The New Economic Geography and Regional Growth in Brazil and India

by

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Chapter V - The Case of Brazil - Panel Results

Introduction

The structure of the Chapter will be the following: in Section V.1 we will discuss the correlation matrix for the panel data, comparing it with the cross-section one; in Sections V.2.1, V.2.2, V.2.3 and V.2.4, the panel results for the samples 1950-1995 (18 states), 1950-1970 (18 states), 1970-1995 (18 states) and 1970-1995 (24 states) will be discussed, respectively. In Section V.3, the panel results with PROX and YPROXM, instead of TR and YTRM, will be discussed. Section V.4 will discuss alternative interaction terms. Section V.5 will discuss the importance of the performance of the Northern region for our results. Section V.6 will investigate if there were changes in the coefficients between the periods 1950-1970 and 1970-1995. Section V.7 will observe if the sign of the interaction term has changed with time. Section V.8 will present the results when we try to observe if other variables are being omitted from our models.

V.1 - Correlation Matrix

Table V.1 shows the correlation matrix for the panel sample of 1950-1995. It can be seen that the results are similar to the cross-section ones. The main difference is that the income growth rate is related to no right-hand side.

The richer states in per capita terms are highly industrialised and well provided with services. They have high population density as well.

TR and PROX are positively correlated, suggesting that the two variables are measuring economic distances from markets, and so both of them are useful as proxies for transportation cost. YTRM is also highly positively correlated with YPROXM.

YTRM positively reflects São Paulo and the states of SE, while YPROXM negatively reflects the higher distances from the market faced by the states of NE, and the smaller distances from the market of the states of SE.

São Paulo (SP) has a very high per capita income and has a large share of its output dedicated to the industrial production. It faces low transportation costs (positive correlations with TR and PROX).

The states of the Southeast (SE) are rich in per capita terms and well provided with services and industries, showing also high population density and low transportation costs.

The states of the Northeast (NE) are poor in per capita terms and are far from the richest markets.

The correlations of CO and S are weak.

Table V.1 - CORRELATION MATRIX (1950-1995: 18 States)

	gr	y	indgsp	nonagr	dd	tr	trm
gr	1.0000						
y	-0.3297	1.0000					
indgsp	-0.3639	0.7583	1.0000				
nonagr	-0.2168	0.6600	0.8040	1.0000			
dd	-0.2288	0.5772	0.4449	0.5805	1.0000		
tr	-0.1961	0.6988	0.7290	0.6700	0.5117	1.0000	
trm	-0.0899	0.4944	0.4466	0.3316	0.4627	0.8285	1.0000
item	-0.0985	0.6256	0.5084	0.3761	0.4725	0.7801	0.8710
prox	-0.0181	0.7186	0.4143	0.3530	0.4500	0.5069	0.5659
proxm	-0.0139	0.6858	0.3698	0.2993	0.4359	0.4702	0.5676
yproxm	-0.0965	0.7757	0.4719	0.4083	0.5770	0.5376	0.5667
ne	-0.0881	-0.5700	-0.1636	-0.0842	-0.1597	-0.2918	-0.3522
se	-0.0493	0.4820	0.2727	0.3651	0.4951	0.3455	0.4170
s	0.0116	0.2554	0.1547	-0.0527	-0.1089	0.3286	0.3966
co	0.1916	-0.0337	-0.2839	-0.2865	-0.2717	-0.3825	-0.4617
sp	0.0009	0.4731	0.3571	0.2565	0.1877	0.3481	0.4202

	ytrm	prox	proxm	yproxm	ne	se	s
ytrm	1.0000						
prox	0.6146	1.0000					
proxm	0.6094	0.9971	1.0000				
yproxm	0.7671	0.8504	0.8435	1.0000			
ne	-0.3322	-0.8102	-0.8126	-0.5329	1.0000		
se	0.4301	0.7743	0.7766	0.6830	-0.5345	1.0000	
s	0.2763	0.2434	0.2441	0.0551	-0.4472	-0.2390	1.0000
co	-0.3681	-0.0240	-0.0240	-0.1211	-0.3536	-0.1890	-0.1581
sp	0.5856	0.5478	0.5494	0.7097	-0.2425	0.4537	-0.1085

	co	sp
co	1.0000	
sp	-0.0857	1.0000

Table V.2 shows the results for the 18-State sample of the period 1950-1970. The growth rate of total output does not have any significant correlation with the other variables.

Richer states in per capita terms were the most industrialised ones, the ones with more supply of services, the ones better provided with transport availability and with a higher population density. The richest states are in SE (especially SP) and the poorest ones are in NE.

SP is characterised by having a high share of industrial income and by having a good provision of transport.

SE has a high provision of transport and has the highest share, among the regions, of industrial and service incomes. SE has high population density.

NE has the lower population density and, together with CO, is badly provided with transport availability.

The two interaction terms are highly positively correlated with SP and SE and highly negatively correlated with NE.

Table V.2 - CORRELATION MATRIX (1950-1970: 18 States)

	gr	y	indgsp	nonagr	dd	tr	trm
gr	1.0000						
y	-0.0453	1.0000					
indgsp	0.0519	0.6806	1.0000				
nonagr	0.0492	0.6683	0.7568	1.0000			
dd	-0.0996	0.6355	0.5772	0.7723	1.0000		
tr	-0.0981	0.7659	0.6490	0.5591	0.6220	1.0000	
trm	-0.0246	0.7163	0.7139	0.5772	0.6122	0.9493	1.0000
ytrm	0.0597	0.7795	0.7379	0.6639	0.6389	0.8745	0.8947
prox	0.1036	0.7932	0.5642	0.4901	0.4201	0.6131	0.6507
proxm	0.0940	0.7980	0.5625	0.4909	0.4224	0.6178	0.6508
yproxm	0.0889	0.8650	0.7190	0.6732	0.5991	0.6895	0.7212
ne	-0.2019	-0.6486	-0.2526	-0.1755	-0.1327	-0.3997	-0.4210
se	-0.0033	0.5934	0.4191	0.5821	0.4980	0.5296	0.5578
s	0.0800	0.2405	0.1752	-0.0938	-0.1258	0.2675	0.2818
co	0.2307	-0.0383	-0.3603	-0.3797	-0.2985	-0.3819	-0.4023
sp	0.0650	0.5783	0.6527	0.3971	0.1544	0.5015	0.5282

	ytrm	prox	proxm	yproxm	ne	se	s
ytrm	1.0000						
prox	0.6433	1.0000					
proxm	0.6445	0.9998	1.0000				
yproxm	0.8334	0.8882	0.8883	1.0000			
ne	-0.3574	-0.8131	-0.8132	-0.5750	1.0000		
se	0.5749	0.7923	0.7925	0.7571	-0.5345	1.0000	
s	0.0881	0.2307	0.2307	0.0381	-0.4472	-0.2390	1.0000
co	-0.2962	-0.0281	-0.0281	-0.1319	-0.3536	-0.1890	-0.1581
sp	0.6675	0.5308	0.5309	0.7239	-0.2425	0.4537	-0.1085

	co	sp
co	1.0000	
sp	-0.0857	1.0000

Table V.3 shows the results for the small sample (18 states) of the period 1970-1995.

The income growth rate is only strongly correlated negatively with INDGSP. In the cross-section sample, this variable showed high correlations with almost all variables of the right-hand side.

Y, INDGSP, NONAGR and DD show similar patterns from the cross-section sample.

NE faces the highest distances from the richer markets, while SE faces the smallest distances.

CO is badly provided with transport availability.

YTRM positively reflects the behaviour of SP. It also weakly reflects the positive behaviour of the states of the South and of the Southeast, and the negative behaviour of the states of the NE and CO.

YPROXM reflects the high distances from the markets faced by the states of the Northeast and the proximity of the markets of the states of SE (especially of SP). In the cross-section sample this variable does not capture any dummy behaviour.

In per capita terms, the states of SE are the richest states, especially SP, and the states of NE are the poorest. CO shows a weak negative correlation with per capita income.

SE has a high population density and is close to the richer markets.

The states of NE and of CO face high transportation costs. The states of NE are far from the richest markets, while the states of CO are badly provided with roads and railways.

Table V.3 - CORRELATION MATRIX (1970-1995: 18 States)

	gr	y	indgsp	nonagr	dd	tr	trm
gr	1.0000						
y	-0.4360	1.0000					
indgsp	-0.5854	0.6705	1.0000				
nonagr	-0.4578	0.5515	0.6818	1.0000			
dd	-0.2700	0.5394	0.3663	0.6461	1.0000		
tr	-0.1939	0.5673	0.5907	0.5046	0.4401	1.0000	
trm	-0.1402	0.5425	0.5490	0.4851	0.4371	0.9888	1.0000
ytrm	-0.2120	0.7537	0.6152	0.5142	0.4836	0.8717	0.8731
prox	-0.0487	0.7949	0.4391	0.4041	0.4599	0.5361	0.5497
proxm	-0.0908	0.8125	0.4687	0.4259	0.4671	0.5415	0.5515
yproxm	-0.1391	0.8167	0.4813	0.4995	0.5670	0.5521	0.5594
ne	0.0017	-0.7046	-0.2024	-0.0683	-0.1857	-0.3239	-0.3299
se	-0.0867	0.5796	0.3383	0.4918	0.5366	0.3542	0.3608
s	-0.0429	0.3339	0.2200	-0.0605	-0.1106	0.4598	0.4682
co	0.1628	-0.0417	-0.3865	-0.4702	-0.2831	-0.4985	-0.5077
sp	-0.0504	0.5703	0.3961	0.3584	0.2190	0.3736	0.3805

	ytrm	prox	proxm	yprox	ne	se	s
ytrm	1.0000						
prox	0.7073	1.0000					
proxm	0.7123	0.9983	1.0000				
yproxm	0.8077	0.8954	0.8958	1.0000			
ne	-0.4481	-0.7987	-0.8000	-0.5807	1.0000		
se	0.4870	0.7771	0.7785	0.7480	-0.5345	1.0000	
s	0.3805	0.2637	0.2641	0.0746	-0.4472	-0.2390	1.0000
co	-0.3826	-0.0700	-0.0702	-0.1541	-0.3536	-0.1890	-0.1581
sp	0.6522	0.5486	0.5496	0.7760	-0.2425	0.4537	-0.1085

	co	sp
co	1.0000	
sp	-0.0857	1.0000

Table V.4 show the correlations for the 24-State sample of 1970-1995.

In the cross-section sample, the income growth rate was correlated with DD, TR, PROX, the interaction terms and the dummy for the Northern states (N). In the panel sample, GRGSP is negatively correlated with INDGSP and has a weaker negative correlation with per capita income and NONAGR.

The correlation of Y and INDGSP are similar in both samples.

The dummy for SE has a weaker correlation in the panel sample.

TR and PROX perform as in the cross-section samples. North has a poor provision of roads and railways, while SE and S have a good one. The states of the North face high distances from the richer markets and the opposite occurs with the states of SE.

YTRM has a positive correlation with SP, SE (and a weak one with S), and a negative correlation with N. YPROXM has a positive correlation with S and SP and a negative correlation with N and NE.

SP has a high per capita income and a high share of industrial output. SE has rich states well provided with industries and services. Its states have high population density and face low transportation costs.

The states of NE are very poor in per capita terms.

The South has good provision of transport and CO has a small share of services in its income.

The states of the North have low population density and are the ones who face high transportation costs in the 24-State sample.

Table V.4 - CORRELATION MATRIX (1970-1995: 24 States)

	gr	y	indgsp	nonagr	dd	tr	trm
gr	1.0000						
y	-0.4025	1.0000					
indgsp	-0.4802	0.5978	1.0000				
nonagr	-0.3776	0.5593	0.6596	1.0000			
dd	-0.2844	0.4959	0.3061	0.4972	1.0000		
tr	-0.2893	0.4361	0.4110	0.2925	0.5621	1.0000	
trm	-0.2729	0.4091	0.3790	0.2662	0.5590	0.9919	1.0000
ytrm	-0.2311	0.5756	0.4072	0.2820	0.5791	0.8974	0.9009
prox	-0.1761	0.6782	0.3609	0.2832	0.5633	0.6861	0.6938
proxm	-0.1992	0.6920	0.3788	0.3006	0.5673	0.6888	0.6944
yproxm	-0.1997	0.7305	0.3842	0.3531	0.6405	0.6591	0.6620
n	0.2771	-0.0536	-0.1021	0.0430	-0.3896	-0.6771	-0.6826
ne	-0.1228	-0.5781	-0.0969	-0.0719	0.0212	0.0897	0.0904
se	-0.1304	0.5487	0.2837	0.3986	0.5780	0.4266	0.4301
s	-0.0899	0.3230	0.1914	-0.0603	-0.0144	0.4778	0.4817
co	0.0644	-0.0299	-0.2819	-0.4068	-0.1889	-0.2433	-0.2452
sp	-0.0685	0.5474	0.3219	0.3016	0.2471	0.3543	0.3572

	ytrm	prox	proxm	yproxm	n	ne	se
ytrm	1.0000						
prox	0.7792	1.0000					
proxm	0.7794	0.9992	1.0000				
yproxm	0.8481	0.9147	0.9145	1.0000			
n	-0.5487	-0.5139	-0.5143	-0.4215	1.0000		
ne	-0.0836	-0.3820	-0.3823	-0.2992	-0.4472	1.0000	
se	0.5279	0.7757	0.7763	0.7567	-0.2582	-0.3464	1.0000
s	0.4246	0.3325	0.3328	0.1834	-0.2182	-0.2928	-0.1690
co	-0.2138	0.0304	0.0304	-0.0553	-0.1741	-0.2335	-0.1348
sp	0.5976	0.5284	0.5288	0.7385	-0.1204	-0.1615	0.4663

	s	co	sp
s	1.0000		
co	-0.1140	1.0000	
sp	-0.0788	-0.0629	1.0000

V.2 - One-Way (time) Fixed Regressions

All the econometric models specified in the previous chapter will be considered in this section.

The results were tested for heteroscedasticity using the Cook and Weisberg (1983) approach. Under the null (homoscedasticity), t is equal to zero in the following specification:

$Var(e) = s^{2exp(zt)}$, where t is the fitted values.

If our sample was facing heteroscedasticity, we corrected it with White's method.

Due to the small length of our time periods, it is impossible to test for autocorrelation of the residuals.[1]

We did not choose to run all the equations correcting for autocorrelation within this chapter, due to the fact that the usage of time-fixed effect panel data and the assumptions used for generating the robust variance estimator (with the cluster command) require too many degrees of freedom (see stata website, FAQ).

The complete set of equations can be seen in Appendix 2. The tables displayed inside the chapter only display a subset of more representative equations taken from them. The two main specifications without the dummies and the analogous specification, controlling for the dummy for NE and the dummy for SP, are shown. The inclusion of these dummies aims to test for robustness and also to control for omitted variables.

Besides the significant coefficients, we will only consider a coefficient to be negative or positive if its t-statistic is higher than one.

V.2.1 - 1950-1995 (18 States)

a) INDGSP

Table V.5 shows the panel results for the 18-state sample of the period 1950-1995.

The first column shows a regression that includes per capita GDP, the share of industry, transport availability and population density only.

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[1] The major change after correcting for autocorrelation (using the command

None of these variables are statistically significant. Only population density (-1.50) has a t-statistic that exceeds one, and the sign of the INDGSP coefficient is contrary to the predictions of the model.

In column (3), we add dummy variables for SP and the Northeast. The SP dummy is positive and significant at the 1% level (+2.67), and so is the NE dummy (-4.33). The INDGSP variable now has a positive but highly insignificant coefficient (t-statistic of +0.16). In this specification, per capita income has a significant negative coefficient (-3.80), implying a dispersion of economic activity towards poorer states, once special factors in SP and NE have been accounted for.

In column (5) our specification includes per capita income, INDGSP, the interaction term (YTRM) and the population density variable (DD). This specification resembles column (1) except that YTRM replaces TR. Again, the coefficients are not significant.

The coefficient of INDGSP is negative (with a t-statistic higher than one).

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cluster (state) in stata) is the small increase in the number of significant coefficients for DD and SP.

Controlling for the dummies for SP and NE, in column (7), significant results are very similar to column (3).

The per capita income coefficient is now significantly negative at the 1% level (-3.82), indicating again a dispersion of activities.

In Equation (8a), the demeaned variable, TRM, was significant. It includes Y, INDGSP, TRM, YTRM, DD and NE. Y is negative and significant (-3.69), indicating that there was a dispersion of economic activity towards the poorer states. TRM is negative and significant (-2.03). YTRM is positive and significant (+2.34) and NE is significant, with a t-statistic of -4.32.

The combination of a negative Y and a positive YTRM implies that, although poor states were growing faster, this effect is diminished by low transportation cost. Nevertheless, Y is still negative, showing that other causes are prevailing and helping the activities to disperse towards the poorer states of Brazil. This combination is also found in Equation (8), Appendix 2, Table I.

Observing all the results in Appendix 2 - Table I, we can observe that the NE dummy is always negative and significant.

Observing also the coefficients with t-statistics higher than one, and excluding the NE dummy, DD is negative, suggesting the existence of congestion effects, and INDGSP is usually negative, which means that highly industrialised states grew less.

Table V.5 -INDGSP & TR - BRAZIL - 1950-1995 (18 states)

dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t	8a	t
Y	-0,047	(-0.176)	-1,631***	(-3.803)	-0,108	(-0.376)	-1,685***	(-3.822)	-1.666***	(-3.688)
INDGSP	-0,038	(-0.886)	6,94E-03	(0.157)	-0,043	(-1.045)	-0,010	(-0.254)	0,036	(0.809)
TR	0,544	(0.280)	-0,926	(-0.497)						
TRM									-6.192**	(-2.032)
YTRM					0,380	(-0.654)	0,329	(0.578)	2.122**	(2.339)
DD	-9.84 E-03	(-1.495)	5,23E-03	(0.744)	-9.90 E-03	(-1.526)	3,92E-03	(0.571)	2.79 E-03	(0.407)
SP			3,685***	(2.669)			3.435**	(2.420)		
NE			-3,375***	(-4.328)			-3.336***	(-4.336)	-3.522***	(-4.318)
R2	0,491		0,554		0,492		0,554		0,549	
MSE	3,140		2,958		3,137		2,957		2,974	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.6 -NONAGR & TR - BRAZIL - 1950-1995 (18 states)

dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t	7a	t
Y	-0,166	(-0.668)	-1,633***	(-4.165)	-0,225	(-0.817)	-1,758***	(-4.237)	-1,946***	(-4.620)
NONAGR	0,036	(1.118)	0,044	(1.418)	0,032	(1.028)	0,039	(1.278)	0.056*	(1.790)
TR	-0,701	(-0.397)	-1,240	(-0.745)						
TRM									-5.802**	(-2.009)
YTRM					0,057	(0.106)	0,258	(0.477)	1.807*	(1.924)
DD	-0,014*	(-1.862)	3,10E-04	(0.040)	-0.014*	(-1.904)	-7,37E-04	(-0.095)	4.62 E-04	(0.060)
SP			3.312**	(2.389)			3,002***	(2.092)	2.423*	(1.672)
NE			-3,449***	(-4.672)			-3.473***	(-4.657)	-3.900***	(-5.078)
R2	0,492		0,560		0,492		0,559		0,571	
MSE	3,136		2,938		3,137		2,941		2,912	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.6 shows the results with NONAGR.

Specification (1) includes only per capita income, the share of non-agricultural income (NONAGR), transport availability (TR) and population density (DD). It does not show any significant variable, with the exception of the negative DD (-1.86). The sign of the coefficient of NONAGR is the one predicted by the model, which could indicate that economies of scale outside the agricultural sector were helping growth, and the coefficient of NONAGR has a t-statistic greater than one (+1.12).

The introduction of the dummies for SP and NE in column (5) changes the sign of DD and makes Y significant (t-statistic of -4.17, as in Table V.4).

SP is positive and significant at 5% (+2.39) and NE is negative and significant, showing a t-statistic of -4.67. NONAGR has a positive coefficient with a t-statistic at least higher than one.

Column (5) shows the specification that includes per capita income, NONAGR, the interaction term (YTRM) and population density. Population density is significant at the 10% level (-1.90). NONAGR shows a positive coefficient with a t-statistic higher than one (+1.03).

Introducing the dummies (Equation (7)), once more per capita income is highly significant (-4.24) and negative. SP also shows a significant coefficient at the 5% level, with t-statistics of +2.09. NE shows a t-statistic of -4.66 (significant at 1%). NONAGR remains positive, with a t-statistic higher than one.

The specifications with NONAGR are much more robust since, when we introduce the dummies, few coefficients change signs. Comparing (5) and (7), there is no change in the signs of the coefficients. The main change is that per capita income is now significant.

Specification (7a) includes Y, NONAGR, TRM, YTRM, DD, SP and NE. Both dummies are statistically significant. Y is negative and significant (-4.62), TRM is negative and significant (-2.01), YTRM is positive and significant (+1.92), while NONAGR shows a positive and significant coefficient (+1.79), supporting the idea that externalities in the industrial and service sectors taken together were concentrating economic activity.

In this specification, we found again significant coefficients for Y (negative) and YTRM (positive). The negative coefficient for Y indicates that, at average levels of transport availability, economic activity is dispersing towards poorer states. The positive coefficient of YTRM shows that this effect is strongest when transport availability is low (i.e. TRM <0) and the positive coefficient for YTRM indicates that lower transportation cost was generating a concentration of activities towards the richest states. In spite of that, counteractive forces were still helping the existence of a dispersion of activities among the states of Brazil, since Y is negative.

Observing all the results in Appendix 2 - Table II, and also considering the coefficients with t-statistics higher than one, we confirm that the significant NE is extremely important to highlight a pattern of behaviour for our variables.

There was a dispersion of economic activity towards poor states, since Y is negative and significant, when controlling for the special effects of NE.

NONAGR is frequently positive (and four times significant), suggesting a concentration of economic activity due to "backward and forward" linkages.

YTRM is positive and significant in the two equations with the significant TRM.

DD is negative, not controlling for NE, and shows positive and significant coefficients when the dummy for NE is also included in the specification.

Comparing the panel results with the cross-section results, the main differences are:

a) per capita income is significant in the equations with smaller MSEs (which are usually the ones that include dummies). Per capita income is negative in the panel exercises;

b) the interaction term is more often significant;

c) the importance of using DD decreases, since its coefficient is rarely significant;

d) controlling for NE, we could find a significant pattern for the combination of the coefficients of Y and YTRM. The signs of these coefficients are different from the cross-section exercise, when Y was also positive.

V.2.2 - 1950-1970 (18 States)

a) INDGSP

Table V.7 shows the results for INDGSP.

Equation (1) includes Y, INDGSP, TR and DD. No coefficient is significant in this equation. Only per capita income has a t-statistic greater than one (+1.21), displaying a positive sign.

Including the dummies, in Equation (3), the sign of the coefficient of per capita income changes. Only NE is negative and significant (-2.54).

Equation (5) shows the results with the interaction term, including in its specification Y, INDGSP, YTRM and DD. Only the coefficient of DD has a t-statistic greater than one (-1.22).

Including the dummies, in Equation (7), NE is significant (-2.31). Per capita income is negative and significant (-1.70) and the interaction term has a t-statistic greater than one (-+1.03).

Specification (5a) includes Y, INDGSP, TRM, YTRM and DD. TRM is negative and significant (-1.87), while YTRM is positive and significant (+2.01). DD shows a negative coefficient.

Controlling for SP and NE, Equation (7a), we obtained a negative and significant coefficient for per capita income (-2.29), and a positive and significant coefficient for YTRM (this significant combination is also found in Equation 8a, Appendix 2, Table III). The positive interaction term suggests that a decrease in transportation cost was generating concentration of economic activity.

Despite this economic factor, other elements were generating dispersion of economic activity, since Y is negative.

In Equation (7a) NE is negative and significant (-3.19) and INDGSP shows a positive coefficient with a t-statistic higher than one.

Observing all the results in Appendix 2, Table III, the significant NE will again help us to make some other inferences.

Per capita income is frequently negative and significant with NE, suggesting that there was a dispersion of economic activity towards poorer states.

The coefficients for INDGSP with t-statistics at least higher than one show positive coefficients, providing some weak support for the hypothesis of the model.

YTRM is usually positive in the specifications and positive and significant with the inclusion of TRM.

DD is frequently negative and SP is rarely significant.

Table V.7 -INDGSP & TR - BRAZIL - 1950-1970 (18 states)

dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t	5a	t	7a	t
Y	1,125	1,12	-3,056	-1,56	0,392	0,38	-3.317*	-1.70	0,511	(0.50)	-4.255**	(-2.29)
INDGSP	9.81 E-03	0,09	0,082	0,68	-0,046	-0,44	0,037	0,32	-0,028	(-0.27)	0,135	(1.18)
TR	-3,505	-0,64	-6,509	-1,19								
TRM									-13.922*	(-1.87)	-23.033***	(-3.05)
YTRM					2,518	0,97	2,958	1,03	7.161**	(2.01)	11.822***	(2.98)
DD	-0,017	-0,88	0,031	1,09	-0,024	-1,22	9.02 E-03	0,31	-0,020	(-1.07)	0,015	(0.53)
SP			4,743	1,37			2,163	0,58			0,324	(0.09)
NE			-4.552***	-2,54			-4.051**	-2,31			-5.475***	(-3.19)
R2	0,277		0,346		0,283		0,342		0,321		0,429	
MSE	3,776		3,650		3,760		3,660		3,689		3,438	

* Equations (1) and (5) were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.8 -NONAGR & TR - BRAZIL - 1950-1970 (18 states)

dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t	5a	t	7a	t
Y	0,715	0,73	-3.751**	-2.00	-0,054	-0,05	-4.276**	-2,26	0,199	(0.20)	-4.494**	(-2.49)
NONAGR	0,076	1,26	0.119*	1,95	0,072	1,20	0.126**	2,08	0,051	(0.83)	0.108*	(1.85)
TR	-3,002	-0,58	-4,592	-0,89								
TRM									-12.794*	(-1.70)	-18.945***	(-2.63)
YTRM					1,769	0,72	3,158	1,14	6.285*	(1.75)	10.581***	(2.74)
DD	-0,035	-1,47	9.24 E-03	0,30	-0.041*	-1,77	-0,014	-0,45	-0,033	(-1.401)	-2.00 E-03	(-0.07)
SP			4,786	1,47			1,977	0,57			1,273	(0.38)
NE			-4.996***	-2,89			-4.786***	-2,80			-5.565***	(-3,36)
R2	0,295		0,379		0,297		0,384		0,328		0,447	
MSE	3,730		3,556		3,724		3,541		3,671		3,383	

* Equations (1) and (5) were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.8 shows the result with NONAGR.

Equation (1) includes Y, NONAGR, TR and DD. There are no significant coefficients. NONAGR (+1.26) and DD (-1.47) show t-statistics greater than one.

Including the dummies in Equation (3), NE is negative and significant (-2.89) and NONAGR is positive and significant (+1.95). This last result suggests that economic activity was moving towards the states with a high share of services and industries. Per capita income is negative and significant (-2.00).

Equation (5) includes Y, NONAGR, the interaction term - YTRM, and DD. Only DD is negative and significant at the 10% level (-1.77). NONAGR is positive with a t-statistic higher than one (+1.20).

Including the dummies (7), once more we have a significant coefficient for NONAGR (t-statistic of +2.08). Per capita income is significant and negative (t-statistic of -2.26), implying the poor states were showing higher total income growth rates. NE is negative and significant at the 1% level (-2.80). The interaction term shows a t-statistic higher than one (+1.14).

Equation (5a) includes Y, NONAGR, TRM, YTRM and DD, TRM is negative and significant (-1.70), YTRM is positive and significant (+1.75), and DD shows a negative coefficient.

Controlling for SP and NE (which is significant), Y is negative and significant (-2.49) and YTRM is positive and significant (+2.74), which was the same combination we have found with INDGSP. This combination also appears in (8a)(Appendix 2, Table IV).

NONAGR is positive and significant (-2.63), supporting the hypothesis that economies of scale in the industrial and service sector taken together were generating concentration in this period.

Observing Appendix 2 - Table IV, once more the importance of controlling for the special effects of NE appears (NE is negative and significant).

Controlling for NE, we frequently found negative and significant coefficients for per capita income and positive and significant coefficients for YTRM in the specifications that include the TRM variable. YTRM is also positive in almost all specifications with the interaction term.

NONAGR is positive and significant, controlling for NE, and it frequently shows positive coefficients.

DD frequently shows negative coefficients and SP is never significant.

The main differences with the cross-section exercises are:

a) per capita income is negative in the panel exercises;

b) there is an increase in the number of significant coefficients for the interaction term.

V.2.3 - 1970-1995 (18 States)

a) INDGSP

Table V.9 shows the results for the small sample of the period 1970-1995.

Specification (1), with Y, INDGSP, TR and DD, shows only two coefficients with t-statistics greater than one: the negative ones for DD and INDGSP.

Including the dummies, in specification (3), Y becomes significant at the 1% level (-3.88).

SP shows a t-statistic of +3.13 and NE of -3.79.

Specification (5) includes Y, INDGSP, YTRM and DD. INDGSP is negative and significant at the 10% level (-1.74), indicating that there was a dispersion of activities towards the less industrialised states.

DD is once more negative.

Including the dummies, in (7), Y becomes negative and significant at 1% (t-statistic of -3.90). SP shows a t-statistic of +2.92 and NE of -3.84.

Observing the whole set of equations in Appendix 2, Table V, we can add that per capita income is always negative and significant controlling for NE.

On the other hand, not including NE, INDGSP is negative and significant and DD is negative.

We were unable to find a pattern for the combination of Y and YTRM.

Table V.9 -INDGSP & TR - BRAZIL - 1970-1995 (18 states)

dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t
Y	-0,127	(-0.550)	-1,901***	(-3.881)	-0,176	(-0.718)	-1.907***	(-3.900)
INDGSP	'-0,067*	(-1.678)	-0,003	(-0.067)	'-0,068*	(-1.736)	-6.03 E-04	(-0.015)
TR	1,196	(0.686)	0,261	(0.160)				
YTRM					0,395	(0.805)	0,034	(0.069)
DD	'-9.29 E-03	(-1.603)	0,005	(0.809)	-9.04 E-03	(-1.579)	0,005	(0.839)
SP			5,044***	(3.129)			5,021***	(2.923)
NE			-4,064***	(-3.793)			'-4,084***	(-3.842)
R2	0,676		0,732		0,677		0,732	
MSE	2,513		2,316		2,510		2,317	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.10 -NONAGR & TR - BRAZIL - 1970-1995 (18 states)
dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t
Y	-0,262	(-1.229)	-1,924***	(-4.437)	-0,292	(-1.233)	-1,925***	(-4.371)
NONAGR	-0,046	(-1.014)	0,002	(0.052)	-0,048	(-1.059)	0,004	(0.079)
TR	0,257	(0.159)	0,189	(0.128)				
YTRM					0,149	(0.322)	0,026	(0.057)
DD	-0,005	(-0.803)	0,005	(0.764)	-0,005	(-0.790)	0,005	(0.762)
SP			5,052***	(3.151)			5,027***	(2.992)
NE			-4,115***	(-4.061)			-4,118***	(-4.059)
R2	0,669		0,732		0,670		0,732	
MSE	2,540		2,316		2,539		2,317	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

In Table V.10 we observe the usual result for Y, SP and NE.

Equation (1) includes Y, NONAGR, TR and DD. Y and NONAGR are negative.

Controlling for SP and NE, in Equation (3), per capita income is negative and significant and the dummies are significant.

Equation (5) includes Y, NONAGR, YTRM and DD. Y and NONAGR are negative. Controlling for SP and NE, in Equation (7), there was a dispersion of economic activity towards poorer states, since Y is negative and significant (-4.37). The dummies are significant: SP shows a t-statistic of +2.99 and NE of -4.06.

Observing all the results in Appendix 2, Table VI, we need only to add that the per capita income is usually negative and significant and that NONAGR shows a negative coefficient, if we do not control for NE.

Comparing the panel results with the cross-section results for the small sample of 1970-1995, we can observe:

a) there is more evidence that Y is negative and significant;
b) twice INDGSP showed a significant coefficient in the panel results (and the coefficient is always negative in the two exercises);
c) TR and PROX are consistently positive;
d) there is a decrease in the significance of DD.

Conclusion for the 18-State Sample

Table V.11 helps us to summarise the panel results (using all the information in Appendix 2). It is important to remember that the symbols (<) and (>) are applied for coefficients with t-statistics higher than one and that the symbols (<*) and (>*) show significant coefficients.

TABLE V.11 - PANEL RESULTS (TR)

5095	<	>	<*	>*	number of equations
Y*	1	0	4	0	8
INDGSP	3	0	0	0	9
NONAGR	0	4	0	4	10
TR	0	0	0	0	10
DD	6	0	2	0	19
SP	0	2	0	5	9
NE	0	0	11	0	11
Y**	1	0	7	0	11
YTRM	0	2	0	3	11
Y*&YTRM*	< 3 >				

5070 (18 States)	<	>	<*	>*	number of equations
Y*	2	0	1	0	8
INDGSP	0	3	0	0	12
NONAGR	0	5	0	6	12
TR	1	0	0	0	8
DD	8	1	3	0	24
SP	2	2	0	0	12
NE	0	0	12	0	12
Y**	1	0	7	0	16
YTRM***	0	6	0	8	16
Y* & YTRM*	Y<* YTRM>* (4)				
7095 (18 States)	<	>	<*	>*	number of equations
Y*	2	0	5	0	8
INDGSP	0	0	4	0	8
NONAGR	4	0	0	0	8
TR	0	0	0	0	8
DD	4	0	0	0	16
SP	0	4	0	4	8
NE	0	0	8	0	8
Y**	3	0	4	0	8
YTRM	0	1	0	0	8
*** Y* & YTRM*	0				

7095 (24 States)	<	>	<*	>*	number of equations
Y*	1	0	5	0	8
INDGSP	2	0	2	0	8
NONAGR	0	3	0	0	10
TR	1	0	3	0	8
DD	7	2	2	2	18
SP	0	1	0	7	8
NE	0	0	9	0	9
Y**	1	0	6	0	10
YTRM	1	1	3	1	10
Y* & YTRM*	< > (1)				

Y* - without the interaction term

Y** - with the interaction term

*** - significant pairs of Y and the interaction term

In the first sub-period (1950-1970), per capita income was negative or negative and significant controlling for NE (Appendix 2, Table III, (3), (7), (8), (7a), (8a) and Table IV, Equations (3), (4), (7), (8), (7a) and (8a)), and it was usually negative in the second sub-period (1970-1995)(Appendix 2, Tables V and VI, with the exception of (1) and (5) in Table V). In the whole period, a negative and significant coefficient prevails for per capita income when controlling for NE (Appendix 2, Tables I and II, Equations (3), (4), (7), (8), (7a) and (8a)).

INDGSP shows positive coefficients controlling for NE and including TRM (Table III, Equations (7a) and (8a)) in the first sub-period. It shows negative and significant coefficients, when not controlling for NE, in the second sub-period (Table V, Equations (1), (2), (5), (6)). The result is a negative coefficient for INDGSP, without controlling for NE, in the whole period 1950-1995 (Table I, Equations (2), (5) and (6)).

TR seldom gives any information. TRM (with YTRM) shows negative coefficients for the period 1950-1970 and 1950-1995.

YTRM is frequently positive or positive and significant (with TRM) in the period 1950-1970 (Appendix 2, Tables III and IV, Equations (6), (7), (8), (5a), (6a), (7a) and (8a)). In the second sub-period, it only shows one positive coefficient (Appendix 2, Table V, Equation (8)). In the whole period, the interaction term is positive only in the specifications (8) (Tables I and II, Appendix 2), and positive and significant in Table I, Equation (8a) and Table II, Equations (7a) and (8a).

Congestion effects are usually only observable not controlling for NE.

NE is negative and significant and SP is rarely significant.

The result for NONAGR is similar to the results for INDGSP. NONAGR is positive or positive and significant when controlling for NE, in the first sub-period (almost all coefficients in Table IV). It is negative in the second sub-period, without controlling for NE. (Table IV, Equations (1), (2), (5) and (6)). For the whole period, it shows a positive coefficient (or positive and significant, with NE)(Table II).

Controlling for NE, we could find a pattern for the combination of Y and YTRM for the whole period 1950-1995 in specifications (8a), with INDGSP (Table I); and in specifications, (7a) and (8a), with NONAGR (Table II). Y is negative and significant, while YTRM is positive and significant in them. It suggests that a lower transportation cost was decreasing the higher growth rates of the poor states, acting in favour of a concentration of activities, as in phase II of the K&V(m) model.

The same pattern was found for the first sub-period (1950-1970). The relevant specifications are (7a), (8a), with INDGSP (Table III) and (7a) and (8a) with NONAGR (Table IV).

We could not find any pattern for the second sub-period.

INDGSP shows positive coefficients, controlling for NE (Table III, Equations (7a) and (8a)), for the period 1950-1970, weakly supporting the hypothesis that economies of scale in the industrial sector were generating concentration. This result is also consistent with phase II of K&V(m) model.

For the other periods, INDGSP is negative (without NE in the whole period - Table I) or negative and significant (without Northeast in the second sub-period - Table V).

We considered that the interaction term was providing evidence that the whole period would be in phase II of K&V(m) model. The negative coefficient for INDGSP is not consistent with this statement.

NONAGR (with NE) supports significantly the hypothesis of the model in the period 1950-1970 (Table IV, Equations (3), (4), (7), (8), (7a) and (8a). In the period 1970-1995, it is negative (without NE) (Table VI, Equations (1), (2), (5) and (6)), and in the whole period it shows some significant positive coefficients controlling for NE (Table II, Equations (4) and (8)).

For the periods 1950-1995 and 1950-1970, the behaviour of NONAGR is in accordance with the model.

The coefficient of per capita income is usually negative and significant with NE for all samples. Although we would expect it to be positive in phase two, we can consider that other forces, not discussed by K&V(m) were interfering with the results.

The observation of the scarce importance of DD and SP for the sample 1950-1970 and 1950-1995 encouraged us to exclude DD from equation (8a) with INDGSP and NONAGR. Specification (1) in Table V.12 includes Y, INDGSP, TRM, YTRM and NE. Y, TRM and NE are negative and significant at the 1% level, while YTRM is positive and significant at this same level. INDGSP is positive, but not significant. With NONAGR, in specification (2), all the coefficients are significant. NONAGR is also positive and significant at the 10% level. Specifications (3) and (4) are run with PROXM and YPROXM showing similar results.

We did the same exercise for the whole period. The other results are similar(Table V.13).

Table V.12 - Without Congestion Effects (1950-1970)

	1	2	3	4
Y	-3.555***	-4.274***	-2.023***	-2.086***
INDGSP	0.131		0.058	
NONAGR		0.098*		0.017**
TRM/PROXM	-21.954***	-19.938***	-3.352*	-0.437**
YTRM/YPROXM	11.696***	11.364***	0.102**	0.112***
NE	-4.925***	-5.440***	-4.958***	-5.596***
R2	0.425	0.444	0.550	0.563
MSE	3.394	3.337	2.961	2.919

Table V.13 - Without Congestion Effects (1950-1995)

	1	2	3	4
Y	-1.570***	-1.785***	-2.023***	-2.086***
INDGSP	0.033	0.063**	0.058	
NONAGR				0.074**
TRM/PROXM	-5.809**	-7.030***	-0.352*	-0.437**
YTRM/YPROXM	2.041**	2.380***	0.103**	0.112***
NE	-3.385***	-3.769***	-4.958***	-5.596***
R2	0.5487	0.5617	0.5501	0.5627
MSE	2.9655	2.9226	2.9609	2.9191

We observed some specifications where, for these first two samples, the coefficient of the interaction term indicates concentration of activity, while the coefficient of per capita income indicates dispersion. Using the specifications with smaller MSR for the two samples ((7a) for 1950-1995 and (8a) for 1950-1970), we have calculated the amount of states for which the concentration effects of a decrease in transportation cost was stronger. For the whole period, only 12 states were in this category (Santa, Rio Grande do Sul and Mato Grosso). For the first sub-period, only eight states were included (Paraná, Santa Catarina and Goiás). With YPROXM, seven states are included (Paraná and Santa Catarina)).

V.2.4 - 1970-1995 (24 States)

a) INDGSP

Table V.14 shows the panel results for the 24-State sample of the period 1970-1995.

Specification (1) - Y, INDGSP, TR and DD, does not show any significant coefficient, although the t-statistics are greater than one (except for per capita income).

Specification (3) adds the dummies for SP and NE into (1). Per capita income is negative and significant at the 1% level (-5.07), suggesting dispersion of activities towards the poorer states. DD is positive and significant (+1.85), indicating possible agglomeration benefits from a high population density, after controlling for the peculiarities of SP and NE.

Specification (5) includes Y, INDGSP, YTRM and DD. INDGSP shows a negative and significant coefficient (-1.66). DD is negative and significant at 5% (-2.14).

Including the dummies (7), per capita income is again negative and significant (-4.86). DD assumes again a positive coefficient (+1.94).

SP and NE are significant at the 1% level. SP has a t-statistic of +4.80, while NE has a t-statistic of-4.72).

Observing all the results in Appendix 2, Tables VII, we can conclude that there was a dispersion of economic activity towards poorer states, controlling for NE (Equations (3), (4), (7) and (8)).

Not controlling for NE, INDGSP is negative or negative and significant (Table VI, Equations (1), (2), (5) and (6)).

Not controlling for NE and with INDGSP (Table VII), YTRM is also negative (5) or negative and significant (6).

SP and NE are significant.

Table V.14 -INDGSP & TR - BRAZIL - 1970-1995 (24 states)

dependent variable : GRGSP - panel results

	1	t	3	t	5	t	7	t
Y	0,004	(0.016)	-2,273***	(-5.071)	0,072	(0.256)	'-2,260***	(-4.864)
INDGSP	-0,074	(-1.340)	-0,035	(-0.579)	'-0,085*	(-1.657)	-0,035	(-0.613)
TR	-2,918	(-1.543)	-1,015	(-0.626)				
YTRM					-0,454	(-1.023)	-0,348	(-0.884)
DD	-9.83 E-03	(-1.625)	0,009*	(1.853)	-0.013**	(-2.140)	0,010*	(1.939)
SP			6,815***	(4.901)			7,306***	(4.795)
NE			-5,303***	(-4.942)			'-5,358***	(-4.716)
R2	0,501		0,582		0,492		0,582	
MSE	3,794		3,505		3,827		3,504	

* The coefficients were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.15 -NONAGR & TR - BRAZIL - 1970-1995 (24 states)
dependent variable : GRGSP - panel
results

	1	t	3	t	5	t	7	t	5a	t	8a	t
Y	-0,285	(-1.24)	-2,664***	(-6.71)	-0,225	(-0.87)	'-2,681***	(-6.64)	-0.531**	(-2.01)	-2,127***	(-5.81)
NONAGR	0,026	(0.39)	0,062	(0.94)	0,024	(0.36)	0,060	(0.90)	0,036	(0.53)	0,085	(1.23)
TR	-3,848**	(-2.32)	-0,997	(-0.76)								
TRM									-7,599**	(-2.16)	-5.972**	(-1.98)
YTRM					-0.665*	(-1.68)	-0,257	(-0.84)	1,234	(1.50)	1.709**	(2.31)
DD	-0,010	(-1.41)	0,008	(1.15)	'-0,014*	(-1.86)	0,008	(1.14)	-0,011	(-1.53)	-1.32 E-03	(-0.21)
SP			6,798***	(4.77)			7,166***	(4.67)				
NE			-5,875***	(-5.87)			'-5,979***	(-5.72)			-4.706***	(-5.09)
R2	0,485		0,584		0,470		0,584		0,492		0,562	
MSE	3,853		3,494		3,908		3,495		3,844		3,588	

* The coefficients were corrected for heteroscedasticity;
** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.15 gives the results with NONAGR.

Equation (1) includes per capita income (Y), the share of non-agricultural output (in total income) (NONAGR), transport availability (TR) and population density (DD).

TR shows the only significant coefficient at 5% (t-statistic of -2.32). The coefficient is negative, which suggests that good transport availability is associated with a dispersion of economic activities to other states.

NONAGR shows the expected sign, indicating that economies of scale in the industrial and service sectors were generating growth, but the coefficient is not significant, showing a t-statistic of +0.39.

Y and DD show negative coefficients with t-statistics greater than one.

Equation (3) adds the two dummies. SP is positive and significant at 1% (+4.77) and so is NE (-5.87).

The introduction of the dummies generates many changes: TR loses significance, Y becomes significant and DD changes sign.

Y shows a negative coefficient with a t-statistic equal to -6.71. This specification suggests that, after allowing for special factors in the case of SP and NE, there has been a strong dispersion of economic activity towards poorer states, independent of transport costs.

Specification (5) includes per capita income, NONAGR, the interaction term, and DD. The interaction term has a negative and significant coefficient (-1.68) and DD is also significant at 10% (-1.86), the negative sign indicating the presence of congestion effects.

When we add the dummies to this basic specification (Equation (7)), Y becomes negative and significant at 1% (-6.64).

DD still shows a t-statistic greater than one, but it is not significant even at the 10% level. Its sign has changed, indicating the collinearity of this variable with SP. YTRM is also not significant any more.

Both SP and NE show significant coefficients at the 1% level. SP shows a t-statistic of +4.67 and NE shows a t-statistic of -5.72.

Equation (5a) includes Y, NONAGR, TRM, YTRM, and DD. Per capita income is negative and significant (-2.01) and TRM is negative and significant (-2.16). YTRM (positive) and DD (negative) show t-statistics higher than one.

It is important to comment on Equation (8a). This specification includes Y, NONAGR, TRM, which is significant, YTRM, DD and NE. Y and YTRM show significant coefficients at least at the 5% level. This indicates that the coefficient of Y changes with the level of transportation cost. In this case, the negative coefficient of Y increases as we increase transport availability.

Observing all results in Appendix 2, Table VIII, per capita income is negative or negative and significant. Not controlling for NE, there are negative signs of congestion effects and decreases in transportation cost (TR and TRM) were generating dispersion of activity (Equations (1), (2), (5a), (6a)).

NONAGR is positive in the specifications that include only the dummy for NE ((4),(8) and (8a)).

YTRM shows ambiguous results. It is negative and significant in (5) and (6). Positive in (5a) and positive and significant in (8a). We refute that this sample can be explained by K&V(m) model.

The main difference with respect to the cross-section exercises is the evidence that there was a dispersion of economic activity, with the panel results, while in the cross-sections Y was positive.

V.3 - PROX

In this section, we will repeat the exercises above, for the three samples, but using PROX instead of TR.

The tables within the Chapter display the most important equations of Appendix 2.

V.3.1 - 1950-1995 (18 States)

a) INDGSP

Table V.16 shows the results with INDGSP and PROX.

Equation (1) includes per capita income (Y), the share of industrial output (INDGSP), a proxy for the proximity to the richer markets (PROX) and population density (DD). INDGSP and DD have no significant coefficients in this specification, although all their t-statistics are at least greater than one. Y is negative and significant at the 10% level (-1.87). PROX is positive and significant at the 5% level (+2.49), suggesting geographical concentration of economic activity.

Equation (3) includes the dummies for SP and NE. Per capita income has a negative and significant coefficient (t-statistic of -3.89), indicating that there was a dispersion of economic activity towards poorer states.

SP is positive and significant at the 1% level (+3.03) and NE is negative and significant, with a t-statistic of -3.89.

PROX shows a negative coefficient and DD shows a positive one, although they are not significant.

Equation (5) includes Y, INDGSP, the interaction term YPROXM and DD. The interaction term is not significant, but has a t-statistic greater than one (+1.21). A positive coefficient for YPROXM indicates that the negative coefficient of Y increases the closer the states are to the centres of economic activity.

DD is negative and significant (-1.70), indicating the presence of congestion effects.

Controlling for the special cases of SP and NE, Y is significant at the 1% level (-3.33). SP is positive and significant (+2.09) and NE is negative and significant (-4.28).

Equation (5a) includes Y, INDGSP, PROM, YPROXM and DD. Y is negative and significant (-1.69), PROXM is positive and significant (+2.16), and DD is negative.

Controlling for the special effects of SP and NE (7a), Y is negative and significant (-3.87), and PROXM is negative and significant (-1.94). SP is positive and significant at the 5% level (+2.20) and NE is negative and significant at the 1% level

(-4.01). The interaction term is positive, with a t-statistic of +1.28.

Observing the results for this sample in Appendix 2, Table IX, we can see that the interaction term, YPROXM, is significant in specification (8a) (t-statistic of +2.42), which includes Y, INDGSP, PROXM, YPROXM, DD and NE. Y is negative and significant at the 1% level in (8a) as well. The negative coefficient of Y and the positive coefficient of YPROXM indicate that there was a dispersion of activities towards poorer states, but that this effect varies strongly with distance, being stronger in the more distant states and weaker in the states closest to the main markets.

Per capita income is negative in the majority of the specifications.

INDGSP shows four negative and one positive coefficients.

PROX and PROXM are positive and significant without NE, while PROXM is negative and significant with NE.

DD shows usually a negative coefficient, but it is only significant in (5).

Table V.16 - INDGSP & PROX - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	t	5a	t	7a	t
Y	-0.693*	(-1.870)	-1.657***	(-3.887)	-0,385	(-0.982)	-1.622***	(-3.330)	-0.698*	(-1.686)	-2.072***	(-3.871)
INDGSP	-0,037	(-1.001)	0,016	(0.388)	-0,035	(-0.923)	-3.41 E-03	(-0.087)	-0,037	(-0.998)	0,039	(0.881)
PROX	0.236***	(2.488)	-0,210	(-1.461)								
PROXM									0.234**	(2.156)	-0.371**	(-1.943)
YPROXM					0,035	(1.209)	-4.45 E-04	(-0.013)	8.53 E-04	(0.026)	0,059	(1.277)
DD	-9.03 E-03	(-1.423)	9.26 E-03	(1.225)	-0.012*	(-1.699)	4.43 E-03	(0.591)	-9.07 E-03	(-1.378)	7.79 E-03	(1.021)
SP			4.762***	(3.032)			3.648**	(2.087)			3.814**	(2.200)
NE			-4.655***	(-3.889)			-3.309***	(-4.279)			-5.552***	(-4.007)
R2	0,511		0,560		0,495		0,553		0,511		0,565	
MSE	3,078		2,939		3,126		2,960		3,088		2,933	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.17 - NONAGR & PROX - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	t	5a	t	7a	t
Y	-0.832**	(-2.389)	-1.632***	(-4.255)	-0,543	(-1.458)	-1.732***	(-3.931)	-0.836**	(-2.108)	-2.075***	(-4.577)
NONAGR	0,024	(0.784)	0.052*	(1.690)	0,032	(1.023)	0,041	(1.315)	0,024	(0.782)	0.075**	(2.259)
PROX	0.222**	(2.322)	-0.247*	(-1.780)								
PROXM									0.221**	(2.014)	-0.455***	(-2.530)
YPROXM					0,326	(1.127)	7.60 E-03	(0.217)	5.65 E-04	(0.017)	0.081*	(1.799)
DD	-0.013*	(-1.739)	3.97 E-03	(0.495)	-0.016**	(-2.078)	-1.19 E-03	(-0.139)	-0.013*	(-1.685)	-8.04 E-04	(-0.096)
SP			4.543***	(2.908)			2.955*	(1.680)			3.164*	(1.829)
NE			-4.916***	(-4.417)			-3.401***	(-4.563)			-5.947***	(-4.779)
R2	0,509		0,568		0,496		0,559		0,509		0,577	
MSE	3,082		2,913		3,124		2,943		3,092		2,891	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.17 shows the results with NONAGR.

Column (1) shows the specification with Y, NONAGR, PROX and DD. Per capita income is negative and significant at the 5% level (-2.39). PROX is positive and significant at the 5% level and DD is negative and significant at the 10% level (-1.74). These results indicate that there was a dispersion of economic activity towards poor states, encouraged by congestion costs, and counterbalanced by proximity to the larger markets.

Equation (3) adds the dummies (SP and NE) to this basic specification. Taking into account the special cases of SP and NE, per capita income remains negative and significant (-4.26). NONAGR has a positive and significant coefficient (+1.69) and PROX, changing signs, shows a negative and significant coefficient.

The negative coefficient of per capita income indicates that economic activity was dispersing towards poorer states.

SP is significant at the 1% level (+2.91) and so is NE (-4.42).

Specification (5) includes Y, NONAGR, the interaction term (YPROXM) and DD. Only DD is significant at the 5% level (-2.08). Y and the interaction term have t-statistics greater than one (-1.46 and +1.13, respectively).

Including the dummies in this specification, as we can see in column (7), per capita income is negative and significant at the 1% level (-3.93). SP is positive and significant at the 10% level (+1.68) and NE is negative and significant at the 1% level (-4.56).

Equation (5a) includes Y, NONAGR, PROXM, YPROXM and DD. Y is negative and significant (-2.11), PROXM is positive and significant (+2.01) and DD is negative and significant (-1.69).

Controlling for SP and NE (7a), the dummies are significant. Y is negative and significant (-4.58), while YPROXM is positive and significant (+1.80), suggesting that a higher proximity to the richer markets decreases the advantage of the poor states.

NONAGR is positive and significant (+2.26), supporting the "backward and forward" hypothesis.

Observing all data in Appendix 2, Table X, we can confirm that there was dispersion towards poor states, since the coefficient of Y is almost always negative and significant.

NONAGR is positive and significant in several specifications - (3), (4), (8), (7a) and (8a)- which have in common the control for NE.

PROX and PROXM are positive and significant, not controlling for NE; while PROX and PROXM are negative and significant, when controlling for NE.

YPROXM shows positive and significant coefficients in (7a) and (8a). It shows positive coefficients in (5) and (8).

DD shows some negative or negative and significant coefficients.

SP is only significant with NE.

The amount of significant information in the panel results is higher than in the cross-section ones. The main difference is the consistent negative coefficient of per capita income in the panel exercises.

V.3.2 - 1950-1970 (18 states)

a) INDGSP

Table V.18 shows the results with INDGSP and PROX.

Equation (1) includes Y, INDGSP, PROX and DD. There is no significant coefficient.

Adding the dummies in Equation (3), SP shows a positive and significant coefficient (+1.70), NE has a significant coefficient at the 1% level (-2.73), and per capita income is negative and significant at the 10% level (-1.73).

Equation (5) includes Y, INDGSP, YPROXM and DD. There is evidence of congestion effects, since DD shows a t-statistic greater than one (-1.10).

Adding the dummies (Equation (7)), only NE is negative and significant (-2.03).

Equation (7a) includes Y, INDGSP, PROXM, YPROXM, DD, SP and NE. There was a dispersion of economic activity towards poor states, since Y is negative and significant (-2.50). This dispersion was counteracted by higher proximity to richer markets, since YPROXM is positive and significant (+2.24).

PROXM and DD are negative and significant.

Observing all the specifications in Appendix 2 - Table XI, we can infer the following.

Per capita income is negative (in (7) and (8)) or negative and significant (in (3), (7a) and (8a)).

The coefficients of INDGSP with t-statistics at least higher than one are positive ((4), (7a) and (8a)).

The interaction term is positive and significant in the equation with the TRM variable. In these equations, Y is also significant.

DD is not significant, SP is only once significant, while NE is negative and significant.

Table V.18 - INDGSP & PROX - BRAXIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	t	7a	t
Y	0,242	(0.171)	-3.324*	(-1.727)	-0,111	(-0.078)	-3,100	(-1.57)	-5.047**	(-2.50)
INDGSP	-5.03 E-03	(-0.050)	0,060	(0.516)	-0,026	(-0.255)	0,050	(0.42)	0,146	(1,23)
PROX	0,115	(0.583)	-0,402	(-1.502)						
PROXM									-1.123***	(-2.7)
YPROXM					0,107	(0.907)	0,031	(0.19)	0.550**	(2.24)
DD	-0,017	(-0.897)	0,038	(1.283)	-0,021	(-1.097)	0,017	(0.50)	4.69 E-03	(0.15)
SP			6.377*	(1.697)			3,201	(0.67)	-0,414	(-0.09)
NE			-6.714***	(-2.732)			-3.949**	(-2.03)	-8.638***	(-3.41)
R2	0,277		0,354		0,282		0,331		0,404	
MSE	3,778		3,626		3,764		3,690		3,514	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.19 - NONAGR & PROX - BRAXIL - 1950-1970 (18 states)

	1	t	3	t	5	t	7	t	7a	t
Y	-0,343	(-0.262)	-4.308**	(-2.334)	-0,402	(-0.293)	-3.893**	(-2.06)	-5.365***	(-2.86)
NONAGR	0,081	(1.352)	0.140**	(2.332)	0,072	(1.187)	0.125**	(2.03)	0.140**	(2.38)
PROX	0,137	(0.709)	-0.474*	(-1.831)						
PROXM									-1.056***	(-2.76)
YPROX					0,083	(0.713)	-0,012	(-0.08)	0.453**	(2.02)
DD	-0,036	(-1.558)	0,018	(0.605)	-0.038*	(-1.674)	4.00 E-04	(0.01)	-6.50 E-03	(-0.21)
SP			6.973**	(2.011)			4,102	(0.95)	2,024	(0.48)
NE			-7.929***	(-3.309)			-4.867**	(-2.51)	-9.200***	(-3.80)
R2	0,297		0,403		0,297		0,371		0,441	
MSE	3,725		3,485		3,725		3,578		3,402	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.19 shows the results for NONAGR.

Equation (1) includes Y, NONAGR, PROX and DD. There are no significant coefficients in this specification. NONAGR and DD show t-statistics higher than one.

Equation (3) adds the dummies for SP and NE. SP is positive and significant at the 5% level (+2.01), and NE is significant at the 1% level (-3.31). Per capita income is negative and significant (-2.33) and NONAGR is positive and significant (+2.33), suggesting that economic activity was moving towards poor and non-agricultural states.

Equation (5) includes Y, NONAGR, YPROXM and DD. DD is again negative and significant (-1.67). NONAGR is positive.

Adding the dummies to this specification (7), we can observe that only Y (-2.06), NONAGR (+2.03) and NE (-2.51) have significant coefficients.

Equation (7a) includes Y, NONAGR, PROXM, YPROXM, DD, SP and NE. NE is negative and significant (-3.80). Per capita income is negative and significant (-2.86). This dispersion of activity towards the poorer states was weaker with lower transportation cost, since YPROXM is positive and significant (+2.02).

PROXM is negative and significant (-2.76).

Observing all the data in Appendix 2, Table XII, per capita income is usually negative and significant, controlling for NE.

NONAGR is positive and significant, controlling for NE, and positive otherwise.

YPROXM is positive and significant in the specifications with the significant TRM. These specifications control for NE. In them, we obtained a pair of negative and significant Y and positive and significant YPROXM.

SP and DD are seldom relevant, while NE is negative and significant.

The existence of a dispersion of economic activity towards the poor states, the negative impact on growth of low transportation cost and the decrease in the significance of DD are the main differences in the contrast with the cross-section results.

V.3.3 - 1970-1995 (18 States)

a) INDGSP

Table V.20 shows the results with INDGSP and PROX. Equation (1) includes per capita income, the share of industrial output, PROX and DD. Per capita income has a negative and significant coefficient (-2.11), showing again that the dispersion of activities was towards the poor states.

INDGSP has also a negative and significant coefficient (-1.76), implying that the dispersion of activities was directed towards the less industrialised states.

PROX has a positive and significant coefficient at the 5% level (+2.37), allowing us to infer that proximity to richer markets was an economic force acting in favour of the concentration of activities in core states.

Finally, DD has a negative coefficient, with a t-statistic greater than one (-1.55), suggesting that congestion was another economic force acting against the formation of cores.

Equation (3) adds SP and NE to the specification in (1). Per capita income remains significant (and negative), showing a t-statistic of -3.93. SP is positive and significant at the 1% level (+2.98) and NE is negative and significant at the 1% level (-3.04).

Equation (5) includes Y, INDGSP, the interaction term - YPROXM, and DD.

The significant information that we have is that congestion effects were dispersing economic activity, since DD is negative and significant at the 10% level (-1.78). INDGSP is negative and significant at the 10% level (-1.66). Controlling for the special effects of SP and NE (column (7)), the negative coefficient of per capita income (-3.81), shows the dispersion of activity towards the poorer states. SP and NE are both significant at the 1% level, with t-statistics of +2.94 and of -4.02, respectively. The interaction term has a t-statistic higher than one.

Equation (5a) includes Y, INDGSP, PROXM, YPROXM and DD. Per capita income is negative and significant (-1.95), INDGSP is negative and significant (-1.74) and PROXM is positive and significant (+1.93). DD has a high t-statistic.

Observing all the Equations in Appendix 2 - Table XIII, there is a dispersion of activity towards poorer states, since Y is usually negative and significant.

INDGSP is negative and significant, not controlling for NE.

PROX and PROXM are positive and significant, not controlling for NE.

YPROXM is negative and significant in (6a). Observing (6a), we found a different impact of a decrease in transportation cost in this period. While there is a dispersion of economic activity towards poorer states (negative Y), higher proximity to richer markets enhances this dispersion (negative YPROXM).

DD usually shows some negative coefficients.

SP is significant with NE or in (6a).

NE is usually negative and significant.

Table V.20 - INDGSP & PROX - BRAXIL - 1970-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	t	5a	t
Y	-0.717**	(-2.105)	-1.951***	(-3.927)	-0,413	(-1.232)	-1.856***	(-3.81)	-0.700*	(-1.95)
INDGSP	-0.060*	(-1.759)	0,010	(0.243)	-0.058*	(-1.658)	6.54 E-03	(0.18)	-0.060*	(-1.74)
PROX	306318.6**	(2.368)	-85513	(-0.485)						
PROXM									321990.9**	(1.98)
YPROXM					38660	(1.256)	-49396	(-1.14)	-6086	(-0.16)
DD	-8.58 E-03	(-1.551)	7.12 E-03	(0.995)	-0.010*	(-1.775)	0,011	(1.37)	-8.30 E-03	(-1.42)
SP			5.509***	(2.977)			7.149***	(2.94)		
NE			-4.619***	(-3.041)			-4.623***	(-4.02)		
R2	0,696		0,733		0,681		0,736		0,696	
MSE	2,437		2,313		2,496		2,298		2,452	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.21 - NONAGR & PROX - BRAXIL - 1970-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	T	5a	t
Y	-0.869***	(-2.639)	-1.916***	(-4.487)	-0.577*	(-1.793)	-1.839***	(-4.29)	-0.858**	(-2.45)
NONAGR	-0,052	(-1.215)	0,013	(0.265)	-0,053	(-1.213)	0,010	(0.23)	-0,051	(-1.18)
PROX	301257.3**	(2.306)	-81817	(-0.489)						
PROXM									310086.8*	(1.89)
YPROXM					40009	(1.279)	-49561	(-1.15)	-3459	(-0.09)
DD	-4.90 E-03	(-0.741)	6.00 E-03	(0.861)	-6.60 E-03	(-0.969)	9.73 E-03	(1.25)	-4.79 E-03	(-0.71)
SP			5.436***	(3.053)			7.116***	(2.96)		
NE			-4.573***	(-3.317)			-4.623***	(-4.21)		
R2	0,690		0,733		0,676		0,736		0,690	
MSE	2,461		2,313		2,515		2,298		2,476	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.21 shows the results with NONAGR for this small sample.

Column (1) includes Y, NONAGR, PROX and DD. Per capita income is negative and significant (-2.64), confirming that the dispersion of activity was towards poor states. PROX was positive and significant (+2.31), showing again that low transportation cost has helping economic growth.

Adding the dummy variables (SP and NE) in column (3), only per capita income remains negative and significant at the 1% level (-4.49). SP has a t-statistic of +3.05 and NE of -3.32.

Column (5) shows the specification with the interaction term. It includes Y, NONAGR, YPROXM and DD. Y is negative and significant at the 10% level (-1.79). The interaction term has a positive coefficient with a t-statistic higher than one.

Adding the dummy variables in column (7), Y remains negative and significant (-4.29). The dummies are significant: SP is positive (+2.96) and NE is negative (-4.21). YPROXM has a negative coefficient with a t-statistic higher than one.

Specifications (5a) and (6a) (in Appendix 2, Table XIV) show negative and significant coefficients for Y and a negative and significant coefficient for YPROXM in (6a), meaning that poorer states were growing more than richer states, at the average levels of TR, and as proximity to richer markets increases, this decrease in transportation cost further benefits the poorer states.

Observing all the specifications in Appendix 2, Table XIV, we again confirm that there was a dispersion of economic activity towards poorer states.

NONAGR is only significant (and negative) in (6a). It shows other negative coefficients.

PROX and PROXM are positive and significant, when not controlling for NE.

YPROXM is significant once, showing a negative coefficient. It also shows two positive coefficients, when excluding SP (Equations, (5) and (8)) and a negative one in Equation (7).

DD is usually not significant and SP is only significant three times. NE is negative and significant.

Except for the increase in the number of significant coefficients, this sample shows similar results in comparison with the cross-section exercises.

Conclusion for the 18-State Samples

Observing the results for PROX in Appendix 2, summarised in Table V.20, we can reach the following conclusions.

TABLE V.20 - PANEL RESULTS (PROX)

50-95 (18 States)	**<**	**>**	**<***	**>***	**number of equations**
Y *	0	0	8	0	8
INDGSP	4	1	0	0	12
NONAGR	0	2	0	5	12
PROX	1	0	1	4	8
DD	8	2	5	0	24
SP	0	2	0	6	12
NE	0	0	12	0	12
Y**	3	0	11	0	16
YPROXM	0	5	0	3	16
Y* & YPROXSHM*	<* >* (3)				

50-70 (18 States)	**<**	**>**	**<***	**>***	**number of equations**
Y *	1	0	2	0	8
INDGSP	0	3	0	0	10
NONAGR	0	4	0	6	10
PROX	1	0	1	0	8
DD	4	1	2	0	20
SP	0	0	0	2	10
NE	0	0	0	12	12
Y**	2	0	6	0	12
YPROXM	0	2	0	4	12
Y* & YPROXM*	<* >* (4)				
70-95 (18 States)	**<**	**>**	**<***	**>***	**number of equations**
Y *	0	0	8	0	8
INDGSP	0	0	6	0	10
NONAGR	5	0	1	0	10
PROX	0	1	0	4	8
DD	4	2	1	0	20
SP	0	2	0	6	10
NE	1	0	7	0	8
Y**	2	0	10	0	12
YPROXSHM	2	4	2	0	12
Y*& YPROXM*	<* <* (2)				

70-95 (24 States)	<	>	<*	>*	number of equations
Y *	2	0	4	0	8
INDGSP	0	0	4	0	8
NONAGR	0	2	0	0	8
PROX	0	0	0	0	8
DD	2	2	7	1	16
SP	0	3	0	5	8
NE	0	0	8	0	8
Y**	2	0	4	0	8
YPROXM	3	1	1	0	8
Y* & YPROXM*	<* <* (1)				

Y* - without the interaction term

Y** - with the interaction term

*** - significant pairs of Y and the interaction term

For the 18-State samples we found again that the special effects of NE are important for our results.

Per capita is almost always negative and significant in the sub-period 1970-1995 (Tables XIII and XIV). It is negative or negative and significant for the first sub-period (1950-1970), when we control for NE (Tables XI and XII). For the whole period 1950-1995, it is frequently negative and significant (Tables IX and X), suggesting a dispersion of economic activity towards poorer states.

INDGSP is significantly negative, when not controlling for NE, in the second sub-period (Table XIII, Equations (1), (2), (5), (6), (5a) and (6a)). In the first sub-period it shows few positive coefficients (when controlling for NE)(Table XI, Equations (7a) and (8a)). In the whole period it is negative, usually not controlling for NE (Table IX, Equations (1), (2), (6) and (6a)). The evidence is clearly against the positive impact of economies of scale in the industrial sector.

NONAGR is usually negative in the sub-period 1970-1995, not controlling for NE (Table XIV, Equations (1), (2), (5), (6)), (5a) and (6a)). In the first sub-period, controlling for NE, it is positive, and it is positive otherwise (Table XII). It is frequently positive and significant in the whole period, when controlling for NE (Table X, Equations (3), (4), 8), (7a) and (8a)).

PROX is positive and significant, without controlling for NE in the second sub-period (Tables XIII and XIV, Equations (1) and (2)) and in the whole period (Tables IX and X, Equations (1), (2)).

PROXM is positive and significant, without controlling for NE, in 1970-1995 (Tables XIII and XIV, Equations (5a) and (6a)). It is negative and significant, controlling for NE, in the first sub-period (Tables XI and XII, Equations (7a) and (8a)). Both patterns appear in the whole period (Tables IX and X).

The interaction term is negative and significant, in the equations with PROXM and without NE, in the period 1970-1995 (Table XIII, Equations (5a) and (6a) and Table XIV, Equation (6a)). It is positive and significant, in 1950-1970, when controlling for NE and with PROXM (Tables XI and XII, Equations (7a) and (8a)). For the whole period it shows one positive and three significant coefficients, controlling for NE Tables IX and X (Equations (7a) and (8a)).

DD is rarely significant. SP is positive and significant, with NE, for the second sub-period and for the whole period.

NE is usually negative and significant.

We found significant evidence against the positive importance of INDGSP for determining the distribution of activities in the period 1970-1995, when not controlling for NE (Table XIII, Equations (1), (2), (5), (6), (5a), (6a)). INDGSP is negative or insignificant in the whole period (Table IX, except (8a)), not supporting the "backward and forward linkages" hypothesis. The evidence in favour of this hypothesis is weak in the first sub-period (Table XI, Equations (4), (7a) and (8a)).

Economies of scale in the industrial and service sector together show some significant and concentrating influences in the period 1950-1970 (Table XII, Equations (3), (4), (7), (8), (7a) and 8a)) and in the whole period (Table X, Equations (4), (8), (7a) and (8a). NONAGR shows negative, and frequently not significant coefficients for 1970-1995 (Table XIV, Equations (1), (2), (5), (6), (5a) and (6a)).

Per capita income is usually negative and significant controlling for NE (or with PROXM), showing a dispersion of economic activity towards poorer states.

In 1950-1995, in three specifications - Table IX - (8a), with INDGSP, Table X - (7a) and (8a), with NONAGR - we observed that an increase in proximity was decreasing the advantage of poor states, acting in favour of the concentration of economic activity. This resemble phase II of K&V(m) model, and the behaviour of NONAGR shows compatibility with this phase. On the other hand, the negative or insignificant coefficients of INDGSP are refuting the model.

In 1950-1970, four specifications - Tables XI and XII -(7a) and (8a) with both INDGSP and NONAGR - support these conclusions. The similarity with phase II is stronger due to the positive coefficients of NONAGR and INDGSP.

In the period 1970-1995, we found that proximity was contributing to the dispersion of economic activity (Tables XIII and XIV-(6a)). This could correspond to the third phase of NEG model. On the other hand, the negative coefficients of NONAGR and INDGSP are not in accordance with the model.

DD is less significant, and so congestion effects were less important to explain the dispersion of activities.

The exercises with TR and PROX show similar results. The main differences are:

a) For the periods 1950-1995 and 1970-1995, TR shows insignificant coefficients, while PROX shows some positive and significant ones;

b) for the period 1950-1995, there are three pairs of significant Y and YPROXM, while with YTRM the three pairs were not significant;

c) for the period 1950-1970, the exercises provide four pair of significant Y and interaction term;

d) for the period 1970-1995, we could only found a pattern for Y and the interaction term with YPROXM;

e) for the larger sample of the period 1970-1995, we also could establish a significant pattern for Y and the interaction term with YPROXM.

Our findings for the distribution of the income growth rate are in accordance with the discussion carried on in the Brazilian literature. A dispersion of total income is a necessary (but not sufficient) condition for the observance of beta-convergence, as portrayed by Azzonni (1994) and Ferreira (1996, 1998b).

Also Diniz (1995), Diniz and Ferreira (1994) and Ferreira (1998a) discuss that, after a period of concentration of activity in the state of São Paulo, from the 70s onwards there was a dispersion of economic activity in Brazil. According to the descriptive interpretations of Brazilian economic geography, this dispersion was due to an increase in congestion effects (we found impact of DD in the later period), new economies of agglomeration in different sites, exploitation of natural resources, unification of the market and, especially, the role of the State.

Accordingly to Diniz (1995), in a first moment the dispersion was spread more evenly, being the direct investment of public enterprises the main driven force of this process.

The Northern states benefited from fiscal incentives, the development of urban areas and the exploitation of mineral resources in Pará.

Fiscal incentives were also important to the industrial development of some state of NE. Bahia was the most privilege state, with the creation of the state petrochemical industry.

Southeast has observed a decline in the rates of growth of the metropolitan area of SP and of the state of Rio de Janeiro, part of this being caused by congestion effects. Meanwhile, Espírito Santo, especially in the intermediary production sector (connected to the export sector), and Minas Gerais (natural resources, proximity to SP and intermediary goods) had a better performance in terms of industrial growth.

In the South, Rio Grande do Sul, due to external economies and incentives, has developed an industry of capital goods and durables, while reinforcing its production of shoes and latter. Most importantly, the growth in the agricultural sector has encouraged the agroindustrial sector. Santa Catarina has benefited from the refrigeration industry, textiles and musical instruments, while Paraná had an expansion in the agricultural and in the agro-industrial sectors.

The Centre-West observed a sharp development in its agricultural sector and in the agro-industrial complex. Exploitation of minerals was also important to the development of CO.

Diniz (1995) observes that, in a second moment, the activities are concentrating again in the later developed areas (Southeast and South - more precisely in the polygonal area defined by Belo Horizonte -Uberlândia - Londrina/Maringá - Porto Alegre- Florianópolis - São José dos Campos - Belo Horizonte.), with expectations of sustaining the performance of CO. This further change would be caused by changes in the technological paradigm, in the role of the government, by the openness of the economy and the creation of Mercosul.

V.3.4 - 1970-1995 (24 States)

a) INDGSP

Table V.23 shows the results for INDGSP with PROX.

Equation (1) includes per capita income, industrial share, the transportation cost proxy - PROX, and DD.

The share of industrial output is negative and significant at the 10% level (-1.92). This empirical evidence suggests that the dispersion of economic activities was towards the less industrialised states, while, based on NEG theories, we were expecting the opposite result.

DD is negative and also significant at the 1% level (-2.52), suggesting that congestion was also a force acting against agglomeration.

Equation (3) controls for the special characteristics of SP and NE. Both dummies are significant at the 1% level. SP is positive with a t-statistic of +4.59 and NE is negative with a t-statistic of -4.39.

Dispersion of economic activities towards the poorest states is indicated by the negative and significant coefficient of per capita income (-5.03).

Controlling for SP and NE, population density is significantly positive (t-statistic of +1.85), suggesting agglomeration benefits.

Equation (5) includes Y, INDGSP, the interaction term - YPROXM, and DD. INDGSP is significant at the 5% level (t-statistic of -1.93). DD is negative and significant at the 5% level (-2.38).

Equation (7) adds the dummies to this specification. Similarly to the results in Equation (3), per capita income is negative and significant at the 1% level and DD is positive and significant at the 5% level. These results imply that growth favoured the most populated states and the poor ones.

The interaction term, YPROXM, is positive and significant at the 10% level (-1.73). Differently from the experience of the 18-State sample in the last section, the dispersion of economic activity towards poor states was reinforced by long distances from the richer markets.

Using all the information in Appendix 2, Table XV, controlling for NE, per capita income is negative and significant (Table XV, Equations (3), (4), (7) and (8). Not controlling for NE, INDGSP is negative and significant (Table XV - Equations (1), (2), (5) and (6)). YPROXM is negative and significant only in Equation (7)(Table XV).

DD shows frequently negative and significant coefficients excluding the dummy for NE.

Unexpected by the model, economies of scale in the industrial sector were dispersing economic activity. Congestion effects were also acting in this direction.

Only in specification (7) - which is the best fitted one did we find a pattern for Y and YPROXM. YPROXM is negative, so low transportation costs were further helping the dispersion of economic activity. This pattern could represent phase III of the model, but the results can be misleading due to the presence of the states of the North.

Table V.23 - INDGSP & PROX - BRAXIL - 1970-1995 (24 states) dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	t
Y	6.01 E-03	(0.017)	-2.230***	(-5.031)	0,012	(0.034)	-2.102***	(-4.462)
INDGSP	-0.092*	(-1.916)	-0,035	(-0.597)	-0.092*	(-1.932)	-0,040	(-0.692)
PROX	-25562	(-0.173)	-121856	(-0.824)				
YPROXM					-6144	(-0.203)	63125*	(-1.726)
DD	-0.016***	(-2.522)	-0.011*	(1.846)	-0.015**	(-2.378)	0.017**	(2.449)
SP			72245***	(4.586)			9.512***	(4.260)
NE			-5.636***	(-4.387)			-5.608***	(-4.601)
R2	0,489		0,584		0,489		0,589	
MSE	3,841		3,497		3,841		3,475	

* All standard errors were corrected for heteroscedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V.24 - NONAGR & PROX - BRAXIL - 1970-1995 (24 states) dependent variable: GRGSP - panel results

	1	t	3	t	5	t	7	t
Y	-0,371	(-1.053)	-2.639***	(-6.898)	-0,385	(-1.151)	-2.550***	(-6.552)
NONAGR	0,030	(0.453)	0,059	(0.876)	0,031	(0.472)	0,050	(0.737)
PROX	-37651	(-0.259)	-102631	(-0.743)				
YPROXM					-6497	(-0.222)	-49697	(-1.422)
DD	-0.018**	(-2.294)	9.023 E-03	(1.233)	-0.019**	(-2.237)	0,014	(1.634)
SP			7.168***	(4.536)			8.959***	(3.990)
NE			-6.186***	(-5.577)			-6.169***	(-5.672)
R2	0,462		0,585		0,462		0,588	
MSE	3,939		3,490		3,939		3,479	

* All standard errors were corrected for heteroscedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table V.24 shows the results with NONAGR.

Equation (1) includes Y, the share of non-agricultural output (NONAGR), PROXM and DD. DD is negative and significant (t-statistic of -2.29) and Y has a t-statistic greater than one.

Column (3) adds the dummies to this specification. SP is positive and significant at the 1% level (+4.54) and NE is negative and significant at the 1% level (-5.58).

Per capita income is negative and significant at the 1% level (-6.90), indicating dispersion of economic activity towards the poorer states. Population density is no longer significant.

Equation (5) replaces PROXM with the interaction term YPROXM in specification (1). DD is negative and significant at the 5% level.

Equation (7) includes Y, NONAGR, YPROXM, DD and the dummies. SP is positive and significant (+3.99) and NE is negative and significant (-5.67).

Per capita income remains negative and significant (-6.55), after controlling for SP and NE, implying dispersion of economic activity towards the poorer states.

Using all the information in Appendix 2, Table XVI, we can observe that, controlling for NE, per capita income is negative and significant (Equations (3),(4), (7) and (8)). DD shows some negative or negative and significant coefficients (and positive coefficients when both dummies are included), when not controlling for NE. The interaction term is twice negative and once positive, although not showing significant coefficients.

This sample is not revealing any impact on the coefficient of per capita income due to changes in transportation cost. It denies the importance of externalities to growth.

The consistent evidence of the dispersion of economic activity towards poorer states and the negative coefficient of YPROXM (with INDGSP) are the main differences in the comparison with the cross-section results.

V.4 - Test of Restrictions

For the panel results with the dependent variable GR, only two specifications have not refuted the model, when we followed the procedures of the restricted tests specified in Section III.7. The coefficient of NONAGR and the coefficient of the interaction term YTRM are positive and significant (jointly and individually) in Equation (10), Appendix 6, as expected by the theory. This combination reinforces the argument that the Brazilian economy in the period 1950-1995 was in the second phase of the K&V(m) model, where agglomerative forces are strong. Economies of scale are important only when we consider the ones that appear both at the industrial and at the service sector together. In Equation (10), TRM, SP and all regional dummies are significant.

In Equation (12), the same can be concluded for the period 1950-1970.

Equations (10) and (12) uses the proxy TR for transportation costs.

Table V.25 - Best Equations - F test - panel

dependent variable: GR - Brazil

variables	Eq. 10 1950-1995 coef (t)	Eq. 12 1950-1970 coef (t)
y	-2.162 (-4.86)	-8.365 (-4.09)
nonagr	0.089 (2.70)	0.187 (3.09)
dd	0.007 (0.77)	0.054 (1.54)
trm	-5.538 (-1.73)	-20.2 (-2.36)
ytrm	1.905 (2.06)	10.849 (2.96)
sp	3.444 (2.11)	8.425 (2.12)
ne	-4.656 (-3.96)	-10.907 (-4.16)
se	-2.042 (-2.08)	-6.013 (-3.32)
co	0.812 (0.65)	-0.669 (-0.31)

V.5 - INDPROXM and NONPROXM

In this section, we will replace the variable YTRM (Y*TRM) with the variables INDTRM (INDGSP*TRM) and NONTRM (NONAGR*TRM), and the variable YPROXM (Y*PROXM) with INDPROXM (INDGSP*PROXM) and NONPROXM (NONAGR*PROXM). Due to the high correlation among Y, INDGSP and NONAGR, we do not expect significant changes in the results. Following the theoretical model more strictly, the interaction terms with INDGSP and NONAGR would better capture the idea of the impact of changes in transportation costs connected with the existence of economies of scale in the regions. The usage of the interaction term with Y has helped us to better understand the pattern of concentration or dispersion of the Brazilian economy.

V.5.1 - 1950-1995 (18 States)

Tables V.25 and V.26 show the results for the 18-State sample of the period 1950-1995. Their equations should be compared to the analogous ones in Tables V.5 (INDGSP) and V.6 (NONAGR), with TR, and V.16 (INDGSP) and V.17 (NONAGR), with PROX. The results, with the inclusion of the demeaned variable for transportation cost, should be compared with the analogous equations in Appendix 2, Tables I, II, IX and X.

The results with INDTRM and INDPROXM show the same conclusions already obtained with YPROXM. There is a dispersion of economic activity towards poor states, controlling for the special effects of NE. NE is a significant dummy and so is SP when included in the specifications with NE.

The interaction terms (INTRM and INDPROXM) are positive and significant in Equations (7at), (8at) and (8ap), reinforcing the inference that lower transportation costs were making the coefficient of INDGSP more positive.

When showing high t-statistcs, INDGSP is positive ((8at) and (8ap)). Congestion effects are not important.

With NONAGR, the results in Table V.26 are also similar to the results with YPROXM.

Per capita income is negative and significant in specifications that controls for NE ((7t), (5at-8at)). NONAGR show positive or positive and significant coefficients and the interaction term increases the coefficient of NONAGR.

SP is important when included with NE and there are some signs of congestion effects.

There is an increase in the number of specifications, in Tables V.25 and V.26, that indicate that lower transportation costs were affecting economic activity. They also add evidence to the similarity with phase II of K&V(m) model, since the decrease in transportation cost tends to generate more positive coefficients for INDGSP and NONAGR.

Table V.25 - INDTRM/INDPROXM - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	5t	t	7t	t	7at	t	8at	t	5p	t	7p	t	8ap	t
Y	-0,154	(-0.535)	-1.674***	(-3.849)	-1.951***	(-4.307)	-1.598***	(-3.716)	-0,635	(-1.508)	-1.606***	(-3.390)	-1.899***	(-3.594)
INDGSP	-0,046	(-1.146)	-0,010	(-0.258)	0,032	(0.696)	0,051	(1.129)	-0,032	(-0.865)	-3.63 E-03	(-0.093)	0,055	(1.222)
TRM					-6.798**	(-1.975)	-7.823**	(-2.263)						
INDTRM	0,063	(1.043)	0,038	(0.651)	0.216**	(2.020)	0.265***	(2.493)						
PROXM													-0.362*	(-1.744)
INDPROXM									6.18 E-03*	(1.822)	-3.79 E-04	(-0.096)	0.012**	(2.228)
DD	-9.56 E-03	(-1.483)	4.12 E-03	(0.602)	8.90 E-03	(1.238)	4.89 E-03	(0.694)	-8.98 E-03	(-1.403)	4.54 E-03	(0.649)	4.02 E-03	(0.558)
SP			3.479***	(2.491)	3.111**	(2.229)					3.724**	(2.240)		
NE			-3.282***	(-4.270)	-3.656***	(-4.662)	-3.235***	(-4.194)			-3.334***	(-4.087)	-4.372***	(-3.452)
R2	0,494		0,555		0,566		0,551		0,501		0,553		0,547	
MSE	3,130		2,956		2,927		2,967		3,107		2,960		2,980	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and INDTRM/INDPROXM are significant.

Table V.26 - NONTRM/NONPROXM - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	5t	t	7t	t	5at	t	6at	t	7at	t	8at	t
Y	-0,215	(-0.830)	-1.664***	(-4.198)	-0,433	(-1.593)	-0,471	(-1.605)	-1.886***	(-4.748)	-1.544***	(-4.353)
NONAGR	0,032	(1.026)	0,041	(1.319)	0,045	(1.435)	0,042	(1.267)	0.060*	(1.930)	0.074**	(2.421)
TRM					-20.569**	(-2.318)	-19.893**	(-2.186)	-22.621***	(-2.667)	-25.447***	(-3.025)
NONTRM	1.25 E-03	(0.052)	-5.62 E-03	(-0.245)	0.277**	(2.284)	0.267**	(2.131)	0.299***	(2.569)	0.344***	(2.989)
PROXM												
NONPROXM												
DD	-0.014*	(-1.895)	-9.55 E-05	(-0.012)	-0.016**	(-2.198)	-0.015*	(-1.938)	-3.32 E-03	(-0.429)	-9.14 E-03	(-1.282)
SP			3.245**	(2.324)			0,503	(0.353)	2.579*	(1.854)		
NE			-3.429***	(-4.640)					-3.556***	(-4.900)	-3.146***	(-4.514)
R2	0,492		0,559		0,509		0,510		0,579		0,569	
MSE	3,137		2,943		3,092		3,101		2,884		2,908	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and NONTRM/NONPROXM are significant.

Table V.26 - NONTRM/NONPROXM - BRAZIL - 1950-1995 (18 states)

	5p	t	7p	t	8ap	t
Y	-0.927**	(-2.424)	-1.574***	(-3.935)	-1.545***	(-3.717)
NONAGR	0,026	(0.850)	0,044	(1.426)	0.073**	(2.280)
TRM						
NONTRM						
PROXM					-0.708*	(-1.895)
NONPROXM	3.11 E-03**	(2.306)	-1.82 E-03	(-1.037)	8.73 E-03*	(1.863)
DD	-0.015**	(-2.003)	2.87 E-03	(0.346)	-0,010	(-1.378)
SP			3.988***	(2.533)		
NE			-4.093***	(-4.178)	-3.934***	(-3.792)
R2	0,509		0,562		0,553	
MSE	3,083		2,933		2,960	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and NONTRM/NONPROXM are significant.

V.5.2 - 1950-1970 (18 States)

Tables V.27 (with INDGSP) and V.28 (with NONAGR) show the results for the 18-State sample of the period 1950-1970. Their equations should be compared to the analogous ones in Tables V.7 (INDGSP)/V.8 (NONAGR), with TR, and V.18 (INDGSP)/V.19 (NONAGR), with PROX. The results, with the inclusion of the demeaned variable for transportation cost, should be compared with the analogous equations in Appendix 2, Table III (INDGSP) and Table IV (NONAGR), and Appendix 2, Table XI (INDGSP) and Table XII (NONAGR).

With INDGSP and INDTRM, there is evidence of a movement of activities towards poorer states, since per capita income is usually negative and significant, if controlling for NE ((7t) showed a positive significant for Y in the results with YPROX).

INDGSP is insignificant (it was positive in 7t with YPROXM).

In (7at) and (8at) we found positive and significant coefficients for the INDTRM, suggesting that lower transportation costs were increasing the coefficient of INDGSP.

Congestion effects are not important and the dummy for SP is insignificant. NE is significant.

With NONAGR, two specifications (8at) and (7p) show a dispersion of activity towards poorer areas.

NONAGR shows positive and positive and significant coefficients.

In (6at) and (8at), NONTRM are positive and significant, suggesting that the coefficient of NONAGR is more positive with lower transportation costs. In (7p), we have the opposite information, since NONPROXM is negative and significant.

Congestion effects and SP are not significant, while NE is significant.

While the results with INDGSP and NONAGR are very similar to the ones with YPROXM, there are fewer specifications where the interaction term plays an important role (there were eight specifications with YPROXM where the interaction term was significant). Even though we found that, in accordance with the "core-periphery" phase of NEG model, a decrease in transportation cost was increasing the coefficients of NONAGR and INDGSP, or, in another words, economies of scale get stronger with lower transportation costs.

Table V.27 - INDTRM/INDPROXM - BRAZIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	5t	t	7t	t	7at	t	8at	t	5p	t	7p	t
Y	0,546	(0.498)	-3,102	(-1.583)	-3.637*	(-1.894)	-3.437**	(-1.973)	0,508	(0.347)	-2,772	(-1.412)
INDGSP	-0,036	(-0.330)	0,040	(0.335)	0,089	(0.751)	0,096	(0.851)	-0,017	(-0.165)	0,032	(0.274)
TRM					-16.973**	(-2.157)	-17.480**	(-2.313)				
INDTRM	0,163	(0.551)	0,113	(0.336)	0.876*	(1.815)	0.940**	(2.292)				
PROXM												
INDPROXM									3.64 E-03	(0.320)	-0,014	(-0.838)
DD	-0,019	(-1.017)	0,018	(0.612)	0,028	(1.001)	0,024	(1.068)	-0,018	(-0.922)	0,031	(1.020)
SP			3,172	(0.802)	1,019	(0.257)					6,902	(1.384)
NE			-4.028**	(-2.259)	-4.682***	(-2.662)	-4.501***	(-2.814)			-4.917**	(-2.447)
R2	0,276		0,332		0,379		0,379		0,274		0,338	
MSE	3,779		3,688		3,584		3,557		3,785		3,671	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and INDTRM/INDPROXM are significant.

Table V.28 - NONTRM/NONPROXM - BRAZIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	5t	t	7t	t	6at	t	8at	t	5p	t	7p	t
Y	0,422	(0.392)	-3.825**	(-2.020)	0,048	(0.041)	-3.132**	(-2.040)	-0,193	(-0.140)	-4.163**	(-2.265)
NONAGR	0,078	(1.290)	0.122**	(1.983)	0,090	(1.450)	0.131**	(2.167)	0,079	(1.314)	0.139**	(2.331)
TRM					-28.871*	(-1.812)	-28.172*	(-1.920)				
NONTRM	-4.04 E-03	(-0.045)	-0,035	(-0.365)	0.506*	(1.745)	0.483*	(1.876)				
PROXM									1.70 E-03	(0.522)	-7.66 E-03*	(-1.822)
NONPROXM									-0.038*	(-1.676)	0,028	(0.876)
DD	-0,038	(-1.554)	5.01 E-03	(0.153)	-0.061**	(-2.018)	-0,032	(-1.337)			7.658**	(2.086)
SP			4,400	(1.286)	-2,529	(-0.843)					-7.662***	(-3.331)
NE			-4.909***	(-2.807)			-3.808***	(-2.696)				
R2	0,291		0,372		0,328		0,392		0,294		0,403	
MSE	3,739		3,575		3,698		0,052		3,732		3,486	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and NONTRM/NONPROXM are significant.

V.5.3 - 1970-1995 (18 States)

Tables V.29 (with INDGSP) and V.30 (with NONAGR) show the results for the 18-State sample of the period 1970-1995. Their equations should be compared to the analogous ones in Tables V.9 (INDGSP)/V.10 (NONAGR), with TR, and V.20 (INDGSP)/V.21 (NONAGR), with PROX. The results, with the inclusion of the demeaned variable for transportation cost, should be compared with the analogous equations in Appendix 2, Table V (INDGSP) and Table VI (NONAGR), and Appendix 2, Table XIII (INDGSP) and Table XIV (NONAGR).

The results with INDTRM and NONTRM are similar to the ones with YPROXM, which say basically that there was a dispersion of activity towards the poorer regions, when controlling for the special effects of SP and NE.

Specifications (5at) and (8at), in Table V.29, add new information about the whole of the transportation cost. NONTRM shows positive and significant coefficients, increasing the importance of economies of scale, through an increase in the coefficient of NONAGR, with lower transportation costs.

The results with INDPROXM are slightly different. In Equation (5p), we now find signs of a dispersion of activity towards poorer states. Although INDGSP and DD are still negative, they are no more significant. INDPROXM is positive and significant (while YPROXM was insignificant), suggesting an increase in the coefficient of INDGSP with lower transportation costs.

Equation (7p) shows also an important difference with respect to equation (7) with YPROXM. The interaction term is not more significant. With YPROXM, we have more evidence (two equations more where the interaction term was significant) that lower transportation cost was affecting the distribution of activities.

The results with NONPROXM are similar to the ones with YPROXM.

The main difference in these exercises is that the interaction terms are positive, suggesting that a lower transportation cost was making economies of scales more influential. For this sample, the interaction term YPROXM was negative, when significant, suggesting that lower transportation cost was helping dispersion of economic activity.

The positive coefficients for the interaction terms with INDGSP and NONAGR contradict the model, since, being the third phase characterised by dispersion, we would expect that lower transportation cost would decrease the effect of economies of scale. The states that would be benefiting from the lower transportation cost would be the ones less provided with industrial and service income. Even tough, the total coefficient of INDGSP and NONAGR must be positive.

Table V.29 - INDTRM/INDPROXM - BRAZIL - 1970-1995 (18 states)
dependent variable: GRGSP - panel results

	5t	t	7t	t	5p	t	7p	t
Y	-0,220	(-0.902)	-1.906***	(-3.907)	-0.689*	(-1.931)	-1.906***	(-3.903)
INDGSP	-0.069*	(-1.878)	-6.76 E-03	(-0.174)	-0,054	(-1.575)	3.65 E-03	(0.098)
TRM								
INDTRM	0,064	(1.281)	0,026	(0.559)				
PROXM								
INDPROXM					7539**	(2.103)	-1954	(-0.430)
DD	-8.75 E-03	(-1.545)	4.99 E-03	(0.790)	-8.32 E-03	(-1.494)	6.58 E-03	(0.968)
SP			4.863***	(2.959)			5.652***	(2.679)
NE			-3.994***	(-3.729)			-4.397***	(-3.448)
R2	0,681		0,733		0,691		0,732	
MSE	2,495		2,312		2,454		2,314	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and INDTRM/INDPROXM are significant.

Table V.30 - NONTRM/NONPROXM - BRAZIL - 1970-1995 (18 states)
dependent variable: GRGSP - panel results

	5t	t	7t	t	5at	t	8at	t	5p	t	7p	t
Y	-0,286	(-1.296)	-1.932***	(-4.448)	-0.509**	(-1.994)	-1.515***	(-3.894)	-0.921***	(-2.720)	-1.911***	(-4.472)
NONAGR	-0,048	(-1.068)	1.87 E-03	(0.042)	-0,013	(-0.259)	0,064	(1.232)	-0,046	(-1.099)	8.90 E-03	(0.195)
TRM					-21.907*	(-1.684)	-30.377**	(-2.422)				
NONTRM	7.68 E-03	(0.366)	4.31 E-03	(0.224)	0.291*	(1.717)	0.402**	(2.460)				
PROXM												
NONPROXM									3768.056***	(2.395)	-805,834	(-0.406)
DD	-5.57 E-03	(-0.816)	5.10 E-03	(0.750)	-8.61 E-03	(-1.232)	-6.61 E-03	(-0.998)	-6.46 E-03	(-0.978)	6.27 E-03	(0.862)
SP			5.026***	(3.125)							5.440***	(2.922)
NE			-4.112***	(-4.059)			-3.062***	(-3.292)			-4.472***	(-3.335)
R2	0,670		0,732		0,681		0,720		0,691		0,732	
MSE	2,538		2,316		2,510		2,369		2,455		2,314	

*The results displayed are the ones for the main equations inside Chapter V and for the equations with TRM/PROXM where both these variables and NONTRM/NONPROXM are significant.

V.5.4 - 1970-1995 (24 states)

Tables V.31 (with INDGSP) and V.32 (with NONAGR) show the results for the 24-State sample of the period 1970-1995. Their equations should be compared to the analogous ones in Tables V.14 (INDGSP)/V.15 (NONAGR), with TR, and V.21 (INDGSP)/V.24 (NONAGR), with PROX. The results, with the inclusion of the demeaned variable for transportation cost, should be compared with the analogous equations in Appendix 2, Table VII (INDGSP) and Table VIII (NONAGR), and Appendix 2, Table XV (INDGSP) and Table XVI (NONAGR).

The results are again similar to the ones with YPROXM. The main differences are: in specification Table V.29-(5p), INDGSP is now negative and significant, while it was only negative with YPROXM. In (7p), the interaction term INDPROXM is not significant, while YPROXM was. In Table V.30, specification (8at), NONAGR is now significant, when it was only positive with YPROXM.

It is interesting to observe that the interaction terms, when showing high t-statistics, are usually negative, increasing the negative coefficient of INDGSP and decreasing the positive coefficient of NONAGR. This evidence is in accordance with our inference that the 24 states of Brazil would be in the third phase of the model.

Table V.31 - INDTRM/INDPROXM - BRAZIL - 1970-1995 (24 states) dependent variable: GRGSP - panel results

	5t	t	7t	t	5p	t	7p	t
Y	0,075	(0.277)	-2.277***	(-5.112)	-0,017	(-0.047)	-2.188***	(-5.136)
INDGSP	-0.091*	(-1.806)	-0,040	(-0.725)	-0.093**	(-1.988)	-0,044	(-0.809)
TRM								
INDTRM	-0,057	(-1.257)	-0,022	(-0.571)				
PROXM								
INDPROXM					-255,917	(-0.070)	-3690,365	(-0.931)
DD	-0.013**	(-2.076)	8.82 E-03*	(1.805)	-0.016***	(-2.595)	0.011*	(1.887)
SP			6.964***	(4.913)			7.854***	(4.223)
NE			-5.372***	(-4.883)			-5.568***	(-4.525)
R2	0,495		0,581		0,488		0,584	
MSE	3,816		3,507		3,841		3,497	

* The standard errors were corrected for heteroscedasticity.

Table V.32 - NONTRM/NONPROXM - BRAZIL - 1970-1995 (24 states)
dependent variable: GRGSP - pane NONPROXM

	5t	t	7t	t	8at	t	5p	t	7p	t	8ap	t
Y	-0,266	(-1.136)	-2.668***	(-6.737)	-2.026***	(-6.040)	-0,420	(-1.187)	-2.645***	(-6.919)	-2.148***	(-6.132)
NONAGR	0,020	(0.296)	0,060	(0.920)	0.121*	(1.876)	0,032	(0.486)	0,057	(0.862)	0.104*	(1.711)
TRM					-25.898*	(-1.822)						
NONTRM	-0.046**	(-2.241)	-0,012	(-0.764)	0.317*	(1.813)						
PROXM											-1797808*	(-1.713)
NONPROXM							-121,656	(-0.072)	-1236	(-0.754)	22123*	(1.814)
DD	-9.73 E-03	(-1.340)	7.89 E-03	(1.204)	-7.88 E-03	(-1.204)	-0.019**	(-2.391)	9.70 E-03	(1.299)	-0.012*	(-1.849)
SP			6.879***	(4.786)					7.311***	(4.416)		
NE			-5.888***	(-5.872)	-4.862***	(-5.124)			-6.201***	(-5.539)	-4.996***	(-4.972)
R2	0,483		0,584		0,561		0,462		0,585		0,564	
MSE	3,861		3,494		3,592		3,940		3,490		3,579	

The results displayed are the ones for the main equations inside Chapter V and for the equations with PROXM where both this variable and YPROXM are significant.
The coefficients were corrected by heteroscedasticity.
Equation 6 (NONAGR) has also shown negative and significant NONTRM.

V.6 - Using the Dummy for North

The differences between the results of the two samples of the 1970-1995 period may depend on the influence of the states of the North (N), that are only included in the 24-State sample. Aiming to test the influence of the Northern states, we ran a set of regressions controlling for the special effects of this region, through the usage of a dummy variable (N).

The results are displayed in Tables A1-A3.

We can see that when adding N in specifications (2) and (4), the coefficient of the dummy for the Northern states is no longer significant. Since SP and NE are highly significant, we must conclude that our results are not distorted due to the behaviour of the Northern states.

Controlling for the special effect of N, we do not change the previous results that there was dispersion of economic activities towards the poorer and less industrialised states. Also SP has usually a positive coefficient and NE has a negative coefficient.

The differences seem to be that:

a) using TR (and INDGSP) the coefficients of TR and YTRM change signs, becoming positive; using PROX (and INDGSP) we find positive significant coefficients for PROX and YPROX;

b) NONAGR is negative in the specifications without SP and NE;

c) DD loses significance.

Table A.1 - NORTH (INDGSP & TR) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRGSP - panel results

	1		2	t	3	t	4	t
Y	-0,279	(-1.084)	-2.130***	(-4.633)	-0,431	(-1.54)	-2.124**	(-4.61)
INDGSP	-0,090	(-1.547)	-0,047	(-0.754)	-0.091*	(-1.65)	-0,045	(-0.74)
TR	1,517	(0.764)	0,619	(0.330)				
YTRM					0,674	(1.38)	0,033	(0.07)
DD	-6.21 E-03	(-1.083)	8.65 E-03*	(1.688)	-6.76 E-03	(-1.22)	9.08 E-03*	(1.78)
N	3.280***	(2.548)	1,447	(1.114)	3.472***	(2.65)	1,262	(0.94)
SP			6.425***	(4.659)			6.433***	(4.23)
NE			-4.586***	(-4.330)			-4.606***	(-4.28)
R2	0,534		0,587		0,538		0,586	
MSE	3,683		3,500		3,668		3,501	

* All coefficients were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table A.2 - NORTH (INDGSP & PROX) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	3a	t
Y	-1.134***	(-3.40)	-2.111***	(-4.40)	-0.828**	(-2.41)	-2.076***	(-4.43)	-1.143***	(-3.24)
INDGSP	-0.085*	(-1.68)	-0,048	(-0.74)	-0,082	(-1.57)	-0,041	(-0.71)	-0.085*	(-1.67)
PROX	475479***	(3.33)	63440	(0.23)						
PROXM									466435.4**	(2.44)
YPROXM					69278**	(2.27)	-51175	(-1.18)	2996	(0.08)
DD	-6.31 E-03	(-1.169)	8.05 E-03	(1.208)	-9.53 E-03	(-1.61)	0.015**	(2.19)	-6.48 E-03	(-1.19
N	4.801***	(4.039)	1,626	(0.973)	3.702***	(3.04)	0,385	(0.27)	4.804***	(4.003
SP			6.158***	(3.363)			8.902***	(3.64)		
NE			-4.262**	(-2.337)			-5.308***	(-4.29)		
R2	0,561		0,587		0,545		0,589		0,561	
MSE	3,573		3,500		3,638		3,490		3,589	

Table A.3 - NORTH (NONAGR & TR) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-0.516**	(-2.32)	-2.628***	(-6.512)	-0.657***	(-2.543)	-2.628***	-6.53
NONAGR	-0,017	(-0.22)	0,055	(0.696)	-0,020	(-0.259)	0,052	0.69
TR	-0,075	(-0.04)	-0,636	(-0.412)				
YTRM					0,390	(0.862)	-0,141	-0.36
DD	-4.21 E-03	(-0.53)	7.89 E-03	(1.104)	-5.10 E-03	(-0.651)	8.08 E-03	1.13
N	2.990**	(2.04)	0,373	(0.240)	3.450**	(2.367)	0,465	0.30
SP			6.723***	(4.867)			6.906***	4.65
NE			-5.689***	(-5.394)			-5.700***	-5.36
R2	0,510		0,585		0,512		0,585	
MSE	3,776		3,509		3,768		3,509	

* All coefficients were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table A.4 - NORTH (NONAGR & PROX) - BRAZIL - 1970-1995 (24 states)

Dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	3a	t
Y	-1.419***	(-4.35)	-2.658***	(-6.53)	-1.131***	(-3.67)	-2.582***	(-6.41)	-1.440***	(-4.25)
NONAGR	-0,020	(-0.28)	0,063	(0.73)	-0,019	(-0.25)	0,055	(-0.73)	-0,020	(-0.08)
PROX	466329***	(3.21)	-133427	(-0.62)						
PROXM									444790**	(2.35)
YPROXM					70308**	(2.31)	-60739	(-1.46)	7143	(0.19)
DD	-5.29 E-03	(-0.69)	9.23 E-03	(1.35)	-8.68 E-03	(-1.09)	0.015*	(1.86)	-5.69 E-03	(-0.77)
N	5.038***	(3.78)	-0,297	(-0.15)	3.978***	(2.94)	-0,396816	(-0.25)	5.042***	(3.74)
SP			7.339***	(4.44)			9.517***	(4.04)		
NE			-6.425***	(-3.67)			-6.476***	(-5.11)		
R2	0,538		0,585		0,524		0,588		0,539	
MSE	3,665		3,505		3,723		3,494		3,682	

* All coefficients were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

V.7 - Checking for Changes in the Coefficients

In this section, we will check if there was a change in the coefficients of our variables between the periods 1950-1969 and 1970-1995, using the sample of 18 states only. The procedure we will adopt is to use a dummy variable (5070) that takes the value (1) for the years 1950 to 1965 and (0) for the period 1970-1995. We multiply each of the variables of our equations by this dummy and include these products (5070 * variable) in the specifications. Let us call these special variables (COEFx) or auxiliary variables. As an example, when discussing difference between periods in the coefficients in the specification

$GRGSP = \alpha + \beta Y + \chi INDGSP + \delta\ TR + \phi\ DD + \ldots + \varepsilon$, we will estimate

$$GRGSP = \alpha + \beta Y + \chi INDGSP + \delta TR + \phi DD + \varphi(5070*Y) + \gamma(5070*INDGSP) + \eta(5070*TR) + \iota(5070*DD) + \ldots + \varepsilon.$$

If γ, η, ι and/or φ is (are) different from zero, we can conclude that there was a change in the respective (s) coefficient(s).

In Tables B.1 and B.2, four specifications were tested. Table B.1 refers to the specifications with INDGSP, while Table B.2 refers to the specifications with NONAGR. We indicate which variables were included in each specification and which coefficients of the auxiliary variables were significant.

It can be seen that only the coefficient of NONAGR (with PROX and YPROXM) and of DD (with YTRM) have changed over the years. The coefficient of NONAGR shows smaller importance of economies of scale outside the agricultural sector in the period 1970-1995, while the negative impact of DD was bigger, or, in other words, congestion effects were more important in the second period.

More interesting would be to test for the joint significance of the auxiliary variables. In the same tables we show the F-test for each specification. The null hypothesis is that the coefficients are equal between the periods 1950-1965 and 1970-1995. We cannot reject the null (at the 5% level) in all specifications. There was no significant change in the coefficients during our whole period.

TABLE B.1 - INDGSP
TEST of JOINT SIGNIFICANCE FOR A CHANGE IN THE COEFFICIENTS
BRAZIL -1950-1995 - (18 states)
dependent variable: GRGSP - panel results

Variables	Specifications				Significant COEFx****			
	1	2	3	4	1	2	3	4
Y	x	x	x	x				
INDGSP	x	x	x	x				
TR	x							
YTRM		x						
PROX			x					
YPROXM				x				
DD	x	x	x	x				
COEFY*	x	x	x	x				
COEFIND	x	x	x	x				
COEFTR	x							
COEFYTRM		x						
COEFPROX			x					
COEFYPROXM				x				
COEFDD	x	x	x	x				
time dummies	x	x	x	x				

F test	**1**	**2**	**3**	**4**
R2**original	0,491	0,492	0,511	0,495
R2*** with coef	0,506	0,509	0,517	0,511
F=	1,160	1,300	0,457	1,187

Pr (F(4,145) >2.45)=0.05;

* COEF(NAME OF THE VARIABLE x) = dummy for the period 1950-1970 * VARIABLE x

** R2 from the original specifications without the variables COEFx;

***R2 from the above specifications;

****In these cases no coefficients of the COEFX variables were significant.

TABLE B.2 - NONAGR
TEST of JOINT SIGNIFICANCE FOR A CHANGE IN THE COEFFICIENTS
BRAZIL -1950-1995 - (18 states)
dependent variable: GRGSP - panel results

Variables	Specifications				Significant COEFx****				Sign
	1	2	3	4	1	2	3	4	
Y	x	x	x	x					
NONAGR	x	x	x	x					
TR	x								
YTRM		x							
PROX			x						
YPROXM				x					
DD	x	x	x	x					
COEFY*									
COEFNON							x	x	(>)
COEFTR									
COEFYTRM									
COEFPROX									
COEFYPROXM									
COEFDD						x			(<)
time dummies									

F test	1	2	3	4
R2**original	0,492	0,492	0,509	0,496
R2***with coef	0,510	0,511	0,524	0,515
F=	1,332	1,454	1,119	1,427

Pr (F(4,145) >2.45)=0.05;

* COEF(NAME OF THE VARIABLE x) = dummy for the period 1950-1970 * VARIABLE x

** R2 from the original specifications without the variables COEFx;

***R2 from the above specifications;

****In these cases no coefficients of the COEFX variables were significant.

V.8 - Has the Interaction Term Changed Sign in the Period 1950-1995?

In Chapter I we explained that, based on NEG ideas, at high levels of transportation cost, there would be a tendency towards dispersion of economic activity in the economy. At intermediate levels of transportation cost, richer states would have an advantage over poorer states (less industrialised ones) and there would be a concentration of activities in them. At very low levels of transportation costs, we would observe again a tendency towards dispersion of economic activity, since the richer states would be facing very high production costs.

In Chapter III, we explained that the coefficient of our interaction terms (YTRM or YPROXM) should reflect one of these "phases" of the model. In phase II, where low transportation costs help concentration, the interaction term should have a positive sign, since the richer states would be benefiting more from the exposure to low transportation costs. At the dispersion phase, the interaction term should be negative.

Another question that we could raise is if the coefficient of the interaction term is changing over time, as a result of technological improvements in the transport sector and elsewhere. Depending on whether Brazil was in an "early" or "late" state of phase II in 1950 (where "early" means closer to phase I and "late" means closer to phase III), the coefficients of YTRM and YPROXM should be either increasing or decreasing over time, as shown in Figure V.1.

To verify if this change has occurred we have run the following specification, the results of which are displayed in Table C.1:

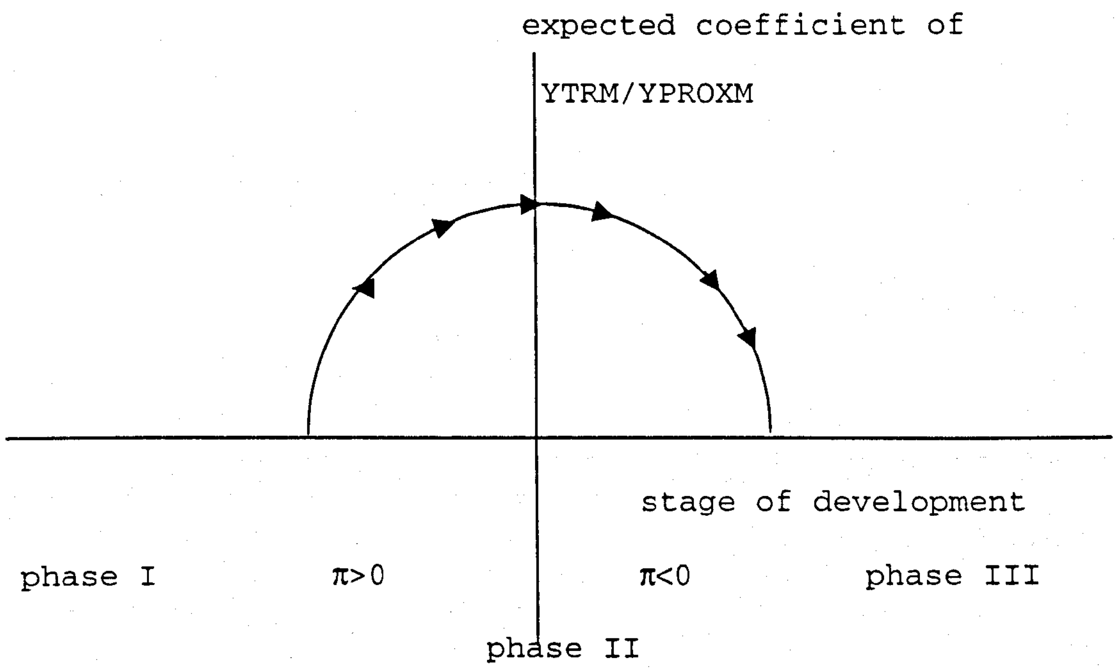
$$GRGSP = \alpha_1 + \beta_1 Y + \chi_1 INDGSP + \delta_1 \ YTRM + \pi_1 (YTRM*YEAR) + \phi_1 DD + \ldots + \varepsilon_1, \quad (1)$$

$$GRGSP = \alpha_2 + \beta_2 Y + \chi_2 INDGSP + \delta_2 \ YPROXM + \pi_2 (YPROXM*YEAR) + \phi_2 DD + \ldots + \varepsilon_2, \quad (3)$$

Specifications (2) and (4) include the dummies for SP and NE in these equations. Table C.2, in its turn, shows analogous equations with NONAGR instead of INDGSP.

The results in Table C.1 show that, using both YTRM and YPROXM, the coefficients of π_1 and π_2 are not significant. We could conclude that, controlling for NE, the states of Brazil would be in phase II of the NEG model, in the period 1950-1995, since the interaction terms show positive signs. This lack of significance (of YTRM*YEAR or YPROXM*YEAR) indicates that the states of Brazil could be in the peak of Figure V.1.

FIGURE V.1 - Stages in Phase II



The results in Table C.2, with NONAGR, show one difference: controlling for NE and SP, YPROXT (YPROXM*YEAR) is positive and significant, indicating that the Brazilian states would be in the "early" phase of development.

TABLE C.1 - INTERACTION TERM*YEAR (GRGSP & INDGSP)

	1 t		2 t		3 t		4 t	
Y	-0,125	(-0.431)	-1.743***	(-3.869)	-0,390	(-0.993)	-1.760***	(-3.554)
INDGSP	-0,053	(-1.220)	-1.81 E-03	(-0.042)	-0,041	(-1.049)	8.48 E-03	(0.212)
YTRM	71,327	(0.761)	-62,253	(-0.652)				
YTRMT*	-0,036	(-0.757)	0,032	(0.656)				
YPROXM**					2,189	(0.716)	-4,715	(-1.404)
YPROXT					-1.09 E-03	(-0.705)	2.37 E-03	(1.404)
DD	-0,010	(-1.565)	4.96 E-03	(0.702)	-0.011*	(-1.700)	7.93 E-03	(1.007)
SP			3.782***	(2.493)			4.873***	(2.501)
NE			-3.463***	(-4.357)			-3.793***	(-4.492)
R2	0,494		0,556		0,497		0,559	
MSE	3,141		2,963		3,131		2,951	

*YTRMT = YTRM *YEAR
**YPROXT=YPROXSHM * YEAR

TABLE C.2 - INTERACTION TERM*YEAR (GRGSP & NONAGR)

	1 t		2 t		3 t		4 t	
Y	-0,222	(-0.797)	-1.841***	(-4.408)	-0,544	(-1.452)	-1.937***	(-4.363)
NONAGR	0,033	(0.939)	0.060*	(1.772)	0,031	(0.892)	0.075**	(2.205)
YTRM	-6,380	(-0.063)	-141,125	(-1.411)				
YTRMT*	3.25 E-03	(0.064)	0,071	(1.414)				
YPROXM**					0,109	(0.032)	-8.140**	(-2.252)
YPROXT					-3.88 E-05	(-0.023)	4.11 E-03**	(2.255)
DD	-0.014*	(-1.880)	-8.49 E-04	(-0.110)	-0.016**	(-2.014)	5.24 E-03	(0.062)
SP			3.654**	(2.432)			4.734***	(2.484)
NE			-3.721***	(-4.873)			-4.199***	(-5.146)
R2	0,492		0,565		0,496		0,573	
MSE	3,148		2,932		3,134		2,903	

*YTRMT = YTRM *YEAR
**YPROXT=YPROXSHM * YEAR

V.9 - Omitted Variables

We have tried to test if three variables commonly highlighted by The New Economic Growth literature would influence our results. These variables were: the urbanisation rate (URB), the share of students in secondary school over total population (SCHOOL) and the share of exports in the income (EXPORTS).

Due to serious problems with our data set, we are showing the results only in Appendix 3. In testing the impact of these variables we realise two main problems: changes in the Brazilian education system do not allow us to construct a complete series of SCHOOL from 1950 to 1990. This variable is also not significant; the data for exports is misleading, since the value of exports is computed in the state that sends the goods abroad, which creates a strong bias towards the coastal states. This variable is sometimes significant.

We have decided to work deeply only with the urbanisation rate.

The correlation matrix among these variables and our previous one is in Table D.1. We can observe that higher urbanisation rate, higher secondary school level and, to a smaller extent, higher exportation rates, are characteristics associated with the richest states, closer to richer markets, with higher industrialisation and a significant participation of the service sector.

TABLE D.1 - CORRELATION MATRIX - OMITTED VARIABLES - 1950-1995 (18 states)

	urb	enrsec	expgsp	gr	grind	y	indgsp
urb	1.0000						
enrsec	0.7473	1.0000					
expgsp	0.4999	0.5146	1.0000				
gr	-0.2897	-0.3409	-0.2430	1.0000			
grind	-0.2180	-0.2803	-0.1998	0.6009	1.0000		
y	0.8263	0.7386	0.7099	-0.3297	-0.2662	1.0000	
indgsp	0.7499	0.7800	0.5331	-0.3639	-0.4231	0.7583	1.0000
nonagr	0.8226	0.7605	0.3965	-0.2168	-0.2378	0.6600	0.8040
dd	0.6411	0.3869	0.3392	-0.2288	-0.1915	0.5772	0.4449
tr	0.6910	0.6372	0.4707	-0.1961	-0.1555	0.6988	0.7290
itrm	0.4386	0.2951	0.5763	-0.0985	-0.1275	0.6256	0.5084
proxsh	0.5620	0.2658	0.4774	-0.0181	-0.0360	0.7186	0.4143
yproxshm	0.5764	0.3379	0.6836	-0.0965	-0.0979	0.7757	0.4719
ne	-0.3770	-0.1741	-0.2873	-0.0881	-0.0430	-0.5700	-0.1636
se	0.4416	0.1596	0.3550	-0.0493	-0.0323	0.4820	0.2727
s	0.0320	0.0770	0.0897	0.0116	-0.0218	0.2554	0.1547
co	-0.0224	-0.0254	-0.1188	0.1916	0.1369	-0.0337	-0.2839
sp	0.3305	0.1105	0.5315	0.0009	-0.0303	0.4731	0.3571

	nonagr	dd	tr	itrm	proxsh	yproxshm	ne
nonagr	1.0000						
dd	0.5805	1.0000					
tr	0.6700	0.5117	1.0000				
itrm	0.3761	0.4725	0.7801	1.0000			
proxsh	0.3530	0.4500	0.5069	0.6146	1.0000		
yproxshm	0.4083	0.5770	0.5376	0.7671	0.8504	1.0000	
ne	-0.0842	-0.1597	-0.2918	-0.3322	-0.8102	-0.5329	1.0000
se	0.3651	0.4951	0.3455	0.4301	0.7743	0.6830	-0.5345
s	-0.0527	-0.1089	0.3286	0.2763	0.2434	0.0551	-0.4472
co	-0.2865	-0.2717	-0.3825	-0.3681	-0.0240	-0.1211	-0.3536
sp	0.2565	0.1877	0.3481	0.5856	0.5478	0.7097	-0.2425

	se	s	co	sp
se	1.0000			
s	-0.2390	1.0000		
co	-0.1890	-0.1581	1.0000	
sp	0.4537	-0.1085	-0.0857	1.0000

V.9.1. - Urbanisation Rate

a) INDGSP

Tables D.2 and D.3 show the results with INDGSP that include only the omitted variable URB.

Equation (1) includes Y, INDGSP, TR, URB and DD. Only two variables are significant: URB (t-statistic of +2.29) and DD (t-statistic of -2.63).

Including the dummies for SP and NE in Equation (2), only per capita income (-4.05), SP (+2.48) and NE (-3.49) are significant.

Equation (3) includes Y, INDGSP, URB, DD and YTRM. Y (-1.61) and INDGSP (-2.08) are negative and significant. URB is positive and significant at the 5% level (+2.43) and DD is negative and significant at the 1% level (-2.75).

Including the dummies in Equation (4), only Y and the dummies are significant.

Equation (5) includes Y, INDGSP, URB, DD and PROX. Y is negative and significant (-2.61), PROX is positive and significant (+2.08), URB is positive and significant (+1.71) and DD is negative and significant (-2.33).

Again, as we include the dummies in Equation (6), only Y remains significant. The dummies are significant at the 1% level.

Equation (7) includes Y, INDGSP, YPROXM, URB and DD. Y is negative and significant (-2.44), YPROXM is positive and significant (+1.92), URB is positive and significant (+2.31) and DD is negative and significant (-2.82).

Including the dummies, which are significant, in Equation (8), only Y remains significant.

We can observe that the urbanisation rate is playing an important role in explaining the growth rate of the states of Brazil. The higher the urbanisation rate, the higher the growth, implying that other sources of economies of agglomeration, not discussed by the basic models of NEG, are affecting the direction of activities among the states of Brazil.

On the other hand, the variable URB has less impact than the dummies for SP and NE, and is insignificant when these are included. Observing the correlation matrix (Table D.1), URB has a high positive correlation with SP (and with SE), and a negative correlation with NE, which explains this outcome.

Comparing these results with the results of Tables V.5, we can observe that the population density becomes significant in the former (in the specifications without the DD). DD shows a negative coefficient suggesting that what affects growth positively is not the total amount of population, but the amount of urbanised one.

We also can observe that three variables have their t-statistics increased, after controlling for URB: Y, INDGSP, and YTRM.

Comparing the results of Table D.1 with the results of Table V.13, the only worthwhile note is that DD, controlling for URB, is negative and significant without the dummies. The other results are very robust to the introducing of URB.

TABLE D.2 - OMITTED VARIABLES - URBANIZATION RATE (INDGSP) BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0,379	(-1.464)	-1.661***	(-4.053)	-0.536*	(-1.907)	-1.752***	(-4.203)	-0.829***	(-2.616)	-1.690***	(-4.124)	-0.730**	(-2.441)	-1.682***	(-4.172)
INDGSP	-0,056	(-1.515)	-5.90 E-03	(-0.149)	-0.073**	(-2.078)	-0,028	(-0.801)	-0,051	(-1.607)	3.78 E-03	(0.114)	-0.054*	(-1.709)	-0,015	(-0.473)
TR	0,484	(0.260)	-0,835	(-0.472)												
YTRM					0,686	(1.570)	0,498	(1.240)								
PROX									0.191**	(2.084)	-0,213	(-1.518)				
YPROXM													0.036*	(1.924)	3.90 E-03	(0.152)
URB	0.069**	(2.290)	0,033	(1.110)	0.076**	(2.431)	0,039	(1.279)	0.054*	(1.711)	0,034	(1.176)	0.070**	(2.308)	0,033	(1.138)
DD	-0.017***	(-2.632)	5.94 E-03	(0.090)	-0.018***	(-2.752)	-1.75 E-03	(-0.261)	-0.015**	(-2.331)	4.58 E-03	(0.660)	-0.019***	(-2.818)	-6.32 E-03	(-0.084)
SP			3.438***	(2.480)			3.044**	(2.276)			4.528***	(2.813)			3.266*	(1.713)
NE			-3.097***	(-3.488)			-3.026***	(-3.522)			-4.394***	(-3.225)			-3.019***	(-3.445)
R2	0,509		0,512		0,513		0,559		0,521		0,564		0,514		0,557	
MSE	3,093		2,956		3,079		2,950		3,054		2,936		3,077		2,958	

* The standard errors were corrected for heretoscedasticity.

TABLE D.3 - OMITTED VARIABLES - URBANIZATION RATE (NONAGR) BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.469*	(-1.702)	-1.666***	(-4.460)	-0.601**	(-1.941)	-1.813***	(-4.572)	-0.974***	(-3.280)	-1.664***	(-4.691)	-0.860***	(-2.926)	-1.774***	(-4.921)
NONAGR	5.90 E-03	(0.147)	0,035	(0.871)	-6.87 E-04	(-0.017)	0,029	(0.720)	2.91 E-03	(0.077)	0,044	(1.115)	1.51 E-03	(0.040)	0,032	(0.820)
TR	-0,723	(-0.426)	-1,233	(-0.807)												
YTRM					0,257	(0.594)	0,313	(0.799)								
PROX									0.191**	(2.072)	-0.246*	(-1.804)				
YPROXM													0.034*	(1.739)	8.81 E-03	(0.335)
URB	0.060*	(1.700)	0,016	(0.443)	0.623*	(1.702)	0,019	(0.525)	0,045	(1.212)	0,015	(0.433)	0.060*	(1.715)	0,017	(0.467)
DD	-0.017***	(-2.475)	-9.51 E-04	(-0.151)	-0.018***	(-2.525)	-2.33 E-03	(-0.367)	-0.015**	(-2.255)	2.74 E-03	(0.414)	-0.019***	(-2.659)	-2.63 E-03	(-0.352)
SP			3.241**	(2.290)			2.877**	(2.081)			4.470***	(2.761)			2,844	(1.470)
NE			-3.327***	(-3.852)			-3.336***	(-3.878)			-4.793***	(-3.655)			-3.270***	(-3.476)
R2	0,503		0,561		0,504		0,560		0,515		0,568		0,507		0,559	
MSE	3,111		2,946		3,110		2,948		3,073		2,920		3,098		2,951	

* The standard errors were corrected for heretoscedasticity.

b) NONAGR

Table D.3 shows the results with NONAGR and URB.

Equation (1) includes Y, NONAGR, URB, TR and DD, URB is positive and significant (+1.84) and DD is negative and significant (-2.25).

Including the dummies in Equation (2), only Y and the dummies are significant.

Equation (3) replaces TR with YTRM in Equation (1). URB is positive and significant at the 10% level (+1.90) and DD is negative and significant (-2.32). Per capita income is also negative and significant (-1.78).

Controlling for the dummies (Equation (4)), again only they and per capita income are significant.

Equation (5) includes Y, NONAGR, PROX, URB and DD. This was the only specification (without the dummies) where URB was not significant. The significant variables in this specification are Y (-3.28), PROX (+2.07) and DD (-2.26), which, with the exception of DD, are the same variables that remain significant with the inclusion of the dummies (Equation (6)).

Equation (7) replaces PROX with YPROXM in Equation (6). YPROXM is positive and significant at the 10% level (+1.74), URB is positive and significant at the 10% level (+1.72), DD is negative and significant (-2.67) and Y is negative and significant at the 1% level (-2.67).

Including the dummies in Equation (8), only Y and NE are significant.

Once more, the general result is that economies of agglomeration represented by URB are positively affecting growth, and are generating concentration of economic activity. The other general result is that the higher the population density, the lower the growth rate of the states. These results are nullified with the inclusion of the dummies.

Comparing the results of Table D.3 with the results in Table V.6 we can observe that Y becomes more significant. We have already reached the result that the richer the state, the lower its growth rate, but the inclusion of URB highlights that this effect is even stronger if we control for the urbanisation rate. Since there is a higher correlation between URB and Y, the positive effects of URB were implicit in Y. On the other hand, NONAGR becomes less significant. The positive effect of economies of scale outside the agricultural sector to the growth process is weakened with the controlling for URB, meaning that part of it was due to economies of agglomeration.

The decrease in significance in NONAGR is also observable in the comparison between Table D.3 and Table V.14.

Conclusion

With the panel results, we were hoping to obtain more precise results in testing the main ideas of NEG models. We were especially concerned with two main ideas: if economies of scale (in the industrial sector or in the non-agricultural sector) were enhancing (decreasing) growth, and so helping to create a concentration (dispersion) of economic activity, as predicted by the Krugman and Venables (1995) model; and if, as transportation cost falls, richer regions were growing faster (slower) than poorer regions, which would reinforce the concentration (dispersion) of economic activities, following the phases predicted by the above-mentioned model.

Two further questions have also received our attention: if congestion effects were helping to disperse economic activity, and if there was a dispersion or concentration of total economic activity (generated also by forces not discussed in NEG models).

We may also interpret our results as a contribution to understanding the determinants of economic growth.

First of all, we have to state that even using a panel approach, which increases our number of observations, we could not find consistently significant results, even though some pattern has been shown by the data.

For the whole period 1950-1995, it seems that the NEG models do represent part of what was going on in the distribution of activities among the Brazilian states.

Economies of scale in the industrial sector were not affecting growth (the coefficients are usually not significant), or (observing the majority of the signs and taking into account t-statistics higher than one or significant) were helping to concentrate economic activity (controlling for NE).

Economies of scale in the industrial and service sectors taken together were either not influencing the distribution of activities, if we consider that the majority of the coefficients was not significant, or were having a positive impact on economic growth, helping to concentrate economic activity, if we consider coefficients with high t-statistics and the significant ones (controlling for NE).

The coefficients of the interaction terms were (almost always) positive, although not significant. But, controlling for NE and including the demeaned variables (TRM/PROXM), we found significant positive coefficients for the interaction terms.

In these specifications, per capita income shows negative and significant signs, indicating that there was a dispersion of economic activity towards the poorer states. Combining the two sets of information, decrease in transportation cost was increasing the value of the per capita income coefficient, and the forces emphasised by NEG were acting in the direction of creating core/periphery structures.

Congestion effects do not seem to be playing an important role in the whole period.

In terms of the determinants of economic growth, economies of scale in both sectors were enhancing growth. The coefficients of proximity to richer markets or good infrastructure of transport do not allow for reaching any conclusion.

Controlling for SP, and especially from the special effects of the NE states, seems important in order to understand the economics of Brazil.

For the first sub-period, 1950-1970, observing the significance of the coefficients (with t-statistics higher than one), we conclude that economies of scale in the industrial sector were positively affecting economic growth and were shaping the distribution of activities. Controlling for NE, we can affirm that economies of scale in the industrial and service sectors taken together were positively helping growth and were helping to concentrate economic activity.

The coefficients of the interaction term were positive, but significant only when we included the demeaned value TRM/PROXM (and usually controlling for NE). The coefficients were positive, which indicates a decrease in the coefficient of per capita income. The coefficients of per capita income, controlling also for NE, are negative and usually significant. So, although there was a dispersion of economic activities towards poor states, the decrease in transportation cost was acting in the opposite direction, helping to concentrate the activities (as in phase II of the model).

Once more, congestion effects were not important in this period, and we cannot reach a conclusion about the effect of transportation cost on growth.

SP and especially NE were important variables in our empirical exercises.

It is important to remember that using tests of restriction, the conclusion that we were in the second phase of the model can only be reached, for 1950-1995 and for 1950-1970, with NONAGR and YTRM.

In our last section, we observed that using INDTRM/INDPROXM or NONTRM/NONPROXM gave similar results as the ones with YTRM/YPROXM. But we can add that for the whole period of 1950-1995 and for the first period, 1950-1970, economies of scale in the industrial and service sector (NONAGR), together with a decrease in transportation cost, have generated a tendency towards concentration of activity, as observed by the sign of the interaction terms, in a similar way to the one predicted in phase II of Krugman and Venables' (1995) model.

Turning to the results for the 18-State sample for the period 1970-1995, we then observe some weakening of the power of explanation of the NEG model.

First of all, we have clear information that the states that grew more were not the most industrialised ones (controlling for NE, nothing can be said). Economies of scale in the industrial and service sector taken together are no longer important in explaining economic growth (including some negative coefficients, although they are usually not significant).

The interaction terms, with PROX, show negative coefficients. Including the demeaned variable (PROXM only), and controlling for the NE only, we obtain negative and significant coefficients for the interaction term, indicating that lower transportation cost was generating dispersion of economic activity (the opposite occurs with NONPROXM in (5ap) and (8ap)).

Congestion effects were not influencing the results and again SP, and especially NE, were important variables in the econometric models.

Proximity to richer markets (PROX/PROXM), without controlling for NE, was helping economic growth. Since the states with higher proximity to rich markets were also the richer ones, this result implies that low transportation cost has helped concentration of economic activity.

The results for the 24-State sample of the period 1970-1995 show dispersion of economic activity towards poorer states (controlling for NE), a negative influence of economies of scale on growth (not controlling for NE) and (not controlling for NE) a negative coefficient for the interaction term.

DD shows more importance (a negative one) in the determination of economic growth, without controlling for NE.

NE is still a significant variable and SP has more significant coefficients.

We have also seen that urbanisation effects showed some positive effects on economic growth, but this effect seems to be reflecting the behaviour of NE and SP. Problems of multicollinearity or poor quality data did not allow us to further explore the influence of other variables considered relevant in the literature of economic growth.

Finally, we did not observe that the coefficient of the interaction term has changed over the period 1950-1995. Controlling for NONAGR, we found a significant coefficient for the variable (YEAR*INTERACTION TERM), but the coefficient is positive, showing that if any change was occurring, we were still close to the left part of phase II, in Figure V.1. Since there was a change in the provision of transport in Brazil during the period, this result generates doubt about the power of the whole history told by the model in explaining the economic growth of Brazil. Another interpretation, which is consistent with the different findings in the two sub-periods, would be that other factors, for example, government actions, were counteracting the economic forces that we are discussing.

Chapter VI - The Case of Brazil - The Growth Rate of Industrial Output (GRIND)

Introduction

In this chapter, we will repeat the panel exercises that were done in the previous one, but change the dependent variable. Our dependent variable will be the *growth rate of industrial output* (GRIND). The pattern of growth of industrial output can be different from the pattern of growth of the total output (GRGSP), and is of particular interest because of the role played by agglomeration forces in the industrial sector in NEG theories.

Section I will discuss the correlation of GRIND with the right hand side variables. Section II will discuss the panel results with the TR proxy (length of road and railways per unit area) and Section III will discuss the panels with the PROX proxy (inverse of average distance from other states weighted by output). Section 4 will exploit the interaction terms IND/NONTRM and IND/NONPROXM. Section 5 will investigate the behaviour of the dummy for the Northern states. Section 6 will investigate if there was a change in the coefficients of the variables and Section 7 will discuss the path of the interaction terms. Finally, in Section 8, we will discuss the impact of the urbanisation rate on our model.

VI.1 - Correlation Matrix

Tables VI.1 - 4 shows the correlation matrix of all the independent variables with the dependent variable "the real growth rate of industrial output" (GRIND).

For the sample 1950-1995, the only strong correlation is between GRIND and the share of industry in total output (INDGSP). The higher the share of industrial output in a state, the lower its industrial growth rate. For the sample 1950-1970, there was no important correlation.

For the sample 1970-1995, using all the 24 states, the same negative relationship is true and even stronger. The correlation coefficient between INDGSP and GRIND is -0.5767. Also strong is the negative correlation between NONAGR and GRIND. Not only did the states with a high share of industrial output grow less, but also the states with a high share of industrial and service output grew less. Obviously, the highest growth has occurred in the agricultural states.

Poor states have also experienced a higher growth in industrial output than rich states.

These three negative correlation coefficients also hold for the small sample of the period 1970-1995. Poor states, mostly agricultural, grew more in terms of industrial output.

Table VI.1 - CORRELATION MATRIX - 1950-1995 (18 states)

	grind	y	indgsp	nonagr	dd	tr	ytrm
grind	1.0000						
y	-0.2662	1.0000					
indgsp	-0.4231	0.7583	1.0000				
nonagr	-0.2378	0.6600	0.8040	1.0000			
dd	-0.1915	0.5772	0.4449	0.5805	1.0000		
tr	-0.1555	0.6988	0.7290	0.6700	0.5117	1.0000	
ytrm	-0.1275	0.6256	0.5084	0.3761	0.4725	0.7801	1.0000
indtrm	-0.0582	0.5742	0.4361	0.2951	0.3963	0.7803	0.9479
nontrm	-0.1107	0.5356	0.4402	0.3298	0.4906	0.8176	0.9110
prox	-0.0360	0.7186	0.4143	0.3530	0.4500	0.5069	0.6146
yproxm	-0.0979	0.7757	0.4719	0.4083	0.5770	0.5376	0.7671
indproxm	-0.0404	0.7332	0.3873	0.3012	0.4574	0.4840	0.7225
nonproxm	-0.0352	0.7123	0.3686	0.3082	0.5008	0.4660	0.6506
ne	-0.0430	-0.5700	-0.1636	-0.0842	-0.1597	-0.2918	-0.3322
se	-0.0323	0.4820	0.2727	0.3651	0.4951	0.3455	0.4301
s	-0.0218	0.2554	0.1547	-0.0527	-0.1089	0.3286	0.2763
co	0.1369	-0.0337	-0.2839	-0.2865	-0.2717	-0.3825	-0.3681
sp	-0.0303	0.4731	0.3571	0.2565	0.1877	0.3481	0.5856

	indtrm	nontrm	prox	yproxm	indproxm	nonproxm	ne
indtrm	1.0000						
nontrm	0.9360	1.0000					
prox	0.5788	0.5965	1.0000				
yproxm	0.6646	0.6285	0.8504	1.0000			
indproxm	0.6705	0.6212	0.9055	0.9561	1.0000		
nonproxm	0.6036	0.6154	0.9783	0.9017	0.9505	1.0000	
ne	-0.3916	-0.3805	-0.8102	-0.5329	-0.6524	-0.7593	1.0000
se	0.3651	0.4421	0.7743	0.6830	0.7086	0.7856	-0.5345
s	0.3349	0.3490	0.2434	0.0551	0.1355	0.1753	-0.4472
co	-0.2571	-0.3933	-0.0240	-0.1211	-0.0601	-0.0392	-0.3536
sp	0.5204	0.4645	0.5478	0.7097	0.6874	0.5852	-0.2425

	se	s	co	sp
se	1.0000			
s	-0.2390	1.0000		
co	-0.1890	-0.1581	1.0000	
sp	0.4537	-0.1085	-0.0857	1.0000

Table VI.2 - CORRELATION MATRIX - 1950-1970 (18 states)

	grind	y	indgsp	nonagr	dd	tr	ytrm
grind	1.0000						
y	0.0540	1.0000					
indgsp	-0.1697	0.6806	1.0000				
nonagr	-0.0001	0.6683	0.7568	1.0000			
dd	-0.0848	0.6355	0.5772	0.7723	1.0000		
tr	0.0549	0.7659	0.6490	0.5591	0.6220	1.0000	
ytrm	0.0133	0.7795	0.7379	0.6639	0.6389	0.8745	1.0000
indtrm	0.0310	0.7840	0.7565	0.6029	0.5437	0.8592	0.9696
nontrm	-0.0243	0.7918	0.7375	0.6468	0.6856	0.9321	0.9567
prox	0.0804	0.7932	0.5642	0.4901	0.4201	0.6131	0.6433
yproxm	0.0566	0.8650	0.7190	0.6732	0.5991	0.6895	0.8334
indproxm	0.0730	0.8446	0.6874	0.5949	0.4734	0.6583	0.7873
nonproxm	0.0663	0.8518	0.6257	0.5967	0.5505	0.6626	0.7298
ne	-0.1262	-0.6486	-0.2526	-0.1755	-0.1327	-0.3997	-0.3574
se	0.0403	0.5934	0.4191	0.5821	0.4980	0.5296	0.5749
s	0.0126	0.2405	0.1752	-0.0938	-0.1258	0.2675	0.0881
co	0.1326	-0.0383	-0.3603	-0.3797	-0.2985	-0.3819	-0.2962
sp	0.0540	0.5783	0.6527	0.3971	0.1544	0.5015	0.6675

	indtrm	nontrm	prox	yproxm	indproxm	nonproxm	ne
indtrm	1.0000						
nontrm	0.9445	1.0000					
prox	0.6687	0.6924	1.0000				
yproxm	0.8322	0.8081	0.8882	1.0000			
indproxm	0.8256	0.7680	0.9035	0.9718	1.0000		
nonproxm	0.7432	0.7614	0.9752	0.9490	0.9512	1.0000	
ne	-0.4199	-0.4502	-0.8131	-0.5750	-0.6233	-0.7395	1.0000
se	0.5451	0.6058	0.7923	0.7571	0.7457	0.8216	-0.5345
s	0.1164	0.1785	0.2307	0.0381	0.0716	0.1255	-0.4472
co	-0.1911	-0.2968	-0.0281	-0.1319	-0.0798	-0.0590	-0.3536
sp	0.7411	0.5786	0.5308	0.7239	0.7739	0.5823	-0.2425

	se	s	co	sp
se	1.0000			
s	-0.2390	1.0000		
co	-0.1890	-0.1581	1.0000	
sp	0.4537	-0.1085	-0.0857	1.0000

Table VI.3 - CORRELATION MATRIX - 1970-1995 (18 states)

	grind	y	indgsp	nonagr	dd	tr	ytrm
grind	1.0000						
y	-0.3206	1.0000					
indgsp	-0.5492	0.6705	1.0000				
nonagr	-0.4370	0.5515	0.6818	1.0000			
dd	-0.2005	0.5394	0.3663	0.6461	1.0000		
tr	-0.1788	0.5673	0.5907	0.5046	0.4401	1.0000	
ytrm	-0.1464	0.6485	0.5587	0.4727	0.4403	0.8793	1.0000
indtrm	-0.0691	0.5979	0.4722	0.3503	0.3699	0.9024	0.9455
nontrm	-0.1352	0.5766	0.5257	0.4614	0.4572	0.9725	0.9171
prox	-0.0577	0.7949	0.4391	0.4041	0.4599	0.5361	0.6456
yprox	-0.1174	0.8167	0.4813	0.4995	0.5670	0.5521	0.7553
indpro	-0.0603	0.8087	0.4308	0.3882	0.4554	0.5304	0.7142
nonpro	-0.0786	0.8180	0.4509	0.4222	0.5046	0.5239	0.6560
ne	-0.0036	-0.7046	-0.2024	-0.0683	-0.1857	-0.3239	-0.3642
se	-0.0698	0.5796	0.3383	0.4918	0.5366	0.3542	0.4374
s	-0.0399	0.3339	0.2200	-0.0605	-0.1106	0.4598	0.3666
co	0.1453	-0.0417	-0.3865	-0.4702	-0.2831	-0.4985	-0.4339
sp	-0.0735	0.5703	0.3961	0.3584	0.2190	0.3736	0.6305

	indtrm	nontrm	prox	yprox	indproxm	nonproxm	ne
indtrm	1.0000						
nontrm	0.9448	1.0000					
prox	0.5905	0.5883	1.0000				
yproxm	0.6423	0.6141	0.8954	1.0000			
indproxm	0.6477	0.5968	0.9487	0.9585	1.0000		
nonproxm	0.5899	0.5808	0.9938	0.9249	0.9650	1.0000	
ne	-0.4267	-0.3714	-0.7987	-0.5807	-0.7134	-0.7777	1.0000
se	0.3501	0.3954	0.7771	0.7480	0.7607	0.7953	-0.5345
s	0.4404	0.4431	0.2637	0.0746	0.1774	0.2149	-0.4472
co	-0.3065	-0.4576	-0.0700	-0.1541	-0.0817	-0.0697	-0.3536
sp	0.5103	0.4407	0.5486	0.7760	0.6984	0.5869	-0.2425

	se	s	co	sp
se	1.0000			
s	-0.2390	1.0000		
co	-0.1890	-0.1581	1.0000	
sp	0.4537	-0.1085	-0.0857	1.0000

Table VI.4 - CORRELATION MATRIX - 1970-1995 (24 states)

	grind	y	indgsp	nonagr	dd	tr	ytrm
grind	1.0000						
y	-0.3398	1.0000					
indgsp	-0.5767	0.5978	1.0000				
nonagr	-0.4735	0.5593	0.6596	1.0000			
dd	-0.2015	0.4959	0.3061	0.4972	1.0000		
tr	-0.2098	0.4361	0.4110	0.2925	0.5621	1.0000	
ytrm	-0.1560	0.5756	0.4072	0.2820	0.5791	0.8974	1.0000
indtrm	-0.0811	0.4629	0.2492	0.1608	0.5067	0.9141	0.9391
nontrm	-0.1768	0.4268	0.3549	0.2409	0.5868	0.9847	0.9253
prox	-0.1262	0.6782	0.3609	0.2832	0.5633	0.6861	0.7792
yprox	-0.1355	0.7305	0.3842	0.3531	0.6405	0.6591	0.8481
indpro	-0.0682	0.7014	0.2841	0.2515	0.5487	0.6568	0.8253
nonpro	-0.1271	0.6978	0.3583	0.2953	0.6056	0.6756	0.7925
n	0.1572	-0.0536	-0.1021	0.0430	-0.3896	-0.6771	-0.5487
ne	-0.0727	-0.5781	-0.0969	-0.0719	0.0212	0.0897	-0.0836
se	-0.0909	0.5487	0.2837	0.3986	0.5780	0.4266	0.5279
s	-0.0633	0.3230	0.1914	-0.0603	-0.0144	0.4778	0.4246
co	0.0793	-0.0299	-0.2819	-0.4068	-0.1889	-0.2433	-0.2138
sp	-0.0733	0.5474	0.3219	0.3016	0.2471	0.3543	0.5976

	indtrm	nontrm	prox	yprox	indpro	nonpro	n
indtrm	1.0000						
nontrm	0.9385	1.0000					
prox	0.6914	0.7179	1.0000				
yprox	0.7178	0.7052	0.9147	1.0000			
indpro	0.7607	0.7028	0.9373	0.9577	1.0000		
nonpro	0.6975	0.7148	0.9942	0.9421	0.9557	1.0000	
n	-0.5909	-0.6928	-0.5139	-0.4215	-0.4286	-0.4977	1.0000
ne	-0.0205	0.0768	-0.3820	-0.2992	-0.3630	-0.3728	-0.4472
se	0.4248	0.4622	0.7757	0.7567	0.7595	0.7974	-0.2582
s	0.4515	0.4495	0.3325	0.1834	0.2581	0.2860	-0.2182
co	-0.1514	-0.2102	0.0304	-0.0553	-0.0256	0.0154	-0.1741
sp	0.4674	0.4009	0.5284	0.7385	0.6712	0.5670	-0.1204

	ne	se	s	co	sp
ne	1.0000				
se	-0.3464	1.0000			
s	-0.2928	-0.1690	1.0000		
co	-0.2335	-0.1348	-0.1140	1.0000	
sp	-0.1615	0.4663	-0.0788	-0.0629	1.0000

VI.2 - TR

In this section we will discuss the panel results for our standard econometric models. The results for all the econometric models can be seen in Appendix 3. Tables VI.5-VI.12 are a summary of the results with TR and Tables VI.15-VI.22 are a summary of the results with PROX. The summaries only present the specifications without any dummies or with the dummy for SP and the dummy for NE. They also include the specifications where TRM or PROXM are significant.

VI.2.1 - 1950-1995 (18 States)

a) INDGSP

Table VI.5 shows the results with TR and INDGSP for the growth rate of industrial output.

Column (1) includes per capita income, the share of industrial output, the transportation cost proxy - TR (transport availability in the state area), and population density. As the correlation matrix has already implied, states with a higher share of industrial output (in total income) showed a smaller growth in their industrial participation. INDGSP is significant at the 1% level, with a t-statistic of -2.60.

This result is robust to the introduction of the dummies for SP and NE, in column (3). SP is positive and significant at the 1% level (+2.72), but NE is less so, with a t-statistic of -1.59.

The other coefficients are not significant.

Column (5) includes per capita income, the interaction term (YTRM), INDGSP and DD.

Again, the unique significant coefficient is that of INDGSP, suggesting that there was dispersion of industrial production in the direction of the less industrialised states.

Including the dummies, in Column (7), we again observe the significance of the negative coefficient of INDGSP (-2.46). SP is significant at the 1% level (+2.66) and NE is significant at the 10% level (-1.81).

Observing the signs of the other coefficients (with high t-statistics), in Appendix 3, Table I, there is a slight suggestion that transport availability impacts positively on the growth of industrial output, not controlling for the states of NE (Equations (1) and (2)). Controlling for SP and NE, we can infer that poor states grew more ((3) and (7)), but that this effect was a decreasing function of availability of transports (YTRM is positive in

(5) and positive and significant in (8)).

Congestion effects were less important, and the dummy for NE is never significant.

SP is positive and significant and INDGSP is negative and significant.

Table VI.5- INDGSP & TR - BRAZIL -1950-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	0.598	(-0.888)	-1.238	(-1.149)	0.481	(0.722)	-1.388	(-1.632)
INDGSP	-0.345***	(-2.603)	-0.329***	(-2.672)	-0.335**	(-2.419)	-0.317**	(-2.464)
TR	4.028	(1.088)	2.463	(0.598)				
YTRM					1.136	(1.388)	0.740	(0.916)
DD	-0.015	(-1.412)	3.86 E-03	(0.333)	-0.013	(-1.250)	5.02E-03	(0.452)
SP			7.052***	(2.718)			6.737***	(2.661)
NE			-3.323	(-1.588)			-3.566*	(-1.810)
R2	0.426		0.450		0.425		0.450	
MSE	6.971		6.870		6.973		6.870	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VI.6 - NONAGR & TR - BRAZIL -1950-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	-0.204	(-0.392)	-2.467***	(-2.633)	-0.189	(-0.357)	-2.469***	(-2.558)
NONAGR	-0.046	(-0.716)	-0.040	(-0.662)	-0.052	(-0.755)	-0.052	(-0.784)
TR	-2.709	(-0.615)	-3.645	(-0.794)				
YTRM					-0.605	(-0.596)	-0.545	(-0.559)
DD	-0.011	(-0.895)	0.012	(0.768)	-0.011	(-0.940)	0.106	(0.705)
SP			5.931**	(2.232)			5.979**	(2.203)
NE			-5.082**	(-2.086)			-4.897**	(-2.126)
R2	0.377		0.412		0.376		0.410	
MSE	7.263		7.100		7.268		7.115	

* All results were corrected by heterocedasticity;

** The high R2s may be due to the usage of time dummies.

b) NONAGR

Table VI.6 displays the results with NONAGR.

Equation (1) does not show any significant coefficient. It includes Y, NONAGR, TR and DD. The coefficients are highly insignificant.

Equation (3) controls this basic specification for the special effects of SP and NE. Per capita income shows now a negative and significant coefficient at the 1% level (-2.63), implying that there was a dispersion of industrial activity towards the poorer states.

SP is positive and significant (t-statistic of +2.23) and NE is negative and significant (-2.09).

Column (5) shows again highly insignificant coefficients for Y, NONAGR, YTRM and DD.

Column (7) adds the dummies for SP and NE to column (5). Per capita income is negative and significant (-2.56). SP and NE are significant at the 5% level.

Besides these coefficients, the other coefficients are not highly significant.

Observing the results in Appendix 3, Table II, Y is negative and significant, when controlling for NE, NE is negative and significant and SP is positive or positive and significant.

YTRM shows positive, but not significant coefficients in Equations (5) and (8).

VI.2.2 - 1950-1970 (18 States)

a) INDGSP

Table VI.7 shows the results with INDGSP for the 18-State sample of 1950-1970.

Equation (1) includes Y, INDGSP, TR and DD. INDGSP is negative and significant at the 5% level (t-statistic of -2.21), and DD shows a negative and significant coefficient at the 1% level (-1.81). Y is positive and significant at the 5% level (+2.41).

Equation (3) includes the dummies, SP and NE. It confirms that there was dispersion of industrial output towards the less industrialised states, while the importance of population density is denied. SP is positive and significant (+2.31).

Equation (5) includes Y, INDGSP, YTRM and DD. INDGSP remains negative and significant (-2.58). Without controlling for the special cases of SP and NE, there are signs of congestion effects, since DD is negative and significant (-2.13). The interaction term is positive and has a t-statistic greater than one (+1.22), implying that the coefficient of per capita income is a function of transportation costs.

Y is positive and significant (+2.09), suggesting that richer states grew more in the period 1950-1970. In this case, a positive interaction term suggests that richer states will tend to grow faster with a decrease in transportation costs.

Taking into account the special cases of SP and NE (Equation 7), Y, INDGSP and SP remain significant.

Observing all the results in Appendix 3, Table III, it is interesting to add that per capita income is positive and significant when not controlling for NE. Significant congestion effects and positive interaction terms appear when we do not include SP.

SP is not significant in only one specification and NE is not significant.

Table VI.7- INDGSP & TR - BRAZIL -1950-1970 (18 states)
dependent variable: Industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	2.680**	(2.406)	0.326	(0.120)	2.218**	(2.090)	0.278*	(0.099)
INDGSP	-0.291**	(-2.208)	-0.363**	(-2.113)	-0.324***	(-2.580)	-0.375**	(-2.285)
TR	0.776	(0.089)	-1.737	(-0.205)				
YTRM					2.716	(1.215)	0.569	(0.223)
DD	-0.029*	(-1.814)	0.011	(0.408)		(-2.130)	6.04 E-03	(0.214)
SP			7.370**	(2.307)			6.807**	(2.071)
NE			-1.832	(-0.629)			-1.702	(-0.565)
R2	0.373		0.393		0.378		0.393	
MSE	5.371		5.367		5.349		5.368	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VI.8 - NONAGR & TR - BRAZIL -1950-1970 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	1.028	(0.823)	-2.593	(-1.008)	0.776	(0.690)	-2.755	(-1.093)
NONAGR	0.094	(1.150)	0.130	(1.506)	0.098	(1.158)	0.136	(1.569)
TR	-3.513	(-0.470)	-4.732	(-0.619)				
YTRM					-0.511	(-0.258)	3.29 E-03	(0.001)
DD	-0.060**	(-2.332)	-0.025	(-0.702)			-0.036	(-0.975)
SP			3.767	(1.181)	-0.064***	(-2.532)	2.826	(0.849)
NE			-4.075	(-1.538)			-3.873	(-1.436)
R2	0.347		0.371		0.345		0.368	
MSE	5.479		5.463		5.488		5.479	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

b) NONAGR

Table VI.8 shows the results with NONAGR.

Equation (1), with Y, NONAGR, TR and DD, only reveals an impact of congestion effects, through the negative and significant coefficient of DD (-2.33).

Equation (3) controls for the special cases of SP and NE, in which there are no significant coefficients.

Equation (5) includes Y, NONAGR, YTRM and DD, confirming the importance of congestion effects, since DD is negative and significant (-2.53).

Equation (7) includes SP and NE, not revealing any significant coefficients.

VI.2.3 - 1970-1995 (18 States)

a) INDGSP

Table VI.9 shows similar results with INDGSP.

Equation (1) includes the basic specification: Y, INDGSP, TR and DD. INDGSP is negative and significant at the 5% level (-2.19). DD shows t-statistics at least greater than one.

Controlling for the dummies, in Equation (3), still the only significant coefficient is the one of INDGSP (-2.32).

Column (5), with the basic specification with the interaction term - Y, INDGSP, YTRM and DD, also shows only the coefficient of INDGSP as significant (-2.03). Controlling for the dummies, in Column (7), this result is sustained.

The only significant coefficient is the negative one for INDGSP, suggesting dispersion of industrial activities towards the less industrialised states.

Y is negative and shows high t-statistics, when we control for the effects of SP and NE (Appendix 3, Table V).

The coefficient of per capita income is weakly influenced by change in transportation cost, since the interaction term always shows t-statistics higher than one. Considering the combination of coefficients in Equation (7) (where Y and YTRM have higher t-statistics), we can infer that the higher growth of the poor states decreases as transport availability increases (Appendix 3, Table V).

Table VI.9- INDGSP & TR - BRAZIL -1970-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	0.461	(0.574)	-1.592	(-1.031)	0.285	(0.373)	-1.675	(-1.111)
INDGSP	-0.390**	(-2.192)	-0.327**	(-2.320)	-0.392**	(-2.032)	-0.318**	(-2.182)
TR	4.136	(1.009)	3.133	(0.644)				
YTRM					1.398	(1.530)	0.924	(1.021)
DD	-0.014	(-1.099)	3.00 E-03	(0.201)	-0.013	(-0.993)	3.66E-03	(0.258)
SP			7.116	(1.440)			6.197	(1.267)
NE			-4.401	(-0.930)			-4.542	(-1.011)
R2	0.452		0.466		0.453		0.465	
MSE	8.037		8.036		8.025		8.037	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VI.10 - NONAGR & TR - BRAZIL -1970-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	-0.295	(-0.504)	-2.881*	(-1.748)	-0.368	(-0.638)	-2.870*	(-1.670)
NONAGR	-0.339*	(-1.841)	-0.277*	(-1.902)	-0.347*	(-1.752)	-0.279*	(-1.815)
TR	-0.599	(-0.131)	-0.719	(-0.153)				
YTRM					0.145	(0.158)	-0.208	(-0.211)
DD	0.014	(0.883)	0.031	(1.405)	0.014	(0.887)	0.032	(1.405)
SP			8.824*	(1.665)			9.043	(1.582)
NE			-6.122	(-1.233)			-6.095	(-1.243)
R2	0.426		0.452		0.426		0.452	
MSE	8.220		8.136		8.220		8.136	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

b) NONAGR

Again some similar pattern appears for the small sample with NONAGR in Table VI.10.

Equation (1) includes the basic specification: Y, NONAGR, TR and DD. NONAGR is the unique significant coefficient. It is negative and significant at the 10% level (-1.84).

Equation (3) controls for special effects of SP and NE. NONAGR is negative and significant (-1.90), confirming the existence of a dispersion of economic activities towards the agricultural states. SP is positive and significant (+1.67). Y is negative and significant at the 10% level (-1.75).

Equation (5) includes Y, NONAGR, YTRM and DD. Once more only NONAGR is significant (-1.75).

In Equation (7), where we control Equation (5) with the dummies, besides NONAGR, Y is negative and significant (-1.67), indicating that there was dispersion of industrial activities in the direction of poorer and agricultural ones.

Observing the results in Appendix 3, Table VI, Y is usually negative and twice significant. NONAGR is negative and always significant. So, poor and agricultural states have shown the best performance in terms of growth of their industrial output.

The coefficients related to transportation costs are not highly significant. DD is again positive and usually shows high t-statistics. NE is usually negative and SP shows positive coefficients.

Conclusion for the 18-state sample

Table IV.11 summarises the results for the 18-state sample with TR using the information in Appendix 3. The symbols (<) and (>) only refer to coefficients with t-statistics higher than one. (<*) and (>*) represent significant coefficients.

TABLE VI.11 - PANEL RESULTS GRIND (TR)

5095	<	>	<*	>*	number of equations
Y*	1	0	2	0	8
INDGSP	0	0	8	0	8
NONAGR	0	0	0	0	8
TR	0	2	0	0	8
DD	2	0	0	0	16
SP	0	2	0	6	8
NE	3	0	5	0	8
Y**	1	0	2	0	8
YTRM	0	1	0	1	8
Y* & YTRM*	0				

5070(18)	**<**	**>**	**<***	**>***	**number of equations**
Y*	1	1	0	2	8
INDGSP	0	0	8	-	8
NONAGR	0	8	0	0	8
TR	0	0	0	0	8
DD	0	0	10	0	16
SP	0	2	0	5	8
NE	4	0	0	0	8
Y**	1	0	0	3	8
YTRM	0	2	0	0	8
Y* & YTRM*	0				
7095(18)	**<**	**>**	**<***	**>***	**number of equations**
Y*	3	0	1	0	8
INDGSP	0	0	8	0	8
NONAGR	0	0	8	0	8
TR	0	1	0	0	8
DD	1	6	0	0	16
SP	0	6	0	1	8
NE	4	0	0	0	8
Y**	3	0	1	0	8
YTRM	0	4	0	0	8
Y* & YTRM*	0				

7095(24)	<	>	<*	>*	number of equations
Y*	0	1	3	0	8
INDGSP	0	0	8	0	8
NONAGR	0	0	9	0	9
TR	2	0	2	0	9
DD	1	4	0	2	17
SP	0	3	0	5	8
NE	0	0	8	0	8
Y**	1	0	3	0	9
YTRM	2	1	1	0	9
Y* & YTRM*	0				

Y* - without the interaction term

Y** - with the interaction term

*** - significant pairs of Y and the interaction term

For the whole period 1950-1995, our significant coefficients only indicate that SP showed higher growth rates of industrial output and that less industrialised states had higher growth rates of industrial output (Appendix 3, Table I). In both sub-periods, we confirm that less industrialised states showed higher growth rates of industrial output (Appendix 3, Tables III and V). SP is usually positive or positive and significant in both sub-periods (Appendix 3, Tables III, V and VI). SP is insignificant in Table IV (Appendix 3)(with NONAGR for the sub-period 1950-1970).

NONAGR shows only significant and negative coefficients in the sub-period 1970-1995 (Table VI). It is positive in the sub-period 1950-1970 (Table IV) and insignificant for the whole period (Table II).

Controlling for SP and NE (and using INDGSP), per capita income indicates that poor states grew more than richer states, in the sub-period 1970-1995 (Table V, Equations (3) and (7)). Excluding the states of Northeast, per capita income is positive in the sub-period 1950-1995 (Table III, Equations (1), (2), (5) and (6)). The result for the whole period, 1950-1995, is a negative, but not significant, coefficient for Y, when both SP and NE are included (Table I, Equations (3) and (7)).

With NONAGR, per capita income is negative and significant, controlling for NE, in the period 1950-1995 (Table II, Equations (3), (4), (7), (8)). In the period 1970-1995, it is only significant when we control for SP and NE (Table VIII, Equations (3) and (7)). Controlling for SP and NE, per capita income is negative in the period 1950-1970 (Table IV, Equations (3) and (7)).

The positive impact of TR in the industrial growth in the period 1950-1995 (Table I, Equations (1) and (2)), not controlling for NE, totally depends on the economic forces in the sub-period 1970-1995 (Table V, Equation (1))

YTRM is positive or positive and significant in the period 1950-1995, excluding SP (Table I, Equations (5) and (8)). YTRM is positive in the same specifications for the sub-period 1950-1970 (Table III, Equations (5) and (8)). YTRM is always positive in the period 1970-1995 (Table V, Equations (5), (6), (7), (8)). YTRM is insignificant in the specifications with NONAGR.

The dummy for NE loses significance in these exercises, comparing to the ones with GRGSP. It is only negative and significant in the specifications with NONAGR for the whole period 1950-1995 (Table II).

Congestion effects are not relevant in the whole period. In the first sub-period, with INDGSP, we observe significant congestion effects, excluding SP (Table III, Equations (1), (4), (5) and (8)). With NONAGR, we usually observe significant congestion effects (Table IV, Equations (1), (2), (4), (5), (6), (8)). In the sub-period 1970-1995, we observe positive influence of high population density, with NONAGR (Table VI, Equations (2), (3), (4), (6), (7) and (8)).

Based on this evidence, we should conclude that "backward and forwards" linkages were not generating industrial growth. Higher industrial growth was associated with less industrialised states. NONAGR is highly insignificant in the whole period, and, when significant, in the period 1970-1995, it is negative, indicating that in this period, a higher industrial growth rate was a characteristic of the agricultural states. The only weak support for this hypothesis is in the positive (but not significant) coefficient of NONAGR in the period 1950-1970.

The coefficients of YTRM indicate that the coefficient of per capita income is a negative function of transportation costs. Based on K&V(m), this would suggest that the impact of lower transportation cost would be in the direction of concentrating industrial activity.

Positive coefficients for the interaction term and negative one for the proxies of linkages are not in accordance with any phase of K&V(m) model.

VI.2.4 - 1970-1995 (24 States)

a) INDGSP

Table VI.12 shows the panel results with INDGSP. Equation (1) includes Y, INDGSP, TR and DD. INDGSP is negative and significant at 5% level (-3.22), indicating that, also in the period 1970-1995, the dispersion of industrial activity was in the direction of the less industrialised states.

Y is positive, showing a t-statistic greater than one (1.08).

Equation (3) includes the dummies. SP is positive and significant at the 5% level (+2.35) and NE is negative and significant at the 5% level (-2.23). INDGSP is still negative and significant (at the 1% level). Y is negative and significant at the 10% level (-1.71). These coefficients suggest a dispersion of the industrial activity towards the poorer and (especially) the less industrialised states.

Equation (5) includes Y, INDGSP, DD and YTRM, replacing TR. Only INDGSP is significant (-3.46). In Equation (7), controlling this specification for the dummies, again we have significant coefficients for Y (-1.70), INDGSP (-2.93), SP (+2.34) and NE (-2.18).

Considering Equation (7), with the smallest MSE, poor states grew more, but this effect was smaller if there was a smaller transportation cost, since Y was negative and YTRM positive.

Table VI.12- INDGSP & TR - BRAZIL -1970-1995 (24 states)
dependent variable: Industrial growth rate - panel results

	1	t	3	t	5	t	7	t
Y	0.670	(1.076)	-1.980*	(-1.713)	0.601	(0.914)	-2.063*	(-1.696)
INDGSP	-0.382***	(-3.224)	-0.339***	(-2.825)	-0.398***	(-3.456)	-0.342**	(-2.925)
TR	-2.064	(-0.586)	-0.079	(-0.024)				
YTRM					0.172	(0.191)	0.279	(0.292)
DD	-0.013	(-0.925)	0.009	(0.645)	-0.018	(-1.292)	0.008	(0.556)
SP			8.875**	(2.345)			8.466**	(2.336)
NE			-5.957**	(-2.225)			-6.102**	(-2.175)
R2	0.525		0.545		0.524		0.546	
MSE	8.571		8.460		8.581		8.458	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VI.13 - NONAGR & TR - BRAZIL -1950-1995 (24 states)
dependent variable: Industrial growth rate - panel results

	1	t	3	t	5	t	7	t	5a	t
Y	0.020	(0.037)	-3.169***	(-3.139)	0.148	(0.235)	-3.267***	(-3.061)	-0.456	(-0.72
NONAGR	-0.360**	(-2.123)	-0.320**	(-2.005)	-0.366**	(-2.155)	-0.327**	(-2.021)	-0.341**	(-2.01
TR	-7.746**	(-2.199)	-4.377	(-1.439)						
TRM									-14.984*	(-1.90
YTRM					-1.363	(-1.558)	-1.072	(-1.167)	2.381	(1.19
DD	0.015	(0.893)	0.039**	(1.999)	7.42E-03	(0.449)	0.040**	(1.997)	0.013	(0.78
SP			10.645***	(2.788)			12.175***	(3.027)		
NE			-7.519***	(-2.920)			-8.011***	(-2.927)		
R2	0.482		0.515		0.471		0.514		0.487	
MSE	8.948		8.737		9.043		8.752		8.946	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

b) NONAGR

Table VI.13 shows more significant results than Table VI.12.

Equation (1) includes the basic specification: Y, NONAGR, TR and DD. NONAGR is negative and significant (-2.12), indicating that the dispersion of industrial activities was towards the agricultural states. TR is also significant (-2.20) and negative, suggesting that high transportation costs were helpful to the growth of industrial output.

Equation (3) adds the dummies, which are significant at the 1% level: SP shows a t-statistic of +2.79 and an NE of -2.92. In Equation (3), Y is negative and significant (-3.14) and NONAGR as well (-2.01), suggesting the dispersion of economic activities towards toward poor and agricultural states. The coefficient of TR loses its significance, but its sign remains negative.

DD is positive and significant (+2.00), which means the higher the population density, the higher the growth rate of industrial output.

Column (5) shows the basic specification with the interaction term: Y, NONAGR, YTRM and DD. Column (7) adds the dummies to (5). Again, without the dummies, NONAGR is negative and significant (-2.16).

Controlling for the special cases of SP and NE (both significant), Y and NONAGR are negative and significant, confirming the dispersion of activities towards poorer and agricultural states. DD is positive and significant (+2.00).

Observing Tables VII and VIII in Appendix 3, agricultural states were the ones with higher industrial growth rate in this period, since both INDGSP and NONAGR are negative and significant.

With INDGSP, controlling for SP and NE, poor states show higher industrial growth rates (Table VII, Equations (3) and (7). With NONAGR, poorer states show a higher industrial growth rate controlling for NE (Table VIII, Equations (3), (4), (7), (8)).

With NONAGR (Table VIII), higher industrial growth rates were associated with states with high transportation cost (TR).

With NONAGR (Table VIII), YTRM is negative (Equations (5) and (7)) or negative and significant when not controlling for NE (Equation(6)).

TRM and YTRM are insignificant with INDGSP.

Controlling for NE, we usually find positive effects of population density, in the specifications with NONAGR (Table VIII). DD is usually insignificant with INDGSP.

SP is positive or positive and significant with INDGSP and NONAGR, and NE is negative and significant.

The coefficients of the interaction term (with NONAGR) indicate dispersion of economic activity, but the results seem very weak to support the hypothesis that it was lower transportation cost that generated the dispersion of industrial activity.

VI.3 - PROX

As in the previous Chapter, we will repeat the exercises above with our alternative proxy for transportation costs: PROX.

The Tables inside this chapter are summaries of Appendix 3.

VI.3.1 - 1950-1995

a) INDGSP

Table VI.14 shows the results with INDGSP. Equation (1) includes Y, INDGSP, PROX and DD. There was dispersion of industrial activity towards the less industrialised states in Brazil, as the negative and significant coefficient of INDGSP suggests (-2.32). Low transportation costs, in their hands, were acting against dispersion, as is suggested by the positive and significant (at the 5% level) sign of the proxy, PROX (+2.30).

Equation (3) adds the dummies to this basic specification. INDGSP is still negative and significant at the 5% level (-2.42) and PROX is positive with a t-statistic higher than one (+1.35). There is evidence that there was dispersion of industrial activity towards the poor states, since the coefficient of per capita income has a t-statistic at least greater than one (-1.45).

SP is positive and significant, with a t-statistic of +2.17, but NE is not significant (-0.68).

Equation (5) includes Y, INDGSP, YPROXM (the interaction term) and DD. Again it is confirmed that there was dispersion of industrial activities in the direction of the less industrialised states.

The interaction term, YPROXM, is positive and significant (+1.67), which means that the negative coefficient of per capita income decreases with a lower transportation cost. The interaction term is also positive and significant in (8) (Appendix 3, Table IX).

Equation (7) includes the dummies in (5). SP is positive and significant at the 5% level (+2.39) and NE is negative and significant at the 5% level (-1.77).

INDGSP remains negative and significant (-2.32).

Equation (5a) includes Y, INDGSP, PROXM, YPROXM and DD. INDGSP is negative and significant (-2.32) and PROXM is positive and significant (+1.96).

Observing all the data in Appendix 3, Table IX, per capita income is almost always negative, but not significant. There was a clear dispersion of industrial income towards the less industrialised states.

Not controlling for NE, proximity to markets (PROX) has enhanced industrial growth. The interaction term (YPROXM) is positive and significant, excluding SP.

DD is negative in (1), (4), (5) and (6a). Otherwise it is insignificant.

SP is positive and significant and NE is only once significant.

Table VI.14 - INDGSP & PROX - BRAZIL - 1950-1995 (18 states)

dependent variable: GRIND - panel results

	1	t	3	t	5	t	7	t	5a	t
Y	-0.663	(-1.102)	-1.208	(-1.451)	-0.998	(-0.152)	-1.256	(-1.423)	-0.726	(-1.151)
INDGSP	-0.314**	(-2.323)	-0.328**	(-2.422)	-0.309**	(-2.268)	-0.301**	(-2.319)	-0.314**	(-2.322)
PROX	0.489**	(2.302)	0.294	(1.346)						
PROXM									0.470**	(1.957)
YPROXM					0.080*	(1.668)	3.63 E-04	-0.007	0.011	(0.237)
DD	-0.011	(-1.109)	-7.32 E-04	(-0.060)	-0.016	(-1.395)	6.04 E-03	(0.468)	-0.012	(-1.119)
SP			5.608**	(2.171)			7.174**	(2.385)		
NE			-1.616	(-0.677)			-3.502**	(-1.770)		
R2	0.442		0.451		0.428		0.449		0.442	
MSE	6.869		6.859		6.955		6.877		6.892	

* All standard errors were corrected for heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VI.15 - NONAGR & PROX - BRAZIL - 1950-1995 (18 states)

dependent variable: GRIND - panel results

	1	t	3	t	5	t	7	t	5a
Y	-1.705**	(-2.37)	-2.617***	(-2.556)	-1.075*	(-1.848)	-2.784***	(-2.602)	-1.704**
NONAGR	-0.076	(-1.02)	-0.052	(-0.785)	-0.060	(-0.831)	-0.049	(-0.728)	-0.076
PROX	0.475**	(2.10)	-0.023	(-0.112)					
PROXM									0.475*
YPROXM					0.069	(1.410)	0.027	(0.518)	-7.81 E-05
DD	-8.67 E-03	(-0.75)	0.010	(0.656)	-0.015	(-1.184)	7.07 E-03	(0.424)	-8.67 E-03
SP			5.704**	(2.040)			4.741*	(1.699)	
NE			-5.143*	(-1.771)			-4.927**	(-2.070)	
R2	0.394		0.409		0.379		0.409		0.394
MSE	7.164		7.119		7.248		7.117		7.188

* All standard errors were corrected for heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Equation (1) in Table VI.15 includes Y, NONAGR, PROX and DD.

When we are observing the growth of industrial output, controlling for NONAGR, it is clear that poor states have shown a better performance in terms of GRIND, since Y is negative and significant at the 5% level (-2.37). As in the exercise above, low transportation costs were helping concentration of industrial activity, since PROX is positive and significant (+2.10).

Equation (3) includes the dummies - SP and NE. SP is positive and significant (+2.04) and NE is negative and significant (-1.77). Y remains negative and significant (-2.56).

Equation (5) is the basic one with the interaction term, including Y, NONAGR, YPROXM and DD. Per capita income is negative and significant (-1.85). The interaction term has a t-statistic greater than one (+1.41). This combination of coefficient implies that although industrial output was dispersing towards the poorer states, this effect was weakened by lower transportation costs.

When adding the dummies to Equation (5), in Column (7), Y again shows a negative and significant sign (-2.60), SP is positive and significant (+1.70), while NE is negative and significant (-2.07).

Equation (5a) has a positive and significant demeaned variable (PROXM). Per capita income is negative and significant in this specification (-2.40).

Observing Appendix 3, Table X, PROX and PROXM show positive and significant signs when NE is not included.

Excluding NE, NONAGR is negative, although not significant in four specifications, (1), (2), (5a) and (6a). Per capita income is always negative and significant.

We can also find a significant pair of the variables Y and YTRM in Equation (8), with NONAGR. Lower transportation cost was decreasing the advantage of the poorer states in terms of industrial growth.

The interaction term is positive (6) and positive and significant (8), which are specifications where we exclude SP.

SP shows less significant coefficients, while NE shows usually negative and significant coefficients.

VI.3.2 - 1950-1970 (18 States)

a) INDGSP

The results of this section are in Table VI.16.

Equation (1) includes Y, INDGSP, PROX and DD. INDGSP is negative and significant at the 5% level (-2.38), suggesting that there was dispersion of industrial activities towards the less industrialised states.

This specification shows one other coefficient with a t-statistic greater than one: DD (-1.54).

Equation (3) adds the dummies for SP and NE, which are not significant. Only INDGSP is negative and significant (-2.30).

Equation (5) includes Y, INDGSP, YPROXM and DD and Equation (7) adds the dummies for SP and NE to the basic specification in (5). In Equation (5), INDGSP is negative and significant (-2.85), YPROXM is positive and significant (+2.41) and DD is negative and significant (-2.03). Only INDGSP is significant in Equation (7), with a t-statistic of -2.06.

Observing all data in Appendix 3 (Table XI), we can only infer that there was a significant dispersion of industrial activity towards the less industrialised states.

YPROXM usually shows positive coefficients (twice significant (5) and (8)).

There are few significant negative coefficients for DD.

NE is not significant and SP is only once significant.

Table VI.16 - INDGSP & PROX - BRAZIL - 1950-1970 (18 states)
dependent variable: GRIND - panel results

	1	t	3	t	5	t	7	t
Y	1.484	(0.950)	0.459	(0.166)	0.370	(0.252)	-0.046	(-0.017)
INDGSP	-0.274**	(-2.380)	-0.379**	(-2.296)	-0.321***	(-2.849)	-0.353**	(-2.063)
PROX	0.228	(0.910)	0.174	(0.564)				
YPROXM					0.258**	(2.414)	0.174	(0.904)
DD	-0.024	(-1.541)	8.47 E-04	(0.023)	-0.031**	(-2.026)	-0.012	(-0.272)
SP			6.035	(1.431)			3.550	(0.600)
NE			-0.585	(-0.149)			-0.841	(-0.260)
R2	0.379		0.395		0.396		0.398	
MSE	5.343		5.361		5.272		5.345	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VI.17 - NONAGR & PROX - BRAZIL - 1950-1970 (18 states)
dependent variable: GRIND - panel results

	1	t	3	t	5	t	7	t
Y	-1.016	(-0.648)	-2.733	(-1.112)	-1.022	(-0.646)	-3.023	(-1.241)
NONAGR	0.104	(1.261)	0.135	(1.603)	0.084	(1.027)	0.127	(1.533)
PROX	0.312	(1.237)	0.026	(0.083)		(1.513)		
YPROXM					0.175		0.215	(1.188)
DD	-0.059**	(-2.403)	-0.037	(-0.897)	-0.064***	(-2.516)	-0.058	(-1.311)
SP			2.656	(0.679)			-1.318	(-0.266)
NE			-3.698	(-1.027)			-2.655	(-0.889)
R2	0.357		0.368		0.356		0.376	
MSE	5.437		5.479		5.444		5.443	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Table VI.17 shows the results with NONAGR.

Equation (1) includes Y, NONAGR, PROX and DD. DD is negative and significant (-2.40). NONAGR and PROX show t-statistics greater than one.

The inclusion of dummies in Equation (3) did not improve the specification.

Equation (5) includes Y, NONAGR, YPROXM and DD. DD is negative and significant (-2.52). NONAGR has a t-statistic of +1.03 and YPPROXM has a t-statistic of +1.51.

Equation (7) adds SP and NE (neither of them being significant), again not improving the results.

Observing all the exercises in Appendix 3, Table XIII, per capita income is negative controlling for the NE. NONAGR is always positive, but never significant.

The interaction term is positive and once significant (6). PROX is positive, not controlling for the NE.

Congestion effects are acting against concentration of economic activity, since DD is usually significant.

SP is not significant and NE is only negative, but not significant.

III.3.3 - 1970-1995 (18 States)

a) INDGSP

Table VI.18 shows the results for the 18-State sample of the second period.

Equation (1) includes Y, INDGSP, PROX and DD. INDGSP is negative and significant (-1.94) and PROX is positive and significant (+2.14).

Equation (3) includes the dummies, which are not significant. INDGSP remains negative and significant at the 5% level (-2.40).

Equation (5) includes Y, INDGSP, YPROXM and DD. INDGSP is negative and significant (-1.92) while the interaction term shows a positive coefficient with a t-statistic higher than one.

Adding the dummies in Equation (7), the only significant coefficient is the one for INDGSP.

Using all information in Appendix 3, Table XIII, we observe that per capita income is negative in two specifications ((2) and (7)). INDGSP is always negative and significant. PROX and PROXM are usually positive and significant without controlling for NE.

YPROXM shows a positive coefficient, when we do not include SP (but a negative one in 6a).

Congestion effects and the dummies are not important.

Table VI.18 - INDGSP & PROX - BRAZIL - 1970-1995 (18 states)

dependent variable: GRIND – panel results

	1	t	3	t	5	t	7	t	5*	t
Y	-0.583	(-0.80)	-1.484	(-0.86)	-0.073	(-0.09)	-1.620	(-1.11)	-0.578	(-0.75)
INDGSP	-0.355*	(-1.94)	-0.324**	(-2.40)	-0.352*	(-1.92)	-0.284**	(-2.12)	-0.355*	(-1.93)
PROX	562319**	(2.14)	321940	(0.56)						
PROXM									566159*	(1.68)
YPROXM					77186	(1.29)	-31463	(-0.27)	-1491	(-0.02)
DD	-0.011	(-0.89)	-3.27 E-03	(-0.02)	-0.015	(-1.09)	9.20 E-03	(0.41)	-0.011	(-0.85)
SP			5.667	(0.80)			8.675	(1.01)		
NE			-2.728	(-0.37)			-5.056	(-0.95)		
R2	0.460		0.465		0.452		0.463		0.460	
MSE	7.978		8.038		8.034		8.050		8.027	

* All standard errors were corrected for heterocedascity;

Table VI.19 - NONAGR & PROX - BRAZIL – 1970-1995 (18 states)

dependent variable: GRIND – panel results

	1	t	3	t	5	t	7	t
Y	-1.447**	(-2.346)	-2.915	(-1.627)	-1.066*	(-1.844)	-2.847*	(-1.710)
NONAGR	-0.357*	(-1.759)	-0.288**	(-2.054)	-0.364*	(-1.762)	-0.276*	(-1.842)
PROX	544689**	(2.041)	50589	(0.088)				
YPROXM					90203	(1.582)	-45319	(-0.387)
DD	0.015	(0.979)	0.031	(1.195)	0.011	(0.733)	0.036	(1.185)
SP			8.577	(1.165)			10.697	(1.176)
NE			-5.836	(-0.755)			-6.583105	(-1.134)
R2	0.437		0.452		0.432		0.452	
MSE	8.141		8.137		8.181		8.132	

* All standard errors were corrected for heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

Equation (1), in Table VI.19, shows the results for NONAGR.

Equation (1) includes Y, NONAGR, PROX and DD. Y is negative and significant (-2.35), NONAGR is negative and significant (-1.76) and PROX is positive and significant (+2.04). Equation (3) adds the dummies, and only NONAGR remains significant (-2.05).

Equation (5) includes Y, NONAGR, YPROXM and DD. Y is negative and significant (-1.84), NONAGR is negative and significant (-1.76) and YPROXM has a positive coefficient with a t-statistic greater than one.

Equation (7) adds SP and NE, which are not significant. Y is negative and significant (-1.71) and NONAGR is negative and significant (-1.84).

Observing the data in Appendix 3, Table XIV, there was a clear dispersion of economic activity towards poor and agricultural states.

Except when we control for SP and NE, proximity has enhanced industrial growth (PROX is positive or positive and significant).

Excluding SP, YPROXM is positive (5) and positive and significant in (8). It is negative in (6a), when we include SP.

Congestion effects and the dummy for NE show few coefficients with t-statistics higher than one. SP is usually positive.

Conclusion for the 18-state samples

Using all the information in Appendix 3, we will try first to summarise the results for GRIND and then to compare them with the results for GRGSP in the previous Chapter. Once more, the symbols (<) and (>) in Table IV.20 will only make reference to coefficients with t-statistics higher than one. (<*) and (>*) indicate significant coefficients.

TABLE VI.20 - PANEL RESULTS - GRIND (PROX)

5095	<	>	<*	>*	number of equations
Y*	3	0	4	0	8
INDGSP	0	0	10	0	10
NONAGR	4	0	0	0	10
PROX	0	2	0	5	8
DD	4	0	0	0	20
SP	0	0	0	7	10
NE	2	0	4	0	8
Y**	3	0	6	0	10
YPROXM	1	1	0	2	12
Y* & YPROXM*	<* >* (1)				
5070(18)	**<**	**>**	**<***	**>***	**number of equations**
Y*	2	0	0	0	8
INDGSP	0	0	8	0	8
NONAGR	0	8	0	0	8
PROX	0	2	0	0	8
DD	3	0	9	0	16
SP	1	1	0	1	8
NE	3	0	0	0	8
Y**	2	0	0	0	8
YPROXM	0	4	-	3	8
Y* & YPROXM*	0				

7095(18)	**<**	**>**	**<***	**>***	**number of equations**
Y*	2	0	4	0	8
INDGSP	0	0	10	0	10
NONAGR	0	0	9	-	9
PROX	0	1	0	5	8
DD	1	4	0	0	19
SP	0	6	0	1	10
NE	2	0	0	0	8
Y**	1	0	5	0	10
YPROXM	2	3	0	1	10
Y* & YPROXM*	< > (1)				
7095(24)	**<**	**>**	**<***	**>***	**number of equations**
Y*	1	0	2	0	8
INDGSP	0	0	8	0	8
NONAGR	0	0	9	0	9
PROX	2	0	0	0	8
DD	4	3	0	2	17
SP	0	3	0	5	8
NE	0	0	9	0	9
Y**	1	0	3	0	9
YPROXM	1	0	1	1	9
Y* & YPROXSHM*	<>(1) <<(1)				

Y* - without the interaction term

Y** - with the interaction term

*** - significant pairs of Y and the interaction term

The results with PROX reinforce the indication that less industrialised states showed higher industrial growth rates in all samples.

In the period 1950-1995 (Appendix 3, Table X), NONAGR is insignificant or negative (in Equations (1) and (2), (5a), (6a)). NONAGR shows positive coefficients for the sample 1950-1970 (Appendix 3, Table XII). NONAGR shows negative and significant coefficients in the second sub-period, 1970-1995 (Appendix 3, Table XIV).

Per capita income shows negative coefficients in the majority of the specifications with INDGSP for the period 1950-1995 (Table IX). With NONAGR, Y is negative and significant in this period (Table X). In the sub-period 1950-1970, the coefficient of per capita income is usually insignificant (Table XI). With NONAGR, it shows negative coefficients when controlling for NE (Table XII, Equations (3), (4), (7) and (8)). For the second sub-period, 1970-1995, per capita income is negative in only two specifications with INDGSP (Table XIII, Equations (2) and (7)). Y is negative and significant in Table XIV, in the specifications with NONAGR.

It is also confirmed that the positive effect of proximity on industrial growth in the whole period (Table IX, Equations (1), (2) and (4)) is due to the influence of the sub-period 1970-1995, usually not including the NE dummy.

In the whole period and in the period 1970-1995, YPROXM is usually positive or positive and significant, when excluding SP (Tables IX, X, XIII and XIV, Equations (5) and (8)). In the period 1950-1970, the interaction term is positive or positive and significant (Tables XI and XII).

With NONAGR, congestion effects are negligible in the whole period (Table X). In the second sub-period - 1970-1995, DD shows four positive coefficients) (Table XIV, Equations (2), (3), (7), (6a). In the first sub-period, 1950-1970 (Table XII), there is strong evidence of congestion effects. With INDGSP, there is some negative influence of congestion, in the period 1950-1995, excluding SP (Table IX, Equations (1), (4), (5) and (6a). Significant congestion effects, excluding SP, is also a feature of the period 1950-1970 (Table XI, Equations (4), (5) and (8), while in (1) DD shows a negative coefficient). In the second sub-period, with INDGSP, there is only one negative, but not significant, coefficient (Table XIV, Equation (5)).

SP is usually significant for the whole period and sometimes positive for the sub-period 1970-1995. It shows positive (3) and significant (2) coefficients, with INDGSP, in the sub-period 1950-1995 (Table IX).

NE is usually negative or negative and significant in the whole period (Table IX and X). NE shows some negative, but not significant, coefficients with NONAGR, in the period 1950-1970 (Table XII). It is usually insignificant for the second sub-period (Tables XIII and XIV).

The evidence is strong in denying that "backward and forward" linkages were generating concentration of industrial activity, contrary to the prediction of the model (except with NONAGR in the period 1950-1970).

The interaction terms indicate that lower transportation cost helps to concentrate industrial activity.

We found only two significant combinations of Y and YPROXM, which could help us to understand the impact of a change in transportation cost. For the period 1970-1995 and for the whole period (1950-1995), although there was a dispersion of industrial activity towards poorer states, lower transportation cost was acting towards a concentration of economic activity. This evidence depends only on specifications (8), Tables X and XIV, with NONAGR.

VI.3.4 - 1970-1995 (24 States)

a) INDGSP

Table VI.21 shows the results with INDGSP, using the proxy PROX.

Equation (1) includes Y, INDGSP, PROX and DD. Only INDGSP is significant (t-statistic of -3.47). Its negative sign indicates dispersion of industrial activity towards less industrialised states.

The coefficient of the proxy for transportation cost is highly insignificant.

Adding dummies to Equation (1), in Equation (3) INDGSP sustains its negative and significant coefficient (-2.81).

SP is positive and significant at 1% (+2.49) and NE is negative and significant at the 5% level (-2.18).

Y is negative and, although not significant at the usual statistical levels, it has a high t-statistic of -1.59. A negative coefficient for per capita income would indicate a dispersion of industrial activities towards poor states.

Equation (5) is the basic equation with the interaction term, including Y, INDGSP, YPROXM and DD. Only INDGSP has a significant coefficient (-3.53).

Equation (7) adds SP and NE to the above basic specification. SP is positive and significant (+2.46) and NE is negative and significant (-2.19).

INDGSP is negative and significant at the 1% level (-2.94), while per capita income has a t-statistic higher than one (-1.43). These results indicate that there was dispersion of industrial activity towards poor and less industrialised states.

The interaction term is highly insignificant in Equations (5) and (7).

We can observe a high degree of collinearity among the variables and the dummies, since their inclusion changes the signs of Y, PROX, YPROXM and DD.

Table VI.21 - INDGSP & PROX - BRAZIL - 1970-1995 (24 states)
dependent variable: GRIND - panel results

	1	t	3	t	5	t	7	t
Y	0.598	(0.833)	-1.891	(-1.590)	0.520	(0.663)	-1.759	(-1.427)
INDGSP	-0.396***	(-3.470)	-0.337***	(-2.812)	-0.396***	(-3.535)	-0.341***	(-2.943)
PROX	26821	(0.090)	-93236	(-0.314)				
YPROXM					15600	(0.232)	-56806	(-0.665)
DD	-0.018	(-1.199)	0.011	(0.774)	-0.019	(-1.228)	0.017	(1.023)
SP			9.216***	(2.491)			11.317**	(2.461)
NE			6.064**	(-2.177)			-6.055***	(-2.193)
R2	0.524		0.546		0.524		0.547	
MSE	8.582		8.456		8.580		8.447	

* All standard errors were corrected for heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VI.22 - NONAGR & PROX - BRAZIL - 1970-1995 (24 states)
dependent variable: GRIND - panel results

	1	t	3	t	5	t	7	t
Y	0.181	(0.255)	-3.160***	(-2.918)	-0.031	(-0.041)	-3.065***	(-2.894)
NONAGR	-0.365**	(-2.241)	-0.331**	(-2.150)	-0.354**	(-2.151)	-0.347**	(-2.178)
PROX	-260141	(-0.908)	-377082	(-1.419)				
PROXM								
YPROXM					-31239	(-0.496)	-132753*	(-1.641)
DD	3.10 E-03	(0.191)	0.044**	(2.325)	9.96 E-04	(0.059)	0.054**	(2.416)
SP			11.994***	(3.235)			16.392***	(3.355)
NE			-8.851***	(-3.178)			-8.758***	(-3.146)
R2	0.467		0.516		0.465		0.517	
MSE	9.075		8.727		9.094		8.720	

* All standard errors were corrected for heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

b) NONAGR

In Table VI.22, we can observe the results with NONAGR.

Equation (1) displays the basic independent variables: Y, NONAGR, PROX and DD. Only NONAGR is significant (-2.24), with a negative coefficient suggesting that the dispersion of industrial activity was in the direction of the agricultural areas.

The other coefficients, except the transportation cost proxy, are highly insignificant.

Adding the dummies for SP and NE in Equation (3), NONAGR is still negative and significant (-2.15). Per capita income is negative and significant (-2.92) and DD is positive and significant (+2.33). These results indicate a dispersion of industrial activity towards the poorest and agricultural states, and that population density was helping this process. The proxy (for the inverse) for transportation cost, PROX, shows a t-statistic greater than one (-1.42) and a negative sign, suggesting that transportation costs were mildly helpful to industrial growth.

SP is positive and significant (+3.24) and NE is negative and significant (-3.18).

Equation (5) displays the basic specification with the interaction term: Y, NONAGR, YPROXM and DD. Only NONAGR is significant (-2.15).

Including the dummies - Equation (7) - NONAGR and Y are significant, with t-statistics of -2.18 and -2.89, respectively. SP is positive and significant (+3.36) and NE is negative and significant (-3.15).

The interaction term in Equation (7) is negative and significant (-1.64), and DD is positive and significant (+2.42).

Observing all the results in Appendix 3, we can observe the following.

For the 24-state sample, per capita income shows negative coefficients, when controlling for SP, NE and INDGSP (Tables XV, Equations (3) and (7)). With

NONAGR (Table XVI, Equations (3), (4), (7), (8) and (8a)) per capita income is negative and significant.

INDGSP and NONAGR are negative and significant, refuting the "backward and forward" linkages hypothesis (Tables XV and XVI).

Controlling for SP and NONAGR, proximity to markets was negative for industrial growth (Table XVI, Equations (2) and (3)).

With NONAGR, YPROXM is positive and significant in Equation (8a), negative in Equation (6) and negative and significant in (7) (Table XVI). The results are inconclusive, not allowing us to identify the impact of lower transportation costs.

PROX and YPROXM are insignificant with INDGSP.

Congestion effects are only significant in specifications (3) and (7), with NONAGR (Table XVI), in which DD shows a positive coefficient.

NE is negative and significant and SP is positive or positive and significant.

The main differences between the results with TR and PROX are:

a) in the period 1950-1995, more evidence if found with PROX for the variables NONAGR, Y, PROX and YPROXM;

b) in the period 1950-1970, the usage of PROX improves the information about the transportation cost variables, although we had more information about per capita income with TR;

c) in the period 1970-1995, we have more information about the behaviour of Y, PROX and YPROXM;

d) in the period 1970-1995, for the larger sample, the variable TR shows more significant results;

e) with YPROXM, we could find a pair of significant Y and YPROXM for the periods 1950-1995 and 1970-1995.

The cross-section results were less revealing in terms of the behaviour of per capita income. On the other hand, the interaction terms showed more significant coefficients in the cross-section exercises. Congestion effects and dummy effects are less important in the panel exercises. In both exercises, with NONAGR, we found the same combination of significant Y and YTRM, including for the first sub-period.

Comparison with GRGSP

The main comparisons between the results with GRGSP and GRIND are the following:

a) the evidence of a dispersion of activities towards poorer states, with INDGSP, is weaker for the case of the growth rate of industrial output. With GRGSP, controlling for NE, Y is negative and significant. With NONAGR, the results are similar;

b) while INDGSP shows ambiguous signs in its role as determining the growth rate of total output, it is clearly generating a decrease in the industrial growth rate;

c) NONAGR, especially controlling for SP, generates concentration of economic activity in the periods 1950-1995 and 1950-1970, while it was negative in the period 1970-1995. With GRIND, NONAGR is negative and significant except for the sample 1950-1970, where it shows a positive coefficient;

d) TR gives poor information in both exercises. PROX shows a positive impact on industrial and total growth (controlling for NE, in the case of the income growth rate);

e) YTRM/YPROXM shows positive and significant coefficients with GRGSP, when controlling for NE.

These variables show positive coefficients, in the case of GRIND, when excluding SP;

f) DD and NE are less important in the explanation of GRIND; SP is more important in explaining GRIND;

g) for the growth rate of total income, we found some support for the hypothesis that economies of scale were concentrating economic activity for the whole period and for the period 1950-1970. For GRIND, this hypothesis is denied;

h) for both dependent variables, we found that the whole period and the sub-period 1950-1970 was resembling the second phase of NEG model, in terms of the effect of a change in transportation cost over the distribution of activities. A decline in transportation cost was generating concentration of both total and industrial income. For the period 1970-1995, we also found a concentration pattern for the industrial growth rate and dispesion for income growth rate;

i) the larger sample of the period 1970-1995 shows, in both cases, a dispersion of economic activity towards poor and agricultural states, while high transportation cost (low PROX) is associated with higher growth rates.

VI.4 - Interaction Terms with INDGSP and NONAGR

Differently from the previous Chapter, we will find important differences when we use our alternative interaction terms when the dependent variable is GRIND.

VI.4.1 - 1950-1995 (18 States)

a) INDGSP

Table VI.23 shows the results with INDTRM and INDPROXM.

With INDTRM, there is an increase in the number of significant coefficients for the interaction term, compared with the specifications in Appendix 3, Table I. All INDTRM are positive and significant.

The coefficients of INDGSP are negative and significant as in Appendix 3, Table I.

These results suggest that lower transportation cost increases the negative coefficient of INDGSP, reinforcing the effects of economies of scale.

With INPROXM we also observe a small increase in the number of the significant coefficients (and in the coefficients with t-statistics higher than one) for the interaction term, comparing with Appendix 3, Table IX. INDPROXM is usually positive and significant, implying increase in the strength of economies of scale in the industrial sector.

Per capita income shows more significant coefficients in these new specifications.

Table VI.23 - INDTRM/INDPROXM - BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t
Y	0,322	(0.528)	-5.75 E-03	(-0.010)	-1.454*	(-1.720)	-0,607	(-0.849)	-0,793	(-1.208)	-0,684	(-1.014)	-1.598**	(-1.960)	-1.428*	(-1.826)
INDGSP	-0.346**	(-2.385)	-0.380***	(-2.499)	-0.330**	(-2.446)	-0.302**	(-2.307)	-0.304**	(-2.263)	-0.330**	(-2.295)	-0.296**	(-2.288)	-0.269**	(-2.212)
INDTRM	0.200**	(1.976)	0.166*	(1.800)	0.153*	(1.670)	0.199**	(1.951)								
YPROXM									0.015***	(3.131)	0.112**	(2.272)	6.76 E-03	(1.208)	0.014***	(3.033)
DD	-0,012	(-1.185)	-7.24 E-03	(-0.692)	4.94 E-03	(0.453)	-5.19 E-03	(-0.520)	-0,011	(-1.133)	-7.94 E-03	(-0.790)	3.52 E-03	(0.304)	-5.19 E-03	(-0.548)
SP			4.803**	(2.251)	6.555***	(2.744)					3,082	(1.272)	5.589*	(1.805)		
NE					-3.399*	(-1.742)	-2,376	(-1.380)					-3,033	(-1.435)	-1,920	(-1.118)
R2	0,431		0,440		0,453		0,438		0,438		0,441		0,451		0,443	
MSE	6,939		6,908		6,847		6,919		6,895		6,901		6,864		6,890	

* All standard errors were corrected for heteroscedasticity.

Table VI.24 - NONTRM/NONPROXM - BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t
Y	-0,246	(-0.460)	-0,504	(-0.904)	-2.482***	(-2.662)	-1.606**	(-2.374)	-1.984***	(-2.504)	-2.046***	(-2.535)	-2.717***	(-2.611)	-2.276***	(-2.538)
NONAGR	-0,051	(-0.771)	-0,068	(-0.936)	-0,046	(-0.731)	-0,019	(-0.335)	-0,072	(-0.992)	-0,079	(-1.047)	-0,057	(-0.838)	-0,043	(-0.671)
NONTRM	-0,023	(-0.422)	-0,030	(-0.543)	-0,036	(-0.632)	-0,021	(-0.395)								
PROXM																
YPROXM									7.01 E-03'	(2.241)	6.77 E-03'	(2.130)	1.54 E-03	(0.599)	4.20 E-03'	(1.678)
DD	-0,011	(-0.910)	-5.87 E-0:	(-0.446)	0,012	(0.750)	-1.08 E-0:	(-0.088)	-0,013	(-1.114)	-0,011	(-0.850)	7.11 E-03	(0.457)	-5.46 E-0:	(-0.477)
SP			2,843	(1.381)	5.915**	(2.189)					1,110	(0.602)	4.903*	(1.884)		
NE					-5.046**	(-2.086)	-4.037*	(-1.924)					-4.434*	(-1.711)	-2,811	(-1.387)
R2	0,376		0,379		0,411		0,398		0,395		0,396		0,410		0,403	
MSE	7,269		7,275		7,109		7,159		7,154		7,176		7,116		7,132	

* All standard errors were corrected for heteroscedasticity.

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b) NONAGR

Table VI.24 shows the results with NONTRM and NONPROXM.

NONTRM shows similar results from YPROXM.

There is an increase in the number of significant coefficients for the interaction term NONPROXM, comparing with Appendix 3, Table X. NONPROXM is positive and significant in (6p) and (7p), suggesting that the coefficient of NONAGR is a negative function of transportation cost. In this case, the coefficients of NONAGR are insignificant.

VI.4.2 - 1950-1970 (18 States)

a) INDGSP

Table VI.25 shows the results for INDGSP.

The results with INDTRM are similar to the ones in Appendix 3, Table III. INDTRM is positive (but not significant) if we exclude the dummy for SP, which is not significant. Since the coefficient of INDGSP is negative and significant, we obtain a weak suggestion that this coefficient is increasing.

The number of significant results with INDPROXM is similar to the results with YPROXM in Appendix 3, Table XI. INDPROXM is now positive and significant in Equations (5) and (8), which excludes SP. The negative coefficient of INDGSP increases with lower transportation cost, not controlling for SP.

Table VI.25 - INDTRM/INDPROXM – BRAZIL - 1950-1970 (18 states)

dependent variable: GRIND – panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t
Y	2.069*	(1.916)	1.849*	(1.704)	0.306	(0.111)	1.859	(0.730)	0.4876	(0.323)	0.7449	(0.447)	0.1007	(0.037)	0.5934	(0.228)
INDGSP	-0.337***	(-2.596)	-0.402***	(-2.630)	-0.375**	(-2.290)	-0.330**	(-2.132)	-0.321***	(-2.880)	-0.368**	(-2.184)	-0.360**	(-2.109)	-0.325**	(-2.202)
INDTRM	0.333	(1.274)	0.084	(0.258)	0.043	(0.141)	0.339	(1.192)								
INDPROXM									0.023**	(2.331)	0.0159	(0.944)	0.0121	(0.650)	0.023**	(2.349)
DD	-0.028*	(-1.703)	-9.45 E-03	(-0.392)	7.43 E-03	(0.246)	-0.026	(-1.285)	-0.0188	(-1.166)	-0.0112	(-0.454)	-9.02 E-04	(-0.023)	-0.0197	(-0.985)
SP			5.136	(1.361)	6.874*	(1.902)					2.8495	(0.564)	4.4012	(0.703)		
NE					-1.683	(-0.563)	-0.240	(-0.087)					-0.9881	(-0.292)	0.1336	(0.050)
R2	0.379		0.389		0.393		0.379		0.3917		0.3942		0.3953		0.3917	
MSE	5.345		5.344		5.368		5.387		5.2887		5.3196		5.3575		5.3304	

* All standard errors were corrected for heteroscedasticity.

Table VI.26 - NONTRM/NONPROXM – BRAZIL - 1950-1970 (18 states)

dependent variable: GRIND – panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t
Y	0.828	(0.633)	0.937	(0.714)	-2.642	(-1.035)	-1.453	(-0.681)	-1.305	(-0.818)	-1.020	(-0.627)	-2.683	(-1.091)	-2.117	(-1.185)
NONAGR	0.095	(1.152)	0.102	(1.129)	0.132	(1.518)	0.139	(1.620)	0.100	(1.230)	0.111	(1.291)	0.132	(1.556)	0.131	(1.559)
NONTRM	-0.023	(-0.204)	-9.52 E-03	(-0.069)	-0.047	(-0.386)	-5.62 E-03	(-0.050)								
PROXM																
NONPROXM									5.69 E-03	(1.487)	5.99 E-03	(1.481)	2.17 E-03	(0.413)	3.31 E-03	(0.877)
DD	-0.062**	(-2.370)	-0.068*	(-1.791)	-0.028	(-0.740)	-0.051**	(-2.152)	-0.065***	(-2.551)	-0.072**	(-2.386)	-0.044	(-0.965)	-0.055**	(-2.164)
SP			-0.982	(-0.301)	3.535	(1.064)					-1.786	(-0.730)	1.755	(0.408)		
NE					-4.020	(-1.531)	-2.981	(-1.331)					-3.060	(-0.843)	-2.263	(-1.012)
R2	0.345		0.346		0.369		0.364		0.359		0.361		0.369		0.368	
MSE	5.487		5.259		5.474		5.451		5.428		5.462		5.474		5.435	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

The results with NONTRM are similar to the ones in Appendix 3, Table IV. NONTRM is insignificant.

The number of significant coefficient for NONPROXM is smaller than for YPROXM, in Appendix 3, Table XII. NONPROXM is positive, not controlling for NE.

VI.4.3 - 1970-1995 (18 States)

a) INDGSP

Table VI.27 displays the results with INDGSP.

INDTRM shows a higher number of significant coefficients than YPROXM (in Appendix 3, Table V). INDTRM is usually positive and significant, suggesting that economies of scale in the industrial sector are stronger with lower transportation costs.

There is also an increase in the number of the significant coefficients, when using INDPROXM (comparing to Appendix 3, Table XIII), which is usually positive and significant.

Table VI.27 – INDTRM/INDPROXM - BRAZIL - 1970-1995 (18 states)
dependent variable: GRIND - panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t
Y	0.164	(0.229)	-0.031	(-0.042)	-1.653	(-1.104)	-0.524	(-0.589)	-0.787	(-0.995)	-0.783	(-0.983)	-1.654	(-1.102)	-1.171	(-1.303)
INDGSP	-0.393**	(-2.016)	-0.402**	(-2.026)	-0.333**	(-2.183)	-0.354**	(-2.166)	-0.344*	(-1.901)	-0.348*	(-1.873)	-0.304**	(-2.255)	-0.319**	(-2.127)
INDTRM	0.207*	(1.860)	0.192*	(1.806)	0.163	(1.589)	0.201*	(1.816)	17143.13 ***	(2.620)	16310.61 **	(2.396)	10067	(0.773)	16090.93 **	(2.437)
PROXM																
INDPROXM									-0.011	(-0.910)	-0.010	(-0.852)	1.56 E-04	(0.009)	-7.17 E-03	(-0.669)
DD	-0.012	(-0.938)	-9.84 E-03	(-0.778)	3.16 E-03	(0.229)	-6.50 E-03	(-0.576)			0.772	(0.251)	4.313	(0.549)		
SP			2.811	(1.038)	6.119	(1.319)							-3.138	(-0.516)	-1.360	(-0.418)
NE					-4.122	(-0.931)	-2.037	(-0.647)								
R2	0.459		0.461		0.470		0.462		0.462		0.462		0.466		0.464	
MSE	7.981		8.014		8.002		8.010		7.958		8.006		8.031		7.999	

* All standard errors were corrected for heteroscedasticity.

Table VI.28 - NONTRM/NONPROXM - BRAZIL - 1970-1995 (18 states)

dependent variable: GRIND - panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t
Y	-0.321	(-0.538)	-0.666	(-1.085)	-2.885*	(-1.741)	-1.360	(-1.514)	-1.520**	(-2.450)	-1.714***	(-2.537)	-2.918*	(-1.659)	-1.811**	(-1.982)
NONAGR	-0.343*	(-1.803)	-0.372*	(-1.842)	-0.279*	(-1.873)	-0.272*	(-1.792)	-0.348*	(-1.730)	-0.372*	(-1.761)	-0.285**	(-1.994)	-0.305*	(-1.940)
NONTRM	-1.17 E-03	(-0.022)	-5.91 E-03	(-0.108)	-7.73 E-03	(-0.136)	7.43 E-04	(0.014)								
PROXM																
YPROXM									6690**	(2.196)	6165**	(2.066)	384	(0.056)	5076	(-1.347)
DD									0.012	(0.814)	0.016	(0.985)	0.031	(1.083)	0.015	(0.868)
SP	0.014	(0.878)	0.019	(1.089)	0.032	(1.383)	0.018	(1.034)			3.306	(1.215)	8.629	(1.092)		
NE			4.223	(1.467)	8.864	(1.617)							-5.949	(-0.783)	-1.944	(-0.454)
					-6.125	(-1.230)	-3.460	(-0.958)								
R2	0.426		0.431		0.452		0.435		0.438		0.441		0.452		0.440	
MSE	8.220		8.235		8.136		8.210		8.138		8.167		8.137		8.174	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

Table VI.28 shows the results for NONAGR.

NONTRM behaves similarly to YPROXM. NONTRM is insignificant.

NONPROXM is positive and significant, not controlling for NE, implying an increase in the coefficient of NONAGR.

VI.4.4 - 1970-1995 (24 States)

a) INDGSP

Table VI.29 shows the results for INDGSP.

Comparing to Table VII, Appendix 3, there was a sharp increase in the number of significant coefficients for the interaction term. All specifications with TRM show significant coefficients for this variable. In these specifications, INDTRM is negative and significant, further decreasing the coefficient of INDGSP.

Table VI.29 - INDTRM/INDPROXM - BRAZIL - 1970-1995 (24 states)

dependent variable: GRIND - panel results

	5t	t	6t	t	7t	t	8t	t	5at	t	6at
Y	0.590	(0.912)	0.331	(0.480)	-2.226*	(-1.819)	-1.097	(-1.125)	-0.035	(-0.051)	-0.110
INDGSP	-0.396***	(-3.549)	-0.402***	(-3.587)	-0.335***	(-3.031)	-0.340***	(-3.061)	-0.293***	(-2.508)	-0.300***
TRM									-18.301**	(-1.953)	-17.524*
INDTRM	0.027	(0.310)	2.92 E-03	(0.035)	0.068	(0.758)	0.095	(1.039)	0.474**	(1.951)	0.446*
PROXM											
INDPROXM											
DD	-0.019	(-1.370)	-0.016	(-1.178)	6.82 E-03	(0.498)	-3.77 E-03	(-0.292)	-6.59 E-03	(-0.513)	-6.12 E-03
SP			3.931	(1.155)	8.363**	(2.325)					1.540
NE					-6.426**	(-2.284)	-4.787**	(-1.967)			
R2	0.524		0.526		0.547		0.537		0.539		0.539
MSE	8.579		8.595		8.446		8.498		8.483		8.519

* All standard errors were corrected for heteroscedasticity.

Table VI.29 - INDTRM/INDPROXM - BRAZIL - 1970-1995 (24 states)
dependent variable: GRIND - panel results

	5p	t	6p	t	7p	t	8p	t
Y	0.183	(0.224)	0.133	(0.161)	-2.124*	(-1.775)	-1.438	(-1.346)
INDGSP	-0.387***	(-3.609)	-0.395***	(-3.643)	-0.335***	(-3.050)	-0.331***	(-3.068)
INDTRM								
PROXM								
INPROXM	6387	(0.848)	3980	(0.498)	3031	(0.370)	8895	(1.161)
DD	-0.022	(-1.563)	-0.019	(-1.361)	6.76 E-03	(0.470)	-5.40 E-03	(-0.427)
SP			2.873	(0.788)	8.007**	(1.990)		
NE					-5.933**	(-2.148)	-4.442*	(-1.885)
R2	0.526		0.527		0.546		0.539	
MSE	8.560		8.589		8.456		8.485	

* All standard errors were corrected for heteroscedasticity.

Table VI.30 - NONTRM/NONPROXM - BRAZIL - 1970-1995 (24 states)
dependent variable: GRIND - panel results

	5t	t	6t	t	7t	t	8t	t	5p	t	6p	t	7p	t	8p	t	8ap	t
Y	0.053	(0.094)	-0.360	(-0.601)	-3.198***	(-3.131)	-1.721**	(-2.275)	0.081	(0.112)	-0.108	(-0.143)	-3.196***	(-2.998)	-1.886**	(-2.158)	-2.477***	(-2.868)
NONAGR	-0.373**	(-2.186)	-0.393**	(-2.245)	-0.328**	(-2.058)	-0.314**	(-1.961)	-0.363**	(-2.244)	-0.383**	(-2.308)	-0.336**	(-2.191)	-0.305**	(-2.007)	-0.243	(-1.573)
NONTRM	-0.090**	(-2.149)	-0.104**	(-2.408)	-0.052	(-1.413)	-0.044	(-1.198)										
PROXM																	-3915176*	(-1.866)
YPROXM									-2346	(-0.696)	-3396	(-1.009)	-4412	(-1.379)	-1711	(-0.519)	45708*	(1.826)
DD	0.016	(0.953)	0.021	(1.199)	0.041**	(2.061)	0.026	(1.505)	2.60 E-03	(0.162)	7.03 E-03	(0.407)	0.046**	(2.389)	0.025	(1.505)	4.78 E-03	
SP			5.805*	(1.718)	10.993***	(2.872)					4.437	(1.337)	12.465***	(3.314)				(-2.989)
NE					-7.597***	(-2.903)	-5.459**	(-2.463)					-8.899***	(-3.176)	-6.375***	(-2.680)	-6.975***	
R2	0.480		0.485		0.515		0.497		0.466		0.469		0.516		0.495		0.510	
MSE	8.968		8.960		8.742		8.857		9.087		9.101		8.734		8.875		8.786	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

Table VI.30 shows the results for NONAGR.

The results with YTRM (Appendix 3, Table VIII) and NONTRM are similar. Excluding NE, NONTRM is negative and significant, decreasing the negative coefficient of NONAGR.

With NONPROXM, the unique significant coefficient is positive (in 8a), suggesting an increase in the negative coefficient of NONAGR.

For the 18-state sample, we have observed that lower transportation cost was generating concentration of industrial activity, which was not compatible, with respect to the theoretical model, with negative coefficients for INDGSP and NONAGR. The results with these alternative proxies provide some evidence in support of the model, since it suggests that lower transportation cost was increasing the coefficients of INDGSP and NONAGR, and so reinforcing the impact of economies of scale.

For the 24-state sample, we observed negative and significant coefficients for INDGSP and NONAGR. The information about the effects of transportation cost was conflicting. With INDTRM and INDPROXM, we usually confirmed that lower transportation cost was further decreasing the coefficients of the proxies for economies of scale. Since we consider (with INDGSP) that the 24 states were in the third phase of the model, this evidence gives support to it, since in the III phase the states which are growing more are characterised for having smaller presence of industry and services.

VI.5 - Using the Dummy for North

Similarly to what we did in Chapter V, we will check if the results of the 24-State sample are influenced by the behaviour of Northern states.

Tables A.1 - A.4 show the results. NORTH is never significant in the equations with SP and NE, as it has happened in the previous Chapter.

Table A.1 shows the results with INDGSP and TR.

The results differ from the ones in Table VI.11. In that Table, Y was significant in the specifications with SP and NE and these dummies were always significant (in the equations where they were included). Another important difference is that TR was negative in Table VI.11.

Table A.2 shows the results with INDGSP and PROX. The main differences between the results in A.2 and the results in VI.21 are:

a) the proxy for transportation cost is consistently positive (in VI.21 it showed both signs and it was not significant);
b) SP is not usually significant in A.2.

Table A.3 shows the results with NONAGR and TR. These results differ from the former ones without controlling for the N (Table VI.12) since, in Table VI.12, Y was significant in the specifications with SP and NE. TR is negative and not significant in both tables.

Table A.4 shows the results with NONAGR and PROX.

Comparing the results in A.4 with the results in B.22 we can observe that, controlling for N:

a) Y is always negative and significant;
b) PROX is positive, while it was negative in Table VI.22;
c) YPROXM is positive and significant without SP and NE (while it was always negative in Table VI.22);
d) DD and SP lose significance.

One result for the real industrial growth rate, controlling for the special case of the Northern states, remains the same: there was a dispersion of industrial activity towards the agricultural states (using INDGSP and NONAGR). But, controlling for N, we can observe that transportation cost was acting in a way that would cause divergence of income among the states of Brazil. States with more transport availability grow more and the higher growth rate of the poor states would be weakened by lower transportation costs. Without controlling for the North, the results related to the impact of transportation cost were much more ambiguous. There is also a strong importance of the states of the North in the significant of Y. When controlling for N, Y is usually not significant.

Table A.1 - NORTH (INDGSP & TR) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	0.312	(0.439)	-1.757	(-1.291)	-0.087	(-0.114)	-1.792	(-1.300)
INDGSP	-0.402***	(-3.401)	-1.359***	(-3.049)	-0.406***	(-3.404)	-0.360***	(-3.165)
TR	3.551	(0.716)	2.475	(0.452)				
YTRM					1.713	(1.624)	1.039	(0.846)
DD	-8.36 E-03	(-0.581)	8.19 E-03	(0.545)	-0.010	(-0.679)	6.10 E-03	(0.423)
N	4.153	(1.356)	2.264	(0.519)	4.744*	(1.812)	2.518	(0.659)
SP			8.264*	(1.914)			6.724	(1.389)
NE			-4.837	(-1.169)			-4.603	(-1.105)
R2	0.535		0.548		0.540		0.549	
MSE	8.520		8.477		8.476		8.467	

* All s.e. were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table A.2 - NORTH (INDGSP & PROX) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	-0.714	(-0.977)	-1.686	(-1.150)	-0.468	(-0.532)	-1.699	(-1.251)
INDGSP	-0.387***	(-3.283)	-0.358***	(-2.938)	-0.383***	(-3.215)	-0.344***	(-3.074)
PROX	603488**	(2.072)	226722	(0.352)				
YPROXM					104288	(1.414)	-28678	(-0.193)
DD	-7.24 E-03	(-0.479)	6.29 E-03	(0.325)	-0.012	(-0.779)	0.014	(0.611)
N	5.527**	(2.350)	2.808	(0.452)	4.353*	(1.784)	0.906	(0.190)
SP			7.340	(1.189)			9.880	(1.113)
NE			-3.692	(-0.537)			-5.349	(-1.021)
R2	0.542		0.548		0.538		0.547	
MSE	8.456		8.480		8.486		8.484	

* All s.e. were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table A.3 - NORTH (NONAGR & TR) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	-0.421	(-0.687)	-2.869**	(-2.341)	-0.684	(-1.017)	-2.882**	(-2.305)
NONAGR	-0.443***	(-2.727)	-0.379***	(-2.570)	-0.450***	(-2.699)	-0.385***	(-2.618)
TR	-0.554	(-0.109)	-1.373	(-0.259)				
YTRM					0.670	(0.637)	-0.229	(-0.180)
DD	0.027	(1.586)	0.042**	(2.238)	0.025	(1.486)	0.042**	(2.165)
N	5.698*	(1.826)	3.110	(0.685)	6.649**	(2.483)	3.390	(0.860)
SP			10.017**	(2.372)			10.285**	(2.027)
NE			-5.966	(1.466)			-5.977	(-1.457)
R2	0.499		0.519		0.500		0.519	
MSE	8.841		8.743		8.832		8.745	

* All s.e. were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table A.4 - NORTH (NONAGR & PROX) - BRAZIL - 1970-1995 (24 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	-1.575**	(-2.356)	-2.919**	(-2.179)	-1.425**	(-1.952)	-2.852**	(-2.299)
INDGSP	-0.449***	(-2.713)	-0.385**	(-2.436)	-0.448***	(-2.686)	-0.382***	(-2.626)
PROX	583664**	(1.950)	-2196	(-0.003)				
YPROXM					112365*	(1.655)	-58990	(-0.407)
DD	0.025	(1.539)	0.041**	(2.057)	0.019	(1.153)	0.048*	(1.791)
N	8.435***	(3.354)	3.619	(0.548)	7.441***	(3.096)	2.651	(0.550)
SP			9.910*	(1.698)			12.665	(1.432)
NE			-5.947	(-0.869)			-6.713	(-1.268)
R2	0.507		0.519		0.505		0.519	
MSE	8.769		8.746		8.784		8.740	

* All s.e. were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

VI.6 - Checking for Changes in the Coefficients

We will use the same procedure in this chapter that we have used in Chapter V for checking if there was a change in the coefficients between 1950-1965 and 1970-1995. The results can be seen in Tables B.1 and B.2.

Table B.1 does not show any change in coefficients for the specifications with INDGSP.

Two coefficients of the variables that explain the growth rate of industrial products, when controlling for NONAGR, have changed in all specifications: the coefficient of NONAGR and of DD.

(NONAGR*YEAR = COEFNON) shows a positive coefficient, meaning that, in the period 1950-1995, industrial activity was growing more in the non-agricultural states than in the period 1970-1995. In this later period, the dispersion of industrial output in the direction of the agricultural areas was stronger.

(DD*YEAR=COEFDD) shows a negative coefficient, implying that congestion effects were stronger in the first period (only with NONAGR).

The F-test for joint significance of the coefficients indicates that, at the 10% level, we can accept that the coefficients of the COEFx variables (5070*variable) have changed between the two periods analysed.

TABLE B.1 - INDGSP

TEST of JOINT SIGNIFICANCE FOR A CHANGE IN THE COEFFICIENTS

BRAZIL -1950-1995 - (18 states)

dependent variable: GRIND - panel results

Variables	Specifications				Significant COEFx****			
	1	2	3	4	1	2	3	4
Y	X	X	X	X				
INDGSP	X	X	X	X				
TR	X							
YTRM		X						
PROXSH			X					
YPROXSHM				X				
DD	X	X	X	X				
COEFY*	X	X	X	X				
COEFIND	X	X	X	X				
COEFTR	X							
COEFYTRM		X						
COEFPROX			X					
COEFYPROXM				X				
COEFDD	X	X	X	X				
time dummies	X	X	X	X				

F test	1	2	3	4
R2**original	0.426	0.425	0.442	0.428
R2*** with coef	0.439	0.441	0.448	0.446
F=	0.833	1.012	0.394	1.131

Pr (F(4,145) >2.45)=0.05;

* COEF(NAME OF THE VARIABLE x) = dummy for the period 1950-1970 * VARIABLE x

** R2 from the original specifications without the variables COEFx;

***R2 from the above specifications;

****In these cases no coefficients of the COEFX variables were significant.

TABLE B.2 - NONAGR
TEST of JOINT SIGNIFICANCE FOR A CHANGE IN THE COEFFICIENTS

BRAZIL -1950-1995 - (18 states)
dependent variable: GRIND - panel results

Variables	Specifications				Significant COEFx****				Sign
	1	2	3	4	1	2	3	4	
Y	x	x	x	x	x	x	x	x	(>)
NONAGR	x	x	x	x					
TR	x								
YTRM		x							
PROXSH			x						
YPROXSHM				x					
DD	x	x	x	x					
COEFY*									
COEFNON									
COEFTR									
COEFYTRM									
COEFPROX									
COEFYPROXM									
COEFDD					x	x	x	x	(<)
time dummies									

F test	1	2	3	4
R2**original	0.377	0.376	0.442	0.379
R2*** with coef	0.414	0.413	0.426	0.428
F=	2.281	2.303	-1.023	3.113

Pr (F(4,145) >2.45)=0.05; Pr (F(4,145) > 1.99)=0.10

** R2 from the original specifications without the variables COEFx;
***R2 from the above specifications;
***R2 from the above specifications;
****In these cases no coefficients of the COEFX variables were significant.

VI.7 - Has the Interaction Term Changed Sign in the Period 1950-1995?

This section is similar to section V.7 in Chapter V. If the economy was moving into the "core-periphery" phase of the NEG model, we would observe a positive and significant coefficient of INTERACTION TERM. If the dispersion forces were becoming stronger, we would observe a negative and significant coefficient for this variable.

We have run the following equations:

$$GRIND = \alpha_1 + \beta_1 Y + \chi_1 INDGSP + \delta_1 \; YTRM + \pi_1 (YTRM*YEAR) + \phi_1 DD + \ldots + \varepsilon_1, \qquad (1)$$

$$GRIND = \alpha_2 + \beta_2 Y + \chi_2 INDGSP + \delta_2 \; YPROXM + \pi_2 (YPROXM*YEAR) + \phi_2 DD + \ldots + \varepsilon_2, \qquad (3)$$

Our conclusion was that for the small samples, usually excluding SP, the interaction term was positive, or the Brazilian economy was in the core-periphery phase of the NEG model.

Running the above specifications, we can observe that the economy is inside the second phase of the model. As transportation cost declines, we would expect a negative coefficient for INTERACTION TERM*YEAR.

Table C.1 shows these results plus the results of Equations (2) and (4), which add the dummies for NE and SP to (1) and (2), respectively.

As in the exercise with GRGSP, we do not observe significant coefficients. The signs of the variable without controlling for NE and SP are positive, but highly insignificant. We would expect that the economy is in the top of the curve described in Figure V.I.

Table C.2 shows analogous exercises with NONAGR. The coefficients are usually not significant. In specification (4) we could conclude that controlling for the special effects of SP and NE, we are still in the "early" stage of development of phase II, when the concentration effects of a decline in transportation costs is stronger.

TABLE C.1 – INTERACTION TERM*YEAR (GRIND & INDGSP)								
	1	t	2	t	3	t	4	t
Y	0.452	(0.677)	-1.460	(-1.583)	-0.111	(-0.169)	-1.373	(-1.475)
INDGSP	-0.352***	(-2.509)	-0.307**	(-2.451)	-0.322**	(-2.279)	-0.291**	(-2.242)
YTRM	126	(0.833)	-77	(-0.474)				
YTRMT*	-0.063	(-0.825)	0.039	(0.478)				
YPROXM**					5.014	(1.043)	-3.983	(-0.873)
YPROXT					-2.49 E-03	(-1.029)	0.002	(0.875)
DD	-0.014	(-1.278)	6.30 E-03	(0.526)	-0.016	(-1.374)	9.00 E-03	(0.648)
SP			7.168**	(2.429)			8.210**	(2.382)
NE			-3.724*	(-1.722)			-3.911*	(-1.774)
R2	0.427		0.450		0.430		0.450	
MSE	6.988		6.891		6.966		6.895	

*YTRMT = YTRM *YEAR

**YPROXT=YPROXSHM * YEAR

*** All s.e. were corrected for heterocedasticity

TABLE C.2 - INTERACTION TERM*YEAR (GRIND & NONAGR)								
	1	t	2	t	3	t	4	t
Y	-0.173	(-0.320)	-2.628***	(-2.541)	-1.090*	(-1.860)	-2.999***	(-2.692)
NONAGR	-0.045	(-0.608)	-0.012	(-0.183)	-0.073	(-0.846)	-0.013	(-0.183)
YTRM	-42	(-0.234)	-270	(-1.323)				
YTRMT*	0.021	(0.231)	0.136	(1.322)				
YPROXM**					2.889	(0.534)	-8.483*	(-1.723)
YPROXT					-1.42 E-03	(-0.522)	4.29 E-03*	(1.730)
DD	-0.118	(-0.952)	0.010	(0.698)	-0.013	(-1.029)	8.86 E-03	(0.530)
SP			7.222**	(2.285)			6.599**	(2.098)
NE			5.369**	(-2.140)			-5.761**	(-2.240)
R2	0.376		0.412		0.380		0.413	
MSE	7.291		7.110		7.269		7.119	

*YTRMT = YTRM *YEAR

**YPROXT=YPROXSHM * YEAR

*** All s.e. were corrected for heterocedasticity

VI.8 - Omitted Variables

Similarly to the procedure in Chapter V, we tested the impact of the urbanisation rate (URB), of the enrolments in secondary school (SCHOOL) and of the share of exports (EXP) in our results, but due to serious problems with SCHOOL and EXP, these results are only reported in Appendix 4. In this section, we will study deeply the impact of urbanisation rate.

The correlation matrix between these variables and GRIND was already shown in Table D.1, Chapter V.

VI.8. 1 - Urbanisation rate

a) INDGSP

Table D.1 shows the results with INDGSP and URB.

Equation (1) includes Y, INDGSP, TR, URB and DD. URB is positive and significant at the 10% level (+1.90), and DD is negative and significant at the 10% level (-2.02). INDGSP is negative and significant (-2.70).

When adding the dummies in Equation (2), only INDGSP (-2.74) remains significant. SP is also significant at the 1% level (+2.51).

Equation (3) replaces TR with YTRM in Equation (1). URB is positive and significant (+2.12), DD is negative and significant (-2.04), YTRM is positive and significant (+1.98) and INDGSP is negative and significant (-2.59).

Equation (4) adds dummies to (3), and INDGSP (-2.60) and URB (+1.67) remain significant among the above-cited variables. Y is negative and significant (-1.83) and SP is positive and significant (+2.35).

Equation (5) includes Y, INDGSP, PROX, URB and DD. URB is not significant when controlling for PROX. INDGSP is negative and significant (-2.40), PROX is positive and significant (+2.07) and DD is negative and not significant (-1.63).

Equation (6) adds the dummies. INDGSP (-2.51) and SP (+1.97) are significant.

Equation (7) includes Y, INDGSP, YPROX, URB and DD. INDGSP is negative and significant (-2.39); YPROXM (+1.71), URB (+1.91) and DD (-1.98).

Equation (8) adds the dummies. INDGSP and SP are the significant variables.

Similarly to our results for the income growth rate, economies of agglomeration (URB) are also generating dispersion of the industrial activity. It seems that these economies of agglomeration are concentrated in the state of SP, since URB loses significance when we control for that dummy.

Comparing the results of Table D.1 with Table VI.5, we observe that, without the dummies, DD increases its significance. Also without the dummies, the t-statistic of Y increases when using TR, and the t-statistic of YTRM increases. Comparing the results with Table VI.13, DD, without controlling for the dummies, is significant and Y has an increased t-statistic in the specification with PROX.

URB is never significant in the specifications with NONAGR (Table D.2). Only Y shows a consistent negative and significant coefficient.

TABLE D.2 - OMITTED VARIABLES - URBANIZATION RATE (INDGSP) BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0,046	(-0.077)	-1,331	(-1.597)	-0,380	(-0.623)	-1.583*	(-1.825)	-0,923	(-1.457)	-1,301	(-1.549)	-0,774	(-1.181)	-1,435	(-1.591)
INDGSP	-0.381***	(-2.695)	-0.368***	(-2.740)	-0.395***	(-2.593)	-0.368***	(-2.599)	-0.340***	(-2.397)	-0.363***	(-2.508)	-0.347**	(-2.389)	-0.336**	(-2.413)
TR	3,910	(1.038)	2,742	(0.655)												
YTRM					1.751**	(1.978)	1,227	(1.427)								
PROX									0.403**	(2.071)	0,284	(1.298)				
YPROXM													0.082*	(1.714)	0,013	(0.247)
URB	0.134*	(1.899)	0,100	(1.516)	0.153**	(2.119)	0.112*	(1.668)	0,104	(1.552)	0,097	(1.445)	0.136*	(1.909)	0,994	(1.482)
DD	-0.029*	(-2.023)	-0,010	(-0.709)	-0.030**	(-2.037)	-0,011	(-0.787)	-0,022	(-1.628)	-0,014	(-0.904)	-0.031**	(-1.983)	-9.00 E-03	(-0.554)
SP			6.294***	(2.514)			5.608**	(2.351)			4.941**	(1.966)			6.040**	(2.083)
NE			-2,468	(-1.242)			-2,672	(-1.442)			-0,871	(-0.373)			-2,642	(-1.423)
R2	0,442		0,458		0,445		0,459		0,451		0,459		0,4448		0,456	
MSE	6,896		6,843		6,873		6,833		6,836		6,935		6,8768		6,851	

* The standard errors were corrected for heretoscedasticity.

TABLE D.3 - OMITTED VARIABLES - URBANIZATION RATE (NONAGR) BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0,885	(-1.543)	-2.624***	(-2.633)	-0,983	(-1.590)	-2.676***	(-2.572)	-2.030**	(-2.420)	-2.774***	(-2.558)	-1.788**	(-2.383)	-2.979***	(-2.614)
NONAGR	-0,113	(-1.243)	-0,080	(-0.998)	-0,121	(-1.260)	-0,091	(-1.062)	-0,124	(-1.280)	-0,092	(-1.073)	-0,127	(-1.282)	-0,090	(-1.028)
TR	-2,758	(-0.625)	-3,611	(-0.784)												
YTRM					-0,184	(-0.196)	-0,340	(-0.356)								
PROX									0.405**	(1.977)	-0,019	(-0.092)				
YPROXM													0,071	(1.508)	0,032	(0.626)
URB	0,134	(1.531)	0,075	(0.987)	0,132	(1.536)	0,072	(0.962)	0,103	(1.254)	0,076	(0.999)	0,136	(1.541)	0,078	(1.023)
DD	-0,018	(-1.417)	5.98 E-03	(0.391)	-0,019	(-1.448)	4.62 E-03	(0.307)	-0,015	(-1.173)	4.23 E-03	(0.272)	-0.022*	(-1.634)	-3.26 E-03	(0.019)
SP			5.595**	(2.168)			5.509**	(2.109)			5.346**	(1.972)			4,220	(1.560)
NE			-4.504**	(-1.986)			-4.382**	(-2.022)			-4.536*	(-1.664)			-4.314	(-1.961)
R2	0,390		0,416		0,388		0,413		0,408		0,413		0,393		0,414	
MSE	7,210		7,101		7,220		7,119		7,145		7,121		7,193		7,117	

* The standard errors were corrected for heretoscedasticity.

VI.9 - Test of Restrictions

All specifications in Appendix 6 have refuted the model.

Conclusion

The behaviour of industrial output was different from the behaviour of total growth income. The concentration effects of a decline in transportation cost is common to all 18-state samples. With GRGSP, concentration due to decline in transportation cost was restricted to the whole period and for the sub-period 1950-1970.

On the other hand, while in the above periods INDGSP and NONAGR has shown some concentration effects with GRGSP, they are clearly negative and significant with GRIND, denying in all samples that "backward and forward" effects were generating concentration of activity, even though, according to the model, decreases in transportation cost had a strong influence in the decline of the coefficients of INDGSP and NONAGR.

Per capita income is negative and significant. This dispersion caused by forces we are not explaining was stronger than the concentration due to the decline in congestion effects. Only in Paraná and Santa Catarina was the concentration caused by transportation cost decrease stronger.

Congestion effects were more important in dispersing industrial income than total income. Urbanisation rates showed concentration effects, but they are not significant with the inclusion of the dummies for SP and NE.

The coefficients of NONAGR and DD have changed between the sub-periods. The dispersion of industrial production due to NONAGR and DD were less strong in the period 1950-1970.

The concentration effects of the interaction term would indicate that we were in the "core-periphery" phase of NEG model. As in the exercises with GRGSP, with INDGSP we would be in the transition from the "early" stage of phase II to the "late". With NONAGR, we were still located in the "early" stage of this phase.

Tests of restrictions refute the model for all specifications.

CHAPTER VII - Regional Growth In India

Introduction

It would be interesting to compare the results obtained for the Brazilian data with similar econometric specifications for another developing country. We have chosen to compare the behaviour of the Brazilian states with the behaviour of Indian states. Both countries are continental-size countries, where transport cost may strongly matter, and both have political partition based on states.

Section VII.1 will comment on the data for India. Section VII.2 will discuss the correlation matrix for this country. Section VII.3 will discuss the cross-section results for the income growth rate, while Section VII.4 will do the same for the results with the industrial growth rate. Section VII.5 investigates the importance of government grants. Section VII.6 displays the panel results with GRGSP, while Section VII.7 does the same to the industrial growth rate. Section VII.8 investigates other interaction terms and Section VII.9 discusses the change in the sign of the coefficient of the interaction term.

VII.1 - Data

The data set was that used by Cashin and Sahay (1996). They used data for the period 1961-1991, covering 20 states of India. Output (GR) corresponds to real net output, at factor cost, in 1990 rupees (Government of India (1986, 1995), *apud* Cashin and Sahay (1996)).

Data on state population was taken from the Indian census. Shares of manufacturing and of non-agricultural outputs were taken from Government of India (1986)(*apud* Cashin and Sahay (1996)).

Total length of surfaced road (km) was obtained from Statistical Abstract of India (1994). The variable ROAD was constructed as the extension of roads(km) per area or the states (km^2). We only have data for ROAD for 1971 and 1981.

Data on roads (1982) and railways (1984) came from the Ministry of Railways, *Indian Railways Year Book*, 1983-1984; and from the Ministry of Information and Broadcasting, *India 1965 - A reference Annual* (May, 1986). We have added the length (in km) of roads and railways from this source to generate our second proxy for transportation cost, TR. TR is the extension of roads and railways per area of each state (in km^2). The data is restricted to 1982 (roads) and 1984 (railway).

Distances between the capital cities of the states of India were from Microsoft Encarta World Atlas (1999). With these distances, and with the share of output of each state in total output, we constructed the variable PROX for the sample of India, as the inverse of the distance to every state, weighted by that state's output.

VII.2 - Correlation Matrix

Table VII.1 shows the correlation matrix for the data set of India.

The growth rate of total output is mainly positively correlated with the industrial growth rate and with the interaction terms YROADM and YTRM.

Richer states in per capita terms are the most industrialised ones, the states where the service sector is more important and highly populated states. They also have a good availability of transport.

Road and TR are extremely positively correlated (0.98), while YTRM and YROADM also show a positive correlation of (0.995). These proxies are not correlated with PROX. The interaction terms YTRM and YROADM are highly positively correlated with per capita income, population density, INDGSP and NONAGR.

PROX and YPROXM do not show any significant correlation with the other variables.

DELHI is a rich state, with a high share of industries and with a high share of service sectors. It has a very good availability of transports.

Table VII.1 - CORRELATION MATRIX - INDIA

	grgsp	grind	y	indgsp	nonagr	dd	tr
grgsp	1.0000						
grind	0.4632	1.0000					
y	0.2969	0.2392	1.0000				
indgsp	0.0607	-0.0579	0.7737	1.0000			
nonagr	0.2880	0.0733	0.8768	0.8318	1.0000		
dd	0.2953	0.1513	0.8000	0.5391	0.8545	1.0000	
tr	0.3853	0.1702	0.7891	0.4912	0.8198	0.9760	1.0000
road	0.3928	0.2718	0.8166	0.5163	0.8179	0.9710	0.9811
ytrm	0.4314	0.1709	0.7877	0.4634	0.8227	0.9689	0.9893
yroad	0.4399	0.2242	0.8048	0.4761	0.8261	0.9733	0.9873
prox61	-0.2044	0.2209	0.1372	0.0380	0.1513	0.0983	0.0147
yproxm	-0.0373	0.2859	0.2340	0.1272	0.3046	0.2281	0.1510
DELHI	0.4490	0.1751	0.8026	0.4669	0.8291	0.9550	0.9708

	road	ytrm	yroad	prox	yproxm	DELHI
road	1.0000					
ytrm	0.9654	1.0000				
yroad	0.9816	0.9955	1.0000			
prox	0.0229	0.0629	0.0646	1.0000		
yproxm	0.1515	0.2085	0.2077	0.9714	1.0000	
DELHI	0.9459	0.9948	0.9895	0.1049	0.2531	1.0000

The correlation matrix for Brazil (1970-1995) showed a different pattern. The income growth rate of the Brazilian states was negatively correlated with per capita income and with the variables that capture the main characteristics of the richer states (INDGSP, NONAGR, DD, TR). In the case of Brazil, GRGSP showed a negative correlation with YTRM.

The correlation among Y, INDGSP, NONAGR, TR and DD are similar for both countries.

Another important difference is that PROX and YPROXM, in the case of Brazil, were negatively correlated with the growth rate and positively correlated with the characteristics of richer states.

VII.3 - Cross-section results (GRGSP)

In this section we will discuss the cross-section results for India, using three proxies for transportation costs: TR, ROAD and PROX.

VII.3.1 - TR and ROAD

a) INDGSP

Table VII.2 shows the cross-section results for INDGSP.

Equation (1) includes Y, INDGSP, TR and DD. TR has a positive and significant coefficient (t-statistic of +1.77), indicating that better transport availability has increased total income growth rate. DD has a negative coefficient with t-statistic greater than one (-1.59)

Equation (2) includes a dummy for DELHI in specification (1), but this variable does not show a significant coefficient. Controlling for the special effects of DELHI, TR is no longer significant and population density shows a negative and significant coefficient (-1.96).

Equation (3) replaces TR with the interaction term, YTRM. YTRM is positive and significant (+2.70) and DD is negative and significant (-2.41). The negative sign of DD implies the presence of congestion effects. The positive sign of YTRM indicates that as transportation cost decreases, the coefficient of per capita income changes.

Equation (4) adds DELHI, which is again not significant. Similarly to Equation (2), controlling for DELHI, only congestion effects seem to be (negatively) affecting growth, which reflects the multicollinearity among DELHI, YTRM and DD.

TABLE VII.2 - INDGSP & TR - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t
Y	2.98 E-06	(0.628)	-4.65 E-07	(-0.095)	4.86 E-07	(0.109)	4.75 E-07	(0.095)
INDGSP	-0.032	(-0.549)	4.98 E-03	(0.084)	5.57E-03	(0.099)	5.61E-03	(0.096)
TR	7.32 E-03*	(1.765)	3.09E-03	(0.665)				
YTRM					1.61 E-06**	(2.698)	1.60E-06	(0.868)
DD	-4.02 E-05	(-1.585)	-0.48 E-05*	(-1.964)	-5.09 E-05**	(-2.412)	-5.08 E-05**	(-2.125)
DELHI			0.658	(1.689)			5.37E-04	(0.006)
R2	0.305		0.423		0.435		0.435	
MSE	0.009		0.008		0.008		0.008	

TABLE VII.3 - INDGSP & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t
Y	1.65 E-06	(0.329)	-3.43 E-06	(-0.718)	-2.45 E-06	(-0.570)	-2.36 E-06	(-0.529)
INDGSP	-0.033	(-0.562)	0.028	(0.504)	0.033	(0.624)	0.033	(0.598)
ROAD	0.040	(1.722)	0.036*	(1.802)				
YROADM					0.13 E-05***	(3.520)	1.43 E-05*	(2.051)
DD	-0.34 E-05	(-1.505)	-6.71 E-05***	(-2.858)	-6.66 E-05***	(-3.214)	-6.77 E-05***	(-3.085)
DELHI			0.076**	(2.508)			-0.012	(-0.229)
R2	0.300		0.517		0.541		0.542	
MSE	0.009		0.007		0.007		0.007	

TABLE VII.4 - NONAGR & TR - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t
Y	-1.71 E-07	(-0.039)	-1.09 E-06	(-0.264)	-1.60 E-07	(-0.041)	-8.46 E-08	(-0.020)
NONAGR	0.018	(0.476)	0.013	(0.366)	0.013	(0.400)	0.014	(0.393)
TR	8.44 E-03**	(2.096)	3.44 E-03	(0.728)				
YTRM					1.61 E-06***	(3.034)	1.73 E-06	(0.929)
DD	-4.85 E-05*	(-1.798)	-5.09 E-05*	(-2.013)	-0.53 E-05**	(-2.541)	-5.38 E-05**	(-2.184)
DELHI			0.064*	(1.758)			-6.87 E-03	(-0.071)
R2	0.302		0.428		0.441		0.441	
MSE	0.009		0.008		0.008		0.008	

TABLE VII.5 - NONAGR & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t
Y	-2.94 E-06	(-0.343)	-4.05 E-06	(-0.594)	-2.40 E-06	(-0.671)	-2.56 E-06	(-0.694)
NONAGR	0.032	(0.533)	0.031	(0.620)	0.027	(0.872)	0.031	(0.947)
ROAD	0.051*	(1.887)	0.040*	(1.966)				
YROADM					1.24 E-05***	(3.896)	1.54 E-05**	(2.199)
DD	-4.75 E-05*	(-1.736)	-7.27 E-05***	(-2.883)	-6.82 E-05***	(-3.371)	-7.18 E-05***	(-3.256)
DELHI			0.069**	(2.768)			-0.265	(-0.487)
R2	0.315		0.536		0.551		0.559	
MSE	0.009		0.007		0.007		0.007	

* The standard errors of Equations (1) and (2) were corrected for heterocedasticity;

Table VII.3 shows the results with the proxy ROAD.

Equation (1) includes Y, INDGSP, ROAD and DD and does not show any significant coefficient, although the coefficients of ROAD and DD show t-statistics greater than one.

Equation (2) includes DELHI, which is significant at the 5% level. Controlling for the special effects of DELHI, DD is negative and significant (-2.86) and ROAD is positive and significant (+1.80).

Equation (3) replaces ROAD with the interaction term YROADM. YROADM is positive and significant (+3.52), suggesting that richer states benefit from a decrease in transportation costs. DD is negative and significant (-3.21). The inclusion of DELHI (4) does not change the main results.

Observing the results with INDGSP, we did not find support for the concentrating effects of "backwards and forwards" linkages in the industrial sector. INDGSP is usually positive, but highly insignificant. On the other hand, transport availability enhances the growth rates of the richer states, creating a tendency of concentration of total activity, corresponding to phase II of the K&V(m) model.

b) NONAGR

Table VII.4 shows the results with NONAGR and TR.

Equation (1) includes Y, NONAGR, TR and DD. TR is positive and significant (+2.10), indicating that transport availability increased growth. DD is negative and significant (-1.80), suggesting the presence of congestion effects.

Equation (2) controls the results of (1) for DELHI. DD remains significant and DELHI is positive and significant at the 10% level (+1.76).

Equation (3) includes Y, NONAGR, YTRM and DD. YTRM is positive and significant (+3.03). Since Y is negative (although not significant), the positive sign of YTRM is suggesting that the higher growth of the poorer states decreases as transportation costs decrease. DD is also significant (-2.54). Controlling this specification for DELHI (4), only DD remains significant.

Table VII.5 uses ROAD as a proxy for transportation cost.

Equation (1) includes Y, NONAGR, ROAD and DD. ROAD is positive and significant (+1.89) and DD is negative and significant (-1.74). Controlling for DELHI, in Equation (2), these results do not change, while DELHI is positive and significant (+2.77).

Equation (3) uses the interaction term YROADM, including in its specification Y, NONAGR, YROADM and DD. YROADM is positive and significant (+3.90) and DD is negative and significant (-3.37). These results are robust to the introducing of DELHI in Equation (4), which does not show a significant coefficient.

The cross-section results with TR and ROAD shows that an increase in transport availability in India was generating concentration of total income, in accordance with the core-periphery phase of the NEG model. The hypothesis that backwards and forwards linkages, in the industrial sector or in the industrial and service sectors taken together, were important for growth is refuted. Congestion effects were clearly acting against the concentration of economic activity.

VII.2.3 - PROX

a) INDGSP

Table VII.6 shows the results with INDGSP and PROX.

Equation (1) includes Y, INDGSP, PROX and DD. No coefficient is significant in this specification. Adding DELHI to (1), DD is negative and significant (-2.12) and DELHI is also significant at the 5% level (+2.48).

In (1) and (2), PROX shows t-statistics higher than one and negative, indicating that proximity to markets was negative for growth.

There are also no significant coefficients in Equation (3), which includes Y, INDGSP, the interaction term - YPROXM - and DD. Controlling for the special effects of DELHI (Equation (4)), DD (-2.12) and DELHI (+2.52) are significant.

INDGSP shows a negative coefficient with t-statistics higher than one, in the specifications that do not include DELHI. This negative coefficient was not expected if economies of scale were prevailing in the industrial sector. The coefficient of PROX is negative, suggesting that the states that grew more were distant from the richer markets. The coefficients of YPROXM are highly not significant.

Equation (3a) displays Y, INDGSP, PROXM, YPROXM and DD. The demeaned variable PROXM is negative and significant at the 1% level. YPROXSHM is positive and significant at the 1% level (t-statistic of +4.60). Since Y is positive and significant (+2.64), the last two results suggest that the lower the transportation cost (the higher the proximity to richer markets), the higher the growth rate of richer states, leading to a concentration of total income.

INDGSP is also negative and significant in this specification, with t-statistic of -2.76 and DD is negative and significant at the 10% level (-1.82), indicating that congestion effects are operating in the regional economies of India.

Controlling for DELHI (Equation (4)), the results are similar for PROXM and YPROXM, although the other coefficients are no longer significant (DELHI also does not show a significant coefficient), although their t-statistics are greater than one.

Table VII.6 - INDGSP & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	6.10 E-06	(1.260)	4.25 E-07	(0.089)	5.54 E-06	(1.109)	-2.57 E-07	(-0.053)	8.46 E-06**	(2.642)	7.01 E-06	(1.656)
INDGSP	-0,073	(-1.253)	-0,006	(-0.107)	-0,067	(-1.119)	1.57 E-03	(0.027)	-0.107**	(-2.762)	-0,090	(-1.739)
PROX	-1.46 E-06	(-1.227)	-1.35 E-06	(-1.314)								
PROXM									-1.90 E-05***	(-4.882)	-1.73 E-05***	(-3.421)
YPROXM					-2.96 E-10	(-0.582)	-3.85 E-10	(-0.879)	7.39 E-09***	(4.600)	6.69 E-09***	(3.195)
DD	1.21 E-06	(0.129)	-3.66 E-05**	(-2.119)	2.01 E-06	(0.206)	-3.77 E-05**	(-2.115)	-1.23 E-06*	(-1.815)	-1.92 E-05	(-1.327)
DELHI			0.078**	(2.478)			0.0820**	(2.522)			0,017	(0.541)
R2	0,238		0,470		0,180		0,436		0,696		0,703	
MSE	0,009		0,008		0,009		0,008		0,006		0,006	

Table VII.7 - NONAGR & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	1.60 E-06	(0.339)	-7.92 E-07	(-0.201)	1.34 E-06	(0.276)	-1.21 E-06	(-0.298)	8.94 E-06**	(2.779)	7.09 e-06*	(1.908)
NONAGR	5.09 E-03	(0.125)	0,011	(0.343)	5.71 E-03	(0.134)	0,015	(0.418)	-0.090***	(-2.898)	-0.074*	(-2.113)
PROX	-1.30 E-06	(-1.044)	-1.37 E-06	(-1.341)								
PROXM									-2.44 E-05***	(-5.330)	-2.10 E-05***	(-3.687)
YPROXM					-2.68 E-10	(-0.498)	-4.25 E-10	(-0.955)	9.89 E-09***	(5.117)	8.44 E-09***	(3.478)
DD	2.96 E-06	(0.260)	-3.92 E-05**	(-2.269)	3.42 E-06	(0.293)	-4.02 E-05**	(-2.245)	5.57 E-07	(0.080)	-1.26 E-05	(-0.843)
DELHI			0.080***	(2.897)			0.083***	(2.882)			0,026	(0.994)
R2	0,159		0,474		0,112		0,443		0,707		0,728	
MSE	0,010		0,008		0,010		0,008		0,006		0,006	

b) NONAGR

Table VII.7 shows the results for NONAGR and PROX.

There is no significant coefficient in (1), where Y, NONAGR, PROX and DD are included. Controlling for DELHI, DD shows again a negative and significant coefficient (-2.27) and DELHI is significant at the 1% level (+2.90).

Equation (3) includes Y, NONAGR, YPROXM and DD, not showing significant coefficients. Controlling for DELHI, this variable (+2.88) and DD (-2.25) are significant.

The coefficient of NONAGR is positive, but highly insignificant in all specifications. PROX shows again negative coefficients, which have t-statistics greater than one, suggesting that low transportation costs were not beneficial for growth. Y changes signs accordingly to the inclusion of DELHI.

Equation (3a) includes Y, NONAGR, PROXM, YPROXM and DD. Y is positive and significant (+2.78), and so richer states (in per capita terms) were having higher total income growth rates. YPROXM is positive and significant (+5.12), which implies that the higher growth rates of the rich states are even increased by to markets. PROX is negative and significant (-5.33) and NONAGR is negative and significant at the 1% level (-2.90), implying that agricultural states grew more.

Controlling for DELHI (4a), the results do not change.

The cross-section results for the Indian case were more informative than the panel ones.

The cross-section results for total income growth rate showed that transport availability (ROAD and TR) has a positive effect over this dependent variable. On the other hand, when we used PROX (the coefficients were not significant, but they were at least greater than one), we observed negative coefficients, indicating that proximity to richer markets has acted against growth among the states of India.

The interaction terms with ROAD and TR showed that the coefficient of per capita income increases with a lower transportation cost, which leads, according to NEG models, to concentration of total income.

Little information could be obtained about the coefficient of per capita income and of INDGSP/NONAGR. Only in the specification with PROX could we obtain significant coefficients for these variables. In these specifications, per capita income showed a positive coefficient and INDGSP/NONAGR a negative one, implying that richer states were growing more and that higher growth rates were associated with agricultural states. A positive coefficient for Y, and a positive coefficient for YPROXM, indicate higher probability of concentration of total income.

The coefficients of INDGSP and NONAGR are refuting the "backward and forward" hypothesis.

DD, when significant, is negative, showing signs of congestion effects counteracting other forces that lead to dispersion.

DELHI shows sometimes a positive and significant coefficient.

We tried to include regional dummies in all exercises, but they do not change our main results.

We chose the 18-state sample of the period 1970-1995 to make some comparisons between the results for Brazil and for India. The choice was dictated by the proximity of the periods.

In the results for Brazil, we also found signs of congestion effects. TR showed positive (but not significant) coefficients, as in the case of India.

Differently from India, PROX was positive (but not significant). We found positive coefficients (and some significant ones) for YPROXM, in the case of Brazil, but they were usually accompanied by negative coefficients for the per capita income variable. A negative coefficient for Y and a positive coefficient for YPROXM indicate that, although a decrease in transportation cost is acting towards a concentration of economic activity, other factors are more than counteracting it, and a dispersion of total activity occurs. In the case of India, both per capita income and the interaction term are showing positive coefficients, suggesting that a strong concentration of activity was taking place in this country.

VII.4 - Cross-section results (GRIND)

VII.4.1 - TR and ROAD

a) INDGSP

Table VII.8 and VII.9 show the cross-section results controlling for INDGSP and using TR and ROAD as proxies for transportation cost respectively.

Table VII.8 reports the results with TR. Per capita income is positive and significant (+1.77) and INDGSP shows a negative coefficient with t-statistic higher than one (-1.36).

Controlling for DELHI (Equation (2)), makes per capita income insignificant, although it still shows a positive coefficient with t-statistic of +1.57.

Equation (3) includes Y, INDGSP, YTRM and DD. The interaction term is highly not significant. Per capita income and INDGSP show t-statistics greater than one. Controlling for DELHI (Equation (4)) does not change these results.

Table VII.9 reports the results using ROAD. Equation (1) includes Y, INDGSP, ROAD, TR and DD. ROAD is positive and significant (t-statistic of

+2.50), implying that road availability has helped industrial growth. DD is negative and significant (-2.48), suggesting the presence of congestion effects. INDGSP and Y show t-statistics higher than one. Their coefficients show the same signs that they showed with TR.

Controlling for the special effects of DELHI (Equation (2)), ROAD is still positive and significant (+2.94), although the congestion effects do not affect significantly industrial growth anymore. DELHI is also not significant.

Equation (3) includes Y, INDGSP, YROADM and DD. No significant coefficient is found in this specification. Controlling for DELHI (4), DELHI is significant (-2.61) and YROADM shows a positive and significant coefficient (+2.88). The positive coefficient of YROADM implies that the industrial output of richer states grew more (per capita income is positive) the lower the transportation cost, leading to a concentration of industrial activity.

The negative sign of INDGSP that does not support the hypothesis that backwards and forwards linkages were affecting industrial growth.

It also seems that congestion effects were less important in explaining industrial growth, since we have found much more significant coefficients in the results with GR as the dependent variable. On the other hand, transport cost seems to be affecting equally GR and GRIND, sustaining a positive correlation with these variables and amplifying the positive performance of the richer states.

Table VII.8 - INDGSP & TR - INDIA - 1961-1991 (20 states) dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t
Y	2.22 E-03*	(1.770)	2.58 E-03	(1.568)	2.42 E-03	(1.647)	2.65 E-03	(1.665)
INDGSP	-26.126	(-1.355)	-30.011	(-1.328)	-29.202	(-1.347)	-29.979	(-1.322)
TR	-0.187	(-0.154)	0.256	(0.227)				
YTRM					-8.24 E-05	(-0.450)	1.20 E-04	(0.260)
DD	-4.42 E-04	(-0.056)	3.61 E-04	(0.044)	1.41 E-03	(0.197)	2.27 E-04	(0.027)
DELHI			-6.908	(-0.814)			-11.706	(-0.614)
R2	0.229		0.251		0.242		0.252	
MSE	2.206		2.251		2.188		2.250	

* The standard errors were corrected for heteroscedasticity.

Table VII.9 - INDGSP & ROAD - INDIA - 1961-1991 (20 states) dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t
Y	1.29 E-03	(1.663)	1.75 E-03	(1.263)	1.84 E-03	(1.542)	2.207 E-03	(1.661)
INDGSP	-17.437	(-1.251)	-23.056	(-1.143)	-21.252	(-1.079)	-22.086	(-1.156)
ROAD	9.809**	(2.499)	10.168***	(2.936)				
YROAD					5.35 E-04	(0.589)	3.90 E-03***	(2.881)
DD	-0.010**	(-2.477)	-7.25 E-03	(-1.205)	-4.33 E-03	(-0.749)	-7.12 E-03	(-1.306)
DELHI			-6.945	(-0.824)			-30.845**	(-2.611)
R2	0.370		0.402		0.238		0.424	
MSE	1.994		2.012		2.193		1.974	

* The standard errors were corrected for heteroscedasticity.

Table VII.10 - NONAGR & TR - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t
Y	1.59 E-03	(1.377)	1.57 E-03	(1.283)	1.58 E-03	(1.346)	1.59 E-03	(1.185)
NONAGR	-11.887	(-1.451)	-11.993	(-1.445)	-11.923	(-1.506)	-11.877	(-1.427)
TR	0.138	(0.132)	0.030	(0.024)				
YTRM					3.14 E-05	(0.257)	4.54 E-05	(0.088)
DD	2.93 E-04	(0.037)	2.41 E-04	(0.030)	3.32 E-05	(0.006)	-6.00 E-05	(-0.007)
DELHI			1.360	(0.242)			-0.761	(-0.033)
R2	0.148		0.149		0.150		0.150	
MSE	2.319		2.399		2.317		2.398	

* The standard errors were corrected for heteroscedasticity.

Table VII.11 - NONAGR & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t
Y	6.73 E-04	(0.688)	6.97 E-04	(0.685)	1.27 E-03	(1.326)	1.11 E-03	(1.315)
NONAGR	-5.684	(-0.945)	-5.660	(-0.886)	-9.928	(-1.543)	-5.637	(-0.947)
ROAD	10.798**	(2.449)	11.029**	(2.406)				
YROAD					1.09 E-03*	(1.900)	4.25 E-03**	(2.402)
DD	-9.77 E-03**	(-2.190)	-9.23 E-03*	(-1.788)	-5.22 E-03	(-1.283)	-9.02 E-03*	(-1.956)
DELHI			-1.476	(-0.289)			-27.804*	(-2.059)
R2	0.316		0.318		0.208		0.349	
MSE	2.078		2.148		2.236		2.099	

* The standard errors were corrected for heteroscedasticity.

b) NONAGR

Table VII.10 shows the results with NONAGR and TR. No significant variable is found in this Table. Per capita income shows a positive coefficient and NONAGR a negative one, both with t-statistics higher than one.

Table VII.11 displays the results with NONAGR and ROAD.

Equation (1) includes Y, NONAGR, ROAD and DD. ROAD is positive and significant at the 5% level (+2.45). DD is negative and significant at the 5% level (-2.19). The inclusion of DELHI (2) does not change the above results.

Equation (3) includes Y, NONAGR, YROADM and DD. YROADM is positive and significant at the 10% level (+1.90). The inclusion of the significant DELHI (Equation (4)) makes DD significant as well (-1.96). YROADM is still positive and significant (+2.40). Not only were richer states growing more, but a decrease in transportation cost would reinforce a concentration of industrial activities.

It is interesting to observe that the sign of NONAGR is usually negative, although not significant, not in accordance with the hypothesis of K&V(m) model.

VII.4.2 - PROX

a) INDGSP

TABLE VII.12 shows the results with the dependent variable GRIND and PROX as the proxy for transportation cost.

Equation (1) includes Y, INDGSP, PROX and DD. Only INDGSP is negative and significant (-1.73), indicating that higher industrial growth rates were not a characteristic of the more industrialised states. This result is not significant to the controlling for DELHI, in Equation (2).

Equation (3) includes Y, INDGSP, YPROXM and DD. INDGSP is negative and significant at the 10% level (-1.78). DELHI does not seem to be important in the explanation of the industrial growth rate, since its coefficient is not significant in (4).

The coefficients of Y are positive, with t-statistics greater than one, suggesting that the richer the state, the higher the growth rates.

Equation (3a) includes Y, INDGSP, PROXM, YPROXM and DD. Y is positive and significant (+2.08) and

INDGSP is negative and significant (-2.00). PROXM is negative and shows a high t-statistic, implying that a higher proximity to rich markets was not crucial for industrial growth. YPROXM is positive and also shows a t-statistic greater than one (+1.62), suggesting that the coefficient of per capita income increases with lower transportation costs.

Equation (4a) controls (3a) for DELHI, which is significant at the 5% level (-2.78). Y is positive and significant (+3.93), INDGSP is negative and significant (-3.86), PROXM is negative and significant (-3.77) and YPROXM is positive and significant (+4.05). The positive coefficients for Y and YPROXM suggest that there was a concentration of industrial activity in the richer states, which was positively influenced by proximity to markets.

Table VII.12 - INDGSP & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	2.05 E-03	(1.714)	2.45 E-03	(1.434)	2.03 E-03	(1.666)	2.49 E-03	(1.413)	2.35 E-03*	(2.078)	4.33 E-03***	(3.932)
INDGSP	-24.256*	(-1.733)	-28,993	(-1.411)	-24.300*	(-1.784)	-29,731	(-1.463)	-28.674*	(-2.004)	-52.864***	(-3.857)
PROX	1.82 E-04	(0.603)	1.74 E-04	(0.573)							-4.39 E-03***	(-3.765)
PROXM									-2.09 E-03	(-1.672)	1.91 E-06***	(4.051)
YPROXM					1.11 E-07	(0.858)	1.18 E-07	(0.907)	9.57 E-07	(1.615)	6.19 E-03	(1.661)
DD	-1.46 E-03	(-0.703)	1.22 E-03	(0.226)	-1.63 E-03	(-0.782)	1.49 E-03	(0.268)	-3.21 E-03	(-1.370)	-23.028**	(-2.780)
DELHI			-5,519	(-0.544)			-6,459	(-0.599)				
R2	0,248		0,267		0,272		0,299		0,379		0,594	
MSE	2,179		2,226		2,144		2,177		2,049		1,721	

* All standard errors were corrected for heteroscedasticity.

Table VII.13 - NONAGR & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	1.59 E-03	(1.084)	1.55 E-03	(1.014)	1.71 E-03	(1.154)	1.70 E-03	(1.066)	2.99 E-03***	(4.072)	4.21 E-03***	(5.612)
NONAGR	-12,957	(-1.346)	-12,85	(-1.294)	-14,885	(-1.476)	-14,864	(-1.369)	-31.139***	(-3.585)	-41.775***	(-4.782)
PROX	2.74 E-04	(0.781)	2.73 E-04	(0.750)								
PROXM									-4.14 E-03**	(-2.766)	-6.37 E-03***	(-3.817)
YPROXM					1.68 E-07	(1.110)	1.65 E-07	(1.016)	1.89 E-06**	(2.637)	2.85 E-06***	(3.759)
DD	1.30 E-03	(0.696)	6.02 E-04	(0.125)	1.33 E-03	(0.736)	1.22 E-03	(0.230)	8.44 E-04	(0.517)	9.57 E-03**	(2.307)
DELHI			1,334	(0.203)			0,197	(0.026)			-17.049**	(-2.530)
R2	0,194		0,195		0,243		0,243		0,535		0,689	
MSE	2,256		2,333		2,186		2,263		1,774		1,504	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

Table VII.13 does not show any significant coefficient in Equations (1)-(4). On the other hand, when we use the demeaned variable PROXM, we found significant coefficients. Equation (3a) includes Y, NONAGR, PROXM, YPROXM and DD. Y is positive and significant (+4.07), NONAGR is negative and significant (-3.59), PROXM is negative and significant (-2.77) and YPROXM is positive and significant (+2.64). DELHI is significant at the 5% level (-2.53), in Equation (4a).

Road availability (ROAD) was beneficial for the industrial growth of the states in India, while average levels of proximity (PROXM) was harmful the industrial growth rate. The interaction terms (YROADM and YPROXM) showed positive coefficients, indicating that better transport availability had a greater impact on industrial growth in richer states.

The coefficients of Y, INDGSP and NONAGR were more informative. Per capita income shows a positive sign, indicating that the richer states showed the highest industrial growth rates. On the other hand, the highest industrial growth rates were not associated with economies of scale in the industrial sector or in the industrial and service sectors taken together.

DD shows ambiguous coefficients. It is usually negative with ROAD and positive with PROX. DELHI showed a negative performance in terms of industrial growth.

In the case of Brazil (18-state sample of 1970-1995), congestion effects were still important in helping to generate a dispersion of industrial activity. Differently from India, both TR and PROX were positively related with the industrial growth rate, and per capita income, when showing significant coefficients, was negative. The interaction terms were also positive.

VII.5 - Omitted Variables - GRANTS

VII.5.1 - GRGSP

CASHIN, P. & SAHAY, R. (1996) highlight the importance of grants from the central government to the economic performance of the states of India. Tables VII.14 and VII.15 show the impact of introducing the variable GRANTS in Equations (1)-(4)

of Tables VII.2&3 and VII.4&5. Tables VII.16 and VII.17 show this impact in Equations (1)-(4) of Tables VII.8&9 and VII.10&11. The coefficient of the variable GRANTS is always positive and frequently significant.

a) INDGSP

Equations (1)-(4) of Table VII.14 include Y, INDGSP, GRANTS, DD and one of the following proxies for transportation cost: TR or YTRM. Equations (2) and (4) also control for DELHI. With the exception of GRANTS in Equation (1), no other variable is significant in these specifications.

Equation (5) of Table VII.14 includes Y, INDGSP, GRANTS, ROAD and DD. Controlling for GRANTS, which is significant at the 1% level (+3.08), ROAD is positive and significant (+2.13) and DD is negative and significant (-2.14).

Controlling for DELHI in Equation (6), there is no change in results and DELHI does not show a significant coefficient.

Equation (7) includes Y, INDGSP, YROADM, DD and GRANTS. YROADM is positive and significant (+2.47) and DD is negative and significant (-2.50). These results are equal to the results in Equation (3) of

Table VII.3. GRANTS is not significant in this specification. Controlling for DELHI (8), the coefficient of GRANTS is positive and significant (+1.82).

With PROX, GRANTS is only significant without DELHI and without the interaction term ((9) and (11)).

Table VII.14 - INDGSP & GRANTS (ROAD) - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	6.31 E-06	(1.418)	3.86 E-06	(0.712)	4.12 E-06	(0.850)	4.49 E-06	(0.826)	4.49 E-06	(1.089)	1.10 E-06	(0.221)	1.04 E-06	(0.226)	2.00 E-06	(0.418)
INDGSP	-0,336	(-0.649)	-0,139	(-0.241)	-0,012	(-0.212)	-0,013	(-0.226)	-0,019	(-0.407)	9.32 E-03	(0.179)	0,018	(0.345)	0,014	(0.263)
TR	4.26 E-03	(1.087)	2.65 E-03	(0.599)												
YTRM					1.00 E-06	(1.461)	1.29 E-06	(0.732)								
ROAD									0.039**	(2.130)	0.038*	(2.048)				
YROAD													9.83 E-06**	(2.472)	1.41 E-05**	(2.177)
PROX																
PROXM																
YPROXM																
DD	2.72 E-04	(-1.170)	-3.38 E-05	(-1.359)	-3.45 E-05	(-1.526)	-0.36 E-04	(-1.451)	-3.88 E-05**	(-2.142)	-5.49 E-05**	(-2.448)	-5.31 E-05*	(-2.498)	-5.46 E-05**	(-2.534)
GRANTS	6.69 E-04**	(2.257)	5.37 E-04	(1.577)	5.15 E-04	(1.581)	5.22 E-04	(1.536)	7.76 E-04***	(3.084)	5.76 E-04*	(1.922)	4.55 E-04	(1.652)	5.37 E-04*	(1.820)
DELHI			0,034	(0.819)			-0,017	(-0.181)			0,040	(1.186)			-0,044	(-0.838)
R2	0,491		0,516		0,521		0,522		0,583		0,624		0,616		0,635	
MSE	0,008		0,008		0,007		0,008		0,007		0,007		0,007		0,007	

Table VII.14 - INDGSP & GRANTS (ROAD) - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - cross-section results

	9	t	10	t	11	t	12	t	13	t	14	t
Y	8.01 E-06*	(1.852)	5.75 E-06	(0.604)	8.02 E-06*	(1.878)	4.16 E-06	(0.718)	8.23 E-06**	(2.507)	5.53 E-06	(1.227)
INDGSP	-0,047	(-0.895)	-0,016	(-0.267)	-0,046	(-0.897)	-0,017	(-0.290)	-0.123**	(-2.688)	-0.100*	(-1.901)
TR												
YTRM												
ROAD												
YROAD												
PROX	419,908	(0.319)	-363,346	(-0.249)								
PROXM									-22962***	(-3.272)	-22187***	(-3.110)
YPROXM					0,332	(0.688)	0,074	(0.135)	8.779***	(3.366)	8.314***	(3.098)
DD	-3.88 E-06	(-0.456)	-2.60 E-05	(-1.265)	-4.60 E-06	(-0.542)	-2.31 E-05	(-1.122)	-1.31 E-05*	(-1.865)	-2.57 E-05	(-1.609)
GRANTS	8.52 E-04**	(2.338)	4.64 E-04	(0.953)	8.87 E-04**	(2.738)	5.88 E-04	(1.325)	-3.02 E-04	(-0.685)	-4.70 E-04	(-0.971)
DELHI			0,050	(1.179)			0,043	(0.986)			0,030	(0.880)
R2	0,452		0,505		0,466		0,503		0,707		0,725	
MSE	0,008		0,008		0,008		0,008		0,006		0,006	

Table VII.15 - NONAGR & GRANTS (TR) - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - cross-section results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	4.48 E-06	(1.001)	2.88 E-06	(0.608)	3.36 E-06	(0.765)	3.53 E-06	(0.753)	2.11 E-06	(0.509)	6.91 E-08	(0.016)	1.07 E-06	(0.261)	1.37 E-06	(0.333)
NONAGR	-1.09 E-03	(-0.031)	1.49 E-04	(0.004)	1.84 E-04	(0.006)	9.78 E-04	(0.028)	0,014	(0.439)	0,018	(0.584)	0,013	(0.421)	0,018	(0.591)
TR	4.99 E-03	(1.262)	2.72 E-03	(0.597)												
YTRM					1.07 E-06	(1.736)	1.33 E-06	(0.736)								
ROAD									0.045**	(2.377)	0.040**	(2.163)				
YROAD													9.56 E-06**	(2.713)	1.49 E-05**	(2.280)
PROX																
PROXM																
YPROXM																
DD	-3.02 E-05	(-1.179)	-3.58 E-05	(-1.366)	-3.65 E-05	(-1.601)	-3.81 E-05	(-1.468)	-4.51 E-05**	(-2.180)	-0.60 E-04**	(-2.592)	-0.54 E-05*	(-2.522)	-5.85 E-05**	(-2.665)
GRANTS	6.69 E-04**	(2.152)	5.20 E-04	(1.510)	5.01 E-04	(1.512)	5,04	(1.464)	7.66 E-04***	(3.008)	5.50 E-04*	(1.894)	4.38 E-04	(1.550)	5.13 E-04*	(1.745)
DELHI			0,039	(1.009)			-0,014	(-0.154)			0,039	(1.312)			-0,051	(-0.969)
R2	0,475		0,514		0,519		0,520		0,584		0,632		0,617		0,643	
MSE	0,008		0,008		0,007		0,008		0,007		0,007		0,007		0,007	

Table VII.15 - NONAGR & GRANTS (TR) - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - cross-section results

	9	t	10	t	11	t	12	t	13	t	14	t
Y	7.18 E-06	(1.579)	2.55 E-06	(0.655)	7.69 E-06	(1.717)	3.77 E-06	(0.664)	8.90 E-06**	(2.598)	5.72 E-06	(1.320)
NONAGR	-0,019	(-0.528)	-1.70 E-03	(0.964)	-0,025	(-0.700)	-8.11 E-03	(-0.207)	-0.091**	(-2.687)	-0.075*	(-2.084)
TR												
YTRM												
ROAD												
YROAD												
PROX	838,632	(0.625)	-350,468	(0.827)								
PROXM	-3.00 E-07	(-0.031)	-2.75 E-05	(0.237)					-24673***	(-3.348)	-23918***	(-3.280)
YPROXM	9.73 E-04**	(2.593)	4.52 E-04	(0.408)	0,506	(0.933)	0,113	(0.183)	9,984	(3.494)	9.379***	(3.275)
DD			0,055	(0.198)	-3.52 E-07	(-0.037)	6.05 E-04	(-1.021)	5.95 E-07	(0.082)	-1.75 E-05	(-1.029)
GRANTS					1.00 E-03***	(2.962)	0,046	(1.236)	-1.78 E-05	(-0.045)	-3.04 E-04	(-0.658)
DELHI											0,366	(1.173)
R2	0,432		0,502		0,454		0,501		0,707		0,737	
MSE	0,008		0,008		0,008		0,008		0,006		0,006	

b) NONAGR

Equations (1)-(4) in Table VII.15, which use TR and YTRM as proxies for transportation cost, do not show significant coefficients, with the exception of the variable GRANTS in Equation (1).

Equation (5) includes Y, NONAGR, ROAD, DD and GRANTS. ROAD is positive and significant (+2.38) and DD is negative and significant (-2.18), as they were in Equation (1), Table VII.5. GRANTS is positive and significant (+3.01). Controlling for DELHI (Equation (6)) does not change these results.

Equation (7) includes Y, NONAGR, YROADM, DD and GRANTS. YROADM is positive and significant (+2.71), suggesting that richer states would be benefiting from lower transportation costs, and DD is negative and significant (-2.52), implying presence of congestion effects. GRANTS is not significant. These results once again resemble the results in Table VII.5. Introducing DELHI in Equation (8) only makes Grants significant (+1.75).

There is evidence that the distribution of government grants has influenced the growth of states in India. Inclusion of this variables does not alter the evidence that lower transportation costs were generating concentration of total income. Also, congestion effects remain important in explaining regional growth in India.

Again, we have only twice significant coefficient for GRANTS with PROX.

VII.5.2 - GRIND

a) INDGSP

Table VII.16a shows the results with the dependent variable GRIND, controlling the right-hand side for INDGSP and using TR as the proxy for transportation cost. Once more with TR, there are no significant coefficients.

Table VII.16b replaces TR by ROAD. Equation (1) includes Y, INDGSP, ROAD, DD and GRANTS. ROAD is positive and significant (+2.47) at the 5% level. DD is also significant (-2.29) and negative. GRANTS is not significant. In controlling for DELHI (2), only ROAD remains significant (+2.75).

Equation (3) includes Y, INDGSP, YROADM, DD and GRANTS. We do not observe any significant coefficient. When controlling for DELHI (4), both DELHI (-2.10) and YROADM (+2.79) are significant.

With PROX (VII.17), the interesting result comes in the specification that includes Y, INDGSP, PROXM, YPROXM, DD and GRANTS. All coefficients are significant at the 1% level and GRANTS shows a negative coefficient. Including DELHI, DD is no longer significant.

Table VII.16a - GRANTS & INDGSP (TR) - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t
Y	2.03 E-03	(1.553)	2.46 E-03	(1.414)	2.28 E-03	(1.420)	2.53 E-03	(1.478)
INDGSP	-26.042	(-1.302)	-24.522	(-1.245)	-28.522	(-1.239)	-29.431	(-1.229)
TR	-0.017	(-0.014)	0.268	(0.228)				
YTRM					-6.54 E-05	(-0.302)	1.29 E-04	(0.269)
DD	-1.17 E-03	(-0.144)	-5.44 E-06	(-0.001)	7.59 E-04	(0.099)	-2.12 E-04	(-0.024)
GRANTS	-0.373	(-0.439)	-0.139	(-0.141)	-0.020	(-0.220)	-0.154	(-0.157)
DELHI			-6.093	(-0.656)			-11.193	(-0.558)
R2	0.239		0.252		0.244		0.253	
MSE	2.269		2.334		2.261		2.333	

* All standard errors were corrected for heteroscedasticity.

Table VII.16b - GRANTS & INDGSP (ROAD) - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t
Y	1.14 E-03	(1.278)	1.71 E-03	(1.127)	1.29 E-03	(0.889)	1.94 E-03	(1.327)
INDGSP	-18.128	(-1.206)	-22.875	(-1.086)	-18.809	(-0.915)	-21.508	(-1.068)
ROAD	9.832**	(2.472)	10.153**	(2.749)				
YROAD					1.03 E-03	(1.023)	3.91 E-03**	(2.785)
DD	-0.010**	(-2.288)	-7.37 E-03	(-1.202)	-6.47 E-03	(-1.071)	-7.51 E-03	(-1.340)
GRANTS	-0.039	(-0.578)	-5.52 E-03	(-0.066)	-0.072	(-1.051)	-0.016	(-0.216)
DELHI			-6.600	(-0.671)			-29.880*	(-2.103)
R2	0.382		0.402		0.270		0.425	
MSE	2.044		2.087		2.222		2.046	

* All standard errors were corrected for heteroscedasticity.

Table VII.17 - GRANTS & INDGSP (PROX) - INDIA - 1961-1991 (20 states)
dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t	5	t	6	t
Y	2.02 E-03	(1.612)	2.82 E-03	(1.383)	2.02 E-03	(1.557)	3.08 E-03	(1.535)	2.09 E-03***	(3.107)	3.52 E-03***	(3.942)
INDGSP	-24,601	(-1.677)	-30,149	(-1.400)	-24,370	(-1.728)	-32,236	(-1.555)	46.757***	(-3.291)	-58.790***	(-4.789)
PROX	156864	(0.389)	295229	(0.549)								
PROXM									-6658184***	(-3.160)	-7071505***	(-4.989)
YPROXM					109,421	(0.666)	180,155	(0.875)	2558.624***	(3.150)	2806.384***	(5.304)
DD	-1.39 E-03	(-0.628)	2.52 E-03	(0.344)	-1.61 E-03	(-0.689)	3.46 E-03	(0.483)	-4.07 E-03**	(-2.810)	2.63 E-03	(1.067)
GRANTS	-0,011	(-0.099)	0,057	(0.320)	-2.88 E-03	(-0.028)	0,079	(0.486)	-0.347***	(-3.001)	-0.258***	(-3.473)
DELHI			-8,916	(-0.591)			-11,742	(-0.776)			-15.890***	(-2.888)
R2	0,248		0,276						0,619		0,705	
MSE	2,255		2,296						1,666		1,525	

* All standard errors were corrected for heteroscedasticity.

Table VII.19 - GRANTS & NONAGR (PROX) - INDIA - 1961-1991 (20 states)
dependent variable: GRIND - cross-section results

	1	t	2	t	3	t	4	t	5	t	6	t
Y	1.96 E-03	(1.447)	2.36 E-03	(1.321)	2.13 E-03	(1.569)	2.85 E-03	(1.564)	2.51 E-03***	(5.378)	3.49 E-03***	(4.519)
NONAGR	-14,551	(-1.684)	-16,043	(-1.469)	-16.969*	(-1.937)	-20,122	(-1.687)	-37.240***	(-4.442)	-42.137***	(-4.808)
PROX	415225	(0.902)	517936	(0.763)								
PROXM									-7654604***	(-3.586)	-7887869***	(-4.362)
YPROXM					217,618	(1.140)	289,404	(1.074)	3158***	(3.475)	3345.189***	(4.156)
DD	1.09 E-03	(0.528)	3.43 E-03	(0.442)	1.08 E-03	(0.519)	5.20 E-03	(0.649)	1.37 E-03	(1.113)	6.98 E-03	(1.567)
GRANTS	0,064	(0.575)	0,109	(0.545)	0,067	(0.633)	0,139	(0.748)	-0.249***	(-3.108)	-0.160**	(-2.413)
DELHI			-4,756	(-0.356)			-8,347	(-0.598)			-11.3267	(-1.529)
R2	0,214		0,223		0,269		0,296		0,685		0,734	
MSE	2,305		2,379		2,223		2,264		1,514		1,448	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

Table VII.18a repeats the same exercise with NONAGR and TR and once more no significant coefficient is found.

Table VII.18b replaces TR for ROAD. Equation (1) includes Y, NONAGR, ROAD, DD and GRANTS. ROAD is positive and significant at the 5% level (+2.44), reinforcing that this kind of infrastructure was beneficial for industrial growth. DD is negative and significant (-2.17). In controlling for DELHI (2), these results remain the same and DELHI is not significant.

Equation (3) includes Y, NONAGR, YROADM, DD and GRANTS. YROADM is positive and significant (+2.06). Controlling for DELHI (4), YROADM (+2.33), DD (-2.07) and DELHI (-1.79) are significant.

With PROX (Table VII.19), as in the case of INDGSP, the interesting result comes in the specifications with PROXM. (5) includes Y, INDGSP, PROXM, YPROXM, DD and GRANTS. With the exception of DD, the coefficients are significant at the 1% level and GRANTS shows a negative coefficient. Including DELHI, DD and DELHI are no longer significant.

Provision of grants, although playing a role in the income growth rate, was not usually important for the industrial growth rate (the exception are the results with NONAGR and PROXM).

VII.6 - Panel Results

The panel results were constructed creating time dummies for three periods: 1961, 1971 and 1981.

The dependent variables are the growth rate of total output (GRGSP) and the growth rate of industrial output (GRIND). The specifications used are similar to the cross-section ones. For the first dependent variable, we have two periods of observation, while for GRIND, we have just one.

VII.6.1 - Dependent Variable - GRGSP

VII.6.1.1 - TR and ROAD

a) INDGSP

Table VII.20 shows the results with INDGSP and TR. Equation (1) includes Y, INDGSP, TR and DD, while Equation (2) controls this specification for the special effects of DELHI. Only DELHI shows a significant coefficient at the 10% level (+1.68).

Equation (3) replaces TR for the interaction term YTRM, while Equation (4) controls Equation (3) for the effects of DELHI. There are no significant coefficients in them.

Equations (1)-(4) in Table VII.21 replaces TR by the other proxy for transportation cost, ROAD. Equation (1) includes Y, INDGSP, ROAD and DD, not showing any significant coefficients. Equation (2) controls Equation (1) for DELHI, which does not alter the results.

Equation (3) uses the interaction term YROADM. It includes Y, INDGSP, YROADM and DD, and also does not show significant coefficients. Controlling for DELHI has experienced a positive growth rate (+1.65).

Table VII.20 - INDGSP & TR - INDIA - 1961-1991 (20 states) dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-2.28 E-04	(-0.839)	-3.22 E-04	(-1.121)	-2.73 E-04	(-0.970)	-3.04 E-04	(-1.110)
INDGSP	-1.660	(-0.354)	-0.440	(-0.094)	-0.463	(-0.094)	-0.657	(-0.127)
TR	0.273	(1.208)	-2.477	(-0.631)				
YTRM					9.25 E-05	(1.312)	2.30 E-05	(0.116)
DD	-8.67 E-05	(-0.119)	-3.41 E-04	(-0.391)	-1.29 E-03	(-0.814)	7.71 E-04	(-0.320)
DELHI			6.509*	(1.684)			3.549	(0.434)
R2	0.091		0.109		0.105		0.107	
MSE	2.438		2.437		2.420		2.440	

* All standard errors were corrected for heteroscedasticity.

Table VII.21 - INDGSP & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-2.54 E-04	(-0.865)	-4.78 E-04	(-1.519)	-1.97 E-04	(-0.716)	-3.90 E-04	(-1.245)
INDGSP	-1.650	(-0.356)	-0.216	(-0.045)	-1.491	(-0.299)	0.418	(0.080)
ROAD	1.030	(0.561)	1.886	(1.116)				
YROAD					4.79 E-05	(0.272)	1.46 E-04	(0.832)
DD	-1.81 E-04	(-0.091)	-2.63 E-03	(-1.173)	4.22 E-04	(0.267)	-1.90 E-03	(-0.921)
DELHI			5.731	(1.630)			5.589*	(1.653)
R2	0.088		0.123		0.084		0.116	
MSE	2.442		2.418		2.448		2.428	

* All standard errors were corrected for heteroscedasticity.

Table VII.22 - NONAGR & TR - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-2.88 E-04	(-1.059)	-3.42 E-04	(-1.219)	-3.01 E-04	(-1.104)	-3.24 E-04	(-1.172)
NONAGR	0.451	(0.176)	0.246	(0.095)	0.431	(0.177)	0.088	(0.035)
TR	0.263	(1.004)	-0.261	(-0.615)				
YTRM					9.21 E-05	(1.322)	2.77 E-05	(0.148)
DD	-1.10 E-04	(-0.149)	-3.51 E-04	(-0.403)	-1.33 E-03	(-0.873)	-8.40 E-04	(-0.373)
DELHI			6.588*	(1.670)			3.385	(0.422)
R2	0.090		0.109		0.105		0.107	
MSE	2.440		2.437		2.420		2.440	

* All standard errors were corrected for heteroscedasticity.

Table VII.23 - NONAGR & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-3.85 E-04	(-1.222)	-5.12 E-04	(-1.614)	-3.19 E-04	(-1.106)	-4.15 E-04	(-1.392)
NONAGR	1.862	(0.839)	0.703	(0.285)	1.973	(0.813)	1.043	(0.404)
ROAD	1.285	(0.688)	1.958	(1.143)				
YROAD					9.59 E-05	(0.508)	1.59 E-04	(0.936)
DD	-6.19 E-04	(-0.304)	-2.73 E-03	(-1.208)	-1.38 E-04	(-0.079)	-2.04 E-03	(-1.037)
DELHI			5.604	(1.575)			5.347	(1.633)
R2	0.090		0.123		0.087		0.117	
MSE	2.439		2.418		2.444		2.427	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

Tables VII.21 and VII.23 show the panel results with NONAGR and TR/ROAD. The results are also very poor and only DELHI appears as significant in Equation (2), Table VII.22.

VII.6.1.2 - PROX

a) INDGSP

Table VII.24 shows the panel results with the dependent variable GR and with INDGSP and PROX (or YPROXM) on the right-hand side.

Equation (1) includes Y, INDGSP, PROX and DD. Only DD is significant (+1.82) and shows an unexpected positive coefficient, which becomes negative (and not significant) when we control for DELHI (Equation (2)).

The replacing of PROX by YPROXM, in (3) and (4) does not alter the results.

Equation (3a) includes Y, INDGSP, PROXM, YPROXM and DD. The demeaned variable, PROXM, is negative and significant at the 1% level (-4.16), or economic growth was harmed by above average levels of transport availability. YPROXM was positive and significant at the 1% level (+3.46). These results imply a negative coefficient of PROXM for Y < 2914 (and a positive one if Y > 2914) The positive coefficient of YPROXM also indicates that concentration forces described by NEG models were affecting the regional economy of India.

Equation (4a) controls (3a) for DELHI, not generating any change in results.

Table VII.24 - INDGSP & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	-1.81 E-04	(-0.714)	-3.18 E-04	(-1.156)	-1.80 E-04	(-0.689)	-3.14 E-04	(-1.100)	-1.80 E-04	(-0.759)	-2.64 E-04	(-0.967)
INDGSP	-1,368	(-0.266)	-0,202	(-0.038)	-1.680	(-0.315)	-0,458	(-0.083)	-4,444	(-0.769)	-3,508	(-0.580)
PROX	-119665	(-0.571)	-138586	(-0.663)								
PROXM									-1967160***	(-4.162)	-1845909***	(-3.882)
YPROX					-8,354	(-0.111)	-18,580	(-0.241)	674.0746***	(3.455)	625.603***	(3.073)
DD	7.88 E-04*	(1.817)	-5.97 E-04	(-0.668)	7.82 E-04*	(1.835)	-5.59 E-04	(-0.643)	-6.25 E-05	(-0.127)	-8.51 E-04	(-1.308)
DELHI			4,799	(1.610)			4,695	(1.547)			2,942	(1.221)
R2	0,090		0,117		0,083		0,108		0,185		0,195	
MSE	2,439		2,426		2,449		2,438		2,331		2,340	

* All standard errors were corrected for heteroscedasticity.

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Table VII.25 - NONAGR & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	-2.69 E-04	(-1.025)	-3.27 E-04	(-1.241)	-2.73 E-04	(-1.008)	-3.31 E-04	(-1.211)	-2.63 E-04	(-1.085)	-3.10 E-04	(-1.243)
NONAGR	1,374	(0.641)	0,113	(0.046)	1,319	(0.605)	0,102	(0.042)	-0,885	(-0.387)	-1,781	(-0.711)
PROX	-128011,400	(-0.643)	-139559,300	(-0.709)								
PROXM									-1895178***	(-4.151)	-1815323***	(-4.177)
YPROXM					-13,779	(-0.197)	-19.62126	(-0.280)	643.116***	(3.739)	610.691***	(3.651)
DD	6.39 E-04*	(1.652)	-6.07 E-04	(-0.702)	6.45 E-04*	(1.690)	-5.77 E-04	(-0.681)	5.28 E-05	(0.110)	-9.15 E-04	(-1.430)
DELHI			4,791	(1.575)			4,720	(1.551)			3,834	(1.575)
R2	0,092		0,117		0,084		0,108		0,176		0,192	
MSE	2,437		2,426		2,448		2,438		2,343		2,343	

* All standard errors were corrected for heteroscedasticity.

b) NONAGR

Among Equations (1)-(4) in Table VII.25, only DD is significant in the equations that do not control for DELHI ((1) and (3)).

Equation (3a) includes Y, NONAGR, PROX, YPROXM and DD. Similarly to Table VII.23, PROXM is negative and significant (-4.15) and YPROXM is positive and significant at the 1% level (+3.74). Controlling for DELHI (4a) does not also affect the results.

The panel results for GRGSP (with TR and ROAD) did not assign any role for INDGSP and NONAGR in the process of economic growth.

Per capita income shows a negative coefficient, with t-statistics usually greater than one. In the cross-section results, per capita income, when significant, was positive.

Transport availability shows a positive relationship with growth, although not always showing t-statistics at least greater than one (TR has t-statistics greater than one without controlling for DELHI and the opposite occurs with ROAD).

The interaction terms, YTRM and YROADM, when showing t-statistics greater than one, have positive coefficients. We have obtained positive coefficients for the interaction term in the cross-section results. The main difference is that per capita income has shown a positive coefficient in the latter results. In the panel ones, the tendency to concentration of total income is diminished. The combination of a negative Y with a positive interaction term means that the higher growth rate of the poorest states decreases as transportation costs decrease.

Controlling for DELHI, there are signs of congestion effects. DELHI shows some significant and positive coefficients.

When using the PROX instead of TR/ROAD, per capita income, the share of industry in output, or the share of non-agricultural in output, show a zero coefficient. Similarly to the cross-section results, PROX is negative, although YPROXM is negative (in (3) and (4))) as well. But the coefficients of PROX and YPROXM are highly insignificant. The coefficients of the interaction term are positive and significant in the equations with the demeaned value for PROX (PROXM).

When DD is significant (without controlling for DELHI), it is positive, and DELHI shows t-statistics greater than one.

The panel results for Brazil (1970-1995 (18 states) were also showing a negative and usually significant coefficient for per capita income. They showed few signs of congestion effects.

The variables INDGSP and NONAGR also refuted the "backward and forward" hypothesis in the Brazilian exercises. INDGSP and NONAGR were negative, implying the higher growth rates were characteristics of agricultural states in the period 1970-1995.

TR and YTRM were highly insignificant for the cases of Brazil.

On the other hand, PROX and YPROXM showed higher t-statistics in the case of Brazil. While PROX was usually negative for India, it was usually positive for Brazil. YPROXM, when significant, is usually positive for India and negative for Brazil.

VII.6.2 - GRIND

VII.6.2.1 - TR and ROAD

a) INDGSP

Table VII.26 shows the following specifications: Equation (1) includes Y, INDGSP, TR, DD; Equation (2) controls Equation (1) for DELHI; Equation (3) includes Y, INDGSP, YTRM and DD; and Equation (4) also controls Equation (3) for DELHI. In all these specifications, the unique significant coefficient is of INDGSP, indicating that the higher industrial growth rate did not occur in the more industrialised states. Per capita income shows t-statistics higher than one and a positive coefficient.

Table VII.26 - INDGSP & TR - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	1.61 E-03	(1.261)	1.72 E-03	(1.299)	1.66 E-03	(1.303)	1.64 E-03	(1.202)
INDGSP	-34.789*	(-1.971)	-36.265*	(-1.983)	-36.218**	(-2.031)	-36.129*	(-1.979)
TR	-0.690	(-0.511)	-0.195	(-0.104)				
YTRM					-1.51 E-04	(-0.688)	-1.74 E-04	(-0.267)
DD	3.48 E-03	(0.551)	3.95 E-03	(0.606)	4.36 E-03	(0.715)	4.41 E-03	(0.699)
DELHI			-6.529	(-1.339)			1.385	(0.038)
R2	0.229		0.232		0.234		0.234	
MSE	5.324		5.392		5.307		5.387	

Table VII.27 - NONAGR & TR - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	1.06 E-03	(0.825)	1.05 E-03	(0.794)	1.05 E-03	(0.813)	9.22 E-04	(0.685)
NONAGR	-12.684	(-1.095)	-12.807	(-1.086)	-12.634	(-1.088)	-12.819	(-1.088)
TR	-0.331	(-0.237)	-0.502	(-0.257)				
YTRM					-4.40 E-05	(-0.196)	-2.57 E-04	(-0.381)
DD	3.70 E-03	(0.553)	3.58 E-03	(0.522)	3.38 E-03	(0.530)	3.88 E-03	(0.585)
DELHI			2.210	(0.127)			12.587	(0.335)
R2	0.170		0.170		0.170		0.172	
MSE	5.523		5.605		5.524		5.598	

Table VII.28 - INDGSP & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	1.21 E-03	(0.910)	1.43 E-03	(1.064)	1.55 E-03	(1.173)	1.61 E-03	(1.214)
INDGSP	-34.120*	(-1.944)	-38.658**	(-2.125)	-34.435*	(-1.928)	-37.187**	(-2.049)
ROAD	4.451	(0.559)	8.079	(0.916)				
YROAD					-2.86 E-04	(-0.200)	2.03 E-03	(0.701)
DD	-2.55 E-03	(-0.428)	1.78 E-04	(0.027)	1.68 E-03	(0.263)	1.26 E-03	(0.196)
DELHI			-13.056	(-0.962)			-22.909	(-0.920)
R2	0.230		0.251		0.224		0.243	
MSE	5.320		5.325		5.341		5.353	

Table VII.29 - NONAGR & ROAD - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	7.56 E-04	(0.560)	7.78 E-04	(0.568)	9.53 E-04	(0.724)	9.17 E-04	(0.688)
NONAGR	-13.223	(-1.145)	-12.934	(-1.102)	-12.957	(-1.118)	-12.475	(-1.060)
ROAD	4.596	(0.557)	5.790	(0.632)				
YROAD					2.73 E-04	(0.186)	1.52 E-03	(0.501)
DD	-7.91 E-04	(-0.124)	9.42 E-05	(0.013)	1.19 E-03	(0.179)	8.15 E-04	(0.120)
DELHI			-4.416	(-0.321)			-12.124	(-0.471)
R2	0.176		0.179		0.169		0.175	
MSE	5.502		5.576		5.525		5.589	

Table VII.28 shows the results for the same exercises replacing TR/YTRM/TRM for ROAD/YROADM/ROADM. The unique significant variable is again the negative INDGSP.

b) NONAGR

The exercises with NONAGR (Tables VII.27 and VII.29) do not show any significant coefficients. It is interesting to observe that the coefficients of NONAGR are negative and have t-statistics greater than one. The highly insignificant coefficients of per capita income showed a positive coefficient.

VII.6.2.2 - PROX

a) INDGSP

Equations (1)-(3a) of Table VII.30, similar to Tables VII.26 and VII.28, only show INDGSP as a significant variable.

Equation (4a) includes Y, INDGSP, PROXM, YPROXM, DD and DELHI. DELHI has a high t-statistic (-1.65). Y is positive and significant (+1.78) and INDGSP is negative and significant at the 1% level (-2.64). These results suggest that the higher industrial growth rates occurred in the richer and the less industrialised states.

PROXM is negative and significant at the 10% level, implying that states that were closer to markets grew less. YPROXM is positive and significant (+2.16) indicating that, on the other hand, in the case of the richest states, a higher proximity to markets speeds their industrial growth, since per capita income shows a positive and significant coefficient.

Table VII.30 - INDGSP & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	4a	t
Y	1.41 E-03	(1.133)	1.68 E-03	(1.272)	1.40 E-03	(1.134)	1.71 E-03	(1.313)	2.28 E-03*	(1.780)
INDGSP	33.969*	(-1.940)	-36.649**	(-2.022)	-34.518*	(-1.984)	-37.778**	(-2.100)	-47.059***	(-2.636)
PROX	317917	(0.664)	331090	(0.685)						
PROXM									-4885073*	(-1.989)
YPROXM					178	(0.970)	199	(1.066)	2067.626**	(2.162)
DD	4.57 E-04	(0.191)	3.69 E-03	(0.672)	2.21 E-04	(0.092)	4.03 E-03	(0.740)	6.74 E-03	(1.250)
DELHI			-8,100	(-0.656)			-9,630	(-0.780)	-22,141	(-1.654)
R2	0,233		0,243		0,244		0,258		0,339	
MSE	5,310		5,355		5,271		5,302		5,079	

b) NONAGR

Equations (1)-(4) (Table VII.31) do not show any significant coefficient.

Equation (3a) includes Y, NONAGR, PROXM, YPROXM and DD. NONAGR is negative and significant (-1.87), suggesting that the highest industrial growth was a characteristic of agricultural states. PROXM is negative and significant (-1.72), showing the lack of positive effects of transport availability on the industrial growth. In the case of the richer states, the higher the proximity of the richer markets, the higher the industrial growth rate, since YPROXM is positive and significant (+1.89). Equation (4a), that controls Equation (3a) for DELHI, shows similar results.

Table VII.31 - NONAGR & PROX - INDIA - 1961-1991 (20 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	9.65 E-04	(0.761)	9.88 E-04	(0.754)	9.83 E-04	(0.783)	1.03 E-03	(0.794)	1.35 E-03	(1.092)	1.73 E-03	(1.341)
NONAGR	-13,095	(-1.138)	-12,993	(-1.107)	-14,278	(-1.242)	-14,099	(-1.205)	-22.913*	(-1.869)	-24.346*	(-1.976)
PROX	327639	(0.661)	329262	(0.654)								
PROXM									-4221794*	(-1.719)	-5425966**	(-1.999)
YPROXM					192,961	(1.011)	197,431	(1.013)	1800.788*	(1.888)	2285.027**	(2.154)
DD	2.29 E-03	(0.740)	2.74 E-03	(0.477)	2.22 E-03	(0.723)	3.14 E-03	(0.549)	1.62 E-03	(0.539)	6.70 E-03	(1.666)
DELHI			-1,166	(-0.093)			-2,401	(-0.191)			-13,774	(-1.036)
R2	0,179		0,179		0,193		0,194		0,259		0,283	
MSE	5,492		5,574		5,446		5,525		5,296		5,290	

The panel results with GRIND have added some information about INDGSP and NONAGR. Both variables show negative coefficients (INDGSP is significant and NONAGR has t-statistics greater than one).

Y (when controlled by INDGSP) has a high t-statistic and shows a positive coefficient, similar to the cross-section results. Congestion effects and DELHI are not relevant to the explanation of the growth of industrial output.

The coefficients of the variables related to transportation cost show highly insignificant coefficients. While in the cross-section results TR/ROAD/PROX showed positive coefficients, here TR shows negative ones. And while in the cross-section results the interaction terms were positive, here again YTRM shows a negative coefficient (but not significant). The only significant coefficient for the interaction term appears in Equations (3a-4a) using YPROXM, where this variable shows clearly positive coefficients.

Again is important to say that the usage of regional dummies did not show changes in the main results.

The similarities with the case of Brazil were the negative impact of NONAGR and INDGSP on the industrial growth rate of the states, and the decrease in the importance of dummies and of the congestion effects.

Per capita income has shown a very different pattern. In Brazil, the poor states were observing a higher industrial growth rate.

In India, TR usually shows a negative coefficient, while in Brazil it usually shows a positive one (when controlling for INDGSP). PROX showed positive coefficients in Brazil and in India. YPROXM is positive in the cases where we used the demeaned value, for India. YPROXM was also positive for Brazil.

VII.7 - IND/NONROADM & IND/NONPROXM

a) INDGSP

Table VII.32 shows the results for INDGSP with INDROADM (INDGSP*ROADM) and INDPROXM (INDGSP*PROXM). We did not discuss the interaction terms with TR since we have data for only one period.

Equation (1) includes Y, INDGSP, INDROADM and DD. Equation (2) controls this specification for DELHI. There are no significant coefficients in these specifications.

Equation (2a) includes the significant demeaned variable ROADM. Per capita income is negative and significant (-2.36), ROADM is positive and significant (+2.54), suggesting that average levels of road extensions was enhancing economic growth. INDROADM is negative and significant (-2.24), implying that a decline in transportation cost was decreasing the coefficient of INDGSP. Congestion effects were also dispersing economic activity, as suggested by its negative and significant coefficient (-2.15).

Equation (4) includes Y, INDGSP, YPROXM and DD, while Equation (5) controls this specification for the special effects of DELHI. No significant coefficients were found, except the positive coefficient for DD in (4).

Equation (4a) includes the significant demeaned variable PROXM in specification (4). PROXM is negative and significant (-4.16), while INDPROXM is positive and significant (+3.46). Controlling for DELHI (Equation (5a)) does not generate different results.

Proximity to markets increases the coefficient of INDGSP, making economies of scale stronger in generating concentration of activities. This result is in accordance with the findings for YPROXM, which signalised that the states of India would be in a "core-periphery" stage.

Table VII.32 - INDROADM & INDPROXM - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - panel results

	1	t	2	t	2a	t	4	t	5	t	4a	t	5a	t
Y	-1.89 E-04	(-0.680)	-3.40 E-04	(-1.120)	-7.41 E-04**	(-2.357)	-1.80 E-04	(-0.689)	-3.14 E-04	(-1.100)	-1.80 E-04	(-0.759)	-2.64 E-04	(-0.967)
INDGSP	-1,609	(-0.326)	-0,188	(-0.038)	-6,269	(-0.985)	-1,680	(-0.315)	-0,458	(-0.083)	-4,444	(-0.769)	-3,508	(-0.580)
ROADM					9.923***	(2.535)								
INDROAM	0,752	(0.129)	2,085	(0.419)	-30.494**	(-2.243)								
PROXM											-1967160***	(-4.162)	-1845909***	(-3.882)
INDPROXM							-8,354	(-0.111)	-18,580	(-0.241)	674.075***	(3.455)	625.603***	(3.073)
DD	6.11 E-04	(0.410)	-1.04 E-03	(-0.612)	-4.36 E-03**	(-2.146)	7.82 E-04*	(1.835)	-5.59 E-04	(-0.643)	-6.25 E-05	(-0.127)	-8.51 E-04	(-1.308)
DELHI			4,732	(1.532)	8.082**	(2.383)			4,695	(1.547)			2,942	(1.221)
R2	0,083		0,108		0,167		0,083		0,108		0,185		0,195	
MSE	2,449		2,438		2,379		2,449		2,438		2,331		2,340	

* The standard erros were corrected for heteroscedasticity.

Table VII.32 - INDROADM & INDPROXM - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - panel results

	1	t	2	t	2a	t	4	t	5	t	4a	t	5a	t
Y	-1.89 E-04	(-0.680)	-3.40 E-04	(-1.120)	-7.41 E-04**	(-2.357)	-1.80 E-04	(-0.689)	-3.14 E-04	(-1.100)	-1.80 E-04	(-0.759)	-2.64 E-04	(-0.967)
INDGSP	-1,609	(-0.326)	-0,188	(-0.038)	-6,269	(-0.985)	-1,680	(-0.315)	-0,458	(-0.083)	-4,444	(-0.769)	-3,508	(-0.580)
ROADM					9.923***	(2.535)								
INDROAM	0,752	(0.129)	2,085	(0.419)	-30.494**	(-2.243)								
PROXM											-1967160***	(-4.162)	-1845909***	(-3.882)
INDPROXM							-8,354	(-0.111)	-18,580	(-0.241)	674.075***	(3.455)	625.603***	(3.073)
DD	6.11 E-04	(0.410)	-1.04 E-03	(-0.612)	-4.36 E-03**	(-2.146)	7.82 E-04*	(1.835)	-5.59 E-04	(-0.643)	-6.25 E-05	(-0.127)	-8.51 E-04	(-1.308)
DELHI			4,732	(1.532)	8.082**	(2.383)			4,695	(1.547)			2,942	(1.221)
R2	0,083		0,108		0,167		0,083		0,108		0,185		0,195	
MSE	2,449		2,438		2,379		2,449		2,438		2,331		2,340	

* The standard erros were corrected for heteroscedasticity.

Table VII.33 - NONROADM & NONPROXM - INDIA - 1961-1991 (20 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	3a	t	4a	t
Y	-3.53 E-04	(-1.191)	-4.20 E-04	(-1.399)	-2.73 E-04	(-1.008)	-3.31 E-04	(-1.211)	-2.63 E-04	(-1.085)	-3.10 E-04	(-1.243)
NONAGR	2,074	(0.915)	0,887	(0.352)	1,319	(0.605)	0,102	(0.042)	-0,885	(-0.387)	-1,781	(-0.711)
ROADM												
NONROADM	1,350	(0.674)	1,482	(0.892)								
PROXM									-1895178***	(-4.151)	-1815323***	(-4.177)
NONPROXM					-13,779	(-0.197)	-19,624	(-0.280)	643.116***	(3.739)	610.691***	(3.651)
DD	-6.33 E-04	(-0.301)	-2.00 E-03	(-0.992)	6.45 E-04*	(1.690)	-5.77 E-04	(-0.681)	5.28 E-05	(0.110)	-9.15 E-04	(-1.430)
DELHI			4,772	(1.503)			4,720	(1.551)			3,834	(1.575)
R2	0,090		0,115		0,084		0,108		0,176		0,192	
MSE	2,440		2,429		2,448		2,438		2,343		2,343	

* The standard erros were corrected for heteroscedasticity.

Table VII.34 - INDROADM & INDPROXM - INDIA -1961-1991 (20 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	1.46 E-03	(1.344)	1.63 E-03	(1.376)	1.36 E-03	(1.243)	1.66 E-03	(1.396)
INDGSP	-33.819*	(-1.733)	-35.577*	(-1.716)	-34.558*	(-1.751)	-37.875*	(-1.846)
INDROAM	0.177	(0.010)	37.950	(0.921)				
INDPROXM					3376413	(0.622)	4078194	(0.731)
DD	4.75 E-04	(0.197)	3.26 E-03	(0.935)	4.62 E-04	(0.306)	4.28 E-03	(1.274)
DELHI			-19.547	(-1.166)			-9.592	(-1.442)
R2	0.223		0.246		0.234		0.247	
MSE	5.344		5.343		5.307		5.340	

* The standard erros were corrected for heteroscedasticity.

Table VII.35 - NONROADM & NONPROXM - INDIA - 1961-1991 (20 states)

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	9.12 E-04	(1.095)	8.36 E-04	(0.936)	9.22 E-04	(1.037)	9.53 E-04	(1.080)
NONAGR	-12.918**	(-2.037)	-11.975*	(-1.772)	-13.201**	(-2.127)	-13.063**	(-2.012)
NONROADM	2.750	(0.510)	12.562	(0.939)				
NONPROXM					817060.600	(0.726)	829705.300	(0.729)
DD	6.05 E-04	(0.164)	4.52 E-05	(0.012)	2.22 E-03	(1.335)	2.83 E-03	(0.819)
DELHI			-14.299	(-0.780)			-1.615	(-0.239)
R2	0.170		0.179		0.180		0.181	
MSE	5.521		5.575		5.488		5.569	

* The standard erros were corrected for heteroscedasticity.

b) NONAGR

Table VII.33 displays the results with NONAGR. Equation (1) includes Y, NONAGR, NONROADM and DD and Equation (2) controls for DELHI. These equations do not show significant coefficients.

Equation (3) includes Y, NONAGR, YPROXM and DD. DD is negative and significant (+1.69). This effect vanishes with the introduction of DELHI in Equation (4).

Equation (3a) includes Y, NONAGR, PROXM, NONPROXM and DD. Differently from the other proxy, proximity to markets was associated with low economic growth rates, since PROXM is negative and significant (-4.15). The interaction term is positive and significant (+3.74), suggesting the negative coefficient of NONAGR tends to increase as transportation cost declines.

The results were run for GRIND, but only INDGSP shows a negative and significant coefficient (Tables VII.34 and VII.35).

VII.8 - Checking for changes in the sign of the interaction term

Tables A.1 to A.4 tries again to observe if the coefficient of the interaction term changes with time, or, alternatively, tries to identify if the economy is moving towards the phases of the "core-periphery" model. We have included, in the specifications with the interaction terms, the variable YEAR* interaction term in order to observe its coefficients. We repeated the exercise for YTRM, YROADM and YPROXSM and, as can be seen, none of the coefficients of these variables is significant. The same occurs for the panel results with the dependent variable GRIND.

TABLE A.1 - INDGSP & YROADM/YPROXM*YEAR - INDIA

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-3.06 E-04	(-1.001)	-3.83 E-04	(-1.207)	-1.62 E-04	(-0.632)	-3.01 E-04	(-1.092)
INDGSP	-1.062	(-0.212)	1.263	(0.208)	-1.978	(-0.400)	-0.781	(-0.148)
YROADM*	0.026	(1.092)	-0.037	(-0.592)				
YROADT	-1.32 E-05	(-1.092)	1.87 E-05	(0.594)				
YPROXM**					-7128.612	(-0.377)	-11024.960	(-0.539)
YPROXT					3.609	(0.377)	5.578	(0.539)
DD	-5.19 E-05	(-0.255)	-2.34 E-03	(-1.076)	7.47 E-04	(1.617)	-7.64 E-04	(-0.772)
DELHI			9.840	(1.193)			5.228	(1.609)
R2	0.096		0.122		0.087		0.117	
MSE	2.454		2.443		2.467		2.450	

* YROADT=YROADM*YEAR

**YPROXT=YPROXSHM * YEAR

*** All s.e. were corrected for heteroscedasticity

TABLE A.2 - NONAGR & YROADM/YPROXM*YEAR - INDIA

dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t
Y	-3.81 E-04	(-1.242)	-3.94 E-04	(-1.277)	-2.72 E-04	(-1.007)	-3.35 E-04	(-1.250)
NONAGR	1.259	(0.487)	1.414	(0.552)	1.571	(0.671)	0.345	(0.138)
YROADM*	0.025	(0.978)	-0.037	(-0.671)				
YROADT	-1.24 E-05	(-0.976)	1.87 E-05	(0.674)				
YPROXM**					-7421.730	(-0.364)	-10986.960	(-0.513)
YPROXT					3.754	(0.364)	5.557	(0.513)
DD	-8.26 E-04	(-0.393)	-2.44 E-03	(-1.289)	5.83 E-04	(1.290)	-7.99 E-04	(-0.844)
DELHI			9.412	(1.376)			5.223*	(1.668)
R2	0.097		0.123		0.088		0.117	
MSE	2.453		2.441		2.466		2.450	

* YROADT=YROADM*YEAR

**YPROXT=YPROXSHM * YEAR

*** All s.e. were corrected for heteroscedasticity

TABLE A.3 - INDGSP & YROADM/YPROXM*YEAR - INDIA

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	1.53 E-03	(1.322)	1.59 E-03	(1.257)	1.42 E-03	(1.339)	1.72 E-03	(1.476)
INDGSP	-32.974	(-1.473)	-35.380	(-1.500)	-34.644*	(-1.802)	-37.801*	(-1.881)
YROADM*	-0.067	(-0.418)	-0.085	(-0.555)				
YROADT	3.43 E-05	(0.416)	4.48 E-05	(0.570)				
YPROXM**					-13901	(-0.186)	-8110	(-0.107)
YPROXT					7.159	(0.189)	4.225	(0.110)
DD	-5.41 E-04**	(-2.036)	-1.66 E-03	(-0.277)	1.90 E-03	(0.121)	3.95 E-03	(1.203)
DELHI			-23.749	(-1.073)			-9.480	(-1.466)
R2	0.226		0.246		0.245		0.258	
MSE	5.415		5.425		5.348		5.383	

* YROADT=YROADM*YEAR

**YPROXT=YPROXSHM * YEAR

*** All s.e. were corrected for heteroscedasticity

TABLE A.4 - NONAGR & YROADM/YPROXM*YEAR - INDIA

dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t
Y	9.55 E-04	(1.127)	9.13 E-04	(0.996)	9.84 E-04	(1.102)	1.03 E-03	(1.164)
NONAGR	-11.567*	(-1.714)	-10.763	(-1.470)	-14.271**	(-2.133)	-14.112**	(-2.037)
YROADM*	-0.133	(0.923)	-0.153	(-1.102)				
YROADT	6.84 E-05	(0.925)	7.93 E-05	(1.115)				
YPROXM**					-327.244	(-0.004)	1174.747	(0.014)
YPROXT					0.264	(0.007)	-0.497	(-0.012)
DD	-3.23 E-03	(-0.523)	-4.39 E-03	(-0.754)	2.22 E-03	(1.264)	3.15 E-03	(0.842)
DELHI			-14.660	(-0.638)			-2.418	(-0.340)
R2	0.177		0.185		0.193		0.194	
MSE	5.582		5.641		5.528		5.611	

* YROADT=YROADM*YEAR

**YPROXT=YPROXSHM * YEAR

*** All s.e. were corrected for heteroscedasticity

VII.9- Tests of Restriction

As in Chapter VI, all specifications in Appendix 6 refuted the model.

Conclusion

The cross-section results for the Indian case were more informative than the panel ones.

The cross-section results, both with GR and GRIND, deny the importance of backward and forward linkages for the distribution of economic activity among the states of India. The variables relating to transportation cost behaved as in the second phase of the NEG models: having transport availability was positive for the growth of a state and the positive coefficient of the interaction terms was indicating that the lower the transportation cost, the higher the growth rate of the richer states.

Congestion seems to be more important in explaining the total income growth rate than the industrial growth rate.

The main difference between the cross-section and the panel results for GR seems to be the significance (with TR and ROAD) of a negative coefficient for per capita income. The panel results show much less significant coefficients than the cross-section ones.

In the panel results for GRIND we gained some information about NONAGR and INDGSP, but the results for the transportation cost variables were very poor. The overall picture is similar in both exercises.

Conclusion

The aim of this dissertation was to test if the theoretical inferences of the New Economic Geography were relevant to explaining the distribution of activity (or industrial activity) among the states of Brazil and India.

The empirical work was based on the models developed by Krugman (1991a), Krugman and Venables (1995) and Puga (1999). These models, when allowing also for congestion effects, predict that a decrease in transportation cost would lead, in a first moment, to a concentration of economic activities due to backwards and forwards linkages among firms (phase II). Further decrease in transportation costs would generate convergence of income among regions (phase III).

We are aware that our empirical specifications do not full recover the ´structural` parameters of the underlying theoretical models. This is a common problem in econometric testing. Moreover, the non-linear character of the NEG models imposes difficulties in finding such corresponding econometric specifications. We also could not contrast NEG ideas with other economic theories that try to explain economic growth (specially due to lack of data).

Dealing with non-linear models was not the only problem. In some respects, our empirical specifications are richer than the theoretical models. For example we distinguish between the per capita income and the share of industry of a region, two variables which are in effect equated in the theoretical models for reasons of tractability. This makes it difficult to recover point estimates of the theoretical models from our results. Even so, we are confident that we were able to evaluate the main inferences of the NEG ideas.

We tried to approximate the two phases of the K&V(m) model (the "core-periphery" phase and the convergence phase) through linear specifications. How we chose our econometric specifications to capture the inferences of the theoretical model and how we interpret our results are discussed in Chapter III. In the following Chapters, we applied the specifications for several samples for Brazil and India.

A representative and appropriate specification that can help us to report our conclusions is:

$$GR\ (\text{or } GRIND)_{i,T-To} = \alpha + \beta y_{0i} + \Omega INDGSP(\text{or } NONAGR)_{0i}$$
$$+ \phi(1/TCM)_{0i} + \sigma(YTCM)_{0i} + \Gamma dd_{0i} + \varepsilon_I$$

where:

$GR_{i,\,T-t0}$ = annual growth rate of total income in the period to-T;

$GRIND_{i,\,T-to}$ = annual industrial growth rate in the period t0-T;

y_0= per capita income in the beginning of the period;

$INDGSP_0$ = share of industrial income in total income in the beginning of the period;

$NONAGR_0$ = share of non-agricultural income in total income in the beginning of the period;

$(1/TCM_0)$ = proxy for the inverse of transportation cost in the beginning of the period;

$YTCM_0$ = interaction term (Yo*(1/TCM0);

dd_0 = population density in the beginning of the period.

As we also explained in Chapter III, Section III.4.2, entering transportation cost trough an interaction term may be the best representation of K&V(m), helping to identify the non-linear impact of lower transportation costs.

Since we do not have a predicted sign for (1/TC), we used (1/TCM) instead of (1/TC) and YTRM instead of YTC (Section III.4.2.2). If the coefficient of (1/TCM) was not significant, we omitted this variable.

This equation was tested for all samples and for the two countries, in Chapters IV-VII, in its basic form and adding regional dummies and dummies for especial cities (Sections III.6.1).

To test the NEG hypothesis that economies of scale, interacting with transportation costs, were affecting the distribution of activity, we had to:

a) refute the null hypothesis that the coefficients of INDGSP/NONAGR and of YTCM are not significant;

b) if significant, the coefficient of INDGSP(or NONAGR) must be positive, since it is reflecting the concentration effects of economies of scale.

With (a) and (b) satisfied, if the coefficient of YTCM is positive, we identified that the economy was in the core-periphery phase of the model; if negative, activity would be dispersing, leading to a convergence of income.

So, with our linear approximation we should be able to check if the variables related to the NEG were having some impact on the distribution of activity and to identify in which phase of the model the economy would be.

The dependent variable, income growth rate, would measure the changes in the economic weight of the states.

With this specification, we could also observe if congestion effects were affecting the economy and if poor states were changing their economic weight in the economy. In the latter case, the coefficient of per capita income would be equal to Y(a+b(1/TCM)). (b) would capture the effect of the NEG variables, while (a) would capture other effects.

We also tried to include dummy variables for regions and for outlier states, trying to control for omitted variable problems, especially when we did not have data to control for the causalities that could be affecting economic growth.

Our procedure during the chapters was to select the better specifications (with or without the dummies) through the smallest MSE, although we also comment on the whole set of equations. We also did test of restrictions for helping to select the "best model". The results of the test of restrictions are in Appendix 6 (the methodology of the test is explained in Chapter III, Section III.7).

The equation highlighted above usually correspond to Equations numbers (7/7a) or 8(8a) in the main tables discussed in the Chapters, since the dummies were usually significant. Equations (7) include regional dummies and SP; equations (8) only include regional dummies; equations (7a) and (8a) are similar to (7) and (8), except for including the variable (1/TCM), when the coefficient of this variable was significant. The above equation is also part of all equations in the test of restrictions (Appendix 6). The inclusion of dummies and of the variable (1/TCM) depended on the results of the F-tests.

For our conclusion, we will restrict the discussion to results that have followed from the test of restrictions, since we realised in Chapters IV to VI that the test of restrictions reinforced (but restricted) the conclusions that we have reached.

The equations that do not deny the model are again reproduced in Tables I and II.

Table I - Best Equations - F test - cross-section - 1950-1970

dependent variable: GR – Brazil

variables	Eq. 3 coef	t	Eq. 4 coef	t
Y	0.413	(0.22)	-2.934	(-2.50)
indgsp	0.152	(2.10)		
nonagr			0.106	(3.65)
dd	-0.067	(-1.43)	-0.034	(-2.901)
trm	-22.29	(-3.08)		
ytrm	25.82	(3.76)		
yproxm			250393	(2.83)
sp	-11.18	(-2.30)		
ne	-0.243	(-0.11)	-2.554	(-3.57)
se	0.45	(0.27)	-2.107	(-1.90)
co	2.689	(1.72)	1.643	(2.94)

Table II - Best Equations - F test - panel

dependent variable: GR - Brazil

variables	Eq. 10	1950-1995	Eq. 12	1950-1970
	coef	t	coef	t
y	-2.162	(-4.86)	-8.365	(-4.09)
nonagr	0.089	(2.70)	0.187	(3.09)
dd	0.007	(0.77)	0.054	(1.54)
trm	-5.538	(-1.73)	-20.2	(-2.36)
ytrm	1.905	(2.06)	10.849	(2.96)
sp	3.444	(2.11)	8.425	(2.12)
ne	-4.656	(-3.96)	-10.907	(-4.16)
se	-2.042	(-2.08)	-6.013	(-3.32)
co	0.812	(0.65)	-0.669	(-0.31)

There is evidence that, for the case of Brazil, during the whole period, 1950-1995 (Equation (10), Appendix 6)), and in the period 1950-1970 (Equation (12), Appendix 6), lower transportation cost was generating concentration of activities, in its interaction with economies of scale in the industrial and service sectors taken together. With the cross-section results, we found the same conclusion for the period 1950-1970 (Equations (3) and (4), Appendix 6), considering also economies of scale inside the industrial sector.

For the other period (1970-1995) and for India, the model is denied, since the coefficients of INDGSP and NONAGR are either not significant or negative. The interaction term would suggest that lower transportation costs were helping to concentrate economic activity and industrial activity in India, while dispersing economic activity in Brazil in the period 1970-1995 (with 24 states). But these results do not highlight the causalities that are interacting with the transportation cost.

The model is also denied for the growth rate of industrial output in Brazil, since the coefficient of the proxy for economies of scale is, when significant, negative. No information was given by the interaction term.

The acceptance of the model for the period 1950-1970 for Brazil does not come as a surprise. High investment in infrastructure was connecting the states of Brazil during this period, but the literature only considers that this country has an integrated market after 1970. So it is plausible to expect that we would be in phase II of the model, as the empirical results suggest. In a first moment of sharp decline in transportation costs, the action of this variable would be to concentrate activity in some regions, when interacting with economies of scale.

For the second moment of Brazilian history, we were expecting some signs of convergence among regions due to the economic forces of NEG. The lower levels of transportation cost and the evidence of convergence of per capita income that we have for Brazil, plus the existence of a dense economic structure, suggest the prediction that Brazil was at least approaching the third phase of the model. The model is denied for this period, although we have some evidence that transportation cost was, as expected, dispersing economic activity.

Although Brazil and India have some similarities, being both continental countries with high internal markets, some characteristics of these countries would lead us to infer that there would be some differences in the results of the model.

As we can see in Tables III-V, Brazil shows higher growth rates and higher shares of industry and non-agricultural activities than India. Brazil also has a much higher provision of transport (we are comparing Brazil - 1970-1995 and India - 1961-1991) and lower population density. The higher level of transportation cost for India would lead us to expect that this country would be lagging behind Brazil in terms of the effect of transportation cost. Since we were expecting that in the period 1970-1995 Brazil would be starting to experience convergence in total income, we would expect that India would be still in phase II, where lower transportation costs, interacting with economies of scale, generate a core-periphery pattern among the regional economies.

Table III - Brazil 1950-1970

Variable	Obs	Mean	Std. Dev.	Min	Max
grgsp	18	6.203742	1.553886	2.882076	9.761149
grind	18	8.05717	1.970743	4.230346	10.99407
y	18	.9040198	.6578335	.2604325	2.561753
indgsp	18	13.43814	7.015131	3.748764	27.88216
nonagr	18	57.02246	12.37362	36.55635	92.29662
dd	18	22.89722	24.43447	.42	107.95
trm	18	-7.76e-11	.1021309	-.1138214	.2686756
ytrm	18	.0445494	.1692792	-.0837445	.6508153
proxm	18	-1.58e-15	4.37e-06	-4.38e-06	9.19e-06
yproxm	18	2.30e-06	7.19e-06	-2.61e-06	.0000223

Table IV - Brazil 1970-1995

Variable	Obs	Mean	Std. Dev.	Min	Max
grgsp	18	5.18445	1.174646	2.596826	8.130785
grind	18	6.02612	2.282936	2.135991	10.07537
y	18	1.711617	1.278421	.5119101	5.192119
indgsp	18	19.22561	9.278527	6.937394	43.85303
nonagr	18	76.64516	10.19532	56.79758	98.17531
dd	18	39.53411	46.08802	1.265247	207.71
trm	18	-2.59e-11	.1907062	-.2978532	.3045369
ytrm	18	.1439922	.4913043	-.4747275	1.581192
proxm	18	6.26e-14	4.48e-06	-4.26e-06	.0000101
yproxm	18	4.62e-06	.0000147	-4.85e-06	.0000526

Table V - India 1961 - 1991

Variable	Obs	Mean	Std. Dev.	Min	Max
gr	20	.0424338	.0092296	.0304517	.0635644
grind	20	4.173507	2.232276	-2.403095	7.068053
y	20	2873.902	985.8689	1437.988	6235.413
indgsp	20	.118	.0579737	.056	.233
nonagr	20	.4657	.1318037	.325	.93
dd	20	236.484	378.6182	16.03	1772.67
trm	20	2.27e-08	2.327098	-1.116127	9.597794
ytrm	20	1719.862	13752.86	-2811.022	59846.2
roadm	20	-1.77e-09	.3953983	-.2264892	1.588913
yroadm	20	302.4157	2284.791	-569.0349	9907.525
proxm	20	-1.01e-14	1.78e-06	-2.83e-06	3.47e-06
yproxm	20	.000229	.0043906	-.0067153	.00817

Although Brazil shows more signs of development in the level of its economic variables, we can observe that it is a much more unequal country in terms of distribution of industry and services, and in terms of total income growth rates. Industrial growth rate and per capita income are unequally distributed in both countries (and population density shows higher standard deviation in India).

One possible interpretation is that, if Brazil was experiencing concentration of activity in the period 1950-1970, the portrait of this country should really be more unequal than the portrait of a country that would be still lagging behind Brazil in terms of the impact of NEG models. If India was in the core-periphery moment in the period 1961-1991, then its portrait after this period would show higher inequality, similarly to the case of Brazil.

Another possible interpretation for the failure of the model in the case of India would be that it would be still in phase I of the model, where transportation costs are so high (and economies of scale so low) that activities would not depend on transportation cost.

Let us now concentrate on the equations that showed some importance of NEG ideas to explain the growth rate of Brazil (Conclusion, Tables I and

II; or Chapter IV Table IV.39 and Chapter V, Table V.25).

It would be interesting to observe how the variables related to the NEG (trm, ytrm, proxm, yproxm, indgsp and nonagr) were improving the econometric specifications. It would also be interesting to observe the contribution of the dummies.

Table VI includes the following exercises: the second column of the table shows the F statistic for the null hypothesis that adding the NEG variables did not affect the explanatory power of the model.

F_{NEG} = {[residual sum of squares of the basic model (model1)/ residual sum of squares of the model that includes the NEG variables(model 2)]/number of variables added}/{residual sum of squares of the model that includes NEG variables (model 2)/ [number of observations-number of parameters]}.

The third column shows a similar F test, but for testing if the inclusion of the dummy variables changes the explanatory power of the model.

Fdummies ={[residual sum of squares of model 2/residual sum of squares of the model that also includes the dummies (model 3)]/number of dummies added}/{residual sum of squares of the model that includes the dummies (model 3)/[number of observations-number of parameters].

Column 4 calculates the percentage of the residual variance of the model with only NEG variables (model 5) with respect to the total variance of the basic model (VarNEG/VarT). Column 5 calculates the percentage of the residual variance of the model with dummies (and without NEG variables) - model 6 - over the total variance of the model (Var D/Var T). Column 6 calculates the percentage of the residual variance of the model that includes the NEG variables and the dummies - model 7 - (over the total variance) - var(NEG+D)/VarT).

So, Model 1 includes only y and dd as independent variables (and the time dummies in the case of panels). Model 2 includes y, dd, indgsp (nonagr), trm(proxm) (if significant), ytrm(yproxm). Model 3 adds SP (if significant) and the regional dummies to model 2. Model 4 includes only indgsp(nonagr), trm(proxm) (if significant), ytrm(yproxm). Model 5 includes only SP (if significant) and the regional dummies. Model 6 includes indgsp(nonagr), trm(proxm) (if significant), ytrm(yproxm), SP (if significant) and the regional dummies.

Column 1 makes the reference to the relevant equations discussed in Tables I and II.

For example, the first line of Table VI shows that in equation 3 we accept the null hypothesis that adding the NEG variables (indgsp, trm and ytrm) to the basic model (y, dd) did not improve the explanatory power of the model. On the other hand, including the dummy variables (sp, ne se co) did improve the model. Column 4 tells us that the residual variance of the model that includes only the NEG variables (indgsp, trm ytrm) represents 48% of the total variance of the model, while the residual variance of the model that adds only dummy variables (sp, ne, se, co) represents 37% of the total variance of the model. In other words, the percentage of the total variance of the model **not** explained by the inclusion of NEG variables is greater than the percentage of the total variance **not** explained by a model that would only include dummy variables. Column 6 shows that 73% of the variance is explained by a model that includes the dummy variables and the NEG variables.

As we can see in Table VI, in the cross-section results (Equations 3 and 4) we fail to attribute any importance to the variables related to the NEG, since we accepted the null hypothesis that the marginal contribution of the NEG variables was significant (Column 2). The test of marginal contribution says that only the dummies improved the specification (Column 3).

In the panel results (Equations 10 and 12), we only accepted that the NEG variables added significant marginal contribution to the models in the period 1950-1970 (eq. 12, and with a very high p-value)- Column 2. It is clear that the dummies were having a much higher impact than the NEG variables (Column 3).

Observing columns (4)-(6), for the cross-section results - Equations (3) and (4), a model with only NEG variables explains less of the total variance than a model with only dummy variables. Column (6) shows results more favourable to the NEG model. Column (6) tells us that, for Equation (3), only 27% of the total variance is not explained by the inclusion of our NEG variables and of the dummy variables. For Equation (4), 37% of the variance is not explained by the model with NEG variables and with dummies.

For the panel specifications, columns (4) and (5) do not show strong difference in the fraction of the total variance that is explained by the models only with NEG variables and by the model only with dummy variables. Column (6) shows that all these variables **explain** only 51% of the total variance, in the period 1950-1995. In the period 1950-170, the result is better: **74% of the variance is explained by the model that includes dummies and NEG variables.**

Table VI - Marginal Contribution of the Inclusion of the Variables and Test of Variance

Equation	FNEG*	Fdummies	VarNEG/VarT(%)**	VarD/VarT (%)***	Var(NEG+D)/VarT(%)****
3	1.37 acceptHo	4.14 rejectHo (p<0.05)	48	37	27
4	0.83 acceptHo	11.21 rejectHo (p<0.01)	57	37	37
10	0.58 acceptHo	8.73 rejectHo (p<0.01)	69	67	49
12	1.719 rejectHo (p<0.025)	7.17 rejectHo (p<0.01)	67	62	26

*F= {(RSSu – RSSr)/var included]/{RSSr/obs-par]

FNEG = variables included refer to NEG

Fdummies= dummies included

**residual variance from the inclusion of the NEG (in the basic model)variables over the variance of the total model

***residual variance from the inclusion dummies (in the basic model)variables over the variance of the total model

**** residual variance from the inclusion of NEG and dummy (in the basic model)variables over the variance of the total model

The restricted power of explanation of NEG was already perceived with the analysis of the total coefficient of the per capita income variable. Usually, when the NEG variables were predicting concentration of activities in richer areas, other variables, not explained by the model, were dispersing economic activity inside Brazil, and this was the dominant effect for the majority of the states.

As already stated, we prefer to concentrate our attention on the panel models, since we have few observations for our cross-sections. We are also considering that the transition between steady-states would be faster for the NEG variables. Using a cross-section exercise, we are expecting that the variables in the beginning of the period would still be impacting on the growth rate over a long period of time. Using (five-year intervals period) panel, we were implicitly hypothesising that the full impact of the levels of the variables in the beginning of the period would be exhausted after five years of growth. The values of the independent variables at the beginning of each sub-period are probably changing due to endogenous and to exogenous forces. We consider it better to "update" these values for each sub-period aiming to capture the impact of these changes on growth, especially because we knew that there were strong interventions from the government. This difference between the two approaches may explain why there are changes in the signs of parameters. The panel approach also allows us to control for variables that are affecting the whole country (like inflation rates and interest rates), since we are controlling for time dummies.

For example, in the cross-section results, we have observed that INDGSP appears as significantly affecting the growth rate in the period 1950-1970. This effect disappears in the panel for the same period. The original distribution of industrial activity would generate concentration of activities over the period 1950-1970, but changes in this distribution affected the results, helping to disperse income.

Despite the limitations of the methodology and data, we could observe that lower transportation costs generated concentration of economic activity among the states of Brazil, especially in the period 1950-1970. This result is interesting to contrast with the idea that it is helpful, for equality reasons, to increase the availability of transports in all geographical areas of Brazil. According to the model, if transportation costs were very low, the economy would tend to show convergence of income and so the correct policy would be always to further decrease transportation cost. If this is true, the government should be aware of the existence of the "core-periphery" phase, especially because it seems to take a long period (for example, we found that we would still be in the "early" stage of the core-periphery phase in Chapter V, using

NONAGR). Compensation measures should be used at this moment. This is even more serious if the economic regions of the country are very asymmetrical (as the Brazilian ones were).

Another concern is about the probability of occurrence the third phase. The requirements of symmetry (or congestion effects) among the states are very strong, raising some doubts about the real possibility of the occurrence of the symmetrical equilibrium, in the case of developing countries. Neary (2001) also observes that there is an implicit optimal amount (from the point of view of the variables of the model **only**) of transports predicted by the model. Alternatively, governments could intervene in the sense of making changes not only in transportation cost but in the level of expenditure, in the structure of the markets, the size of the industrial sector and facilitating migration.

For Diniz (1995), for example, the increase in availability of transport would help the process of re-concentration of activities that is going on, recently, in Brazil (he considers alternative policies that could help the other states). He is assuming that lower transportation costs could generate concentration, and his ideas raise another question: would a core-periphery situation be better for the dynamics of the whole country? Would this be desirable? If concentration is more dynamic, which compensatory policies should be taken?

As we saw, the failure of the model in the period 1970-1995 can be attributed to the high intervention of the government. Was the government right to have intervened? It may be so, since to wait for the market forces to achieve a phase of dispersion would involve difficult choice in terms of intergeneration effects. But it is clear that the intervention did not generate sustainable results, since descriptive statistics are showing that activities are concentrating again (Lavinas *et al.*, 1997), which may open new areas of investigation of which combination of market integration and other policies should be implemented. Interestingly, the option of the Brazilian government was both to decrease transportation cost and to establish public firms in the less developed areas, also helping to finance activities in these areas, which is a way of changing the structure of the economies of scale, propensity to consume and to invest in the areas. Even working with several possible suggestions of economic policies implicit in the

NEG models, the success of the Brazilian government was restricted.

The fact that NONAGR (rather than INDGSP) was the variable whose coefficient tended to be more consistent with NEG predictions calls for another comment. Two kind of services should be analysed: older types of services that are complementary to industrial activity, and the provision of more modern services. Since we found that the coefficient of NONAGR was more important to explain the growth of income in the period 1950-1970, than in the period 1970-1995, we should infer that it was the complementary services that played a role in concentrating activities. Since industrial activity was not significantly affecting the distribution of activities in the period, it may be that these services were implemented with some time lag after the maturation of the industries. On the other hand, recent studies (Lavinas *et al.*, 1997) are showing the importance of the modern service sector to shape economic activity in Brazil.

It is also important to bear in mind the concentration impact of urbanisation that we have found for the case of Brazil. This implies that encouraging a more even distribution of cities would help to generate equality of activities in

Brazil. On the other hand, a more even distribution of cities would decrease the positive effects on growth of economies of agglomeration. It is interesting to remember that we found concentration effects for the rate of urbanisation, even when population density (DD) was generating dispersion of activities. We found also that the coefficient of DD was more important for the second period of the Brazilian history. These findings suggest that other economies of agglomeration may be very important to explain the concentration of activities.

Finally, the high importance of the dummies, which were a proxy for frontier activities and government subsidies (N, CO) should call attention to the possibility of still having marginal growth in these areas. The failure of the incentives for the NE calls for an assessment of the differences in the offer of subsidies among the regions and of the other reasons that make this area lag behind the other areas of Brazil.

The directions of the research should be:

a) working with more recent periods (from 1970 onwards for the case of Brazil), since we have more availability of data related to alternative views of economic growth. It would also be interesting to analyse periods after 1970, where the heterodox approach challenges the utility of backwards and forward linkages in the set up of the assumed new technological paradigm;

b) to test the model with data from different types of manufacturing and services, to observe if NEG has impact only on specific types of activities. It would be particularly interesting to test NEG ideas for the activities that are associated with the "new paradigm", again wishing to debate with the heterodox view;

c) working both with per capita income and with migration as dependent variables;

d) to follow the lines of the literature on specific types of activities summarised in Chapter 3.

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Appendix 1 - DATA FOR BRAZIL

Table 1 - Dataset - BRAZIL - 1950-1995 (18 states)

State	Year	gr	grind	y*	lndgsp	nonagr	dd	tr**	trm	ytrm	prox***	proxm	yproxm	lndtrm	nontrm	lndproxm	nonproxm
1	1950	8.488	14.933	0.309	8.629	53.493	4.880	0.008	-0.113	-0.035	4.622	-4.376	-1.354	-0.978	-234.067	-37.758	-234.067
2	1950	3.269	11.115	0.260	3.749	52.888	4.170	0.027	-0.094	-0.024	5.216	-3.782	-0.985	-0.351	-200.002	-14.176	-200.002
3	1950	0.121	7.089	0.499	6.256	50.559	18.360	0.054	-0.067	-0.034	4.751	-4.247	-2.118	-0.421	-214.701	-26.565	-214.701
4	1950	0.957	0.251	0.593	8.921	49.685	18.260	0.116	-0.005	-0.003	4.915	-4.083	-2.421	-0.040	-202.874	-36.428	-202.874
5	1950	0.993	-1.169	0.549	10.888	45.833	30.390	0.180	0.059	0.033	5.165	-3.832	-2.105	0.648	-175.656	-41.727	-175.656
6	1950	2.846	2.375	0.722	20.422	69.117	34.550	0.135	0.014	0.010	5.385	-3.613	-2.610	0.295	-249.719	-73.785	-249.719
7	1950	2.453	4.675	0.492	18.085	55.981	39.530	0.099	-0.022	-0.011	5.910	-3.088	-1.519	-0.390	-172.887	-55.851	-172.887
8	1950	4.504	1.507	0.479	18.561	64.085	29.300	0.094	-0.027	-0.013	6.521	-2.477	-1.188	-0.501	-158.756	-45.981	-158.756
9	1950	6.869	12.464	0.494	8.700	56.580	8.630	0.041	-0.080	-0.039	7.594	-1.404	-0.693	-0.694	-79.428	-12.214	-79.428
10	1950	6.320	4.455	0.857	13.250	52.231	13.360	0.075	-0.046	-0.040	14.960	5.962	5.112	-0.613	311.395	78.997	311.395
11	1950	4.911	0.275	0.864	7.100	49.670	20.990	0.213	0.092	0.079	11.982	2.984	2.578	0.653	148.236	21.189	148.236
12	1950	5.762	7.338	2.562	23.159	92.297	107.950	0.207	0.086	0.221	16.542	7.544	19.327	1.996	696.313	174.719	696.313
13	1950	7.619	9.992	2.422	27.882	74.129	36.930	0.390	0.269	0.651	18.185	9.187	22.253	7.491	681.005	256.146	681.005
14	1950	10.153	6.346	1.477	13.362	48.394	10.630	0.139	0.018	0.027	13.003	4.005	5.913	0.240	193.807	53.511	193.807
15	1950	8.714	8.506	0.996	21.322	55.892	16.340	0.274	0.154	0.153	11.478	2.480	2.470	3.274	138.631	52.886	138.631
16	1950	8.341	7.012	1.309	18.203	63.640	15.570	0.108	-0.013	-0.016	8.589	-0.409	-0.535	-0.229	-26.007	-7.439	-26.007
17	1950	18.553	10.192	0.745	7.920	55.374	0.420	0.009	-0.112	-0.084	7.276	-1.722	-1.283	-0.890	-95.342	-13.637	-95.342
18	1950	11.888	2.434	0.642	5.476	36.556	1.890	0.007	-0.114	-0.073	9.868	0.870	0.558	-0.623	31.798	4.763	31.798
1	1955	13.852	12.197	0.372	11.327	53.328	6.094	0.015	-0.161	-0.060	4.501	-4.574	-1.703	-1.824	-243.920	-51.809	-243.920
2	1955	10.794	13.482	0.281	5.318	54.634	4.543	0.039	-0.137	-0.038	5.072	-4.003	-1.124	-0.729	-218.680	-21.286	-218.680
3	1955	13.804	13.258	0.454	8.614	59.876	20.302	0.093	-0.082	-0.037	4.588	-4.487	-2.036	-0.709	-268.654	-38.651	-268.654
4	1955	13.972	19.258	0.572	8.473	51.830	19.865	0.158	-0.017	-0.010	4.731	-4.344	-2.483	-0.146	-225.136	-36.805	-225.136
5	1955	13.417	13.164	0.534	9.612	47.560	32.841	0.196	0.020	0.011	4.968	-4.107	-2.193	0.197	-195.342	-39.478	-195.342
6	1955	9.920	6.372	0.757	19.633	73.197	37.943	0.178	0.002	0.002	5.177	-3.898	-2.950	0.040	-285.313	-76.525	-285.313
7	1955	11.506	4.905	0.518	19.804	57.730	42.410	0.137	-0.038	-0.020	5.687	-3.388	-1.754	-0.760	-195.564	-67.087	-195.564
8	1955	10.689	3.773	0.553	15.786	60.644	31.655	0.163	-0.013	-0.007	6.287	-2.788	-1.542	-0.201	-169.075	-44.010	-169.075
9	1955	10.522	13.851	0.622	11.046	59.453	9.551	0.054	-0.122	-0.076	7.351	-1.724	-1.073	-1.342	-102.515	-19.047	-102.515
10	1955	7.411	10.328	1.046	11.931	57.293	14.883	0.104	-0.071	-0.074	15.021	5.946	6.218	-0.850	340.672	70.941	340.672
11	1955	5.221	5.434	0.993	5.571	51.599	23.217	0.299	0.123	0.122	11.849	2.774	2.754	0.687	143.153	15.456	143.153
12	1955	6.558	5.172	2.851	24.529	93.895	128.373	0.461	0.285	0.813	16.812	7.737	22.056	6.998	726.502	189.789	726.502
13	1955	7.234	10.561	2.953	30.587	76.411	43.733	0.429	0.253	0.747	19.258	10.183	30.069	7.738	778.104	311.474	778.104
14	1955	10.601	8.599	1.686	11.024	44.907	15.097	0.192	0.016	0.027	13.731	4.657	7.852	0.178	209.113	51.334	209.113
15	1955	7.571	6.874	1.298	20.774	52.641	19.037	0.335	0.159	0.206	12.037	2.962	3.844	3.304	155.928	61.534	155.928
16	1955	6.071	6.928	1.721	16.834	60.322	17.673	0.256	0.080	0.138	8.927	-0.148	-0.254	1.347	-8.915	-2.488	-8.915
17	1955	7.392	15.489	1.333	5.405	42.713	0.550	0.012	-0.163	-0.218	7.399	-1.676	-2.235	-0.882	-71.601	-9.060	-71.601
18	1955	7.045	19.737	0.897	3.464	33.927	2.373	0.041	-0.135	-0.121	9.951	0.877	0.786	-0.466	29.741	3.037	29.741

State	Year	gr	grind	y*	indgsp	nonagr	dd	tr**	trm	ytrm	prox***	proxm	yproxm	indtrm	nontrm	indproxm	nonproxm
1	1960	3.877	0.267	0.570	9.960	49.979	7.610	0.020	-0.165	-0.094	4.633	-4.327	-2.468	-1.644	-216.275	-43.100	-216.275
2	1960	8.056	3.886	0.430	5.672	52.939	4.950	0.083	-0.102	-0.044	5.221	-3.740	-1.609	-0.578	-197.981	-21.213	-197.981
3	1960	6.950	12.453	0.783	7.957	59.082	22.450	0.097	-0.087	-0.068	4.742	-4.218	-3.305	-0.695	-249.229	-33.564	-249.229
4	1960	4.857	4.155	1.010	10.056	52.978	21.610	0.175	-0.010	-0.010	4.893	-4.068	-4.110	-0.100	-215.506	-40.906	-215.506
5	1960	4.418	2.673	0.927	8.993	43.244	35.490	0.200	0.016	0.015	5.137	-3.823	-3.545	0.142	-165.332	-34.382	-165.332
6	1960	5.827	3.621	1.106	15.764	69.798	41.670	0.177	-0.008	-0.009	5.352	-3.608	-3.991	-0.121	-251.860	-56.885	-251.860
7	1960	4.182	4.363	0.832	13.810	50.331	45.500	0.200	0.016	0.013	5.872	-3.088	-2.569	0.219	-155.434	-42.647	-155.434
8	1960	5.465	2.990	0.851	10.817	57.256	34.200	0.183	-0.002	-0.002	6.480	-2.480	-2.110	-0.019	-141.989	-26.825	-141.989
9	1960	3.677	-2.581	0.927	12.123	60.219	10.570	0.060	-0.124	-0.115	7.546	-1.414	-1.311	-1.507	-85.166	-17.145	-85.166
10	1960	4.848	1.837	1.342	12.906	61.633	16.580	0.097	-0.088	-0.118	14.680	5.720	7.676	-1.133	352.528	73.819	352.528
11	1960	6.096	11.132	1.157	5.324	58.238	25.680	0.334	0.150	0.173	11.736	2.775	3.212	0.797	161.634	14.778	161.634
12	1960	3.539	4.140	3.293	21.737	93.799	152.660	0.466	0.282	0.928	16.075	7.115	23.429	6.124	667.335	154.647	667.335
13	1960	3.949	4.012	3.536	33.716	81.749	51.790	0.348	0.163	0.577	18.144	9.184	32.471	5.503	750.794	309.653	750.794
14	1960	4.574	5.571	1.965	9.520	45.053	21.440	0.252	0.068	0.133	13.211	4.251	8.353	0.644	191.527	40.469	191.527
15	1960	1.061	-4.520	1.605	19.026	56.101	22.180	0.339	0.154	0.248	11.593	2.632	4.224	2.935	147.679	50.084	147.679
16	1960	4.666	2.713	2.036	16.581	64.437	20.060	0.212	0.027	0.056	8.671	-0.289	-0.588	0.456	-18.625	-4.793	-18.625
17	1960	8.059	0.108	1.455	7.354	52.008	0.720	0.020	-0.164	-0.239	7.374	-1.586	-2.307	-1.208	-82.490	-11.665	-82.490
18	1960	11.233	8.814	1.004	5.739	42.900	2.980	0.059	-0.126	-0.126	9.925	0.965	0.969	-0.722	41.405	5.539	41.405

State	Year	gr	grind	y	indgsp	nonagr	dd	tr	trm	ytrm	prox	proxm	yproxm	indtrm	nontrm	indproxm	nonproxm
1	1965	1.953	-0.288	0.635	8.322	48.310	8.272	0.077	-0.170	-0.108	4.643	-4.192	-2.660	-1.418	-202.495	-34.882	-202.495
2	1965	1.681	7.589	0.546	4.646	49.937	5.742	0.086	-0.161	-0.088	5.231	-3.604	-1.969	-0.749	-179.990	-16.747	-179.990
3	1965	-1.318	6.219	0.951	10.197	58.971	25.882	0.097	-0.150	-0.143	4.755	-4.080	-3.879	-1.530	-240.587	-41.602	-240.587
4	1965	-3.182	5.416	1.103	9.697	52.099	25.084	0.183	-0.064	-0.070	4.903	-3.932	-4.338	-0.618	-204.846	-38.126	-204.846
5	1965	-6.328	2.782	1.056	8.243	43.286	38.673	0.407	0.160	0.169	5.147	-3.688	-3.896	1.318	-159.642	-30.401	-159.642
6	1965	2.406	9.135	1.311	14.149	68.636	46.653	0.181	-0.066	-0.086	5.361	-3.474	-4.554	-0.933	-238.422	-49.150	-238.422
7	1965	4.169	5.715	0.913	13.891	48.868	50.885	0.183	-0.064	-0.058	5.878	-2.957	-2.699	-0.885	-144.516	-41.078	-144.516
8	1965	3.836	23.481	1.015	9.579	56.370	37.395	0.183	-0.064	-0.065	6.482	-2.353	-2.389	-0.610	-132.637	-22.539	-132.637
9	1965	5.985	21.675	0.992	8.855	60.235	11.828	0.127	-0.120	-0.119	7.533	-1.302	-1.292	-1.064	-78.409	-11.527	-78.409
10	1965	3.159	18.830	1.566	11.125	64.700	18.000	0.236	-0.011	-0.017	14.443	5.608	8.784	-0.121	362.861	62.393	362.861
11	1965	8.345	21.121	1.339	6.695	62.484	29.830	0.315	0.068	0.091	11.570	2.735	3.664	0.454	170.914	18.313	170.914
12	1965	8.236	10.647	3.382	22.313	93.294	176.879	0.455	0.208	0.704	15.609	6.774	22.911	4.647	631.987	151.149	631.987
13	1965	10.790	14.030	3.653	33.723	81.887	60.828	0.738	0.491	1.795	17.534	8.699	31.781	16.569	712.316	293.349	712.316
14	1965	3.853	12.725	1.931	9.954	49.066	27.289	0.358	0.111	0.214	12.886	4.051	7.821	1.105	198.757	40.323	198.757
15	1965	11.854	27.128	1.444	14.282	58.117	25.975	0.343	0.096	0.139	11.304	2.469	3.567	1.370	143.517	35.268	143.517
16	1965	6.837	12.978	2.355	15.049	62.567	21.781	0.398	0.151	0.355	8.516	-0.319	-0.751	2.265	-19.963	-4.802	-19.963
17	1965	5.498	15.758	1.617	5.005	50.061	0.954	0.021	-0.226	-0.365	7.340	-1.495	-2.418	-1.130	-74.860	-7.484	-74.860
18	1965	2.396	12.451	1.354	5.128	39.439	3.761	0.058	-0.189	-0.256	9.894	1.059	1.434	-0.970	41.766	5.430	41.766
1	1970	7.438	8.618	0.643	8.384	56.798	9.220	0.106	-0.236	-0.152	4.679	-4.960	-3.190	-1.979	-281.713	-41.583	-281.713
2	1970	9.522	14.005	0.512	6.937	68.359	6.700	0.131	-0.211	-0.108	5.269	-4.370	-2.237	-1.462	-298.705	-30.314	-298.705
3	1970	7.693	10.945	0.772	16.587	80.994	29.710	0.380	0.038	0.029	4.754	-4.884	-3.770	0.630	-395.573	-81.013	-395.573
4	1970	12.019	19.666	0.809	16.705	81.323	29.240	0.369	0.028	0.022	4.894	-4.744	-3.836	0.461	-385.808	-79.253	-385.808
5	1970	9.508	17.297	0.699	14.760	73.188	42.270	0.458	0.117	0.082	5.136	-4.502	-3.147	1.722	-329.493	-66.449	-329.493
6	1970	8.363	12.645	1.319	21.897	85.815	52.233	0.279	-0.063	-0.083	5.353	-4.285	-5.651	-1.375	-367.727	-93.831	-367.727
7	1970	8.305	10.872	1.001	16.834	71.455	57.430	0.346	0.004	0.004	5.886	-3.753	-3.757	0.067	-268.161	-63.178	-268.161
8	1970	8.342	10.177	1.121	25.648	78.674	40.950	0.327	-0.015	-0.017	6.512	-3.126	-3.504	-0.387	-245.945	-80.180	-245.945
9	1970	9.460	12.285	1.186	19.882	76.848	13.380	0.130	-0.211	-0.251	7.628	-2.011	-2.385	-4.201	-154.527	-39.980	-154.527
10	1970	10.493	10.327	1.686	25.402	82.044	19.720	0.273	-0.069	-0.115	15.802	6.163	10.388	-1.740	505.646	156.556	505.646
11	1970	7.360	17.728	1.721	13.161	79.228	35.080	0.403	0.061	0.105	12.407	2.768	4.765	0.802	219.334	36.434	219.334
12	1970	8.205	7.666	4.336	28.046	98.175	207.710	0.544	0.202	0.875	17.944	8.306	36.014	5.662	815.407	232.938	815.407
13	1970	10.442	10.623	5.192	43.853	94.277	71.860	0.646	0.305	1.581	21.523	11.884	61.704	13.355	1120.392	521.154	1120.392
14	1970	14.318	17.715	1.832	16.884	72.027	34.810	0.522	0.181	0.331	14.911	5.273	9.661	3.049	379.766	89.023	379.766
15	1970	11.213	16.180	2.159	30.492	74.826	30.380	0.638	0.296	0.639	12.957	3.318	7.166	9.029	248.300	101.185	248.300
16	1970	9.878	15.249	3.019	22.405	76.786	24.910	0.495	0.153	0.463	9.481	-0.157	-0.475	3.433	-12.072	-3.522	-12.072
17	1970	12.512	17.580	1.594	8.961	63.470	1.265	0.044	-0.298	-0.475	7.833	-1.806	-2.878	-2.669	-114.608	-16.181	-114.608
18	1970	10.180	-14.653	1.208	9.221	65.328	4.746	0.061	-0.281	-0.340	10.524	0.886	1.070	-2.593	57.853	8.166	57.853

State	Year	gr	grind	y*	indgsp	nonagr	dd	tr**	trm	ytrm	prox***	proxm	yproxm	indtrm	nontrm	indproxm	nonproxm
1	1975	10.375	25.915	0.797	9.665	57.827	10.382	0.137	-0.318	-0.254	4.651	-5.056	-4.031	-3.076	-292.354	-48.865	-292.354
2	1975	8.181	23.791	0.715	9.255	69.212	7.514	0.185	-0.270	-0.193	5.235	-4.472	-3.198	-2.497	-309.496	-41.385	-309.496
3	1975	11.040	15.250	1.016	21.011	79.303	32.837	0.476	0.021	0.021	4.716	-4.991	-5.071	0.438	-395.809	-104.869	-395.809
4	1975	8.918	12.853	1.289	25.370	79.439	32.205	0.543	0.088	0.113	4.851	-4.856	-6.262	2.230	-385.776	-123.201	-385.776
5	1975	5.918	6.070	1.021	22.717	72.283	45.423	0.663	0.208	0.212	5.088	-4.619	-4.718	4.719	-333.850	-104.920	-333.850
6	1975	5.879	5.672	1.807	29.014	87.636	56.951	0.394	-0.061	-0.111	5.301	-4.406	-7.962	-1.782	-386.089	-127.824	-386.089
7	1975	8.374	7.414	1.336	20.660	73.000	63.559	0.448	-0.007	-0.010	5.827	-3.879	-5.182	-0.154	-283.203	-80.150	-283.203
8	1975	6.662	2.486	1.488	30.450	82.729	45.986	0.414	-0.042	-0.062	6.448	-3.259	-4.847	-1.266	-269.579	-99.224	-269.579
9	1975	10.641	16.844	1.661	24.652	79.456	14.853	0.155	-0.300	-0.498	7.555	-2.152	-3.574	-7.391	-170.976	-53.047	-170.976
10	1975	9.591	14.048	2.573	27.521	82.866	21.080	0.354	-0.101	-0.259	15.817	6.111	15.724	-2.772	506.351	168.168	506.351
11	1975	14.869	22.320	2.184	22.779	80.099	38.962	0.571	0.116	0.254	12.328	2.621	5.723	2.648	209.951	59.706	209.951
12	1975	4.907	5.351	5.742	29.860	98.280	229.568	0.610	0.155	0.889	17.933	8.226	47.233	4.626	808.474	245.634	808.474
13	1975	5.899	4.122	7.188	48.263	95.370	84.798	0.842	0.387	2.783	22.133	12.426	89.315	18.684	1185.046	599.710	1185.046
14	1975	4.441	11.874	3.411	21.336	69.717	36.428	0.668	0.212	0.725	15.389	5.683	19.385	4.532	396.168	121.245	396.168
15	1975	10.547	11.533	3.286	41.411	79.223	34.006	0.915	0.460	1.512	13.281	3.574	11.746	19.053	283.155	148.010	283.155
16	1975	5.650	6.904	4.479	31.048	80.346	25.530	0.578	0.123	0.550	9.660	-0.047	-0.212	3.813	-3.796	-1.467	-3.796
17	1975	14.587	19.507	2.295	12.193	67.555	1.584	0.076	-0.379	-0.870	7.919	-1.788	-4.103	-4.624	-120.758	-21.795	-120.758
18	1975	11.651	66.498	1.712	2.807	62.550	5.437	0.163	-0.292	-0.500	10.590	0.883	1.512	-0.819	55.257	2.480	55.257

State	Year	gr	grind	y	indgsp	nonagr	dd	tr	trm	ytrm	prox	proxm	yproxm	indtrm	nontrm	indproxm	nonproxm
1	1980	2.870	11.541	1.131	21.667	68.267	12.310	0.145	-0.249	-0.282	4.797	-4.913	-5.558	-5.405	-335.417	-106.455	-335.417
2	1980	3.525	3.556	0.939	21.067	77.130	8.520	0.181	-0.214	-0.201	5.401	-4.309	-4.047	-4.503	-332.384	-90.787	-332.384
3	1980	1.699	0.860	1.559	29.362	84.637	36.020	0.290	-0.105	-0.163	4.868	-4.842	-7.547	-3.074	-409.843	-142.182	-409.843
4	1980	7.691	12.022	1.787	35.150	87.426	35.800	0.476	0.081	0.146	5.002	-4.708	-8.413	2.863	-411.606	-165.487	-411.606
5	1980	2.335	-0.969	1.263	26.546	82.272	49.140	0.493	0.099	0.125	5.246	-4.464	-5.639	2.621	-367.268	-118.503	-367.268
6	1980	0.928	-0.606	2.206	33.334	88.980	62.095	0.377	-0.018	-0.040	5.466	-4.245	-9.362	-0.599	-377.676	-141.488	-377.676
7	1980	3.501	5.932	1.788	22.927	76.439	71.700	0.397	0.002	0.004	6.011	-3.699	-6.613	0.052	-282.736	-84.803	-282.736
8	1980	13.640	24.145	1.826	28.933	82.620	51.840	0.327	-0.068	-0.124	6.657	-3.053	-5.575	-1.957	-252.240	-88.333	-252.240
9	1980	4.806	5.616	2.454	37.570	83.725	16.880	0.193	-0.201	-0.493	7.806	-1.905	-4.673	-7.556	-159.467	-71.558	-159.467
10	1980	1.314	-0.713	3.771	38.974	82.255	22.960	0.376	-0.018	-0.069	15.966	6.256	23.588	-0.711	514.554	243.804	514.554
11	1980	4.125	1.190	3.884	36.186	85.324	44.370	0.567	0.173	0.670	12.493	2.783	10.807	6.242	237.434	100.697	237.434
12	1980	-1.970	-0.283	6.513	35.383	98.526	260.740	0.493	0.098	0.640	17.570	7.859	51.191	3.476	774.364	278.091	774.364
13	1980	0.477	-1.623	8.066	51.453	96.137	101.250	0.661	0.266	2.149	21.177	11.467	92.485	13.712	1102.369	590.000	1102.369
14	1980	3.225	1.022	4.042	34.911	79.251	38.330	0.703	0.309	1.248	14.964	5.254	21.236	10.780	416.391	183.424	416.391
15	1980	2.501	-2.470	4.853	50.227	83.647	38.000	0.881	0.487	2.363	12.989	3.279	15.913	24.451	274.263	164.685	274.263
16	1980	1.090	-1.394	5.461	38.211	83.797	29.060	0.343	-0.051	-0.281	9.530	-0.180	-0.984	-1.963	-15.097	-6.884	-15.097
17	1980	3.793	4.307	3.622	17.455	63.007	1.983	0.055	-0.340	-1.230	8.043	-1.667	-6.038	-5.930	-105.042	-29.100	-105.042
18	1980	3.799	2.123	2.593	24.019	71.838	6.229	0.143	-0.251	-0.652	10.798	1.088	2.822	-6.037	78.176	26.138	78.176

State	Year	gr	grind	y*	indgsp	nonagr	dd	tr**	trm	ytrm	prox***	proxm	yproxm	indtrm	nontrm	indproxm	nonproxm
1	1985	5.963	2.257	1.178	40.692	80.910	13.260	0.164	-0.283	-0.333	4.864	-4.682	-5.516	-11.505	-378.858	-190.537	-378.858
2	1985	6.243	-4.610	1.021	26.440	78.448	9.273	0.202	-0.245	-0.250	5.480	-4.067	-4.151	-6.477	-319.027	-107.523	-319.027
3	1985	2.159	0.047	1.552	35.300	86.563	39.481	0.333	-0.114	-0.176	4.943	-4.604	-7.144	-4.014	-398.503	-162.506	-398.503
4	1985	0.948	-3.315	2.304	53.645	89.963	40.017	0.504	0.057	0.131	5.081	-4.465	-10.288	3.054	-401.708	-239.539	-401.708
5	1985	5.454	-1.330	1,324	28.230	78.606	52.415	0.594	0.147	0.195	5.328	-4.218	-5.586	4.155	-331.565	-119.075	-331.565
6	1985	1.703	-4.693	2.153	38.693	86.295	66.612	0.429	-0.019	-0.040	5.551	-3.996	-8.604	-0.718	-344.803	-154.604	-344.803
7	1985	7.855	16.404	1.893	32.265	73.399	79.619	0.482	0.035	0.067	6.106	-3.441	-6.515	1.133	-252.546	-111.016	-252.546
8	1985	-0.966	-6.163	3.036	56.413	88.572	58.951	0.418	-0.029	-0.089	6.763	-2.783	-8.450	-1.647	-246.525	-157.015	-246.525
9	1985	-2.214	-5.510	2.781	48.926	83.608	18.598	0.212	-0.235	-0.653	7.918	-1.629	-4.529	-11.489	-136.162	-79.680	-136.162
10	1985	2.008	4.208	3.726	44.144	81.201	24.563	0.395	-0.052	-0.195	15.550	6.004	22.373	-2.306	487.534	265.040	487.534
11	1985	-0.801	-4.367	4.208	39.306	79.520	49.487	0.649	0.202	0.851	12.298	2.751	11.578	7.948	218.777	108.139	218.777
12	1985	3.115	2.338	5.558	48.285	98.227	272.836	0.580	0.133	0.741	16.701	7.155	39.763	6.440	702.781	345.467	702.781
13	1985	1.065	-0.068	7.383	58.015	92.900	112.596	0.806	0.359	2.649	19.972	10.426	76.978	20.818	968.574	604.863	968.574
14	1985	1.114	5.092	4.517	39.273	74.391	40.066	0.723	0.276	1.246	14.509	4.962	22.414	10.836	369.133	194.876	369.133
15	1985	1.577	1.704	4.928	49.086	81.517	42.361	0.937	0.490	2.416	12.625	3.079	15.172	24.062	250.963	151.119	250.963
16	1985	0.219	-1.086	5.340	42.281	81.083	29.758	0.368	-0.079	-0.420	9.354	-0.192	-1.027	-3.326	-15.588	-8.129	-15.588
17	1985	4.095	-2.210	3.532	22.420	65.145	2.449	0.074	-0.373	-1.318	8.030	-1.516	-5.355	-8.368	-98.762	-33.990	-98.762
18	1985	2.465	0.869	2.773	27.745	72.317	7.019	0.175	-0.272	-0.753	10.762	1.216	3.371	-7.537	87.939	33.739	87.939
1	1990	-0.110	-5.842	1.438	29.057	85.081	14.514	0.162	-0.278	-0.400	4.988	-4.723	-6.790	-8.078	-401.829	-137.231	-401.829
2	1990	1.876	4.056	1.274	13.162	86.417	10.059	0.206	-0.234	-0.298	5.616	-4.095	-5.216	-3.074	-353.841	-53.893	-353.841
3	1990	4.556	5.848	1.594	27.131	90.795	42.779	0.337	-0.103	-0.164	5.063	-4.648	-7.407	-2.789	-421.978	-126.093	-421.978
4	1990	1.273	0.262	2.179	36.888	91.038	44.360	0.516	0.076	0.165	5.202	-4.509	-9.824	2.791	-410.465	-166.318	-410.465
5	1990	1.112	-0.607	1.622	17.273	87.377	55.824	0.599	0.159	0.258	5.454	-4.257	-6.903	2.745	-371.953	-73.530	-371.953
6	1990	1.016	0.436	2.196	23.857	89.431	71.066	0.429	-0.011	-0.025	5.680	-4.031	-8.853	-0.273	-360.503	-96.171	-360.503
7	1990	-0.811	-0.218	2.496	40.311	83.398	88.134	0.475	0.035	0.087	6.243	-3.468	-8.656	1.406	-289.191	-139.781	-289.191
8	1990	0.881	-6.313	2.580	36.759	89.939	66.090	0.425	-0.015	-0.037	6.905	-2.806	-7.238	-0.534	-252.332	-103.130	-252.332
9	1990	2.496	2.963	2.255	35.167	85.668	20.502	0.213	-0.227	-0.513	8.062	-1.649	-3.718	-7.993	-141.233	-57.977	-141.233
10	1990	3.628	4.583	3.835	41.905	88.272	26.362	0.404	-0.036	-0.138	15.867	6.156	23.608	-1.507	543.399	257.963	543.399
11	1990	3.767	5.031	3.632	27.925	85.947	55.081	0.662	0.222	0.807	12.524	2.813	10.217	6.204	241.779	78.556	241.779
12	1990	-0.932	-3.978	6.132	39.668	98.875	288.289	0.567	0.127	0.779	17.036	7.325	44.916	5.042	724.293	290.580	724.293
13	1990	4.068	3.593	7.048	46.785	95.432	124.374	0.807	0.367	2.585	20.141	10.430	73.509	17.161	995.372	487.979	995.372
14	1990	3.407	1.646	4.565	40.638	84.661	41.902	0.721	0.281	1.285	14.638	4.927	22.492	11.436	417.118	200.220	417.118
15	1990	1.075	-1.855	4.839	42.144	88.822	46.647	0.657	0.217	1.052	12.737	3.026	14.643	9.163	268.746	127.512	268.746
16	1990	2.627	0.866	5.032	33.787	87.703	31.924	0.455	0.016	0.078	9.441	-0.270	-1.360	0.524	-23.697	-9.129	-23.697
17	1990	6.124	12.750	3.635	13.996	75.177	2.909	0.107	-0.333	-1.210	8.202	-1.509	-5.486	-4.660	-113.464	-21.124	-113.464
18	1990	2.697	0.027	2.819	21.885	81.236	7.798	0.177	-0.263	-0.742	10.997	1.286	3.624	-5.765	104.465	28.143	104.465

* per capita income - 1995 US$ millions, TR - 1000km/kmsq, PROX - km

Table 2 - Dataset - BRAZIL - 1970-1995 (24 states)

state	year	gr	grind	y*	indgsp	nonagı	dd	tr**	ytrm
1	1970	12.71	14.56	2.139	12.57	78.44	0.46	0.01	-0.53
2	1970	-0.79	13.31	1.387	2.91	59.22	1.41	0.01	-0.35
3	1970	11.70	26.91	1.686	15.46	76.13	0.61	0.00	-0.43
4	1970	9.55	18.59	1.886	3.77	66.04	0.18	0.00	-0.48
5	1970	8.58	15.39	1.189	12.41	77.22	1.77	0.01	-0.29
6	1970	-3.16	-20.16	2.285	58.89	91.67	0.82	0.01	-0.57
7	1970	7.44	8.62	0.643	8.38	56.80	9.22	0.11	-0.10
8	1970	9.52	14.00	0.512	6.94	68.36	6.70	0.13	-0.07
9	1970	7.69	10.95	0.772	16.59	80.99	29.71	0.38	0.09
10	1970	12.02	19.67	0.809	16.71	81.32	29.24	0.37	0.09
11	1970	9.51	17.30	0.699	14.76	73.19	42.27	0.46	0.14
12	1970	8.36	12.65	1.319	21.90	85.81	52.23	0.28	0.03
13	1970	8.31	10.87	1.001	16.83	71.45	57.43	0.35	0.09
14	1970	8.34	10.18	1.121	25.65	78.67	40.95	0.33	0.08
15	1970	9.46	12.29	1.186	19.88	76.85	13.38	0.13	-0.15
16	1970	10.49	10.33	1.686	25.40	82.04	19.72	0.27	0.03
17	1970	7.36	17.73	1.721	13.16	79.23	35.08	0.40	0.25
18	1970	8.21	7.67	4.336	28.05	98.18	207.71	0.54	1.24
19	1970	10.44	10.62	5.192	43.85	94.28	71.86	0.65	2.02
20	1970	14.32	17.71	1.832	16.88	72.03	34.81	0.52	0.48
21	1970	11.21	16.18	2.159	30.49	74.83	30.38	0.64	0.82
22	1970	9.88	15.25	3.019	22.40	76.79	24.91	0.49	0.72
23	1970	12.51	17.58	1.594	8.96	63.47	1.27	0.04	-0.34
24	1970	10.18	-14.65	1.208	9.22	65.33	4.75	0.06	-0.24
1	1975	26.69	47.10	1.872	14.89	73.41	0.99	0.01	-0.63
2	1975	16.64	47.86	1.129	6.18	63.51	1.67	0.01	-0.38
3	1975	16.29	25.24	2.395	31.95	83.77	0.74	0.00	-0.82
4	1975	12.72	34.51	2.140	6.12	67.01	0.25	0.01	-0.72
5	1975	16.45	28.40	1.430	18.36	77.00	2.16	0.01	-0.47
6	1975	14.29	22.51	1.575	24.49	84.79	0.99	0.01	-0.52
7	1975	10.37	25.91	0.797	9.67	57.83	10.38	0.14	-0.16
8	1975	8.18	23.79	0.715	9.25	69.21	7.51	0.19	-0.11
9	1975	11.04	15.25	1.016	21.01	79.30	32.84	0.48	0.13
10	1975	8.92	12.85	1.289	25.37	79.44	32.21	0.54	0.26
11	1975	5.92	6.07	1.021	22.72	72.28	45.42	0.66	0.33
12	1975	5.88	5.67	1.807	29.01	87.64	56.95	0.39	0.09
13	1975	8.37	7.41	1.336	20.66	73.00	63.56	0.45	0.14
14	1975	6.66	2.49	1.488	30.45	82.73	45.99	0.41	0.10
15	1975	10.64	16.84	1.661	24.65	79.46	14.85	0.16	-0.31
16	1975	9.59	14.05	2.573	27.52	82.87	21.08	0.35	0.03
17	1975	14.87	22.32	2.184	22.78	80.10	38.96	0.57	0.50
18	1975	4.91	5.35	5.742	29.86	98.28	229.57	0.61	1.53
19	1975	5.90	4.12	7.188	48.26	95.37	84.80	0.84	3.58
20	1975	4.44	11.87	3.411	21.34	69.72	36.43	0.67	1.11
21	1975	10.55	11.53	3.286	41.41	79.22	34.01	0.92	1.88
22	1975	5.65	6.90	4.479	31.05	80.35	25.53	0.58	1.05
23	1975	14.59	19.51	2.295	12.19	67.56	1.58	0.08	-0.61
24	1975	11.65	66.50	1.712	2.81	62.55	5.44	0.16	-0.31

state	year	gr	grind	y	indgsp	nonagı	dd	tr	ytrm
1	1980	14.62	4.93	2.940	36.45	81.37	2.02	0.03	-0.78
2	1980	4.63	3.25	2.066	23.47	74.58	1.97	0.01	-0.59
3	1980	5.56	4.22	4.163	53.71	91.39	0.92	0.00	-1.23
4	1980	11.26	14.88	2.801	17.19	81.05	0.34	0.01	-0.82
5	1980	4.36	5.28	2.441	34.70	79.84	2.77	0.01	-0.70
6	1980	4.73	1.20	2.484	40.22	86.39	1.26	0.01	-0.72
7	1980	2.87	11.54	1.131	21.67	68.27	12.31	0.15	-0.17
8	1980	3.52	3.56	0.939	21.07	77.13	8.52	0.18	-0.11
9	1980	1.70	0.86	1.559	29.36	84.64	36.02	0.29	-0.01
10	1980	7.69	12.02	1.787	35.15	87.43	35.80	0.48	0.32
11	1980	2.34	-0.97	1.263	26.55	82.27	49.14	0.49	0.25
12	1980	0.93	-0.61	2.206	33.33	88.98	62.09	0.38	0.17
13	1980	3.50	5.93	1.788	22.93	76.44	71.70	0.40	0.17
14	1980	13.64	24.15	1.826	28.93	82.62	51.84	0.33	0.05
15	1980	4.81	5.62	2.454	37.57	83.72	16.88	0.19	-0.26
16	1980	1.31	-0.71	3.771	38.97	82.26	22.96	0.38	0.29
17	1980	4.12	1.19	3.884	36.19	85.32	44.37	0.57	1.04
18	1980	-1.97	-0.28	6.513	35.38	98.53	260.74	0.49	1.26
19	1980	0.48	-1.62	8.066	51.45	96.14	101.25	0.66	2.92
20	1980	3.23	1.02	4.042	34.91	79.25	38.33	0.70	1.63
21	1980	2.50	-2.47	4.853	50.23	83.65	38.00	0.88	2.83
22	1980	1.09	-1.39	5.461	38.21	83.80	29.06	0.34	0.24
23	1980	3.79	4.31	3.622	17.45	63.01	1.98	0.05	-0.88
24	1980	3.80	2.12	2.593	24.02	71.84	6.23	0.14	-0.40
1	1985	3.43	-16.12	3.650	29.38	80.54	3.28	0.04	-1.09
2	1985	10.02	3.48	2.204	27.52	83.38	2.31	0.01	-0.72
3	1985	2.76	-0.64	4.495	63.16	93.64	1.10	0.00	-1.51
4	1985	17.93	7.51	2.660	25.28	87.34	0.63	0.01	-0.87
5	1985	6.96	8.87	2.504	45.43	84.44	3.28	0.02	-0.81
6	1985	14.29	-3.11	2.415	42.46	93.57	1.58	0.02	-0.78
7	1985	5.96	2.26	1.178	40.69	80.91	13.26	0.16	-0.21
8	1985	6.24	-4.61	1.021	26.44	78.45	9.27	0.20	-0.14
9	1985	2.16	0.05	1.552	35.30	86.56	39.48	0.33	-0.01
10	1985	0.95	-3.31	2.304	53.65	89.96	40.02	0.50	0.38
11	1985	5.45	-1.33	1.324	28.23	78.61	52.42	0.59	0.34
12	1985	1.70	-4.69	2.153	38.69	86.29	66.61	0.43	0.19
13	1985	7.85	16.40	1.893	32.27	73.40	79.62	0.48	0.27
14	1985	-0.97	-6.16	3.036	56.41	88.57	58.95	0.42	0.24
15	1985	-2.21	-5.51	2.781	48.93	83.61	18.60	0.21	-0.35
16	1985	2.01	4.21	3.726	44.14	81.20	24.56	0.39	0.21
17	1985	-0.80	-4.37	4.208	39.31	79.52	49.49	0.65	1.30
18	1985	3.12	2.34	5.558	48.29	98.23	272.84	0.58	1.34
19	1985	1.07	-0.07	7.383	58.02	92.90	112.60	0.81	3.44
20	1985	1.11	5.09	4.517	39.27	74.39	40.07	0.72	1.73
21	1985	1.58	1.70	4.928	49.09	81.52	42.36	0.94	2.94
22	1985	0.22	-1.09	5.340	42.28	81.08	29.76	0.37	0.15
23	1985	4.09	-2.21	3.532	22.42	65.15	2.45	0.07	-0.94
24	1985	2.46	0.87	2.773	27.75	72.32	7.02	0.18	-0.46

state	year	gr	grind	y	indgsp	nonagı	dd	tr	ytrm
1	1990	6.66	0.32	3.160	8.79	85.80	4.48	0.04	-0.92
2	1990	5.64	1.56	3.097	17.28	91.71	2.65	0.01	-0.99
3	1990	0.05	-0.06	4.389	45.55	94.52	1.29	0.00	-1.45
4	1990	-0.88	9.84	4.225	13.58	93.70	0.91	0.01	-1.35
5	1990	1.84	-5.39	3.001	42.34	85.41	3.83	0.03	-0.92
6	1990	1.44	9.45	3.845	15.86	94.16	1.94	0.02	-1.22
7	1990	-0.11	-5.84	1.438	29.06	85.08	14.51	0.16	-0.25
8	1990	1.88	4.06	1.274	13.16	86.42	10.06	0.21	-0.16
9	1990	4.56	5.85	1.594	27.13	90.79	42.78	0.34	0.00
10	1990	1.27	0.26	2.179	36.89	91.04	44.36	0.52	0.39
11	1990	1.11	-0.61	1.622	17.27	87.38	55.82	0.60	0.43
12	1990	1.02	0.44	2.196	23.86	89.43	71.07	0.43	0.21
13	1990	-0.81	-0.22	2.496	40.31	83.40	88.13	0.47	0.35
14	1990	0.88	-6.31	2.580	36.76	89.94	66.09	0.43	0.23
15	1990	2.50	2.96	2.255	35.17	85.67	20.50	0.21	-0.28
16	1990	3.63	4.58	3.835	41.90	88.27	26.36	0.40	0.26
17	1990	3.77	5.03	3.632	27.92	85.95	55.08	0.66	1.19
18	1990	-0.93	-3.98	6.132	39.67	98.87	288.29	0.57	1.42
19	1990	4.07	3.59	7.048	46.79	95.43	124.37	0.81	3.32
20	1990	3.41	1.65	4.565	40.64	84.66	41.90	0.72	1.76
21	1990	1.08	-1.85	4.839	42.14	88.82	46.65	0.66	1.56
22	1990	2.63	0.87	5.032	33.79	87.70	31.92	0.46	0.61
23	1990	6.12	12.75	3.635	14.00	75.18	2.91	0.11	-0.83
24	1990	2.70	0.03	2.819	21.89	81.24	7.80	0.18	-0.45

* per capita income - 1995 US$ millions
** TR - 1000km/kmsq
*** PROX - km

Table 2 - Data Table 2 - Dataset - BRAZIL - 1970-1995 (24 states)

state	year	ytrm18	prox***	yprox	prox18	yprox18
1	1970		3.99E-06	-7.80E-06		
2	1970		3.61E-06	-5.58E-06		
3	1970		3.79E-06	-6.48E-06		
4	1970		3.13E-06	-8.49E-06		
5	1970		4.35E-06	-3.91E-06		
6	1970		3.98E-06	-8.35E-06		
7	1970	-0.15	4.64E-06	-1.93E-06	4.64E-06	-2.75E-06
8	1970	-0.11	5.20E-06	-1.25E-06	5.20E-06	-1.90E-06
9	1970	0.03	4.68E-06	-2.28E-06	4.68E-06	-3.27E-06
10	1970	0.02	4.79E-06	-2.30E-06	4.79E-06	-3.33E-06
11	1970	0.08	5.02E-06	-1.83E-06	5.02E-06	-2.72E-06
12	1970	-0.08	5.22E-06	-3.18E-06	5.22E-06	-4.86E-06
13	1970	0.00	5.73E-06	-1.91E-06	5.73E-06	-3.18E-06
14	1970	-0.02	6.33E-06	-1.47E-06	6.33E-06	-2.90E-06
15	1970	-0.25	7.37E-06	-3.13E-07	7.37E-06	-1.83E-06
16	1970	-0.12	1.46E-05	1.17E-05	1.46E-05	9.51E-06
17	1970	0.10	1.16E-05	6.77E-06	1.16E-05	4.58E-06
18	1970	0.88	1.62E-05	3.70E-05	1.62E-05	3.14E-05
19	1970	1.58	1.90E-05	5.92E-05	1.90E-05	5.26E-05
20	1970	0.33	1.36E-05	1.10E-05	1.36E-05	8.64E-06
21	1970	0.64	1.19E-05	9.21E-06	1.19E-05	6.46E-06
22	1970	0.46	8.87E-06	3.72E-06	8.87E-06	-1.31E-07
23	1970	-0.47	7.57E-06	-9.68E-08	7.57E-06	-2.13E-06
24	1970	-0.34	8.12E-06	5.81E-07	8.12E-06	-9.59E-07
1	1975		4.00E-06	-6.91E-06		
2	1975		3.63E-06	-4.59E-06		
3	1975		3.80E-06	-9.34E-06		
4	1975		3.13E-06	-9.76E-06		
5	1975		4.33E-06	-4.81E-06		
6	1975		3.97E-06	-5.86E-06		
7	1975	-0.25	4.61E-06	-2.46E-06	4.61E-06	-3.49E-06
8	1975	-0.19	5.17E-06	-1.80E-06	5.17E-06	-2.73E-06
9	1975	0.02	4.64E-06	-3.10E-06	4.64E-06	-4.41E-06
10	1975	0.11	4.75E-06	-3.79E-06	4.75E-06	-5.46E-06
11	1975	0.21	4.98E-06	-2.77E-06	4.98E-06	-4.10E-06
12	1975	-0.11	5.18E-06	-4.54E-06	5.18E-06	-6.88E-06
13	1975	-0.01	5.68E-06	-2.69E-06	5.68E-06	-4.42E-06
14	1975	-0.06	6.27E-06	-2.11E-06	6.27E-06	-4.04E-06
15	1975	-0.50	7.31E-06	-6.30E-07	7.31E-06	-2.78E-06
16	1975	-0.26	1.46E-05	1.78E-05	1.46E-05	1.45E-05
17	1975	0.25	1.15E-05	8.39E-06	1.15E-05	5.56E-06
18	1975	0.89	1.62E-05	4.90E-05	1.62E-05	4.16E-05
19	1975	2.78	1.96E-05	8.58E-05	1.96E-05	7.65E-05
20	1975	0.72	1.41E-05	2.18E-05	1.41E-05	1.74E-05
21	1975	1.51	1.22E-05	1.49E-05	1.22E-05	1.06E-05
22	1975	0.55	9.05E-06	6.08E-06	9.05E-06	2.83E-07
23	1975	-0.87	7.67E-06	-5.89E-08	7.67E-06	-3.03E-06
24	1975	-0.50	8.14E-06	7.61E-07	8.14E-06	-1.45E-06

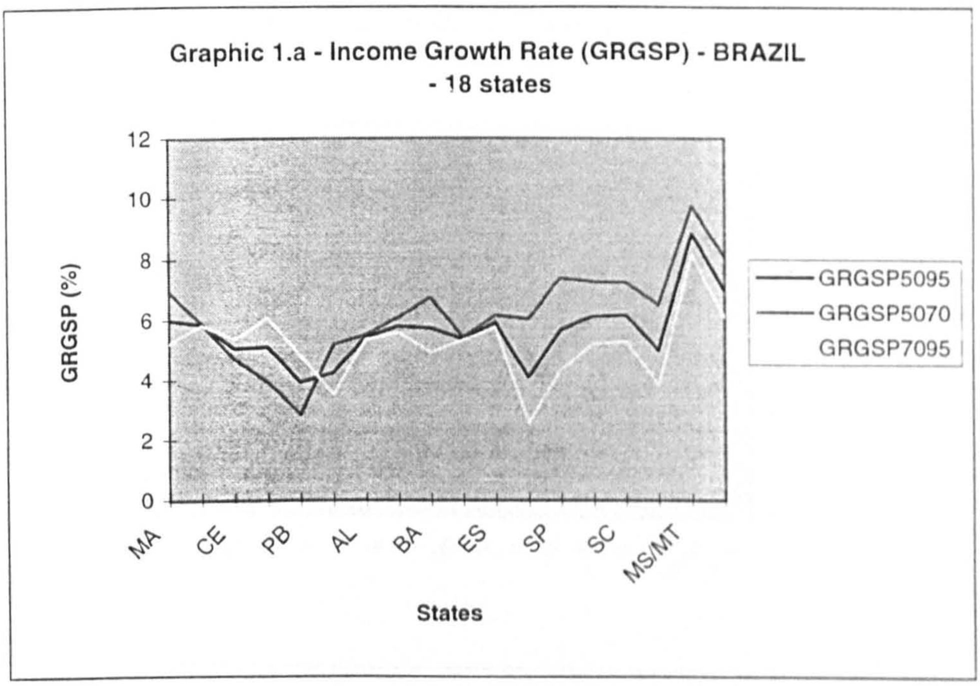
state	year	ytrm18	prox	yprox	prox18	yprox18
1	1980		4.07E-06	-1.02E-05		
2	1980		3.67E-06	-7.95E-06		
3	1980		3.87E-06	-1.52E-05		
4	1980		3.20E-06	-1.21E-05		
5	1980		4.44E-06	-7.52E-06		
6	1980		4.07E-06	-8.58E-06		
7	1980	-0.28	4.73E-06	-3.16E-06	4.73E-06	-4.53E-06
8	1980	-0.20	5.29E-06	-2.10E-06	5.29E-06	-3.23E-06
9	1980	-0.16	4.75E-06	-4.33E-06	4.75E-06	-6.22E-06
10	1980	0.15	4.84E-06	-4.79E-06	4.84E-06	-6.96E-06
11	1980	0.12	5.06E-06	-3.11E-06	5.06E-06	-4.64E-06
12	1980	-0.04	5.26E-06	-4.98E-06	5.26E-06	-7.66E-06
13	1980	0.00	5.77E-06	-3.13E-06	5.77E-06	-5.30E-06
14	1980	-0.12	6.37E-06	-2.11E-06	6.37E-06	-4.32E-06
15	1980	-0.49	7.41E-06	-2.75E-07	7.41E-06	-3.25E-06
16	1980	-0.07	1.42E-05	2.51E-05	1.42E-05	2.05E-05
17	1980	0.67	1.13E-05	1.46E-05	1.13E-05	9.92E-06
18	1980	0.64	1.52E-05	4.99E-05	1.52E-05	4.20E-05
19	1980	2.15	1.79E-05	8.34E-05	1.79E-05	7.37E-05
20	1980	1.25	1.32E-05	2.28E-05	1.32E-05	1.79E-05
21	1980	2.36	1.15E-05	1.94E-05	1.15E-05	1.35E-05
22	1980	-0.28	8.66E-06	6.21E-06	8.66E-06	-4.11E-07
23	1980	-1.23	7.66E-06	4.90E-07	7.66E-06	-3.90E-06
24	1980	-0.65	8.23E-06	1.83E-06	8.23E-06	-1.31E-06
1	1985		4.07E-06	-1.18E-05		
2	1985		3.68E-06	-8.01E-06		
3	1985		3.90E-06	-1.53E-05		
4	1985		3.22E-06	-1.09E-05		
5	1985		4.48E-06	-7.08E-06		
6	1985		4.10E-06	-7.75E-06		
7	1985	-0.33	4.77E-06	-3.00E-06	4.77E-06	-4.33E-06
8	1985	-0.25	5.33E-06	-2.02E-06	5.33E-06	-3.18E-06
9	1985	-0.18	4.78E-06	-3.93E-06	4.78E-06	-5.69E-06
10	1985	0.13	4.87E-06	-5.63E-06	4.87E-06	-8.24E-06
11	1985	0.19	5.09E-06	-2.94E-06	5.09E-06	-4.45E-06
12	1985	-0.04	5.28E-06	-4.36E-06	5.28E-06	-6.80E-06
13	1985	0.07	5.79E-06	-2.88E-06	5.79E-06	-5.03E-06
14	1985	-0.09	6.39E-06	-2.80E-06	6.39E-06	-6.24E-06
15	1985	-0.65	7.41E-06	2.67E-07	7.41E-06	-2.89E-06
16	1985	-0.19	1.35E-05	2.30E-05	1.35E-05	1.88E-05
17	1985	0.85	1.09E-05	1.50E-05	1.09E-05	1.02E-05
18	1985	0.74	1.41E-05	3.76E-05	1.41E-05	3.13E-05
19	1985	2.65	1.64E-05	6.71E-05	1.64E-05	5.88E-05
20	1985	1.25	1.25E-05	2.33E-05	1.25E-05	1.81E-05
21	1985	2.42	1.09E-05	1.78E-05	1.09E-05	1.23E-05
22	1985	-0.42	8.33E-06	5.47E-06	8.33E-06	-5.81E-07
23	1985	-1.32	7.56E-06	8.95E-07	7.56E-06	-3.11E-06
24	1985	-0.75	8.18E-06	2.41E-06	8.18E-06	-7.30E-07

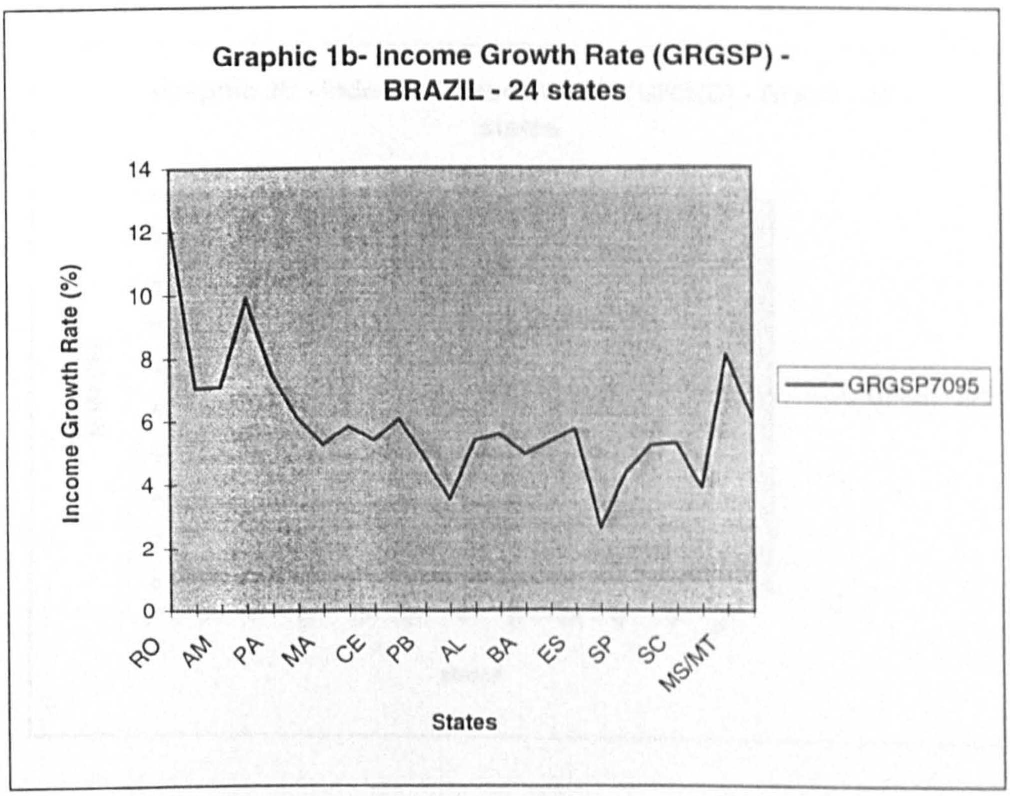
state	year	ytrm18	prox	yprox	prox18	yprox18
1	1990		4.14E-06	-9.99E-06		
2	1990		3.73E-06	-1.11E-05		
3	1990		3.97E-06	-1.46E-05		
4	1990		3.28E-06	-1.70E-05		
5	1990		4.58E-06	-8.17E-06		
6	1990		4.19E-06	-1.20E-05		
7	1990	-0.40	4.87E-06	-3.51E-06	4.87E-06	-5.10E-06
8	1990	-0.30	5.43E-06	-2.39E-06	5.43E-06	-3.80E-06
9	1990	-0.16	4.86E-06	-3.90E-06	4.86E-06	-5.66E-06
10	1990	0.16	4.94E-06	-5.16E-06	4.94E-06	-7.57E-06
11	1990	0.26	5.16E-06	-3.49E-06	5.16E-06	-5.28E-06
12	1990	-0.03	5.35E-06	-4.29E-06	5.35E-06	-6.72E-06
13	1990	0.09	5.85E-06	-3.63E-06	5.85E-06	-6.39E-06
14	1990	-0.04	6.44E-06	-2.22E-06	6.44E-06	-5.08E-06
15	1990	-0.51	7.44E-06	3.01E-07	7.44E-06	-2.20E-06
16	1990	-0.14	1.34E-05	2.33E-05	1.34E-05	1.90E-05
17	1990	0.81	1.08E-05	1.27E-05	1.08E-05	8.65E-06
18	1990	0.78	1.39E-05	4.04E-05	1.39E-05	3.36E-05
19	1990	2.59	1.60E-05	6.10E-05	1.60E-05	5.32E-05
20	1990	1.28	1.22E-05	2.24E-05	1.22E-05	1.74E-05
21	1990	1.05	1.07E-05	1.66E-05	1.07E-05	1.12E-05
22	1990	0.08	8.22E-06	4.63E-06	8.22E-06	-9.45E-07
23	1990	-1.21	7.62E-06	1.15E-06	7.62E-06	-2.87E-06
24	1990	-0.74	8.28E-06	2.74E-06	8.28E-06	-3.85E-07

* per capita income - 1995 US$ millions

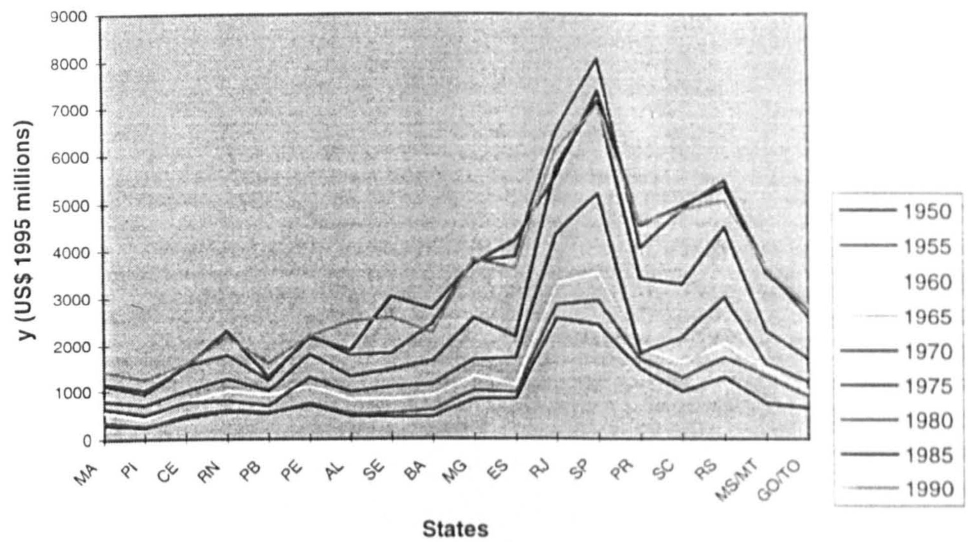
** TR - 1000km/kmsq

*** PROX - km

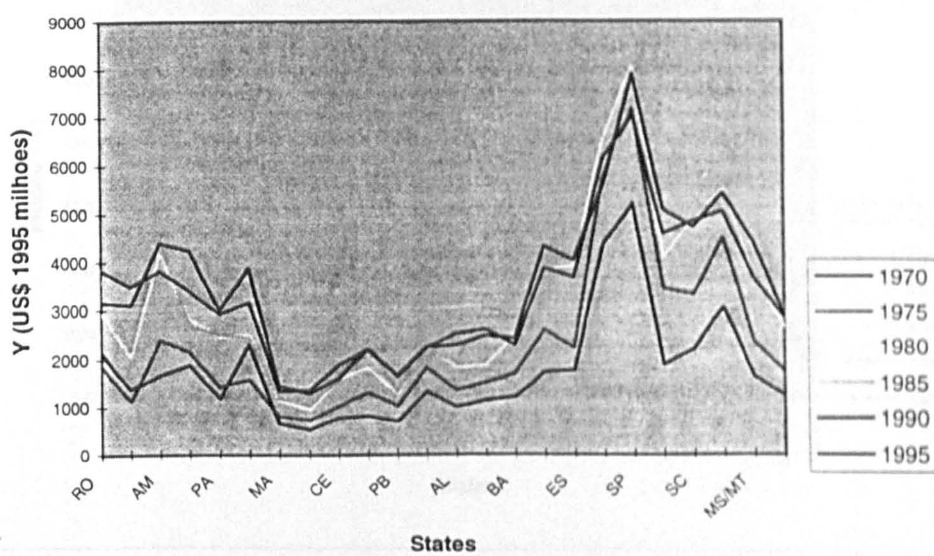

Graphic 1.a - Income Growth Rate (GRGSP) - BRAZIL - 18 states
12
10
8
6
4
2
0
GRGSP (%)
MA
CE
PB
AL
BA
ES
SP
SC
MS/MT
States
GRGSP5095
GRGSP5070
GRGSP7095

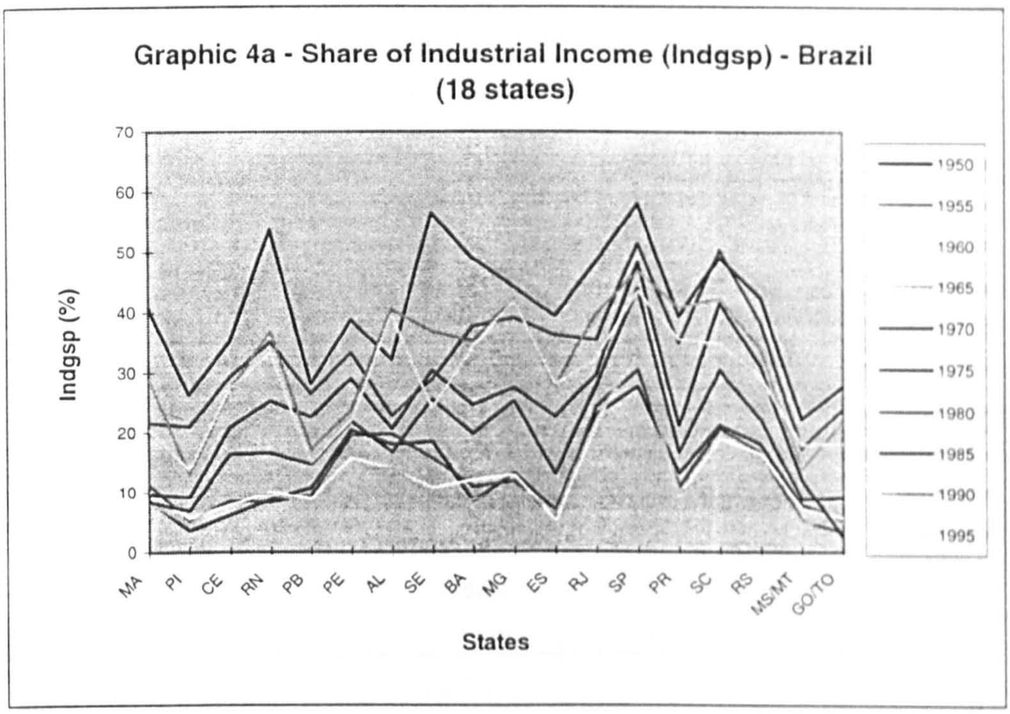

Graphic 1b- Income Growth Rate (GRGSP) - BRAZIL - 24 states
14
12
10
8
6
4
2
0
Income Growth Rate (%)
RO
AM
PA
MA
CE
PB
AL
BA
ES
SP
SC
MS/MT
States
GRGSP7095

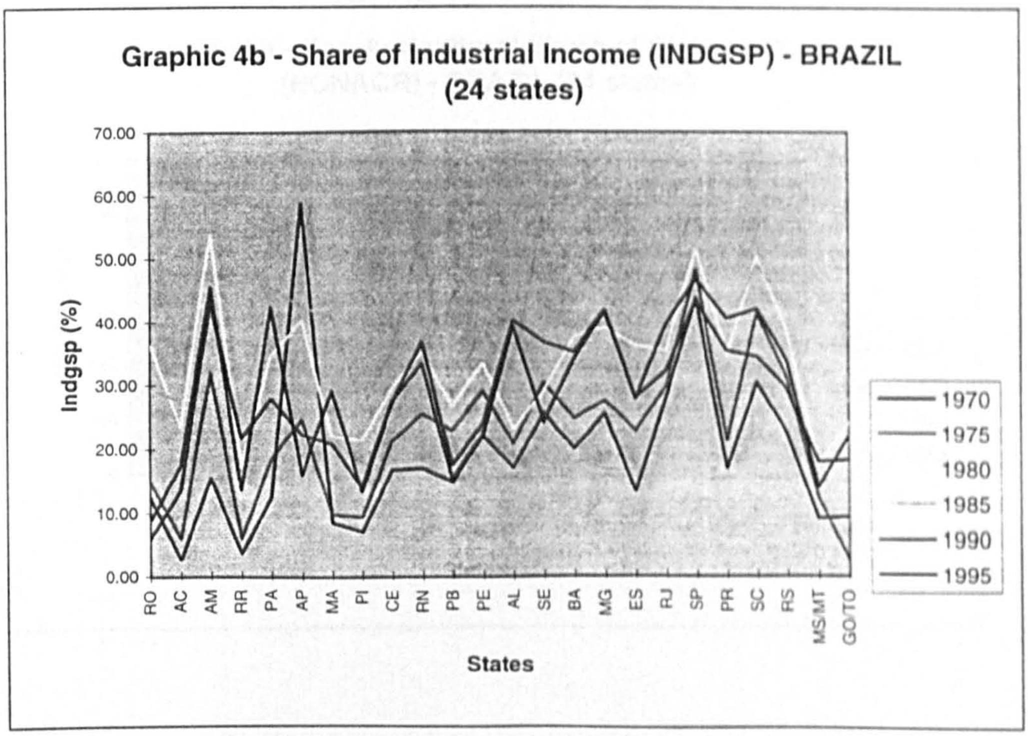
Graphic 3a - Per Capita Income (Y) - Brazil (18 states)

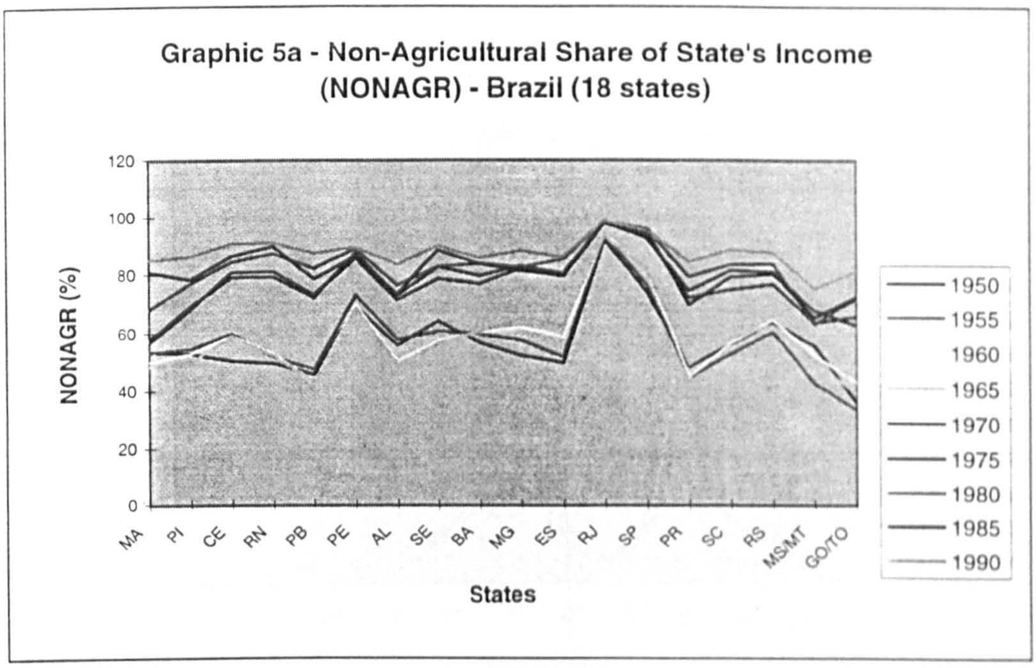


Graphic 3b - Per Capita Income (Y) - Brazil (24 states)

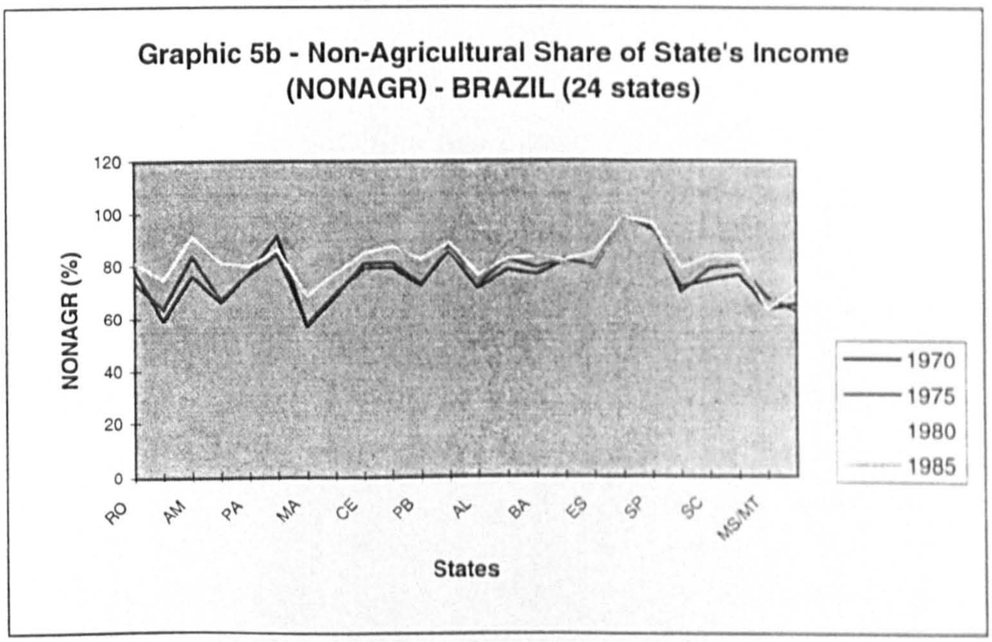



Graphic 4a - Share of Industrial Income (Indgsp) - Brazil (18 states)
Indgsp (%)
70
60
50
40
30
20
10
0
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
States
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995

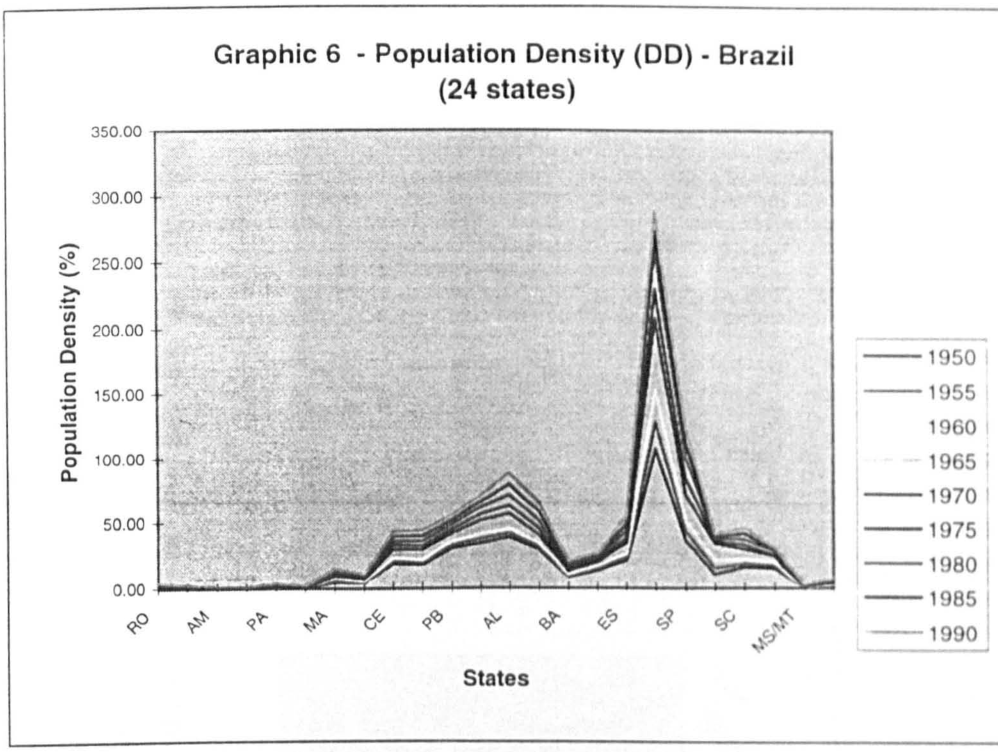

Graphic 4b - Share of Industrial Income (INDGSP) - BRAZIL (24 states)
Indgsp (%)
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
RO
AC
AM
RR
PA
AP
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
States
1970
1975
1980
1985
1990
1995

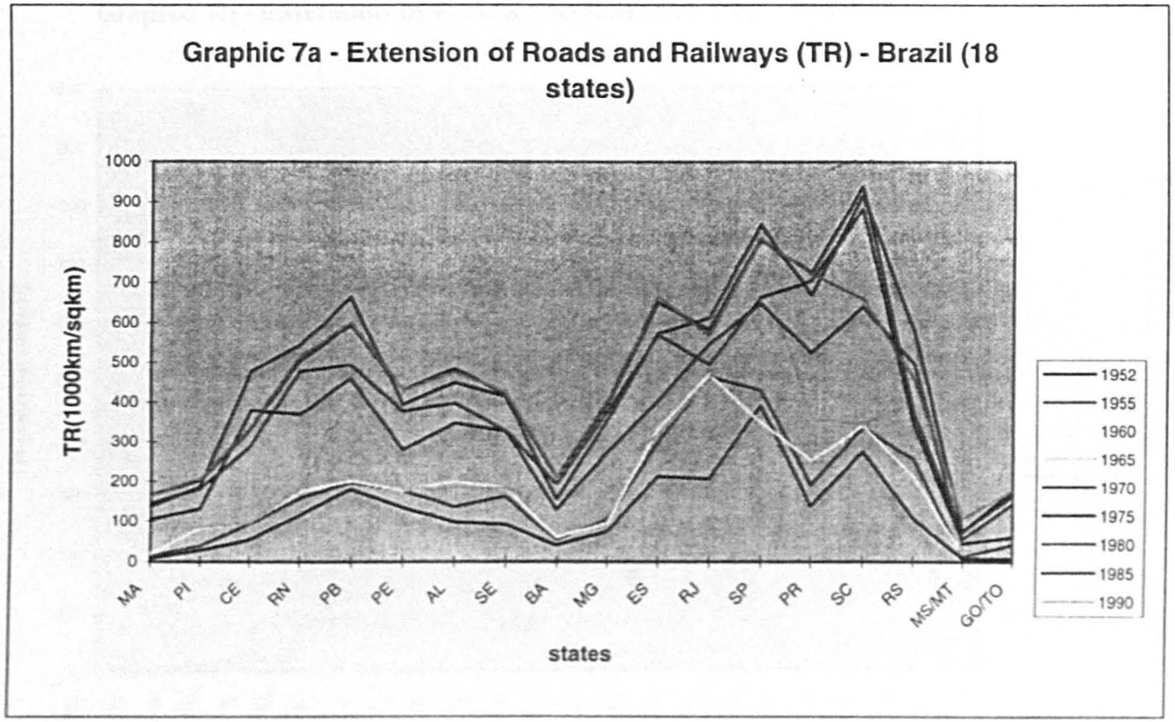


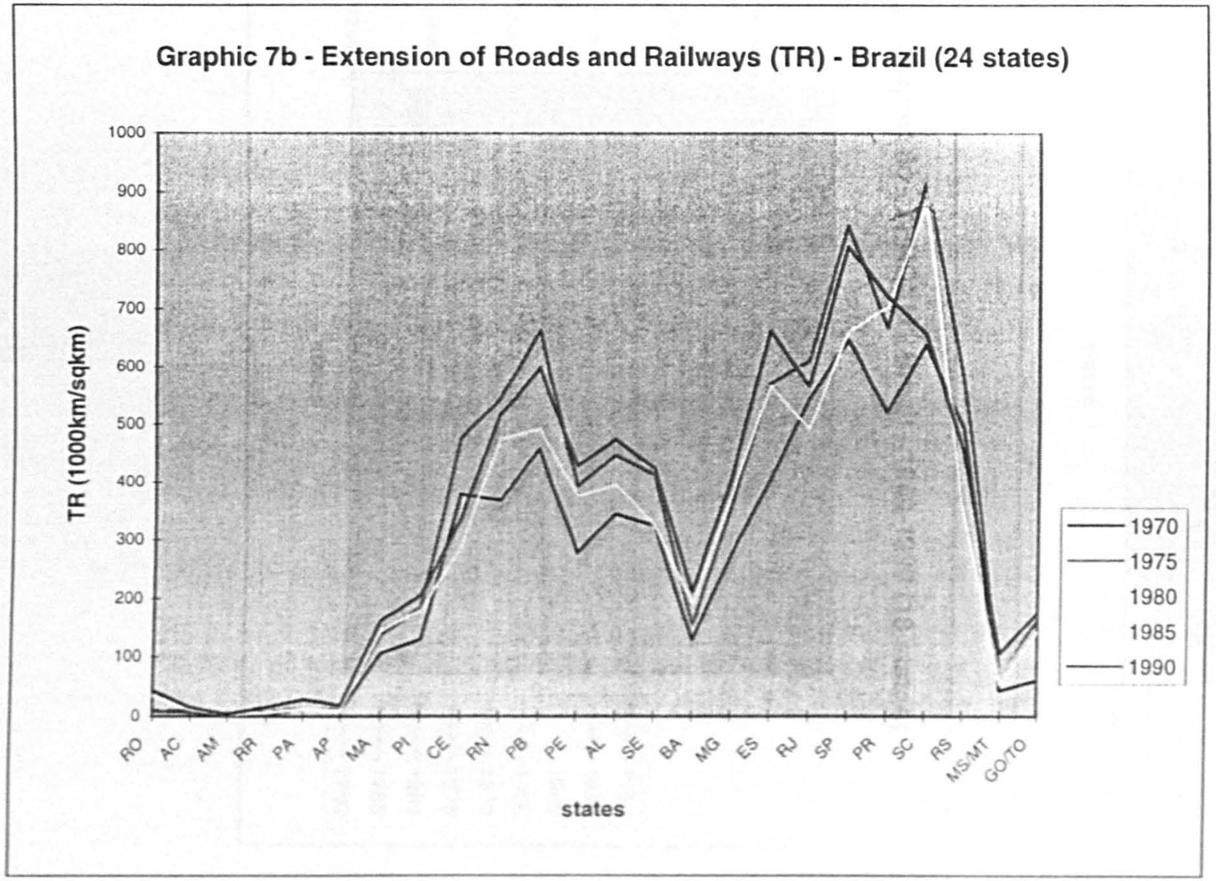
Graphic 5a - Non-Agricultural Share of State's Income (NONAGR) - Brazil (18 states)
NONAGR (%)
120
100
80
60
40
20
0
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
States
1950
1955
1960
1965
1970
1975
1980
1985
1990

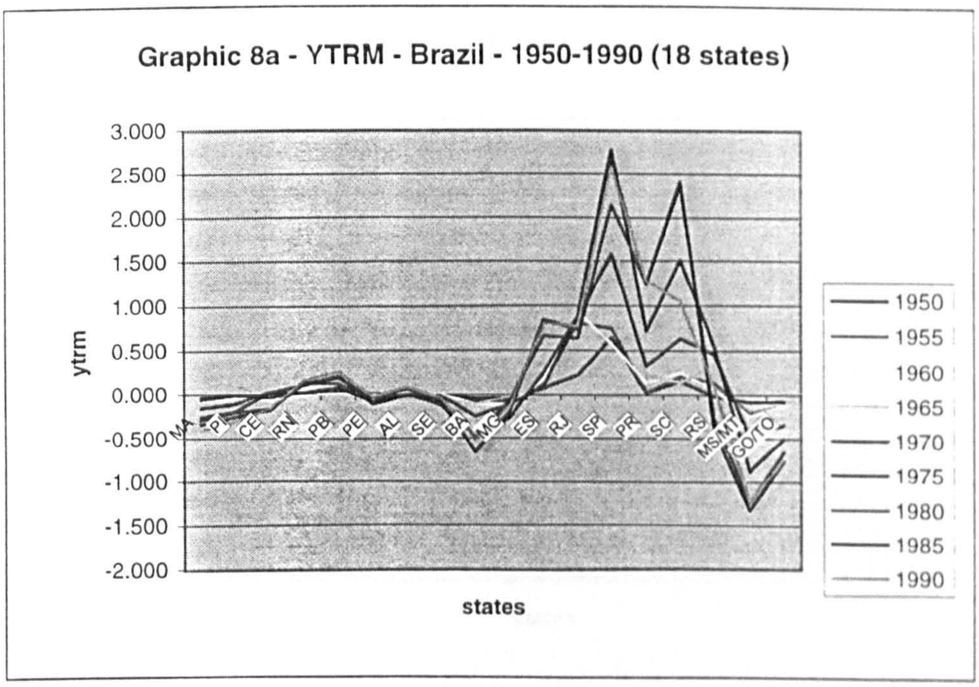


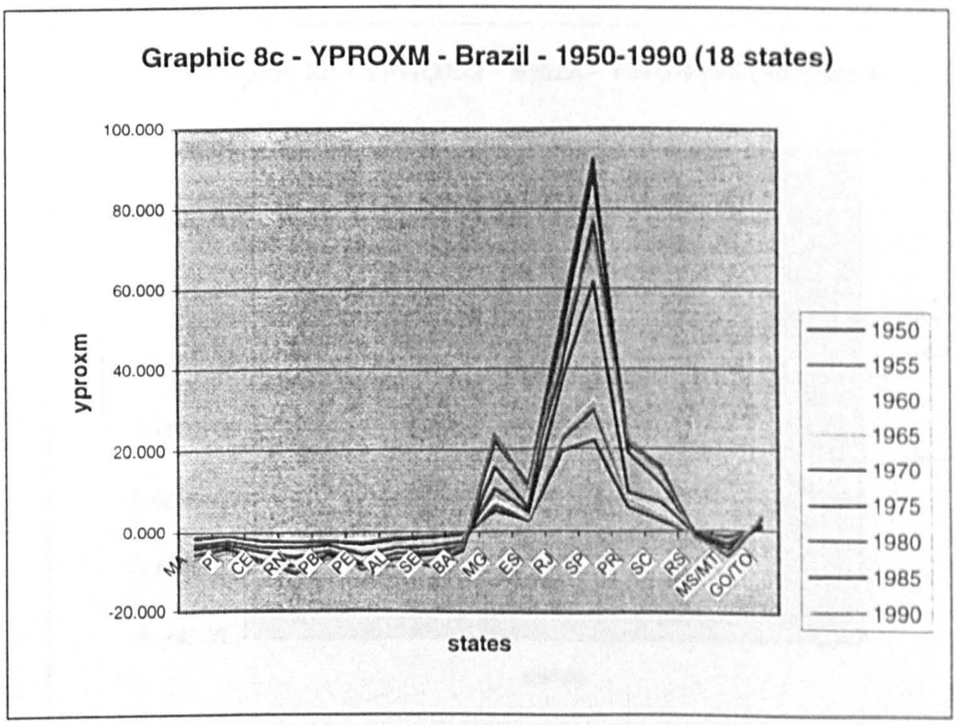
Graphic 5b - Non-Agricultural Share of State's Income (NONAGR) - BRAZIL (24 states)
NONAGR (%)
120
100
80
60
40
20
0
RO
AM
PA
MA
CE
PB
AL
BA
ES
SP
SC
MS/MT
States
1970
1975
1980
1985

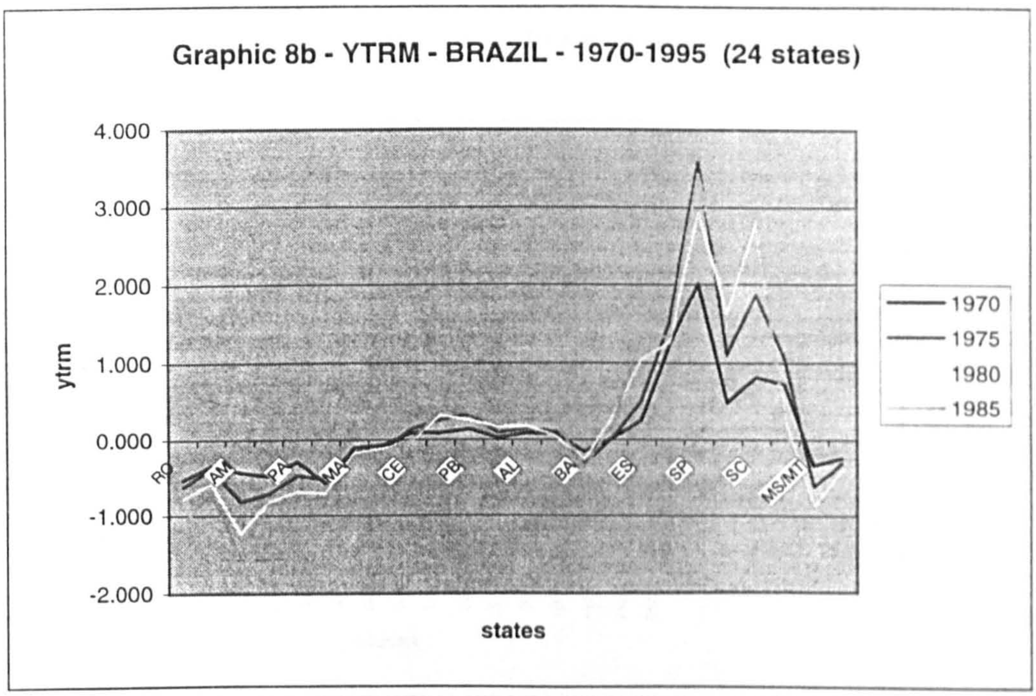

Graphic 6 - Population Density (DD) - Brazil
(24 states)
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Population Density (%)
RO
AM
PA
MA
CE
PB
AL
BA
ES
SP
SC
MS/MT
States
1950
1955
1960
1965
1970
1975
1980
1985
1990

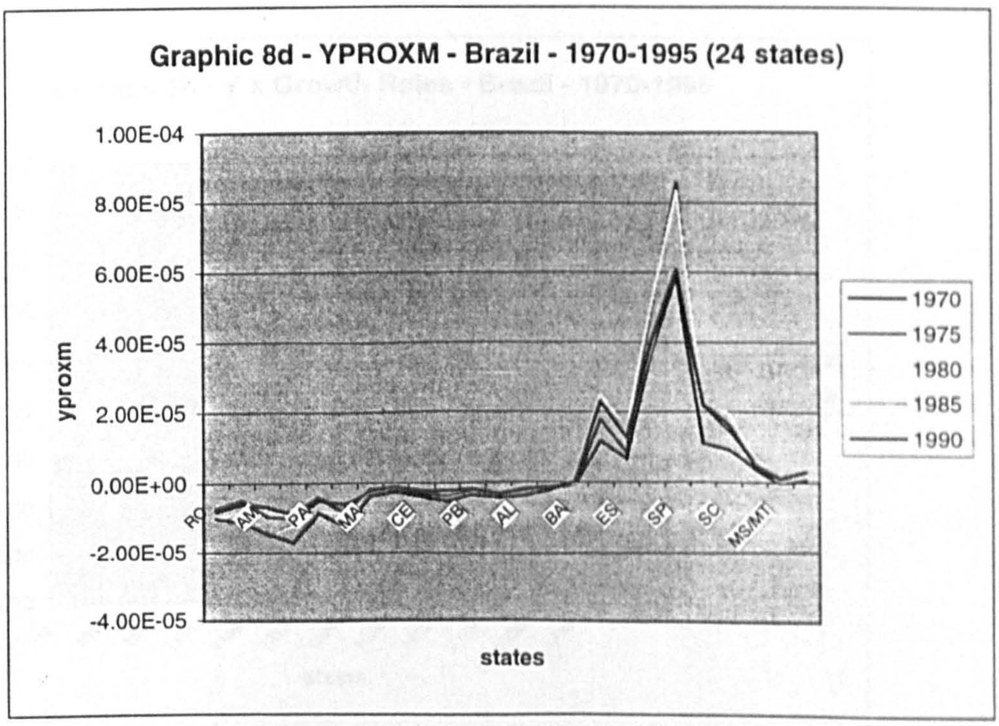

Graphic 7a - Extension of Roads and Railways (TR) - Brazil (18 states)
TR(1000km/sqkm)
1000
900
800
700
600
500
400
300
200
100
0
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
states
1952
1955
1960
1965
1970
1975
1980
1985
1990

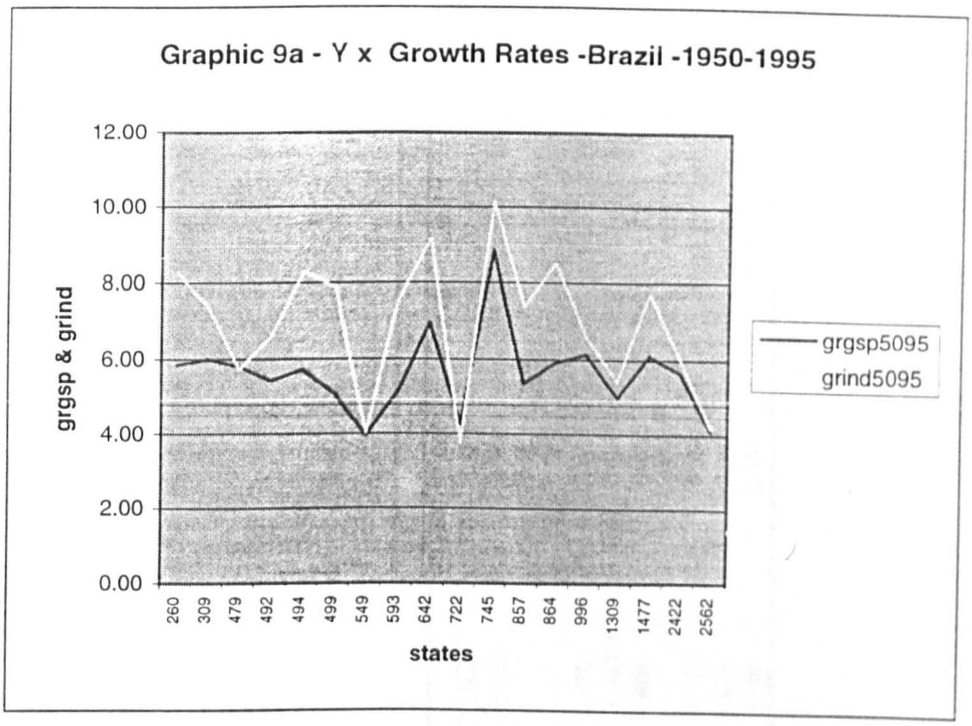

Graphic 7b - Extension of Roads and Railways (TR) - Brazil (24 states)
TR (1000km/sqkm)
1000
900
800
700
600
500
400
300
200
100
0
RO
AC
AM
RR
PA
AP
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
states
1970
1975
1980
1985
1990

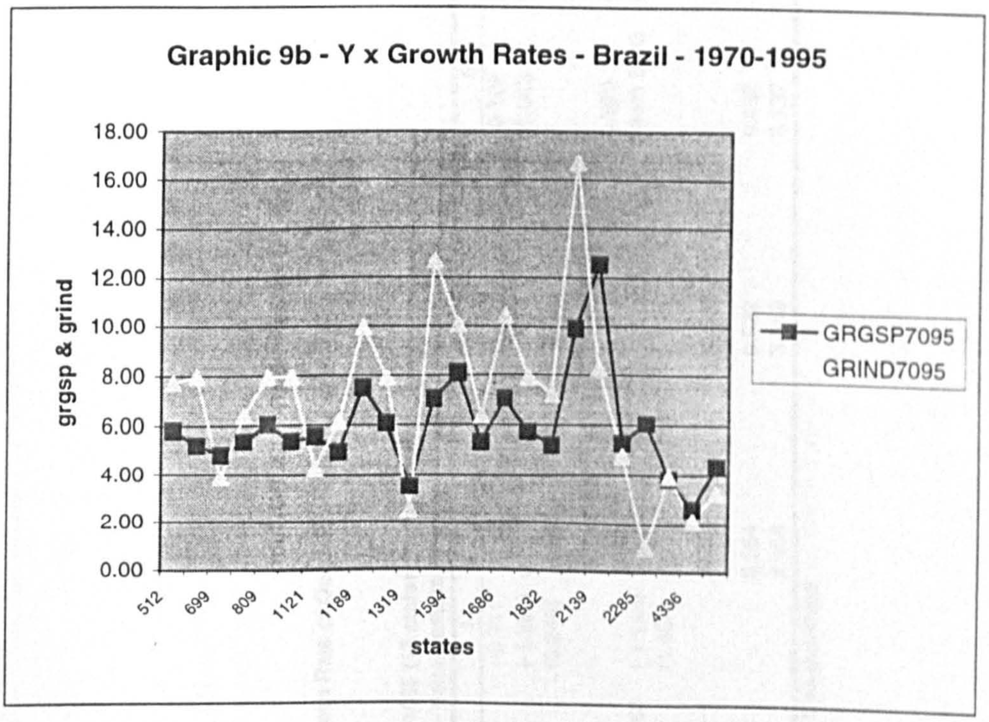

Graphic 8a - YTRM - Brazil - 1950-1990 (18 states)
3.000
2.500
2.000
1.500
1.000
0.500
0.000
-0.500
-1.000
-1.500
-2.000
ytrm
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
states
1950
1955
1960
1965
1970
1975
1980
1985
1990


Graphic 8c - YPROXM - Brazil - 1950-1990 (18 states)
100.000
80.000
60.000
40.000
20.000
0.000
-20.000
yproxm
MA
PI
CE
RN
PB
PE
AL
SE
BA
MG
ES
RJ
SP
PR
SC
RS
MS/MT
GO/TO
states
1950
1955
1960
1965
1970
1975
1980
1985
1990


Graphic 8b - YTRM - BRAZIL - 1970-1995 (24 states)
4.000
3.000
2.000
1.000
0.000
-1.000
-2.000
ytrm
states
RO
AM
PA
MA
CE
PB
AL
BA
ES
SP
SC
MS/MT
1970
1975
1980
1985


Graphic 8d - YPROXM - Brazil - 1970-1995 (24 states)
1.00E-04
8.00E-05
6.00E-05
4.00E-05
2.00E-05
0.00E+00
-2.00E-05
-4.00E-05
yproxm
states
RO
AM
PA
MA
CE
PB
AL
BA
ES
SP
SC
MS/MT
1970
1975
1980
1985
1990


Graphic 9a - Y x Growth Rates -Brazil -1950-1995
12.00
10.00
8.00
6.00
4.00
2.00
0.00
grgsp & grind
260
309
479
492
494
499
549
593
642
722
745
857
864
996
1309
1477
2422
2562
states
grgsp5095
grind5095


Graphic 9b - Y x Growth Rates - Brazil - 1970-1995
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
grgsp & grind
512
699
809
1121
1189
1319
1594
1686
1832
2139
2285
4336
states
GRGSP7095
GRIND7095

Appendix 2 - Dependent Variable : Growth Rate of Output (GRGSP) -Panel Results for Brazil

Table I - INDGSP & TR - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.047	(-0.176)	-0.207	(-0.711)	-1.631***	(-3.803)	-1.105***	(-2.843)	-0.108	(-0.376)	-0.220	(-0.733)	-1.685***	(-3.822)	-1.285***	(-3.093)
INDGSP	-0.038	(-0.886)	-0.054	(-1.225)	6.94 E-03	(0.157)	0.024	(0.539)	-0.043	(-1.045)	-0.053	(-1.271)	-0.010	(-0.254)	1.07 E-03	(0.026)
TR	0.544	(0.280)	0.477	(0.246)	-0.926	(-0.497)	-0.561	(-0.296)								
TRM																
YTRM									0.380	(0.654)	0.172	(0.286)	0.329	(0.578)	0.665	(1.184)
DD	-9.84 E-03	(-1.495)	-7.70 E-03	(-1.143)	5.23 E-03	(0.744)	-7.37 E-04	(-0.108)	-9.90 E-03	(-1.526)	-7.69 E-03	(-1.148)	3.92 E-03	(0.571)	-1.53 E-03	(-0.231)
SP			1.969	(1.407)	3.685***	(2.669)					1.866	(1.285)	3.435**	(2.420)		
NE					-3.375***	(-4.328)	-2.777***	(-3.643)					-3.336***	(-4.336)	-2.861***	(-3.785)
R2	0.491		0.497		0.554		0.532		0.492		0.497		0.554		0.537	
MSE	3.140		3.130		2.958		3.019		3.137		3.130		2.957		3.005	

* The high R2 may be due to the usage of time dummies.

Table I - INDGSP & TR - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	8a	t
Y	-1.666***	(-3.688)
INDGSP	0.036	(0.809)
TR		
TRM	-6.192**	(-2.032)
YTRM	2.122**	(2.339)
DD	2.79 E-03	(0.407)
SP		
NE	-3.522***	(-4.318)
R2	0.549	
MSE	2.974	

* The high R2 may be due to the usage of time dummies.

Table II - NONAGR & TR - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.166	(-0.668)	-0.283	(-1.000)	-1.633***	(-4.165)	-1.124***	(-3.362)	-0.225	(-0.817)	-0.307	(-1.049)	-1.758***	(-4.237)	-1.398***	(-3.662)
NONAGR	0.036	(1.118)	0.028	(0.858)	0.044	(1.418)	0.059*	(1.921)	0.032	(1.028)	0.026	(0.789)	0.039	(1.278)	0.053*	(1.744)
TR	-0.701	(-0.397)	-0.864	(-0.487)	-1.240	(-0.745)	-0.780	(-0.464)								
TRM																
YTRM									0.057	(0.106)	-0.100	(-0.175)	0.258	(0.477)	0.573	(1.088)
DD	-0.014*	(-1.862)	-0.012	(-1.503)	3.10 E-04	(0.040)	-6.78 E-03	(-0.931)	-0.014*	(-1.904)	-0.012	(-1.524)	-7.37 E-04	(-0.095)	-6.95 E-03	(-0.961)
SP			1.214	(0.867)	3.312**	(2.389)					1.227	(0.831)	3.002**	(2.092)		
NE					-3.449***	(-4.672)	-2.878***	(-4.057)					-3.473***	(-4.657)	-3.059***	(-4.207)
R2	0.492		0.495		0.560		0.543		0.492		0.494		0.559		0.546	
MSE	3.136		3.138		2.938		2.985		3.137		3.140		2.941		2.975	

* The high R2 may be due to the usage of time dummies.

Table II - NONAGR & TR - BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	7a	t	8a	
Y	-1,946***	(-4.620)	-1,698***	(-4.281)
NONAGR	0.056*	(1.790)	0.069**	(2.279)
TR				
TRM	-5.802**	(-2.009)	-6,762**	(-2.375)
YTRM	1.807*	(1.924)	2,307***	(2.576)
DD	4.62 E-04	(0.060)	-4.16 E-03	(-0.576)
SP	2.423*	(1.672)		
NE	-3.900***	(-5.078)	-3,650***	(-4.815)
R2	0.571		0.563	
MSE	2.912		2.929	

* The high R2 may be due to the usage of time dummies.

Table III - INDGSP & TR - BRAZIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3		4		5	t	6	t	7		8	t
Y	1.125	(1.121)	1.076	(0.994)	-3.056	(-1.585)	-1.518	(-0.962)	0.392	(0.375)	0.496	(0.461)	-3.317*	(-1.699)	-2.790	(-1.626)
INDGSP	9.81 E-03	(0.094)	2.29 E-03	(0.019)	0.082	(0.681)	0.128	(1.101)	-0.046	(-0.437)	-0.023	(-0.193)	0.037	(0.317)	0.056	(0.504)
TR	-3.505	(-0.641)	-3.601	(-0.648)	-6.509	(-1.194)	-4.880	(-0.911)								
TRM																
YTRM									2.518	(0.966)	3.154	(1.064)	2.958	(1.031)	3.673	(1.427)
DD	-0.017	(-0.878)	-0.015	(-0.671)	0.031	(1.088)	4.94 E-03	(0.230)	-0.024	(-1.224)	-0.031	(-1.243)	9.02 E-03	(0.307)	-2.87 E-03	(-0.138)
SP			0.403	(0.128)	4.743	(1.370)					-1.609	(-0.460)	2.163	(0.575)		
NE					-4.552***	(-2.543)	-3.345**	(-2.133)					-4.051**	(-2.307)	-3.612**	(-2.297)
R2	0.277		0.278		0.346		0.326		0.283		0.286		0.342		0.339	
MSE	3.776		3.805		3.650		3.675		3.760		3.784		3.660		3.641	

* Equations (1) and (5) were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table III - INDGSP & TR - BRAZIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	5a	t	6a	t	7a	t	8a	t
Y	0.511	(0.498)	0.784	(0.742)	-4.255**	(-2.288)	-4.183**	(-2.509)
INDGSP	-0.028	(-0.267)	0.032	(0.272)	0.135	(1.177)	0.138	(1.281)
TR								
TRM	-13.922*	(-1.870)	-16.453**	(-2.112)	-23.033***	(-3.048)	-23.148***	(-3.133)
YTRM	7.161**	(2.009)	9.535**	(2.281)	11.822***	(2.982)	11.971***	(3.343)
DD	-0.020	(-1.072)	-0.037	(-1.513)	0.015	(0.530)	0.013	(0.644)
SP			-3.870	(-1.083)	0.324	(0.091)		
NE					-5.475***	(-3.194)	-5.418***	(-3.425)
R2	0.321		0.334		0.429		0.429	
MSE	3.689		3.684		3.438		3.410	

* Equations (1) and (5) were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table IV - NONAGR & TR - BRAZIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.715	(0.732)	0.804	(0.745)	-3.751**	(-1.998)	-1.926	(-1.355)	-0.054	(-0.053)	0.218	(0.207)	-4.276**	(-2.263)	-3.686**	(-2.353)
NONAGR	0.076	(1.264)	0.079	(1.261)	0.119*	(1.951)	0.128**	(2.084)	0.072	(1.201)	0.085	(1.375)	0.126**	(2.082)	0.129**	(2.140)
TR	-3.002	(-0.584)	-2.675	(-0.493)	-4.592	(-0.888)	-2.193	(-0.443)								
TRM																
YTRM									1.769	(0.724)	3.213	(1.102)	3.158	(1.140)	3.903	(1.611)
DD	-0.035	(-1.465)	-0.037	(-1.364)	9.24 E-03	(0.303)	-0.020	(-0.841)	-0.041*	(-1.771)	-0.055**	(-1.974)	-0.014	(-0.447)	-0.025	(-1.111)
SP			-0.573	(-0.203)	4.786	(1.470)					-2.904	(-0.909)	1.977	(0.565)		
NE					-4.996***	(-2.891)	-3.549**	(-2.476)					-4.786***	(-2.804)	-4.306***	(-2.924)
R2	0.295		0.295		0.379		0.357		0.297		0.306		0.384		0.381	
MSE	3.730		3.758		3.556		3.589		3.724		3.729		3.541		3.522	

* Equations (1) and (5) were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table IV - NONAGR & TR - BRAZIL - 1950-1970 (18 states)
dependent variable: GRGSP - panel results

	5a	t	6a	t	7a	t	8a	t
Y	0.199	(0.198)	0.614	(0.584)	-4.494**	(-2.487)	-4.119***	(-2.740)
NONAGR	0.051	(0.838)	0.066	(1.069)	0.108*	(1.847)	0.109*	(1.887)
TR								
TRM	-12.794*	(-1.697)	-14.640*	(-1.916)	-18.945***	(-2.634)	-19.163***	(-2.692)
YTRM	6.285*	(1.751)	8.956**	(2.163)	10.581***	(2.738)	11.143***	(3.143)
DD	-0.033	(-1.405)	-0.051*	(-1.875)	-2.00 E-03	(-0.068)	-9.18 E-03	(-0.412)
SP			-4.062	(-1.275)	1.273	(0.380)		
NE					-5.565***	(-3.358)	-5.266***	(-3.634)
R2	0.328		0.345		0.447		0.446	
MSE	3.671		3.653		3.383		3.360	

* Equations (1) and (5) were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table V - INDGSP & TR - BRAZIL - 1970-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4		5	t	6	t	7	t	8	t
Y	-0.127	(-0.550)	-0.279	(-1.082)	-1.901***	(-3.881)	-0.922**	(-2.322)	-0.176	(-0.718)	-0.273	(-1.045)	-1.907***	(-3.900)	-1.068***	(-2.579)
INDGSP	-0,067*	(-1.678)	-0.076*	(-1.874)	-2.80 E-03	(-0.067)	-0.017	(-0.383)	-0.068*	(-1.736)	-0.068*	(-1.754)	-6.03 E-04	(-0.015)	-0.025	(-0.610)
TR	1.196	(0.686)	1.206	(0.694)	0.261	(0.160)	0.639	(0.374)								
TRM																
YTRM									0.395	(0.805)	0.195	(0.372)	0.034	(0.069)	0.535	(1.123)
DD	-9.29 E-03	(-1.603)	-0.008	(-1.363)	5.22 E-03	(0.809)	-2.87 E-03	(-0.462)	-9.04 E-03	(-1.579)	-7.65 E-03	(-1.303)	5.37 E-03	(0.839)	2.67 E-03	(-0.443)
SP			1.924	(1.285)	5.044***	(3.129)					1.704	(1.060)	5.021***	(2.923)		
NE					-4.064***	(-3.793)	-2,353**	(-2.424)					-4.084***	(-3.842)	-2,523***	(-2.624)
R2	0.676		0.683		0.732		0.699		0.677		0.682		0.732		0.703	
MSE	2.513		2.503		2.316		2.440		2.510		2.508		2.317		2.424	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VI - NONAGR & TR - BRAZIL - 1970-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2		3	t	4		5	t	6	t	7	t	8	t
Y	-0.262	(-1.229)	-0.430*	(-1.715)	-1.924***	(-4.437)	-1.034***	(-2.980)	-0.292	(-1.233)	-0.406	(-1.602)	-1.921***	(-4.371)	-1.200***	(-3.114)
NONAGR	-0.046	(-1.014)	-0.060	(-1.292)	2.36 E-03	(0.052)	7.72 E-03	(0.161)	-0.048	(-1.059)	-0.058	(-1.262)	3.51 E-03	(0.079)	3.48 E-03	(0.075)
TR	0.257	(0.159)	0.230	(0.143)	0.189	(0.128)	0.258	(0.167)								
YTRM									0.149	(0.322)	-0.068	(-0.138)	0.026	(0.057)	0.429	(0.948)
DD	-5.48 E-03		-3.03 E-03	(-0.429)	5.18 E-03	(0.764)	-2.77 E-03	(-0.418)	-5.39 E-03	(-0.790)	-2.95 E-03	(-0.416)	5.18 E-03	(0.762)	-2.35 E-03	(-0.356)
SP		(-0.803)	1.941	(1.261)	5,052***	(3.151)					2.025	(1.229)	5.027***	(2.922)		
NE					-4.115***	(-4.061)	-2.590***	(-2.759)					-4.118***	(-4.059)	-2.782***	(-2.912)
R2	0.669		0.676		0.732		0.698		0.670		0.676		0.732		0.701	
MSE	2.540		2.531		2.316		2.442		2.539		2.531		2.317		2.429	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VI - INDGSP & TR - BRAZIL - 1970-1995 (24 states)
dependent variable: GRGSP - panel results

	1	t	2		3	t	4		5	t	6		7	t	8	t
Y	4.10 E-03	(0.016)	-0.2161	(-0.768)	-2.273***	(-5.071)	-1,255***	(-2.973)	0.0723	(0.256)	-0.135	(-0.462)	-2,260***	(-4.864)	-1.411***	(-3.384)
INDGSP	-0.074	(-1.340)	-0.077	(-1.416)	-0.035	(-0.579)	-0.041	(-0.663)	-0.085*	(-1.657)	-0.086*	(-1.695)	-0.035	(-0.613)	-0.045	(-0.784)
TR	-2.918	(-1.543)	-3.280*	(-1.728)	-1.015	(-0.626)	-0.943	(-0.563)								
TRM																
YTRM									-0.454	(-1.023)	-0.806*	(-1.697)	-0.348	(-0.884)	0.156	(0.394)
DD	-9.83 E-03	(-1.625)	-8.23 E-03	(-1.331)	9.35 E-03*	(1.853)	1.20 E-03	(0.216)	-0.013**	(-2.140)	9.53 E-03	(-1.496)	9.89 E-03*	(1.939)	-5.36 E-04	(-0.105)
SP			2,895*	(1.718)	6,815***	(4.901)					3,750**	(2.139)	7,306***	(4.795)		
NE					-5,303***	(-4.942)	-3,798***	(-3.836)					-5,358***	(-4.716)	-4.124***	(-3.965)
R2	0.501		0.509		0.582		0.546		0.492		0.503		0.582		0.545	
MSE	3.794		3.782		3.505		3.637		3.827		3.802		3.504		3.640	

* The coefficients were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VIII - NONAGR & TR - BRAZIL - 1970-1995 (24 states)
dependent variable: GRGSP - panel results

	1	t	2		3	t	4		5	t	6	t	7	t	8	t
Y	-0.285	(-1.239)	-0,473*	(-1.838)	-2,664***	(-6.712)	-1.706***	(-4.789)	-0.225	(-0.866)	-0.397	(-1.459)	-2,681***	(-6.644)	-1.973***	(-5.425)
NONAGR	0.026	(0.390)	0.019	(0.273)	0.062	(0.941)	0.069	(1.019)	0.024	(0.359)	9.32 E-03	(0.137)	0.060	(0.903)	0.078	(1.157)
TR	-3,848**	(-2.318)	-4.214***	(-2.500)	-0.997	(-0.757)	-0.941	(-0.689)								
TRM																
YTRM									-0.665*	(-1.676)	-1,020**	(-2.420)	-0.257	(-0.836)	0.263	(0.799)
DD	-0.010	(-1.412)	-8.50 E-03	(-1.096)	7.57 E-03	(1.148)	-6.66 E-04	(-0.100)	-0.014*	(-1.863)	-9.92 E-03	(-1.205)	7.80 E-03	(1.139)	-3.04 E-03	(-0.479)
SP			2.529	(1.505)	6.798***	(4.772)					3.570**	(2.066)	7.166***	(4.670)		
NE					-5.875***	(-5.866)	-4.455***	(-4.815)					-5.979***	(-5.722)	-4.953***	(-5.041)
R2	0.485		0.491		0.584		0.548		0.470		0.480		0.584		0.548	
MSE	3.853		3.848		3.494		3.625		3.908		3.890		3.495		3.625	

* The coefficients were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table VIII - NONAGR & TR - BRAZIL - 1970-1995 (24 states)
dependent variable: GRGSP - panel results

	5a	t	8a	t
Y	-0.531**	(-2.007)	-2,127***	(-5.805)
NONAGR	0.036	(0.533)	0.085	(1.231)
TR				
TRM	-7,599**	(-2.155)	-5.972**	(-1.982)
YTRM	1.234	(1.496)*	1.709**	(2.312)
DD	-0.011	(-1.530)	-1.32 E-03	(-0.206)
SP				
NE			-4.706***	(-5.090)
R2	0.492		0.562	
MSE	3 844		3 588	

* The coefficients were corrected for heteroscedasticity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Appendix 2 - dependent variable: GRGSP panel results for Brazil
Table IX - INDGSP & PROX - BRAZIL- 1950-1995 (18 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.693*	(-1.870)	-0.773**	(-2.047)	-1.657***	(-3.887)	-1.108***	(-2.795)	-0.385	(-0.982)	-0.316	(-0.787)	-1.622***	(-3.330)	-1.594***	(-3.238)
INDGSP	-0.037	(-1.001)	-0.050	(-1.279)	0.016	(0.388)	0.017	(0.407)	-0.035	(-0.923)	-0.046	(-1.156)	-3.41 E-03	(-0.087)	0.016	(0.424)
PROX	0.236**	(2.488)	0.220**	(2.301)	-0.210	(-1.461)	3.99 E-03	(0.031)								
PROXM																
YPROXM									0.035	(1.209)	0.016	(0.431)	-4.45 E-04	(-0.013)	0.044	(1.595)
DD	-9.03 E-03	(-1.423)	-7.46 E-03	(-1.147)	9.26 E-03	(1.225)	-1.25 E-03	(-0.182)	-0.012*	(-1.699)	-8.66 E-03	(-1.197)	4.43 E-03	(0.591)	-3.02 E-03	(-0.453)
SP			1.503	(1.081)	4.762***	(3.032)					1.510	(0.853)	3.648**	(2.087)		
NE					-4.655***	(-3.889)	-2.719***	(-2.614)					-3.309***	(-4.279)	-2.847***	(-3.800)
R2	0.511		0.514		0.560		0.532		0.495		0.498		0.553		0.540	
MSE	3.078		3.076		2.939		3.019		3.126		3.129		2.960		2.994	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table IX - INDGSP & PROX - BRAZIL- 1950-1995 (18 states)
dependent variable: GRGSP-panel results

	5a	t	6a	t	7a	t	8a	t
Y	-0.698*	(-1.686)	-0.628	(-1.512)	-2.072***	(-3.871)	-2.018***	(-3.726)
INDGSP	-0.037	(-0.998)	-0.056	(-1.416)	0.039	(0.881)	0.058	(1.294)
PROX								
PROXM	0.234**	(2.156)	0.267**	(2.405)	-0.371**	(-1.943)	-0.351*	(-1.813)
YPROXM	8.53 E-04	(0.026)	-0.035	(-0.833)	0.059	(1.277)	0.103**	(2.422)
DD	-9.07 E-03	(-1.378)	-4.69 E-03	(-0.641)	7.79 E-03	(1.021)	-1.77 E-04	(-0.026)
SP			2.432	(1.363)	3.814**	(2.200)		
NE					-5.552***	(-4.007)	-4.945***	(-3.595)
R2	0.511		0.517		0.565		0.550	
MSE	3 088		3 079		2 933		2 971	

Table X - NONAGR & PROX - BRAZIL- 1950-1995 (18 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.832**	(-2.389)	-0.891**	(-2.435)	-1.632***	(-4.255)	-1.113***	(-3.199)	-0.543	(-1.458)	-0.535	(-1.420)	-1.732***	(-3.931)	-1.659***	(-3.760)
NONAGR	0.024	(0.784)	0.019	(0.609)	0.052*	(1.690)	0.060*	(1.898)	0.032	(1.023)	0.030	(0.909)	0.041	(1.315)	0.055*	(1.857)
PROX	0.222**	(2.322)	0.215**	(2.228)	-0.247*	(-1.780)	-0.051	(-0.409)								
PROXSM																
YPROXM									0.033	(1.127)	0.029	(0.785)	7.60 E-03	(0.217)	0.044	(1.596)
DD	-0.013*	(-1.739)	-0.011	(-1.502)	3.97 E-03	(0.495)	-6.74 E-03	(-0.924)	-0.016**	(-2.078)	-0.015*	(-1.753)	-1.19 E-03	(-0.139)	-8.80 E-03	(-1.209)
SP			0.745	(0.538)	4.543***	(2.908)					0.288	(0.163)	2.955*	(1.680)		
NE					-4.916***	(-4.417)	-3.134***	(-3.291)					-3.401***	(-4.563)	-2.985***	(-4.220)
R2	0.5093		0.510		0.568		0.543		0.496		0.496		0.559		0.550	
MSE	3.082		3.089		2.913		2.985		3.124		3.134		2.943		2.961	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table X - NONAGR & PROX - BRAZIL- 1950-1995 (18 states)
dependent variable: GRGSP-panel results

	5a	t	6a	t	7a	t	8a	t
Y	-0.836**	(-2.108)	-0.827**	(-2.081)	-2.075***	(-4.577)	-1.985***	(-4.369)
NONAGR	0.024	(0.782)	0.016	(0.480)	0.075**	(2.259)	0.090***	(2.754)
PROX								
PROXM	0.221**	(2.014)	0.240**	(2.117)	-0.455***	(-2.530)	-0.439**	(-2.427)
YPROXM	5.65 E-04	(0.017)	-0.018	(-0.423)	0.081*	(1.799)	0.117***	(2.889)
DD	-0.013*	(-1.685)	-9.69 E-03	(-1.106)	-8.04 E-04	(-0.096)	-8.95 E-03	(-1.250)
SP			1.231	(0.683)	3.164*	(1.829)		
NE					-5.947***	(-4.779)	-5.415***	(-4.440)
R2	0.509		0.511		0.577		0.567	
MSE	3.092		3.098		2.891		2.914	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XI - INDGSP & PROX - BRAZIL- 1950-1970 (18 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.242	(0.171)	0.232	(0.156)	-3.324*	(-1.727)	-1.450	(-0.906)	-0.111	(-0.078)	-0.308	(-0.211)	-3.100	(-1.565)	-2.708	(-1.437)
INDGSP	-5.03 E-03	(-0.050)	-6.61 E-03	(-0.056)	0.060	(0.516)	0.115	(1.016)	-0.026	(-0.255)	0.018	(0.146)	0.050	(0.419)	0.078	(0.708)
PROX	0.115	(0.583)	0.115	(0.577)	-0.402	(-1.502)	-0.198	(-0.816)								
PROXSM																
YPROXM									0.107	(0.907)	0.168	(1.114)	0.031	(0.192)	0.107	(0.927)
DD	-0.017	(-0.897)	-0.017	(-0.756)	0.038	(1.283)	2.33 E-03	(0.110)	-0.021	(-1.097)	-0.031	(-1.260)	0.017	(0.495)	-9.19 E-04	(-0.044)
SP			0.079	(0.025)	6.377*	(1.697)					-2.568	(-0.654)	3.201	(0.671)		
NE					-6.714***	(-2.732)	-4.156**	(-2.110)					-3.949**	(-2.028)	-3.171**	(-2.037)
R2	0.277		0.277		0.354		0.324		0.282		0.287		0.331		0.326	
MSE	3.778		3.807		3.626		3.680		3.764		3.780		3.690		3.674	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XI - INDGSP & PROX - BRAZIL- 1950-1970 (18 states)
dependent variable: GRGSP-panel results

	7a	t	8a	t
Y	-5.047**	(-2.502)	-5.076***	(-2.572)
INDGSP	0.146	(1.232)	0.142	(1.323)
PROX				
PROXSM	-1.123***	(-2.720)	-1.113***	(-2.831)
YPROXSM	0.550**	(2.244)	0.537***	(2.868)
DD	4.69 E-03	(0.146)	6.88 E-03	(0.343)
SP	-0.414	(-0.087)		
NE	-8.638***	(-3.413)	-8.688***	(-3.553)
R2	0.404		0.404	
MSE	3.514		3.485	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XII - NONAGR & PROX - BRAZIL- 1950-1970 (18 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.343	(-0.262)	-0.128	(-0.089)	-4.308**	(-2.334)	-1.743	(-1.277)	-0.402	(-0.293)	-0.489	(-0.356)	-3.893**	(-2.059)	-3.084*	(-1.829)
NONAGR	0.081	(1.352)	0.087	(1.390)	0.140**	(2.332)	0.139**	(2.255)	0.072	(1.187)	0.085	(1.371)	0.125**	(2.033)	0.124**	(2.015)
PROX	0.137	(0.709)	0.137	(0.700)	-0.474*	(-1.831)	-0.220	(-0.951)								
PROXM																
YPROXM									0.083	(0.713)	0.166	(1.153)	-0.012	(-0.075)	0.091	(0.813)
DD	-0.036	(-1.558)	-0.040	(-1.550)	0.018	(0.605)	-0.021	(-0.940)	-0.038*	(-1.674)	-0.052*	(-1.938)	4.00 E-04	(0.012)	-0.0220011	(-0.966)
SP			-0.967	(-0.359)	6.973**	(2.011)					-3.244	(-0.978)	4.102	(0.949)		
NE					-7.929***	(-3.309)	-4.595***	(-2.594)					-4.867**	(-2.512)	-3.623***	(-2.541)
R2	0.297		0.298		0.403		0.365		0.297		0.307		0.371		0.362	
MSE	3.725		3.750		3.485		3.569		3.725		3.726		3.578		3.575	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XII - NONAGR & PROX - BRAZIL- 1950-1970 (18 states)
dependent variable: GRGSP-panel results

	7a	t	8a	t
Y	-5.365***	(-2.860)	-5.025***	(-2.907)
NONAGR	0.140**	(2.384)	0.140**	(2.397)
PROX				
PROXM	-1.056***	(-2.755)	-1.089***	(-2.908)
YPROXM	0.453**	(2.019)	0.517***	(2.861)
DD	-6.50 E-03	(-0.208)	-0.017	(-0.807)
SP	2.024	(0.484)		
NE	-9.200***	(-3.798)	-8.744***	(-3.943)
R2	0.441		0.439	
MSE	3.402		3.381	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XIII - INDGSP & PROX - BRAZIL- 1970-1995 (18 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.717**	(-2.105)	-0.845**	(-2.337)	-1.951***	(-3.927)	-1.012***	(-2.515)	-0.413	(-1.232)	-0.3689557	(-1.068)	-1.856***	(-3.812)	-1.357***	(-2.840)
INDGSP	-0.060*	(-1.759)	-0.068**	(-1.957)	0.010	(0.243)	-0.027	(-0.649)	-0.058*	(-1.658)	-0.062*	(-1.723)	6.54 E-03	(0.178)	-0.011	(-0.289)
PROX	306318.6**	(2.368)	299745.7**	(2.322)	-85513	(-0.485)	175939	(1.097)							46949.710	(1.574)
PROXM																
YPROXM									38660	(1.256)	21534.010	(0.498)	-49395.780	(-1.138)	-4.13 E-03	(-0.678)
DD	-8.58 E-03	(-1.551)	-7.37 E-03	(-1.316)	7.12 E-03	(0.995)	-4.39 E-03	(-0.695)	-0.010*	(-1.775)	-8.77 E-03	(-1.347)	0.011	(1.374)		
SP			1.778	(1.222)	5.509***	(2.977)					1.888	(0.566)	7.149***	(2.943)		
NE					-4.619***	(-3.041)	-1.621	(-1.360)					-4.623***	(-4.020)	-2.557***	(-2.682)
R2	0.696		0.701		0.733		0.703		0.681		0.682		0.736		0.707	
MSE	2.437		2.430		2.313		2.424		2.496		2.506		2.298		2.406	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XIII - INDGSP & PROX - BRAZIL- 1970-1995 (18 states)
dependent variable: GRGSP-panel results

	5a	t	6a	t
Y	-0.700*	(-1.946)	-0.765**	(-2.195)
INDGSP	-0.060*	(-1.736)	-0.081**	(-2.367)
PROX				
PROXM	321990.9**	(1.983)	676758.4***	(3.248)
YPROXM	-6086.246	(-0.161)	-153641.7**	(-2.271)
DD	-8.30 E-03	(-1.423)	3.15 E-03	(0.440)
SP			6.817***	(2.588)
NE				
R2	0.696		0.720	
MSE	2.452		2.369	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XIV - NONAGR & PROX - BRAZIL- 1970-1995 (18 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.869***	(-2.639)	-1.015***	(-2.905)	-1.916***	(-4.487)	-1.135***	(-3.159)	-0.577*	(-1.793)	-0.544*	(-1.654)	-1.839***	(-4.285)	-1.434***	(-3.364)
NONAGR	-0.052	(-1.215)	-0.065	(-1.487)	0.013	(0.265)	-6.08 E-03	(-0.123)	-0.053	(-1.213)	-0.058	(-1.290)	0.010	(0.233)	1.53 E-03	(0.033)
PROX	301257.3**	(2.306)	295432.7**	(2.267)	-81817.140	(-0.489)	141680	(0.895)								
PROXM																
YPROXM									40009	(1.279)	23961.290	(0.550)	-49561.380	(-1.145)	46535.740	(1.550)
DD	-4.90 E-03	(-0.741)	-2.62 E-03	(-0.382)	6.00 E-03	(0.861)	-3.12 E-03	(-0.471)	-6.60 E-03	(-0.969)	-4.72 E-03	(-0.612)	9.73 E-03	(1.246)	-3.97 E-03	(-0.603)
SP			1.820	(1.219)	5.436***	(3.053)					1.133	(0.532)	7.116***	(2.963)		
NE					-4.573***	(-3.317)	-1.996*	(-1.742)					-4.623***	(-4.209)	-2.697***	(-2.908)
R2	0.690		0.695		0.733		0.701		0.676		0.677		0.736		0.707	
MSE	2.461		2.454		2.313		2.431		2.515		2.526		2.298		2.407	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XIV - NONAGR & PROX - BRAZIL- 1970-1995 (18 states)
dependent variable: GRGSP-panel results

	5a	t	6a	t
Y	-0.858**	(-2.453)	-0.972***	(-2.833)
NONAGR	-0.051	(-1.182)	-0.076*	(1.766)
PROX				
PROXM	310086.8*	(1.891)	641400.2***	(3.051)
YPROXM	-3458.968	(-0.090)	-141348**	(-2.072)
DD	-4.79 E-03	(-0.706)	7.87 E-03	(0.936)
SP			6.459**	(2.415)
NE				
R2	0.690		0.711	
MSE	2.476		2.404	

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XV - INDGSP & PROX - BRAZIL- 1970-1995 (24 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	6.01 E-03	(0.017)	-0.137	(-0.368)	-2.230***	(-5.031)	-1.280***	(-3.086)	0.012	(0.034)	0.028*	(0.076)	-2.102***	(-4.462)	-1.599***	(-3.648)
INDGSP	-0.092*	(-1.916)	-0.096**	(-2.005)	-0.035	(-0.597)	-0.043	(-0.737)	-0.092*	(-1.932)	-0.098**	(-2.038)	-0.040	(-0.692)	-0.043	(-0.768)
PROXH	-25562	(-0.173)	-53578	(-0.361)	-121856	(-0.824)	-34403	(-0.233)								
YPROXSM									-6144.341	(-0.203)	-52587.830	(-1.257)	-63124.84*	(-1.726)	25322.280	(0.932)
DD	-0.016***	(-2.522)	-0.014**	(-2.232)	-0.011*	(1.846)	7.17 E-04	(0.121)	-0.015**	(-2.378)	-8.50 E-03	(-1.154)	0.017**	(2.449)	-2.15 E-03	(-0.407)
SP			2.420	(1.419)	7.245***	(4.586)					4.467**	(1.976)	9.512***	(4.260)		
NE					-5.636***	(-4.387)	-4.007	(-3.550)					-5.608***	(-4.601)	-4.209***	(-3.998)
R2	0.489		0.494		0.584		0.545		0.489		0.499		0.589		0.547	
MSE	3.841		3.838		3.497		3.640		3.841		3.817		3.475		3.632	

* All coefficients were corrected by heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Table XVI - NONAGR & PROX - BRAZIL- 1970-1995 (24 states)
dependent variable: GRGSP-panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.371	(-1.053)	-0.466	(-1.286)	-2.639***	(-6.898)	-1.794***	(-4.834)	-0.385	(-1.151)	-0.349	(-1.033)	-2.550***	(-6.552)	-2.230***	(-5.821)
NONAGR	0.030	(0.453)	0.024	(0.349)	0.059	(0.876)	0.072	(1.066)	0.031	(0.472)	0.014	(0.202)	0.050	(0.737)	0.084	(1.258)
PROX	-37650.940	(-0.259)	-61366.570	(-0.419)	-102631	(-0.743)	-11892	(-0.085)								
YPROXM									-6497	(-0.222)	-43629.990	(-1.093)	-49696.760	(-1.422)	38095.860	(1.475)
DD	-0.018**	(-2.294)	-0.017**	(-2.022)	9.023 E-03	(1.233)	-1.64 E-03	(-0.241)	-0.019**	(-2.237)	-0.012	(-1.254)	0.014	(1.634)	-5.70 E-03	(-0.900)
SP			1.720	(1.020)	7.168***	(4.536)					3.400	(1.551)	8.959***	(3.990)		
NE					-6.186***	(-5.577)	-4.703***	(-4.761)					-6.169***	(-5.672)	-5.035***	(-5.197)
R2	0.462		0.465		0.585		0.547		0.462		0.468		0.588		0.552	
MSE	3.939		3.947		3.490		3.630		3.939		3.936		3.479		3.609	

* All coefficients were corrected by heterocedascity;

** The high R2s, even when there is no significant coefficients, are probably due to the usage of time dummies.

Appendix 3 - Dependent Variable: GRIND - panel results for Brazil

Table I- INDGSP & TR - BRAZIL -1950-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.598	(0.888)	0.164	(0.257)	-1.238	(-1.149)	-0.232	(-0.329)	0.481	(0.722)	0.178	(0.281)	-1.388	(-1.632)	-0.603	(-0.804)
INDGSP	-0.345***	(-2.603)	-0.389***	(-2.736)	-0.329***	(-2.672)	-0.296***	(-2.508)	-0.335**	(-2.419)	-0.363***	(-2.513)	-0.317**	(-2.464)	-0.295**	(-2.337)
TR	4.028	(1.088)	3.844	(1.018)	2.463	(0.598)	3.161	(0.800)								
YTRM									1.136	(1.388)	0.572	(0.695)	0.740	(0.916)	1.399*	-1.687
DD	-0.015	(-1.412)	-8.86 E-0:	(-0.854)	3.86 E-03	(0.333)	-7.55 E-0:	(-0.728)	-0.013	(-1.250)	-7.40 E-0:	(-0.696)	5.02 E-03	(0.452)	-5.67 E-0:	(-0.556)
SP			5.363**	(2.398)	7.052***	(2.718)					5.060**	(2.218)	6.737***	(2.661)		
NE					-3.323	(-1.588)	-2.179	(-1.192)					-3.566*	(-1.810)	-2.635	(-1.502)
R2	0.426		0.437		0.450		0.432		0.425		0.435		0.450		0.434	
MSE	6.971		6.924		6.870		6.958		6.973		6.939		6.870		6.943	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table II - NONAGR & TR - BRAZIL -1950-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.204	(-0.392)	-0.478	(-0.869)	-2.467***	(-2.633)	-1.555**	(-2.311)	-0.189	(-0.357)	-0.422	(-0.782)	-2.469***	(-2.558)	-1.752**	(-2.305)
NONAGR	-0.046	(-0.716)	-0.063	(-0.898)	-0.040	(-0.662)	-0.013	(-0.233)	-0.052	(-0.755)	-0.071	(-0.938)	-0.052	(-0.784)	-0.025	(-0.417)
TR	-2.709	(-0.615)	-3.090	(-0.688)	-3.645	(-0.794)	-2.820	(-0.644)								
YTRM									-0.605	(-0.596)	-1.050	(-0.951)	-0.545	(-0.559)	0.082	(0.091)
DD	-0.011	(-0.895)	-5.82 E-0	(-0.444)	0.012	(0.768)	-7.47 E-0	(-0.061)	-0.011	(-0.940)	-5.22 E-0	(-0.393)	0.106	(0.705)	-1.76 E-0	(-0.147)
SP			2.840	(1.389)	5.931**	(2.232)					3.477	(1.596)	5.979**	(2.203)		
NE					-5.082**	(-2.086)	-4.060*	(-1.914)					-4.897**	(-2.126)	-4.072**	(-1.984)
R2	0.377		0.380		0.412		0.400		0.376		0.380		0.410		0.398	
MSE	7.263		7.268		7.100		7.151		7.268		7.267		7.115		7.162	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table IV - NONAGR & TR - BRAZIL -1950-1970 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	1.028	(0.823)	1.122	(0.874)	-2.593	(-1.008)	-1.157	(-0.562)	0.776	(0.690)	0.881	(0.726)	-2.755	(-1.093)	-1.912	(-0.920)
NONAGR	0.094	(1.150)	0.098	(1.099)	0.130	(1.506)	0.137	(1.599)	0.098	(1.158)	0.103	(1.159)	0.136	(1.569)	0.139	(1.630)
TR	-3.513	(-0.470)	-3.169	(-0.373)	-4.732	(-0.619)	-2.844	(-0.386)								
YTRM									-0.511	(-0.258)	0.048	(0.017)	3.29 E-03	(0.001)	1.068	(0.432)
DD	-0.060**	(-2.332)	-0.063*	(-1.799)	-0.025	(-0.702)	-0.048**	(-2.037)					-0.036	(-0.975)	-0.052**	(-2.135)
SP			-0.604	(-0.200)	3.767	(1.181)			-0.064***	(-2.532)	-0.069**	(-2.036)	2.826	(0.849)		
NE					-4.075	(-1.538)	-2.936	(-1.309)			-1.123	(-0.343)	-3.873	(-1.436)	-3.186	(-1.339)
R2	0.347		0.347		0.371		0.365		0.345		0.346		0.368		0.365	
MSE	5.479		5.522		5.463		5.445		5.488		5.529		5.479		5.447	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table V- INDGSP & TR - BRAZIL -1970-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.461	(0.574)	0.165	(0.206)	-1.591	(-1.031)	-0.211	(-0.236)	0.285	(0.373)	0.142	(0.185)	-1.675	(-1.111)	-0.640	(-0.684)
INDGSP	-0.390**	(-2.192)	-0.406**	(-2.213)	-0.327**	(-2.320)	-0.347**	(-2.335)	-0.392**	(-2.032)	-0.393**	(-2.026)	-0.318**	(-2.182)	-0.348**	(-2.159)
TR	4.136	(1.009)	4.156	(0.990)	3.133	(0.644)	3.666	(0.808)								
YTRM									1.398	(1.530)	1.104	(1.254)	0.924	(1.021)	1.544	(1.624)
DD	-0.014	(-1.099)	-0.011	(-0.898)	3.13 E-03	(0.201)	-8.30 E-0:	(-0.672)	-0.013	(-0.993)	-0.011	(-0.840)	3.66 E-03	(0.258)	-6.26 E-0:	(-0.538)
SP			3.738	(1.289)	7.116	(1.440)					2.509	(0.881)	6.197	(1.267)		
NE					-4.401	(-0.930)	-1.986	(-0.590)					-4.542	(-1.011)	-2.615	(-0.805)
R2	0.452		0.456		0.466		0.454		0.453		0.455		0.465		0.458	
MSE	8.037		8.057		8.036		8.068		8.025		8.063		8.037		8.041	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VI - NONAGR & TR - BRAZIL -1970-1995 (18 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.295	(-0.504)	-0.657753	(-1.070)	-2.881*	(-1.748)	-1.325	(-1.478)	-0.368	(-0.638)	-0.628	(-1.088)	-2.870*	(-1.670)	-1.573	(-1.485)
NONAGR	-0.339*	(-1.841)	-0.370*	(-1.890)	-0.277*	(-1.902)	-0.267*	(-1.808)	-0.347*	(-1.752)	-0.370*	(-1.777)	-0.279*	(-1.815)	-0.280*	(-1.760)
TR	-0.599	(-0.131)	-0.658	(-0.143)	-0.719	(-0.153)	-0.597	(-0.130)								
YTRM									0.145	(0.158)	-0.347	(-0.341)	-0.208	(-0.211)	0.517	(0.583)
DD	0.014	(0.883)	0.019	(1.097)	0.031	(1.405)	0.018	(1.042)	0.014	(0.887)	0.020	(1.107)	0.032	(1.405)	0.018	(1.073)
SP			4.195	(1.492)	8.824*	(1.665)					4.601	(1.444)	9.043	(1.582)		
NE					-6.122	(-1.233)	-3.459	(-0.947)					-6.095	(-1.243)	-3.691	(-1.013)
R2	0.426		0.431		0.452		0.435		0.426		0.431		0.452		0.435	
MSE	8.220		8.235		8.136		8.210		8.220		8.233		8.136		8.204	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VII- INDGSP & TR - BRAZIL -1970-1995 (24 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.670	(1.076)	0.330	(0.495)	-1.980*	(-1.713)	-0.655	(-0.730)	0.601	(0.914)	0.356	(0.518)	-2.063*	(-1.696)	-1.080	(-1.052)
INDGSP	-0.382***	(-3.224)	-0.387***	(-3.264)	-0.339***	(-2.825)	-0.347***	(-2.860)	-0.398***	(-3.456)	-0.399***	(-3.468)	-0.342***	(-2.925)	-0.353***	(-3.018)
TR	-2.064	(-0.586)	-2.624	(-0.743)	-0.079	(-0.024)	0.014	(0.004)								
YTRM									0.172	(0.191)	-0.243	(-0.264)	0.279	(0.292)	0.863	(0.894)
DD	-0.013	(-0.925)	-0.010	(-0.746)	9.29 E-03	(0.645)	-1.32 E-0	(-0.095)	-0.018	(-1.292)	-0.014	(-0.996)	7.71 E-03	(0.556)	-4.38 E-0	(-0.332)
SP			4.472	(1.280)	8.875**	(2.345)					4.416	(1.262)	8.466**	(2.336)		
NE					-5.957**	(-2.225)	-3.997*	(-1.772)					-6.102**	(-2.175)	-4.673*	(-1.864)
R2	0.525		0.528		0.545		0.534		0.524		0.527		0.546		0.536	
MSE	8.571		8.579		8.460		8.526		8.581		8.594		8.458		8.505	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VIII - NONAGR & TR - BRAZIL -1970-1995 (24 states)
dependent variable: industrial growth rate - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.020	(0.037)	-0.365	(-0.609)	-3.169***	(-3.139)	-1.669**	(-2.258)	0.148	(0.235)	-0.207	(-0.323)	-3.267***	(-3.061)	-2.064**	(-2.316)
NONAGR	-0.360**	(-2.123)	-0.376**	(-2.168)	-0.320**	(-2.005)	-0.310*	(-1.924)	-0.365446	(-2.155)	-0.396**	(-2.236)	-0.327**	(-2.021)	-0.297*	(-1.874)
TR	-7.746**	(-2.199)	-8.494**	(-2.366)	-4.377	(-1.439)	-4.291	(-1.410)								
TRM																
YTRM									-1.363	(-1.558)	-2.094**	(-2.094)	-1.072	(-1.167)	-0.189	(-0.218)
DD	0.015	(0.893)	0.019	(1.074)	0.039**	(1.999)	0.026	(1.499)	0.007	(0.449)	0.016	(0.876)	0.040**	(1.997)	0.022	(1.273)
SP			5.182	(1.541)	10.645***	(2.788)					7.357**	(1.995)	12.175***	(3.027)		
NE					-7.519***	(-2.920)	-5.296**	(-2.450)					-8.011***	(-2.927)	-6.267***	(-2.553)
R2	0.482		0.487		0.515		0.499		0.471		0.479		0.514		0.494	
MSE	8.948		8.949		8.737		8.843		9.043		9.018		8.752		8.882	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table VIII - NONAGR & TR - BRAZIL -1970-1995 (24 states)
dependent variable: industrial growth rate - panel results

	5a	t
Y	-0.456	(-0.722)
NONAGR	-0.341**	(-2.010)
TR		
TRM	-14.984*	(-1.907)
YTRM	2.381	(1.194)
DD	0.013	(0.783)
SP		
NE		
R2	0.487	
MSE	8.946	

* All standard errors were corrected for heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Appendix 3 - GRIND - panel results
Table IX - INDGSP & PROX - BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.663	(-1.102)	-0.900	(-1.463)	-1.208	(-1.451)	-0.561	(-0.790)	-0.998	(-0.152)	0.127	(0.181)	-1.256	(-1.423)	-1.202	(-1.398)
INDGSP	-0.314**	(-2.323)	-0.351**	(-2.463)	-0.328**	(-2.422)	-0.327**	(-2.393)	-0.309**	(-2.268)	-0.347**	(-2.373)	-0.301**	(-2.319)	-0.263**	(-2.162)
PROX	0.489**	(2.302)	0.443**	(2.162)	0.294	(1.346)	0.545**	(2.418)								
PROXM																
YPROXM									0.080*	(1.668)	0.018	(0.297)	3.63 E-04	(0.007)		
DD	-0.011	(-1.109)	-6.53 E-03	(-0.637)	-7.32 E-04	(-0.060)	-0.013	(-1.214)	-0.016	(-1.395)	-7.81 E-03	(-0.619)	6.04 E-03	(0.468)	0.089*	(1.929)
SP			4.477**	(2.243)	5.608**	(2.171)					4.912*	(-0.520)	7.174**	(2.385)	-8.62 E-03	(-0.808)
NE					-1.616	(-0.677)	0.665	(0.358)					-3.502**	(-1.770)	-2.595	(-1.454)
R2	0.442		0.450		0.451		0.443		0.428		0.434		0.449		0.437	
MSE	6.869		6.844		6.859		6.890		6.955		6.942		6.877		6.926	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table IX - INDGSP & PROX - BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	5a	t	6a	t
Y	-0.726	(-1.151)	-0.532	(-0.817)
INDGSP	-0.314**	(-2.322)	-0.368**	(-2.467)
PROX				
PROXM	0.470**	(1.957)	0.562**	(2.223)
YPROXM	0.011	(0.237)	-0.089	(-1.308)
DD	-0.012	(-1.119)	5.45 E-04	(0.046)
SP			6.853**	(2.391)
NE				
R2	0.442		0.454	
MSE	6.892		6.846	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table X - NONAGR & PROX - BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-1.705**	(-2.370)	-1.841**	(-2.447)	-2.617***	(-2.556)	-1.965**	(-2.415)	-1.075*	(-1.848)	-1.050*	(-1.817)	-2.784***	(-2.602)	-2.666***	(-2.581)
NONAGR	-0.076	(-1.024)	-0.086	(-1.114)	-0.052	(-0.785)	-0.042	(-0.656)	-0.060	(-0.831)	-0.065	(-0.850)	-0.049	(-0.728)	-0.026	(-0.430)
PROX	0.475**	(2.098)	0.460**	(2.023)	-0.023	(-0.112)	0.223	(1.211)								
PROXM																
YPROXM									0.069	(1.410)	0.058	(0.947)	0.027	(0.518)	0.085*	(1.831)
DD	-8.67 E-03	(-0.754)	-5.88 E-03	(-0.461)	0.010	(0.656)	-3.16 E-03	(-0.271)	-0.015	(0.078)	-0.013	(-0.834)	7.07 E-03	(0.424)	-5.14 E-03	(-0.436)
SP			1.731	(0.962)	5.704**	(2.040)					0.877	(0.350)	4.741*	(1.699)		
NE					-5.143*	(-1.771)	-2.905	(-1.348)					-4.927**	(-2.070)	-4.260**	(-1.978)
R2	0.394		0.395		0.409		0.400		0.379		0.379		0.409		0.404	
MSE	7.164		7.181		7.119		7.149		7.248		7.271		7.117		7.123	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table X - NONAGR & PROX - BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	5a	t	6a	t
Y	-1.704**	(-2.403)	-1.683**	(-2.396)
NONAGR	-0.076	(-1.017)	-0.095	(-1.139)
PROX				
PROXM	0.475*	(1.807)	0.521*	(1.894)
YPROXM	-7.81 E-05	(-0.001)	-0.044	(-0.637)
DD	-8.67 E-03	(-0.718)	-1.48 E-03	(-0.093)
SP			2.926	(1.203)
NE				
R2	0.394		0.396	
MSE	7.188		7.201	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XI - INDGSP & PROX - BRAZIL - 1950-1970 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	1.484	(0.950)	0.769	(0.516)	0.459	(0.166)	2.232	(0.978)	0.370	(0.252)	0.548	(0.344)	-0.046	(-0.017)	0.388	(0.148)
INDGSP	-0.274**	(-2.380)	-0.384**	(-2.457)	-0.379**	(-2.296)	-0.327**	(-2.076)	-0.321***	(-2.849)	-0.360**	(-2.153)	-0.353**	(-2.063)	-0.322**	(-2.157)
PROX	0.228	(0.910)	0.219	(0.864)	0.174	(0.564)	0.366	(1.487)								
YPROXM									0.258**	(2.414)	0.203	(1.120)	0.174	(0.904)	0.258**	(2.396)
DD	-0.024	(-1.541)	-3.94 E-03	(-0.181)	8.47 E-04	(0.023)	-0.033*	(-1.701)	-0.031**	(-2.026)	-0.022	(-0.716)	-0.012	(-0.272)	-0.031*	(-1.690)
SP			5.486*	(1.785)	6.035	(1.431)					2.321	(0.463)	3.550	(0.600)		
NE					-0.585	(-0.149)	1.836	(0.616)					-0.841	(-0.260)	0.022	(0.008)
R2	0.379		0.394		0.395		0.383		0.396		0.397		0.398		0.396	
MSE	5.343		5.319		5.361		5.368		5.272		5.306		5.345		5.314	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XII - NONAGR & PROX - BRAZIL - 1950-1970 (18 states)
dependent variable: GRIND - panel results

	1		2		3		4		5		6		7		8	
Y	-1.016	(-0.648)	-0.783	(-0.474)	-2.733	(-1.112)	-1.756	(-1.032)	-1.022	(-0.646)	-1.166	(-0.722)	-3.023	(-1.241)	-3.283	(-1.528)
NONAGR	0.104	(1.261)	0.110	(1.269)	0.135	(1.603)	0.135'	(1.606)	0.084	(1.027)	0.105	(1.251)	0.127	(1.533)	0.126	(1.542)
PROX	0.312	(1.237)	0.311	(1.223)	0.026	(0.083)	0.123	(0.485)		(1.513)						
YPROXM									0.175		0.311967*	(1.889)	0.215	(1.188)	0.182	(1.617)
DD	-0.059**	(-2.403)	-0.064**	(-2.189)	-0.037	(-0.897)	-0.052**	(-2.082)	-0.064***	(-2.516)	-0.086***	(-2.636)	-0.058	(-1.311)	-0.051**	(-2.083)
SP			-1.048	(-0.462)	2.656	(0.679)					-5.326	(-1.446)	-1.318	(-0.266)		
NE					-3.698	(-1.027)	-2.429	(-1.053)					-2.655	(-0.889)	-3.054	(-1.434)
R2	0.357		0.358		0.368		0.365		0.356		0.368		0.376		0.375	
MSE	5.437		5.477		5.479		5.446		5.444		5.435		5.443		5.401	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XIII - INDGSP & PROX - BRAZIL - 1970-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.583	(-0.804)	-0.831	(-1.123)	-1.484	(-0.863)	-0.518	(-0.609)	-0.073	(-0.089)	6.05 E-03	(0.007)	-1.620	(-1.112)	-1.015	(-0.951)
INDGSP	-0.355*	(-1.939)	-0.370**	(-1.969)	-0.324**	(-2.399)	-0.363**	(-2.369)	-0.352*	(-1.920)	-0.359*	(-1.904)	-0.284**	(-2.119)	-0.305**	(-2.054)
PROX	562319**	(2.142)	549520**	(2.129)	321940	(0.556)	590875*	(1.655)								
PROXM																
YPROXM									77186	(1.286)	46113	(0.543)	-31463	(-0.266)	85451	(1.462)
DD	-0.011	(-0.888)	-8.89 E-03	(-0.706)	-3.27 E-03	(-0.015)	-0.012	(-0.943)	-0.015	(-1.085)	-0.012	(-0.804)	9.20 E-03	(0.411)	-8.59 E-03	(-0.709)
SP			3.463	(1.212)	5.667	(0.803)					2.156	(0.513)	8.675	(1.011)		
NE					-2.728	(-0.365)	0.355	(0.087)					-5.056	(-0.949)	-2.549	(-0.781)
R2	0.460		0.463		0.465		0.460		0.452		0.453		0.463		0.456	
MSE	7.978		8.001		8.038		8.027		8.034		8.079		8.050		8.052	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XIII - INDGSP & PROX - BRAZIL - 1970-1995 (18 states)
dependent variable: GRIND - panel results

	5a	t	6a	t
Y	-0.578	(-0.753)	-0.693	(-0.892)
INDGSP	-0.355*	(-1.933)	-0.393**	(-1.999)
PROX				
PROXM	566159*	(1.677)	1196063**	(2.037)
YPROXM	-1491	(-0.021)	-263482	(-1.410)
DD	-0.011	(-0.850)	9.16 E-03	(0.522)
SP			12.103*	(1.668)
NE				
R2	0.460		0.472	
MSE	8.027		7.985	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XIV - NONAGR & PROX - BRAZIL - 1970-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-1.447**	(-2.346)	-1.766***	(-2.515)	-2.915	(-1.627)	-1.682*	(-1.861)	-1.066*	(-1.844)	-1.003*	(-1.745)	-2.847*	(-1.710)	-2.237*	(-1.801)
NONAGR	-0.357*	(-1.759)	-0.387*	(-1.808)	-0.288**	(-2.054)	-0.317**	(-2.024)	-0.364*	(-1.762)	-0.373*	(-1.744)	-0.276*	(-1.842)	-0.290*	(-1.798)
PROX	544689**	(2.041)	532007**	(2.009)	50589	(0.088)	403251	(1.124)								
PROXM																
YPROXM									90203	(1.582)	59376	(0.775)	-45319	(-0.387)	99129*	(1.721)
DD	0.015	(0.979)	0.020	(1.169)	0.031	(1.195)	0.017	(0.989)	0.011	(0.733)	0.015	(0.788)	0.036	(1.185)	0.015	(0.926)
SP			3.963	(1.454)	8.577	(1.165)					2.177	(0.564)	10.697	(1.176)		
NE					-5.836	(-0.755)	-1.769	(-0.385)					-6.583105	(-1.134)	-3.688	(-1.000)
R2	0.437		0.442		0.452		0.439		0.432		0.432		0.452		0.441	
MSE	8.141		8.159		8.137		8.181		8.181		8.227		8.132		8.162	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XIV - NONAGR & PROX - BRAZIL - 1970-1995 (18 states)
dependent variable: GRIND - panel results

	6a	t
Y	-1.701***	(-2.509)
NONAGR	-0.403*	(-1.831)
PROX		
PROXM	1047429*	(1.824)
YPROXM	-210580	(-1.212)
DD	0.036	(1.397)
SP	10.873	(1.602)
NE		
R2	0.447	
MSE	8.168	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XV - INDGSP & PROX - BRAZIL - 1970-1995 (24 states)
1970-1995: 2 dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	
Y	0.598	(0.833)	0.361	(0.471)	-1.891	(-1.590)	-0.682	(-0.703)	0.520	(0.663)	0.541	(0.688)	-1.759	(-1.427)	-1.161	(-0.978)
INDGSP	-0.396***	(-3.470)	-0.402***	(-3.520)	-0.337***	(-2.812)	-0.347***	(-2.909)	-0.396***	(-3.535)	0.404***	(-3.598)	-0.341***	(-2.943)	-0.344***	(-3.014)
PROX	26821	(0.090)	-19775	(-0.067)	-93236	(-0.314)	18015	(0.060)								
YPROXM									15600	(0.232)	-45430	(-0.516)	-56806	(-0.665)	48420	(0.694)
DD	-0.018	(-1.199)	-0.016	(-1.042)	0.011	(0.774)	-1.67 E-03	(-0.118)	-0.019	(-1.228)	-0.010	(-0.579)	0.017	(1.023)	-5.46 E-03	(-0.394)
SP			4.025	(1.155)	9.216***	(2.491)					5.869	(1.310)	11.317**	(2.461)		
NE					6.064**	(-2.177)	-3.991*	(-1.666)					-6.055***	(-2.193)	-4.390*	(-1.744)
R2	0.524		0.526		0.546		0.534		0.524		0.527		0.547		0.536	
MSE	8.582		8.595		8.456		8.526		8.580		8.588		8.447		8.512	

* All results were corrected by heterocedasticity;

** The high R2s may be due to the usage of time dummies.

Table XVI- NONAGR & PROX - BRAZIL - 1970-1995 (24 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	0.181	(0.255)	-0.051	(-0.067)	-3.160***	(-2.918)	-1.747**	(-2.025)	-0.031	(-0.041)	0.060	(0.082)	-3.065***	(-2.894)	-2.479**	(-2.416)
NONAGR	-0.365**	(-2.241)	-0.380**	(-2.288)	-0.331**	(-2.150)	-0.308**	(-2.008)	-0.354**	(-2.151)	-0.397**	(-2.309)	-0.347**	(-2.178)	-0.285*	(-1.865)
PROX	-260141	(-0.908)	-318043	(-1.115)	-377082	(-1.419)	-225256	(-0.815)								
PROXM																
YPROXM									-31299	(-0.496)	-124140	(-1.467)	-132753*	(-1.641)	27888	(0.426)
DD	3.10 E-03	(0.191)	6.25 E-03	(0.364)	0.044**	(2.325)	0.026	(1.570)	9.96 E-04	(0.059)	0.017	(0.809)	0.054**	(2.416)	0.018	(1.110)
SP			4.198	(1.256)	11.994***	(3.235)					8.501**	(1.967)	16.392***	(3.355)	-6.683***	(-2.691)
NE					-8.851***	(-3.178)	-6.369***	(-2.676)					-8.758***	(-3.146)		
R2	0.467		0.470		0.516		0.496		0.465		0.472		0.517		0.495	
MSE	9.075		9.091		8.727		8.864		9.094		9.078		8.720		8.878	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Table XVI- NONAGR & PROX - BRAZIL - 1970-1995 (24 states)
dependent variable: GRIND - panel results

	8a	t
Y	-2.690***	-2.645
NONAGR	-0.295*	-1.907
PROX		
PROXM	-791537*	-1.869
YPROXM	186668*	1.891
DD	0.201	1.201
SP		
NE	-7.793***	-2.957
R2	0.505	
MSE	8.826	

* All standard errors were corrected for heteroscedasticity;

** The high R2s may be due to the usage of time dummies.

Appendix 4 - Data Set India

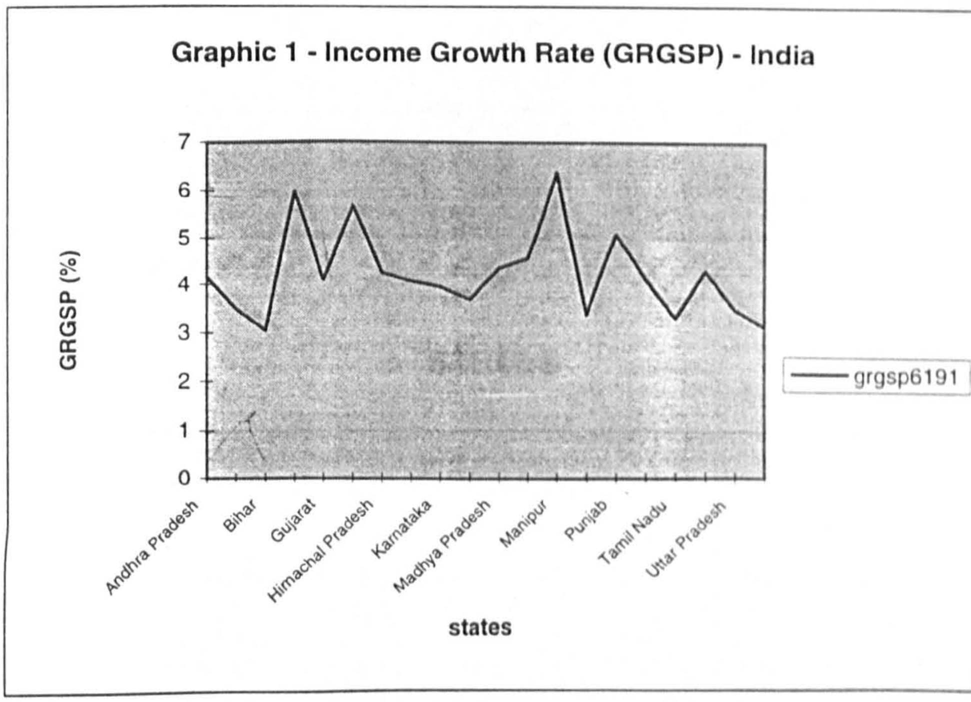
State	Year	grgsp	grind	y*	indgsp	nonagr	dd	tr (km/sql	road (km	prox (km)	yroadm	yproxm
Andhra Pra	1961	3.42	4.68	2568	7.8	41.8	130.7			1.1E-05	-277.190	5.63E-03
Assam	1961	-7.09	-12.77	2940	17.1	44.7	88.83			6.9E-06	-516.224	-6.26E-03
Bihar	1961	2.21	2.41	2006	9.7	46.4	266.94			1E-05	-178.879	2.81E-03
Delhi	1961	4.05	1.40	6235	23.3	93	1772.67			9.8E-06	9907.526	4.95E-03
Gujarat	1961	4.98	2.26	3378	20.8	58.4	110.28			9.9E-06	-467.271	3.07E-03
Haryana	1961	6.87	5.56	3053	11.2	37.3	171.74			8.4E-06	133.843	-1.81E-03
Himachal P	1961	5.64	6.01	2465	5.6	39.4	99.72			8.2E-06	-499.140	-1.89E-03
Jammu&Ka	1961	3.77	3.03	2512	5.8	32.5	16.03			6.7E-06	-569.035	-5.76E-03
Karnataka	1961	3.95	9.69	2763	9	39.6	122.72			8.5E-06	65.810	-1.43E-03
Kerala	1961	4.71	4.71	2419	12.5	44.4	434.55			6.2E-06	652.141	-6.72E-03
Madhya Pra	1961	3.09	5.87	2352	6.9	37.9	72.99			1.2E-05	-399.463	8.17E-03
Maharashtra	1961	2.94	5.06	3820	21.6	58.4	128.63			9.9E-06	-426.045	3.24E-03
Manipur	1961	6.39	5.60	1438	8.3	44.3	34.98			6.2E-06	-280.492	-4.07E-03
Orissa	1961	4.19	5.15	2026	7.3	38.7	112.64			1E-05	-365.530	2.02E-03
Punjab	1961	6.90	4.44	3415	10.1	46	91.05			8.4E-06	101.524	-2.03E-03
Rajasthan	1961	4.85	-12.88	2652	10.2	43.8	58.88			1E-05	-482.388	3.72E-03
Tamil Nadu	1961	1.55	4.14	3118	15	48.1	258.34			8.6E-06	452.283	-1.21E-03
Tripura	1961	4.18	-3.32	2324	5.7	37.3	108.76			7.3E-06	-347.647	-3.90E-03
Uttar Prade	1961	2.39	3.75	2352	7.8	39.9	250.53			1.2E-05	-315.711	5.90E-03
West Benga	1961	2.65	1.14	3641	20.3	59.5	398.7			9E-06	-139.798	1.34E-04

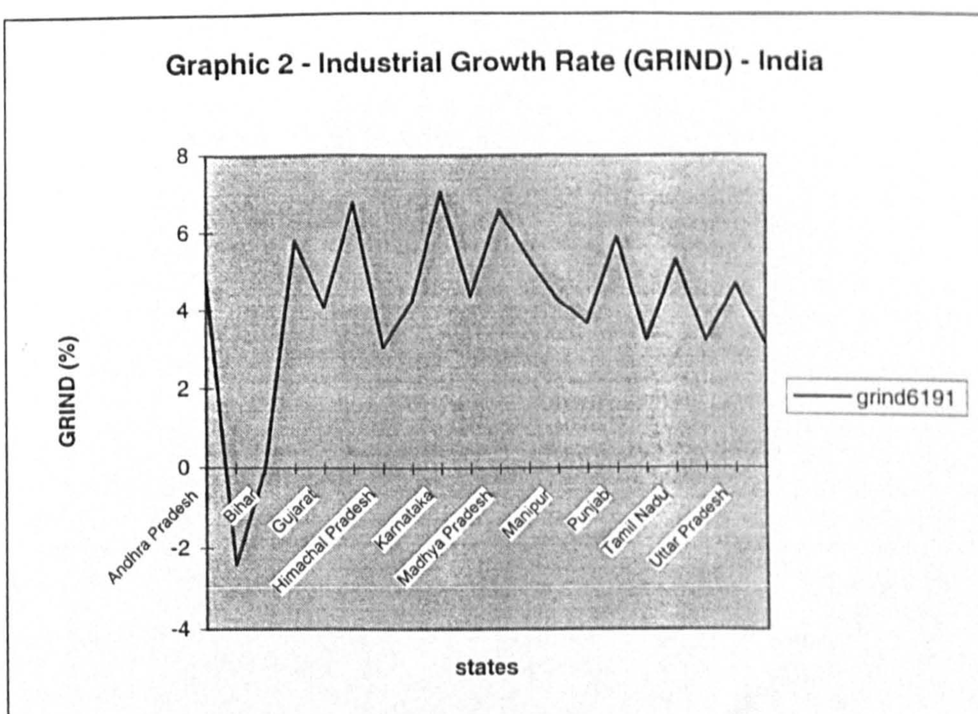
* 1990 rupees

State	Year	grgsp	grind	y*	indgsp	nonagr	dd	tr (km/sql	road (km	prox (km)	yroadm	yproxm
Andhra Pra	1971	2.44	4.94	2993	8.8	43.4	157.16		0.141	1.1E-05	-323.016	6.40E-03
Assam	1971	12.26	9.20	2738	9.1	38.6	71.1		0.074	6.7E-06	-480.843	-6.52E-03
Bihar	1971	2.11	-2.25	2057	9.9	42	324.05		0.160	1E-05	-183.408	2.29E-03
Delhi	1971	7.65	10.46	6136	18	93.2	2710.67		1.838	1E-05	9750.267	6.38E-03
Gujarat	1971	2.71	5.98	4243	16	52	136.21		0.111	1E-05	-586.932	5.17E-03
Haryana	1971	4.29	8.05	4487	9.9	35.4	227.08		0.293	8.7E-06	196.698	-1.63E-03
Himachal P	1971	3.03	0.22	3467	5.8	43	62.12		0.047	8.5E-06	-701.967	-1.95E-03
Jammu&Ka	1971	6.24	5.43	2805	5.4	43.1	20.78		0.023	6.9E-06	-635.201	-6.05E-03
Karnataka	1971	2.78	4.51	3278	15.4	45.8	152.76		0.273	8.5E-06	78.083	-1.88E-03
Kerala	1971	2.78	4.03	3038	12.5	50.6	548.77		0.519	6.2E-06	819.145	-8.55E-03
Madhya Pra	1971	4.29	7.33	2475	9	40.3	94.07		0.079	1.3E-05	-420.364	9.03E-03
Maharashtr	1971	5.34	5.69	4004	26.5	71.6	163.78		0.138	1E-05	-446.547	4.05E-03
Manipur	1971	8.22	3.01	1949	7.7	47.9	47.9		0.054	6E-06	-380.142	-5.93E-03
Orissa	1971	3.02	2.22	2445	8	34.5	140.85		0.069	9.7E-06	-441.134	1.69E-03
Punjab	1971	3.12	7.39	5475	8	41.7	268.87		0.279	8.7E-06	162.764	-1.99E-03
Rajasthan	1971	0.85	22.40	3331	1.6	39	75.3		0.067	1.1E-05	-605.920	5.71E-03
Tamil Nadu	1971	2.82	6.49	2972	19.3	60.7	316.92		0.394	8.5E-06	431.086	-1.58E-03
Tripura	1971	4.75	10.24	2568	2.7	30	148.19		0.100	7.1E-06	-384.209	-5.01E-03
Uttar Prade	1971	3.71	5.64	2487	8.9	40	300.07		0.115	1.2E-05	-333.895	6.13E-03
West Benga	1971	1.70	5.27	3692	17.5	56.5	504.12		0.211	8.7E-06	-141.769	-1.11E-03

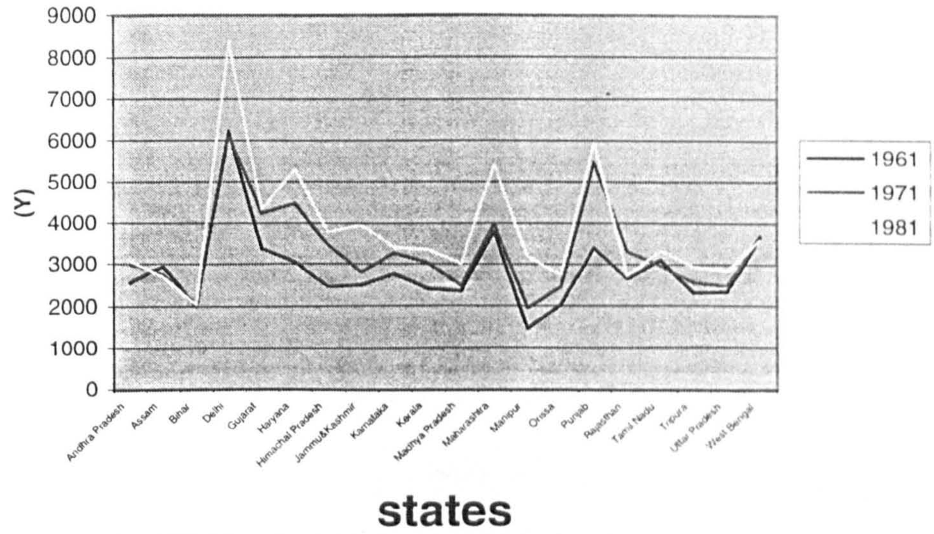
State	Year	grgsp	grind	y*	indgsp	nonagr	dd	tr (km/sq	road (km	prox (km)	yroadm	yproxm
Andhra Pra	1981	6.65		3075	11.2	54.4	194.73	0.486	0.223	1.1E-05	-791.327	6.21E-03
Assam	1981	6.31		2676	6.9	46	231.31	0.788	0.107	6.6E-06	-999.913	-6.40E-03
Bihar	1981	4.84		2045	6.4	45.9	401.81	0.512	0.162	1E-05	-650.013	2.03E-03
Delhi	1981	6.34		8383	23.3	95.5	4146.67	10.767	4.790	1E-05	36125.581	9.55E-03
Gujarat	1981	4.69		4342	21.9	61.5	173.91	0.337	0.202	1E-05	-1210.461	5.81E-03
Haryana	1981	5.97		5282	14.1	45.8	293.7	0.577	0.445	8.7E-06	-184.729	-1.38E-03
Himachal P	1981	4.24		3797	4.4	49.9	76.45	0.373	0.076	8.5E-06	-1533.990	-1.76E-03
Jammu&Ka	1981	2.34		3960	5	49.3	26.97	0.053	0.030	6.9E-06	-1782.329	-8.17E-03
Karnataka	1981	5.23		3405	18.2	57.2	193.42	0.604	0.315	8.4E-06	-563.660	-2.24E-03
Kerala	1981	3.67		3361	14.1	60.5	652.67	2.777	0.584	6.2E-06	347.606	-9.59E-03
Madhya Pra	1981	5.74		3008	12	50.7	117.79	0.255	0.117	1.3E-05	-1094.471	1.11E-02
Maharashtr	1981	5.44		5410	27.4	72.2	203.84	0.603	0.250	1E-05	-1248.946	6.41E-03
Manipur	1981	4.49		3184	4.7	51.2	64.59	0.239	0.088	5.9E-06	-1248.781	-9.74E-03
Orissa	1981	2.99		2744	7.4	45.1	169.04	0.785	0.103	9.5E-06	-1036.261	1.38E-03
Punjab	1981	5.31		5961	12	51.1	335.78	0.960	0.691	8.7E-06	1256.577	-1.55E-03
Rajasthan	1981	6.81		2724	11.1	49.7	100.18	0.228	0.101	1.1E-05	-1032.935	4.87E-03
Tamil Nadu	1981	5.67		3341	27.4	74.6	372.37	1.050	0.697	8.3E-06	724.308	-2.20E-03
Tripura	1981	3.97		2948	4.5	42.8	205.3	0.764	0.120	7E-06	-1062.386	-5.92E-03
Uttar Prade	1981	4.45		2850	10.7	48.3	377.08	0.550	0.233	1.1E-05	-704.021	7.04E-03
West Beng	1981	5.15		3594	24.7	68.1	613.27	0.684	0.274	8.5E-06	-743.156	-1.65E-03

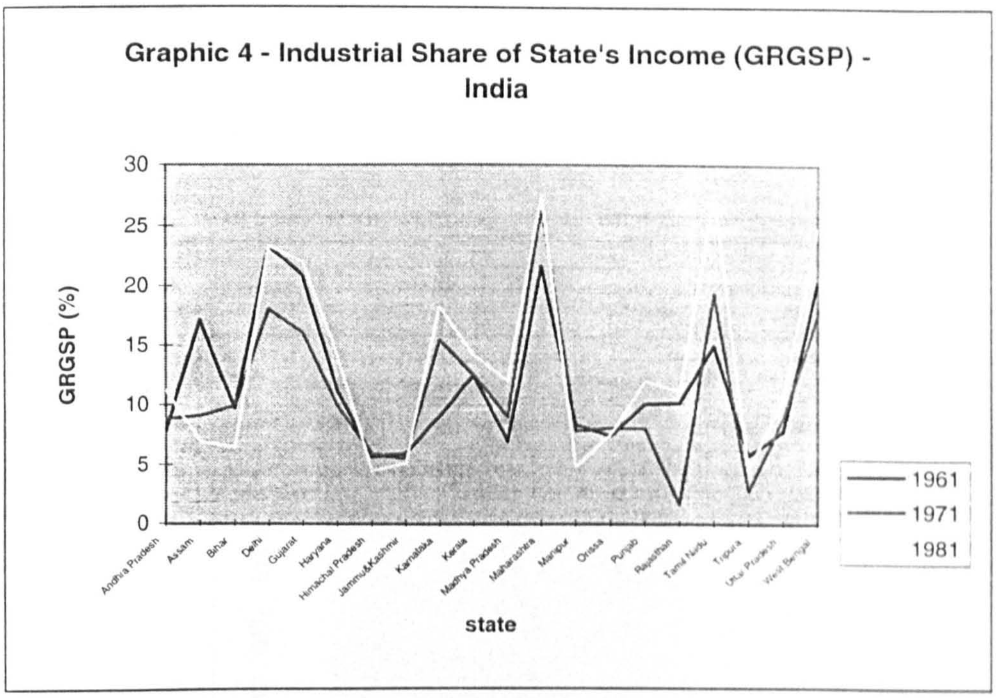
* 1990 rupees

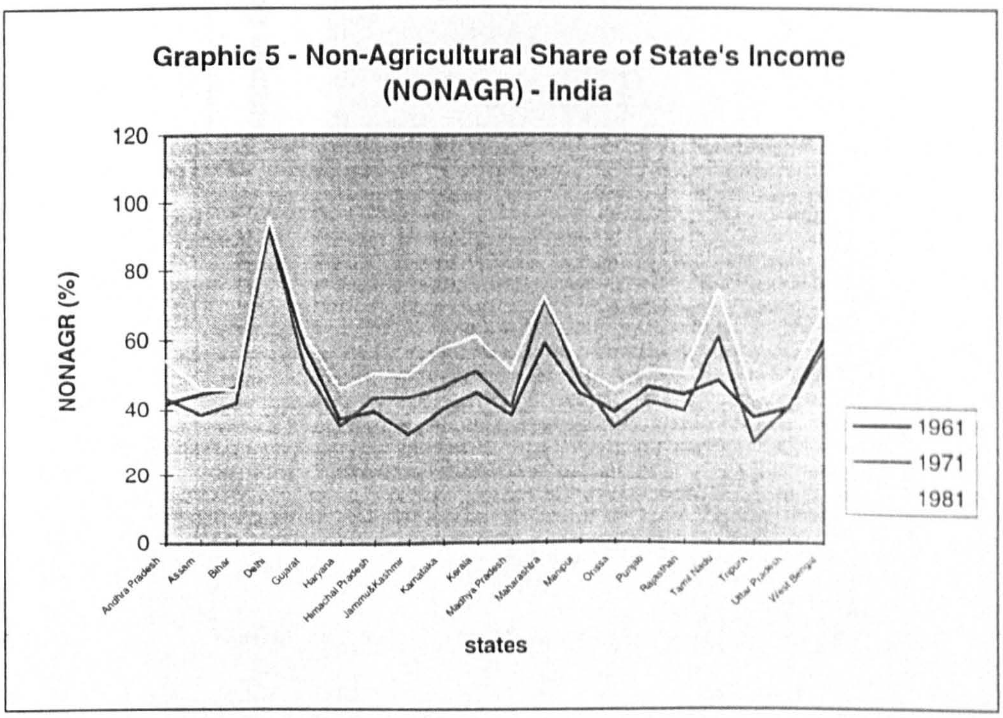

Graphic 1 - Income Growth Rate (GRGSP) - India
GRGSP (%)
7
6
5
4
3
2
1
0
Andhra Pradesh
Bihar
Gujarat
Himachal Pradesh
Karnataka
Madhya Pradesh
Manipur
Punjab
Tamil Nadu
Uttar Pradesh
states
grgsp6191

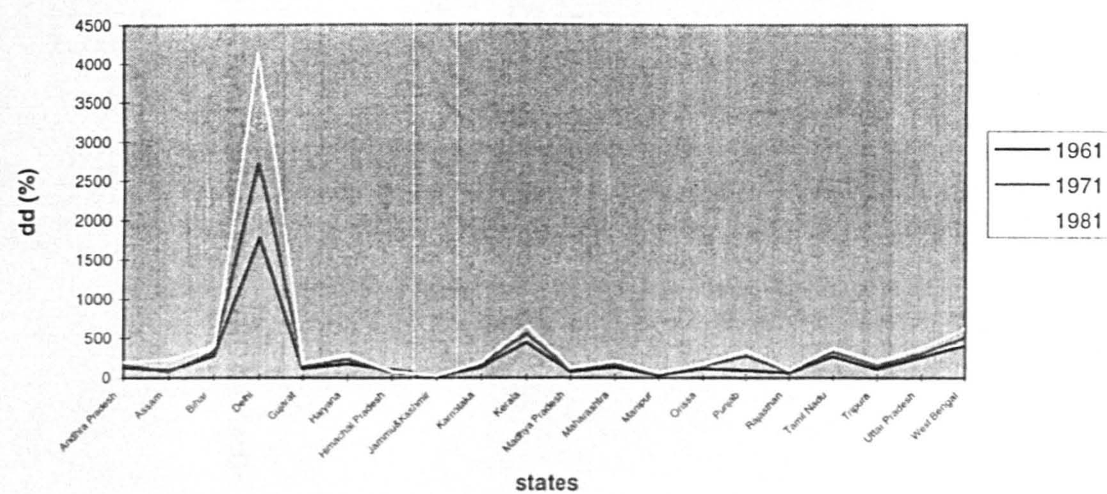

Graphic 2 - Industrial Growth Rate (GRIND) - India
GRIND (%)
8
6
4
2
0
-2
-4
Andhra Pradesh
Bihar
Gujarat
Himachal Pradesh
Karnataka
Madhya Pradesh
Manipur
Punjab
Tamil Nadu
Uttar Pradesh
states
grind6191

Graphic 3 - Per Capita Income (Y) - India

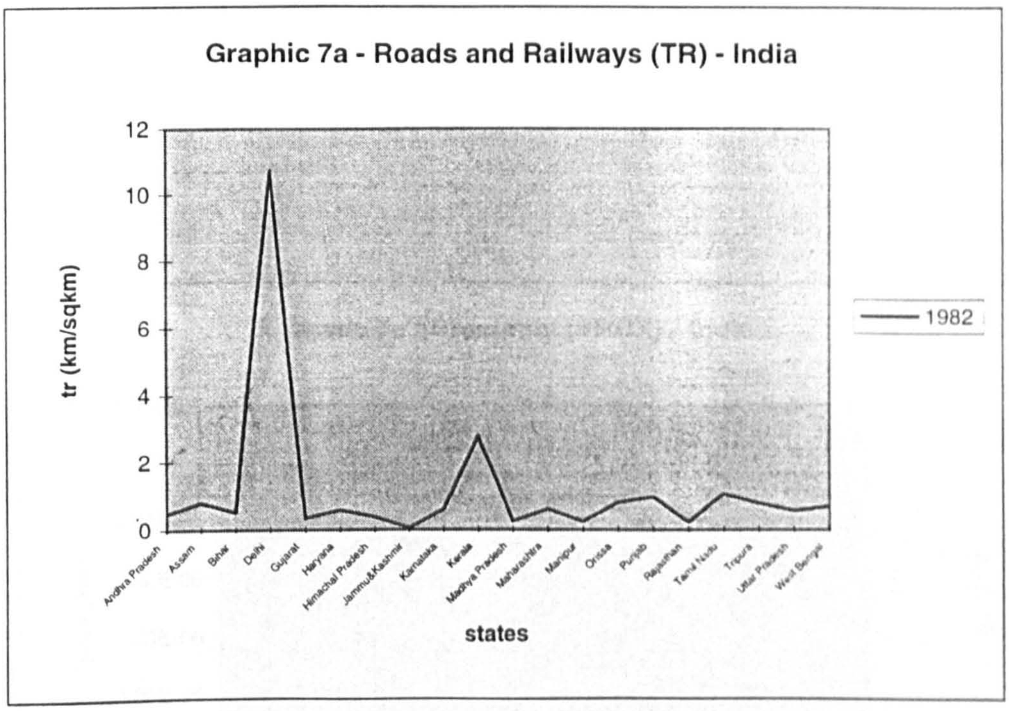


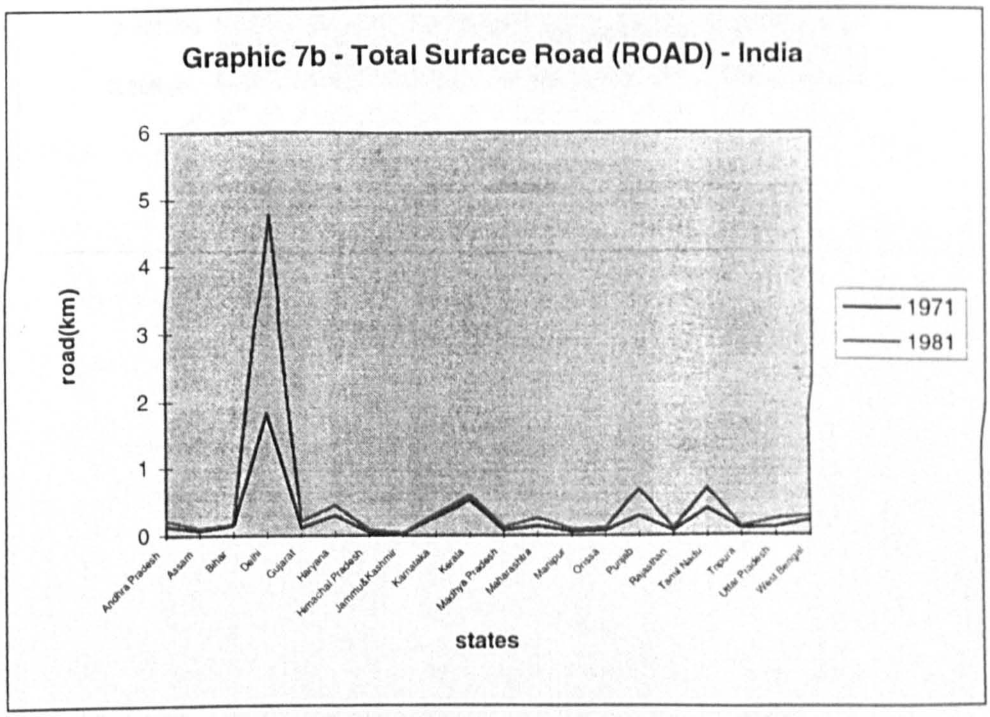

Graphic 4 - Industrial Share of State's Income (GRGSP) - India
GRGSP (%)
30
25
20
15
10
5
0
Andhra Pradesh
Assam
Bihar
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
state
1961
1971
1981

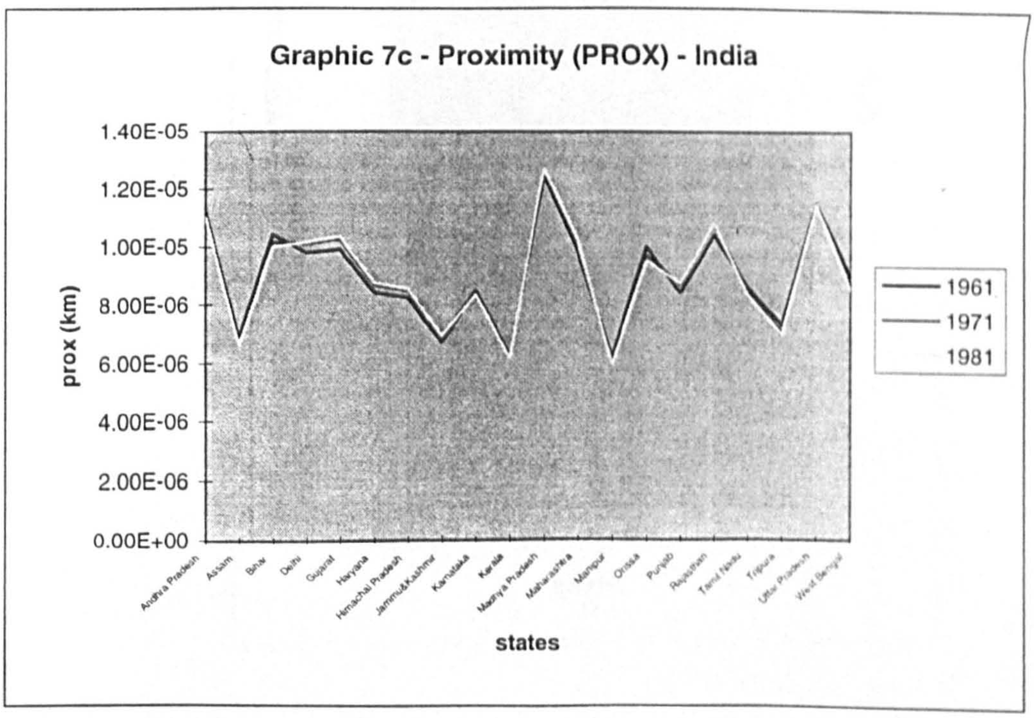

Graphic 5 - Non-Agricultural Share of State's Income (NONAGR) - India
NONAGR (%)
120
100
80
60
40
20
0
Andhra Pradesh
Assam
Bihar
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
states
1961
1971
1981

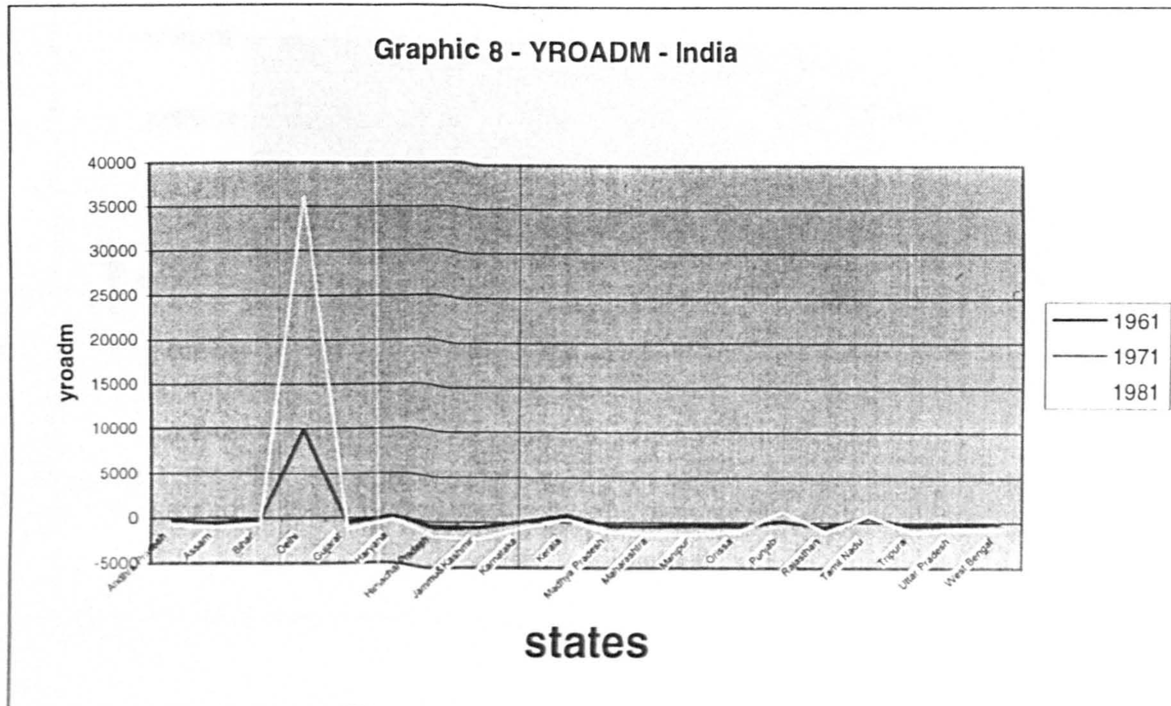


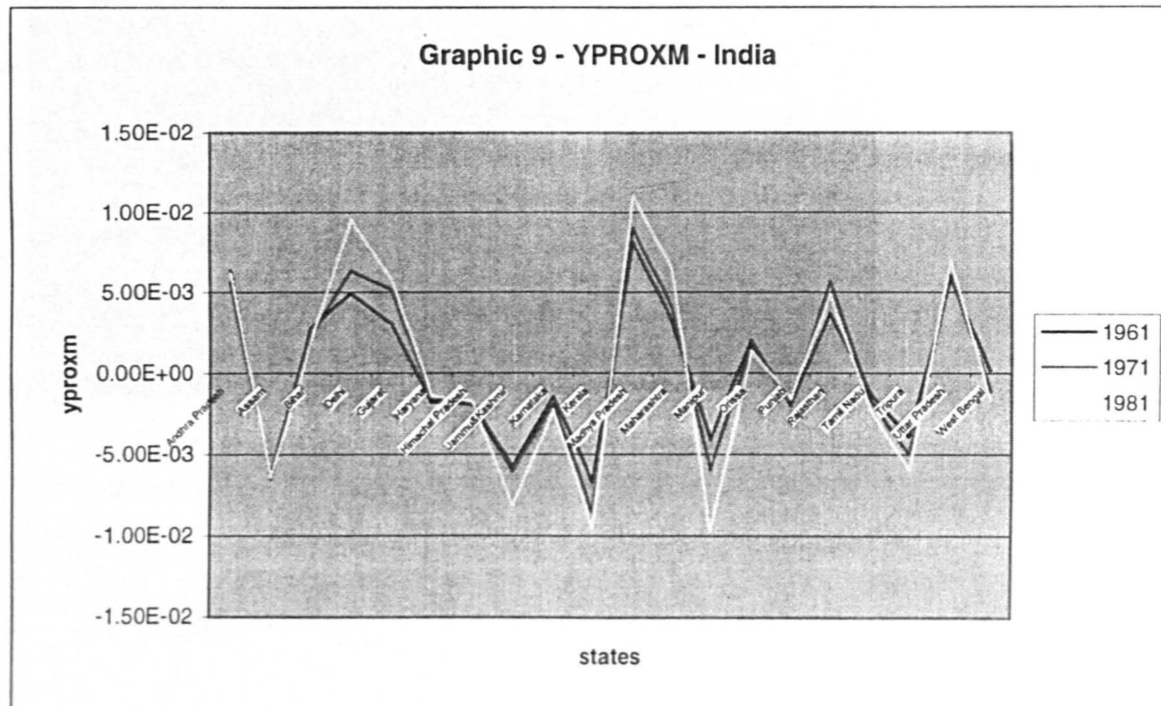
Graphic 6 - Population Density (DD) - India


Graphic 7a - Roads and Railways (TR) - India
12
10
8
6
4
2
0
tr (km/sqkm)
1982
Andhra Pradesh
Assam
Bihar
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
states

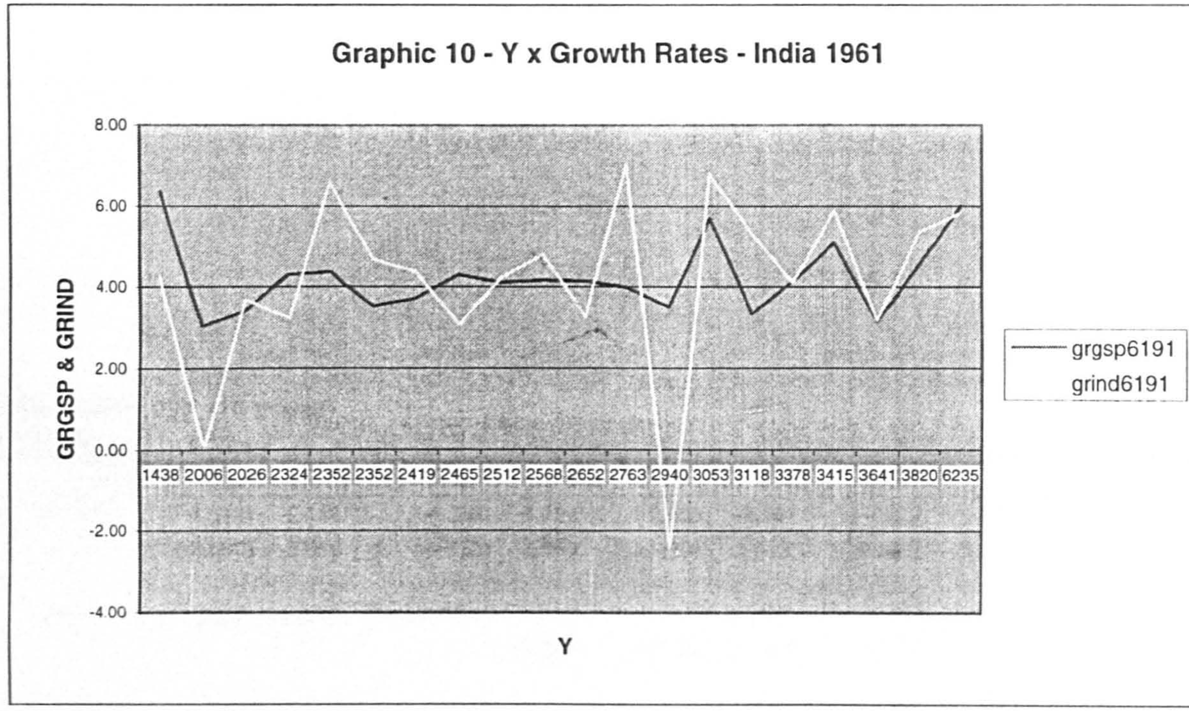

Graphic 7b - Total Surface Road (ROAD) - India
6
5
4
3
2
1
0
road(km)
1971
1981
Andhra Pradesh
Assam
Bihar
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
states


Graphic 7c - Proximity (PROX) - India
1.40E-05
1.20E-05
1.00E-05
8.00E-06
6.00E-06
4.00E-06
2.00E-06
0.00E+00
prox (km)
Andhra Pradesh
Assam
Bihar
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
states
1961
1971
1981


Graphic 8 - YROADM - India
yroadm
40000
35000
30000
25000
20000
15000
10000
5000
0
-5000
Assam
Bihar
Delhi
Gujarat
Haryana
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
states
1961
1971
1981



Graphic 9 - YPROXM - India
1.50E-02
1.00E-02
5.00E-03
0.00E+00
-5.00E-03
-1.00E-02
-1.50E-02
yproxm
Andhra Pradesh
Assam
Bihar
Delhi
Gujarat
Haryana
Himachal Pradesh
Jammu&Kashmir
Karnataka
Kerala
Madhya Pradesh
Maharashtra
Manipur
Orissa
Punjab
Rajasthan
Tamil Nadu
Tripura
Uttar Pradesh
West Bengal
states
1961
1971
1981



Graphic 10 - Y x Growth Rates - India 1961
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
GRGSP & GRIND
1438 2006 2026 2324 2352 2352 2419 2465 2512 2568 2652 2763 2940 3053 3118 3378 3415 3641 3820 6235
Y
grgsp6191
grind6191

Appendix 5 - Omitted Variables

TABLE 1 - OMITTED VARIABLES (INDGSP) BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.539	(-1.387)	-2.203***	(-4.286)	-0.603	(-1.543)	-2.165***	(-4.263)	-1.127***	(-2.483)	-2.191***	(-4.373)	-0.800*	(-1.911)	-2.107***	(-4.172)
INDGSP	-0.057	(-1.549)	7.17 E-03	(0.182)	-0.072**	(-2.060)	-0.016	(-0.455)	-0.052	(-1.604)	0.013	(0.381)	-0.054*	(-1.696)	-8.33 E-03	(-0.260)
TR	0.434	(0.228)	-1.265	(-0.690)												
YTRM					0.615	(1.314)	0.296	(0.734)								
PROX									0.203**	(2.165)	-0.221	(-1.556)				
YPROXM													0.034	(1.539)	-0.012	(-0.475)
DD	-0.017***	(-2.621)	1.47 E-03	(0.224)	-0.018***	(-2.702)	-7.27 E-04	(-0.111)	-0.015**	(-2.346)	5.28 E-03	(0.778)	-0.019*	(-2.768)	1.44 E-03	(0.197)
URB	0.074**	(2.385)	0.038	(1.290)	0.078**	(2.467)	0.042	(1.372)	0.060*	(1.837)	0.041	(1.379)	0.072**	(2.294)	0.039	(1.298)
SEC	0.035	(0.036)	0.853731	(1.021)	-0.048	(-0.049)	0.656	(0.793)	0.403	(0.437)	0.625	(0.755)	0.196	(0.201)	0.747	(0.919)
EXP	1.65 E-04	(1.159)	2.82 E-04	(1.753)	1.01 E-04	(0.067)	2.50 E-04	(1.606)	1.95 E-04	(1.480)	3.03 E-04	(1.923)	5.55 E-05	(0.330)	2.98 E-04**	(1.982)
SP			3.255**	(2.132)			2.965**	(1.997)			4.245***	(2.540)			3.481*	(1.835)
NE			-3.448***	(-3.796)			-3.299***	(-3.756)			-4.755***	(-3.417)			-3.387***	(-3.762)
R2	0.511		0.565		0.514		0.564		0.524		0.570		0.514		0.564	
MSE	3.108		2.952		3.098		2.955		3.065		2.933		3.097		2.956	

* The standard errors were corrected for heretoscedasticity.

TABLE 2 - OMITTED VARIABLES - (NONAGR) BRAZIL - 1950-1995 (18 states)
dependent variable: GRGSP - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.657	(-1.623)	-2.234***	(-4.746)	-0.722*	(-1.759)	-2.277***	(-4.730)	-1.282***	(-2.821)	-2.200***	(-4.849)	-0.945**	(-2.226)	-2.226	(-4.731)
NONAGR	7.19 E-03	(0.178)	0.048	(1.174)	1.27 E-03	(0.031)	0.040	(1.013)	4.97 E-03	(0.131)	0.055	(1.397)	2.75 E-03	(0.072)	0.041	(1.050)
TR	-0.825	(-0.472)	-1.543	(-0.955)												
YTRM					0.158	(0.344)	0.111	(0.272)								
PROX									0.204**	(2.149)	-0.253*	(-1.842)				
YPROXM													0.032	(1.422)	-8.44 E-03	(-0.336)
DD	-0.017**	(-2.467)	-1.06 E-03	(-0.169)	-0.018***	(-2.484)	-2.13 E-03	(-0.338)	-0.016**	(-2.285)	2.69 E-03	(0.415)	-0.019***	(-2.608)	-9.69 E-04	(-0.134)
URB	0.064**	(1.773)	0.020	(0.547)	0.065*	(1.747)	0.021	(0.576)	0.049	(1.287)	0.020	(0.563)	0.062*	(1.695)	0.020	(0.556)
SEC	0.213	(0.213)	0.991	(1.213)	0.124	(0.125)	0.819	(1.014)	0.497	(0.540)	0.736	(0.921)	0.277	(0.284)	0.855	(1.078)
EXP	1.58 E-04	(1.082)	3.21 E-04	(1.988)	1.36 E-04	(0.894)	3.12 E-04**	(1.980)	1.82 E-04	(1.351)	3.49 E-04**	(2.192)	4.76 E-05	(0.283)	3.37 E-04	(2.220)
SP			3.022**	(1.968)			2.746*	(1.820)			4.129**	(2.471)			3.065	(1.603)
NE			-3.694***	(-4.180)			-3.645***	(-4.140)			-5.189***	(-3.890)			-3.683***	(-4.092)
R2	0.505		0.570		0.505		0.568		0.518		0.577		0.508		0.568	
MSE	3.126		2.935		3.128		2.943		3.084		2.910		3.118		2.943	

* The standard errors were corrected for heretoscedasticity.

TABLE 3 - OMITTED VARIABLES (INDGSP) BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-0.275	(-0.345)	-1.790	(-1.582)	-0.416	(0.521)	-1.916*	(-1.740)	-1.458*	(-1.662)	-1.842*	(-1.652)	-0.746	(-0.903)	-1.844*	(-1.674)
INDGSP	-0.388***	(-2.706)	-0.355***	(-2.619)	-0.394***	(-2.554)	-0.355**	(-2.469)	-0.345**	(-2.409)	-0.351**	(-2.404)	-0.349**	(-2.380)	-0.327**	(-2.340)
TR	4.090	(1.069)	2.524	(0.583)												
YTRM					1.575*	(1.743)	1.051	(1.555)								
PROX									0.416**	(2.122)	0.268	(1.204)				
YPROXM													0.064	(1.189)	-9.59 E-03	(-0.170)
DD	-0.028**	(-1.977)	-9.31 E-03	(-0.642)	-0.029**	(-1.962)	-0.010	(-0.702)	-0.022	(-1.624)	-0.013	(-0.839)	-0.029*	(-1.887)	-5.79 E-03	(-0.354)
URB	0.146**	(2.041)	0.109*	(1.639)	0.159**	(2.184)	0.118*	(1.745)	0.118*	(1.738)	0.106	(1.561)	0.143**	(1.986)	0.108	(1.593)
SEC	-1.105	(-0.708)	5.48 E-04	(0.000)	-1.106	(-0.697)	-0.079	(-0.056)	-0.121	(-0.087)	0.366	(0.264)	-0.566	(-0.371)	0.229	(0.165)
EXP	4.94 E-04**	(1.988)	4.25 E-04	(1.341)	3.40 E-04	(1.313)	3.61 E-04	(1.100)	5.65 E-04	(2.307)	4.06 E-04	(1.293)	2.96 E-04	(0.949)	4.63 E-04	(1.382)
SP			5.550**	(2.086)			5.061**	(1.958)			4.429*	(1.706)			6.013**	(1.998)
NE			-2.827	(-1.324)			-2.955	(1.499)			-1.337	(-0.540)			-3.110	(-1.558)
R2	0.447		0.460		0.448		0.461		0.456		0.461		0.446		0.459	
MSE	6.914		6.875		6.904		6.870		6.852		6.868		6.916		6.883	

* The standard errors were corrected for heretoscedasticity.

TABLE 4 - OMITTED VARIABLES - (NONAGR) BRAZIL - 1950-1995 (18 states)
dependent variable: GRIND - panel results

	1	t	2	t	3	t	4	t	5	t	6	t	7	t	8	t
Y	-1.190	(-1.621)	-3.388***	(-2.772)	-1.204*	(-1.654)	-3.352***	(-2.777)	-2.512***	(-2.537)	-3.444***	(-2.773)	-1.753**	(-2.199)	-3.463***	(-2.780)
NONAGR	-0.115	(-1.229)	-0.063	(-0.784)	-0.120	(-1.211)	-0.072	(-0.846)	-0.124	(-1.254)	-0.076	(-0.885)	-0.129	(-1.262)	-0.078	(-0.895)
TR	-2.794	(-0.628)	-3.858	(-0.810)												
YTRM					-0.466	(-0.479)	-0.640	(-0.609)								
PROX									0.418**	(2.020)	-0.042	(-0.202)				
YPROXM													0.057	(1.054)	2.33 E-03	(0.043)
DD	-0.017	(-1.322)	6.06 E-03	(0.405)	-0.017	(-1.324)	5.27 E-03	(0.356)	-0.014	(-1.119)	4.71 E-03	(0.307)	-0.021	(-1.472)	3.70 E-03	(0.219)
URB	0.146*	(1.634)	0.085	(1.103)	0.141	(1.617)	0.080	(1.051)	0.115	(1.369)	0.086	(1.116)	0.141	(1.591)	0.086	(1.116)
SEC	-0.541	(-0.339)	0.607	(0.440)	-0.648	(-0.399)	0.446	(0.324)	-0.037	(-0.027)	0.238	(0.179)	-0.520	(-0.332)	0.256	(0.194)
EXP	4.37 E-05*	(1.764)	6.29 E-04**	(2.222)	4.74 E-03	(1.785)	6.65 E-04	(2.262)	4.80 E-04**	(2.045)	6.28 E-04*	(2.252)	2.33 E-04	(0.755)	6.18 E-04**	(2.054)
SP			4.693*	(1.821)			4.699*	(1.817)			4.427*	(1.709)			4.148	(1.520)
NE			-5.060**	(-2.119)			-4.906**	(-2.162)			-5.183*	(-1.827)			-4.913**	(-2.128)
R2	0.393		0.421		0.392		0.419		0.404		0.418		0.393		0.418	
MSE	7.240		7.118		7.248		7.134		7.172		7.139		7.237		7.140	

* The standard errors were corrected for heretoscedasticity.

Appendix 6 - Test of Restrictions

Table I - Best Fitted Equations - F-test

number	country	period	method	dep.variable	ind. var	$Ho:\Omega=0$ $H0:\phi=0$
1	Brazil	1950-1995	cs	gr	y, indgsp, yproxm, dd	accepted accepted
2	Brazil	1950-1995	cs	gr	y, nonagr, yproxm, dd, ne, se, co	accepted **denied (>)**
3	Brazil	1950-1970	cs	gr	y, indgsp, trm, ytrm, dd, sp, ne, se, co	**denied (>)** **denied (>)**
4	Brazil	1950-1970	cs	gr	y, nonagr, yproxm, dd, ne, se co	**denied (>)** **denied (>)**
5	Brazil	1970-1995	cs 18	gr	y, indgsp, dd, yproxm	accepted accepted
6	Brazil	1970-1995	cs18	gr	y, nonagr, dd, ytrm	accepted accepted
7	Brazil	1970-1995	cs 24	gr	y, indgsp, dd, trm, ytrm, sp	**denied (<)** **denied (<)**
8	Brazil	1970-1995	cs 24	gr	y, nonagr, dd, ytrm,	accepted **denied**

					sp	**(<)**
9	Brazil	1950-1995	pn	gr	y indgsp dd ytrm sp ne se co	accepted accepted
10	Brazil	1950-1995	pn	gr	y nonagr dd trm ytrm sp ne se co	**denied (>) denied (>)**
11	Brazil	1950-1970	pn	gr	y indgsp dd trm ytrm ne se co	accepted **denied (>)**
12	Brazil	1950-1970	pn	gr	y nonagr dd trm ytrm sp ne se co	**denied (>) denied (>)**
13	Brazil	1970-1995	pn : 18	gr	y indgsp dd yproxm sp ne se co	accepted accepted

14	Brazil	1970-1995	pn :18	gr	y nonagr dd yproxm sp ne se co	accepted accepted
15	Brazil	1970-1995	pn: 24	gr	y indgsp ytrm sp ne se co n	accepted accepted
16	Brazil	1970-1995	pn: 24	gr	y nonagr dd ytrm sp ne se co n	accepted **denied (<)**
17	Brazil	1950-1995	cs	grind	y indgsp dd yproxm	**denied (<)** accepted
18	Brazil	1950-1995	cs	grind	y nonagr dd trm ytrm	accepted accepted
19	Brazil	1950-1970	cs	grind	y indgsp dd yproxm	**denied (<)** **denied (>)**
20	Brazil	1950-1970	cs	grind	y nonagr dd yprsom ne se co	accepted accepted
21	Brazil	1970-1995	cs:18	grind	y indgsp dd proxm yproxm	**denied (<)** accepted
22	Brazil	1970-1995	cs: 18	grind	y nonagr dd yproxm	**denied (<)** accepted

23	Brazil	1970-1995	cs:24	grind	y indgsp dd yproxm n ne se co	**denied** (<) accepted
24	Brazil	1970-1995	cs:24	grind	y nonagr dd ytrm n ne se co	**denied** (<) accepted
25	Brazil	1950-1995	pn	grind	y indgsp dd proxm yproxm sp	**denied** (<) accepted
26	Brazil	1950-1995	pn	grind	y nonagr dd proxm yproxm	accepted accepted
27	Brazil	1950-1970	pn	grind	y indgsp dd yproxm	**denied** (<) accepted
28	Brazil	1950-1970	pn	grind	y nonagr dd ypoxm	accepted accepted
29	Brazil	1970-1995	pn:18	grind	y indgsp dd ytrm	**denied** (<) accepted
30	Brazil	1970-1995	pn:18	grind	y nonagr dd yproxm	**denied** (<) accepted
31	Brazil	1970-1995	pn:24	grind	y indgsp dd yproxm	**denied** (<) accepted

32	Brazil	1970- 1995	pn:24	grind	y nonagr ytrm sp ne se co n	**denied (<)** accepted
33	India	1961- 1991	cs	gr	y indgsp dd proxm yprosm	**denied (<)** **denied (>)**
34	India	1961- 1991	cs	gr	y nonagr dd proxm yproxm	**denied (<)** **denied (>)**
35	India	1961- 1991	pn	gr	y indgsp dd proxm yproxm	accepted **denied (>)**
36	India	1961 - 1991	pn	gr	y nonagr dd proxm yproxm	accepted **denied (>)**
37	India	1961 - 1991	cs	grind	y indgsp proxm yprosm dd delhi	**denied (<)** **denied (>)**
38	India	1961 - 1991	cs	grind	y nonagr proxm yproxm dd delhi	**denied (<)** **denied (>)**
39	India	1961 - 1991	pn	grind	y indgsp dd ytrm	**denied (<)** accepted

40	India	1961 - 1991	pn	grind	y nonagr dd proxm yproxm	**denied (<) denied (>)**