Industrial Policies, Global Imbalances and Technological Hegemony*

Ambrogio Cesa-Bianchi†
Bank of England and CEPR

Andrea Ferrero‡
Oxford University and CEPR

Luca Fornaro§
CREI, Universitat Pompeu Fabra, BSE and CEPR

Martin Wolf ¶
University of St Gallen and CEPR

January 2026

Abstract

We provide a framework that connects industrial policies to global imbalances and technological hegemony, and describe some empirical facts consistent with our model. We study the international spillovers triggered by industrial policies promoting high-tech sectors. Since high-tech goods and services are typically traded internationally, these policies boost the supply of tradable goods. Moreover, industrial policies lead to trade surpluses if the government pursues an *unbalanced policy mix*, such that domestic demand does not rise as much as supply. These surpluses are absorbed by the rest of the world, which in response runs trade deficits. Absent policy interventions, trade deficits reduce the competitiveness of the domestic tradable sector, stifling innovation and productivity growth. Innovation policies can help the rest of the world to mitigate these negative spillovers.

JEL Codes: E21, E22, E23, E44, F32, F43, O31.

Keywords: trade imbalances, productivity, international spillovers, tariffs, innovation, high-tech, China shock, endogenous growth, capital flows.

*The views expressed in this paper are solely those of the authors and should not be taken to represent those of the Bank of England or its committees. Luca Fornaro acknowledges financial support from the European Research Council through the Consolidator Grant MACROGROWTH-101169982, from the Spanish Ministry of Economy and Competitiveness through the Severo Ochoa Programme for Centres of Excellence in R&D (CEX2019-000915-S), and from the Generalitat de Catalunya, through CERCA and SGR Programme (2021-SGR-01599). Martin Wolf acknowledges financial support from the Swiss National Science Foundation (SNSF) under the career grants program, SNSF Starting Grant (TMSGI1_226520-DEBTANDGROWTH).

†Email: ambrogio.cesa-bianchi@bankofengland.co.uk.

‡Email: andrea.ferrero@economics.ox.ac.uk.

§Email: LFornaro@crei.cat.

¶Email: martin.wolf@unisg.ch.

1 Introduction

Industrial policies are back in fashion. Indeed, in recent years, public interventions targeting the structure of the economy have been on the rise (Juhász et al., 2024). This fact has sparked a heated debate about the international spillovers triggered by industrial policies, especially through their impact on global imbalances. Most notably, many commentators are arguing that the world is facing a Second China Shock (Krugman, 2025; Smith, 2025). The argument is that the policies deployed by the Chinese government to promote high-tech manufacturing, coupled with weak demand by Chinese consumers, are flooding the world with high-tech goods made in China (Al-Haschimi et al., 2025). Should governments in the rest of the world adopt a laissez-faire approach, or rather act to protect their own high-tech industries? Policymakers are struggling to answer this question, not least because they lack an analytical framework to think clearly about it.

We contribute to this debate by providing a framework that connects industrial policies to the pattern of global imbalances and technological hegemony, and presenting empirical evidence consistent with the model. We study the international spillovers triggered by industrial policies promoting high-tech sectors. Since high-tech goods and services are typically traded internationally, these policies expand the supply of tradable goods. Industrial policies also lead to trade surpluses if the government pursues an *unbalanced policy mix*, such that domestic demand does not rise as much as supply. This happens when industrial policies are accompanied by tight fiscal policy, foreign reserve accumulation, controls on capital inflows, or other policies that suppress domestic consumption. Unbalanced industrial policy emanate negative spillovers toward the rest of the world. The reason is that, absent policy interventions, trade deficits reduce the competitiveness of the domestic tradable sector, stifling innovation and productivity growth. Through this channel, unbalanced industrial policies shift the balance of technological hegemony in favor of the country adopting them.

We formalize these insights using an endogenous growth model of the global economy composed of two countries: East and West. The two countries are symmetric, except for the policies that their governments implement, and are connected through trade and capital flows. There are two key features in our model. First, the tradable sector—which we think of as the aggregate of high-tech manufacturing and high-tech services—is the engine of growth in our economy. That is, in both countries productivity growth is the result of innovation activities by firms operating in the tradable sector.[1] Second, households enjoy utility from holding liquid assets, which implies that government bonds earn a convenience yield and Ricardian equivalence fails to hold.

We consider the impact of industrial policies adopted by the East government. More precisely, we study a scenario in which the East government subsidizes production of tradable goods. This is meant to capture a variety of industrial policies, going from subsidized credit to tax incentives, aiming at boosting economic activity in the high-tech sectors of the economy. As it is intuitive, these subsidies induce a reallocation of production from the non-tradable to the tradable sector. Moreover, a larger tradable sector increases firms' incentives to innovate, which translates into

[1] This feature of the framework aligns well with a few empirical observations. First, it is well documented that tradable sectors are typically characterized by higher productivity growth compared to sectors producing non-tradable goods (Inklaar et al., 2024; Lee, 2025). Second, tradable sectors play a key role in innovation activities. For instance, the manufacturing sector accounts for about 70% of total R&D spending done by U.S. firms, in spite of representing only around 10% of value added (this statistic refers to the OECD data series on "Business enterprise R&D expenditure by industry", for the period 2009-2017). As for tradable services, just think of Silicon Valley's Big Tech firms which sell their high-tech products all over the world.

more innovation and higher productivity.

The key insight of our framework is that industrial policies generate trade surpluses when the government adopts an *unbalanced policy mix*. The reason is that industrial policies boost national income, and thus households' demand for liquid assets. If the government expands the supply of liquid assets to balance this higher demand, industrial policies do not contribute to global imbalances. In contrast, when the government pursues a tight fiscal policy, accumulates foreign reserves, or adopts other policies that suppress domestic consumption, industrial policies create an excess demand for liquid assets that spills over into foreign asset purchases. This unbalanced policy mix—combining supply-side expansions with demand-side restrictions—has characterized the development strategies of several surplus countries, including China (Klein and Pettis, 2020).

In fact, in our model unbalanced industrial policies are particularly effective at promoting technological development. This is because policies that foster the demand for foreign assets depreciate the real exchange rate. The result is a reallocation of economic activity from the non-tradable sector to the tradable one, leading to higher investment in innovation and a rise in productivity. In this sense, public interventions that stimulate trade surpluses, by suppressing domestic consumption and increasing the demand for foreign assets, can themselves be seen as a form of industrial policy.

What happens to the West when the East adopts an unbalanced industrial strategy? Under a laissez-faire approach, the West is likely to suffer a process of de-industrialization and loss in productivity. The reason is that capital inflows boost consumption demand by West households. In order to satisfy this increase in demand, the non-tradable sector expands at the expense of the tradable one. As the tradable sector shrinks, firms' incentives to innovate fall—because the profits appropriated by successful innovators are now smaller. The result is a drop in innovation and productivity in the West. This process, akin to a financial resource curse, implies that the unbalanced policy mix pursued by the East shifts the balance of technological hegemony in its favor.[2]

We then provide empirical evidence in support of the economic forces highlighted by our model. First, we show that in the recent years industrial policies have been accompanied by expansions of the tradable sector, faster productivity growth, and higher trade surpluses. Second, we show that persistent trade deficits are associated with lower economic activity in the tradable sector and slowdowns in productivity growth. These empirical regularities suggest that unbalanced industrial policies may have been a non-negligible driver of global imbalances in recent years, and that their adoption may have triggered a process of de-industrialization and slowdown in productivity growth in the rest of the world.

In the last part of the paper, we consider policy interventions that the West may wish to adopt in response to unbalanced industrial policies implemented by the East. We start by showing that persistent trade deficits may lead to welfare losses through several channels. First, while trade deficits boost real income in the short run—because they decrease the price of imported goods—their impact on innovation and productivity depresses national income over the medium run. When the negative effects dominate, the result is a drop in consumption and asset holdings

[2] In the natural resource curse literature, the discovery of natural resources slows down productivity growth by inducing a reallocation of production from tradable goods to non-tradable services (Krugman, 1987). The notion of financial resource curse refers to a similar process, but triggered by cheap access to foreign capital rather than the discovery of natural resources (Benigno and Fornaro, 2014; Benigno et al., 2025).

by households, which negatively affects welfare.[3] Second, insofar as geoeconomic strength depends on technological power, industrial policies impose negative geoeconomic externalities toward the rest of the world.

What can West governments do to mitigate these welfare losses? One possibility is to pursue the same type of industrial policies implemented by the East. Another option is to design policies that directly aim at reducing global imbalances. While broad-based tariffs are unlikely to attain this target, policies that boost national savings, both public and private, can indeed improve the trade balance. However, these policies also decrease global demand. If implemented aggressively, they may end up backfiring by pushing the world in a global liquidity trap, in which output is depressed by weak aggregate demand. Hence, reducing global imbalances may call for a multilateral approach, based on a combination of policies that boost national savings, such as fiscal tightening, in the West, and policies that boost domestic consumption in the East.

We conclude the paper by considering innovation policies in the West. In our model, unregulated trade deficits generate welfare losses because they finance booms in non-tradable sectors with little scope for productivity growth, while hindering economic activity in high-tech tradable sectors. But governments can take measures to prevent this outcome, by subsidizing economic activity—and especially investment in innovation—in the high-tech sectors that they wish to protect. Innovation policies, such as subsidies to private R&D as well as public R&D programs (Van Reenen, 2020; Gazzani et al., 2025), can redirect the cheap credit coming from abroad to productivity-enhancing investments, and thus reconcile trade deficits with a healthy productivity growth. While our analysis represents just a first pass at this issue, it suggests that countries negatively affected by global imbalances should include innovation policies as part of their policy response toolbox.

Related literature. This paper is related to several strands of the literature. First, it is connected to the literature on industrial policies, which studies government interventions targeting the structure of the economy. The rise in the use of industrial policies that occurred over the last few years triggered a revival of this literature (Juhász et al., 2024). For instance, DiPippo et al. (2022) and Juhász et al. (2025) represent two recent efforts aiming at empirically measuring the use of industrial policies, as well as their macroeconomic impact. Liu (2019) and Lashkaripour and Lugovskyy (2023), instead, are two recent theoretical contributions to the literature. Compared to these works, our focus is on the international spillovers triggered by industrial policies, through their impact on global imbalances and technological hegemony.

This paper thus contributes to the long-standing debate on global imbalances. Itskhoki and Mukhin (2025a) provide an excellent survey of this literature. As in Caballero et al. (2008) and Caballero et al. (2015), in our model persistent global imbalances arise from secular forces that generate a mismatch between domestic demand and supply of liquid assets. Moreover, as in Benigno et al. (2025), global imbalances affect investment in innovation and the pattern of technological power.[4] What differentiates this paper is its focus on the role played by industrial policies in

[3] More precisely, trade deficits may reduce national income and welfare because firms do not fully internalize the social return from their investments in innovation. Trade deficits exacerbate this source of inefficiency.

[4] While the literature connecting global imbalances to productivity growth is limited, several contributions have recently considered the impact of capital flows on innovation and technology adoption in small open economies (Rodrik, 2008; Benigno and Fornaro, 2014; Ates and Saffie, 2016; Queraltó, 2019; Brunnermeier et al., 2018; Benigno et al., 2022; Varela et al., 2023; Ottonello et al., 2024). A recent exception is Cuñat and Zymek (2025), which connects global imbalances and static external economies of scale in the tradable sector.

generating global imbalances.

The paper is also connected to the literature studying the impact of capital flows on the sectoral allocation of production. Benigno et al. (2015) and Kalantzis (2015) analyze empirically episodes of large capital inflows, and find that they are characterized by a shift of labor and capital out of the manufacturing sector. More broadly, Mian et al. (2019) show that increases in credit supply tend to boost employment in non-tradable sectors at the expense of tradable ones. In a very interesting recent paper, Müller and Verner (2024) document how credit booms geared toward the non-tradable sector are typically followed by slowdowns in productivity growth, lending empirical support to one of the key mechanisms of the model. Furthermore, Diebold and Richter (2025) find that credit booms financed by foreign capital flows are particularly likely to be followed by drops in output growth in the medium run. All this evidence is consistent with the predictions of our model.

The rest of the paper is structured as follows. Section 2 introduces the model. Section 3 presents our main results, by studying the impact of industrial policies on global imbalances and technological hegemony. Section 4 provides empirical evidence consistent with the framework. Section 5 discusses some policy implications of the model. Section 6 concludes.

2 Model

Consider a world composed of two countries: East (e) and West (w). The two countries are symmetric, except for the policies that their governments implement. Time is discrete and indexed by $t \in \{0, 1, ...\}$. For simplicity, we will focus on a perfect-foresight economy.

2.1 Households

Each country is inhabited by a measure one of identical households. The lifetime utility of the representative household in country i is

$$\sum_{t=0}^{\infty} \beta^t \left(\omega \log C_{i,t}^T + (1-\omega) \log C_{i,t}^N + \omega\phi \log B_{i,t} + \theta \log J_{i,t} \right), \tag{1}$$

where $0 < \beta < 1$ is the subjective discount factor, $C_{i,t}^T$ and $C_{i,t}^N$ denote consumption of respectively a tradable and a non-tradable good, and $0 < \omega < 1$ denotes the expenditure share on tradables. Moreover, each household is endowed with $\bar{L}$ units of labor, and there is no disutility from working.

Households derive utility from holding liquid bonds $B_{i,t}$. As discussed by Mian et al. (2025), there are several ways to motivate this assumption. Our preferred interpretation is that it captures in reduced form the notion that households use liquid assets to self-insure against idiosyncratic risks. This motive is particularly important in developing countries, such as China, in which social safety nets are scarce. The strength of this effect is determined by the parameter $\phi > 0$.

Recent work in geoeconomics emphasizes that technological leadership confers strategic advantages beyond pure economic returns: control over critical supply chains, ability to set international standards, and resilience to economic coercion.[5] The last term in the utility function, where $\theta \geq 0$ and $J_{i,t}$ is an index of technological power, captures in reduced form these strategic benefits of

[5]See Mearsheimer (2003), Clayton et al. (2023), Clayton et al. (2026) and Broner et al. (2025).

technological leadership. To be clear, our positive analysis is not affected by the presence of this term, which will play a role only in the welfare analysis that we develop in Section 5.

The household budget constraint in terms of the tradable good is

$$C^T_{i,t} + P^N_{i,t} C^N_{i,t} + \frac{B_{i,t+1}}{R_t(1+\tau_{i,t})} = W_{i,t}\bar{L} + \Pi_{i,t} + B_{i,t} - T_{i,t}. \tag{2}$$

The left-hand side of this expression represents the household's expenditure. $P^N_{i,t}$ denotes the price of a unit of the non-tradable good in terms of the tradable one, and so $C^T_{i,t} + P^N_{i,t} C^N_{i,t}$ is the total expenditure on consumption. $B_{i,t+1}$ denotes the purchase of bonds made by the household at time t, paying the gross interest rate R_t. R_t can be thought of as the world interest rate. Moreover, governments subsidize investment in bonds at rate $\tau_{i,t}$.

The right-hand side captures the household's income. $W_{i,t}$ denotes the wage, and hence $W_{i,t}\bar{L}$ is the household's labor income. Firms are fully owned by domestic agents, and $\Pi_{i,t}$ denotes the profits that households receive from the ownership of firms. $T_{i,t}$ is a lump-sum tax paid to the domestic government.

The optimal allocation of consumption expenditure between tradable and non-tradable goods implies

$$C^N_{i,t} = \frac{1-\omega}{\omega} \frac{C^T_{i,t}}{P^N_{i,t}}. \tag{3}$$

Naturally, demand for non-tradables is decreasing in their relative price $P^N_{i,t}$. Since $P^N_{i,t}$ is proportional to the real exchange rate, this means that a real exchange rate appreciation depresses demand for non-tradables. Moreover, demand for non-tradables is increasing in $C^T_{i,t}$, due to households' desire to consume a balanced basket between tradable and non-tradable goods.

The households' optimal consumption/saving decision is captured by[6]

$$\frac{C^T_{i,t+1}}{C^T_{i,t}} = \beta R_t (1+\tau_{i,t}) \left(1 + \phi \frac{C^T_{i,t+1}}{B_{i,t+1}}\right). \tag{4}$$

This is a standard Euler equation, adjusted for the liquidity services provided by bonds. Notice that an increase in the subsidy $\tau_{i,t}$ induces households to reallocate their income from consumption to savings in liquid assets. This subsidy thus captures a variety of policies aiming at suppressing consumption and boosting savings, such as financial repression policies or controls on capital inflows.[7]

2.2 Non-tradable sector

The non-tradable sector represents a traditional sector with limited scope for productivity improvements. The non-tradable good is produced by a large number of competitive firms using labor, according to the production function $Y^N_{i,t} = L^N_{i,t}$. $Y^N_{i,t}$ is the output of the non-tradable good, while $L^N_{i,t}$ is the amount of labor employed by the non-tradable sector. The zero profit condition thus requires that $P^N_{i,t} = W_{i,t}$. Hence, in our simple model, the real exchange rate is determined by wages.

[6]The optimal saving behavior also satisfies a standard transversality condition.

[7]To see the parallel with financial repression policies, consider that subsidizing savings in liquid bonds is equivalent to taxing consumption and investment in other assets.

2.3 Tradable sector

The tradable good is produced by competitive firms using labor and a continuum of measure one of intermediate inputs $x_{i,t}^j$, indexed by $j \in [0,1]$. Intermediate inputs cannot be traded across the two regions.[8] Denoting by $Y_{i,t}^T$ the output of tradable good, the production function is

$$Y_{i,t}^T = \left(ZL_{i,t}^T\right)^{1-\alpha} \int_0^1 \left(A_{i,t}^j\right)^{1-\alpha} \left(x_{i,t}^j\right)^{\alpha} dj, \tag{5}$$

where $0 < \alpha < 1$, and $A_{i,t}^j$ is the productivity, or quality, of input j.[9] $Z \equiv (\alpha^{\frac{2\alpha}{1-\alpha}}(1-\alpha^2))^{-1}$ is a normalizing constant.

The government subsidizes firms in the tradable sector by paying a share $s_{i,t}$ of their production costs. These subsidies capture a variety of industrial policies, for instance tax breaks or subsidized credit, aiming at supporting economic activity in the tradable sector. Profit maximization implies the demand functions

$$(1-\alpha)Z^{1-\alpha}\left(L_{i,t}^T\right)^{-\alpha} \int_0^1 \left(A_{i,t}^j\right)^{1-\alpha} \left(x_{i,t}^j\right)^{\alpha} dj = (1-s_{i,t})W_{i,t} \tag{6}$$

$$\alpha\left(ZL_{i,t}^T\right)^{1-\alpha} \left(A_{i,t}^j\right)^{1-\alpha} \left(x_{i,t}^j\right)^{\alpha-1} = (1-s_{i,t})P_{i,t}^j, \tag{7}$$

where $P_{i,t}^j$ is the price in terms of the tradable good of intermediate input j. As it is intuitive, a higher subsidy induces firms producing tradable goods to increase their demand for labor and intermediate inputs.

To simplify notation, it is convenient to define $\xi_{i,t} \equiv (1-s_{i,t})^{-\frac{1}{1-\alpha}}$. The variable $\xi_{i,t} \geq 1$ can be thought of as an index of industrial policies, with higher values of $\xi_{i,t}$ associated with larger subsidies to the production of traded goods.

2.4 Intermediate goods production and profits

Every intermediate good is produced by a single monopolist. One unit of tradable output is needed to manufacture one unit of the intermediate good, regardless of quality. In order to maximize profits, each monopolist sets the price of its good according to

$$P_{i,t}^j = \frac{1}{\alpha} > 1. \tag{8}$$

This expression implies that each monopolist charges a constant markup $1/\alpha$ over its marginal cost.

Equations (7) and (8) imply that the quantity produced of a generic intermediate good j is

$$x_{i,t}^j = \alpha^{\frac{2}{1-\alpha}} \xi_{i,t} Z A_{i,t}^j L_{i,t}^T. \tag{9}$$

[8] We make this assumption to generate asymmetries in productivity across the two countries. Fornaro and Wolf (2025b) study trade in intermediate goods in a framework similar to the one used in this paper.

[9] More precisely, for every good j, $A_{i,t}^j$ represents the highest quality available. In principle, firms could produce using a lower quality of good j. However, as in Aghion and Howitt (1992), the structure of the economy is such that in equilibrium only the highest quality version of each good is used in production.

Moreover, the profits earned by the monopolist in sector j are given by

$$P^j_{i,t}x^j_{i,t} - x^j_{i,t} = \frac{\alpha}{1+\alpha}A^j_{i,t}\xi_{i,t}L^T_{i,t},$$

The profits earned by a monopolist are thus increasing in the productivity of its intermediate input. This is the reason why firms will want to invest to become more productive. The term $\xi_{i,t}L^T_{i,t}$ captures a market size effect. Intuitively, a rise in economic activity in the tradable sector boosts demand for intermediate inputs, leading to higher profits in the intermediate sector.

2.5 Tradable GDP and wages

Combining equations (5) and (9) gives

$$Y^T_{i,t} = \alpha^{\frac{2\alpha}{1-\alpha}}\xi^{\alpha}_{i,t}ZL^T_{i,t}A_{i,t}, \tag{10}$$

where $A_{i,t} \equiv \int_0^1 A^j_{i,t}dj$ is an index of average productivity of the intermediate inputs. Hence, production of the tradable good is increasing in the average productivity of intermediate goods and in the amount of labor employed in the tradable sector. Moreover, higher subsidies increase production of traded goods.

Value added in the tradable sector equals total output minus the cost of producing intermediate goods

$$GDP^T_{i,t} = Y^T_{i,t} - \int_0^1 x^j_{i,t}\,dj = \frac{\xi^{\alpha}_{i,t} - \alpha^2\xi_{i,t}}{1-\alpha^2}L^T_{i,t}A_{i,t}. \tag{11}$$

Therefore, a rise in subsidies increases tradable GDP as long as $s_{i,t} < 1-\alpha$. We will assume that this condition holds throughout the paper. Equilibrium wages are equal to

$$W_{i,t} = \frac{\xi_{i,t}A_{i,t}}{1+\alpha}. \tag{12}$$

Intuitively, wages are pinned down by labor demand in the tradable sector. This explains why a rise in labor productivity in the tradable sector or in the subsidy leads to an increase in wages. Since wages determine the real exchange rate, this expression also implies that a higher productivity in the tradable sector causes a real exchange rate appreciation, through the familiar Balassa-Samuelson effect.

2.6 Innovation and productivity growth

Firms operating in the intermediate sector can invest in innovation to improve the quality of their products. In particular, a firm that employs in innovation $L^j_{i,t}$ units of labor sees its productivity evolve according to

$$A^j_{i,t+1} = A^j_{i,t} + A^*_t L^j_{i,t}. \tag{13}$$

A^*_t is an exogenous variable determining the productivity of investment in innovation. One could think of A^*_t as the stock of basic scientific knowledge, on which firms draw when innovating. We will refer to A^*_t as the world technological frontier, and assume that it grows at the constant rate $g > 1$.

Innovation-based endogenous growth models typically posit that knowledge is only partly excludable. For instance, this happens if inventors cannot prevent others from drawing on their ideas to innovate. For this reason, in most endogenous growth frameworks, the social return from investing in innovation is higher than the private one.[10] We introduce this effect by assuming that at the start of every period there is a constant probability $1-\eta$ that the incumbent firm dies, and is replaced by another firm that inherits its technology. Moreover, following a long-standing literature arguing that geographical proximity fosters knowledge spillovers (Audretsch and Feldman, 1996; Moretti, 2021), we assume that the technology of a dying firm is inherited by a new firm located in the same country.

Defining firms' profits net of expenditure in research as $\Pi_{i,t}^{j} \equiv \alpha \xi_{i,t} A_{i,t}^{j} L_{i,t}^{T}/(1+\alpha) - W_{i,t} L_{i,t}^{j}$, firms producing intermediate goods choose investment in innovation to maximize their discounted stream of profits

$$\sum_{t=0}^{\infty} \frac{(\eta\beta)^t C_{i,0}^T}{C_{i,t}^T} \Pi_{i,t}^j,$$

subject to (13). Since firms are fully owned by domestic households, they discount profits using the households' discount factor $\beta^t C_{u,0}^T / C_{u,t}^T$, adjusted for the survival probability η^t.

From now on, we assume that firms are symmetric and so $A_{i,t}^j = A_{i,t}$. Moreover, we focus on equilibria in which investment in innovation is always positive in both countries. Optimal investment in research then requires

$$\frac{W_{i,t}}{A_t^*} = \frac{\beta\eta C_{i,t}^T}{C_{i,t+1}^T} \left(\frac{\alpha}{1+\alpha} \xi_{i,t+1} L_{i,t+1}^T + \frac{W_{i,t+1}}{A_{t+1}^*} \right). \tag{14}$$

Intuitively, firms equalize the marginal cost from performing research $W_{i,t}/A_t^*$ to its marginal benefit discounted using the households' discount factor. The marginal benefit is given by the increase in next period profits $\alpha \xi_{i,t+1} L_{i,t+1}^T/(1+\alpha)$ plus the savings on future research costs $W_{i,t+1}/A_{t+1}^*$.

As it will become clear later on, a crucial aspect of the model is that the return from innovation is increasing in the size of the tradable sector, as captured by $L_{i,t+1}^T$. This happens because higher economic activity in the tradable sector boosts the profits that firms producing intermediate goods enjoy from improving the quality of their products.[11] In this sense, the tradable sector is the engine of growth in our model.

This feature of the framework accords well with several empirical facts. First, tradable sectors are characterized by faster productivity growth compared to non-tradable ones. Inklaar et al. (2024) and Lee (2025) are two recent contributions reaffirming this fact. Second, tradable sectors perform the bulk of innovation activities. For instance, the manufacturing sector accounts for about 70% of total R&D spending done by U.S. firms, in spite of representing only around 10% of value added.[12] Moreover, the highly innovative Big Tech firms inhabiting the Silicon Valley sell their services all over the world.

[10] See for instance Romer (1990) and Aghion and Howitt (1992).

[11] Alternatively, as in Krugman (1987), we could have assumed that productivity growth is increasing in the size of the tradable sector because of the presence of learning by doing effects. The key insights of the model would apply also to this case. In fact, it is often hard to cleanly separate learning-by-doing from R&D investments. A case in point is the invention of the just-in-time production system by Toyota, which emerged from a combination of active investments and learning by doing (Ohno, 1982).

[12] This statistic refers to the OECD data series on "Business enterprise R&D expenditure by industry", for the period 2009-2017.

2.7 Governments

Denoting by $D_{i,t+1}$ the government debt issued at time t, the government budget constraint is given by

$$T_{i,t} + \frac{D_{i,t+1}}{R_t} = \frac{s_{i,t}}{1 - s_{i,t}} Y_{i,t}^T + \frac{\tau_{i,t} B_{i,t+1}}{R_t(1 + \tau_{i,t})} + D_{i,t}. \tag{15}$$

Intuitively, governments finance the subsidies and repayment of legacy debt through taxes and issuance of new debt. Effectively, governments have three independent policy instruments. First, each government chooses its industrial policy, by setting a path for $s_{i,t}$. Second, each government sets its fiscal policy by choosing a value for the subsidy on purchases of liquid bonds $\tau_{i,t}$ and a path for $D_{i,t+1}$. The lump-sum tax $T_{i,t}$ then adjusts to ensure that the government budget constraint holds.

2.8 Aggregation and market clearing

Market clearing for the non-tradable good requires that in every region consumption is equal to production, so that

$$C_{i,t}^N = Y_{i,t}^N = L_{i,t}^N. \tag{16}$$

The market clearing condition for the tradable good can be instead written as

$$C_{i,t}^T + \frac{B_{i,t+1} - D_{i,t+1}}{R_{i,t}} = \frac{\xi_{i,t}^{\alpha} - \alpha^2 \xi_{i,t}}{1 - \alpha^2} A_{i,t} L_{i,t}^T + B_{i,t} - D_{i,t}. \tag{17}$$

To derive this expression, we have used the facts that domestic households receive all the income from production, as well as the government budget constraint. Moreover, global asset market clearing requires that

$$B_{w,t} + B_{e,t} = D_{w,t} + D_{e,t}, \tag{18}$$

so that households' bond holdings are equal to total government debt. Finally, in every region the labor market must clear

$$\bar{L} = L_{i,t}^N + L_{i,t}^T + L_{i,t}^R. \tag{19}$$

In this expression, we have defined $L_{i,t}^R = \int_0^1 L_{i,t}^j dj$ as the total amount of labor devoted to research in country i.

2.9 Equilibrium

In the balanced growth path of the economy some variables will be constant, and others will grow at the same rate as the world technological frontier. In order to write down the equilibrium in stationary form, we normalize this second group of variables by A_t^*. To streamline notation, for a generic variable $X_{i,t}$ we define $x_{i,t} \equiv X_{i,t}/A_t^*$.

The model can be narrowed down to three sets of equations or "blocks". The first block describes the path of tradable consumption and capital flows. Using the notation spelled out above, the households' Euler equation becomes

$$\frac{c_{i,t+1}^T}{c_{i,t}^T} = \frac{\beta R_t(1 + \tau_{i,t})}{g} \left(1 + \phi \frac{c_{i,t+1}^T}{b_{i,t+1}}\right). \tag{20}$$

Moreover, the market clearing conditions for the tradable good and for bonds become

$$c_{i,t}^{T} + (b_{i,t+1} - d_{i,t+1})\frac{g}{R_t} = \frac{\xi_{i,t}^{\alpha} - \alpha^2 \xi_{i,t}}{1-\alpha^2} a_{i,t} L_{i,t}^{T} + b_{i,t} - d_{i,t} \tag{21}$$

$$b_{w,t} + b_{e,t} = d_{w,t} + d_{e,t}, \tag{22}$$

where $a_{i,t}$ can be thought of as a measure of country i proximity to the technological frontier. These equations define the path of $c_{i,t}^{T}$, $b_{i,t}$ and R_t given a path for productivity, tradable output and fiscal policy.

The second block of the model describes how productivity evolves. In equilibrium, equation (14) becomes

$$a_{i,t} = \frac{\eta\beta}{g} \frac{c_{i,t}^{T}}{c_{i,t+1}^{T}} \frac{\xi_{i,t+1}}{\xi_{i,t}} \left(\alpha L_{i,t+1}^{T} + a_{i,t+1}\right). \tag{23}$$

This equation captures the optimal investment in research by firms, and implies a positive relationship between the proximity to the technological frontier and expected future employment in the tradable sector. Intuitively, a rise in production of tradable goods is associated with higher monopoly profits. In turn, higher expected profits induce entrepreneurs to invest more in research, leading to a positive impact on productivity. This is the classic market size effect emphasized by the endogenous growth literature, with a twist. The twist is that the allocation of labor across the two sectors matters for productivity growth. Moreover, productivity is decreasing in the growth rate of normalized tradable consumption, $c_{i,t+1}^{T}/c_{i,t}^{T}$. A rise in expected consumption growth, the reason is, leads households to discount more heavily future dividends, which translates into a fall in firms' investment. Finally, the term $\xi_{i,t+1}/\xi_{i,t}$ appears because the wage, and thus the cost of hiring researchers, is increasing in the subsidy.

The last block describes the use of productive resources, that is how labor is allocated across the production of the two consumption goods and research. To derive an expression for $L_{i,t}^{N}$, we can use $Y_{i,t}^{N} = L_{i,t}^{N}$ and $P_{i,t}^{N} = W_{i,t}$ to write equation (3) as

$$L_{i,t}^{N} = \frac{1-\omega}{\omega} \frac{1+\alpha}{\xi_{i,t}} \frac{c_{i,t}^{T}}{a_{i,t}}. \tag{24}$$

The interesting aspect of this equation is that production of non-tradable goods is positively related to consumption of tradables, because of households' desire to balance their consumption across the two goods. Hence, as tradable consumption rises more labor is allocated to the non-tradable sector.[13] As we will see, this effect plays a key role in mediating the impact of capital flows on productivity growth.

An expression for $L_{i,t}^{R}$ can be derived by writing equation (13) as

$$L_{i,t}^{R} = g a_{i,t+1} - a_{i,t}$$

As it is intuitive, a closer proximity to the frontier requires larger innovation effort, and hence

[13] In particular, a rise in tradable consumption fosters demand for non-traded goods, driving up their price (and the real exchange rate) $P_{i,t}^{N}$. The real exchange rate appreciation induces a reallocation of labor toward the non-tradable sector. The associated rise in the supply of non-traded goods puts downward pressure on the real exchange rate. This process goes on until the real exchange rate goes back to its initial value, which now corresponds to a larger size of the non-traded sector. So, while in equilibrium the real exchange rate does not move, its off-equilibrium behavior is a key component of the adjustment process. Section IV.A of Benigno et al. (2025) elaborates on this point.

more labor allocated to research.

Plugging these expressions in the market clearing condition for labor then gives

$$L_{i,t}^T = \bar{L} - \frac{1-\omega}{\omega}\frac{1+\alpha}{\xi_{i,t}}\frac{c_{i,t}^T}{a_{i,t}} - (ga_{i,t+1} - a_{i,t}) \tag{25}$$

This equation can be interpreted as the resource constraint of the economy.

We are ready to define an equilibrium as paths of real allocations $\{c_{i,t}^T, b_{i,t+1}, a_{i,t+1}, L_{i,t}^T\}_{i,t}$ and interest rates $\{R_t\}_t$ satisfying (20), (21), (22), (23) and (25) given paths for the policy variables $\{\tau_{i,t}, d_{i,t+1}, \xi_{i,t}\}_{i,t}$ and initial conditions $\{b_{i,0}, a_{i,0}\}_i$.

3 A global perspective on industrial policies

In this section we study the macroeconomic effects of industrial policies. We start by characterizing the balanced growth path – or steady state – of the model. Focusing on steady states, and thus on the long-run behavior of the economy, allows us to derive analytically our key results about the impact of industrial policies on the global economy. Thereafter, we consider transitional—or medium-run—dynamics.

Steady state equilibria can be represented using a simple diagram, connecting productivity to the size of the tradable sector. Start by considering that in steady state $c_{i,t}^T$, $L_{i,t}^T$ and $a_{i,t}$ are all constant. We can then write the optimal investment equation (23) as

$$a_i = \frac{\alpha L_i^T}{g/(\beta\eta) - 1}, \tag{GG}$$

where the absence of a time subscript denotes the steady state value of a variable. Due to the market size effect described above, a larger size of the tradable sector induces firms to increase investment in innovation, leading to an increase in productivity. This effect explains the positive relationship between a_i and L_i^T implied by the GG schedule.[14]

A second relationship between a_i and L_i^T can be obtained using equation (25) to write

$$L_i^T = \bar{L} - \frac{1-\omega}{\omega}\frac{1+\alpha}{\xi_i}\frac{c_i^T}{a_i} - a_i(g-1). \tag{RR}$$

This expression captures the resource constraint of the economy, and in particular the fact that sustaining a higher productivity requires moving labor from production of consumption goods to research. This explains why, holding constant c_i^T/a_i, the RR schedule describes a negative relationship between a_i and L_i^T. The RR schedule also implies that ξ_i and L_i^T are positively related, because subsidies to the production of tradable goods increase the profitability of employing workers in the tradable sector.

Finally, the RR schedule embeds a negative relationship between L_i^T and c_i^T/a_i. The reason is that consumption of non-traded goods, and so employment in the non-traded sector, is increasing in c_i^T/a_i. This is due to two distinct effects. On the one hand, higher consumption of traded goods,

[14]Notice that industrial policies do not affect the shape of the GG schedule. This happens because of two offsetting effects. On the one hand, the subsidies increase monopolists' profits, as well as their incentives to innovate. On the other hand, subsidies boost wages, and so the cost of hiring researchers. In our simple model these two effects exactly cancel out.

i.e. a higher c_i^T, induces households to consume more non-traded goods. On the other hand, a rise in a_i boosts wages, leading to a real exchange rate appreciation, i.e. a rise in P_i^N, that depresses demand for non-tradables. These effects will play an important role in our narrative, because they determine the macroeconomic impact of capital flows.

The intersection of the GG and RR schedules determines the equilibrium values of a_i and L_i^T. However, to fully characterize the equilibrium, we need to specify the industrial and fiscal policies pursued by the two governments. We turn to this task next.

3.1 The free-markets steady state

It is useful to start the analysis by characterizing the free-markets steady state. In this balanced growth path, both countries refrain from using industrial policies ($\xi_e = \xi_w = 1$), do no subsidize liquid bonds ($\tau_e = \tau_w = 0$) and issue the same amount of public debt ($d_e = d_w = d$).

Using the fact that in a symmetric equilibrium each country consumes exactly its domestic output, the RR schedule can be written as

$$L_i^T = \frac{\bar{L} - a_i(g-1)}{1 + \frac{1-\omega}{\omega}(1+\alpha)}. \qquad (RR_{fm})$$

As shown by Figure 1a, the free-markets steady state is given by the unique intersection of the GG and RR_{fm} schedules. This equilibrium, which can be easily solved in closed form, has intuitive properties.[15] For instance, a larger size of the tradable sector (i.e. a higher ω) is associated with a closer proximity to the frontier, because technology adoption is the result of research efforts by firms in the tradable sector.

In equilibrium, the world interest rate adjusts so that the global asset markets clear. Equation (20), evaluated in steady state, gives the demand for assets by households

$$b_i = \frac{\phi c_{fm}^T}{g/(\beta R) - 1}, \qquad (26)$$

where c_{fm}^T denotes consumption of traded goods in the free-markets steady state. As shown by Figure 1b, asset demand is increasing in the world interest rate R. Since the assets supplied by governments are fixed and equal to d, the equilibrium interest rate is given by

$$R_{fm} = \frac{g}{\beta}\left(1 + \phi\frac{c_{fm}^T}{d}\right)^{-1}. \qquad (27)$$

[15] More precisely, combining the GG and RR_{fm} equations gives

$$a_{fm} = \frac{\alpha\omega\bar{L}}{(1+\alpha)\left(g/(\beta\eta) - 1\right) - \alpha\omega(g/(\eta\beta) - g)}$$

$$L_{fm}^T = \frac{\omega(g/(\beta\eta) - 1)\bar{L}}{(1+\alpha)\left(g/(\beta\eta) - 1\right) - \alpha\omega(g/(\eta\beta) - g)}.$$

where the subscripts fm denote the value of a variable in the symmetric free-markets steady state. Since tradable consumption is equal to tradable GDP we then have

$$c_{fm}^T = a_{fm}L_{fm}^T = \frac{g/(\beta\eta) - 1}{\alpha}a_{fm}^2.$$

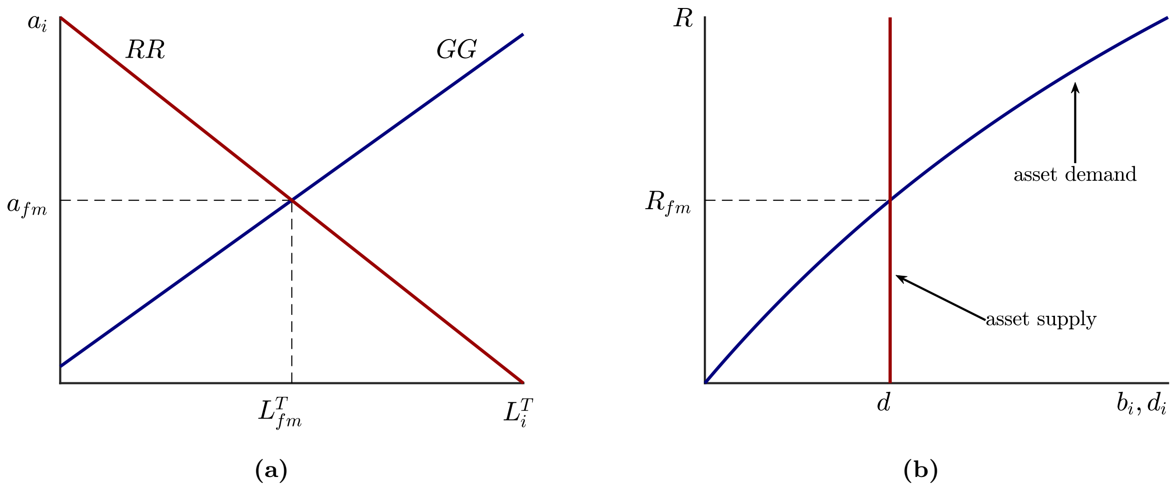


Figure 1: The free-markets steady state.

This expression implies that the equilibrium interest rate increases with the supply of assets d.

From now on, we will assume that the supply of liquid assets d is scarce enough so that $R_{fm} < g$. This seems like the empirically relevant case, at least if one takes the return on US Treasury bonds as a measure of the world interest rate. Moreover, focusing on the case $R_{fm} < g$ allows us to illustrate our results using steady state analyses. That said, our key insights do not rely on this assumption.

3.2 Industrial policies and trade surpluses

We now show that trade surpluses are the natural consequence of *unbalanced industrial policy mixes*, that is policy mixes that increase the demand for foreign assets. The basic logic is simple. Industrial policies boost production of traded goods and national income. Higher income, in turn, increases households' demand for liquid assets. Now suppose that the domestic government, due to institutional features or policy choices, does not increase the supply of assets as much as domestic demand. Then part of this demand for assets will be satisfied through the purchase of foreign bonds, and domestic consumption will fall short of the country's production of traded goods. Industrial policies will then come with capital outflows and trade surpluses.

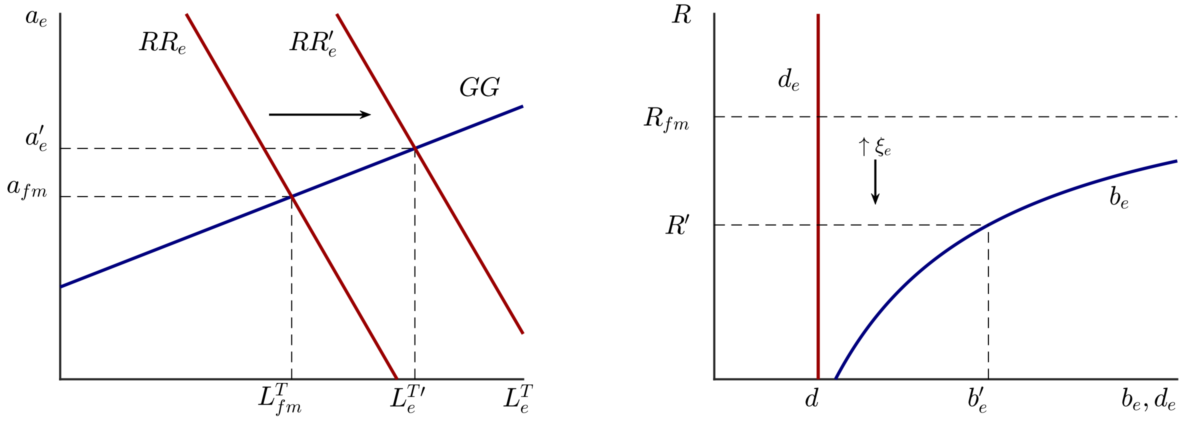
We illustrate this point using a simple scenario. Imagine that, starting from the free-markets equilibrium, the East implements a constant subsidy $\xi_e > 1$ on its production of tradable goods. Let us also assume that the East government adjusts the saving subsidy τ_e to ensure that $c^T_e = a_e L^T_e$, while keeping its stock of public debt constant and equal to d. This policy configuration allows us to show the effects of an unbalanced industrial strategy, while keeping the analysis transparent.

The RR schedule for the East then becomes

$$L^T_e = \frac{\bar{L} - a_e(g-1)}{1 + \frac{1-\omega}{\omega}\frac{1+\alpha}{\xi_e}}. \qquad (RR_e)$$

Once again, the RR_e schedule implies a negative relationship between L^T_e and a_e because to sustain a higher productivity the economy has to reallocate workers out of production and toward research.

We are ready to trace the macroeconomic impact of industrial policies. As shown by Figure



(a) **(b)**

Figure 2: Unbalanced industrial policies by the East.

2a, a higher subsidy to production of traded goods makes the RR_e curve shift right, causing an expansion of the tradable sector. In turn, firms' incentives to innovate rise, paving the way to an increase in long-run productivity. Through this channel, industrial policies lead to a rise in technological power and national income.

The rise in national income boosts households' demand for consumption, but less than one-for-one with tradable value added. This policy mix – which is inherently unbalanced – pushes the East trade balance into surplus, and so creates an excess supply of tradable goods at the global level. Indeed, the East trade balance is given by

$$tb_e \equiv \frac{\xi_e^\alpha - \alpha^2 \xi_e}{1-\alpha^2} a_e L_e^T - c_e^T = \left(\frac{\xi_e^\alpha - \alpha^2 \xi_e}{1-\alpha^2} - 1 \right) a_e L_e^T, \tag{28}$$

and so it is increasing in ξ_e. In turn, trade surpluses lead to capital outflows and current account surpluses. Under the policy mix that we are considering, the East demand for liquid bonds is

$$b_e = \frac{\left(\frac{\xi_e^\alpha - \alpha^2 \xi_e}{1-\alpha^2} - 1 \right) a_e L_e^T}{g/R - 1} + d. \tag{b_e}$$

As shown in Figure 2b, East demand for assets exceeds the domestic supply for any value of the world interest rate (as long as $R < g$).[16] We will see shortly how the rest of the world accommodates this increase in assets demand by the East.

What would it take to prevent industrial policies from causing trade surpluses? One can show that setting the saving subsidy to zero would not be enough. The reason is that industrial policies, through their positive impact on national income, boosts households' demand for assets. Unless the supply of public assets increases as much as domestic demand, industrial policies will thus lead to trade surpluses and capital outflows. Therefore, while the government could insulate the trade balance from its industrial policies, doing so would require an increase in the stock of public debt

[16] This policy mix is strongly unbalanced, in the sense that it entails an excess demand for assets for any value of the world interest rate. More generally, a policy mix is unbalanced whenever it generates excess demand for assets for $R = R_{fm}$.

d_e.[17]

The model then suggests that, while the impact of industrial policies on global imbalances depends on the whole macroeconomic framework, it should not be surprising that industrial policies are often accompanied by trade surpluses. In fact, as we will argue next, policies that foster trade surpluses can be themselves seen as a form of industrial policy.

3.3 Consumption suppression as industrial policies

We consider a simple form of consumption-suppression policies. Let us assume that the East government sets the saving subsidy so that $c_e^T = \zeta a_e L_e^T$ with $\zeta < 1$. A lower value for the parameter ζ corresponds to more intense consumption-suppression policies. The East RR schedule now becomes

$$L_e^T = \frac{\bar{L} - a_e(g-1)}{1 + \frac{1-\omega}{\omega}(1+\alpha)\zeta}. \qquad (RR_e)$$

This expression implies that a consumption-suppression policy, captured with a drop in ζ, triggers a rightward shift of the RR schedule. The equilibrium response is then isomorphic to the one shown in Figure 2. That is, more labor is allocated to the tradable sector, while innovation and productivity both rise. In turn, higher production of tradable goods results in an increase in the trade surplus.[18]

While the effects are similar to the industrial policies studied in the previous section, consumption-suppression policies reverse the direction of causality.[19] Intuitively, consumption-suppression policies boost households' demand for liquid assets, causing a wave of capital outflows. The counterpart of these capital outflows is a drop in the demand for non-tradable goods, which leads to a reallocation of labor from the non-tradable to the tradable sector. As the tradable sector expands, firms innovate more and productivity increases, further boosting output of tradable goods. The resulting mismatch between domestic production and consumption of traded goods gives rise to trade surpluses. It is in this sense that policies that suppress consumption and foster trade balance

[17] An equivalent viewpoint on why (unbalanced) industrial policies lead to trade balance surpluses is the following. Industrial policies boost production of traded goods and national income. Households' consumption rises with higher income, but less than one-for-one due to the presence of bonds in the utility function. The excess supply of tradable goods is exported, leading to a trade surplus. Why does expanding asset supply by the domestic government eliminate the trade surplus? As the government expands its stock of debt, it sends transfer checks to households. Those transfers lift private consumption, to the point where the trade surplus is eliminated. We explain in more detail the role of policies that shift consumption in Section 3.3.

[18] While consumption-suppression policies definitely lead to a drop in consumption of non-traded goods, they have an ambiguous impact on tradable consumption. This can be seen by totally differentiating expressions (GG) and (RR) to obtain

$$\frac{\partial c_i^T}{\partial a_i} = -\frac{\bar{L} - 2L_i^N}{\frac{1-\omega}{\omega}(1+\alpha)}.$$

Since consumption-suppression policies lead to a rise in a_i, their marginal impact on c_i^T is determined by the term $\bar{L} - 2L_i^N$. In particular, if $\bar{L} > 2L_i^N$ a marginal rise in consumption-suppression policies leads to a drop in c_i^T. Otherwise, the boost to production of tradable goods implied by consumption-suppression policies is so strong that c_i^T will actually rise. Even in this case, tradable consumption rises by less than tradable output, so that consumption-suppression policies unambiguously lead to a trade balance surplus.

[19] That is, the trade balance surplus is causing the expansion of the tradable sector, rather than the other way round. By using that $tb_e \equiv a_e L_e^T - c_e$, it can be seen that consumption suppression policies shift exogenously the trade balance-to-tradable-GDP ratio:

$$\frac{tb_e}{a_e L_e^T} = 1 - \zeta.$$

We use the fact that consumption-suppression policies pin down the trade balance in Section 3.5, where we calibrate ζ to target the trade balance surplus in the East in a numerical simulation.

surpluses may be seen as a form of industrial policies.

Before moving on, two remarks are in order. First, subsidizing households' purchases of liquid assets - through financial repression or by imposing controls on capital inflows - is only one of the possible instruments that governments can use to suppress domestic consumption and boost demand for foreign assets. To see this point, consider that combining equations (20) and (21) gives

$$c_i^T \left(1 + \frac{\phi(g-R)}{g/(\beta(1+\tau_i)) - R}\right) = \frac{\xi_i^\alpha - \alpha^2 \xi_i}{1-\alpha^2} a_i L_i^T + z_i, \tag{29}$$

where we have denoted with $z_i \equiv d_i(g/R - 1)$ the primary deficit run by the domestic government. This expression shows that households' consumption is directly affected by the fiscal deficit. The reason is that, due to the presence of bonds in the utility function, Ricardian equivalence does not hold in our framework. Hence, fiscal policies that reduce the public deficit effectively act as consumption-suppression policies.

For instance, a fiscal tightening, that is a drop in the stock of public debt d_i, causes a drop in domestic consumption and an increase in the trade surplus. The reason is that a lower supply of liquid bonds by the domestic government induces households to increase their purchases of foreign assets. Our model then offers a simple rationale to explain why in some countries, most notably Germany, tight fiscal policy and large trade surpluses have gone hand in hand. Alternatively, the government could suppress domestic consumption and boost the trade surplus by directly purchasing foreign assets to build up a stock of foreign reserves. Imagine that the East government allocates part of its fiscal revenue to purchase bonds issued by the West, so that

$$z_e = (d_e - fx_e)\left(\frac{g}{R} - 1\right), \tag{30}$$

where fx_e denotes the stock of foreign reserves held by the East government. This equation implies that a higher stock of reserves is associated with lower deficits, lower domestic consumption and a higher trade surplus. This is consistent with the notion that East Asian countries, China in particular, have accumulated large stocks of foreign reserves to boost their trade surpluses.[20]

Second, our model is consistent with the notion that policies that suppress consumption and increase the demand for foreign assets depreciate the real exchange rate. The intuition is simple. As households' demand for non-traded goods falls, this puts downward pressure on their price. The result is a real exchange rate depreciation.[21] In fact, in our model policy mixes that foster the demand for foreign assets boost technological development precisely through their effect on the real exchange rate. The real exchange rate depreciation, the logic is, is what induces the reallocation of

[20] Developing countries that accumulate large stocks of foreign reserves often also implement restrictions on the movements of capital flows. While we could consider explicitly capital controls in our model, their role would be similar to the saving subsidy τ_e.

[21] To see this point, consider that the real exchange rate is given by

$$P_i^N = \frac{1-\omega}{\omega}\frac{C_i^T}{C_i^N}.$$

This expression implies that, holding everything else constant, a lower consumption of traded goods depreciates the exchange rate. In general equilibrium there is also an offsetting effect, because as C_i^T drops labor migrates out of the non-traded sector, which increases the scarcity of non-traded goods and increases their price. In our simple model, this effect is strong enough so that the real exchange rate in equilibrium does not respond to changes in C_i^T. Introducing concavity in the production function of non-traded goods would make this effect weaker, so that a lower C_i^T would lead to an exchange rate depreciation (see Section IV.A of Benigno et al. (2025)).

economic activity from the non-tradable sector to the tradable one, leading to higher investment in innovation and a rise in productivity.

3.4 International spillovers of unbalanced industrial policies

What is the impact of the industrial policies implemented by the East on the West economy? In this section, we show that the industrial policies implemented by the East cause an excess supply of tradable goods at the global level, which is absorbed by the West through trade deficits. As a result, the tradable sector in the West shrinks, leading to a drop in innovation. Over time, lower innovation reduces the productivity of the West relative to the East.

More formally, suppose that the West maintains a free-markets approach ($\xi_w = 1, \tau_w = 0$) and keeps constant its stock of public debt ($d_w = d$). As we have just seen, industrial policies cause trade surpluses in the East. In equilibrium, trade surpluses by the East have to be matched by trade deficits in the West. We will elaborate shortly on the mechanism that leads to this adjustment, but for now just consider that then

$$c_w^T = a_w L_w^T + tb_e. \tag{31}$$

Hence, the East trade surpluses induce a rise of tradable consumption above domestic production ($c_w^T > a_w L_w^T$).

Using this fact, we can then write the RR schedule in the West as[22]

$$L_w^T \left(1 + \frac{1-\omega}{\omega}(1+\alpha)\right) = \bar{L} - \frac{1-\omega}{\omega}(1+\alpha)\frac{tb_e}{a_w} - a_w(g-1). \tag{RR_w}$$

This expression implies that higher trade surpluses from the East cause a leftward shift of the RR schedule in the West. As shown by Figure 3a, the result is a contraction in economic activity in the tradable sector, leading to a drop in innovation and in long-run productivity.[23]

The trade imbalances triggered by the industrial policies implemented by the East then cause a process of de-industrialization and loss in productivity in the West.[24] The basic logic should be by now familiar. Capital inflows boost demand for non-tradable goods by West households. In order to satisfy this increase in demand, labor migrates out of the tradable sector and toward the

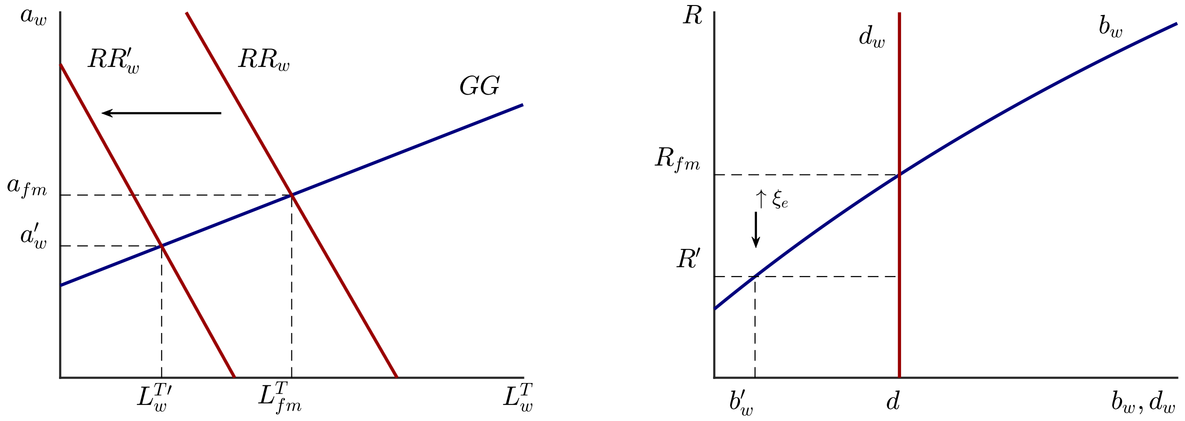
[22] For sufficiently small values of a_w the RR schedule bends backward. Intuitively, when a_w increases so do wages, shifting labor out of the non-tradable sector and toward the tradable one. When this effect is sufficiently strong, a_w and L_w^T become positively related. In fact, there are two possible equilibria. But the one characterized by the lowest a_w is unstable, since it corresponds to a point such that the RR_w curve is steeper than the GG one. We focus the analysis on the stable equilibrium, the one characterized by the highest a_w.

[23] Combining the GG and RR_w schedules gives a quadratic expression, whose stable solution is the largest one. The equilibrium can thus be solved analytically, and is such that

$$\frac{a_w}{a_{fm}} = \frac{1 + \sqrt{1 - 4(1-\omega)\frac{tb_e}{a_{fm}L_{fm}^T}\Gamma}}{2},$$

where $\Gamma \equiv (1 - g\omega\frac{\alpha}{1+\alpha}(1-\beta\eta)/(g-\eta\beta))^{-1}$. As long as tb_e is not too large, this expression implies that a rise in tb_e triggers a drop in a_w. Our numerical experiments suggest that this condition holds for reasonable values of trade imbalances. For instance, if $\beta \approx 1$ and $\eta \approx 1$ then the condition for a_w to be decreasing in tb_e is $4(1-\omega)tb_e < a_{fm}L_{fm}^T$. Since GDP in the free markets steady state is equal to $a_{fm}L_{fm}^T/\omega$, that condition holds unless tb_e exceeds 100% of GDP.

[24] Consistent with these results, Benigno et al. (2015) and Benigno et al. (2025) show empirically that periods of large capital inflows are associated with contractions in economic activity in the tradable sector, as well as slowdowns in productivity growth.



(a) **(b)**

Figure 3: International spillovers to the West.

non-tradable one. As the tradable sector shrinks, firms' incentives to innovate fall—because the profits appropriated by successful innovators are now smaller. The result is a drop in innovation and productivity in the West.[25]

We have left to explain how the West ends up absorbing the trade imbalances coming from the East. Consider that the West trade balance can be written as

$$tb_w = (b_w - d_w)\left(\frac{g}{R} - 1\right). \tag{32}$$

The demand for assets by West households is equal to[26]

$$b_w = \frac{\phi}{1+\phi}\left(\frac{a_w L_w^T}{g/R - 1} + d\right), \tag{b_w}$$

where we have used that $\beta \approx 1$ to simplify the algebra. Assets demand by West households is thus increasing in the world interest rate. Since the West assets supply is constant, a drop in the world interest rate thus triggers an increase in the West trade deficit (i.e. a drop in tb_w).

Figure 3b illustrates how the equilibrium on the global assets market is reached. Industrial policies trigger a rise in asset demand by the East, which puts downward pressure on the world interest rate. As the world interest rate drops, households in the West lower their demand for assets. The process goes on until a new equilibrium is reached, such that global credit markets clear. In this new equilibrium, the East runs a trade surplus, while the West a trade deficit.

[25] As discussed in footnote 18, while trade deficits unambiguously boost consumption of non-traded goods, their impact on tradable consumption is ambiguous. That is, it may be that West production of tradable goods declines so much that West consumption of tradables falls, in spite of the trade deficit. We will elaborate on this point in Section 5, where we discuss the normative implications of our model.

[26] To be precise, the $a_w L_w^T$ term in this expression is the solution to

$$a_w = \frac{\alpha L_w^T}{g/\eta - 1}.$$

$$L_w^T\left(1 + \frac{1-\omega}{\omega}(1+\alpha)\frac{\phi}{1+\phi}\right) = \bar{L} - \frac{1-\omega}{\omega}\frac{1+\alpha}{1+\phi}\frac{d\,(g/R-1)}{a_w} - a_w(g-1).$$

One can verify that $a_w L_w^T$ is thus an increasing function of R, such that $a_w L_w^T = a_{fm} L_{fm}^T$ when $R = R_{fm}$.

Industrial policies therefore cause a global saving glut, which drives down the world interest rate and creates global imbalances.

3.5 Medium-run dynamics

So far, we have focused our analysis on steady states, that is on the long run behavior of the economy. In this section, we study the transitional dynamics triggered by the implementation of an unbalanced industrial policy mix by the East. We do so by resorting to some simple numerical simulations. To be clear, the objective of this exercise is not to provide a careful quantitative evaluation of the framework or to replicate any particular historical event. In fact, both of these tasks would require a much richer model. Rather, our aim is to show that, for reasonable values of the parameters, the magnitudes implied by the model are quantitatively relevant.

A period in the model corresponds to one year. We normalize the labor endowment to $\bar{L} = 1$. We set $\omega = .25$ to hit a share of tradable goods in final consumption of 25%. We set $g = 1.02$, so that productivity growth in steady state is equal to 2 percent. To set the discount factor, we match a return on equity in steady state $(g/\beta - 1)$ equal to 4%. This procedure implies that $\beta = .98$. We then set the bonds-in-utility-function parameter, ϕ, so that the return on liquid bonds in the initial steady state is equal to 1%. This yields $\phi = 0.0596$. We set $\alpha = 1/9$, to hit a profit share of firms in the tradable sector of 10% (Fornaro and Wolf, 2025b). We pick η so that the social return to innovation is two times the private one in our model, in line with the empirical estimates provided by Bloom et al. (2019) on knowledge spillovers within U.S. firms. This yields $\eta = 0.963$.[27]

We consider an economy that starts from the free-markets steady state explained in Section 3.1. We assume that from period 0 onward, the East government implements a package of industrial policies, while the West maintains a free-markets approach. This policy change comes as an unexpected shock to agents in period 0, but from then on agents have perfect foresight.

More precisely, from period 0 onward the East government subsidizes economic activity in the tradable sector at the constant rate s_e, and adjusts the saving subsidy $\tau_{e,t}$ to ensure that $c^T_{e,t} = \zeta a_{e,t} L^T_{e,t}$. This corresponds to an unbalanced industrial policy promoting production of tradable goods and trade surpluses. We set s_e and ζ so that, in the final steady state, the East spends 1% of its GDP on industrial policies – in line with the recent experience of China (DiPippo et al., 2022) – and runs a trade surplus equal to 1% of its GDP. This yields $s_e = 0.038$ and $\zeta = 0.965$.[28] We also assume that both governments keep their stock of debt stable over time, so that $d_e = d_w = d$. We choose d to target a public debt-to-GDP ratio in the initial steady state of 50%.

Figure 4 shows the impact of this policy mix on the global economy. In the East, this industrial policy mix leads to an expansion of the tradable sector, a rise in productivity and GDP, and a

[27]To set η, we use the fact that on the balanced growth path the private return from R&D is given by

$$r^p = \frac{g}{\beta} - 1 = \eta \frac{\alpha L^T_{fm} + a_{fm}}{a_{fm}} - 1,$$

while the social return, which internalizes the inter-firms knowledge spillovers, is given by

$$r^s = \frac{\alpha L^T_{fm} + a_{fm}}{a_{fm}} - 1.$$

Setting $\eta = 0.963$ implies that $r^s = 2r^p$.

[28]In the final steady state, the saving subsidy needed to implement this outcome is $\tau_e = 0.0428$, or a bit more than four percent.

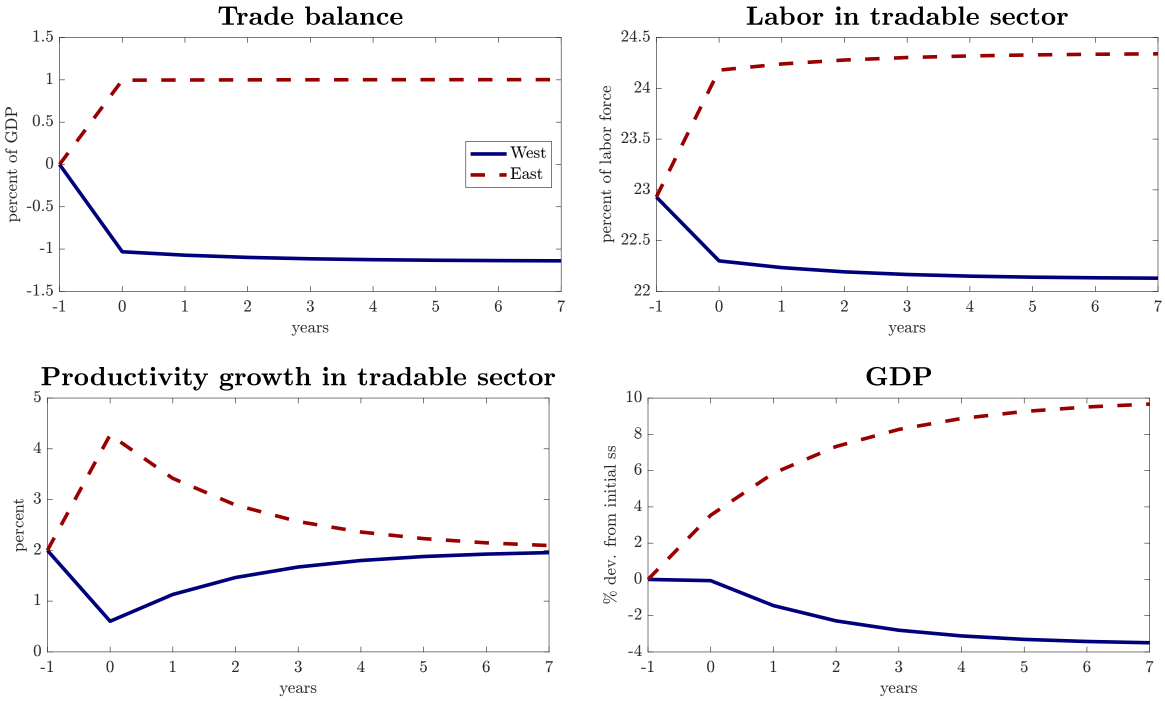


Figure 4: Impact of East industrial policies on the global economy.

stream of trade balance surpluses. The magnitudes involved are sizable. For instance, long-run GDP increases by around 10%, and the share of employment allocated to tradable-goods production rises by 1.5 percentage points.[29] In contrast, the West experiences trade deficits, which trigger a contraction of the tradable sector, and a slowdown in productivity growth which causes a long-run drop in GDP. Again the magnitudes are significant. For instance, long-run GDP declines by around 4%, while employment in the tradable sector relative to the total labor force shrinks by 0.7 percentage points.

These simulations also capture, albeit in a stylized way, the fact that it takes time for the full effect of the East industrial policies to materialize.[30] Focus on the West. Initially, the unbalanced industrial policies pursued by the East cause a trade balance deficit, with little impact on GDP. Hence, in the short run the East industrial policies seem to have a benign effect on West households, because they lead to cheaper access to foreign goods and credit. Over time, however, lower innovation translates into a fall in GDP, depressing West households' income. Therefore, the negative spillovers triggered by unbalanced industrial policies materialize over the medium run. We will go back to this point later on, when we discuss the implications of our model for welfare.

[29] We consider GDP in units of the tradable good, that is we define

$$GDP_{i,t} = \frac{\xi_{i,t}^{\alpha} - \alpha^2 \xi_{i,t}}{1-\alpha^2} L_{i,t}^T A_{i,t} + P_{i,t}^N Y_{i,t}^N + W_{i,t} L_{i,t}^R.$$

[30] Our simple model abstracts from many features, such as adjustment costs, that would slow down the macroeconomic impact of industrial policies. More quantitative-oriented frameworks should take these adjustment frictions into account.

4 Empirical evidence

In this section, we assess whether the key assumptions and predictions of the model find support in cross-country data. We document three patterns: i) industrial policies are accompanied by expansions in economic activity in the tradable sector and faster productivity growth, ii) industrial policies tend to be unbalanced, that is they positively correlate with trade surpluses, iii) trade deficits typically come with contractions in economic activity in the tradable sector and slowdowns in productivity growth. To be clear, the evidence that we provide is just suggestive and not based on causal identification strategies. But we find comforting that the correlations implied by our model are present in the data.

To perform our empirical analysis, we construct a balanced panel dataset covering 24 countries over the period 2002–2019. The choice of the time frame is dictated not only by data availability, but also by the fact that the outward-oriented industrial policies that our model is meant to capture are a hallmark of the recent years (Juhász et al., 2024). Our sample includes both advanced economies (United States, United Kingdom, Germany, Japan) and major emerging markets (China, Brazil, Mexico, South Korea), capturing a diverse set of countries that vary substantially in their use of industrial policies.[31]

We draw on several data sources, on which we provide details in Appendix A. For productivity, we use total factor productivity (TFP) measures from the Penn World Tables 10.0. We employ TFP at constant national prices to compute growth rates, and TFP relative to the United States as a control for distance to the technological frontier. We proxy the size of the tradable sector with the manufacturing employment and value added shares from UNIDO INDSTAT2. Finally, we rely on World Bank WDI for the remaining series used as outcome variables or controls, namely current account balances (our proxy for trade imbalances), population growth, old-age dependency ratio, life expectancy, and oil and gas rents over GDP.

Since there are no publicly available datasets on industrial policies that fit our purposes, we construct our own measure of industrial policy intensity.[32] To do so, we rely on a text-based index from NL Analytics, a platform that analyzes transcripts of earnings calls from publicly listed firms. NL Analytics maintains a database of over 400,000 earnings calls from approximately 14,000 firms across 82 countries dating back to 2002. The platform uses natural language processing to identify and classify policy-relevant content in corporate communications.

For each country-year, we construct the industrial policy intensity measure as

$$ip_{i,t} = 100 \times \frac{\text{positive industrial policy sentences}_{i,t}}{\text{total sentences}_{i,t}},$$

expressed as a percentage. The numerator counts sentences in earnings calls by firms headquartered in country i that contain positive mentions of industrial policy, identified through keyword matching and sentiment classification.[33]

[31] The sample composition is determined by the need for a balanced panel with complete data on all required variables. The full list of countries includes: Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Mexico, Netherlands, Norway, Philippines, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, United Kingdom, and United States.

[32] For instance, Juhász et al. (2025) constructed a promising dataset on industrial policies, but it is publicly available only for the 2010-2022 period, which is too short for our analysis.

[33] Figure A.1 in Appendix A shows the time series of our industrial policy intensity measure $ip_{i,t}$ for all countries in our sample (panel A), together with a cumulative index (panel B) which captures the accumulated stock of policy activism over time. The figure reveals clear divergence in industrial policy strategies across countries, with Asian

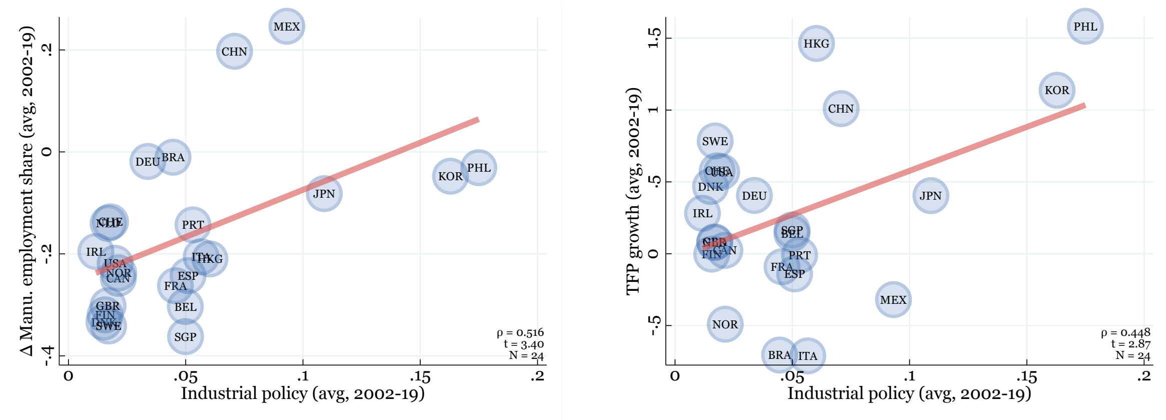


Figure 5: Industrial Policy, Manufacturing Employment, and TFP Growth.

Notes: Each bubble represents a country. The x-axis shows the average industrial policy intensity over the 2002–2019 period, namely $ip_i = \sum_{2002}^{2019} ip_{it}$. The y-axis shows the change in manufacturing employment share (left panel) and the log change in TFP (right panel), on average, over the same period. Source: Penn World Tables 10.0, UNIDO INDSTAT2, NL Analytics.

While our industrial policies index is far from perfect, it has the advantage that it partly captures the intensive margin of industrial policies. Intuitively, an industrial policy with broader scope will likely be mentioned more times by firms in their earnings calls. In this respect, our measure improves upon indexes purely based on counting the number of industrial policies implemented.

4.1 Industrial policies, structural change and productivity

Our model implies a tight link between industrial policy and both the size of the tradable sector and productivity growth. We therefore check whether these implications are borne out in the data by examining whether those countries that used industrial policies more intensively also experienced larger increases in the manufacturing employment share and faster TFP growth over the 2002–2019 period.

Figure 5 reports scatter plots together with correlation coefficients (ρ) and associated t-statistics. The data reveal strong and interesting correlations. The left panel shows that countries with higher use of industrial policies experienced larger rises (or smaller drops) in manufacturing employment shares. The correlation is 0.52 and highly statistically significant. The right panel shows that an analogous result applies to TFP growth, with a similar correlation (0.48) and high statistical significance.

While these correlations are only suggestive at this stage, they align well with our model's core implications. Moreover, as one would expect, East-Asian countries play an important role in driving these correlations. This conforms with the popular view that East-Asian countries have adopted a strategy of outward-oriented growth, characterized by policies that promote tradable sectors.

4.2 Industrial policies and external balances

We turn next to the correlation between industrial policy and external balances, a central aspect of our analysis. Figure 6 shows the relationship between industrial policies and export growth

countries among the most active in ramping up industrial policies over the sample period.

(left panel) and the current account to GDP ratio (right panel), both averaged over the 2002–2019 period. The results show a positive relation between industrial policies and exports, though with a smaller coefficient (0.30) and lower statistical significance than for TFP or manufacturing employment shares. Industrial policy does not appear to be related to current account to GDP ratios in the raw cross-country data.

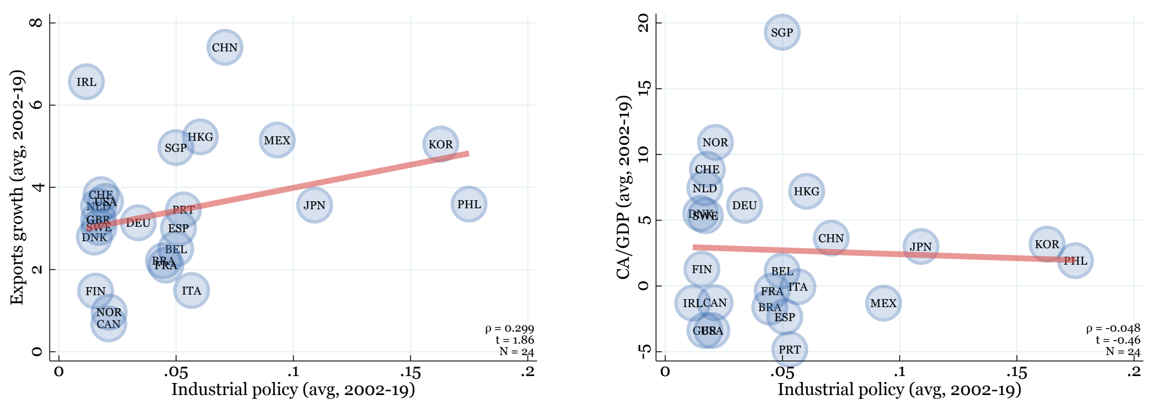


Figure 6: Industrial Policy, Exports, and the Current Account.

Notes: Each bubble represents a country. The x-axis shows the average industrial policy intensity over the 2002–2019 period, namely $ip_i = \sum_{2002}^{2019} ip_{it}$. The y-axis shows the log change in exports (left panel) and the average current account to GDP ratio (right panel), on average, over the same period. Source: Penn World Tables 10.0, UNIDO INDSTAT2, NL Analytics.

Note that our model does not strictly imply a positive unconditional correlation between industrial policies and the current account. First, in our theory industrial policies lead to trade surpluses only if the government adopts an unbalanced macroeconomic framework, such that tradable production increases more than consumption. Second, our model abstracts from many forces – such as demographic factors and natural resource endowments (e.g., oil) – that affect the current account. The result in the right panel of Figure 6 is thus not surprising.

Our sample is too small to control for these confounding forces using a purely cross-country approach. We, therefore, employ a different strategy, based on bilateral country-pair regressions. That is, for each unique pair of countries (i, j) in our sample—yielding 276 bilateral pairs from 24 countries—we compute bilateral differences in all key variables. Specifically, we estimate regressions of the form

$$CA_{ij} = \alpha + \beta \cdot ip_{ij} + \gamma' \text{Controls}_{ij} + u_{ij},$$

where $ip_{ij} = ip_i - ip_j$ measures the difference in average industrial policy intensity between country i and country j over the 2002–2019 period, while $CA_{ij} = CA_i - CA_j$ captures the difference in average current account to GDP ratios between the two countries over the same period.

The question that we ask is thus: "Is country A's higher industrial policy intensity relative to country B associated with a larger CA surplus relative to country B?" This comparison differences out many factors common to both countries, making it more robust to unobserved confounders. While the approach is not immune to bias (e.g. if countries differ substantially on important dimensions), it is generally less fragile than cross-country analysis with a small number of observations. Moreover, we now have more observations to control for the macro fundamentals that are well-known drivers of the current account.[34]

[34]The increased number of observations comes at a cost, namely that observations are not statistically independent

Table 1: Industrial Policy and the Current Account

	(1)	(2)	(3)	(4)
	Dep. var: Avg CA/GDP (i-j)			
Industrial Policy	-6.570	-4.554	35.378***	37.664***
	(5.895)	(5.899)	(6.931)	(7.027)
Oil + Gas Rents		0.472***		0.316**
		(0.167)		(0.134)
Population Growth			2.580***	2.469***
			(0.292)	(0.297)
Old Age Dep. Ratio			-0.584***	-0.574***
			(0.077)	(0.077)
Life Expectancy			1.244***	1.250***
			(0.148)	(0.151)
Prime-age savers			0.422***	0.432***
			(0.148)	(0.149)
Observations	276	276	276	276
R squared	0.003	0.027	0.409	0.419

Note. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All variables are computed as bilateral differences between country i and country j. Industrial policy measures the average share of positive mentions in official documents. Demographic controls include average population growth, the old age dependency ratio (population aged 65 and over relative to working-age population), prime age savers (the share of working age population aged 45 to 64) and life expectancy at birth. Oil and gas rents are measured as a share of GDP.

As controls, we include fundamental non-policy factors: population growth, old-age dependency ratio, life expectancy, the share of prime-age savers, and oil and gas rents. We deliberately exclude policy variables from the control set. The reason is that our model predicts that the link between industrial policies and the current account depends on the government's broader policy mix—specifically, on the use of policies that suppress consumption relative to income (such as capital controls, fiscal austerity, or reserve accumulation).

Table 1 reports the results. We first examine the unconditional relationship between industrial policies and the current account in column (1). In line with the simple cross-country correlation, without controls there is no significant relationship. Column (2) controls for oil and gas resources alone. The coefficient becomes smaller than in the simple specification of column (1) and remains highly insignificant. We then control for demographic factors (population growth, old-age dependency ratio, life expectancy, prime age savers) in column (3). The coefficient on IP now becomes positive, large, and statistically significant (at the 1% level). With all controls included in column (4), the relationship between IP and CA becomes marginally larger and retains statistical significance.[35] This result suggests that unbalanced industrial policies, leading to external surpluses, have been the norm in our sample.

as each country appears in 23 pairs. We account for correlation in residuals using robust standard errors.

[35]This bilateral approach can also be used to estimate the relationship between industrial policies and the other key outcomes considered above: TFP growth, manufacturing employment share, and exports. We report the results in Appendix B, and show relationships that are robust and in line with the simpler cross-country evidence presented earlier.

In sum, the empirical evidence presented in this section is broadly consistent with the main predictions of our theoretical framework. Countries that ramped up industrial policies between 2002 and 2019 experienced faster productivity growth and expansions of their tradable sectors. Moreover, after controlling for non-policy macroeconomic fundamentals, industrial policies are positively correlated with current account surpluses. Through the lens of our model, this means that several countries have relied on unbalanced industrial policies over the last few years.

4.3 Trade deficits, structural change, and productivity growth

In our model, unbalanced industrial policies generate negative international spillovers, because unregulated trade deficits lead to contractions in economic activity in the tradable sector, and slowdowns in productivity growth. To confront this model prediction with the data, we turn to the empirical evidence in Benigno et al. (2025), a paper that has been written by a subset of the coauthors of this paper. Benigno et al. (2025), using both cross-country and time-series evidence, show that persistent trade deficits are accompanied by reallocations of economic activity from the tradable to the non-tradable sectors, as well as slowdowns in productivity growth.

We report here one of their key results, based on the panel regression[36]

$$\Delta_3 tfp_{i,t+h} = \alpha_i^h + \beta^h \times CapInf_{i,t} + \varepsilon_{i,t}, \tag{33}$$

where the dependent variable is the annualized change in log TFP from year $t-3+h$ to $t+h$. The independent variable is the cumulated current account deficit run by the country scaled by initial GDP: $CapInf_{i,t} = -\sum_{k=0}^{2} CA_{i,t-k}/(3Y_{i,t-2})$, where CA denotes the current account and Y denotes GDP. In turn, α_i^h is a country fixed effect, allowing for different trends across countries, and β^h is our coefficient of interest.

Panel A in Table 2 shows that a current account deficit equal to 1% of GDP that is maintained for 3 years is accompanied by a decline in TFP growth of 0.098 percent, then 0.106 percent in the next year, and so forth. This result, as well as the complementary evidence provided by Benigno et al. (2025), suggests that trade deficits tend to come with slowdowns in productivity growth.

Panel B in Table 2 shows the correlation between capital inflows and the share of employment in manufacturing by replacing $\Delta_3 tfp_{i,t+h}$ in (33) with $share_{i,t+h} - share_{i,t-4}$, where $share_{i,t}$ is the share of employment in manufacturing in country i and year t. Again consistent with our model, this regression implies that capital inflows are accompanied by persistent declines in economic activity in manufacturing.

This evidence suggests that, on average, capital inflows are associated with a smaller size of the tradable sector and lower productivity growth.[37] A few other studies have documented similar empirical regularities. The first fact is related to Benigno et al. (2015) and Kalantzis (2015), who show that episodes of large capital inflows are associated with a reallocation of productive activities out of manufacturing and toward the non-tradable sectors. The second fact is consistent with the evidence by Mian et al. (2019), Müller and Verner (2024) and Diebold and Richter (2025), who show that credit supply expansions geared toward the household and non-tradable sectors are

[36] See Benigno et al. (2025) for the details of the analysis, and for complementary empirical evidence.

[37] While the evidence that we report here is based on time-series analyses that capture medium-run dynamics, Gourinchas and Jeanne (2011) Alfaro et al. (2014) and Benigno et al. (2025) show that the negative association between trade deficits and productivity growth also holds in cross-country regressions, which instead focus on long-term relationships.

Table 2: Trade deficits, structural change, and productivity growth.

Panel A. Dependent variable: Total factor productivity growth					
	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$
Capital inflows	-0.098	-0.106	-0.084	-0.041	-0.003
	(0.022)	(0.017)	(0.013)	(0.010)	(0.012)
Observations	2828	2759	2690	2621	2549
R^2	0.11	0.12	0.11	0.10	0.10
Panel B. Dependent variable: Employment share manufacturing					
	$h = 0$	$h = 1$	$h = 2$	$h = 3$	$h = 4$
Capital inflows	-0.049	-0.051	-0.047	-0.038	-0.024
	(0.0188)	(0.021)	(0.021)	(0.022)	(0.020)
Observations	2057	1985	1920	1852	1790
R^2	0.14	0.18	0.21	0.26	0.31

NOTE. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Regression analysis according to equation (33). Robust standard errors in parentheses. All variables are expressed in percent.

accompanied by a shift of productive resources out of tradable sectors and lower future GDP growth.

Again, this evidence does not establish any causal relation, and cannot be used as a direct test of our model. Still, we think that these empirical regularities are intriguing, because they suggest that industrial policies can be a significant driver of global imbalances, and that their adoption may trigger a process of de-industrialization and slowdown in productivity growth in the rest of the world.

5 Policy options for the West

In our theory, an unbalanced policy mix pursued by the East generates a contraction of tradable output, and productivity, in the West. But does the West suffer a welfare loss because of these dynamics? If so, how should the West government design an appropriate policy response? In this section, we examine these questions through the lens of our theoretical framework. Rather than providing definite answers, our objective here is to highlight some trade-offs that policymakers are currently facing, and invite future research aiming at designing optimal policy responses.

5.1 Welfare implications for the West

Suppose that the East runs an unbalanced industrial policy, of the type described in Section 3. That is, assume that the industrial policies implemented by the East government generate a trade surplus equal to tb_e, which effectively amounts to a transfer of tradable goods to the West. Also suppose that, as in Section 3.4, the West government maintains a laissez faire approach to its policies ($\xi_w = 1, \tau_w = 0$). How is welfare in the West affected by the trade imbalances originating from the East? A naive observer could conclude that receiving a transfer from abroad leads to higher welfare, by increasing households' consumption. We will show that there are several reasons to be wary of this logic.

Start by considering that, in steady state, the utility attained by West households is proportional to

$$\underbrace{\omega \log c_w^T + (1-\omega)\log C_w^N}_{\text{consumption}} + \underbrace{\omega\phi \log b_w}_{\text{asset holdings}} + \underbrace{\theta \log J_w}_{\text{geoeconomics}} . \quad (34)$$

We have thus split welfare into three components. Let us analyze how global imbalances affect each of them.

Consumption. The first term in equation (34) captures the utility that households derive from consumption, which is increasing in the households' consumption basket $C_i \equiv \left(C_i^T\right)^{\omega}\left(C_i^N\right)^{1-\omega}$. It is natural to think that trade deficits, which are akin to a transfer of resources from abroad, should be associated with a rise in consumption. Indeed, in Section 3.4 we have seen that trade deficits boost consumption of non-traded goods in the West. But, perhaps surprisingly, trade deficits may actually lead to a drop in the overall consumption basket, and so in the utility that households derive from consumption.

To see this point, recall that $c_w^T = a_w L_w^T + tb_e$. Therefore, holding production constant, running a trade deficit increases consumption of tradable goods. However, trade deficits also depress domestic production of tradable goods, which exerts a negative impact on tradable consumption. It turns out that the second effect may dominate, so a higher trade deficit may very well be associated with a lower consumption of traded goods in equilibrium.[38]

It follows that trade deficits have an ambiguous impact on the utility that West households enjoy from consumption. In fact, one can show that[39]

$$\frac{\partial\left(\omega \log c_w^T + (1-\omega)\log C_w^N\right)}{\partial tb_e} = -\frac{\omega}{1-\omega}\frac{\bar{L} - (1+\omega)L_w^N}{(1+\alpha)c_w^T}\frac{\partial a_w}{\partial tb_e}.$$

Since $\partial a_w/\partial tb_e < 0$, a marginal rise in tb_e thus increases the utility that West households derive from consumption if $\bar{L} > (1+\omega)L_w^N$, otherwise trade deficits are associated with a lower utility from consumption.

How can a transfer of resources from abroad lower the utility that households enjoy from consumption? This paradoxical finding is due to the presence of two inefficiencies characterizing the tradable sector. First, the monopoly power enjoyed by firms producing intermediate goods depresses output of tradable goods below the first best level. Second, knowledge spillovers depress the private return from innovating below the social one, causing private firms to underinvest in innovation compared to the social optimum. Both sources of inefficiencies imply that under laissez faire the tradable sector is inefficiently small compared to the non-tradable one. Trade deficits thus exacerbate the tendency of the private sector to underproduce tradable goods compared to the social optimum. When this effect is sufficiently strong, unregulated trade deficits lead to a decline in aggregate consumption.

We have thus found a first reason why unregulated trade deficits may end up hurting welfare. By exacerbating an inefficient sectoral allocation of productive resources, trade deficits may eventually lead to a drop in national income. Importantly, it may take time for this effect to materialize.

[38] As we explained in footnote 18, a marginal rise in tb_e depresses c_w^T when $\bar{L} < 2L_w^N$.

[39] To derive this expression, we have used equation (24) and the results illustrated in footnote 18.

Indeed, the key reason why trade deficits depress production of tradable goods is that they lead to lower innovation. But, empirically, the impact of lower innovation on productivity is felt only after a substantial time lag. Hence, while trade deficits and capital inflows may boost households' disposable income in the short run, the forces highlighted by our model may end up depressing it in the medium run. These considerations underscore the importance of a forward-looking analysis of the macroeconomic effects of unbalanced industrial policies.

Asset holdings. The second term in the welfare function captures the utility that households derive from holding liquid assets. Now recall that the unbalanced industrial policies implemented by the East increases its demand for liquid assets. If the total supply of liquid assets remains unchanged, it follows that higher demand from the East will be accommodated through lower liquid assets holdings by West households, lowering welfare.[40]

More precisely, as we have seen in Section 3.4, the assets held by West households in steady state are equal to[41]

$$b_w = \frac{\phi}{1+\phi}\left(\frac{a_w L_w^T}{g/R-1} + d_w\right).$$

We have also shown that the unbalanced policy mix pursued by the East depresses the world interest rate, inducing West households to reduce their assets holdings.

This expression shows that, in principle, the West government could prevent b_w from falling by expanding its supply of liquid assets (i.e. by increasing d_w). For instance, if the West government were to increase its government debt exactly in tandem with the higher demand from the East, then industrial policies would not affect b_w.

But is this a viable solution? Expanding the supply of liquid assets, especially in the context of a shrinking production of tradable goods, may not be possible if the government cannot credibly commit to honor its obligations. Worse yet, expanding the supply of government debt may create the risk of a default, compromising the safety and liquidity properties of the whole stock of government bonds (Farhi and Maggiori, 2018). These considerations suggest that, while expanding the supply of government bonds may be a natural response to higher demand by foreign agents, the risks of overdoing it are substantial, so this strategy should be pursued with great caution.

Geoeconomics. The last term in the welfare function is meant to capture strategic benefits of technological leadership beyond standard consumption welfare. Recent geoeconomics research shows that technological leaders possess greater bargaining power in international negotiations, more influence over global standards and supply chains, and enhanced resilience to economic coercion.[42] Since our model connects global imbalances to technological power, some strategic implications are straightforward.

Let us assume that a country's geoeconomic position depends on its technological power relative to others. More precisely, let us posit that $J_{w,t} = a_{w,t}/a_{e,t}$, where $J_{e,t}$ is defined symmetrically.[43] Under this formulation, the unbalanced policy mix pursued by the East has a strong impact on

[40] As we noted in Section 2, our preferred interpretation of the bonds-in-utility term is that it captures in reduced form the notion that households need liquid assets to self-insure against idiosyncratic risk. Under this interpretation, West welfare losses arise once East households start buying bonds from the West, because West households become less able to self-insure.

[41] This expression is derived under the approximation $\beta \approx 1$, but the insights that we highlight do not depend on it.

[42] See Broner et al. (2025), Clayton et al. (2023), Pflueger and Yared (2024) and Clayton et al. (2026) for macroeconomic models integrating geopolitical considerations. In turn, these contributions build on the literature on international politics (Mearsheimer, 2003).

[43] Another possibility would be to link geoeconomic power to the manufacturing base, that is to assume $J_{w,t} =$

relative strategic position. It increases the East's technological capabilities and thus its capacity for economic statecraft, while simultaneously reducing the West's technological leadership and strategic autonomy. Taken together, these two forces imply that unbalanced industrial policies may shift the balance of technological hegemony in the East's favor, thus reducing the West's strategic autonomy and bargaining power in the international system, i.e. that $\partial J_{w,t}/\partial tb_e \ll 0$. This suggests that in times of heightened geoeconomic competition, such as the ones that we are currently experiencing, unbalanced industrial policies can generate negative spillovers through their impact on relative technological leadership and economic statecraft capabilities.

Taking stock, our model implies that when a country runs an unbalanced industrial policy strategy the rest of the world is likely to suffer from important negative spillovers. We now discuss some policy measures that may be implemented to counter the adoption of unbalanced industrial policies by a foreign country.

Of course, one possibility is for the West to implement the same kind of unbalanced industrial policies pursued by the East. These policies would have the same effects described in Section 3.2, so they would lead to an increase in production of tradable goods and improve the trade balance. Since we have already described the macroeconomic impact of industrial policies, in what follows we consider other policy interventions that the West may want to implement.

5.2 Reducing global imbalances

Given that trade deficits may impose welfare losses, it is tempting for the West to implement policies aiming at reducing global imbalances. A smaller trade deficit, the logic is, will contain the loss of high-tech tradable activities in the West triggered by the unbalanced industrial policies pursued by the East. In this section, we consider this proposal. Our discussion centers around two issues: i) Which policy instruments can reduce the trade deficit? ii) Is a multilateral approach to contain global imbalances preferable to a unilateral one?

Trade vs. macroeconomic policies. Suppose that the West wants to reduce its trade deficit. Which policy instruments should it use? Let us start by considering a case in which the objective is to reduce the overall trade deficit. Policymakers often claim that erecting generalized trade barriers, such as the imposition of broad-based import tariffs, will improve a country's trade balance. In contrast, the international macroeconomics literature has shown that import tariffs can have at best an indirect effect on the trade balance, while generating substantial microeconomic distortions.[44] The basic logic is that import tariffs do lower imports, but they also generate an exchange rate appreciation that depresses exports by a roughly equal amount.

The fundamental reason why tariffs do not directly affect global imbalances, is that trade deficits reflect a shortfall of domestic savings relative to investment. Hence, macroeconomic policies that aim at increasing national savings – by curtailing private and public borrowing – have a better chance at reducing trade deficits than tariffs.

To see how this would work in the context of our model, imagine that the West government were to adjust its savings subsidy τ_w so that $b_w = \bar{b}_w$, where $\bar{b}_w$ is an exogenous policy target for

$\frac{(\xi^{\alpha}_{w,t}-\alpha^2\xi_{w,t})a_{w,t}L^T_{w,t}}{(\xi^{\alpha}_{e,t}-\alpha^2\xi_{e,t})a_{e,t}L^T_{e,t}}$. In this case, the effects that we describe would be even stronger.

[44] See Obstfeld and Rogoff (2000), Costinot and Werning (2025), Fornaro and Wolf (2025b) and Itskhoki and Mukhin (2025b) for theoretical analyses linking tariffs to trade deficits. Lindé and Pescatori (2019) show empirically that changes in tariffs have negligible effects on the trade balance.

West households' bond holdings. In this case, the trade balance in the West would be equal to

$$tb_w = a_w L_w^T - c_w^T = (\bar{b}_w - d_w)\left(\frac{g}{R} - 1\right).$$

This equation shows that there is a direct link between the trade balance and macroeconomic policies affecting national savings. More precisely, this expression implies that, holding constant R, a fiscal tightening (i.e. a drop in d_w) or a macroeconomic policy aiming at increasing private savings (i.e. a rise in $\bar{b}_w$) lead to an improvement in the West trade balance. Moreover, drawing on the analysis in Section 3.4, it is easy to check that an improvement in the West trade balance would revive economic activity and innovation in the tradable sector.

Based on these results, one could conclude that macroeconomic policies that reduce private and public borrowing form part of a desirable response to the unbalanced industrial policies pursued by a foreign country. While there is a grain of truth in this logic, we will next argue that these policies may sometimes backfire, so that a multilateral agreement on reducing global imbalances may be needed.

Unilateral vs. multilateral approach. The point that we want to make here is simple. Reducing global imbalances through macroeconomic policies that boost national savings effectively reduce global demand. If pursued aggressively, the result may be a global economy stuck in secular stagnation, in which output is depressed because of weak demand.

To illustrate this logic, let us simplify our model a bit.[45] Suppose that the consumption basket is made entirely of tradable goods ($\omega = 1$), that investment in innovation is not profitable ($\eta = 0$) and that productivity in both countries is normalized to $A_e = A_w = 1$. Moreover, let us introduce the possibility of involuntary unemployment by assuming that nominal wages are rigid, and that households are willing to satisfy firms' labor demand. Under these assumptions, the labor market clearing condition (19) is replaced by $L_{i,t}^T \leq \bar{L}$. When $L_{i,t}^T = \bar{L}$ we say that country i is operating at full employment, while $L_{i,t}^T < \bar{L}$ corresponds to a labor market characterized by involuntary unemployment.

Since we have introduced nominal rigidities, we have to specify how monetary policy is conducted to close the model. For simplicity, from now on we will restrict attention to steady state equilibria. Let us assume that nominal wages are constant, which implies that steady state price inflation is equal to zero. In this case, the real and the nominal interest rate coincide. This implies that, since the nominal rate cannot fall below zero, monetary authorities face the constraint $R_i \geq 1$, where R_i denotes the (gross) policy rate in country i.

Finally, let us assume that central banks in the East and West set their policy rate according to

$$(R_i - 1)\left(L_i^T - \bar{L}\right) = 0. \tag{MP}$$

This expression implies that central banks seek to maintain full employment ($L_i^T = \bar{L}$), but that involuntary unemployment may arise when the zero lower bound constraint binds. As for the other policies, let us assume that the East pursues the unbalanced industrial policy mix studied in Section 3.2, while the West sets $\xi_w = 1$, $d_w = d$ and sets the saving subsidy so that $b_w = \bar{b}_w$.

It turns out that this policy mix leads to multiple equilibria when the zero lower bound on the interest rate binds. This is not surprising, given that equilibrium multiplicity is prevalent when the

[45] See Eggertsson et al. (2016), Fornaro and Romei (2019) and Caballero et al. (2021), for fully-fleshed theoretical frameworks studying a global economy facing persistent aggregate demand shortages.

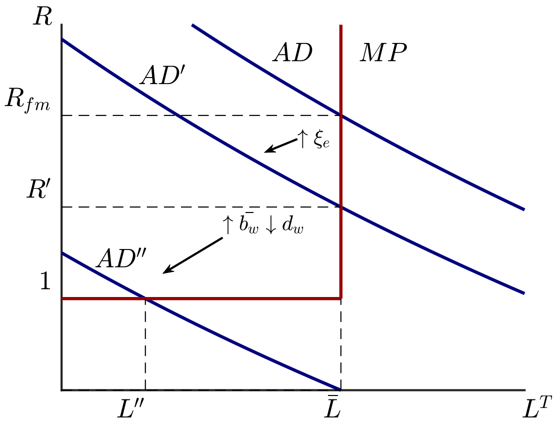


Figure 7: Falling into a global liquidity trap.

zero lower bound constrains the behavior of global interest rates.[46] Without entering too much into the details, we will focus on the unique equilibrium in which $L_e^T = L_w^T = L^T$, and so $R_e = R_w = R$.

Now consider that in equilibrium $tb_e = -tb_w$, which implies that

$$\left(\frac{\xi_e^\alpha - \alpha^2 \xi_e}{1-\alpha^2} - 1\right) L^T = (d_w - \bar{b}_w)\left(\frac{g}{R} - 1\right). \tag{AD}$$

This expression links global employment to global aggregate demand. Intuitively, a lower interest rate boosts demand for consumption by households. As demand for their products rise, firms hire more workers, leading to an increase in employment.

Figure 7 shows how the equilibrium is determined. The MP schedule captures central banks' behavior, while households' demand for consumption is represented by the AD schedule. The equilibrium is reached at the intersection of the two schedules.

Now imagine that the economy starts from a free-markets equilibrium, in which global demand is sufficiently high to maintain full employment. The adoption of unbalanced industrial policies by the East ($\uparrow \xi_e$) increases the level of output consistent with full employment, without a comparable rise in demand by East households. Graphically, this is represented by the leftward shift of the AD curve, from AD to AD′. As we have seen, the result is a drop in the equilibrium interest rate R, from R_{fm} to R'. As shown in the diagram, this drop in the world interest rate is enough to ensure full employment. In fact, this is the scenario that we have considered in our baseline analysis, which focused on full-employment economies. We have done so because, in spite of the aggressive unbalanced industrial policies adopted by some countries, in recent years global rates have been well above the zero lower bound.

But now imagine that the West, in an effort to reduce its trade deficit, adopts a combination of tighter fiscal policy ($\downarrow d_w$) and policies that boost private savings ($\uparrow \bar{b}_w$). These policies trigger a further drop in aggregate demand, captured by a shift of the AD schedule from AD′ to AD″. The diagram captures a scenario in which the drop in aggregate demand is so strong so that monetary policy ends up being constrained by the zero lower bound ($R = 1$). The global economy thus enters a state of secular stagnation, characterized by a chronic liquidity trap, in which global demand is

[46] In fact, multiple equilibria appear in Eggertsson et al. (2016), Fornaro and Romei (2019) and Caballero et al. (2021).

too weak to sustain full employment ($L^T = L'' < \bar{L}$).

The welfare losses associated with a global liquidity trap are likely to be high, both for the East and the West. First, demand-driven unemployment represents an income loss for households. Second, it is easy to show that weak demand depresses investment in innovation and productivity growth (Benigno and Fornaro, 2018). In this sense, there is a risk that unilateral actions implemented by the West to reduce global imbalances may backfire.

These results suggest that reducing global imbalances is likely to require a multilateral approach, based on a mix of policies that boost national savings in the West, while increasing households' consumption in the East. This policy mix, indeed, would reduce global imbalances without excessively depressing aggregate demand. In terms of our model, this multilateral approach would shrink global imbalances without affecting much the world interest rate.

To conclude this section, let us highlight a risk that may arise from a fast rebalancing of the global economy. Imagine that the East were to implement policies to boost its consumption of tradable goods. The result would be a rise in global demand, and so in the world interest rate. In the short run, this increase in the cost of credit would reduce West households' disposable income, as well as force the West government to increase taxes to ensure the sustainability of its debt. While eventually these negative effects will be outweighed by higher productivity, this will only occur in the medium run, when the effect of higher innovation on productivity materializes. Hence, a fast rebalancing through higher consumption by the East could generate problems during the transition for the West. While our model, in which households can perfectly smooth consumption and the government has unlimited access to lump-sum taxes, does not directly capture these concerns, it would be interesting to integrate them in future analyses.[47]

5.3 Innovation policies

Our model puts emphasis on the welfare losses that unregulated trade deficits generate, because of their depressive impact on innovation and productivity. Insofar as this source of welfare loss is important, the natural solution seems to subsidize investment in innovation. In fact, in our model trade deficits are not a problem per se. The issue is rather that, absent policy interventions, trade deficits end up financing booms in non-tradable sectors, such as construction, with little scope for productivity growth. Innovation policies, instead, can redirect the cheap credit coming from abroad to productivity-enhancing investments, and thus reconcile trade deficits with a healthy productivity growth.

More formally, imagine that the West government subsidizes spending on innovation at rate $\iota_{w,t}$, so that equation (14) is replaced by

$$(1-\iota_{w,t})\frac{W_{i,t}}{A_t^*} = \frac{\beta\eta C_{i,t}^T}{C_{i,t+1}^T}\left(\frac{\alpha}{1+\alpha}\xi_{i,t+1}L_{i,t+1}^T + (1-\iota_{w,t+1})\frac{W_{i,t+1}}{A_{t+1}^*}\right). \tag{35}$$

In steady state, the West GG equation now becomes

$$a_w = \frac{\alpha L_w^T}{(1-\iota_w)\left(g/(\beta\eta)-1\right)}. \tag{GG_w}$$

[47]For instance, Fornaro and Wolf (2025a) show that in presence of distortionary taxes and high legacy public debt a rise in interest rates can generate a vicious cycle between lower growth and high fiscal distortions, eventually pushing the economy into a state of fiscal stagnation.

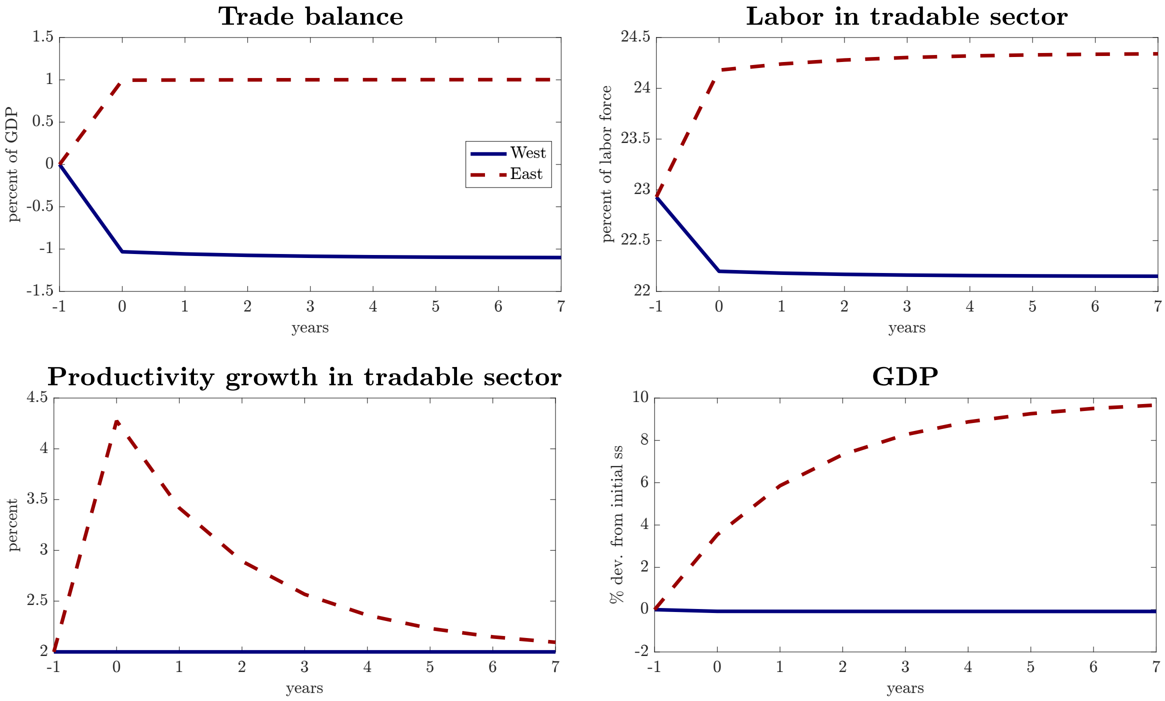


Figure 8: Innovation policies by the West.

As it is intuitive, this equation implies that a higher subsidy drives up investment in innovation and productivity in steady state. As a corollary, the government can thus use this subsidy to insulate investment in innovation from global imbalances. To do so, the government should respond to a higher trade deficit, which causes a drop in L_w^T, by subsidizing innovation activities at a higher rate ($\uparrow \iota_w$).

Figure 8 shows a scenario in which the West responds to the East unbalanced industrial strategy by subsidizing investment in innovation. Compared to the scenario considered in Section 3.5, the only difference is that now the West government uses the subsidy $\iota_{w,t}$ to insulate investment in innovation from global imbalances.

The key result here is that the industrial policies implemented by the East do not affect negatively GDP in the West. Moreover, innovation policies increases the likelihood that the West will benefit from the East trade surpluses. The combination of higher trade deficits and unchanged GDP, in fact, implies that households' consumption in the West rises. This result suggests that it is possible for the West to combine global imbalances with robust productivity growth and higher welfare. However, for this to happen, governments might need to implement policies supporting investment in innovation.

More broadly, our model emphasizes that trade deficits become problematic when they induce a shift of economic activity out of high-tech tradable sectors, and toward low-productivity non-tradable ones. This is the case in a laissez-faire regime, in which cheap capital inflows end up financing credit booms in the non-tradable sector, and thus triggering effects akin to a financial resource curse. But governments can take measures to prevent this outcome, by subsidizing economic activity—and especially investment in innovation—in the high-tech sectors that they wish to protect. While our analysis represents just a first pass at this issue, it suggests that countries negatively affected by global imbalances should include innovation policies as part of their policy response toolbox.[48]

6 Conclusion

In this paper, we have presented a model to study the impact of industrial policies on global imbalances and technological hegemony. We have argued that unbalanced industrial policies cause global imbalances, and exert negative spillovers toward the rest of the world by shifting the pattern of technological hegemony. We have also discussed several policies that can be implemented to mitigate these negative effects of industrial policies.

This paper represents just a first step in a broader research agenda, and there is much yet to be done. First, providing more empirical evidence on the international spillovers caused by industrial policies is on top of the list. Recent efforts at quantifying the use of industrial policies, e.g. DiPippo et al. (2022) and Juhász et al. (2025), will hopefully foster future research on this topic. Second, our theoretical framework highlights some key channels through which industrial policies exert international spillovers. Quantifying these forces is an interesting area for future research. Moreover, our framework could be used to design the optimal policy responses to unbalanced industrial policies implemented by a foreign power.

[48] Van Reenen (2020) and Gazzani et al. (2025) discuss several types of innovation policies that governments can adopt to foster private investment in R&D.

References

Aghion, Philippe and Peter Howitt (1992) "A Model of Growth Through Creative Destruction," *Econometrica*, Vol. 60, No. 2, pp. 323–351.

Al-Haschimi, Alexander, Natálie Dvořáková, Julien Le Roux, and Tajda Spital (2025) "China's growing trade surplus: why exports are surging as imports stall," *Economic Bulletin Boxes*, Vol. 7.

Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych (2014) "Sovereigns, upstream capital flows, and global imbalances," *Journal of the European Economic Association*, Vol. 12, No. 5, pp. 1240–1284.

Ates, Sina and Felipe Saffie (2016) "Fewer but better: Sudden stops, firm entry, and financial selection,"Technical Report 1187, FRB International Finance Discussion Paper.

Audretsch, David B and Maryann P Feldman (1996) "R&D spillovers and the geography of innovation and production," *American Economic Review*, Vol. 86, No. 3, pp. 630–640.

Benigno, Gianluca, Nathan Converse, and Luca Fornaro (2015) "Large capital inflows, sectoral allocation, and economic performance," *Journal of International Money and Finance*, Vol. 55, pp. 60–87.

Benigno, Gianluca and Luca Fornaro (2014) "The financial resource curse," *Scandinavian Journal of Economics*, Vol. 116, No. 1, pp. 58–86.

——— (2018) "Stagnation traps," *The review of economic studies*, Vol. 85, No. 3, pp. 1425–1470.

Benigno, Gianluca, Luca Fornaro, and Martin Wolf (2022) "Reserve accumulation, growth and financial crises," *Journal of International Economics*, Vol. 139, p. 103660.

——— (2025) "The global financial resource curse," *American Economic Review*, Vol. 115, No. 1, pp. 220–262.

Bloom, Nicholas, Brian Lucking, and John Van Reenen (2019) "Have R&D Spillovers Declined in the 21st Century?" *Fiscal Studies*, Vol. 40, No. 4, pp. 561–590.

Broner, Fernando, Alberto Martin, Josefin Meyer, and Christoph Trebesch (2025) "Hegemonic globalization,"Technical report, CESifo Working Paper.

Brunnermeier, M., P. O. Gourinchas, and O. Itskhoki (2018) "Consumption-led Growth," Manuscript, Princeton University.

Caballero, Ricardo J, Emmanuel Farhi, and Pierre-Olivier Gourinchas (2008) "An equilibrium model of global imbalances and low interest rates," *American Economic Review*, Vol. 98, No. 1, pp. 358–93.

——— (2015) "Global Imbalances and Currency Wars at the ZLB," NBER Working Paper No. 21670.

——— (2021) "Global imbalances and policy wars at the zero lower bound," *The Review of Economic Studies*, Vol. 88, No. 6, pp. 2570–2621.

Clayton, Christopher, Matteo Maggiori, and Jesse Schreger (2023) "A framework for geoeconomics,"Technical report, National Bureau of Economic Research.

——— (2026) "Global Imbalances and Power Imbalances,"Technical report, National Bureau of Economic Research.

Costinot, Arnaud and Iván Werning (2025) "How tariffs affect trade deficits,"Technical report, National Bureau of Economic Research.

Cuñat, Alejandro and Robert Zymek (2025) "Unbalanced Trade 2.0," IMF working paper.

Diebold, Lukas and Björn Richter (2025) "AD Two Become One: Foreign Capital and Household Credit Expansion," *The Review of Financial Studies*, p. hhaf114.

DiPippo, G, I Mazzocco, S Kennedy, and MP Goodman (2022) "Red ink: Estimating Chinese industrial policy spending in comparative perspective. CSIS Report."

Eggertsson, Gauti B, Neil R Mehrotra, Sanjay R Singh, and Lawrence H Summers (2016) "A contagious malady? Open economy dimensions of secular stagnation," *IMF Economic Review*, Vol. 64, No. 4, pp. 581–634.

Farhi, Emmanuel and Matteo Maggiori (2018) "A model of the international monetary system," *The Quarterly Journal of Economics*, Vol. 133, No. 1, pp. 295–355.

Fornaro, Luca and Federica Romei (2019) "The paradox of global thrift," *American Economic Review*, Vol. 109, No. 11, pp. 3745–3779.

Fornaro, Luca and Martin Wolf (2025a) "Fiscal Stagnation," CREI working paper.

——— (2025b) "Tariffs and technological hegemony," CREI working paper.

Gazzani, Andrea, Joseba Martinez, Filippo Natoli, and Paolo Surico (2025) "The Public Origins of American Innovation," LBS working paper.

Gourinchas, P.O. and O. Jeanne (2011) "Capital Flows to Developing Countries: The Allocation Puzzle," NBER Working Paper No. 13602.

Inklaar, Robert, Ryan Marapin, and Kaira Gräler (2024) "Tradability and sectoral productivity differences across countries," *IMF Economic Review*, pp. 1–53.

Itskhoki, Oleg and Dmitry Mukhin (2025a) "Global Imbalances: A Progress Report,"Technical report.

——— (2025b) "The optimal macro tariff,"Technical report, National Bureau of Economic Research.

Juhász, Réka, Nathan J Lane, Emily Oehlsen, and Veronica C Perez (2025) "Measuring industrial policy: A text-based approach,"Technical report, National Bureau of Economic Research.

Juhász, Réka, Nathan Lane, and Dani Rodrik (2024) "The new economics of industrial policy," *Annual Review of Economics*, Vol. 16, No. 1, pp. 213–242.

Kalantzis, Yannick (2015) "Financial fragility in small open economies: firm balance sheets and the sectoral structure," *The Review of Economic Studies*, Vol. 82, No. 3, pp. 1194–1222.

Klein, Matthew C and Michael Pettis (2020) *Trade wars are class wars: How rising inequality distorts the global economy and threatens international peace*: Yale University Press.

Krugman, P. (2025) "China's Trade Surplus," https://paulkrugman.substack.com/p/chinas-trade-surplus-part-i.

Krugman, Paul (1987) "The narrow moving band, the Dutch disease, and the competitive consequences of Mrs. Thatcher: Notes on trade in the presence of dynamic scale economies," *Journal of Development Economics*, Vol. 27, No. 1-2, pp. 41–55.

Lashkaripour, Ahmad and Volodymyr Lugovskyy (2023) "Profits, scale economies, and the gains from trade and industrial policy," *American Economic Review*, Vol. 113, No. 10, pp. 2759–2808.

Lee, Sang Min (2025) "Globalization and structural transformation: the role of tradable services,"Technical report.

Lindé, Jesper and Andrea Pescatori (2019) "The macroeconomic effects of trade tariffs: Revisiting the lerner symmetry result," *Journal of International Money and Finance*, Vol. 95, pp. 52–69.

Liu, Ernest (2019) "Industrial policies in production networks," *The Quarterly Journal of Economics*, Vol. 134, No. 4, pp. 1883–1948.

Mearsheimer, John J (2003) *The tragedy of great power politics (Updated edition)*: WW Norton & Company.

Mian, Atif R, Amir Sufi, and Emil Verner (2019) "How does credit supply expansion affect the real economy? The productive capacity and household demand channels," *Journal of Finance*.

Mian, Atif, Ludwig Straub, and Amir Sufi (2025) "A goldilocks theory of fiscal deficits," *American Economic Review*, Vol. 115, No. 12, pp. 4253–4291.

Moretti, Enrico (2021) "The effect of high-tech clusters on the productivity of top inventors," *American Economic Review*, Vol. 111, No. 10, pp. 3328–3375.

Müller, Karsten and Emil Verner (2024) "Credit allocation and macroeconomic fluctuations," *Review of Economic Studies*, Vol. 91, No. 6, pp. 3645–3676.

Obstfeld, Maurice and Kenneth Rogoff (2000) "The six major puzzles in international macroeconomics: is there a common cause?" *NBER macroeconomics annual*, Vol. 15, pp. 339–390.

Ohno, Taiichi (1982) "How the Toyota Production System was Created," *Japanese Economic Studies*, Vol. 10, No. 4, pp. 83–101.

Ottonello, Pablo, Diego J Perez, and William Witheridge (2024) "The Exchange Rate as an Industrial Policy,"Technical report, National Bureau of Economic Research.

Pflueger, Carolin and Pierre Yared (2024) "Global hegemony and exorbitant privilege,"Technical report, National Bureau of Economic Research.

Queraltó, Albert (2019) "A model of slow recoveries from financial crises," *Journal of Monetary Economics*.

Rodrik, Dani (2008) "The real exchange rate and economic growth," *Brookings papers on economic activity*, Vol. 2008, No. 2, pp. 365–412.

Romer, Paul M (1990) "Endogenous Technological Change," *Journal of Political Economy*, Vol. 98, No. 5, pp. S71–S102.

Smith, N. (2025) "Why Europe should resist the Second China Shock," https://www.noahpinion.blog/p/why-europe-should-resist-the-second.

Van Reenen, John (2020) "Innovation policies to boost productivity," *The Hamilton Project*.

Varela, Liliana, Kei-Mu Yi, and Felipe Saffie (2023) "The Micro and Macro Dynamics of Capital Flows," Available at SSRN 4931103.

Appendix

A Data

A.1 Sample Selection

We construct a balanced panel covering the period 2002–2019 with complete data on all key variables described below. The sample includes 24 countries: Belgium, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, Ireland, Italy, Japan, Mexico, Netherlands, Norway, Philippines, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, United Kingdom, and United States.

This sample provides a mix of advanced economies and emerging markets, and includes both surplus countries (China, Germany) and deficit countries (US, UK). The main constraints to obtain a balanced panel are the availability of NL Analytics industrial policy data (which starts in 2002) and Penn World Tables data (which ends in 2019 in version 10.0).

A.2 Variable Construction

Industrial Policy Intensity To measure industrial policy intensity, we use a text-based index from NL Analytics, a platform that analyzes transcripts of earnings calls from publicly listed firms. NL Analytics maintains a database of over 400,000 earnings calls from approximately 14,000 firms across 82 countries dating back to 2002. The platform uses natural language processing to identify and classify policy-relevant content in corporate communications.

For each country-year, we construct the industrial policy intensity measure as:

$$ip_{i,t} = 100 \times \frac{\text{positive industrial policy sentences}_{i,t}}{\text{total sentences}_{i,t}}, \tag{A.1}$$

expressed as a percentage. The numerator counts sentences in earnings calls by firms headquartered in country i that contain positive mentions of industrial policy, identified through keyword matching and sentiment classification. We then construct the cumulative industrial policy index as $IP_{i,t} = \sum_{\tau=2002}^{t} ip_{i,\tau}$, which captures the accumulated stock of policy activism over time. Figure A.1 shows the time series of our industrial policy intensity measure $ip_{i,t}$ for all countries in our sample (panel A), together with the cumulative index (panel B). The figure reveals clear divergence in industrial policy strategies across countries, with Asian countries among the most active in ramping up industrial policies over the sample period. For the regression analysis in Section 4, we compute the average of ip_it (panel A) over the 2002-2019 period.

Total Factor Productivity We obtain total factor productivity (TFP) measures from the Penn World Tables 10.0, a comprehensive database covering 183 countries from 1950 to 2019 maintained by the Groningen Growth and Development Centre. The PWT provides internationally comparable measures of income, output, inputs, and productivity based on detailed national accounts data and purchasing power parity (PPP) adjustments.

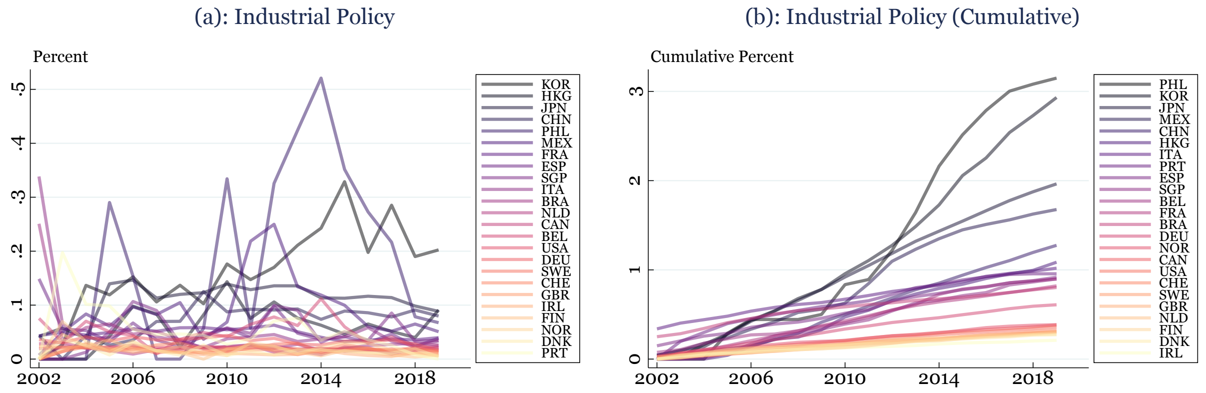


Figure A.1: Industrial Policy.

Notes: The figure shows the evolution of our industrial policy measure for all 24 countries in our sample from 2002 to 2019. Panel (a): industrial policy intensity. Panel (b): cumulative industrial policy index (running sum of annual IP intensity). Sources: NL Analytics.

We use two TFP measures for different purposes. First, we employ TFP at constant national prices (`ctfp`) to compute productivity growth rates over time within each country. This measure is indexed to equal 1 in 2017 for all countries and captures productivity changes holding domestic prices constant. Second, we use TFP relative to the United States (`rtfpna`) as a control for each country's distance to the technological frontier, which accounts for convergence effects in our regressions. This measure equals 1 when a country has the same TFP level as the United States. For graphical presentation, we rebase TFP at constant national prices so that each country equals 100 in 2002, making it easier to visualize relative productivity trajectories over our sample period (Figure A.2(b)). For the regression analysis in Section 4, we compute the average annual log change of TFP between 2002 and 2019. We also control for initial distance to the US technological frontier using $TFP^{\to US}_{i,2002} \in [0, 1]$, where values closer to 1 indicate proximity to the frontier and values closer to 0 indicate greater distance.

Manufacturing Employment Share Data on the manufacturing sector come from UNIDO INDSTAT2, the Industrial Statistics Database maintained by the United Nations Industrial Development Organization. This database provides detailed employment and value added data for the manufacturing sector across countries. We define $Manu_{i,t}$ as manufacturing employment as a percentage of total employment in country i at time t (Figure A.2(c)). For the regression analysis in Section 4, we compute the average annual change in manufacturing employment share over the 2002 to 2019 period, measured in percentage points.

Exports We use real exports at constant 2017 national prices from Penn World Tables 10.0. To facilitate comparison across countries, we rebase export values so that each country equals 100 in 2002 (Figure A.2(d)). For the regression analysis in Section 4, we compute the average annual log change of exports between 2002 and 2019.

Current Account Current account balance data come from the External Wealth of Nations database, a comprehensive dataset on external assets and liabilities maintained by Philip Lane and Gian Maria Milesi-Ferretti and now hosted at the Brookings Institution. The database covers 212 countries and territories from 1970 onward and provides detailed information on countries' external positions, including current account balances, foreign direct investment, portfolio investment, and net international investment positions. We construct the current account to GDP ratio, $CA/GDP_{i,t}$, as the current account balance scaled by nominal GDP, which we plot in Figure A.2(e). For the regression analysis in Section 4, we compute the average current account to GDP ratio over the 2002 to 2019 period, $\overline{CA/GDP}_i$. This captures persistent external imbalances rather than year-to-year fluctuations.

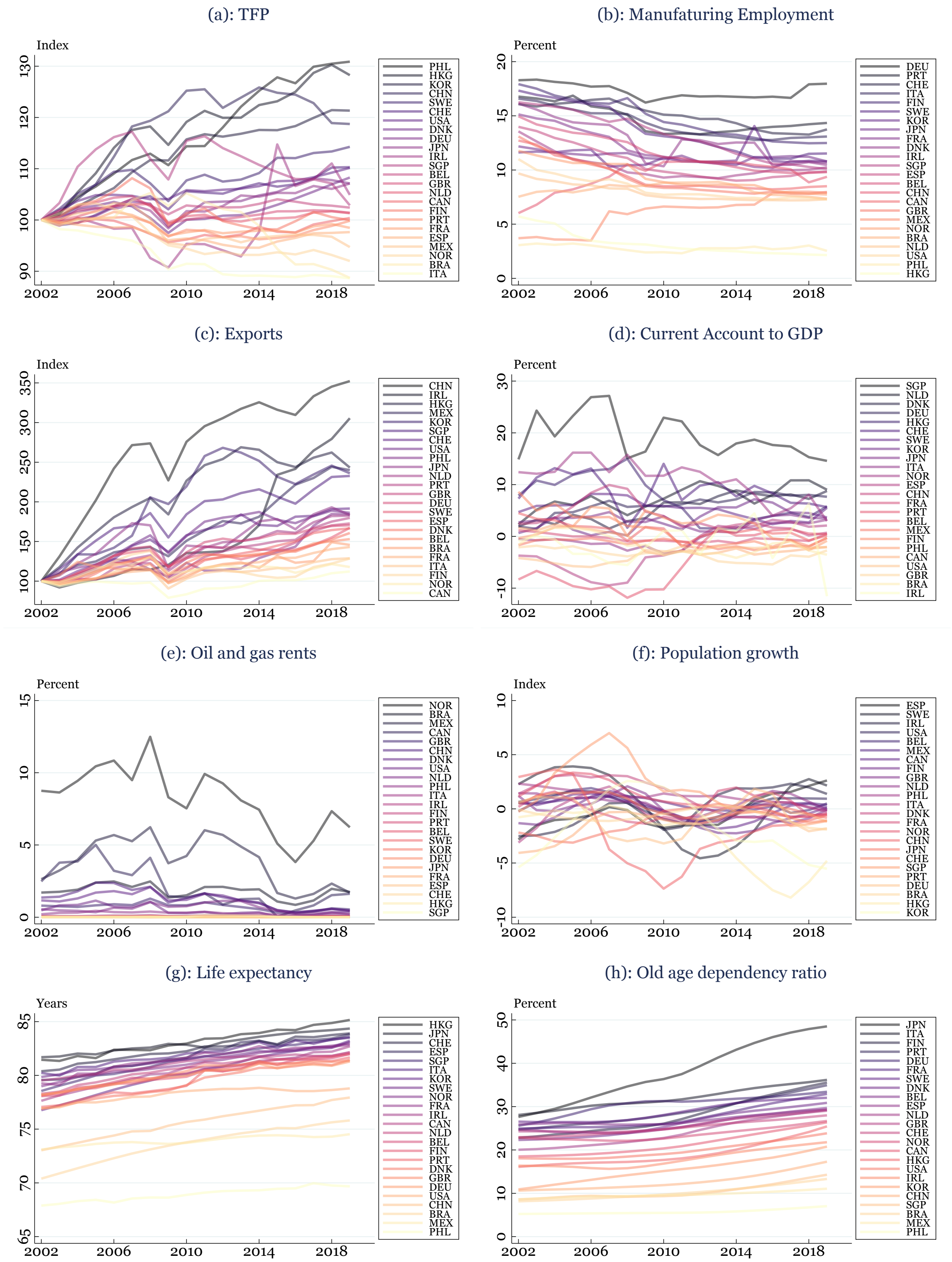


Figure A.2: Key Macro Variables.

Notes: The figure shows the evolution of key variables for all 24 countries in our sample from 2002 to 2019. Panel (a): TFP at constant national prices, rebased to 100 in 2002. Panel (b): Manufacturing employment share (percent of total employment). Panel (c): Real exports, rebased to 100 in 2002. Panel (d): Current account to GDP ratio (percent). Panel (e): Oil and gas rents (percent of GDP). Panel (f): Population (index). Panel (g): Life expectancy at birth (years). Panel (h): Old-age dependency ratio (percent). Sources: Penn World Tables 10.0, UNIDO INDSTAT2, External Wealth of Nations, World Bank.

B Additional Results

Table B.1 reports bilateral regression results examining the relationship between industrial policy intensity and key economic outcomes: manufacturing employment share, TFP growth, and export growth.

Table B.1: Industrial Policy, Manufacturing Employment, TFP Growth, and Exports.

	(1)	(2)	(3)
	TFP	Manu. Emp. Share	Exports
Industrial Policy	4.851***	0.875***	6.002**
	(0.880)	(0.197)	(2.558)
Initial TFP Gap	-0.323*	-0.285***	-1.387**
	(0.176)	(0.040)	(0.683)
Observations	276	276	276
R squared	0.207	0.389	0.110

NOTE. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. All variables are computed as bilateral differences between country i and country j. Industrial policy measures the average share of positive mentions in official documents. Initial TFP gap captures the difference in total factor productivity relative to the US frontier in 2002. Dependent variables are average annual growth rates for TFP, manufacturing employment share, and exports.