Does Industrial Policy Impact Capital Flows?

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Abstract

This study explores the relationship between industrial policy and capital flows, focusing on how government interventions through industrial policy influence the movement of capital across borders. It examines the impact of industrial policy shocks on gross capital inflows and outflows, alongside other macroeconomic variables like consumer confidence, GDP per capita and investment. The study employs a panel Vector Autoregression (PVAR) methodology, analysing data from 34 primarily high-income countries. The findings suggest that industrial policy shocks cause a drop and then subsequent increase in capital flows after which its effect dissipates. Capital flows are thus highly responsive to business cycle frequencies and changes in investor sentiment. It also finds that industrial policy shocks lead to increases in consumer confidence, but also leads to a fall in investment and GDP per capita levels before the impact of the shock declines. Further, the FEVDs show that apart from previous levels of gross capital inflows and outflows themselves, industrial policy predicts around 60 - 65 percent of their future levels. This research contributes to the literature by shedding light on the relationship between industrial policy and capital flows. The study underscores the need for further investigation into the behaviour of industrial policy and the channels through which it may impact capital flows.

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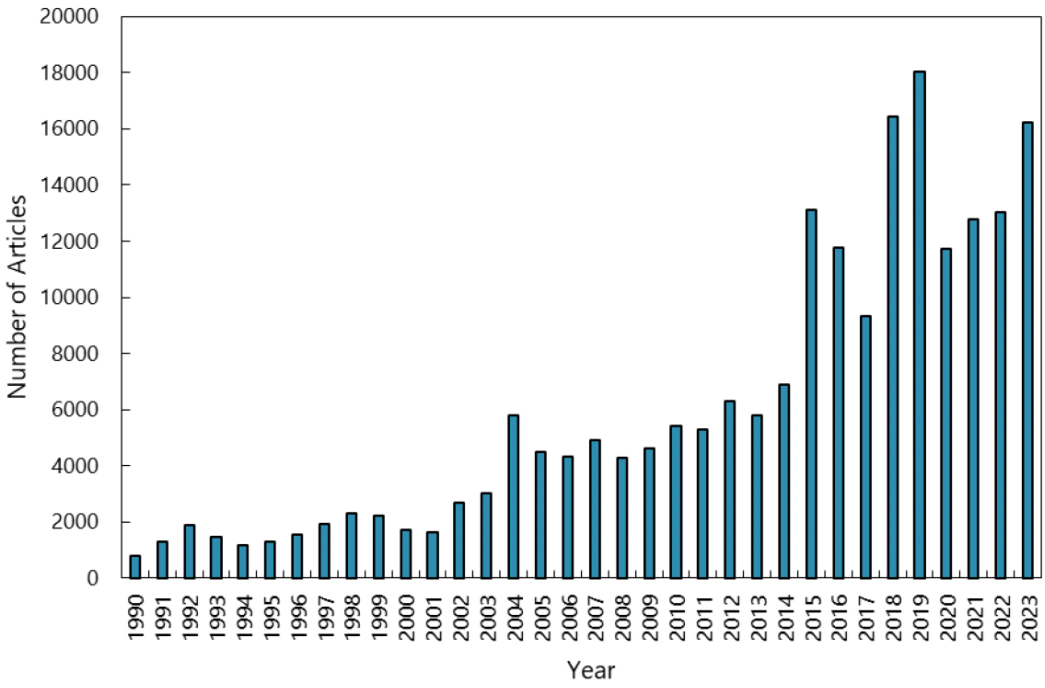
1 Introduction

Industrial policy has gained increasing prominence in recent years, especially in the wake of global crises such as the 2007-2008 financial crisis, the sluggish post-crisis recovery, and the COVID-19 pandemic. Coupled with rising geopolitical tensions and the ongoing climate crisis, concerns about the resilience of supply chains, economic stability, and national security have intensified. These developments have fueled skepticism regarding the ability of markets to efficiently allocate resources, prompting a global shift towards more active government involvement in industrial policy (see Bulfone, 2023; IMF, 2024; UNCTAD, 2018,2). Consequently, industrial policy has garnered greater traction in both academic and public discourse over the past two decades, as illustrated in Figure 1.

Figure 1: Mentions of Industrial Policy in Major Business Press



Source : Evenett et al. (2024)

At the same time, the dynamics of global capital flows have become increasingly complex and volatile. As governments adopt industrial policies to reshape their economies, questions arise about the impact of these interventions on international capital markets and cross-border investments. Industrial policies, aim to alter the structure of economic activity by targeting specific sectors, can influence the movement of capital across borders. Therefore, understanding how industrial policy interacts with capital flows is crucial for assessing the broader economic implications

of government intervention.

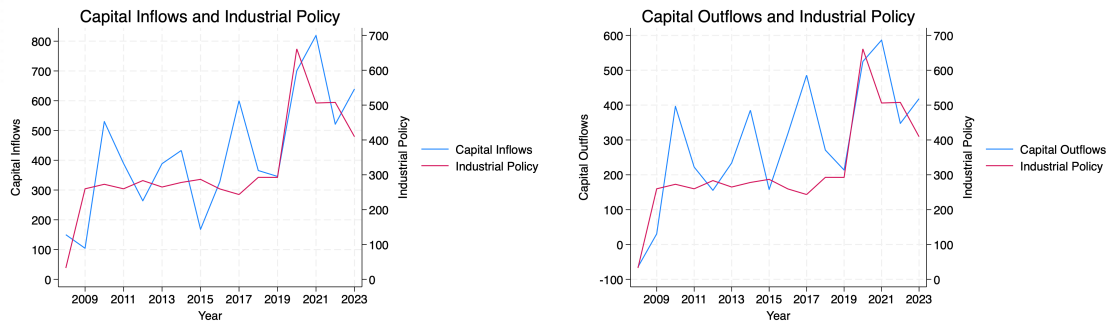
Macroeconomic literature has established that gross capital inflows and outflows are positively correlated with each other, pro-cyclical and volatile (see Avdjiev et al., 2017; Broner et al., 2013; Davis and Wincoop, 2017; Forbes and Warnock, 2012). The positive correlation between gross capital inflows and outflows remains puzzling, making it essential to examine the factors influencing capital flows to better understand their behavior. This study aims to contribute to the literature by exploring the role of government intervention, through industrial policy, in determining capital flows. While extensive research exists on capital flows, relatively little attention has been paid to understanding the behavior of industrial policy and its impact on global financial markets. Therefore, investigating the relationship between industrial policy and capital flows is crucial. This research seeks to answer the following questions: What is the impact of an industrial policy shock on capital flows? Does industrial policy lead to a reallocation of capital?

As Juhász et al. (2023) notes, although industrial policy is frequently discussed, it is seldom clearly defined. According to their definition, industrial policy refers to "government policies that explicitly target the transformation of the structure of economic activity in pursuit of some public goal" (Juhász et al., 2023). These goals may range from stimulating innovation, productivity, and economic growth to promoting the climate transition, reducing unemployment, supporting domestic regions with lower growth, and improving the terms of trade. A key feature of industrial policy is the discretion granted to public authorities in selecting which sectors or activities to promote or prioritise.

Data from the Global Trade Alert, as reported by the IMF (2024), [1] reveal that over 2,500 industrial policy interventions were implemented in 2023, marking a significant surge. This increase was driven primarily by large economies such as China, the European Union, and the United States, which collectively accounted for nearly half of all new measures introduced. Both developed and developing countries are now employing industrial policies to promote productivity growth in key sectors. Special Economic Zones (SEZs) have also become increasingly popular as an industrial policy tool to attract foreign direct investment (FDI), with their numbers growing significantly across the globe (Narula and Zhan, 2019). As of 2023, the number of SEZs globally had risen to 5,400, across 150 economies, up from 4,000 in 2015, with

[1] Link to blog post: https://www.imf.org/en/Blogs/Articles/2024/04/12/industrial-policy-is-back-but-the-bar-to-get-it-right-is-high

Figure 2: Capital Flows and Industrial Policy



Source: Author's calculations

hundreds more in the planning stages. The United Nations Conference on Trade and Development (UNCTAD) attributes this growth to increasing competition for FDI between countries and regions (UNCTAD, 2019).

The UNCTAD reports (see UNCTAD, 2018,1,2) highlight the role of industrial and investment policies in shaping future growth and cross-border investments.UNCTAD (2018) notes that the majority of industrial policies adopted in the past decade have aimed to attract foreign investors, highlighting the importance of governments positioning their economies as resilient and stable investment destinations, particularly for short- to medium-term investments. However, for longer-term investment prospects, economies must undergo strategic shifts in their development approaches, industrial policies, and regional cooperation in trade and investment policies (UNCTAD, 2020). This suggests that industrial policy may significantly influence trade, investment, and financial flows, as well as global market prices, with important implications for trade partners and the global economy. The impact of industrial policy varies depending on the specific measures implemented, the sectors targeted, and whether the policies promote or hinder trade.

Figure 2 shows that industrial policy and capital flows (both inflows and outflows) have followed similar trends over the past 15 years. However, capital flows tend to be more volatile, often influenced by factors such as macroeconomic fundamentals, risk aversion, financial crises, shifts in monetary policy, or geopolitical tensions, as documented in the literature (see Adler et al., 2014; Pagliari and Hannan, 2024).

In contrast, the steady rise in industrial policy may reflect deliberate efforts by governments to engage more actively in the economy, with a focus on fostering growth in specific sectors. This consistent increase in industrial policy could create a more

favorable environment for investment, potentially attracting greater gross capital inflows. However, while industrial policy has steadily increased, capital flows remain highly susceptible to global shocks and financial conditions.

To address the questions this paper asks, I employ a panel Vector Autoregression (PVAR) method using data from 34 mostly high-income countries. Building on the framework of Benhima and Cordonier (2022), my analysis includes variables for industrial policy, investment, GDP per capita, consumer confidence, and capital flows. The results suggest that the response of gross capital flows, net flows, and other variables to an industrial policy shock is temporary and short-lived. On impact, all variables experience a fall, but gross capital inflows and outflows move similarly and appear correlated, consistent with the literature. One quarter after the shock, these variables rise, after which, the effect of the shock eventually dissipates. This indicates that industrial policy shocks may lead to short-term fluctuations at the business cycle frequency, potentially driven by changes in investor sentiment. Furthermore, industrial policy shocks negatively affect investment and GDP per capita at the business cycle frequency, but they may lead to longer-term adjustments that benefit these indicators. Moreover, we find that apart from gross capital flows themselves, industrial policy determines approximately 60 and 65 percent of the future values of gross inflows and gross outflows respectively.

In this study, I follow the standard terminology in the literature, referring to gross inflows as the net changes in a country's international liabilities and gross outflows as the net change in its international assets. Positive gross capital inflows represent an accumulation of net foreign liabilities, while gross capital outflows represent an accumulation of net foreign assets. Additionally, as is typical in the capital flows literature, my analysis of gross inflows reflects foreign investors' behavior, while the analysis of gross outflows reflects domestic investors' behavior.

The remainder of the paper is structured as follows: Section 2 reviews some literature regarding the determinants of capital flows and industrial policy, Section 3 describes the methodology used and defines the data gathered for the empirical analysis, Section 4 presents the main findings of the study and Section 5 concludes and provides avenues for future research.

2 Literature Review

The findings of this paper contribute to multiple strands of literature including the determinants of capital flows and the role of industrial policy in shaping

economic outcomes. Understanding the dynamics of capital flows is essential given the substantial increase in global financial integration over the last several decades. Simultaneously, the significance of industrial policy has gained traction, particularly in response to global and domestic financial crises. This review summarises findings from key studies on the determinants of capital flows and the implications of industrial policy for economic development.

2.1 Determinants of Capital Flows

The first strand of literature this study contributes to explores the determinants of capital flows to understand its dynamics given the substantial increase in global financial integration over the last several decades.

2.1.1 Role of Central Banks, Policy and Global Shocks and Capital Flow Dynamics

The influence of central banks in emerging markets on capital flows has been extensively studied. Villamizar-Villega et al. (2024) conduct a meta-analysis that dissects the effects of policy shocks, finding that gross inflows generally increase with the tightening of monetary policy. However, domestic and global risks are found to suppress gross inflows, with global risks exerting a more pronounced impact. Additionally, the study reveals that banking and portfolio flows are particularly responsive to monetary shocks, while FDI remains relatively unaffected.

Dahlhaus and Vasishtha (2020) further explores the impact of U.S. monetary policy news on portfolio flows to emerging markets, employing a Bayesian Vector Autoregression model. Although the aggregate impact of such news is modest, the study finds significant variation across countries, particularly those that experienced large volumes of inflows and outflows surrounding events like the 2013 taper tantrum.

The cyclical nature of gross capital flows and their responsiveness to global shocks is explored by Broner et al. (2013). Their study provides an in-depth analysis of gross capital flows across business cycles and during financial crises, revealing the pro-cyclical behavior of capital flows by both domestic and foreign agents. Notably, the study finds that domestic agents often behave counter-cyclically during global crises, retrenching capital flows as foreign agents withdraw, which underscores the importance of understanding the distinct behaviors of different economic actors during periods of financial instability.

Building on this, Adler et al. (2014) use a Panel Vector Autoregression model

to examine the responses of gross capital flows in emerging markets to various global shocks. Their findings suggest that domestic agents play a stabilising role by mitigating the adverse effects of global shocks, particularly through the repatriation of foreign assets during times of uncertainty.

2.1.2 Sentiment and Media Influence

The role of expectations and media sentiment as determinants of capital flows is another critical area of inquiry. Beckmann et al. (2024) investigate how macroeconomic expectations and media sentiment shape capital flow dynamics in eight emerging economies. Their findings suggest that news related to exchange rates exerts the strongest influence on capital flows, with substantial heterogeneity observed across different countries.

Benhima and Cordonier (2022) further expands the literature by exploring the impact of news and sentiment shocks on capital flows. The study distinguishes between "news" shocks, which decrease gross capital flows, and "sentiment" shocks, which increase them. These findings highlight the significant role of domestic optimism in driving capital flows, with sentiment-related shocks accounting for a large portion of the variance in capital flows in both the U.S. and OECD economies.

2.1.3 Push and Pull Factors

A substantial body of literature has explored the determinants of capital flows, distinguishing between push factors (global forces) and pull factors (country-specific characteristics) (see Calvo et al., 1993; Fernandez-Arias, 1996; Fratzscher, 2012; Reinhart and Reinhart, 2009). These studies investigate how both sets of factors shape capital movement, as well as the role of capital flow regulations and policies in managing them.

Ghosh et al. (2014) analyse the effectiveness of capital flow regulations in mitigating the influence of push (external) and pull (domestic) factors. Their findings suggest that capital controls in recipient countries can effectively reduce the volume and volatility of inflows, especially speculative ones, while regulatory measures in source countries can mitigate systemic risks by reducing excessive outflows. The study highlights the importance of coordinated efforts between source and destination countries, noting that such collaboration is more successful in stabilising capital flows. However, the authors also highlight trade-offs, such as potential distortions in financial markets and diminished investment opportunities in regulated economies.

Building on this, Eguren-Martin et al. (2024) examines how push and pull factors influence the probability distributions of gross capital flows, highlighting the diverse effects these factors have across different economies. Their study also assesses the role of macro-prudential and capital flow management policies, concluding that tighter regulations can reduce the sensitivity of portfolio flows to global financial shocks. By doing so, these policies lower the likelihood of significant outflows and contribute to the stabilisation of capital flows.

2.2 Industrial Policy and the Economy

The second strand of literature that the findings of this study contributes to is understanding the impact of industrial policy on macroeconomic fundamentals. As industrial policy is gaining more importance,the literature on industrial policy is broadening (see Lane (2020) and Juhász et al. (2023) for some reviews on the literature). The resurgence of industrial policy, particularly in advanced economies, has prompted a renewed focus on its implications. Evenett et al. (2024) notes that recent industrial policy activity is primarily driven by advanced economies, with subsidies being the most commonly employed instrument.

2.2.1 Industrial Policy and Structural Change

Lane (2022) examines the impact of industrial policy on industrial development by using the Heavy and Chemical Industry (HCI) drive in South Korea from 1973 - 1979 as a natural experiment. He finds that HCI bolstered the expansion and dynamic comparative advantage of directly targeted industries, HCI indirectly benefited downstream users of targeted intermediaries and that the benefits of HCI persist even after the end of HCI. His findings indicate that the temporary drive shifted Korean manufacturing into more advanced markets and supported long-term change.

Ocampo (2020) argues that rapid economic growth is closely linked to the efficiency of an economy's production structure, particularly its capacity for innovation. The study emphasises that industrial policies must be complemented by sound macroeconomic and financial policies to maintain a competitive and stable real exchange rate. The role of national development banks in financing innovation-driven activities is also underscored.

2.2.2 Industrial Policy and Macroeconomic Fundamentals

Ottonello et al. (2024) explore the role of exchange rates as industrial policy, particularly in economies with production externalities and limited capital mobility.

The study suggests that maintaining a depreciated exchange rate can significantly enhance the competitiveness of strategic sectors, thereby accelerating economic development. The authors argue that in economies converging towards the technological frontier, foreign exchange interventions aimed at undervaluing the currency can be used as industrial policy and is particularly beneficial during the early stages of development. These interventions can increase labour supply and channel resources into the tradable sector, where externalities tend to be stronger. This approach, however, is contingent on the dynamic patterns of these externalities; while beneficial in earlier stages of development, such policies may reduce welfare in economies that are either stagnating or have already reached the technological frontier.

Finally, Navarra (2023) provides new evidence on the impact of politically motivated subsidies on exports and employment in the United States. The study finds that such subsidies significantly boost exports and employment, with positive effects extending throughout supply chains. The study provides evidence that industrial policy can be beneficial at a sectoral level by highlighting that these subsidies not only directly benefit the targeted industries but also have a ripple effect on related sectors, both downstream and, to a lesser extent, upstream. The findings underscore the need for reforming multilateral trading rules on subsidies and call for further research into the broader welfare implications of such policies.

The literature on capital flows and industrial policy reveals the intricate and interconnected nature of global financial dynamics and domestic economic strategies. Capital flows are influenced by a multitude of factors, including policy shocks and market sentiment. Industrial policy, meanwhile, has re-emerged as a crucial tool for promoting structural change and economic development, particularly in the wake of financial crises. This review highlights the importance of understanding both the determinants of capital flows and the role of industrial policy in shaping economic outcomes. The existing literature, however, lacks a thorough examination of how industrial policy may influence international financial markets and capital flows, which this study explores. As noted by Evenett et al. (2024), there appears to be a rising trend of reciprocal actions in the implementation of industrial policies and government interventions. This raises the question of what specific impacts such policies might have on global financial dynamics, warranting further investigation.

3 Methodolody

3.1 Empirical Methodology

I examine the dynamic response of capital flows to a shock to industrial policy using a PVAR model drawing on Adler et al. (2014)and Benhima and Cordonier (2022). The studies examine the dynamic response of gross capital flows in emerging market economies to global financial shocks and to shocks related to news, sentiment, and total factor productivity (TFP), respectively. A PVAR is employed as it addresses any endogeneity concerns by capturing the dynamic interdependencies among multiple time series while treating all variables as endogenous. Granger causality tests confirm the presence of endogeneity between variables in the specification, further justifying the use of the PVAR model to mitigate any potential endogeneity issues.

For this analysis, I use data on industrial policy, investment, GDP per capita, consumer confidence and capital flows. The baseline vector for the PVAR $y_{i,t}$, is used to examine the dynamic effect of an industrial policy shock, $IP_{i,t}$ to four variables: the percent of GDP that is explained by investment, $Inv_{i,t}$, the growth rate of GDP per capita, $GDP_{i,t}$, an expectation variable that is an index of consumer confidence, $Exp_{i,t}$ and capital flows, $KF_{i,t}$

The baseline vector is as follows:

$$y_{i,t} = [IP_{i,t}, Inv_{i,t}, GDP_{i,t}, Exp_{i,t}, KF_{i,t}] \tag{1}$$

where i = country and t = time

The variables are ordered according to their level of endogeneity. Since the focus of this study is to examine the behaviour of capital flows in response to industrial policy, capital flows are positioned last, while industrial policy is placed first (and assumed to be exogenously set by the government, see definition as per Juhász et al. (2023)). Consumer confidence is considered the most endogenous after capital flows as it captures household's expectations about future and current economic conditions, capturing "animal spirits" and thus reacting to changes in GDP, investment and industrial policy. Gross Domestic Product (GDP) per capita is ranked next, as it may respond quickly to industrial policy shocks driven by changes in total factor productivity (TFP). Investment is positioned before GDP, as it may face adjustment costs, causing it to respond more slowly to industrial policy shocks compared to GDP.

Furthermore, the ordering of the variables apart from capital flows is supported by Granger causality tests. The results indicate that investment is influenced solely by industrial policy, while consumer confidence, GDP, and industrial policy influence one another. Additionally, consumer confidence and GDP are also affected by investment.

In the PVAR model, all variables utilise the cyclical component, as the focus is on understanding the impact of an industrial policy shock on aggregate fluctuations at the business-cycle frequency Uribe and Schmitt-Grohé (2017). The existing literature suggests several methods for extracting the cyclical component of variables such as first differencing, log linearising and using the Hodrick-Prescott (HP) filter. This study employs the HP filter, which distinguishes between the cyclical and trend components of each time series.

Once the PVAR is estimated, impulse response functions are computed to analyse the effects of an industrial policy shock on the other variables. These impulse response functions are generated through Monte Carlo simulations [2]. Monte Carlo simulations are used in IRFs to account for the uncertainty in the model's parameters, allowing us to construct confidence intervals to assess the robustness of the relationship shown in the IRFs. This method allows for a more accurate and comprehensive understanding of how the industrial policy shock affects the economic variables in the specification over time.

3.2 Data

The panel consists of quarterly data from 34 countries, over the period 2008Q1-2023Q4. Table 1 in the Appendix presents the list of countries in the sample and their corresponding income levels.

For the analysis of industrial policy, I utilise data collected by the Global Trade Alert. The number of industrial policies announced per quarter is counted, and the logarithm of these counts is taken to normalise the values.

Investment data is obtained from the OECD and is calculated by dividing Gross Fixed Capital Formation by asset by GDP, using the expenditure approach. The OECD provides this data in both national currencies and euros (for European Union

[2]Monte Carlo simulations are a class of computational algorithms that rely on repeated random sampling to obtain numerical results. They involve generating a large number of random scenarios to estimate potential outcomes of a model, capturing a range of possibilities and associated uncertainties.

countries), with all the data reported in chain-linked volumes.

Two forward-looking variables are included in the study, following Benhima and Cordonier (2022); consumer confidence and GDP per capita.

The main measure of expectations in the Vector Autoregression (VAR) model, is the OECD's consumer confidence Barometer. [3] This barometer represents the monthly growth rate of the OECD's Consumer Confidence Indicator, which is derived from survey responses to four key questions: (i) financial situation over the past 12 months, (ii) expected financial situation over the next 12 months, (iii) expected general economic situation over the next 12 months, and (iv) intentions regarding major purchases over the next 12 months. Each question offers five response options: "a lot better," "a little better," "the same," "a little worse," and "a lot worse." The net balance is constructed by assigning weights of 1 to the extreme responses, 0.5 to "a little better" or "a little worse," and 0 to "the same." The data provided by the OECD is monthly, and since the analysis is done for quarters, the average is calculated for each quarter, which is then used for the analysis.

GDP per capita growth rate is used as an additional forward looking variable and as a proxy for economic output. The data on GDP per capita is sourced from the OECD, expressed in US dollars per person and adjusted for purchasing power parity (PPP) using 2015 prices. The growth rate of GDP per capita is computed relative to its value from four quarters prior, ensuring normalised values.

Data on gross capital flows, encompassing both gross capital inflows and outflows, is obtained from the Balance of Payments Statistics Database (IFS/IMF), following the BPM6 methodology from the International Monetary Fund (IMF). Gross inflows are calculated by summing direct liabilities, portfolio liabilities, and other liabilities, while gross outflows are derived from the sum of direct assets, portfolio assets, and other assets, following the methodology outlined in Adler et al. (2014). To normalise these flows, the totals are divided by trend GDP, extracted using the HP filter, as per Adler et al. (2014); Benhima and Cordonier (2022); Broner et al. (2013). Trend GDP is used as its reacts to shocks much less compared to current GDP. Doing this allows us to attribute most of the impact of the industrial policy shock to capital flows as GDP would not react as much. Lastly, capital net flows are calculated by subtracting gross capital outflows from gross capital inflows.

[3] OECD's Calculation of the Consumer Barometer: https://www.oecd.org/content/dam/oecd/en/data/methods/OECD-Consumer-Barometer-calculation.pdf

4 Results

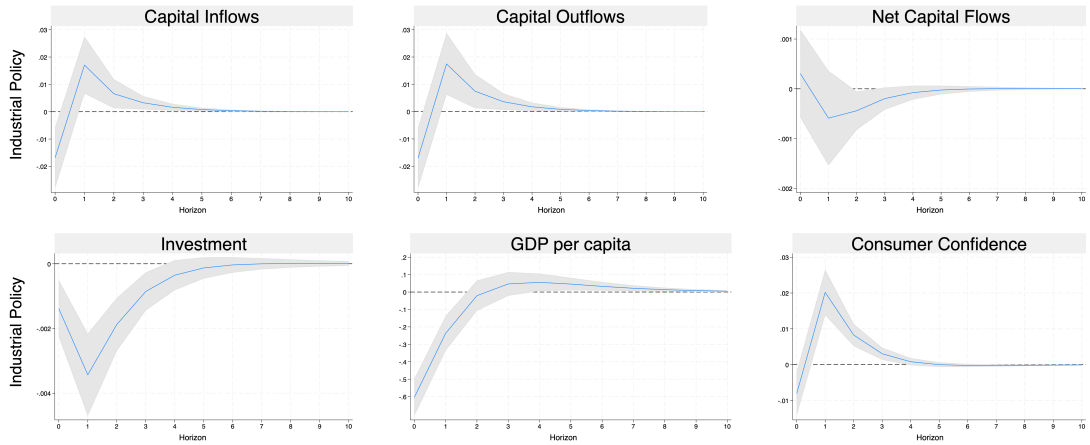
In this section, I estimate the effects of an industrial policy shock on capital flows and other variables in the baseline specification. The results shown in Figure 3 indicate that an industrial policy shock causes an immediate fall in gross capital flows, with inflows and outflows decreasing by a similar magnitude, and then rising after which its effect diminishes. Furthermore, the shock results in a direct negative impact on consumer confidence, GDP per capita, and investment on impact. Consumer confidence increases in the first quarter, after which its response to the shock shrinks until it reaches zero while GDP per capita and investment remain mostly negative until as they recover from the shock.

I present the orthogonalised impulse response functions derived from the VAR for the panel. These functions employ a Cholesky decomposition to orthogonalise shocks, ensuring that each shock is uncorrelated with others, which aids in identifying structural shocks within the model. The VAR specification follows the baseline outlined in the Methodology section, with the number of lags set at $p = 1$ [4]. The lag length of 1 allows us to capture the short-term dynamics and the immediate response of capital flows and the other variables in the specification to an industrial policy shock. Confidence intervals around the impulse responses are generated through Monte Carlo simulations, repeated 700 times, following the approach of Adler et al. (2014). I first estimate the PVAR using gross capital inflows, then sequentially replace gross capital inflows with gross capital outflows and capital net flows. Figure 3 illustrates the impulse responses of the variables in the baseline specification; capital flows - including gross capital inflows, gross capital outflows and capital net flows- , investment, GDP per capita and consumer confidence to shocks to industrial policy. The IRFs for investment, GDP per capita and consumer confidence that are presented are generated using the PVAR with gross capital inflows.

The top panel of Figure 3 present the IRFs of gross and net capital flows. It shows that both gross capital inflows and outflows respond similarly to an industrial policy shock. The increase in the impulse responses for both inflows and outflows is statistically significant. Both initially decline sharply on impact, then rise rapidly

[4]Since the sample consists of quarterly data over 16 years, which is a relatively small sample size for a VAR, a lag of 1 was selected. In addition, results of the Akaike Information Criterion (AIC), the Hannan-Quinn Information Critierion(HQIC) and the Schwarz-Bayesian Information Criterion (SBIC) were used. The results were mixed, with the AIC indicating the use of $p = 4$ and the HQIC and the SBIC indicating the optimal lag to be $p = 1$. Since the majority of the criteria suggested a lag length of 1, we use $p = 1$.

Figure 3: IRFs of variables in the specification to a shock to industrial policy



Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

to their peak at the first time horizon. Following this peak, the effect on both gross capital inflows and outflows decreases swiftly and with the shock having no impact on gross flows approximately seven quarters after the shock. Since capital net flows represent the difference between inflows and outflows, their response fluctuates around zero, with an initial jump followed by a decline.

The overshooting in the impulse response of gross capital inflows may be attributed to the possibility that the industrial policy shock creates more favourable investment conditions for foreign agents one quarter after the initial impact. This could occur due to industrial policy interventions, such as tax breaks or subsidies, which attract foreign capital in the short term. The subsequent decline following this spike might reflect the temporary or insufficient nature of these perceived benefits, which are inadequate to sustain long-term gross capital inflows. Additionally, concerns about the stability of the policy or the broader economic environment of recipient countries could contribute to this short-term effect, leading foreign investors to withdraw funds or reduce overseas investments.

In contrast, the spike observed after the initial decline in gross capital outflows might suggest that domestic investors seek to diversify their portfolios by investing in foreign markets. This behaviour could stem from uncertainty or perceived risks associated with the impact of industrial policy on the domestic economy. The decline that follows this increase may reflect a retrenchment of capital, as increased confidence in the policies and the domestic economy encourages a return to domestic investments. Indeed, the eventual reduction of the impact of the shock to zero, for both gross capital flows suggests that the effects of the shock are temporary and that eventually

both investors and the economy adjust.

The response of capital net flows shows an initial decline, which may indicate that, upon the impact of the industrial policy shock, gross capital outflows exceed gross capital inflows, reflecting a greater degree of uncertainty or pessimism among domestic investors than foreign investors. The gradual reduction of the shock suggests that the balance between gross capital inflows and outflows improves and eventually stabilises. This pattern indicates that an industrial policy shock has temporary effects and creates short-term imbalances in capital net flows.

Next, we analyse the response of investment, GDP per capita, and consumer confidence to an industrial policy shock, as illustrated by the bottom panel of Figure 3.

Focusing on investment, the results indicate an initial decline upon impact, with investment continuing to decrease for one quarter after the industrial policy shock. However, despite remaining negative, investment gradually begins to recover until the effect of the shock is minimised. The initial decline in investment may be attributed to perceived uncertainty or adjustment costs that typically arise in response to a shock. As the economy adapts to the policy shock, firms may adjust and increase their investment levels, contributing to the gradual recovery. This improvement could be driven by growing confidence in the policy, such as enhanced infrastructure or subsidies, which incentivise investment.

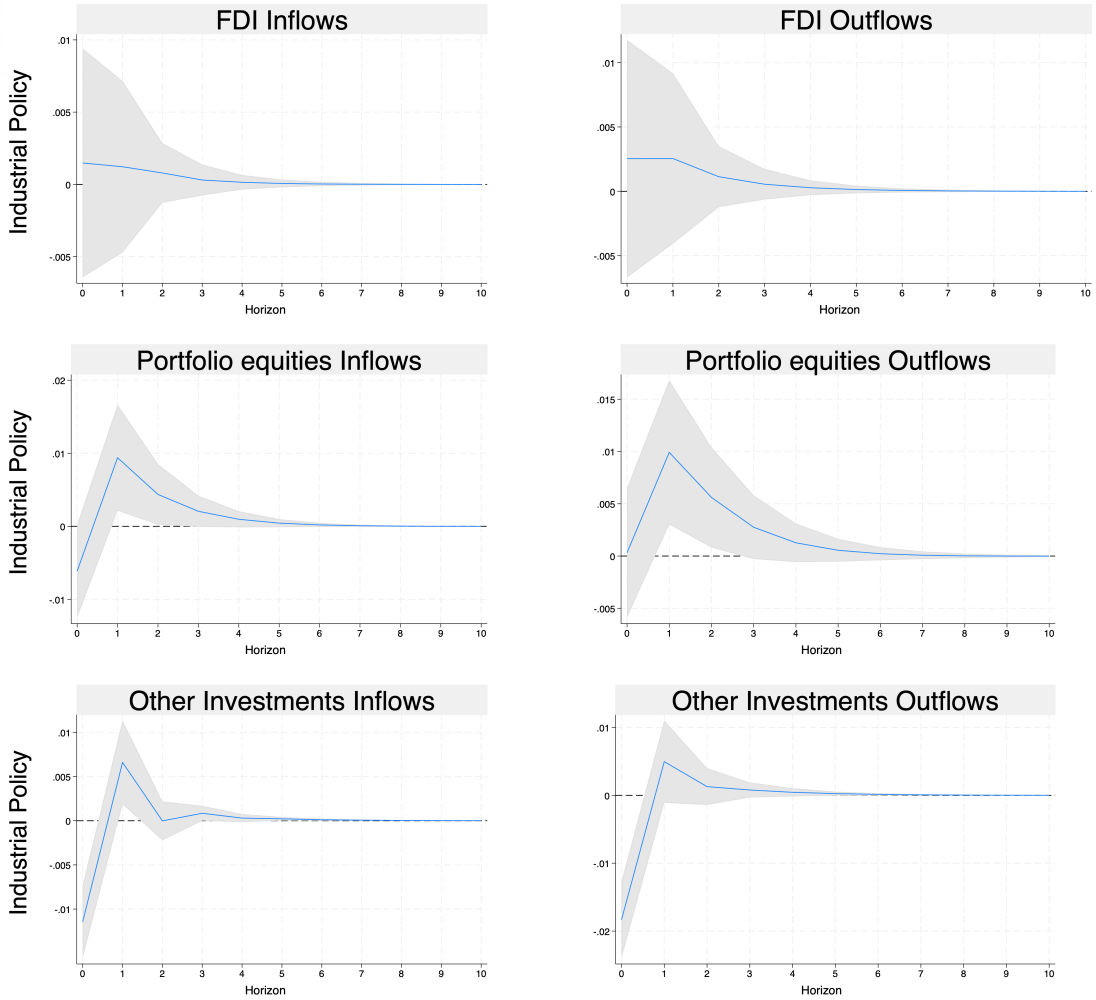
Furthermore, the response of GDP per capita to an industrial policy shock indicates an initial decline followed by a gradual recovery. GDP per capita eventually rises and has a slightly positive impact, until the response stablises. The immediate decline may result from reduced production capacity if TFP is affected or from a decrease in aggregate demand due to uncertainty associated with the industrial policy shock. The subsequent recovery and increase above the baseline two quarters after the shock suggest that industrial policy may ultimately slightly stimulate growth. This could be driven by improvements in productivity, enhanced infrastructure, or increased innovation as a consequence of the policy.

Additionally, examining the response of consumer confidence, we observe a slight drop on impact, followed by a positive response one quarter after the industrial policy shock. However, consumer confidence then rapidly declines, indicating a eventual decline of the shock. This pattern can be explained by the permanent income hypothesis, suggesting that economic agents perceive the effects of the industrial policy shock as temporary. While consumer confidence initially increases in response

to the shock, the effect of the shock only lasts four quarters. This reaction may occur if the policy includes measures such as tax cuts or subsidies that temporarily boost consumer confidence.

The confidence intervals for the responses of investment, GDP per capita, and consumer confidence indicate that the impact of the industrial policy shock on investment is statistically significant in the initial periods following the shock. However, similar to the impact on capital flows, the impact of the shock is short-lived as the response stabilises and is mitigated within ten quarters.

Figure 4: IRFs of Components of Gross Inflows to an Industrial Policy Shock



Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

Figure 4 shows the responses of different categories of capital flows to an industrial policy shock. The top panel shows the response of FDI inflows and outflows, the middle panel, the response of Portfolio equity inflows and outflows and the bottom panel, the response of Other investments to an industrial policy shock.

Industrial policies, including incentives, subsidies, or regulatory changes, can enhance a country's attractiveness as a destination for foreign direct investment (FDI) in the short term. Following the implementation of such policies, we see a slight increase in both FDI inflows and outflows. However, once the policy's initial impact has been absorbed by the economy, the levels of FDI tend to stabilise as the impact of the shock returns to zero. This pattern could convey that industrial policy shocks do not have much of an impact on FDI at the business-cycle frequency.

In contrast, portfolio equity inflows initially decline on impact in response to the policy shock but rise after one period, while portfolio equity outflows jump on impact immediately after the shock and continue to rise until the first horizon. After this point, both inflows and outflows decrease, as the impact of the industrial policy shock wanes. Investors may initially adjust their exposure in other countries based on policy changes, but as they reassess long-term risks and returns, the effects diminish over time. This suggests that portfolio investors, both foreign and domestic, are highly responsive to changes in industrial policy, possibly due to the liquid and short-term nature of these investments. Foreign investors may quickly capitalise on policies that temporarily boost the profitability of specific industries, leading to increased inflows. However, as portfolio equity investments are often speculative and sensitive to short-term risks, foreign investors may pull back as uncertainties about the long-term benefits arise, stabilising inflows. Domestic investors might initially increase their foreign portfolio holdings if they perceive that domestic policies are sector-specific and do not benefit their current investments. For instance, if domestic policy favors the manufacturing sector but not the financial sector, domestic investors in finance may seek opportunities abroad. Additionally, if domestic industrial policy creates imbalances or long-term risks, domestic investors may hedge their risks by diversifying into foreign markets. The reduction in outflows after the initial surge suggests that as the effects of the policy are fully absorbed and uncertainties decrease, domestic investors find fewer reasons to move capital abroad.

Other investments, which include loans, currencies, deposits, trade credit, and advances—comprising a significant portion of capital flows— also respond to industrial policy shocks in the short term. Initially, both inflows and outflows of these investments decline on impact, but they increase after one period and eventually the effect of the shock stabilises, converging to zero, within four quarters. The sharp increase after the initial shock may reflect changes in investor sentiment or operational adjustments, with the effects diminishing over time. Other investments inflows may rise as foreign investors perceive improved creditworthiness and profitability in the

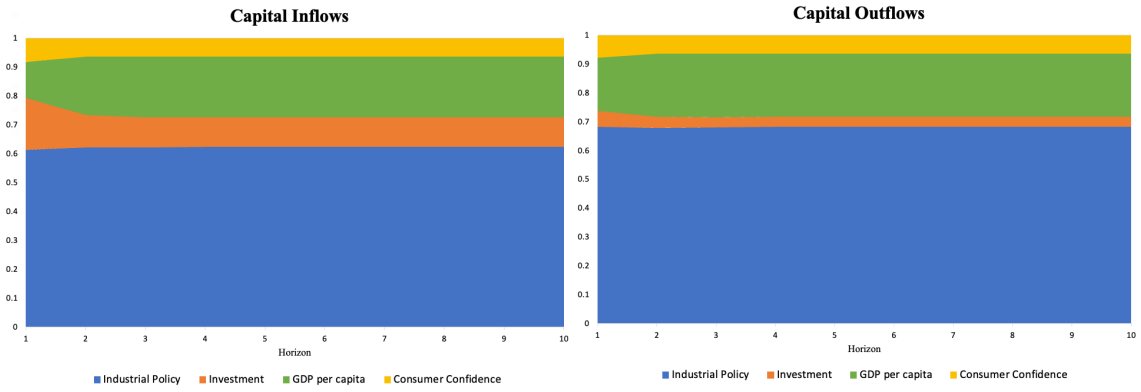
domestic economy due to the industrial policy. For example, if the government introduces subsidies for industrial development, foreign banks may increase lending to domestic firms in the targeted sectors. However, as the initial effects of the policy materialise and long-term stability becomes clearer, foreign investors may reduce their exposure, causing inflows to decline. Similarly, domestic agents may reduce their investments abroad immediately following the policy shock but increase them after one period. This pattern could occur if domestic firms become more confident in extending credit abroad or seek to diversify risks due to the policy shock. Alternatively, firms in sectors not favored by the industrial policy may prefer to allocate resources abroad. Similar to the response of inflows, outflows also reduce after the increase caused by the shock, indicating that as the policy's effects settle, capital flows normalise.

Portfolio equities flows appear to follow a similar trend to gross inflows and outflows and seem to be the most sensitive to industrial policy shocks, followed by other investments and then FDI, likely due to their greater liquidity. The results, while consistent with expectations, are largely insignificant. This could suggest that the response of gross capital inflows and outflows to an industrial policy shock is not primarily driven by FDI, but by portfolio equities and other investments. Given that industrial policy effects are short-lived and FDI is more long-term in nature, FDI may be less affected by industrial policy compared to portfolio and other investments in the short-term.

The results presented above are robust to alternative specifications of the model (not shown here). Particularly, I check the results by changing the order of the variables, in the orthgonalised impulse response functions. The responses of variables remain consistent across different orderings. In addition, the patterns are also robust with additional lags (see IRFs in Appendix). The difference that is observed however is that although GDP per capita still falls on impact, it then increases significantly above its baseline as the lags increase, indicating that the effect of an industrial policy shock on the economy may need an adjustment period. Moreover, in terms of consumer confidence, as the lags increase, we see an increasing negative effect following the initial overshoot after the industrial policy shock. This could indicate that after the perceived benefits of the shock, costs such as increased inefficiency in the economy may be realised, reducing consumer confidence.

To further analyse the behaviour of gross capital flows and their interaction with other variables in the specification, I conduct a panel Forecast Error Variance Decomposition (FEVD). The results, presented in Figure 5, illustrate how the other

Figure 5: FEVDs for Gross Capital Flows



variables, aside from gross capital flows themselves, influence future values of gross capital inflows and outflows. The findings reveal that, after its own lagged values, industrial policy exerts the greatest influence on both gross capital inflows and outflows, accounting for approximately 60 percent of future capital inflow levels and around 65 percent of future capital outflow levels. Following industrial policy, GDP per capita has the second most significant impact on both gross flows, with consumer confidence and investment having smaller effects.

The prominence of industrial policy in explaining future values of gross capital flows highlights the critical role of government intervention, particularly through strategic initiatives, incentives, and regulations, in attracting gross capital inflows and determining the allocation of domestic capital abroad through outflows. Additionally, GDP per capita serves as an indicator of economic stability. In the context of gross capital inflows, it suggests that foreign investors seek stable returns, while in the context of outflows, it implies that more industrialised economies have access to a greater amount of resources to invest globally.

Overall, the impact of industrial policy appears to be temporary and, in some cases, counter-intuitive. Governments typically implement industrial policies to alter the economic structure of an economy and to motivate growth. However, coupled with the observation that all variables initially decline following the policy shock and then gradually adjust (either becoming positive or remaining negative) as the effects of the shock disappear, suggests that industrial policy may not fully achieve its intended objectives.

The impact of industrial policy on gross inflows and outflows is puzzling, as these variables move together and appear to be correlated. This outcome is counter-

intuitive, given that theoretical frameworks typically assume that gross inflows would be offset by gross outflows. Nevertheless, this finding aligns with existing literature that documents the allocation puzzle of gross inflows and outflows (see Broner et al., 2013; Gourinchas and Jeanne, 2007; Lane and Milesi-Ferretti, 2008; Milesi-Ferretti and Tille, 2011; Obstfeld, 2012).

Furthermore, we also see GDP per capita and investment respond counter-intuitively to a shock to industrial policy, both of which decline following the shock, contrary to the expected positive impact of such policies on both GDP per capita and investment. Additionally, the increase in consumer confidence, while GDP per capita continues to decline and remains negative until it returns to long-run equilibrium, presents a puzzle. We would typically expect GDP per capita to rise in tandem with consumer confidence.

Examining the different categories of capital flows, specifically, we observe that although foreign direct investment (FDI) flows—both inflows and outflows—increase respond positively, the effect of the shock is minimal as it reaches zero fairly quickly, these results are highly insignificant. This suggests that FDI may have a limited impact on gross capital flows. The short-lived effects of industrial policy, combined with the long-term nature of FDI returns, could explain this minimal influence. In contrast, portfolio equities and other investments demonstrate greater sensitivity and exhibit patterns similar to gross inflows and outflows, indicating that they may have a more significant influence on gross capital flows. This difference could be attributed to the more liquid nature of both portfolio equities and other investments.

5 Discussion and Future Research Implications

Given that we see some insignificant and counter-intuitive patterns in the results, This section discusses potential channels through which industrial policy may affect capital flows and outlines future research avenues that warrant investigation.

5.1 Potential Behavioural Impacts of Industrial Policy on Capital Flows

Industrial policies often target specific sectors, resulting in uneven effects across economies. Such policies can positively impact capital inflows as foreign investors may seek to invest in these targeted sectors and earn returns. Conversely, domestic investors in sectors not supported by industrial policy may opt to invest abroad,

leading to increased outflows. Additionally, domestic agents might choose to invest overseas if they anticipate that domestic industrial policies could create economic distortions.

Agents' risk perceptions can also impact the way capital flows react to industrial policy. The results of the study above indicate a positive response in both inflows and outflows, reflecting agents' reactions to the announcements of industrial policies. However, uncertainty regarding the credibility or sustainability of these policies and the overall market conditions can influence the behavior of both foreign and domestic investors and affect their adjustments over time.

Global competitiveness and comparative advantage also play a role in shaping the relationship between industrial policy and capital flows. Initially, industrial policies might enhance domestic competitiveness and attract more foreign investment. Nevertheless, as global conditions evolve and other countries adopt similar policies, the relative advantage may diminish, leading to reduced inflows over time. Similarly, domestic agents may initially increase outflows if they perceive better investment opportunities abroad, but they may revise their strategies in response to changing global economic conditions.

The timing and potential adjustment costs associated with industrial policy effects can further influence capital flow behavior. For instance, FDI and other long-term investments require time to adjust. The initial response might be positive as investors reposition their assets, but over time, as they reassess any associated risks and returns, the impact on capital flows may stabilise. In contrast, short-term investments, such as portfolio equity flows, may react more immediately but also more temporarily as investors respond instantaneously to perceived opportunities and risks.

Macroeconomic fundamentals, such as exchange rates and interest rate differentials, can be affected by industrial policy, thereby influencing capital flows. Favorable industrial policies may strengthen the domestic currency, making the economy more attractive for capital inflows. However, a stronger currency could render exports less competitive, potentially reducing inflows and increasing outflows as domestic agents seek investment opportunities abroad where currencies may be weaker. Moreover, industrial policies that influence interest rates, such as subsidies, can also impact capital flows. For example, if an industrial policy leads to higher economic growth expectations, the central bank might raise interest rates to reduce inflation, which could attract more foreign capital seeking higher returns. However, higher interest rates may also increase borrowing costs for domestic firms, possibly prompting

them to invest abroad or reduce overall investment, thereby contributing to capital outflows.

Industrial policy can intersect with trade policies, particularly when aimed at protecting domestic industries or promoting export-oriented growth. Disruptions to global supply chains or trade tensions resulting from such policies can affect capital flows. For instance, foreign investors may be deterred from investing in a country that imposes tariffs or trade barriers, leading to reduced inflows. Conversely, if industrial policies enhance a country's integration into global supply chains, this could attract foreign investment and increase inflows.

Tax policies and incentives incorporated into industrial policy can significantly influence capital flows. Tax breaks, subsidies, or other incentives for specific sectors may attract FDI into those areas, boosting inflows. However, if domestic investors perceive an increased tax burden on other sectors or on capital gains, they may move their investments abroad to avoid higher taxes, resulting in capital outflows.

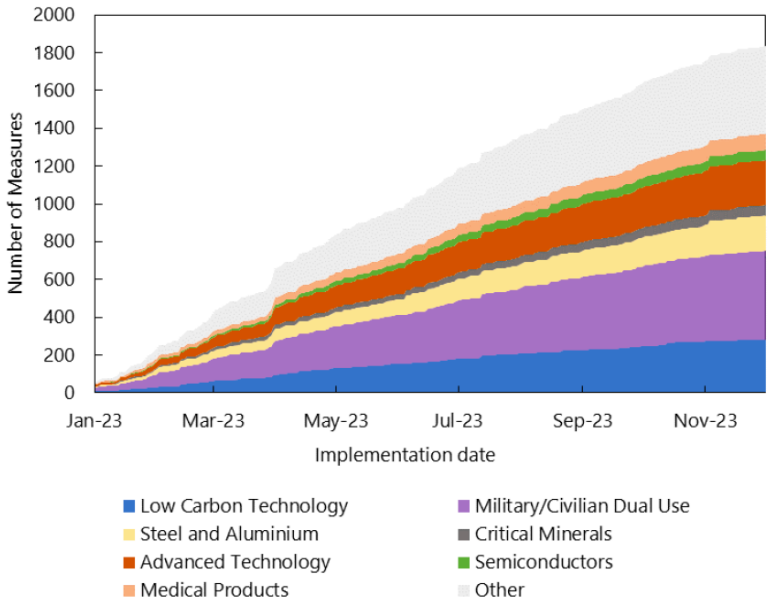
5.2 Future Empirical Research Implications

The findings of the study and the above mentioned behavioural explanations provide several implications for future empirical research.

One avenue for extending this research involves examining the sector-specific impacts of industrial policies. It would be fascinating to explore the conditions under which domestic investors opt to invest abroad when industrial policies target specific sectors. Future studies could investigate how domestic investors' expectations regarding economic distortions drive capital flight and identify policy mechanisms that facilitate such behavior. Additionally, comparative studies could be conducted across countries that implement similar sector-specific policies to assess the varying impacts on capital flows. Research could also utilise industrial policy databases to analyse how sector-specific policies, particularly in capital-intensive industries like manufacturing or technology, influence both domestic and international capital flows. This includes evaluating whether these policies effectively attract or retain capital within these sectors.

Another potential research extension involves analysing how other macroeconomic variables, influenced by industrial policies, affect capital flows. Macroeconomic variables such as exchange rates, interest rates, and credit conditions reflect the overall health of an economy and can impact capital flows. Variations in these fundamentals may lead to sudden stops or reversals in capital flows.

Figure 6: Trade Distortive Industrial Policy by Sector



Note: Cumulative stock of measures. For measures covering multiple sectors, each sector is given equal weight.

smallskip

Source: Evenett et al. (2024)

The impact of industrial policies on supply chains and capital flows also warrants investigation. Future research could explore how industrial policies that alter trade relationships or supply chains—particularly in light of increasing trade-distorting measures—affect capital flows. Additionally, examining the spillover effects of one country's industrial policy on the capital flows of other countries within the same supply chain network could provide valuable insights.

The intersection of industrial policy and global geopolitical tensions presents another area for exploration. Research could examine how industrial policies that encourage or discourage trade and international financial flows and how they could influence global supply chains, particularly in the context of rising geopolitical tensions. Given that there has been an increase in trade distortive policies (see Figure 7) where out of 2,500 implemented industrial policies in 2023, two-thirds were trade distorting IMF (2024), studying the implications of these on capital flows may prove worthwhile.

Future studies might also incorporate global shocks to analyse how industrial policy in major economies, such as the United States, impacts capital flows to and from other countries. This research would offer a more comprehensive understanding of cross-border capital movements and the interconnectedness of global financial

markets.

One limitation of this study, due to data availability, is that the panel includes mainly high income countries. Expanding the sample of countries could provide broader insights. Including emerging economies along with advanced, would enhance our understanding of how industrial policies affect capital flows across both income groups.

Exploring alternative data sources for variables such as consumer confidence, investment, and total factor productivity (TFP) could enrich empirical research. Utilising a broader range of data would facilitate more extensive analyses and offer a more comprehensive understanding of how industrial policies impact capital flows across various economic environments. Additionally, empirically validating the effectiveness of industrial policies in influencing capital flows is a critical research avenue. Developing new datasets or methodologies to address limitations in existing data would strengthen the robustness of future research findings.

Finally, future research can compare the impact of industrial policy on capital flows in democracies and autocracies. These include examining how economic stability can affect investor confidence, and comparing the effectiveness of targeted industrial policies and regulatory environments in influencing investment. Research could also explore how economic openness, fiscal and monetary policies, and the ability to implement reforms shape capital flows differently in each political system.

6 Conclusion

As global and domestic crises become more prevalent, leading to market failures, the role of government intervention through industrial policy has become increasingly critical. The persistently low investment growth rates worldwide has raised concerns, especially as economic growth rates have remained sluggish in the aftermath of the financial crisis and COVID-19. Consequently, the UNCTAD underscores the significance of industrial and investment policies in stimulating cross-border investment. This study seeks to deepen our understanding of the relationship between industrial policy and capital flows, and by extension, its effects on international financial markets.

Using a panel of 34 countries and a PVAR model, this study explores the dynamic responses of capital flows to industrial policy shocks within this sample of countries. The findings suggest that the effects of an industrial policy shock are temporary rather

than persistent, with variables stabilising and the impact of the shock dissipating by approximately ten quarters after the shock. Both gross and net capital flows exhibit short-lived responses to the shock, reflecting perceived risks and opportunities in the quarter immediately following the shock. Notably, the results reveal a temporary increase in both flows, indication a potential correlation between gross inflows an outflows, a counter intuitive outcome that aligns with existing literature. While net capital flows initially decline, they recover as economies adjust to the new policy environment. Furthermore, in analysing the components of capital flows, it is evident that portfolio equity investments and other investments primarily drive the response of gross inflows and outflows, whereas FDI exhibits limited influence as its response to the industrial shock is minimal and highly statistically insignificant. This distinction can be attributed to the nature of the different types of capital flows; portfolio equity investments and other investments, are more liquid, and thus react more swiftly than FDI, which tends to adjust over a longer time frame. Moreover, the impulse response functions indicate that investment and GDP per capita experience short-term negative impacts following the industrial policy shock but gradually recover. Conversely, consumer confidence initially dips slightly on impact, but then improves and is positively impacted by the shock, after which the impact of the industrial policy eventually diminishes. This pattern aligns with the permanent income hypothesis, suggesting that the industrial policy shock is perceived as a temporary disruption to income. Lastly, the Forecast Error Variance Decomposition (FEVD) results further reveal that, beyond the direct effects of gross capital flows on its future values, industrial policy plays a dominant role in influencing gross capital inflows and outflows over the ten-quarter horizon. This highlights the critical importance of government strategy and stability in shaping capital movement behaviors.

This study opens several avenues for future empirical research on the interaction between industrial policy and capital flows. Examining sector-specific impacts could explain how targeted policies shape domestic and international investments. Comparative analyses across different countries and industries, along with studies of macroeconomic variables and supply chain effects, will further elucidate capital flow dynamics. Additionally, incorporating global geopolitical tensions and shocks into research could enhance our understanding of global financial interconnectedness. Finally, expanding the datasets to include emerging economies and diverse data sources, and evaluating the effects of industrial policies in varying political systems, will further enrich our comprehension of these complex interactions.

7 Appendix

Table 1: Sample of Countries

Country Name	Income Level	Country Name	Income Level
Australia	High Income	Italy	High Income
Austria	High Income	Japan	High Income
Belgium	High Income	Korea, Rep.	High Income
Canada	High Income	Latvia	High Income
Chile	High Income	Lithuania	High Income
Colombia	Upper Middle Income	Luxembourg	High Income
Costa Rica	Upper Middle Income	Netherlands	High Income
Czech Republic	High Income	New Zealand	High Income
Denmark	High Income	Poland	High Income
Estonia	High Income	Portugal	High Income
Finland	High Income	Slovakia	High Income
France	High Income	Slovenia	High Income
Germany	High Income	Spain	High Income
Greece	High Income	Sweden	High Income
Hungary	High Income	Switzerland	High Income
Ireland	High Income	United Kingdom	High Income
Israel	High Income	United States	High Income

Table 2: Descriptive Statistics (Pre detrending)

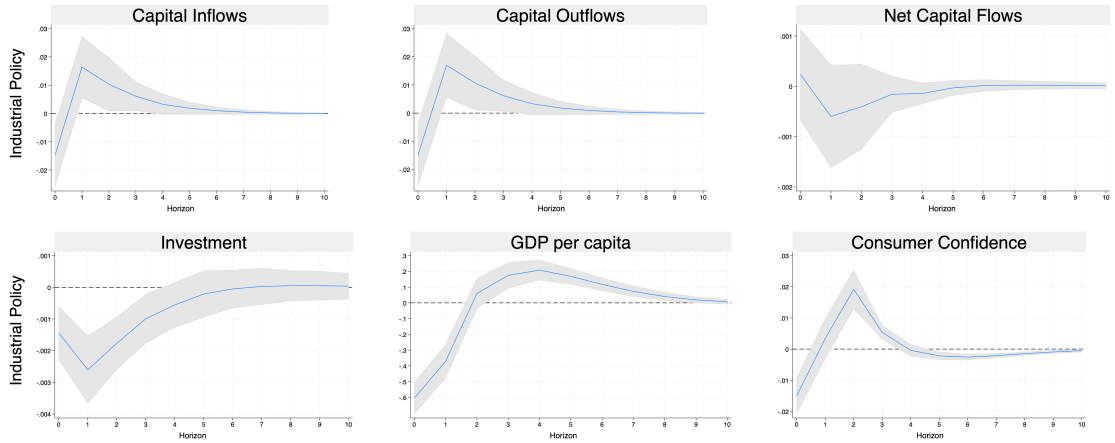
Variable	Mean	Std. Dev.	Min	Max	Obs
Gross Inflows	0.069	0.515	-4.723	9.139	2,176
Gross Outflows	0.069	0.521	-4.807	9.070	2,176
Net flows	0.000	0.029	-0.292	0.253	2,176
Consumer Confidence	-0.005	0.181	-0.904	1.360	2,160
GDP per capita, growth	1.158	4.159	-22.275	25.835	2173
Investment	0.219	0.046	0.095	0.914	2,176
Log of Industrial Policy	2.682	0.938	0	6.675	1988

Note: Author's Calculations

Table 3: Description of Data used for Variables

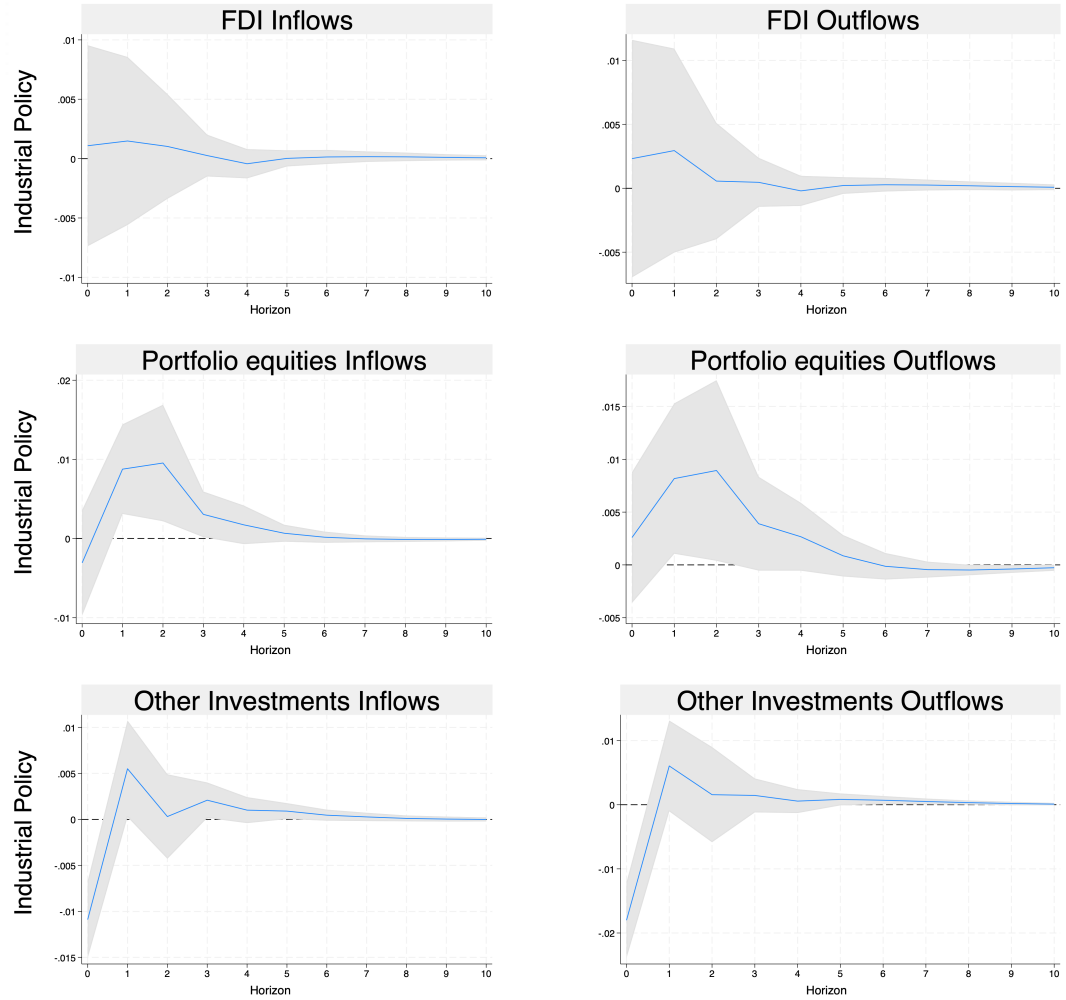
Variable	Description	Formula	Source
Gross Inflows	Total liabilities in terms of trend real GDP in USD	(DILiab + PILiab+ OILiab)/GDP	IMF's Balance of Payments BMP6 Database and author's calculations
Gross Outflows	Total Assets in terms of trend real GDP in USD	(DIAssets + PIAssets+ OIAssets)/GDP	IMF's Balance of Payments BMP6 Database and author's calculations
Net Capital Flows	Net liabilities flows in terms of trend real GDP in USD	Gross inflows - Gross outflows	IMF's Balance of Payments BMP6 Database and author's calculations
Consumer Confidence	The monthly growth rate of the normalised consumer confidence interval (CCI)		OECD's Consumer Barometer
GDP per capita	The growth rate of GDP per capita in USD	((GDP pc/ GDP pc lag4) - 1) * 100	OECD : GDP pc acc. to the expenditure approach
Investment	Investment in terms of real GDP	GFCF/ GDP	OECD: GFCF and GDP
Industrial Policy	Log of the count of industrial policies per quarter		Global Trade Alert

Figure 7: IRFs with lags, $p = 2, 1$



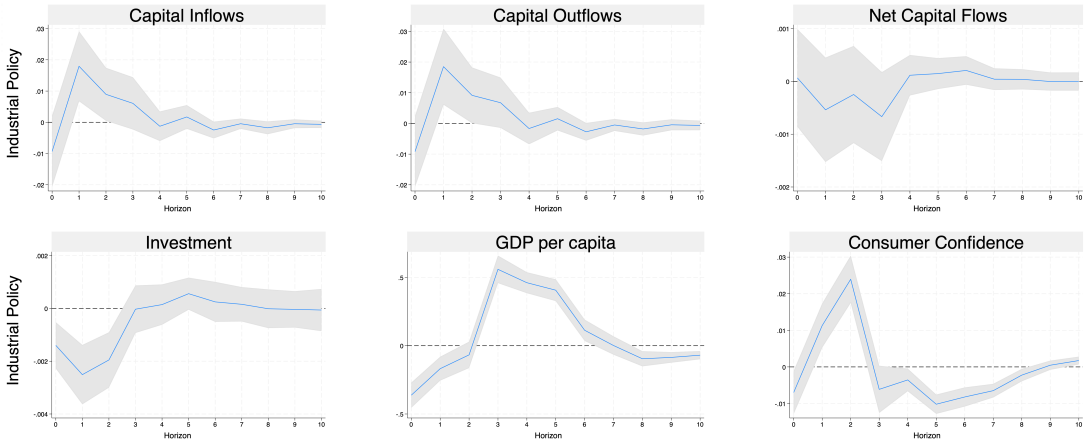
Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

Figure 8: IRFs with lags, $p = 2, 2$



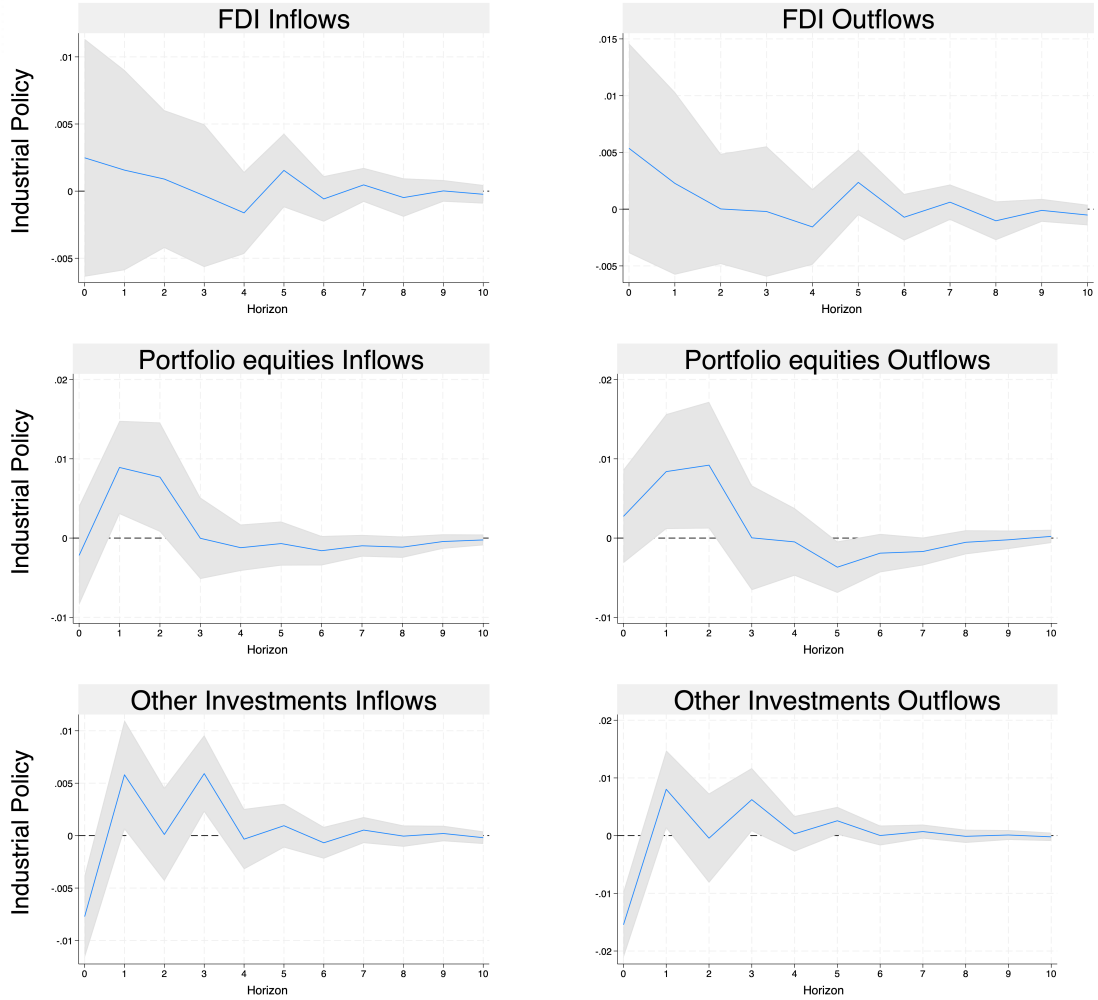
Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

Figure 9: IRFs with lags, $p = 3, 1$



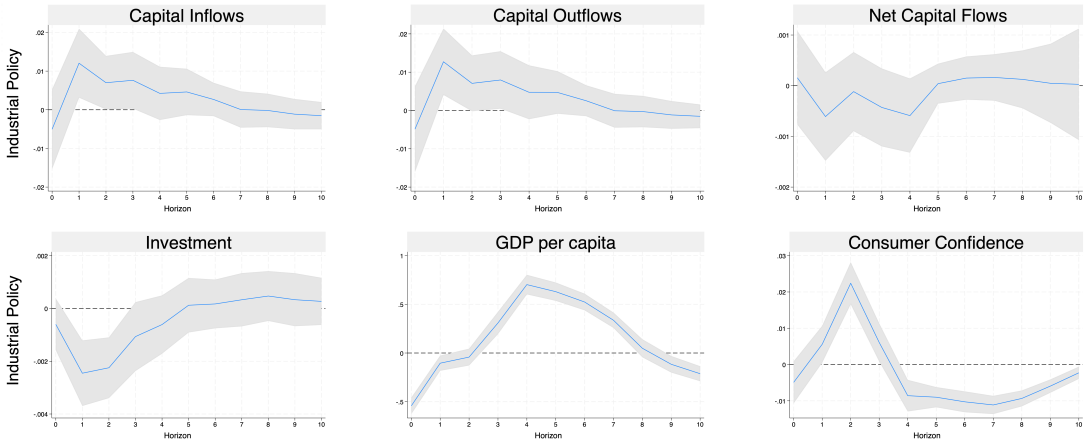
Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

Figure 10: IRFs with lags, $p = 3, 2$



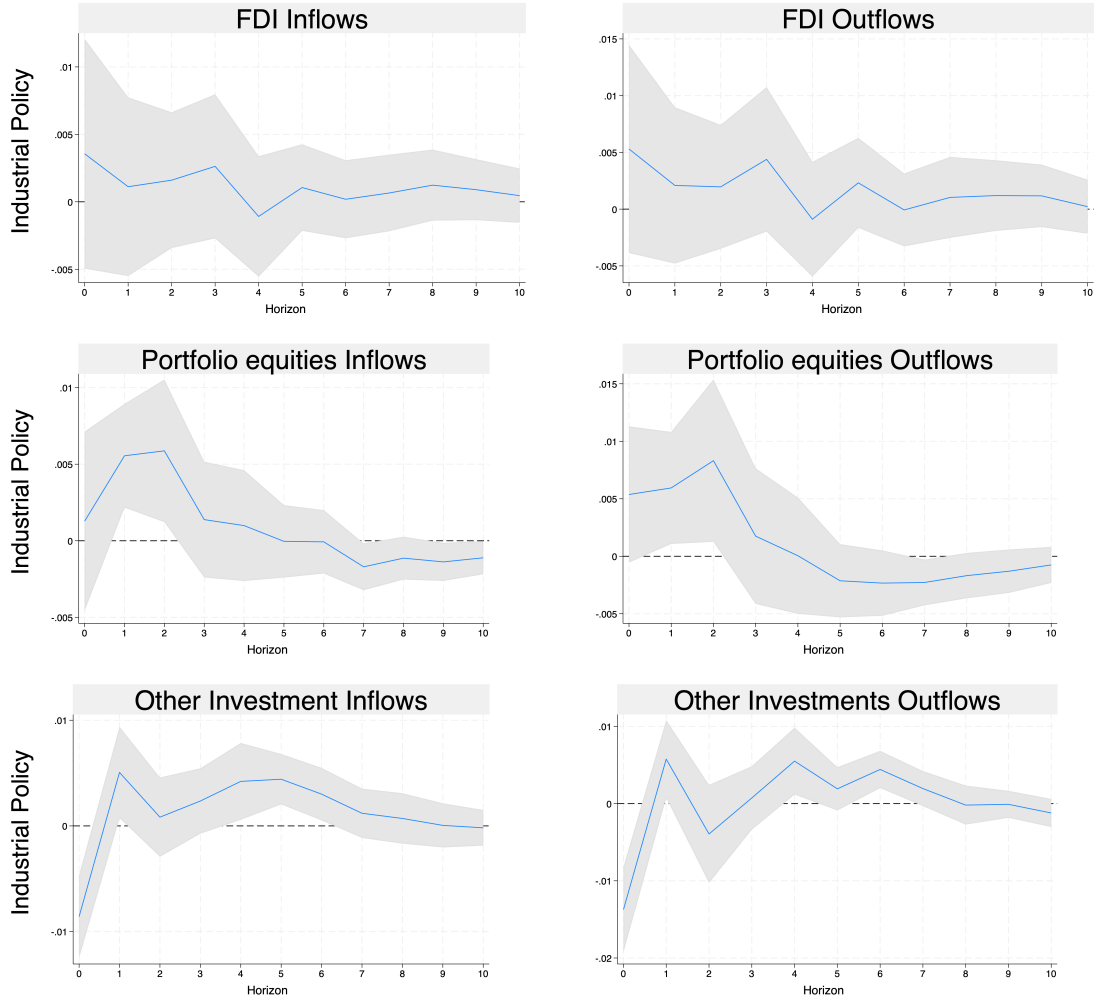
Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

Figure 11: IRFs with lags, $p = 4$, 1



Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

Figure 12: IRFs with lags, $p = 4$, 2



Note: The blue line shows the IRFs in response to the shock, the grey shaded regions indicate the 90 percent confidence intervals generated using 700 Monte Carlo Simulations

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