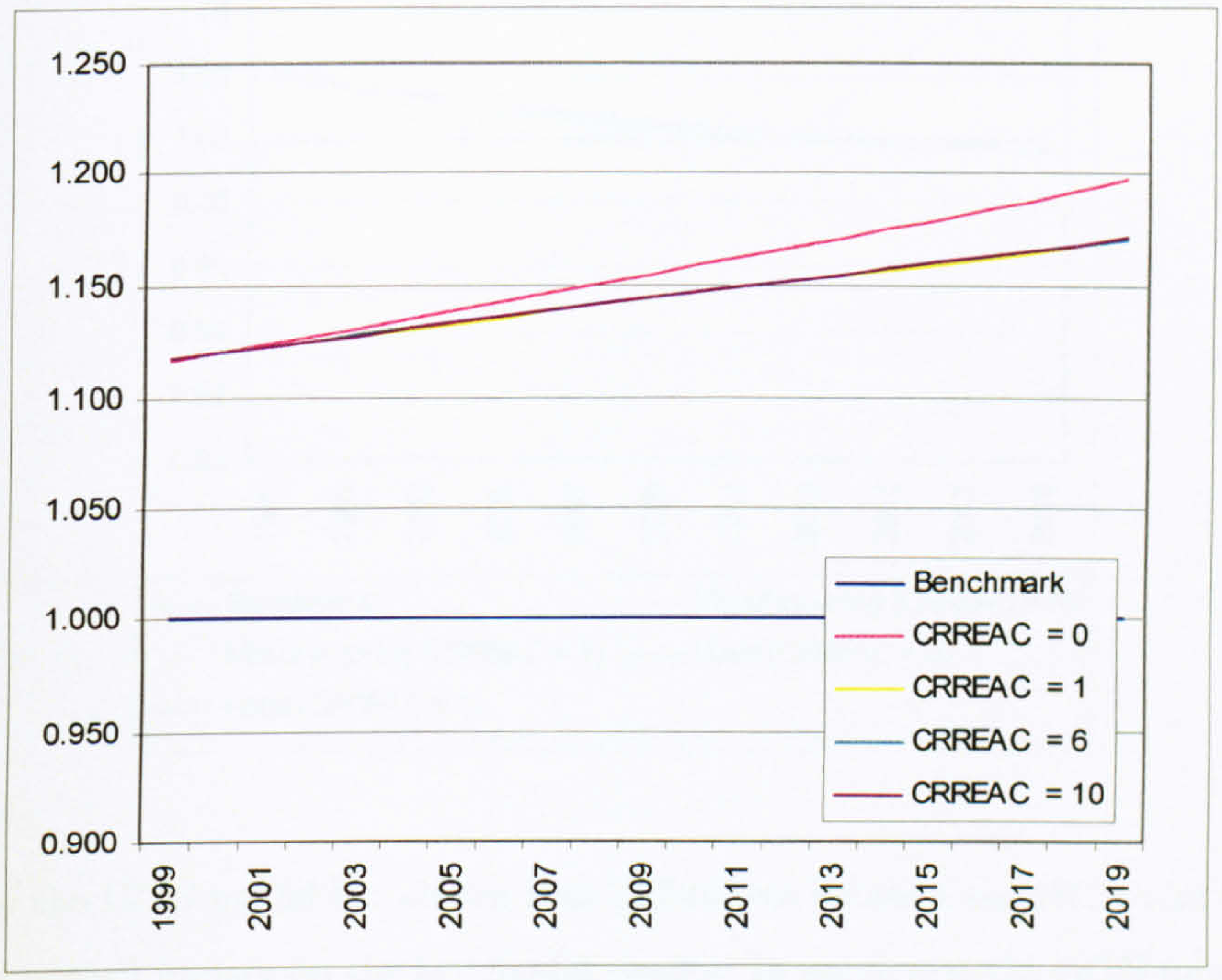
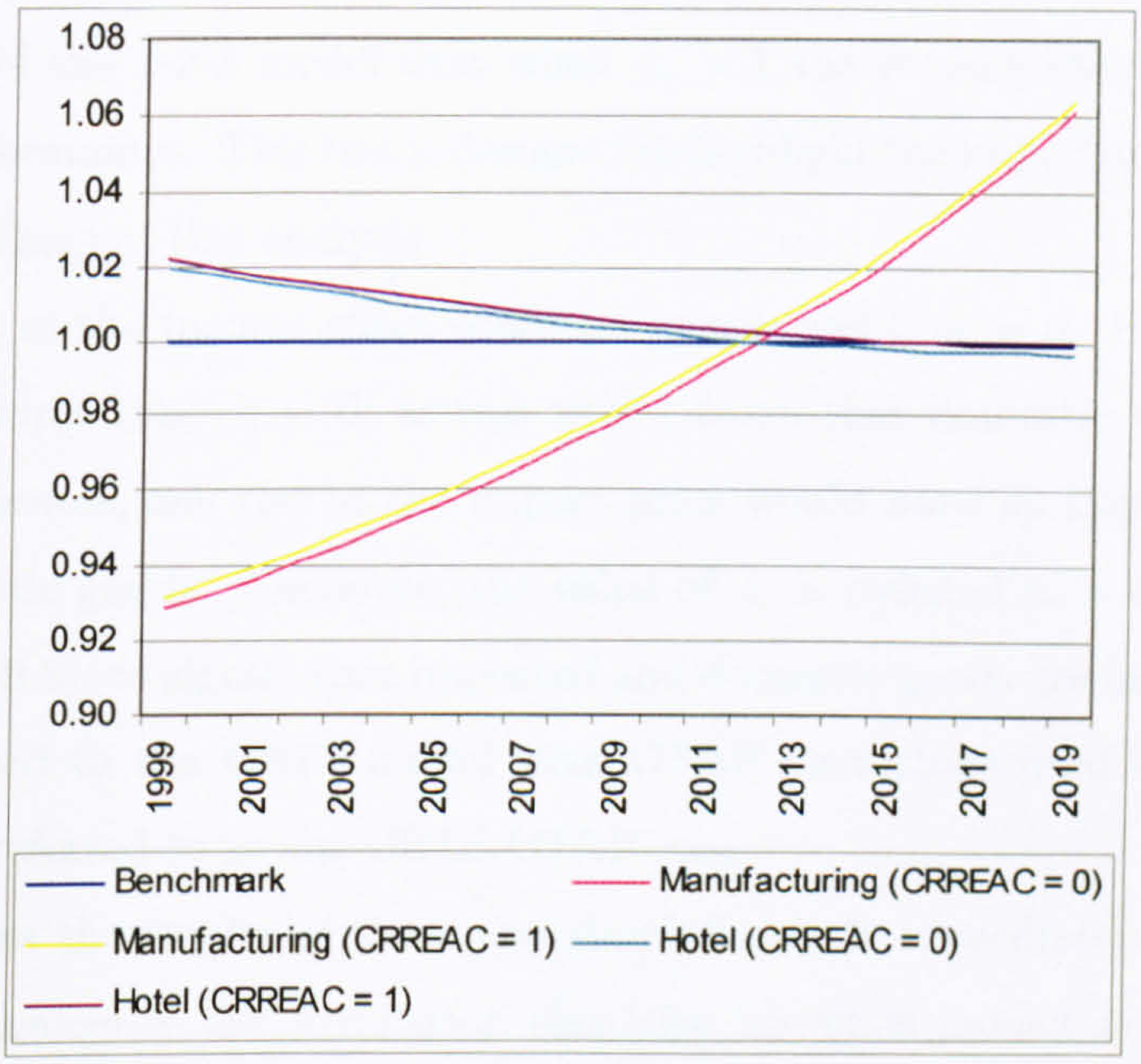


Figure 7.18 shows the impact of changing μ_i^M on sectoral output. It can be seen that when $\mu_i^M = 1$, output is higher than when $\mu_i^M = 0$. It is known that the *income effect* dominates the *substitution effect* in the Canaries CGE model when the import price shock is imposed. The lower import price observed when the parameter value of $\mu_i^M = 1$ means that there is a smaller

[5]CRREAC is the parameter name for the conjectural variations parameter in the GAMS programming language used in this thesis.

depreciation in the real exchange rate. This leads to a smaller decline in household income in this model which translates into a higher output. In the hotel sector, the increased level of household income compensates for the marginally lower levels of foreign tourism consumption due to the lower appreciation in the real exchange rate. Only results for $\mu_i^M = 1$ are shown in Figure 7.18, but increased values of μ_i^M lead to lower levels of output, however, due to the marginal differences in the import price, the differences in output are also only marginal.

Figure 7.18: Impact of an Adverse Terms of Trade Shock on Sectoral Output – IRTS Model, Conjectural Variation Comparison



The use of the IRTS model has shown that differences between the IRTS and CRTS model again have no overall impact on the key model results. In particular the IRTS model still highlights the dominance of the income effect over the substitution effect. However, output levels are consistently lower and prices are consistently higher in the IRTS model which drives differences in the magnitudes of the IRTS results. Changes in the conjectural variation parameter amplify these results still further, although changes are marginal in this instance.

The next sections report on a range of sensitivity analysis with the intention of checking the robustness of the results described in the previous subsections. The parameters that are investigated are the Armington elasticity the nature of the terms of trade shock. These sensitivity tests are undertaken using the CRTS model so that impacts of parameter changes can be distinguished from the additional intuition that the IRTS model offers.

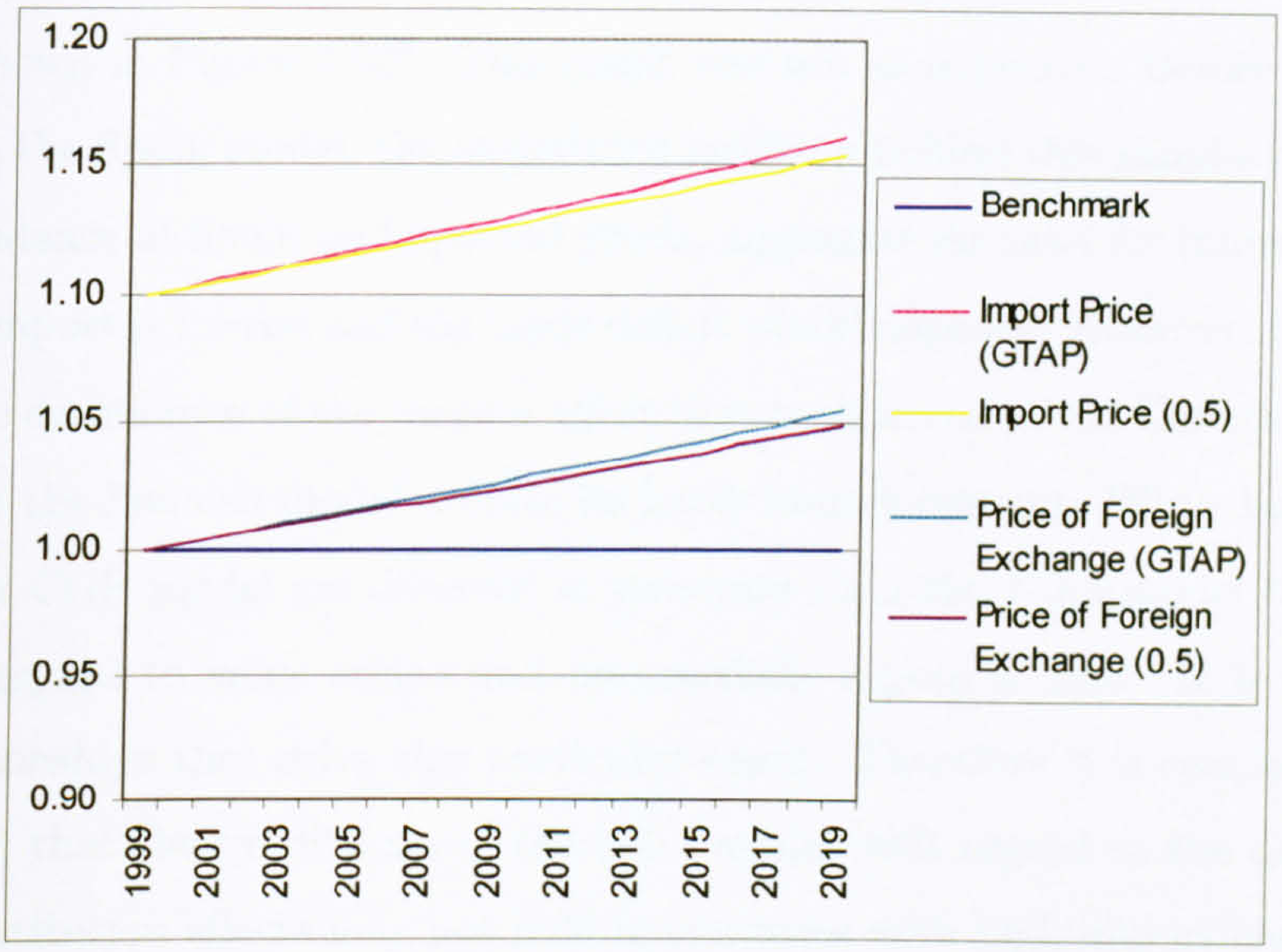
7.4.5 Sensitivity Analysis - Armington Elasticity

The importance of the Armington elasticity has already been discussed. Sensitivity analysis is undertaken to compare the results generated in section 7.4.2 which use the GTAP elasticities (as discussed in chapter 4 section 4.5) to the same terms of trade shock scenario where the Armington elasticity is set $\phi_i < 1$, for all sectors. It has been shown already that contrary to the predictions of the 1-2-3 model that when $\phi_i > 1$ the *income effect*, as opposed to the *substitution effect* dominates. This test is designed to highlight the importance of the Armington elasticity in the findings of this analysis.

The upper limit of the income effect could be established if $\phi_i = 0$. However, it would be unreasonable to assume that $\phi_i = 0$, as this would mean that domestic and imported goods are imperfect substitutes, any rise in the import price would have no impact on the quantity demanded of domestic goods. Therefore, the value of ϕ_i is reduced to a value below 1 for all sectors (in this case 0.5), to signify that imported and domestic goods are imperfect substitutes. Results are compared to the CRTS model with GTAP elasticities used in section 7.4.2, for convenience this is referred to as the CRTS-GTAP case.

Figure 7.19 shows the results of these two simulations. It immediately becomes apparent that a substantial change in the Armington elasticity has little impact on the model results. Results are consistent with the theory described in section 7.4.2 in that a lower value of the Armington elasticity leads to a lower change in the import price, but this effect can be described as marginal in the Canaries case.

Figure 7.19: Impact of an Adverse Terms of Trade Shock on the Import Price and the Price of Foreign Exchange – CRTS Model, Sensitivity Analysis



The finding that the *income effect* dominates the *substitution effect* when $\phi_i > 1$ in the Canaries model and its relative insensitivity to the Armington elasticity are counterinutitive as compared to other CGE analyses. While it has been explained that the result is caused by the reliance of the Canaries on imports and its inability to supply substitutes, the result could also be attributed to the structure of the model. In order to gain further insight as to the nature of this change, the results are compared with the CRTS CGE model of Spain used in chapter 5. The Spanish CGE model is adjusted and set to the same structural form as the Canaries model, so that the only fundamental difference is the dataset, and the same simulation is run so that results can be compared. These are shown in Figure 7.20 below.

Comparison of the two models indicates that by changing the Armington elasticity in the Spain model, a much stronger substitution effect occurs. This can be seen in Figure 7.20. The import price follows the same path as the Canaries whereby the real exchange rate rises and the *compounding effect* described earlier depreciates the value of domestic currency in subsequent periods. However, the effect is not as strong as in the Canary Islands as the proportion of imports in the Spanish economy is smaller than the Canaries economy. Nonetheless, the same effect as the Canaries can be seen to occur whereby the quantity of import demand falls but by a lesser amount than the rise in import prices. Thus the overall amount of imports in the economy increases and the trade deficit worsens, although by a lower amount than the Canary Isles. This is shown in Figure 7.20[6]. This result was not as expected. Before undertaking the simulation with the Spain model, the underlying intuition behind this simulation is that due to the lower dependence of Spain on imported goods, aggregate demand for imports would fall by more than the import price rise and the trade deficit would improve. However, this is clearly not the case and the dominance of the *income effect* that is observed in the Canaries CGE model is also observed in the Spanish model despite its lower import content. While both the Canaries and the Spanish CGE model are different in structure than the 1-2-3 model the same nesting structure with regard to value added and intermediate inputs is used. It is these particular functional relationships that drive this particular result. Therefore it is concluded that this is a data issue and that the predictions of the 1-2-3 model with regard to the dominance of the income and substitution effects may not hold in countries with high import contents.

[6]Figure 7.21 must be treated with some caution. It shows that the relative deviation from the benchmark caused by the terms of trade shock is smaller in the Spanish model. The worsening of the trade deficit in the Spain model is proportionately smaller in the Spain model; while the Spanish trade deficit is larger it represents a smaller proportion of GDP.

Figure 7.20: Impact of an Adverse Terms of Trade Shock on the Import Price - CRTS model, Spain and Canaries Comparison

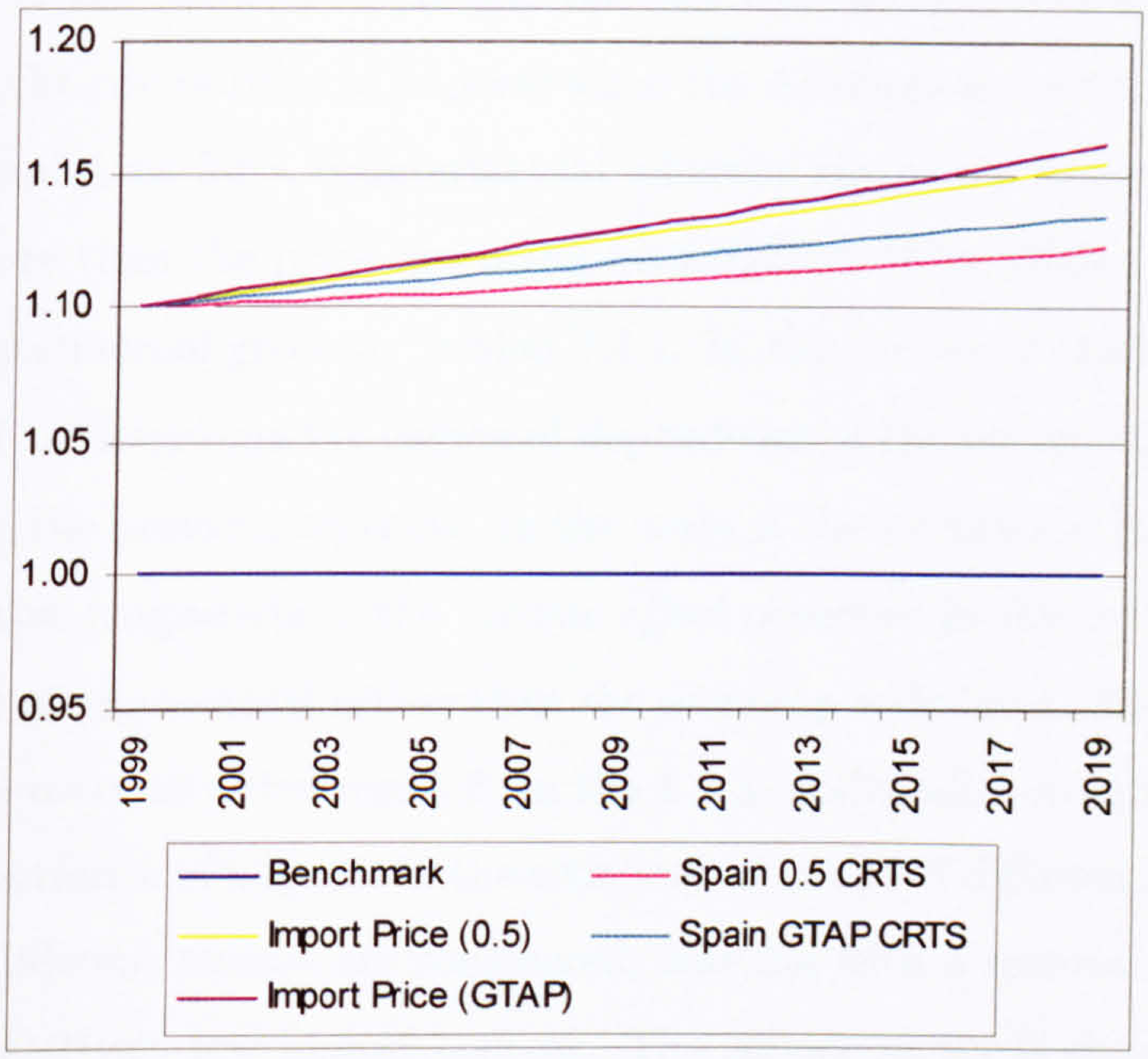
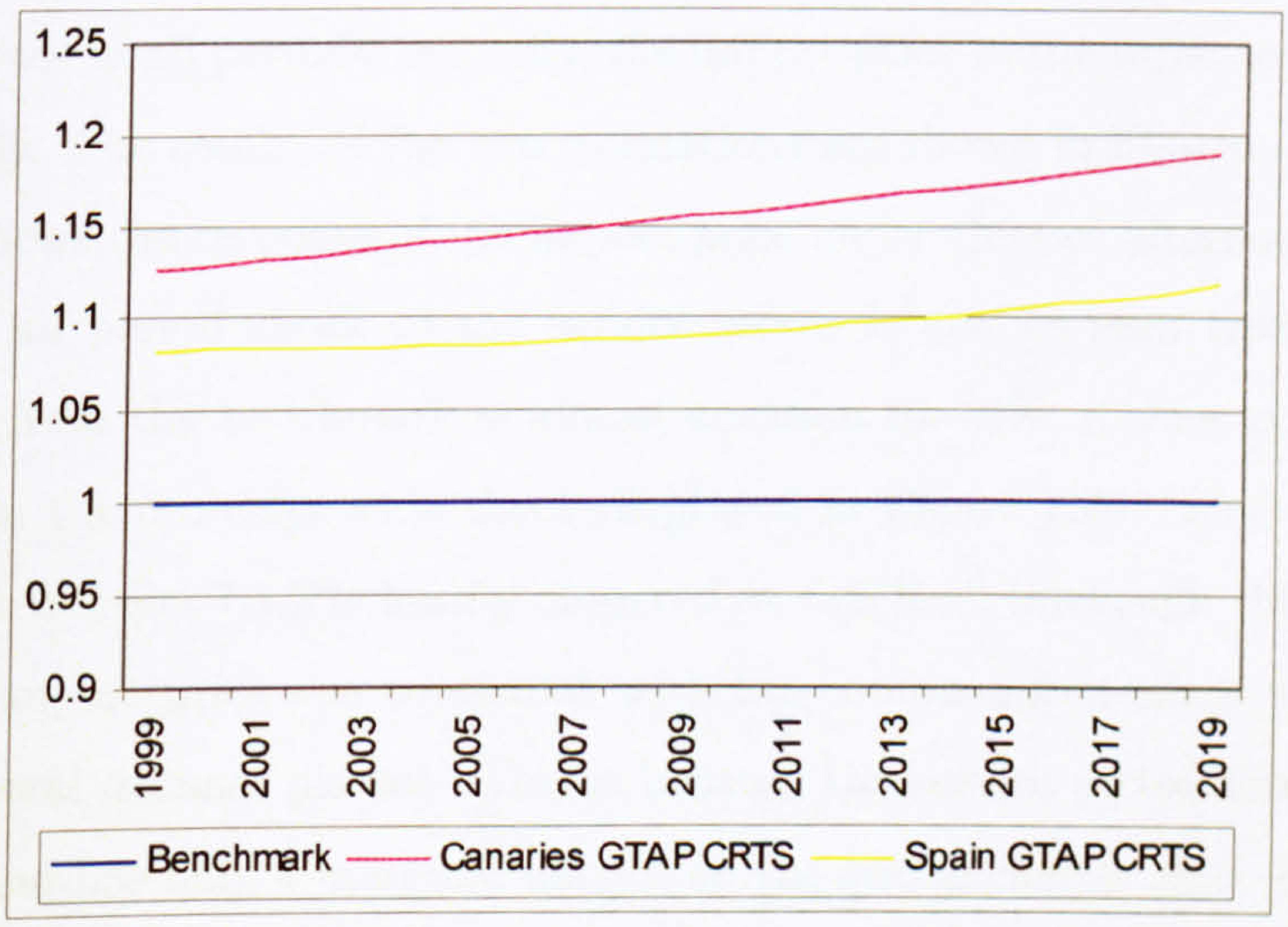


Figure 7.21: Impact of an Adverse Terms of Trade Shock on the Trade Deficit - CRTS model, Spain and Canaries Comparison



7.4.6 Sensitivity Analysis - Choice of Counterfactual

Due to the nature of the Spanish result and the fact that the demand for imports falls by a lower amount than the rise in price of imports when the Armington elasticities are greater than 1, the necessary conditions for a counterfactual whereby there is a reverse effect i.e. import demand falls by more than the price rise being investigated. This relates to the discussion of the size of the counterfactual given in Section 7.4.1. In this section a range of simulations are undertaken in order to determine the degree of dependence of the nature and orientation of the results, discussed in the previous sections, on the scale of the simulation imposed.

Due to the relative magnitude of the *income effect* observed in the earlier simulations, the investigation begins at the sectoral rather than the economy-wide level. The reason is that it is more likely that the more intuitive result from the 1-2-3 model will reveal itself at the sectoral level due to the importance of imports in the economy. A range of different import price shocks of varying sizes in different sectors are considered, starting with a sectoral import price shock in a sector with a relatively low import content. The service sector is chosen for this analysis because only 7.8% of its intermediate inputs are imported as compared to larger shares in other sectors (see Table A6.2). In addition to this only 2.7%[7] of its final demand is imported.

Initially two simulations are undertaken: firstly, the adverse terms of trade shock is imposed on the service sector in all periods; secondly, the import price in the same sector is 'shocked' in the year 2000 only. The results of the two simulations are shown in Figures 7.23 and 7.24.

Figure 7.22 shows the response of the import price under the two alternative terms of trade shocks. For the all period shock to the service sector it can be seen that the deviation of the import price from the benchmark is almost constant at 10%; it does not rise continually as was the case in the economy wide shock displayed in Figure 7.24. Thus the *compounding effect* described in Section 7.4.2 is hardly observed at this level (although there is a very small deviation in the import price rise consistent with the compounding effect when the data are scrutinised at several decimal places). This is because the service sector terms of trade shock is much smaller and has only a marginal impact on the real exchange rate. Further, when the import price shock is introduced in the year 2000 only, the deviation from the benchmark is

[7] 7.1% from overseas, and 2.4% from other Spanish regions.

again constant except in the year that the shock occurs. There are no impacts in subsequent years.

Figure 7.22: Impact of Alternative Terms of Trade Shocks on the Import Price

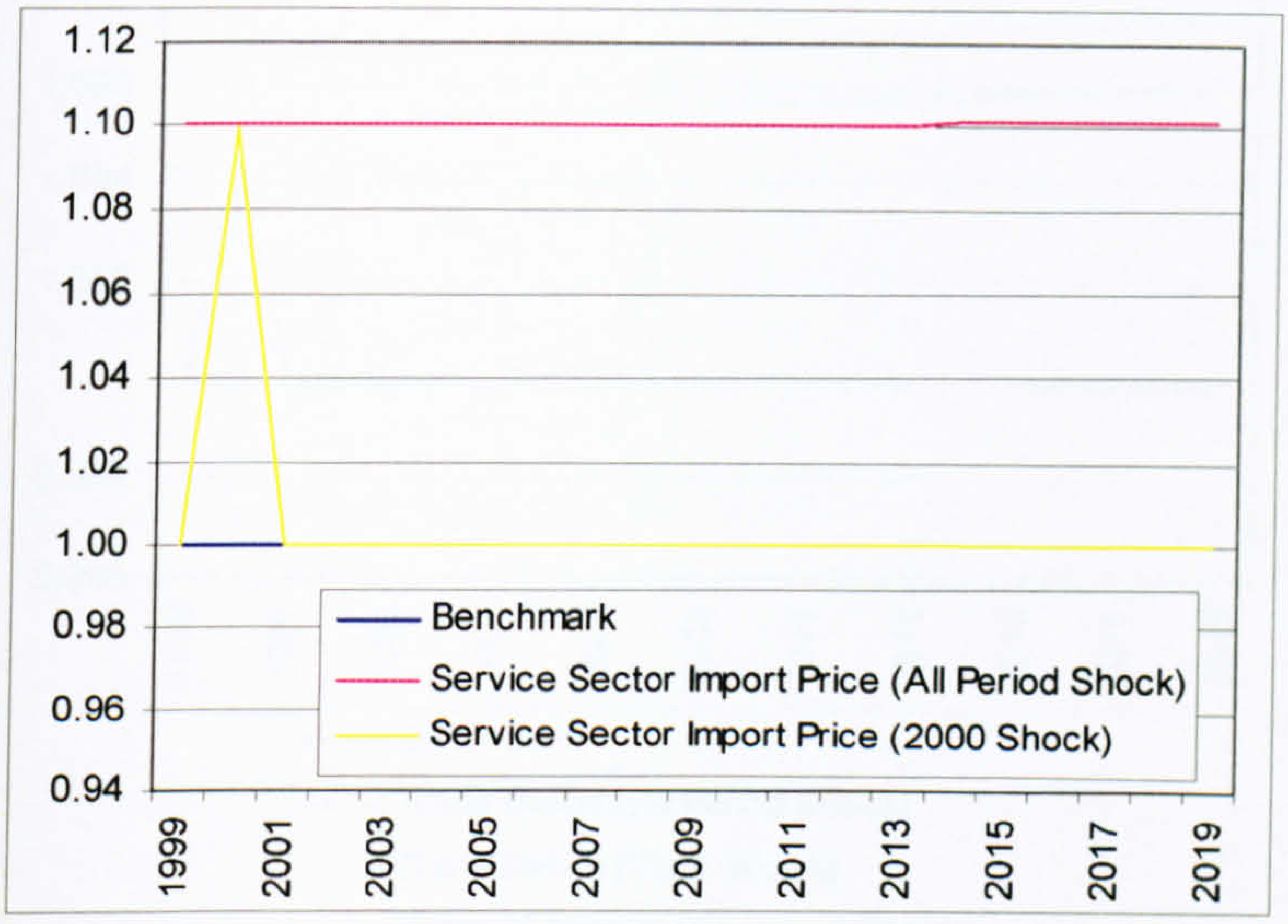
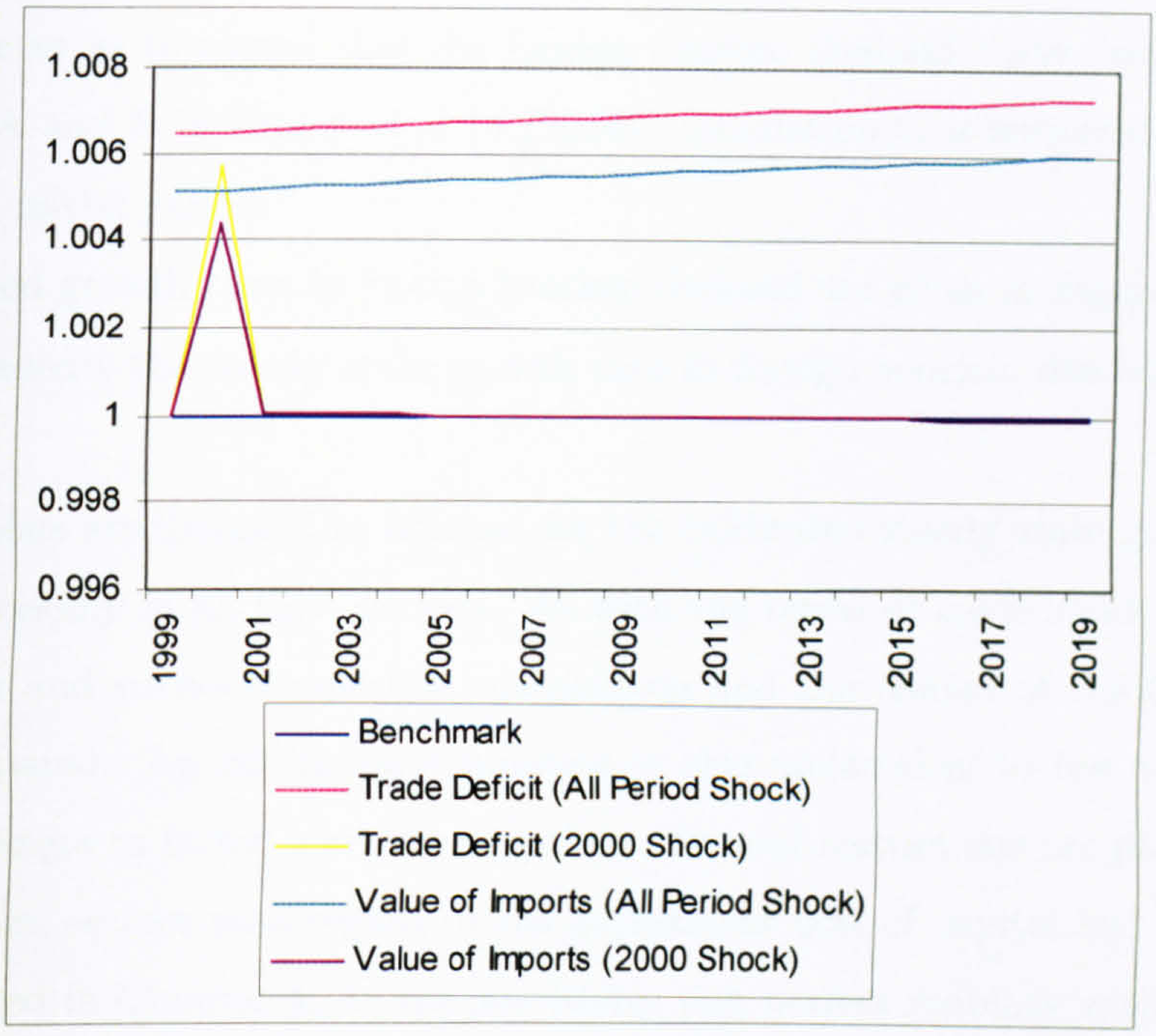


Figure 7.23 illustrates the value of total imports in the economy and the trade deficit. It can be seen that following both the permanent and temporary shock to the service sector, the value of imports in the economy increases, and so the trade deficit worsens. However, as the graph shows, these effects are marginal. Differences also exist between the two scenarios. In the case of the permanent shock, the value of imports and the trade deficit can be seen to be continually rising, if only by very small amounts. This is driven by a very small depreciation in the real exchange rate. In the case where the terms of trade shock is temporary, the *compounding effect* is not observed. The value of imports and the trade deficit return to benchmark levels almost immediately following the terms of trade shock. Neither set of results shows an improving trade deficit, increased exports or increased domestic output. The results of these two simulations illustrate how weak the *substitution effect* is in the Canaries. Even with a small terms of trade shock the *income effect* still dominates, there is no sign of a significant increase in domestic output to counter the increasing cost of imports. A range of alternative simulations on other sectors were undertaken in order to try to identify the 'intuitive result', but it was not observed. Theoretically the model incorporates effects of this nature. However, it is also clear that it is not easily identified given the Canaries dataset.

Figure 7.23: Impact of Alternative Terms of Trade Shocks on the Trade Deficit and Value of Imports - CRTS Model



7.5 Model Results: Tourism Demand Shock

7.5.1 The Tourism Demand Counterfactual

The next set of experiments undertaken with the Canaries model involves exploring the impact of various foreign (inbound) tourism demand shocks on the Canaries economy. Three alternative experiments are undertaken in relation to shifts in foreign tourism demand. For convenience we shall refer to them as Simulations A, B and C:

i) Simulation A: a unanticipated 10% increase in foreign tourism demand in year 1. Foreign tourism demand is then calibrated to grow at 10% above the benchmark level in each year after year 1.

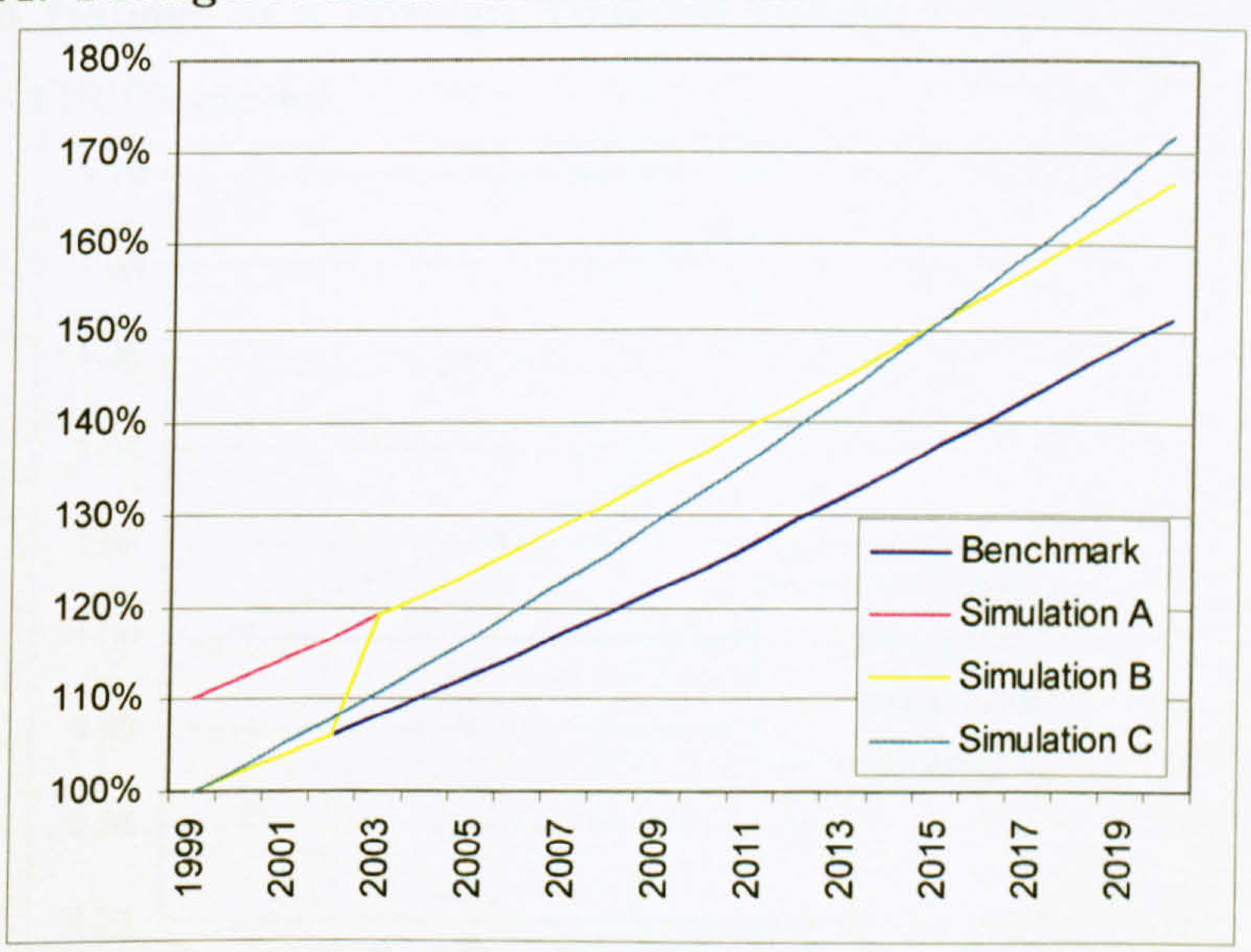
ii) Simulation B: the model is shocked with an anticipated increase in foreign tourism demand in year 5 in order to ensure that the associated foreign tourism demand curve coincides with the foreign tourism demand curve associated with Simulation A, following that tourism demand grows at the same rate as Simulation A thereafter.

iii) Simulation C: a continual anticipated growth rate in tourism demand is assumed above the steady state so as to ensure that the foreign tourism demand curve coincides with those of Simulations A and B in time period 15 (2014). Simulation C is anticipated as there is no deviation in the initial period.

The calibrated growth rates in foreign tourism demand are given in Figure 7.24 below, the benchmark represents the steady state growth rate in foreign tourism demand relative to the base year.

The simulations are designed to account for the calibrated steady state growth rate which occurs in the economy in all time periods. As with the terms of trade shock, simulations are undertaken with and without imperfect competition and the results of the CRTS and IRTS models are compared. An additional simulation is also undertaken to test the sensitivity of the model to changes in factor market restrictions. Several restrictions are placed on resource movement between sectors with regard to the adjustment cost of capital and labour mobility, these are discussed in Chapter 4. In the sensitivity test perfect mobility with regard to both labour and capital are assumed and results are compared to the restricted case.

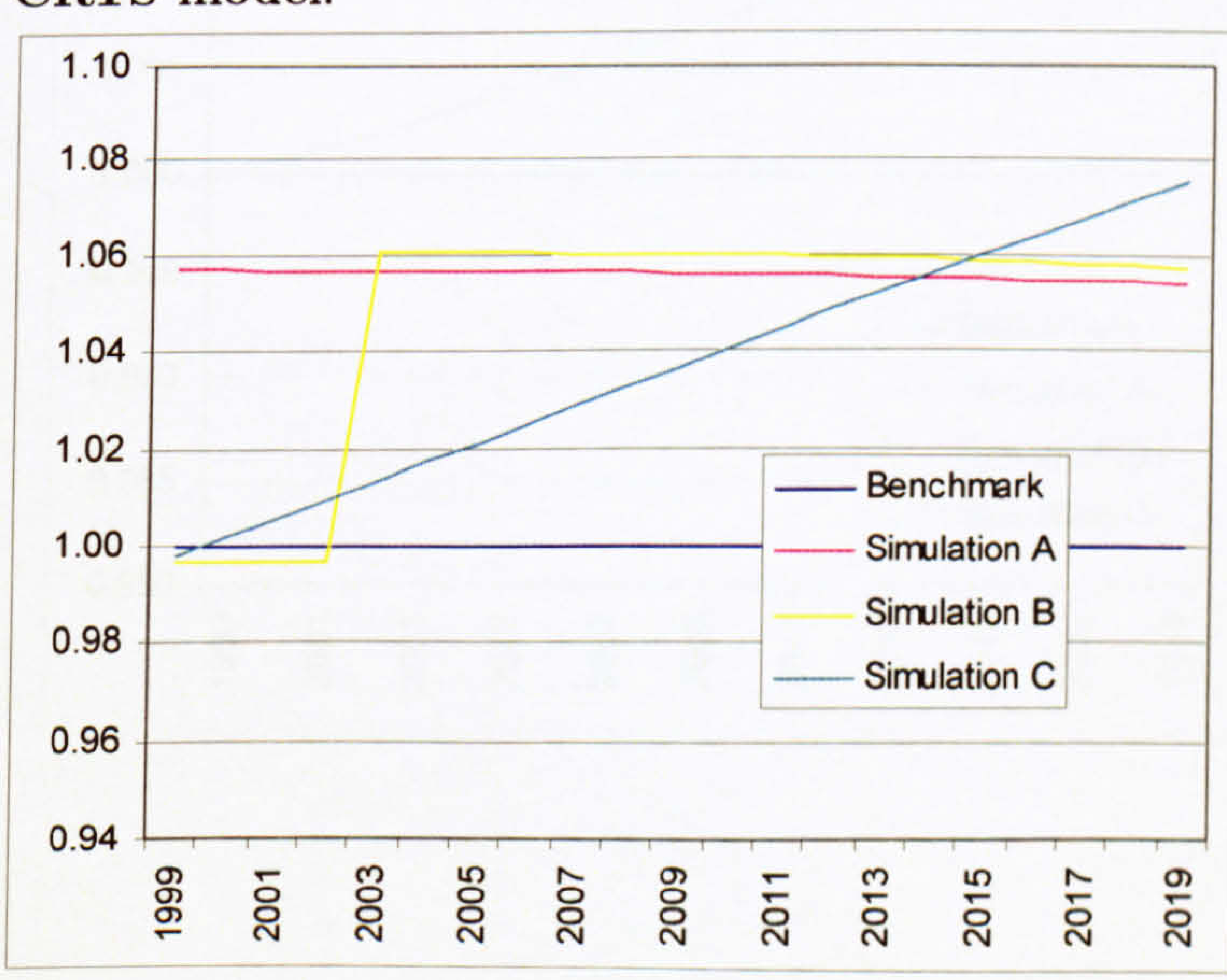
Figure: 7.24: Foreign tourism demand shocks



7.5.2 Results from the CRTS Model

It can be seen by comparing Figures 7.24 and 7.25 that the increase in foreign tourism expenditure mimics the demand shifts imposed by the simulations. In simulations A and B the 10% foreign tourism demand shock leads to an approximate 6% increase in foreign tourism expenditure. While in Simulation C this appreciation is more gradual due to the nature of the shock. It can also be seen that the transmission of the demand shock is imperfect i.e. a 10% rise in foreign tourism demand does not result in a 10% increase in foreign tourism expenditure. Foreign tourism expenditure does not rise by 10% due to the *diffusion effect* as first described in chapter 5. As the demand for holidays in the Canaries rises the price of the products that foreign tourists consume will rise. This leads to an increase in the domestic price level and an appreciation in the real exchange rate. In turn, holiday's in the Canaries become more expensive and the foreign tourism demand shock is diffused. Such results are largely consistent with those for the Spanish model presented in Figure 5.37. However, it can be seen that the diffusion effect is larger in the Canaries model. This is due to the higher intensity of foreign tourism consumption in the Canaries model. This result is also consistent with the findings of the multi-regional model in Chapter 5.

Figure 7.25 Impact of a Foreign Tourism Demand Shock on Foreign Tourism Expenditure – CRTS model.



The appreciation in the real exchange rate attributable to the foreign tourism demand shock is shown in Figure 7.26. Again the movements in the purchasing power of foreign currency are similar to the structure of the equivalent tourism demand shocks. Although it can be seen that in this instance the convergence of the results does not occur in period 2014 in the same way that the demand shocks converge. The differing nature of the shocks affect investment and capacity decisions in the tourism sector which in turn affects the domestic price level. In Simulation A the real exchange rate appreciates by more than Simulation B during periods in which the tourism demand shocks are equivalent. This difference is attributed to the *anticipated* and *unanticipated* nature of the counterfactuals. When the shock is anticipated tourism characteristic firms will invest more as they have more knowledge of future profits associated with the increased foreign tourism expenditure. Consequently tourism capacity is increased and the diffusion effect is smaller when the shock is anticipated.

Figure 7.26: Impact of a Foreign Tourism Demand Shock on the Real Exchange Rate – CRTS model.

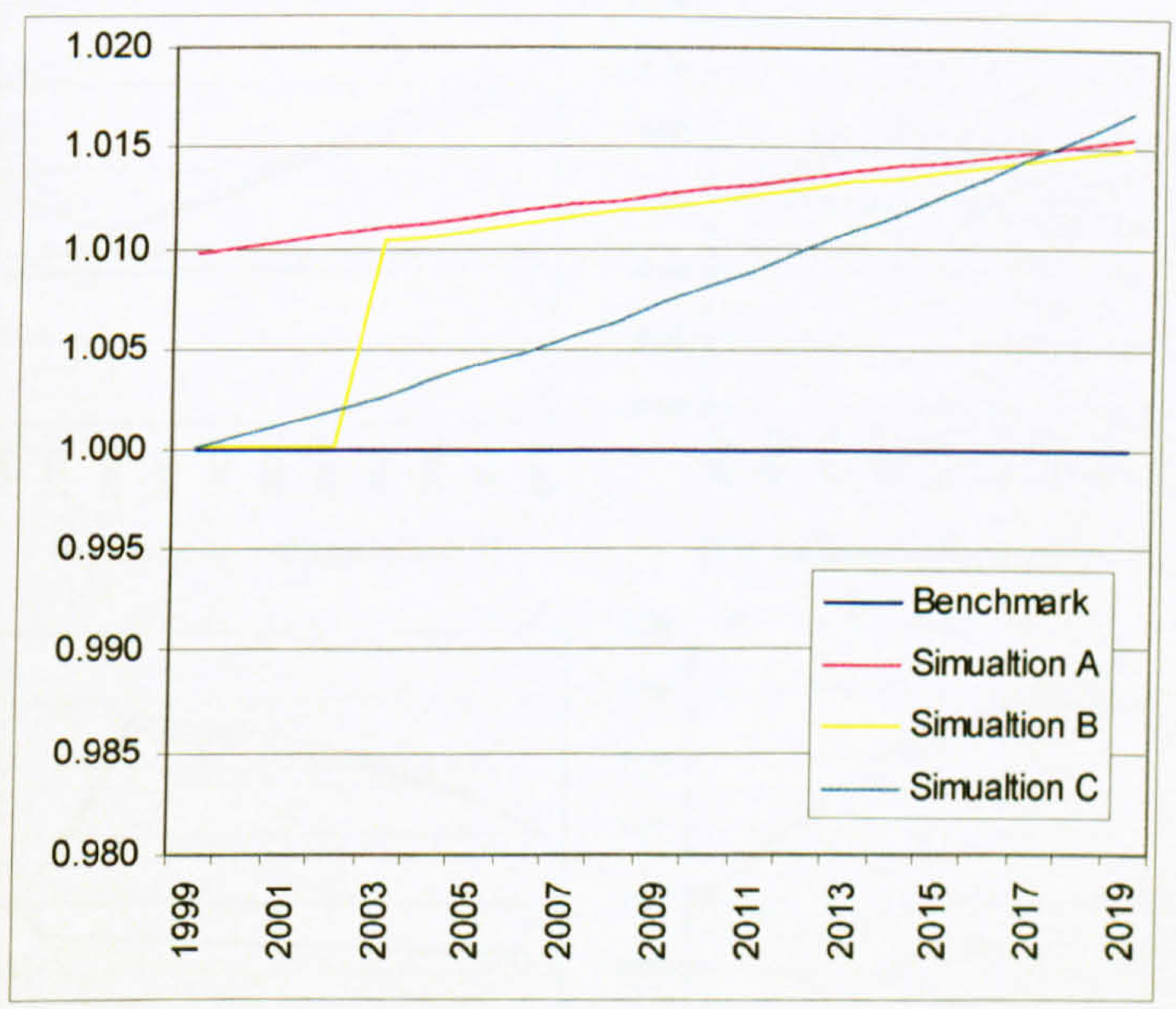


Figure 7.27a: Impact of a Foreign Tourism Demand Shock on Output and Quantity of Labour in Value Added - CRTS model

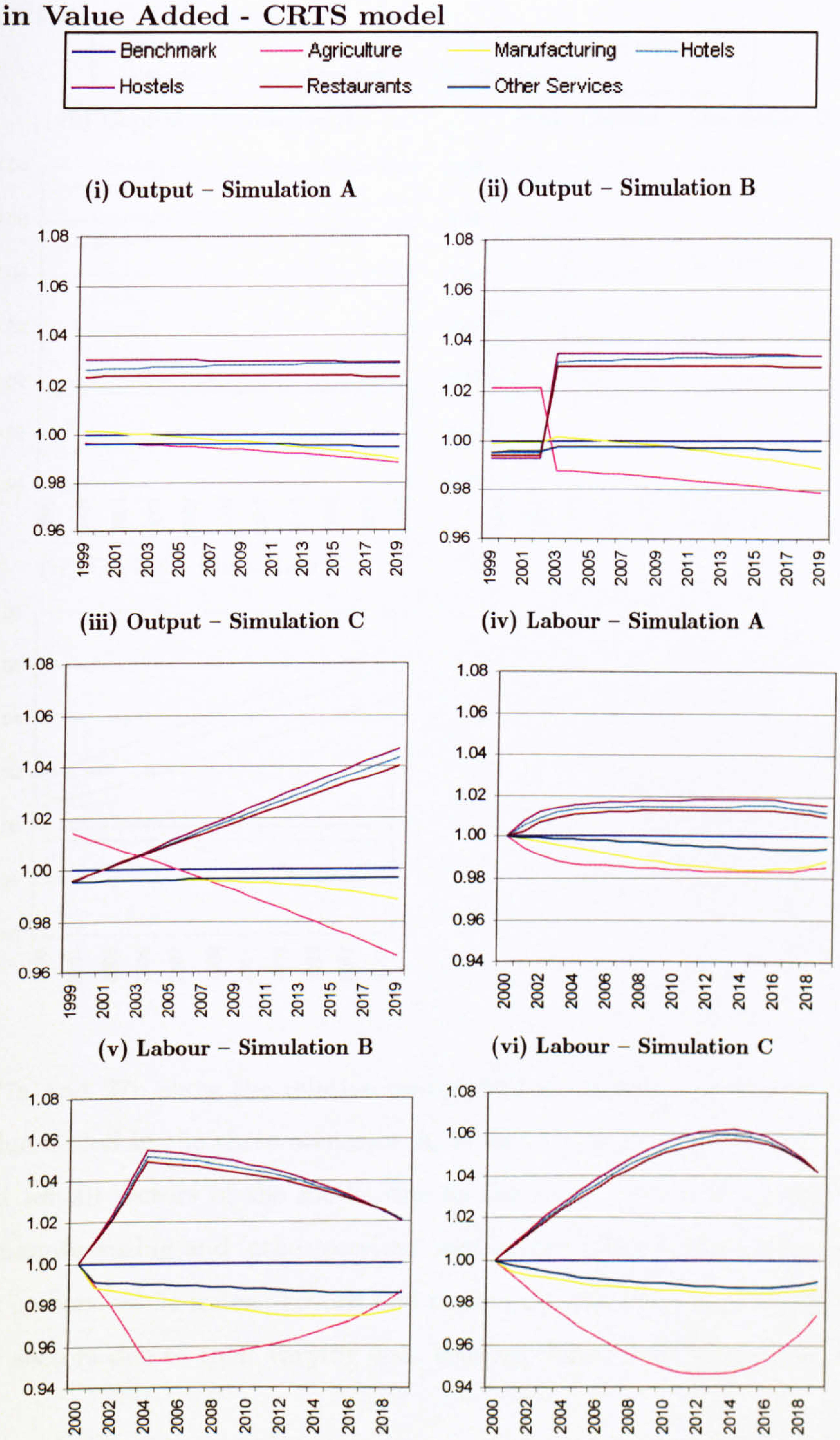
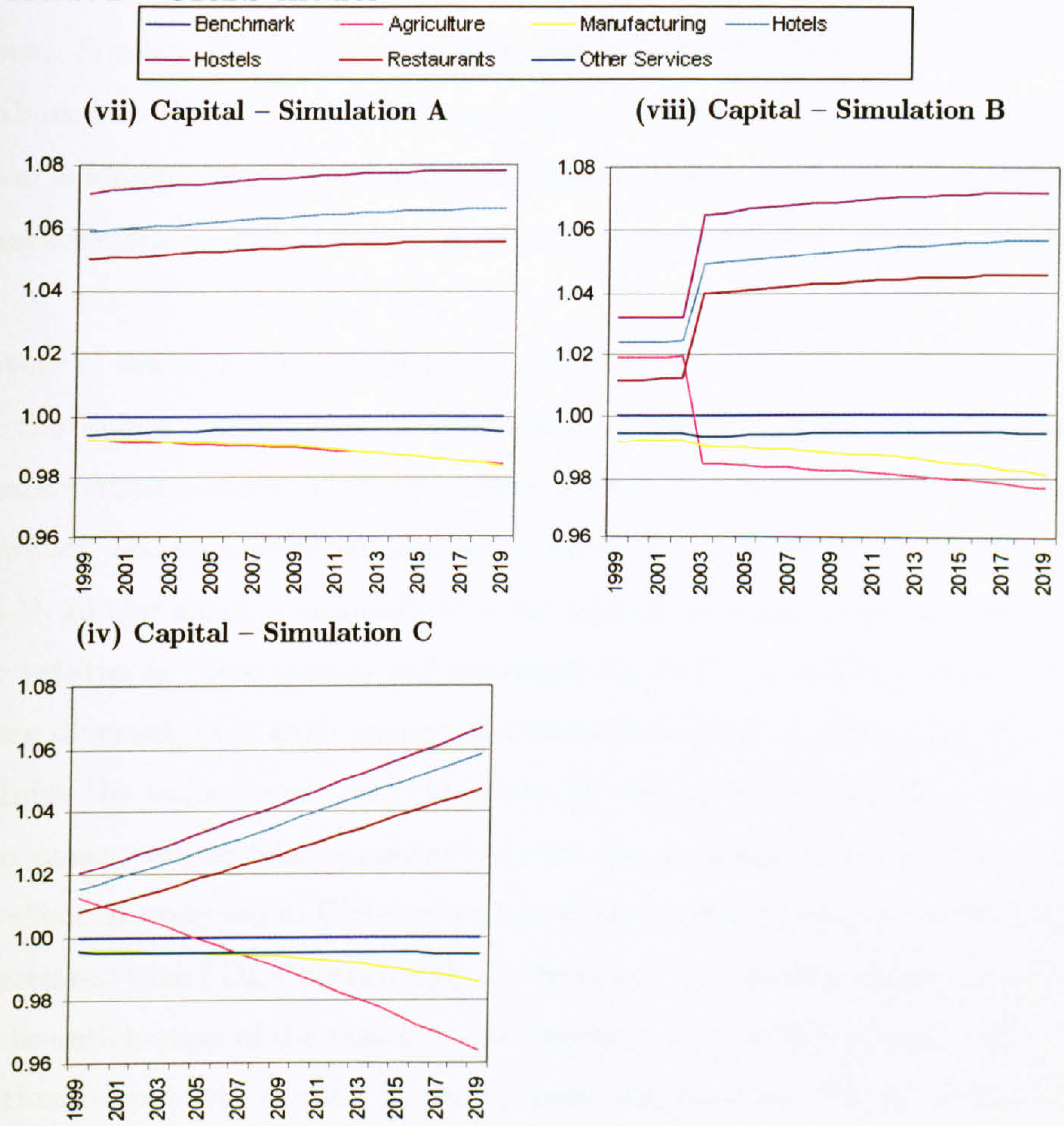


Figure 7.27b: Impact of a Foreign Tourism Demand Shock on Quantity of Capital in Value Added - CRTS model



Figures 27a and 27b show the relative movements in output, the quantity of labour and capital in value added in the three scenarios A, B and C. As in previous sections, results are not presented for all sectors of the model due to the large volume of results involved. The agriculture, manufacturing and 'other services' sectors are taken to represent the non-tourism characteristic sectors, while hotels, hostels and restaurants are chosen to represent the tourism characteristic sectors due to their varying size, tourism demand structures and capital/labour intensities.

Output can be seen to rise in the tourism characteristic sectors shown in this diagram. For instance, in Simulation A, output in the hostels sector rises by 3%, while approximately 2.5%

and 2.2% rises are observed in the restaurants and hotels sector respectively. It is interesting to see that a 10% increase in foreign tourism demand only transfers into a 2.5% increase in hotel output. Similar effects have been observed in both chapters 5 and 6 and this result is again attributed to the diffusion effect described earlier and the fact that only 52% of hotel consumption is foreign tourism related in the CAN-IO dataset. Output is seen to fall in the non-tourism characteristic sectors as resources move into the more profitable tourism characteristic sectors.

The nature of the change in output varies between the *anticpated* and *unanticipated* demand shocks. In the *unanticipated* shock in Simulation A there is a sharp increase in output in the tourism characteristic sectors. This adjustment is instantaneous following the imposition of the shock. However, the pattern of adjustment is somewhat different in the *anticipated* shock in Simulation B. In this shock it is known that the tourism demand boom will occur in 2004 and that factor returns in these sectors will consequently rise[8]. In tourism characteristic sectors, resources are diverted away from output and investment rises in preparation for the shock so as to minimise the adjustment cost. This can be seen in Figure 7.27a(ii), where output in the tourism characteristic falls temporarily below the benchmark level. This is an identical behavioral effect as observed in Chapter 5 when FDI recipient firms were absorbing innovation transfer associated with FDI. Contrastingly, in the non-tourism characteristic sectors investment is withheld in anticipation of the *resource movement* effect, investors have rational expectations and know that output will expand in the tourism characteristic sectors in later periods and returns will be higher. So to avoid the associated adjustment cost, investment is witheld and output is increased in these sectors. Following the tourism demand boom, output can be seen to fall in the agriculture. manufacturing and service sectors due to the *resource movement* effect. The resource movement effect is particularly strong in the agricultural sector. This sector has minimal linkages with the expanding tourism characteristic sectors and the foreign tourism consumption ratio is low (3.0%). This effect is particularly stong in Simulation C.

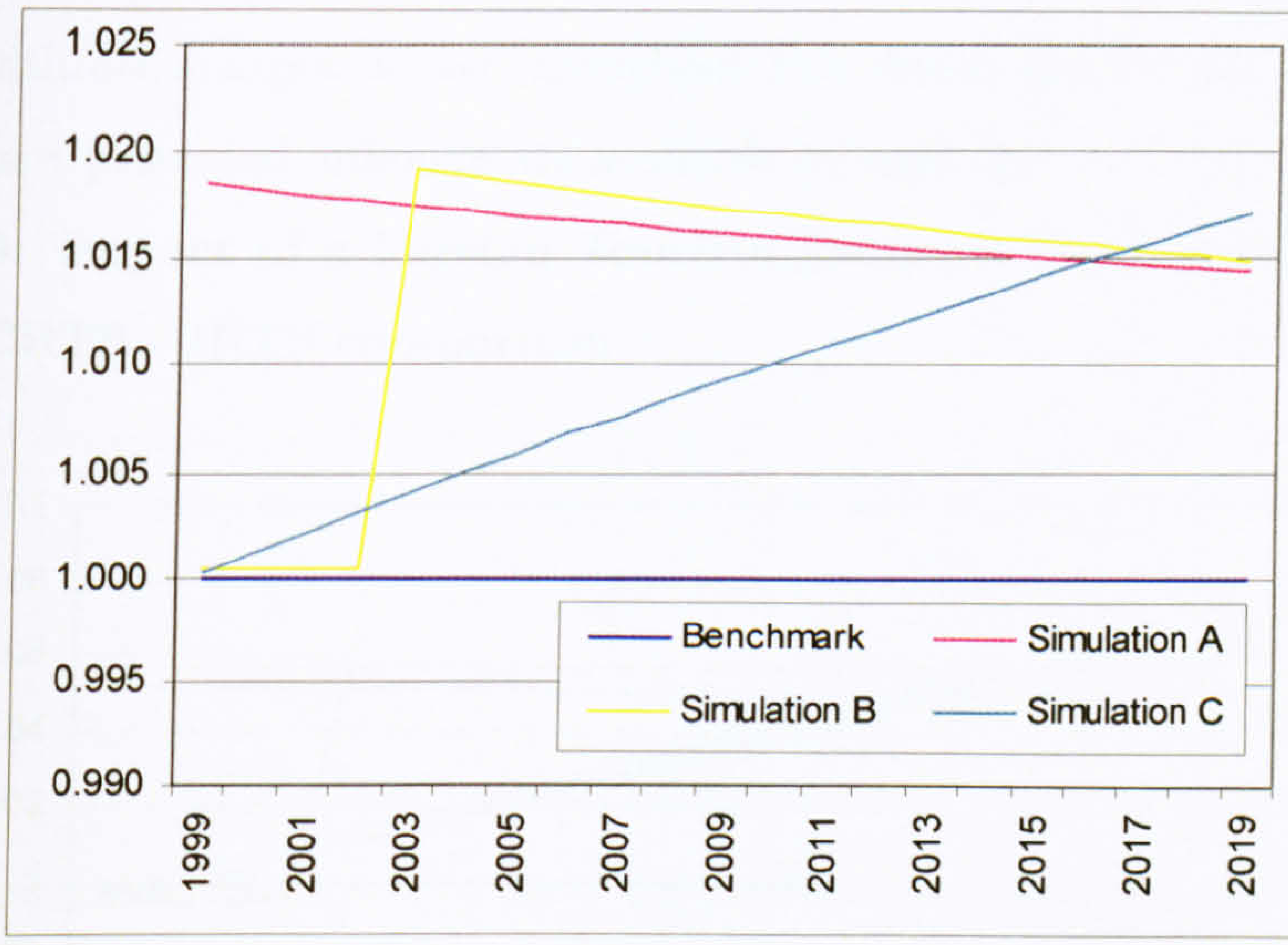
When comparing capital and labour movements between the *anticipated* and *unanticipated* shocks further contrasting effects can be observed. In the CAN-IO dataset used in this model

[8] A similar effect occurs in Simulation C. The assumption of perfect foresight implies that consumers and producers know that the growth rate of tourism demand will be higher (relative to the benchmark) in later years.

the tourism characteristic sectors are labour intensive, so it is expected that when these sectors expand significant quantities of labour will flow into them. As demand and consequently output rise in the tourism sector, the quantity of labour used rises, and this of course bids up its price. Therefore, capital becomes relatively cheaper and its use will increase as a substitute for labour. This is particularly the case when the tourism demand shock is *unanticipated*. As the demand shock is *unanticipated* the price of labour rises considerably more in this simulation since firms and domestic households are not aware of the nature of the shock. Therefore, as Figure 7.27a (iv) and Figure 7.27b (vii), show, there is a significant increase in capital usage and only a marginal change in labour usage. When the demand shock is *anticipated* the rise in the price of labour is significantly lower as there is foresight as to the extent of the shock as firms and households can plan accordingly. Therefore, the use of labour is greater under the *anticipated* scenario. However, it is important to note that while the changes in the demand for capital are significantly larger in all three simulations, the volume of labour usage is substantially larger.

It can be seen from Figure 7.28 that the overall effect of the tourism boom has a positive effect on GDP. The growth in tourism demand leads to a growth in earnings and domestic demand, consequently GDP rises. The overall GDP gain is largest in simulation B, this is due to the higher levels of investment that occur in this simulation. The downward sloping nature of the GDP trajectory reflects diminsihing returns to capital that accrue following the tourism sector expansion.

Figure 7.28: Impact of a Foreign Tourism Demand Shock on GDP at Factor Cost - CRTS Model

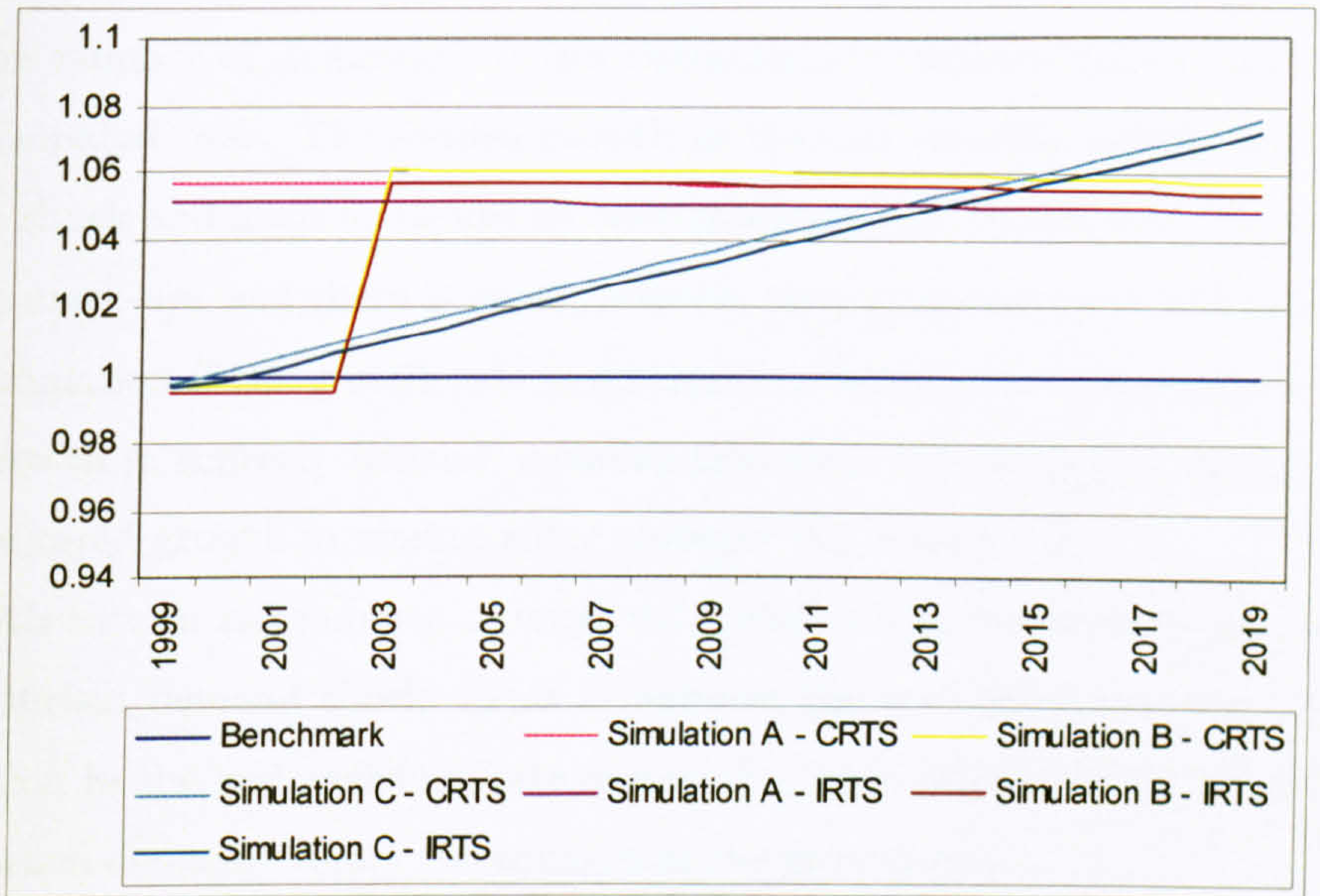


7.5.3 Results from the IRTS Model

As is the case in other chapters comparisons of the CRTS and IRTS model structures yield differences in the underlying results. Again these differences can be attributed to the strategic interaction among firms, and the same principles apply. As tourism demand rises, domestic firms perceive the price elasticity of demand for the goods and services they supply to the market to be falling. Consequently prices will rise by a greater amount in the IRTS case. Therefore, in the IRTS case the demand shock is diffused still further, and it can be seen in Figure 7.30 that the impacts of the demand shock are indeed smaller in the IRTS as opposed to the CRTS case. Consequently output changes are smaller in the IRTS case.

However, as shown in Figure 7.29, while the impact of this output restriction and higher domestic price level is consistent in all simulations, the impact of introducing IRTS in this model are at best marginal. These are consistent with the static results from the multi-regional model presented in chapter 6 section 6.5.3, where the difference between the CRTS and IRTS models in the Canaries instance was shown to be small due to the fact that firms have lower calibrated mark-ups in this region and hence have less market power to raise prices. The differences between the CRTS and IRTS case are also smaller than those shown for the Spanish national model in chapter 5. Due to the marginal nature of these results and the fact that they are consistent with other explanations throughout this thesis, the full set of results for these simulations are not presented although are available on request.

Figure 7.29: Impact of a Foreign Tourism Demand Shock on Foreign Tourism Expenditure CRTS - IRTS comparison

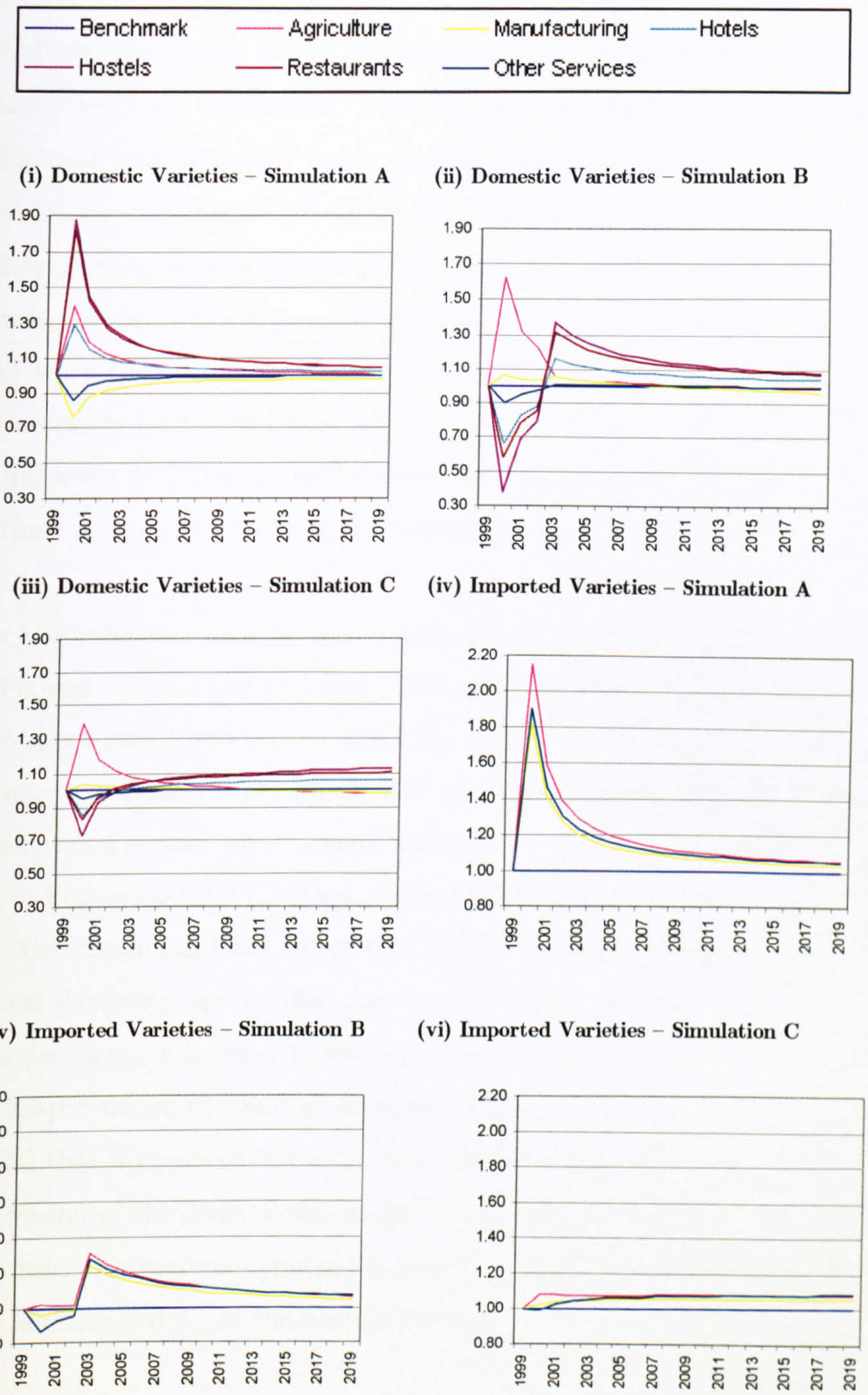


The impact of the resource movement effect on the number of varieties in the model can also be evaluated in the IRTS case. It has already been observed that the increase in foreign tourism demand means that there will be a rise in the marginal value product of the factors of production used in the tourism industry. Factors move out of unrelated sectors and into the tourism sector. The number of tourism characteristic firms (varieties) as represented by the hotel, hostels and restaurants sectors rise above benchmark levels.

It can be seen in Figure 7.30 below that in Simulation A the growth rate in number of tourism characteristic firms relative to the benchmark rises significantly in the second period following the tourism demand shock. For example, the growth rate of domestic restaurant varieties increases by almost 90%. In the benchmark the number of domestic varieties grow at the same rate as long-run output growth, which is set at 2% in this model. A 90% increase in a 2% growth rate, implies that the growth rate of domestic varieties increases to approximately 3.8% in Simulation A. Growth rates in the number of firms in Simulation's B and C reflect the nature of the tourism demand shocks. As the tourism demand shock is anticipated in Simulation B, there is no major growth until period 5, which is when the shock is timed to occur. In fact, the growth rate in tourism characteristic varieties actually falls for the same reason that output declines in the early periods of this model, namely that tourism characteristic firms will reduce output and channel resources into investing for the anticipated expansion in tourism demand. The number of domestic tourism characteristic varieties grows much more sharply in the unanticipated case. The sudden growth in tourism varieties reflects the unanticipated nature of the shock and firms mark-ups increase more rapidly. Hence, more firms are willing to contest these mark-ups and there is an expectation that greater growth will occur in the next period. In Simulation C the growth rate of domestic varieties is much more modest, this reflect the steady growth in tourism demand, meaning that their are no sudden changes in output in order to drive rapid growth in market entry amongst domestic firms.

The growth rate in the number of imported varieties also increases in all simulations following the tourism demand shock. This is because the volume of imports rises because of the appreciation in the real exchange rate due to the rise in the domestic price caused by the increased tourism demand. Again the changes in the growth rates

Figure 7.30: Impact of a Foreign Tourism Demand Shock on the Growth rate of Domestic and Imported Varieties - IRTS model



7.5.4 Sensitivity Analysis: Testing Factor Market Restrictions

In order to evaluate the impact of the restrictions on labour and capital movements between sectors sensitivity tests are undertaken. Two scenarios are generated for purposed of comparison. A flexible case with increased factor market mobility is compared to the current model calibration, which for convenience is termed the inflexible case. In the flexible case, capital is perfectly mobile between sectors and the putty clay assumption is removed from the model. In the labour market calibration, the parameter β^S which determines the proportion of the labour force that will leave the current firm and find employment in the same sector is set to zero and ϑ, which accounts for the fact that labour loses a proportion of its skill level as it moves between sectors, is set to 1 (i.e. no skill depreciation). The nature of the results are identical across simulations A, B and C, however, for convenience only the results from Simulation A are presented.

Results for the 'inflexible' case for labour and capital and output are identical to the results presented in Figures 7.25a(i) and (iv) and 7.25b(viii). Increased flexibility means that factors can now move more easily between sectors. The nature of the results are identical to those presented in chapter 5 section 5.5.4. Figure 7.32 shows that output is higher in the flexible case in the expanding hotel sector, while output contracts by more in the manufacturing sector. It can be seen from Figure 7.33 and 7.34 that under the flexibility scenario more labour and capital will move into the expanding hotel sector and will leave the tourism unrelated manufacturing sector. Increased flexibility also implies that factor prices (i.e. wages and the cost of capital) do not need to rise as much in order to entice inter-sectoral factor movement. This means that they will be cheaper under the flexible scenario. Consequently, the domestic price level rise (see Figure 7.23) that is observed in conjunction will the tourism demand shock is smaller and there is less diffusion of the demand shock. As the equivalent demand shock is stronger in the flexible case, tourism characteristic output is larger. In the hotel sector, output can be seen to increase by an additional 0.5% in the flexible scenario.

Figure 7.31: Impact of a Foreign Tourism Demand Shock on Output: CRTS Model, Flexible vs Inflexible Assumptions

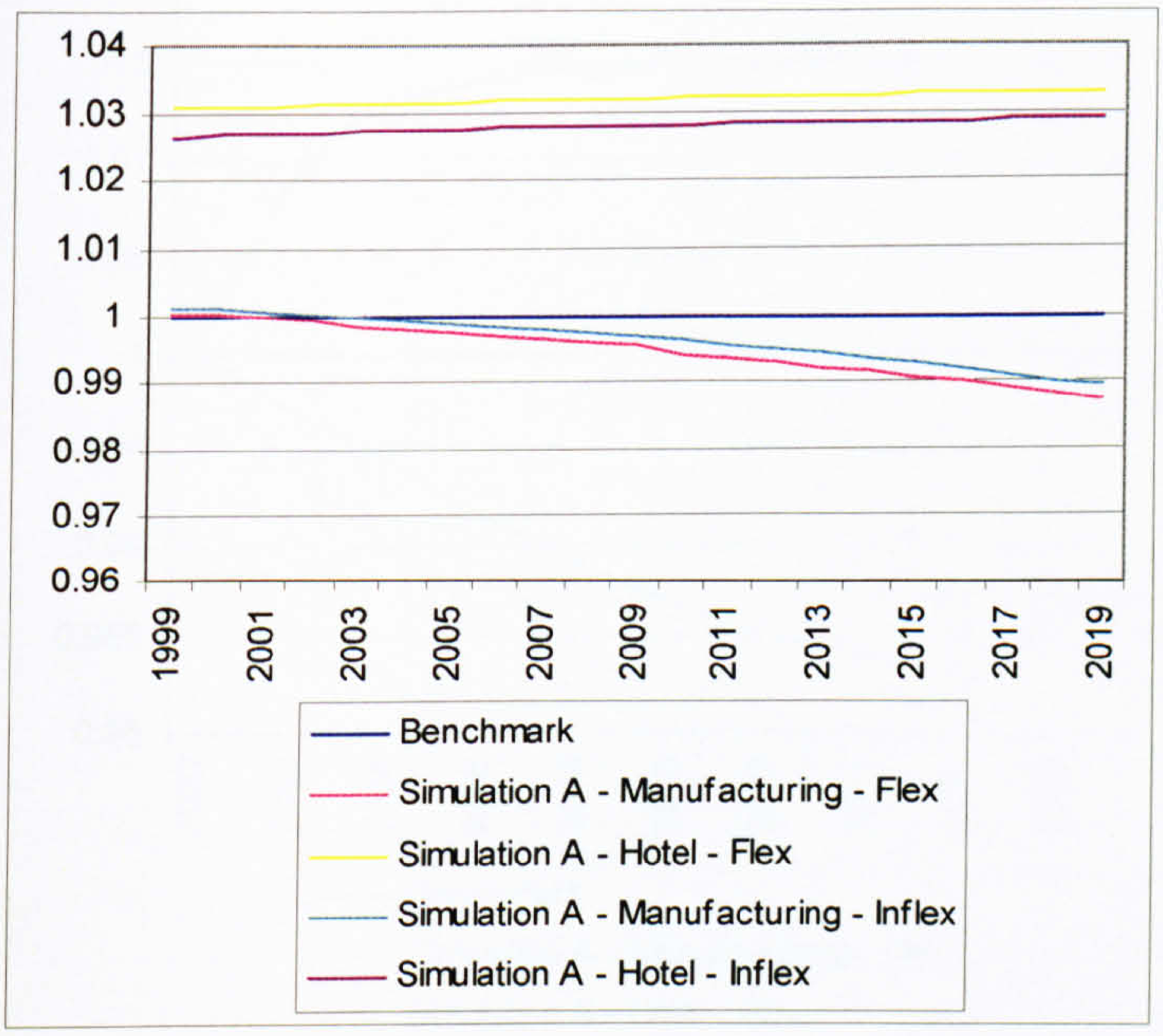


Figure 7.32: Impact of a Foreign Tourism Demand Shock on the Quantity of Labour: CRTS Model, Flexible vs Inflexible Assumptions

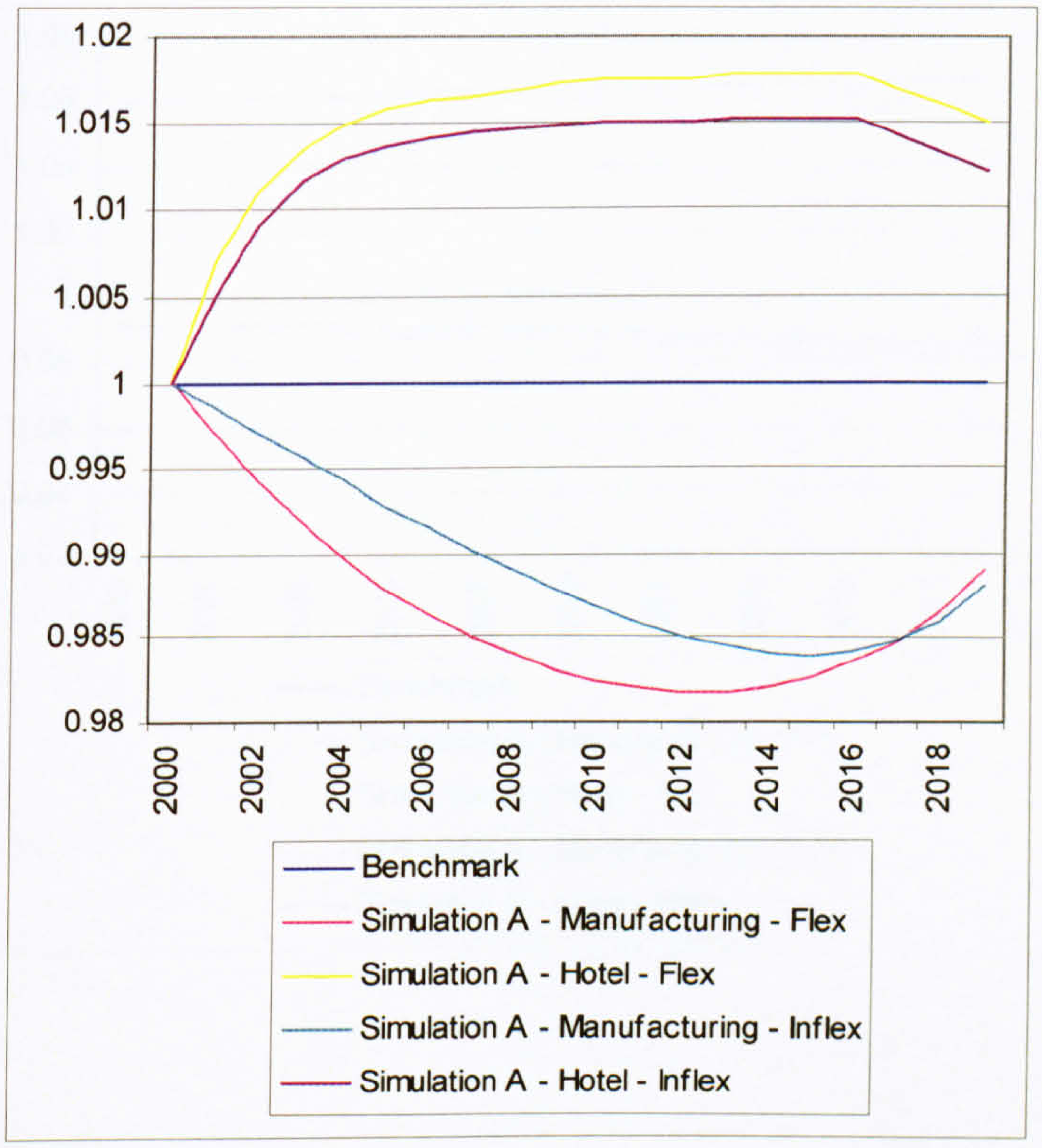
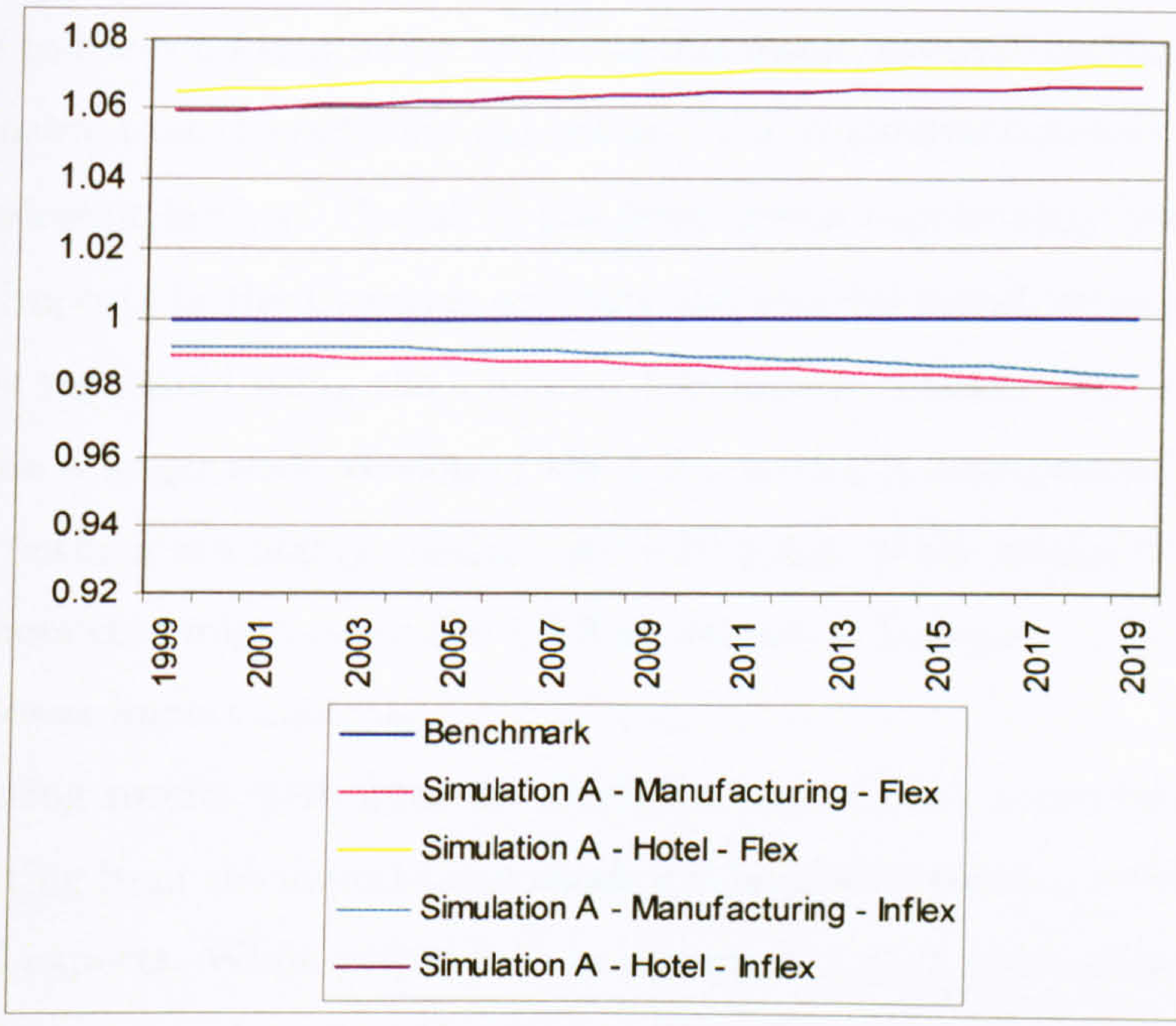


Figure 7.33: Impact of a Foreign Tourism Demand Shock on Capital Allocations: CRTS Model, Flexible vs Inflexible Assumptions



7.6 Conclusion

This chapter attempts to give some insights as to the possible impacts of an adverse terms-of-trade shock and positive tourism demand shock on a small island economy that is highly reliant on imports both to supply tourists and to supplement a limited domestic manufacturing base.

The first set of scenarios that is analysed relates to a permanent 10% rise in the world price of imports. A direct result of this is that the Canaries trade deficit worsens. The effect can be seen to occur even when the elasticity of substitution between domestic and imported goods is low. Moreover, any substitution towards domestic goods that might be expected to occur in the wake of an import price rise is completely crowded out by the dominant affect of the decline in real incomes. This effect goes against the predictions of the Devarajan, Lewis and Robinson (1990) 1-2-3 model which predicts that when the Armington elasticity is greater than 1 the substitution effect will domintate. The reason for the differences in this result is the rise in production costs brought about by the rise in price of intermediate imports. Blake *et al.* (1996) find a similar result in a CGE model for Mauritius. The Blake *et al.* model also includes intermediate imports, unlike the 1-2-3 model which again drives the difference between the results. Due to the counterintuitive nature of this result, several specifications of the model were tested to ensure that the outcome was robust. The counterfactual was also re-specified in order to test the result further. Overall it has been shown convincingly that due to the scale of intermediate imports in the Canaries economy the intutive result presented from the 1-2-3 model cannot be replicated using the Canaries benchmark dataset. The model used in this chapter represents a larger scale version of the 1-2-3 model, it incorporates many its nuances and the core structures are highly similar. An evaluation of the model does not reveal any apparent differences that might cause the 1-2-3 model not to be replicated given an alternative data set with a lower import content.

Other interesting results stem from the Canaries analysis, the depreciation of the real exchange rate resulting from the import price shock has beneficial effects for both foreign tourism consumption and exports. While output falls in sectors with high levels of intermediate inputs, output expands in tourism characteristic sectors. Therefore, due to the inherent trade openess in SIEs, tourism is an industry that may well insulate an SIE from an adverse terms of trade shock. Also the climate and terrain of many SIEs make them ideal candidates for tourism development. It may also help them diversify from over reliance on a single natural resource.

It can be seen from the results that the impact of the various counterfactuals imposed on the model are sensitive to the alternative model structures, whether it be CRTS or IRTS, and assumptions relating to the conjectural reaction of domestic producers. The depreciation in the real exchange rate experienced by the Canaries following the rise in import prices is larger in the IRTS model. However, the benefits of this increase in foreign tourism expenditure are not fully realised by the tourism characteristic sectors. this is due to two concurrent outcomes in the model results. Firstly, the response of a firm in the IRTS model faced with an increase in demand is to restrict output and raise prices thus further, this seeks to amplify the *income effect* which leads to declining demand for tourism characteristic output from domestic tourists and non tourism consumers.

Overall the direction of the results from the IRTS model are the same as the CRTS model. Tests on the sensitivity of the conjectural reaction parameter μ_i^M also reveal that when μ_i^M

increases foreign firms perceived elasticities of demand and mark-ups are higher. This means that import prices rise by more following the adverse terms of trade shock and real incomes fall by more. However, this effect is only marginal and while the outcome of this result is intutitive and provides useful insights, differences between the alternative specfications of the IRTS model are marginal. Such a result, as in previous chapters supports the conculsion of Willenbockel 2004 that it is the introduction of an IRTS specfication that is important rather than the specification itself.

The second set of simulations look at the impact of an unanticipated and anticipated commodity boom on the Canary Islands. Earnings in the tourism sector, which is the Islands main source of foreign exchange, can be seen to rise sharply although there is a significant diffusion of this effect due to subsequent price rises relating to the increased tourism demand.

Following the *spending effect* associated with the commodity boom a significant *resource movement effect* also occurs. Demand in tourism characteristic sectors such as hotels and restaurants rise sharply, while factors flow out of unrelated sectors such as manufacturing and agriculture. The adverse terms of trade effect associated with the tourism demand shock further harms the manufacturing sector leading to a rise in imported varieties. The reaction of the manufacturing sector is driven by the adjustment costs relating to the *resource movement effect.* When the demand shock is anticipated investment is withheld so that it can be transferred to the tourism sector in later periods, and consumption increases and there is a temporary boom in the manufacturing sector. However, if the demand shock is unanticipated this adjustment effect does not occur and manufacturing demand declines. The service sector which is neither to closely related or too detached from the tourism sector experiences a more even reaction to the commodity boom as the resource movement effect is limited by an increase in demand.

These results indicate the effects of a tourism boom are wide ranging and not necessarily beneficial for all sectors of the economy. It is apparent that the effects of such shocks are larger when they are anticipated as this gives the recipeint economy time to reallocate factor resources and investment so as to be able to harness the shock more efficiently and reduce the diffusion effect.

Chapter 8

Conclusions

8.1 Introduction

It is often said that tourism can stimulate increases in income in a recipient economy. However, little is known about the magnitudes of these effects and the impacts on the wider economy outside the tourism sector. The importance of the impacts relating to tourism have often been overlooked in the policy debate either due to their complexity or, as in the case of Spain, to a lack of understanding about their importance. This has been indicated in Chapter 2 where it is shown that the early development of tourism policy was often demand driven with scant regard for wider impacts. While policy development has taken on a more responsible sustainable orientation under the PICTE plan, it is still the case that little attention is paid to the effects of a growing tourism sector on the Spanish economy as a whole. Such impacts are particularly important in a large and expanding economy where tourism now contributes in excess of 12% of GDP. The importance of tourism should not be underestimated. It contributes significantly to the balance of trade, employs more than 2.5 million people and has a considerable fiscal impact.

The main objective of this thesis is to investigate the nature of the economic interrelationships associated with the tourism sector, not just on the tourism sector but on different parts of the economy. Specifically, the analysis has focused on the relationships between key economic variables such as economic output, both at the national and sectoral level, the real exchange rate, the trade deficit, the domestic price level, investment and household income. The impact of changes in tourism behaviour on these variables is important, not just for the tourism sector, but for the economy as a whole.

8.2 The Application of Computable General Equilibrium Modelling

The development of Computable General Equilibrium modelling provides a robust analytical framework for investigating the interrelationships between the tourism sectors and the other sectors of the economy. It is an approach that attempts to simulate numerically the general equilibrium structure of the economy. This means that relationships between multiple agents and sectors of the economy can be estimated. The basis of this estimation is a sound microeconomic framework based on the Walrasian paradigm and subsequently developed inter alia by Arrow (1954), Debreu (1959) and Hahn (1971). Due to the economy-wide impacts of tourism the CGE approach is suited to this type of analysis. Tourists purchase goods and services from a wide range of sectors (for example, food, accommodation, transport and retail goods), in turn these products will use inputs from all over the economy in the production process. In addition to this, these sectors will require factors of production to produce the goods. Many sectors are heavily reliant on tourism in the Spanish economy, with tourists consuming in excess of 70% of the sector's output in some instances. Due to this reliance and the scope of tourism activity, the changes in tourism activity are likely to have significant feedback effects and linkages throughout the entire economy. However, several other important characteristics of the tourism sector and the wider Spanish economy exist that need to be incorporated into the modelling framework. These are discussed below.

A review of the literature relating to trade in services highlights important characteristics that should be embodied in tourism analysis. Firstly, from Hill's (1977) definition of a service, it is noted that quality is an important issue to bear in mind when evaluating the service sector. Tourism in particular is characterised by differentiated products within a market structure that is far from perfectly competitive (Soler, Domingo 2003). This highlights the need for an approach to modelling services that incorporates an imperfectly competitive market structure. Hill (1977) also notes that services are a flow rather than a store, so that the need for a dynamic modelling strategy becomes apparent. Bhagwati (1984) notes the high level of producer-consumer interaction associated with services trade. It is clear that services must be treated as heterogeneous products and that they are often customised to the needs of consumers. This reinforces the need for a modelling strategy that can incorporate characteristics relating to an imperfectly competitive market structure, as is undertaken in this thesis. While it is apparent that this approach is suitable for the tourism sector due to the arguments presented above, it is also difficult to find a sector in the Spanish economy that is not characterised by product heterogeneity, particularly given the aggregate nature of the data sources used in this thesis. Therefore, a rationale exists for applying a framework that captures imperfect competition and increasing returns to scale to all sectors in the Spanish economy .

The way in which services are traded is also explored. Tourism trade requires either the consumer or the producer, or both, to move in order to engage in a tourism transaction. Tourism trade does not take place in the traditional goods sense; interaction between consumers and producers is always required, and in some cases the movement of the factors of production is also necessary. A key mechanism enabling producer movement is via Foreign Direct Investment (FDI) by which Multi-national Enterprises (MNEs) are able to establish tourism business in overseas countries. Hence, the concept of international trade is tourism and its impact on a recipient economy can be explored in more detail, and the evaluation of the economic impact of FDI in the Spanish tourism sector is investigated in detail in this thesis.

Another aspect of the tourism sector that must be considered is that tourists consume goods that are generally considered nontradable. Sectors which, in the absence of tourism, only had limited exposure to overseas economic conditions, now find themselves directly exposed to economic shocks in global markets. The majority of tourism goods are consumed in the place where tourists visit. Hence economies that receive large amounts of tourists may become subject to the symptoms of Dutch Disease; either following resource movement effects (where resources are attracted to the tourism sector following an increase in tourism demand), or spending effects (where increased tourism demand drives up incomes and leads to an increase in the domestic price level).

Previous CGE models applied to the tourism sector have been quite simplistic in nature and are generally focussed on issues relating to taxation or simple demand shocks in a static framework. However, such models are not usually suitable for capturing the characteristics described above, so the CGE models used in this thesis are adapted accordingly. The objective of the CGE models used in this thesis is to add value to the knowledge base relating to tourism in a general equilibrium framework. Consequently, the CGE models themselves also implement and combine characteristics not previously included in a CGE framework.

In order to capture the wide ranging effects of tourism consumption and the reliance of certain sectors of the Spanish economy on this particular form of income, the consumption patterns of both domestic and foreign tourists are disaggregated from the aggregate domestic consumption data in the various input-output tables used in this thesis. Such an approach has not been applied in such detail in a CGE model before. The importance of identifying tourism characteristic sectors and consumption patterns plays a key role in the outcomes and interpretation of the results of the CGE models.

This thesis also presents an innovative way to incorporate FDI inflows into a quantitative modelling framework. Previous attempts have either only proxied the likely behaviour of FDI on a recipient economy via off model adjustments and counterfactual design, or alternatively data sources and calibration methods have been highly arbitrary. This thesis seeks to offer an improved framework for carrying out the analysis of FDI shocks in a framework with endogenous FDI determinants and more robust sectorally differentiated data sources. The work of De Santis (1999, 2002) is extended to evaluate these concepts in a dynamic rather than static modelling framework. While neither of these techniques have been applied in a dynamic CGE model before, this thesis is also unique in that it is the first application of this particular type for the Spanish economy.

The first regional CGE model of the Spanish economy is also constructed. Spain is divided into 18 regional communities, each with varying degrees of autonomy in terms of fiscal decision making and tourism policy. There is a relative abundance of regional data for Spain as compared to other major tourism economies so these data are used to construct a regional general equilibrium model to highlight some of the regional economic issues relating to tourism policy.

8.3 Key Findings

The first set of model scenarios that is evaluated using the CGE model for Spain examines the impact of an inflow of foreign investment on the tourism sector under different assumptions relating to the behaviour of MNEs, the productivity of foreign capital and imperfect competition and increasing returns to scale.. Spain is one of the world's largest recipients of FDI. Foreign investment slumped globally in the aftermath of the events of September 11th 2001. However, tourism is thought by leading analysts to be one of the sectors capable of leading a recovery in foreign investment activity. Coupled with the fact that the Spanish government has been continually attempting to attract more foreign investment into the country since the early 1990s, this research is considered to be particularly timely.

The analysis from the Spanish CGE model mirrors the predictions of the Devarajan, *et al.* (1990) 1-2-3 model, that as FDI increases in a recipient economy the real exchange rate appreciates, imports and domestic output increase at the expense of exported goods and consumption increases. Such results are intuitive given that FDI is known to drive up asset prices in the recipient economy and reduce capacity constraints. These particular outcomes are also observed in the CGE model. The real exchange rate appreciation can be shown to reduce output in the very sectors it is designed to benefit. Tourism demand is elastic in the CGE models used in this thesis and in turn foreign tourists are sensitive to product prices. A large component of tourism demand comes from overseas, and so fluctuations in the purchasing power of foreign currency have significant influences on sectors whose main source of income is foreign tourism consumption. Even small increases in the real exchange rate will mean that foreign tourism demand declines. This is apparent in those sectors that have a larger share of domestic as opposed to foreign tourism consumption in their demand structure. During periods where FDI inflows are high and tourism demand is unchanged, the appreciation of the real exchange rate can actually cause foreign tourism expenditure to decline. However, once the FDI inflow has subsided, then the increased capacity in the sector leads to an endogenously determined demand expansion. While this result may seem at odds with intuition given that FDI recipient sectors effectively contract in size, it is consistent with the explanation of the 1-2-3 model. Tourism is in many senses an export good, although it differs from traditional exports goods as tourists must travel outside their usual environment to consume it, and the 1-2-3 model predicts a decline in export goods due to the real exchange rate appreciation.

It is unlikely that an increase in FDI in the tourism sector will occur on its own. It is however, likely to be coupled with a tourism demand boom as FDI would be attracted towards an expanding sector as rents will be higher. Later simulations show that when FDI accompanies increased foreign tourism demand the benefits to the recipient economy are greater than a foreign tourism demand shock alone. Nonetheless, the dual FDI and tourism shock does not eradicate the problems associated with the real exchange rate appreciation during the FDI inflow. It only serves to mitigate them. Tourism sector FDI inflows on their own, may lead to a decline in foreign tourism expenditure. Therefore, any increase in foreign tourism demand will be diffused significantly by a joint FDI increase.

The impact of FDI on GDP growth is not permanent. This is because the CGE model is based on the neoclassical structure of the Solow (1956) model. Long-run gains to the economy are not realised due to diminishing returns to capital. However, much of the FDI literature highlights the fact that FDI will lead to long-run changes in growth if the social rate of return to investment can exceed its private rate. Such gains can be realised via externalities such as learning by doing, spillover effects and human capital accumulation. The impact of these positive externalities are approximated in the CGE model by implementing an increased total factor productivity shock on foreign capital and the proportion of the labour force associated with it. This alternative specification shows that with a 10% increase in total factor productivity long-term GDP gains can be sustained and that the FDI recipient sectors will experience a sharp fall in costs and an increase in capacity, which, in turn, generates a tourism mini-boom.

A key influence on the model results in this chapter is the level of profit repatriation. The level of profit repatriation is highly sensitive to a number of key factors, most notably the nominal exchange rate and the tax regime. The level of profit repatriation will have a significant impact on the outcomes associated with FDI, as output is significantly lower in FDI recipient sectors when profits are not invested. Capacity increases are lower in later periods of the model which leads to less endogenous tourism expansion.

The second set of scenarios analysed in this thesis relate to regional policy issues. These issues are analysed with a specially constructed R-CGE model that explicitly models the behaviour of four regions in the Spanish economy. In Spain the contribution of tourism to the national economy is around 12% of GDP. However, the contribution of the Spanish regions varies significantly. Some regions such as the Canary or Balearic Isles have high tourism intensities, others such as Castilla y León or Navarra do not. Of interest to tourism policy makers is that each autonomous region in Spain has different tax setting powers and different powers relating to tourism policy. As the process of the devolution of power from central government continues it will become more likely that regions will act independently when it comes to taxing and attracting tourists.

A regional CGE model is constructed that examines at the impact of tourism demand and tax shocks in the regions of Andalucía, the Canary Islands, Castilla y León, Madrid and a region comprising the remainder of the Spanish economy ('Rest of Spain'). The first set of simulations undertaken with the regional CGE model looks at the effects of a 10% increase in foreign tourism demand across all regions in Spain. The impact of the tourism demand shock varies between regions depending on their tourism intensity. The increased demand from foreign tourists drives up the price level in the regional economies and to some extent in each region the demand shock is diffused. The largest diffusion is seen in the Canary Islands, which experiences the largest rise in the price level as it has the highest intensity of tourism consumption of all the regions modelled. A much smaller diffusion effect is observed in Castilla y León as this is the region where there is the lowest intensity of foreign tourism and prices rise by less. The region also benefits from significant substitution effects as tourists substitute towards this region since relative prices are lower.

The regional model is static in nature, as at the time of writing, the CGE modelling software used in this thesis, MPSGE, is not capable of solving such a large model over multiple time-periods. However, the essence of the results does not differ from the dynamic models used in other chapters. There is an appreciation in the real exchange rate following the demand shock, imports generally rise, exports fall and tourism characteristic sectors generally expand at the expense of non-tourism characteristic sectors. However, regional nuances mean that in some instances there is divergence in the results. Of particular interest is the case observed in Andalucía where output is observed to fall in some tourism characteristic sectors where the share of domestic tourism consumption is greater than that of foreign tourism consumption. The outcome of this result is influenced by a number of factors. Primarily, the result is driven by the resource movement effect, where other sectors which are dominated by foreign tourism taxation draw resources out of the hotel sector which is more focused on domestic tourism.

Sensitivity analysis is undertaken with regard to the tourism elasticity parameters in the regional CGE model. A scenario is investigated whereby the elasticity of substitution of tourism demand increases between the regions. Therefore when larger increases in the domestic price level are observed in tourist intensive regions as a result of the tourism demand shock, tourists substitute their demand to regions where the price increases are lower. The overall outcome of this result is that the diffusion effect is smaller and tourism demand is higher. The Spanish government is trying to market tourism more effectively in regions where tourism demand is lower so as to increase demand. If this policy is successful Spain will be able to reap more of the gains from increased tourism demand.

The R-CGE model is also redefined to allow for an alternative demand structure. The primary specification assumes that tourists choose the destination in Spain first, but then substitute to other regions when prices get too high. The alternative specification assumes that tourists first compare Spain with other countries and then choose a region accordingly. This alternative specification is tested with an alternative nesting structure which reflects the fact that tourists are more likely to substitute between regions with similar characteristics i.e. tourists might be unwilling to substitute a beach holiday for a cultural holiday in the centre of Spain. This alternative structure significantly limits the substitution effects in the model, particularly for regions such as Castilla y León which although relatively cheaper, might not be viewed as a suitable substitute for the Canaries. The overall direction of the results is unchanged in this scenario, but it does highlight the fact that careful consideration of the structure of tourists' regional preferences needs to be accounted for in regional general equilibrium models.

The second set of simulations undertaken with the regional CGE model looks at the impact of two different consumption taxation scenarios relating to the hotel sectors in the Canary Islands and Madrid. The regional effects of the taxes differ widely, and they are dependent on the consumption patterns of domestic and foreign tourists in the regions that are being taxed. In both regions, when the tax is imposed the regional domestic price level rises and so too does the cost of staying in a hotel. However, due to the lack of available substitutes in Madrid, hoteliers prefer to pass on virtually all of the tax increase in the form of higher prices rather than to reduce their profit margins as they know that second round substitution effects will be minimal.

In the Canaries it is observed that the majority of domestic tourists stay in hotels, so they are hit particularly hard by the tax and reductions in domestic tourism demand are larger than foreign tourism demand. This result is somewhat surprising given the intensity of foreign tourism in the Canaries. The adverse impact on domestic tourism is also compounded by the loss in household income associated with the decline in foreign tourism.

Due to the decline in tourism demand in the Canary Islands and Madrid, output in tourism characteristic sectors also falls. Further to this, tourists substitute away from the Canaries and Madrid in their respective scenarios and tourism demand is seen to increase in other regions, so tourism characteristic output will rise in other regions. This effect is stronger under the Canaries simulation as the scale of the reduction in tourism consumption is larger in this region.

The final set of simulations undertaken in this thesis relate to the Canary Islands. The Canary Islands exhibit symptoms typical of a small island economy, for example, small production base, lack of raw material and high import content. Tourists consume goods and services which are not indigenous to the Islands' economy so have to be imported. The Canaries model is shocked with a permanent 10% increase in the world price of imports to simulate the potential adverse impacts that the Canaries' exposure to international markets might bring about.

As imports become more expensive in the Canary Islands, the trade deficit worsens, even when the elasticity of substitution between imported and domestic goods is greater than 1. This is contrary to the predictions of the Devarajan, *et al.'s* (1990) 1-2-3 model. The 1-2-3 model states that when the Armington elasticity is greater than 1 the substitution effect will dominate any income effects relating to reduced domestic purchasing power. However, this is contrary to the findings of the Canaries model. The difference between the Canaries model and the 1-2-3 model is the inclusion of intermediate imports. In the Canaries model, intermediate imports drive up domestic production costs when there is an adverse terms of trade shock in the region. As there is a high level of imported intermediates, the domestic price level does not fall substantially relative to the increased price of imports to compensate for reduced domestic purchasing power. Therefore the income effect dominates. Extensive testing of the structure of the model, the elasticity parameters and the nature of the counterfactual itself is undertaken.

The same result still holds throughout these tests and the predictions of the stylised 1-2-3 model do not hold. A consequence of the import price rise is that the real exchange rate in the Canaries depreciates. This has the effect of making foreign tourism cheaper and a consequent increase in foreign tourism demand ensues.

Throughout this thesis, results are augmented by the use of a model with imperfect competition and Increasing Returns to Scale (known as the IRTS model) as opposed to the perfect competition Constant Returns to Scale (CRTS) approach. Results from the IRTS model and CRTS models are compared for each of the main simulations. A fundamental difference exists between the two models that relates specifically to the firm's output decision. In the CRTS model firms will produce at $P = MC$, and economic profits are zero. However, when imperfect competition is introduced into the model the pricing equation changes. The monopolist no longer takes price as given but takes advantage of its ability to limit supply. This means that the pricing equation alters to a mark-up equation (the Lerner index of monopoly power) which is the inverse of the absolute value of the firms' perceived elasticity of demand.

In all instances of the IRTS model, firms will restrict output with regard to the CRTS model. This means that any price level changes associated with the counterfactual will be higher in the IRTS model. The extent of the price level changes will depend on the firms' perceived elasticity of demand. This parameter value varies by sector and in the R-CGE model, by region. The differences between the CRTS and IRTS models are variable. When mark-ups in sectors or regions are high the effect is particularly noticeable, and the fact firms restrict output has a noticeable impact on the output result. In some instances output can be 20-30% lower in the IRTS case than the CRTS case. This effect is particularly noticeable in the manufacturing sector, as opposed to the tourism characteristic sectors modelled, and also in the region of Madrid in the R-CGE model. However, the impact of the IRTS specification does not impact on the overall direction of the results of the CGE model, only on their magnitude. Therefore, the IRTS structure does not interfere with the fundamental conclusions of the CGE models used in this thesis, but it does give insights with regard to the magnitude of the results. If the hypothesis that firms will restrict output so as to preserve mark-ups is accepted, then based on the evidence presented in this thesis, the CRTS model may overstate the impacts of policy shocks in CGE models. However, while this point is important in the interpretation of CGE results, the usefulness of CGE models must not be overstated. The results of CGE models can be more useful for highlighting indicative trends and the ordering of specific outcomes such as the income effect and the substitution effect, than for providing precise estimates for policy problems. So while the IRTS model is useful and gives additional insights that will be useful for policy makers it is more important to produce a robust model that is consistent with economic theory and the available data.

The IRTS model is also varied to account for changes in the conjectural variation parameter with a view to establishing insight regarding its influence on the results of the CGE models used in this thesis. It is generally found that this parameter has little influence on the results, and no fundamental directional changes are observed. While the results are theoretically consistent, given our knowledge of the impact of fixed conjectures provided by De Santis (2002) and Kamien and Schwarz (1983), differences between the relative magnitude of the results presented for the standard IRTS model with Cournot conjectures between domestic and foreign firms are marginal. Therefore, it is concluded that the importance and usefulness of varying the parameter is limited, particularly given its known theoretical inconsistencies. It is even difficult, given the empirical findings, to concur with optimistic views like those of Helpman and Krugman (1989) who advocate the approach for giving general insights as to what the behavioural effects of firms might be. It is clear that if CGE modelling is to develop into this area, then more work is needed to further develop the firm's expectations function.

The model also includes an element of labour market rigidity. This is designed to capture the level of structural unemployment in Spain. Estimates for the labour market elasticity are low in Spain and labour market entry is low as there is an absence of schemes to entice the unemployed into the labour market and levels of benefits are high. There are also large numbers of workers who are unsalaried and are paid in kind. Therefore, in order to entice workers to move between sectors or enter the labour market, changes in the real wage will be larger than in a labour market with perfect factor mobility. Assumptions have been made with regard to skill depreciation, the fact that workers become less productive when they move between sectors and unemployment. Assumptions relating to rigidity in the capital market are also made. Adjustment cost functions are fairly standard practice in CGE models and there is evidence of capital market rigidity given localised risk premia in capital markets. This has had led to inflationary problems in Spain in the past.

When the assumptions regarding labour market mobility are removed, as is found in the IRTS model the fundamental structure of the results does not change. The assumptions do not significantly affect the relative magnitudes of factor earnings i.e. earnings attributable to labour do not substantially increase at the expense of capital when the restrictions are removed. Output does, however, increase significantly when perfect factor mobility is introduced. Again the policy conclusions from the results are similar to the CRTS case with factor market restrictions; it is just the relative factor movements that differ.

Several variations on the structure of the standard neoclassical CGE model have been introduced in this thesis and extensive sensitivity tests have been undertaken. While it is clear that alternative calibrated parameter values and alternative model structure do have an impact on the model results, the fundamental policy outcomes from a CRTS model with perfect factor mobility are generally unchanged. However, it is clearly worthwhile incorporating and experimenting with additional aspects of CGE models to reflect local economic phenomena, as they will have an impact on the magnitude of the results which might imply that the CRTS model with perfect factor mobility may overstate economic impacts.

8.4 Possible Extensions and Further Work

An obvious extension to this analysis would be to include dynamics in the regional CGE model structure. This would make all models consistent and more easily comparable. However, at the time of writing this thesis the capacity of software available is unable to cope with the increased number of variables that this would involve in the model solution. In order to implement a model of this nature a more powerful GAMS solver is required. A relatively recent software development is likely to provide a solution to this problem in the form of the PATH solver, which allows increased dimensionality in non-linear models. This may give an option for the regional model to be extended in this way.

The process of calibration involves fitting data to the parameters of the theoretical general equilibrium model. Such an undertaking can become problematic as some data (for example, those for interest payments, savings and depreciation etc.) are not accommodated within the theoretical constructs of the model; consequently the model must be manipulated to fit the data or vice versa. Although representing an improvement from the standard stationary static approach, traditional dynamic models do not overcome this problem. Data are generally manipulated to accommodate certain closure rules and, as a consequence the government budget and the balance of payments balance, while net investment does not occur in the base year.

However, good modelling practice reminds us that the model should be chosen to fit the data and the overall functioning of the economy, not the other way round! To improve on the current situation, the dynamic model could also be extended to incorporate the non-steady state. The first step in deciding on the calibration process is to determine whether the economy is in a stationary (or steady state) in the base year. The orientation of the model and the structure of the economy determines this decision. If the modeller believes that the structure of the economy is unlikely to change during the modelling period, and that the conditions imposed by the steady state calibration method are not too far away from the current economic situation, then it may not be worthwhile to consider a steady state calibration process. However, in a situation where the frequency, composition and magnitude of economic interactions are ever changing, then calibrating the model to the steady state should be deemed inappropriate. In the Spanish case we must concur that economy exhibits characteristics which would be more suited to non steady-state modelling, for example, budget deficits and change in the economic structure. This last point perhaps represents the strongest case for non steady-state analysis, as the growth of Spain's service sector, since its liberalisation in the late 1950s, has significantly altered the underlying economic configuration of the entire economy. The tourism sector has been and still is one of the main sources of such changes and is a sector associated with continual growth and development. Such growth will also contribute to the evolution of variables normally considered fixed in steady state models for example, the current account and government balances.

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Appendix A

Appendicies for Chapter's 4, 5, 6 and 7

A.1 Chapter 4 Appendicies

A.1.1 Derivation of the CES Demand Function

The standard 2 variable CES production function for value added at factor cost may be written as:

$$QF_i = A_i \left[\gamma_i QL_i^{\rho_i} + (1-\gamma_i)\, QK_i^{\rho_i}\right]^{(1/\rho_i)} \quad \text{where } -\infty < \rho < 1 \text{ and } 0 < \gamma_i < 1 \qquad \text{(A-1)}$$

where QF_i represents value added at factor cost, which is a composite of labour inputs (QL_i) and the composite of foreign and domestic capital inputs (QK_i), A_i is a scale parameter, γ_i[1] is the share parameter for labour in factor payments and ρ_i governs the curvature of the isoquants. A more usual measure of substitution is the elasticity of substitution σ_i, where $\sigma_i = 1/(1-\rho_i)$; this gives an alternative specification of the CES function (equation 4.8):

$$QF_i = A_i \left[\gamma_i QL_i^{((\sigma_i-1)/\sigma_i)} + (1-\gamma_i)\, QK_i^{((\sigma_i-1)/\sigma_i)}\right]^{(\sigma_i/(\sigma_i-1))} \quad \text{where } 0 < \sigma_i, < \infty \qquad \text{(A-2)}$$

[1] It should be noted at this point, that in all cases of the CES function the share parameters sum to 1 i.e. in this case $\sum_i \gamma_i = 1$

In this case σ represents the elasticity of substitution between labour and capital. The CES production function is linearly homogenous, and varies between 0 and ∞. When $\sigma \rightarrow 0, \rho \rightarrow -\infty$; when $\sigma \rightarrow 1, \rho \rightarrow 0$ and when $\sigma \rightarrow +\infty, \rho \rightarrow +1$. Hence the range of values for ρ is $-\infty < \rho < 1$. When $\sigma \rightarrow 0, \rho \rightarrow -\infty$ the isoquants become L-shaped, i.e. the function becomes a fixed proportions Leontief function and when $\sigma \rightarrow 1$ the CES function becomes the Cobb-Douglas function.

In order to derive constant input factor demands we must minimise the cost function subject to equation (4.9). For the factor demand case the cost function can be represented as:

$$PF_iQF_i = PL_iQL_i + PK_iQK_i \tag{A-3}$$

The first step is to differentiate output to obtain marginal product which gives:

$$\begin{aligned} \frac{\partial QF_i}{\partial QK_i} &= A_i\left(\sigma_i/\sigma_i - 1\right)\left[\gamma_i QL_i^{(\sigma_i-1)/\sigma_i} + \left(1-\gamma_i\right)QK_i^{(\sigma_i-1)/\sigma_i}\right]^{1/\sigma_i} \\ &\quad \gamma_i\left(\sigma_i - 1/\sigma_i\right)QL_i^{-1/\sigma_i} && \text{(A-4)} \\ \frac{\partial QF_i}{\partial QL_i} &= A_i\left(\sigma_i/\sigma_i - 1\right)\left[\gamma_i QL_i^{(\sigma_i-1)/\sigma_i} + \left(1-\gamma_i\right)QK_i^{(\sigma_i-1)/\sigma_i}\right] \\ &\quad \left(1-\gamma_i\right)\left(\sigma_i - 1/\sigma_i\right)QK_i^{-1/\sigma_i} && \text{(A-5)} \end{aligned}$$

Equation (4.8) is then rearranged to give:

$$\left[\frac{QF_i}{A_i}\right]^{((\sigma_i-1)/\sigma_i)} = \left[\gamma_i QL_i^{((\sigma_i-1)/\sigma_i)} + \left(1-\gamma_i\right)QK_i^{((\sigma_i-1)/\sigma_i)}\right] \tag{A-6}$$

Equation (A-6) can then be substituted into equations (A-4) and (A-5) to obtain:

$$\begin{aligned} MPK_i &= A_i\left[\frac{QF_i}{A_i}\right]^{((\sigma_i-1)/\sigma_i)}\left(1-\gamma_i\right)QK_i^{-1/\sigma_i} \\ &= A_i^{-1/\sigma_i}QF_i^{((\sigma_i-1)/\sigma_i)}\left(1-\gamma_i\right)QK_i^{-1/\sigma_i} && \text{(A-7)} \\ MPL_i &= A_i\left[\frac{QF_i}{A_i}\right]^{((\sigma_i-1)/\sigma_i)}\gamma_i QL_i^{-1/\sigma_i} && \text{(A-8)} \\ &= A_i^{-1/\sigma_i}QF_i^{((\sigma_i-1)/\sigma_i)}\gamma_i QL_i^{-1/\sigma_i} && \text{(A-9)} \end{aligned}$$

Divide (A-7) by (A-9) and equate to the factor prices given in (A-3):

$$\frac{MPK_i}{MPL_i} = \frac{A_i^{-1/\sigma_i} QF_i^{((\sigma_i-1)/\sigma_i)} (1-\gamma_i) QK_i^{-1/\sigma_i}}{A_i^{-1/\sigma_i} QF_i^{((\sigma_i-1)/\sigma_i)} \gamma_i QL_i^{-1/\sigma_i}} = \frac{PK_i}{PL_i} \tag{A-10}$$

rearrange to obtain QK_i and QL_i

$$QK_i = QL_i \left[\frac{PK_i}{PL_i}.\frac{(1-\gamma_i)}{\gamma_i}\right]^{-\sigma_i} \tag{A-11}$$

$$QL_i = QK_i \left[\frac{PL_i}{PK_i}.\frac{\gamma_i}{(1-\gamma_i)}\right]^{-\sigma_i} \tag{A-12}$$

The CES function has a constant elasticity of substitution between inputs equal to σ. This can be verified, as follows:

$$\frac{QL_i}{QK_i} = \left[\frac{PL_i}{PK_i}\frac{\gamma_i}{(1-\gamma_i)}\right]^{\sigma_i}$$

Therefore:

$$\frac{\partial(QL_i/QK_i)}{\partial(PL_i/PK_i)}\frac{(PL_i/PK_i)}{(QL_i/QK_i)} = \sigma_i \left(\frac{\gamma_i}{1-\gamma_i}\right)^{\sigma_i} \left(\frac{PL_i}{PK_i}\right)^{\sigma_i-1} \left(\frac{PL_i/PK_i}{QL_i/QK_i}\right)$$

$$= \sigma_i \frac{\left(\frac{\gamma_i}{(1-\gamma_i)}\frac{PL_i}{PK_i}\right)^{\sigma_i}}{(QL_i/QK_i)} = \sigma_i \frac{\left(\frac{\gamma_i}{(1-\gamma_i)}\frac{PL_i}{PK_i}\right)^{\sigma_i}}{\left(\frac{\gamma_i}{(1-\gamma_i)}\frac{PL_i}{PK_i}\right)^{\sigma_i}} = \sigma_i \tag{A-13}$$

The next stage is to obtain the factor demand functions for QK_i and QL_i. Firstly, to obtain each parameter substitute equations (A-11) and (A-12) separately into the factor cost function (A-3):

$$PF_iQF_i = PL_iQK_i \left[\frac{PL_i}{PK_i}.\frac{\gamma_i}{(1-\gamma_i)}\right]^{-\sigma_i} + PK_iQK_i \tag{A-14}$$

and :

$$PF_iQF_i = PL_iQL_i + PK_iQL_i \left[\frac{PK_i}{PL_i}.\frac{(1-\gamma_i)}{\gamma_i}\right]^{-\sigma_i} \tag{A-15}$$

The solution algorithms for the factor demands are almost identical for both parameters so only the function for QK_i is derived. The next stage is to factor out QK_i from equation (A-14):

$$PF_iQF_i = QK_i \left[PK_i + PL_i \left(\frac{PL_i}{PK_i} \right)^{-\sigma_i} \left(\frac{1-\gamma_i}{\gamma_i} \right)^{-\sigma_i} \right]$$

rearrange for QK_i to give the factor demand function:

$$QK_i = \frac{PV_iQV_i}{PK_i + PL_i \left(\frac{PL_i}{PK_i} \right)^{-\sigma_i} \left(\frac{1-\gamma_i}{\gamma_i} \right)^{-\sigma_i}}$$

$$QK_i = \frac{PV_iQV_i \left((1-\gamma_i)/PK_i \right)^{\sigma_i}}{PL_i^{1-\sigma_i} \gamma_i^{\sigma_i} + PK_i^{1-\sigma_i} (1-\gamma_i)^{\sigma_i}} \tag{A-16}$$

Following the same method we also find the expression for the labour input demand function:

$$QL_i = \frac{PV_iQV_i \left(\gamma_i/PL_i \right)^{\sigma_i}}{PL_i^{1-\sigma_i} \gamma_i^{\sigma_i} + PK_i^{1-\sigma_i} (1-\gamma_i)^{\sigma_i}} \tag{A-17}$$

We can also obtain the dual price index:

$$PF_i = \frac{1}{A_i} \left[\gamma_i^{1-\sigma_i} PL_i + (1-\gamma_i) PK_i^{1-\sigma_i} \right]^{1/(1-\sigma_i)} \tag{A-18}$$

A.2 Chapter 5 Appendicies

A.2.1 Calibrated Mark-ups and Conjectures

Table A5.1: Calibrated Mark-ups and Conjectures

	Scenario	if $\mu_i^M = 0$, $1/\lvert\varepsilon_i^M\rvert =$	if $\mu_i^D = 0$, $1/\lvert\varepsilon_i^D\rvert =$	if $\mu_i^D = -1$, $1/\lvert\varepsilon_i^D\rvert =$	if $\mu_i^M = 0$, then $\lambda_i^M =$	if $\mu_i^D = 0$, then $\lambda_i^D =$	if $\mu_i^D = -1$, then $\lambda_i^D =$
1	Agriculture	0.24	0.24	1.67	0.03	0.02	0.35
2	Manufacturing	0.14	0.13	0.19	-0.08	0.00	0.04
3	Hotels	0.26	0.26	0.41	0.17	0.13	0.37
4	Hostels	0.26	0.21	0.30	-0.14	0.04	0.14
5	Camp Sites	0.26	0.18	0.19	-0.30	0.01	0.02
6	Other Accommodation	0.26	0.21	0.25	-0.14	0.06	0.14
7	Restaurants	0.26	0.27	0.46	0.23	0.15	0.43
8	Air Transport	0.29	0.28	0.18	-0.88	-0.62	-0.73
9	Land Transport	0.26	0.29	1.50	0.15	0.03	0.36
10	Sea Transport	0.26	0.23	1.08	-0.09	0.00	0.16
11	Travel Agents	0.26	0.22	0.36	-0.10	0.04	0.18
12	Passenger Transport Supporting Services	0.28	0.24	0.36	-0.15	-0.01	0.14
13	Car Rental	0.26	0.23	0.44	-0.09	0.03	0.18
14	Leisure	0.27	0.23	0.31	-0.16	0.00	0.12
15	Public Sector	-	-	-	-	-	-
16	Other Services	0.24	0.23	0.24	-0.05	0.04	0.21

A.3 Chapter 6 Appendicies

A.3.1 Regional Input Output Tables: Summary Data

Tables A6.1 through to A6.5 present summary data from the 5 regional input output tables used in Chapter 5.

Table A6.1: Summary Figures from the Andalucia Input-Output Table

	GDP (% of total) (1)	Share of Labour Returns (2)	Share of Capital Returns (3)	Capital-Labour Ratio (4)	Proportion of Foreign Tourism in Final Demand (5)	Proportion of Domestic Tourism in Final Demand (6)	% of Exports in Final Demand (7)	% of Imports in Final Demand (8)	% of Imports from Other Spanish Regions (9)	% of Intermediate Imports (10)	Average Effective VAT Rate (%) (11)
1 Agriculture	7.6%	6.0%	11.0%	1.5	0%	0.5%	34.7%	0.6%	2.5%	42.2%	0.9%
2 Manufacturing	37.8%	37.9%	37.4%	0.8	1%	0.5%	8 6%	6.8%	17.2%	42.4%	10.9%
3 Hotels	4.1%	4.7%	3.3%	0.6	23%	50.9%	0.0%	0.0%	0.0%	1.2%	8.6%
4 Hostels	0.5%	0.6%	0.4%	0.6	59%	39.1%	0.0%	0.0%	0.0%	1.1%	7.7%
5 Camp Sites	0.0%	0.0%	0.0%	0.6	68%	22.9%	0.0%	0.0%	0.0%	1.9%	7.7%
6 Other Accomodation	6.0%	3.5%	9.5%	2.1	51%	13.2%	0.0%	0.0%	0.0%	8.6%	8.8%
7 Restaurants	4.2%	5.8%	2.4%	0.3	26%	29.4%	0.0%	0.0%	0.0%	31.9%	8.8%
8 Air Transport	0.4%	0.3%	0.6%	1.6	31%	26.6%	0.0%	0.0%	0.0%	0.2%	8.8%
9 Land Transport	3.5%	2.5%	4.7%	1.5	1%	2.8%	9.8%	2.0%	13.6%	15.4%	8.9%
10 Sea Transport	0.0%	0.0%	0.0%	0.6	4%	10.9%	0.0%	2.4%	0.0%	5.6%	8.4%
11 Travel Agents	0.1%	0.2%	0.1%	0.4	8%	59.9%	0 0%	0.0%	12.9%	7.8%	11.4%
12 Passenger Transport Supporting Services	0.6%	0.6%	0.5%	0.6	1%	2.9%	0.0%	0.2%	0.0%	35.9%	12.2%
13 Car Rental	0.6%	0.4%	0.7%	1.3	5%	11.0%	0.0%	0.0%	0.0%	28.4%	8.0%
14 Leisure	0.7%	0.8%	0.5%	0.5	18%	32.0%	0.0%	0.1%	0.0%	12.8%	11.5%
15 Public Sector	13.7%	17.7%	7.8%	0.4	0%	0.3%	0.0%	0.0%	0.0%	32.0%	7.7%
16 Other Services	20.3%	19.1%	21.2%	0.9	3%	2.7%	0.1%	15.8%	0.5%	9.6%	10.1%
17 Total	100%	100%	100%	-	-	-	-	-	-	-	-

Source: Adapted from the 1995 IO Table for Andalucia and 1996 SUT for Spain, for further details see Chapter 4.

Table A6.2: Summary Figures from the Canary Islands Input-Output Table

	GDP (% of total) (1)	Share of Labour Returns (2)	Share of Capital Returns (3)	Capital-Labour Ratio (4)	Proportion of Foreign Tourism in Final Demand (5)	Proportion of Domestic Tourism in Final Demand (6)	% of Exports in Final Demand (7)	% of Imports in Final Demand (8)	% of Imports from Other Spanish Regions (9)	% of Intermediate Imports (10)	Average Effective VAT Rate (%) (11)
1 Agriculture	3 44%	4.3%	3.2%	0.7	3%	0.6%	24.8%	5.1%	7.3%	30%	3.1%
2 Manufacturing	26.32%	26.8%	27.3%	0.9	4%	2.3%	6.6%	19.2%	17.2%	43%	2.9%
3 Hotels	7.40%	8.5%	5.6%	0.6	52%	22.4%	0.0%	0.0%	0.0%	12%	9.7%
4 Hostels	3.76%	3.8%	3.8%	0.9	91%	9.0%	0.0%	0.0%	0.0%	16%	3.1%
5 Camp Sites	0.15%	0.1%	0.2%	0.9	99%	1.3%	0.0%	0.0%	0.0%	28%	6.0%
6 Other Accomodation	10.67%	8.6%	12.8%	1.3	79%	7.6%	0.0%	0.0%	0.0%	5%	6.0%
7 Restaurants	6.83%	7.0%	5.9%	0.7	71%	21.1%	0.0%	0.0%	0.0%	25%	15.4%
8 Air Transport	0.85%	0.6%	1.1%	1.6	76%	9.7%	0.0%	0.0%	7.7%	9%	5 9%
9 Land Transport	2.07%	2.0%	2 6%	1.2	15%	6.2%	0.0%	0.0%	0.0%	11%	0.9%
10 Sea Transport	0.28%	0.2%	0.4%	1.4	19%	10.9%	0.0%	0.0%	5.2%	13%	9.3%
11 Travel Agents	0.29%	0.4%	0.2%	0.5	37%	57.9%	0.0%	0.0%	0.0%	2%	12.2%
12 Passenger Transport Supporting Services	0.49%	0.6%	0.4%	0.6	37%	13.8%	0.0%	0.0%	0.0%	7%	11.9%
13 Car Rental	0.61%	0.4%	0.8%	1.6	70%	0.6%	0.0%	0.0%	0.0%	1%	6.9%
14 Leisure	2.43%	1.9%	2.9%	1.3	41%	35.8%	0.0%	0.0%	0.0%	13%	7.6%
15 Public Sector	11.00%	12.0%	9.6%	0.7	3%	0.2%	0.0%	0.0%	0.0%	21%	8.8%
16 Other Services	23.41%	22.7%	23.3%	0.9	8%	5.5%	14.6%	7.8%	2.7%	23%	11.9%
17 Total	**100%**	**100%**	**100%**	-	-	-	-	-	-	-	-

Source: Adapted from the 1992 IO Table for Canary Islands and 1996 SUT for Spain, for further details see Chapter 4.

Table A6.3: Summary Figures from the Castilla y León Input-Output Table

	GDP (% of total) (1)	Share of Labour Returns (2)	Share of Capital Returns (3)	Capital-Labour Ratio (4)	Proportion of Foreign Tourism in Final Demand (5)	Proportion of Domestic Tourism in Final Demand (6)	% of Exports in Final Demand (7)	% of Imports in Final Demand (8)	% of Imports from Other Spanish Regions (9)	% of Intermediate Imports (10)	Average Effective Tax Rate (%) (11)
1 Agriculture	6.0%	5.9%	8.3%	1.3	0.4%	1.3%	3.4%	4.1%	4.7%	33.0%	1.4%
2 Manufacturing	35.7%	36.9%	33.7%	0.8	0.2%	1.0%	18.8%	8.3%	16.4%	46.1%	12.2%
3 Hotels	1.8%	2.2%	1.3%	0.5	6.3%	33.3%	0.0%	0.0%	0.0%	11.5%	7.6%
4 Hostels	0.9%	1.1%	0.7%	0.6	5.9%	36.2%	0.0%	0.0%	0.0%	26.9%	8.6%
5 Camp Sites	0.1%	0.2%	0.1%	0.4	5.1%	37.0%	0.0%	0.0%	0.0%	47.6%	7.4%
6 Other Accomodation	0.7%	0.6%	0.7%	1.0	2.3%	10.7%	0.0%	0.0%	0.0%	32.8%	6.8%
7 Restaurants	4.7%	5.6%	3.7%	0.6	2.4%	17.5%	0.0%	0.0%	0.0%	10.9%	6.9%
8 Air Transport	0.2%	0.2%	0.2%	0.8	3.8%	20.6%	23.5%	0.0%	1.8%	29.0%	0.8%
9 Land Transport	2.7%	2.0%	4.3%	2.0	0.5%	11.0%	5.0%	0.0%	1.8%	34.1%	0.9%
10 Sea Transport	0.1%	0.0%	0.1%	2.1	3.1%	19.7%	0.0%	0.0%	4.3%	24.0%	3.2%
11 Travel Agents	0.4%	0.5%	0.3%	0.5	1.7%	42.7%	0.0%	0.0%	4.3%	30.7%	6.6%
12 Passenger Transport Supporting Services	0.5%	0.5%	0.5%	1 0	6.5%	26.9%	0.0%	0.0%	2.3%	37.9%	8.0%
13 Car Rental	0.3%	0.2%	0.3%	1.3	3.3%	8.5%	0.0%	0.0%	0.1%	27.6%	15.3%
14 Leisure	0.7%	0.8%	0.7%	0.8	5.8%	25.3%	0.0%	0.0%	0.0%	12.4%	15.6%
15 Public Sector	15.5%	25.6%	4.0%	0.1	0.1%	0.1%	0.0%	0.0%	0.0%	38.9%	5.5%
16 Other Services	29.8%	17.7%	41.2%	2.1	0.5%	0.6%	15.7%	0.3%	3.1%	16.3%	13.9%
17 Total	100%	100%	100%	-	-	-	-	-	-	-	-

Source: Adapted from the 1995 IO Table for Castilla y León and 1996 SUT for Spain, for further details see Chapter 4.

Table A6.4: Summary Figures from the Madrid Input-Output Table

	GDP (% of total) (1)	Share of Labour Returns (2)	Share of Capital Returns (3)	Capital-Labour Ratio (4)	Proportion of Foreign Tourism in Final Demand (5)	Proportion of Domestic Tourism in Final Demand (6)	% of Exports in Final Demand (7)	% of Imports in Final Demand (8)	% of Imports from Other Spanish Regions (9)	% of Intermediate Imports (10)	Average Effective VAT Rate (%) (11)
1 Agriculture	0.2%	0.4%	0.2%	0.4	2%	3.6%	5.0%	12.6%	74.9%	40.7%	1.7%
2 Manufacturing	33.1%	32.5%	33.4%	0.9	0%	0.3%	32.2%	8.2%	9.4%	46.2%	5.9%
3 Hotels	0.9%	1.1%	0.7%	0.6	51%	37.7%	0.0%	0.0%	0.0%	42.0%	8.7%
4 Hostels	0.5%	0.5%	0.4%	0.7	46%	41.6%	0.0%	0.0%	0.0%	32.0%	9.4%
5 Camp Sites	0.0%	0 1%	0.0%	0.1	21%	24.7%	0.0%	0.0%	0.0%	0.0%	9.9%
6 Other Accomodation	0.9%	0.5%	1.3%	2.2	10%	2.6%	0.0%	0.0%	0.0%	36 8%	13.9%
7 Restaurants	3.0%	3.4%	2.5%	0.6	12%	19.6%	0.0%	0.0%	0.0%	56.0%	11.3%
8 Air Transport	0.7%	0.7%	1.0%	1.3	11%	5.0%	38.5%	2.1%	2.3%	46.4%	2.2%
9 Land Transport	3 8%	4.5%	3.9%	0.8	0%	2.5%	14 1%	3.0%	7.6%	38.5%	0.4%
10 Sea Transport	0.2%	0.2%	0.2%	0.8	5%	7.6%	33.8%	6.7%	36.8%	57.1%	2.3%
11 Travel Agents	0.5%	0.6%	0.4%	0.6	3%	49.5%	2.8%	4.9%	4.9%	12.9%	7.5%
12 Passenger Transport Supporting Services	0.2%	0.2%	0.3%	1.3	10%	33.8%	0.0%	0.0%	0.0%	16.8%	12.6%
13 Car Rental	0.3%	0.2%	0.3%	1.4	10%	11.1%	4.0%	7.9%	7.5%	7.3%	7.0%
14 Leisure	0.4%	0.3%	0.6%	1.8	18%	21.0%	0.0%	0.0%	0.0%	0.0%	10.0%
15 Public Sector	12.5%	21.7%	2.7%	0.1	0%	0.3%	0.0%	0.0%	0.0%	30.7%	1.8%
16 Other Services	42.7%	33.2%	52.3%	1.4	1%	0.5%	31.9%	4.4%	4.3%	18.8%	9.8%
17 Total	**100%**	**100%**	**100%**	-	-	-	-	-	-	-	-

Source: Adapted from the 1996 IO Table for Madrid and 1996 SUT for Spain, for further details see Chapter 4.

Table A6.5: Summary Figures from the Rest of Spain Input-Output Table

	GDP (% of total) (1)	Share of Labour Returns (2)	Share of Capital Returns (3)	Capital-Labour Ratio (4)	Proportion of Foreign Tourism in Final Demand (5)	Proportion of Domestic Tourism in Final Demand (6)	% of Exports in Final Demand (7)	% of Imports in Final Demand (8)	% of Imports from Other Spanish Regions (9)	% of Intermediate Imports (10)	Average Effective VAT Rate (%) (11)
1 Agriculture	4.3%	7.0%	2.0%	0.2	1%	2.1%	18.2%	8.1%	14.4%	23.6%	1.3%
2 Manufacturing	25.4%	20.3%	30.8%	1.2	1%	0.9%	9.3%	11.3%	5.4%	22.9%	12.7%
3 Hotels	2.7%	3.4%	1.9%	0.4	56%	26.3%	0.0%	0.0%	0.0%	4 8%	4.7%
4 Hostels	1.0%	1.2%	0.7%	0.5	51%	44.1%	0.0%	0.0%	0.0%	15.2%	6.6%
5 Camp Sites	0.1%	0.1%	0.0%	0.4	58%	39 5%	0.0%	0.0%	0.0%	42.2%	6.9%
6 Other Accomodation	2.5%	1.3%	4.1%	2.4	16%	9.6%	0.0%	0.0%	0 0%	26.4%	6 6%
7 Restaurants	6.5%	8 2%	3.9%	0.4	15%	31.9%	0.0%	0.0%	0.0%	4.1%	8.3%
8 Air Transport	0.4%	0.3%	0.6%	1.4	34%	36.2%	9.9%	9.5%	1 6%	28.4%	9.1%
9 Land Transport	5.7%	7.9%	4.7%	0.5	1%	5.2%	10.1%	0.3%	33.6%	14.4%	6.6%
10 Sea Transport	1.4%	1.3%	1.7%	1.1	2%	0.6%	26.2%	0.4%	6 9%	13.5%	6.3%
11 Travel Agents	0.5%	0 6%	0.2%	0.3	8%	69 4%	4.2%	0.3%	1.4%	5.4%	13.0%
12 Passenger Transport Supporting Services	0.4%	0.3%	0.5%	1.3	19%	26.1%	5.4%	0.2%	0.1%	7.2%	12.2%
13 Car Rental	0.3%	0.2%	0.4%	1.3	16%	22.0%	6.1%	1.0%	0.5%	14.3%	10.5%
14 Leisure	2.0%	2 3%	1.5%	0.5	18%	50.0%	0.1%	0.0%	0.0%	26.9%	9.3%
15 Public Sector	9.1%	10.9%	6.5%	0.5	0%	0.4%	1.3%	0.0%	6.6%	20.6%	13.4%
16 Other Services	37.8%	34.8%	40.5%	0.9	0%	0.9%	7.8%	1.2%	0.5%	9.8%	7.9%
17 Total	**100%**	**100%**	**100%**	-	-	-	-	-	-	-	-

Source: Adapted from the Regional Input Output Tables for Andalucia, the Canary Islands, Castilla y León and Madrid and the 1996 SUT for Spain, for further details see Chapter 4.

A.3.2 Calibrated Mark-ups and Conjectures

Table A6.6 Calibrated Domestic Mark-ups, $\mu_i^D = 0$

Scenario	Andalucia if $\mu_i^D = 0$ then $1/\lvert\varepsilon_i^d\rvert =$	Canaries if $\mu_i^D = 0$ then $1/\lvert\varepsilon_i^d\rvert =$	Castilla y León if $\mu_i^D = 0$ then $1/\lvert\varepsilon_i^d\rvert =$	Madrid if $\mu_i^D = 0$ then $1/\lvert\varepsilon_i^d\rvert =$	Rest of Spain if $\mu_i^D = 0$ then $1/\lvert\varepsilon_i^d\rvert =$
1 Agriculture	0.25	0.22	0.20	0.10	0.23
2 Manufacturing	0.17	0.16	0.10	0.16	0.12
3 Hotels	0.30	0.30	0.32	0.38	0.27
4 Hostels	0.35	0.31	0.28	0.37	0.30
5 Camp Sites	0.31	0.31	0.26	0.18	0.31
6 Other Accommodation	0.30	0.28	0.24	0.22	0.20
7 Restaurants	0.29	0.32	0.29	0.35	0.30
8 Air Transport	0.16	0.27	0.33	0.38	0.25
9 Land Transport	0.17	0.17	0.26	0.30	0.21
10 Sea Transport	0.22	0.36	0.21	0.24	0.34
11 Travel Agents	0.23	0.30	0.30	0.33	0.28
12 Passenger Transport Supporting Services	0.22	0.26	0.30	0.22	0.23
13 Car Rental	0.29	0.34	0.36	0.29	0.27
14 Leisure	0.23	0.29	0.30	0.30	0.27
15 Public Sector	-	-	-	-	-
16 Other Services	0.25	0.22	0.22	0.16	0.18

Table A6.7: Calibrated Mark-ups, $\mu_i^M = 0$

Scenario	Andalucia if $\mu_i^M = 0$, $1/\|\varepsilon_i^m\| =$	Canaries if $\mu_i^M = 0$, $1/\|\varepsilon_i^m\| =$	Castilla y León if $\mu_i^M = 0$, $1/\|\varepsilon_i^m\| =$	Madrid if $\mu_i^M = 0$, $1/\|\varepsilon_i^m\| =$	Rest of Spain if $\mu_i^M = 0$, $1/\|\varepsilon_i^m\| =$
1 Agriculture	0.20	0.23	0.21	0.10	0.20
2 Manufacturing	0.18	0.18	0.17	0.16	0.14
3 Hotels	-	-	-	-	-
4 Hostels	-	-	-	-	-
5 Camp Sites	-	-	-	-	-
6 Other Accomodation	-	-	-	-	-
7 Restaurants	-	-	-	-	-
8 Air Transport	0.14	0.36	0.36	0.36	0.25
9 Land Transport	0.23	0.26	0.26	0.26	0.26
10 Sea Transport	0.22	0.36	0.36	0.26	0.35
11 Travel Agents	0.32	0.32	0.32	0.31	0.32
12 Passenger Transport Supporting Services	0.24	0.32	0.32	0.32	0.31
13 Car Rental	0.32	0.32	0.32	0.31	0.30
14 Leisure	0.27	0.28	0.28	0.28	0.28
15 Public Sector	-	-	-	-	-
16 Other Services	0.26	0.26	0.26	0.24	0.25

Table A6.8: Rival Domestic Firms Conjectures, $\mu_i = 0$

Scenario	Andalucia	Canaries	Castilla y León	Madrid	Rest of Spain
	if $\mu_i^D = 0$, then $\lambda_i^D =$	if $\mu_i^D = 0$, then $\lambda_i^D =$	if $\mu_i^D = 0$, then $\lambda_i^D =$	if $\mu_i^D = 0$, then $\lambda_i^D =$	if $\mu_i^D = 0$, then $\lambda_i^D =$
1 Agriculture	0.01	0.06	0.02	-0.21	0.03
2 Manufacturing	0.05	0.07	0.04	0.02	0.00
3 Hotels	0.24	0.26	0.15	0.13	0.15
4 Hostels	0.22	0.22	0.17	0.12	0.22
5 Camp Sites	0.27	0.27	0.15	0.00	0.27
6 Other Accomodation	0.25	0.26	0.08	0.06	0.21
7 Restaurants	0.22	0.20	0.19	0.16	0.22
8 Air Transport	-0.61	-0.63	-0.54	-0.43	-0.63
9 Land Transport	-0.01	-0.01	0.03	0.03	0.02
10 Sea Transport	-0.68	-0.46	-0.62	-0.59	-0.51
11 Travel Agents	-0.27	-0.19	-0.19	-0.23	-0.23
12 Passenger Transport Supporting Services	-0.26	-0.25	-0.21	-0.28	-0.27
13 Car Rental	-0.24	-0.09	0.03	-0.18	-0.26
14 Leisure	-0.01	0.09	0.15	0.14	0.06
15 Public Sector	-	-	-	-	-
16 Other Services	0.02	0.03	0.03	0.02	0.02

Table A6.9: Rival Foreign Firms Conjectures, $\mu_i^M = 0$

Scenario	Andalucia	Canaries	Castilla y León	Madrid	Rest of Spain
	if $\mu_i^M = 0$, then $\lambda_i^M =$	if $\mu_i^M = 0$, then $\lambda_i^M =$	if $\mu_i^M = 0$, then $\lambda_i^M =$	if $\mu_i^M = 0$, then $\lambda_i^M =$	if $\mu_i^M = 0$, then $\lambda_i^M =$
1 Agriculture	-0.03	0.04	-0.02	-0.28	-0.05
2 Manufacturing	0.00	-0.01	-0.05	-0.06	-0.09
3 Hotels	-	-	-	-	-
4 Hostels	-	-	-	-	-
5 Camp Sites	-	-	-	-	-
6 Other Accomodation	-	-	-	-	-
7 Restaurants	-	-	-	-	-
8 Air Transport	-0.69	-1.37	-0.92	-0.45	-0.87
9 Land Transport	-0.24	-0.36	0.00	-0.01	-0.16
10 Sea Transport	-0.93	-0.59	-1.73	-0.89	-0.75
11 Travel Agents	-0.76	-0.34	-0.35	-0.50	-0.50
12 Passenger Transport Supporting Services	-0.46	-0.60	-0.36	-0.83	-0.75
13 Car Rental	-0.47	-0.01	0.27	-0.36	-0.49
14 Leisure	-0.19	0.17	0.32	0.29	0.04
15 Public Sector	-	-	-	-	-
16 Other Services	-0.19	-0.13	-0.12	-0.12	-0.19

A.4 Chapter 7 Appendices

A.4.1 Calibrated Mark-ups and Conjectures

Table A7.1: Canaries Model - Calibrated Mark-Ups, Benchmark Case

	Scenario	if $\mu_i^D = 0$ then $1/\|\varepsilon_i^d\| =$	$\mu_i^M = 0$ $1/\|\varepsilon_i^m\| =$	$\mu_i^M = 1$ $1/\|\varepsilon_i^m\| =$	$\mu_i^M = 6$ $1/\|\varepsilon_i^m\| =$	$\mu_i^M = 10$ $1/\|\varepsilon_i^m\| =$
1	Agriculture	0.22	0.38	0.37	0.35	0.32
2	Manufacturing	0.16	0.23	0.22	0.21	0.19
3	Hotels	0.30	-	-	-	-
4	Hostels	0.29	-	-	-	-
5	Camp Sites	0.31	-	-	-	-
6	Other Accomodation	0.30	-	-	-	-
7	Restaurants	0.28	-	-	-	-
8	Air Transport	0.27	0.55	0.53	0.51	0.47
9	Land Transport	0.17	-	-	-	-
10	Sea Transport	0.36	0.49	0.48	0.46	0.39
11	Travel Agents	0.29	-	-	-	-
12	Passenger Transport Supporting Services	0.25	-	-	-	-
13	Car Rental	0.34	-	-	-	-
14	Leisure	0.28	-	-	-	-
15	Public Sector		-	-	-	-
16	Other Services	0.23	0.35	0.33	0.31	0.29

Table A7.2: Canaries Model - Endogenously Determined Conjectural Variations - Values of λ_i^D and λ_i^M

	Scenario	if $\mu_i^D = 0$ then $\lambda_i^D =$	$\mu_i^M = 0$ then $\lambda_i^M =$	$\mu_i^M = 1$ then $\lambda_i^M =$	$\mu_i^M = 6$ then $\lambda_i^M =$	$\mu_i^M = 10$ then $\lambda_i^M =$
1	Agriculture	0.05	0.01	0.03	0.04	0.00
2	Manufacturing	0.06	-0.02	-0.01	-0.01	-0.01
3	Hotels	0.24	-	-	-	-
4	Hostels	0.20	-	-	-	-
5	Camp Sites	0.27	-	-	-	-
6	Other Accomodation	0.25	-	-	-	-
7	Restaurants	0.18	-	-	-	-
8	Air Transport	-0.63	-0.92	-0.79	-0.65	-0.63
9	Land Transport	-0.01	-0.36	-0.36	-0.36	-0.36
10	Sea Transport	-0.48	-0.65	-0.64	-0.62	-0.61
11	Travel Agents	-0.21	-	-	-	-
12	Passenger Transport Supporting Services	-0.26	-	-	-	-
13	Car Rental	-0.09	-	-	-	-
14	Leisure	0.08	-	-	-	-
15	Public Sector		-	-	-	-
16	Other Services	0.04	-0.06	-0.05	-0.03	-0.03

A.5 Derivation of Relative Armington Prices

The Armington aggregate good is produced from a combination of domestic and imported varieties following equation (4.18) given in Chapter 4.

$$QA_i = B_i \left[\alpha_i QD_{j,i}^{(\phi_i - 1/\phi_i)} + (1-\alpha_i)\, QM_i^{(\phi_i - 1/\phi_i)}\right]^{(\phi_i/(\phi_i - 1))}$$

The unit demand functions for the domestic and foreign varieties are derived using the same method:

$$QD_i = \frac{PA_i QA_i \,(\gamma_i / PD_i)^{\phi_i}}{PD_i^{1-\phi_i}\gamma_i^{\phi_i} + PM_i^{1-\phi_i}\,(1-\gamma_i)^{\phi_i}} \tag{A-19}$$

$$QM_i = \frac{PA_i QA_i \,((1-\gamma_i)/PM_i)^{\phi_i}}{PD_i^{1-\phi_i}\gamma_i^{\phi_i} + PM_i^{1-\phi_i}\,(1-\gamma_i)^{\phi_i}} \tag{A-20}$$

while the supply function for domestic variety is:

$$SD_i = \beta_i PD_i^{\theta_i} \tag{A-21}$$

where θ_i is the elasticity of domestic supply and β_i is a share parameter. The price of the imported variety (PM_i) assumed to be exogenous. Dividing equation (A-19) by (A-20) we obtain:

$$\frac{QD_i}{QM_i} = \frac{\gamma_i^{\phi_i} PD_i^{-\phi_i}}{(1-\gamma_i)^{\phi_i}\, PM_i^{-\phi_i}} \tag{A-22}$$

rearranging to give:

$$QD_i.PD_i^{\phi_i}.\gamma_i^{-\phi_i} = (1-\gamma_i)^{-\phi_i}\, PM_i^{\phi_i} QM_i \tag{A-23}$$

totally differentiate:

$$\gamma_i^{-\phi_i}.\phi_i.PD_i^{\phi_i - 1}.QD_i.\partial PD_i + \gamma_i^{-\phi_i}.PD_i^{\phi_i}.\partial QD_i \tag{A-24}$$

$$= (1-\gamma_i)^{-\phi_i}.\phi_i.PM_i^{\phi_i - 1} QM_i.\partial PM_i + (1-\gamma_i)^{-\phi_i}.PM_i^{\phi_i}.\partial QM_i \tag{A-25}$$

or, writing $\widehat{QD_i} = \partial QD_i/QD_i$, $\widehat{PD_i} = \partial PD_i/PD_i$ etc.

$$\gamma_i^{-\phi_i}.\phi_i.PD_i^{\phi_i}.QD_i.\widehat{PD_i} + \gamma_i^{-\phi_i}.PD_i^{\phi_i}.QD_i.\widehat{QD_i} \tag{A-26}$$

$$= (1-\gamma_i)^{-\phi_i}.\phi_i.PM_i^{\phi_i}QM_i.\widehat{PM_i} + (1-\gamma_i)^{-\phi_i}.PM_i^{\phi_i}.QM_i.\widehat{QM_i} \tag{A-27}$$

However, from equation (A-23)we know that $QD_i.PD_i^{\phi_i}.\gamma_i^{-\phi_i} = (1-\gamma_i)^{-\phi_i}PM_i^{\phi_i}QM_i$, dividing through by both sides we obtain:

$$\frac{\gamma_i^{-\phi_i}.\phi_i.PD_i^{\phi_i}.QD_i.\widehat{PD_i}}{QD_i.PD_i^{\phi_i}.\gamma_i^{-\phi_i}} + \frac{\gamma_i^{-\phi_i}.PD_i^{\phi_i}.QD_i.\widehat{QD_i}}{QD_i.PD_i^{\phi_i}.\gamma_i^{-\phi_i}}$$

$$= \frac{(1-\gamma_i)^{-\phi_i}.\phi_i.PM_i^{\phi_i}QM_i.\widehat{PM_i}}{(1-\gamma_i)^{-\phi_i}PM_i^{\phi_i}QM_i,} + \frac{(1-\gamma_i)^{-\phi_i}.PM_i^{\phi_i}.QM_i.\widehat{QM_i}}{(1-\gamma_i)^{-\phi_i}PM_i^{\phi_i}QM_i,} \tag{A-28}$$

which gives:

$$\phi_i.\widehat{PD_i} + \widehat{QD_i} = \phi_i.\widehat{PM_i} + \widehat{QM_i} \tag{A-29}$$

But by definition of the elasticity of substitution:

$$\widehat{QD_i} - \widehat{QM_i} = \phi_i\left(\widehat{PM_i} - \widehat{PD_i}\right) \tag{A-30}$$

or

$$\widehat{QM_i} = \widehat{QD_i} - \phi_i\left(\widehat{PM_i} - \widehat{PD_i}\right) \tag{A-31}$$

so substituting for $\widehat{QM_i}$ in equation (A-29):

$$\phi_i.\widehat{PD_i} + \widehat{QD_i} = \phi_i.\widehat{PM_i} + \widehat{QD_i} - \phi_i\left(\widehat{PM_i} - \widehat{PD_i}\right) \tag{A-32}$$

But by definition of the elasticity of domestic supply and given equilibrium in the market for the domestic variety:

$$\widehat{QD_i} = \widehat{SD_i} = \beta_i\widehat{PD_i} \tag{A-33}$$

so

$$\beta_i\widehat{PD_i} + \phi_i\widehat{PD_i} = \phi_i\widehat{PM_i} \tag{A-34}$$

rearranging gives:

$$\widehat{PD_i} = \frac{\phi_i}{\phi_i + \beta_i}\widehat{PM_i} \tag{A-35}$$

Based on this relationship two special cases exist:

1. If $\phi_i = 0$ then there should be no change in PD_i as $\widehat{PD_i} = 0$.
2. As $\phi_i \rightarrow \infty$ the varieties become perfect substitutes, and $PD_i = PM_i$, $\widehat{PD_i} = \widehat{PM_i}$.