Industrial Policies and Firm Performance: A Nuanced Relationship*

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Abstract

This paper combines data on industrial policies (IPs) with firm-level data to examine the dynamic relationship between IPs and firm performance. We find that this relationship varies by instrument, firm and sector characteristics, position in the value chain, and time horizon. Domestic subsidies discriminating against foreign interests are linked to temporary improvements in value added, total factor productivity (TFP), and payroll, as well as more sustained increases in capital. These associations are stronger for young and financially constrained firms. Export incentives are linked to short-term declines in firm performance but to medium-term gains in value added and TFP, particularly among young firms. Consistent with the trade literature, IPs reducing trade barriers are linked to improved firm performance in the medium term. Sectoral distortions also matter—IPs are associated with stronger improvements in value added, capital and payroll when they target highly distorted sectors. Finally, we document cross-sectoral spillovers: protective policies targeting upstream sectors are associated with improved outcomes in downstream firms, while those targeting downstream sectors correlate with weaker performance in upstream firms. Spillovers from trade liberalizing policies are consistently positive and larger in magnitude, regardless of value chain position.

Keywords: Industrial Policies, Firm Performance, Subsidies, Export Incentives, Productivity.

JEL codes: L52, D22, O25, D57

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1 Introduction

After a period of decline following the liberalization wave of the 1990s, industrial policies (IPs) have been widely used in both advanced economies and emerging markets in recent years, particularly since 2017. This is clearly reflected in the business press, where the number of articles mentioning IPs rose from under 1,000 in 1990 to over 18,000 in 2019 (Evenett et al., 2024). As governments increasingly turn to IPs in response to economic and geopolitical challenges, reassessing IPs' economic effects is essential. Importantly, their impact on firm performance is a key channel through which IPs are expected to shape economic performance. Intuitively, IPs may help firms overcome market failures and promote strategic sectors, but they can also have unintended consequences within targeted sectors, and across sectors, and could be hampered by capacity and political capture. Hence, whether IPs improve, on average, the performance of firms remains an open empirical question.

Against this backdrop, this paper addresses three questions: How does the introduction of IPs relate to firm performance? Which firms benefit more from IPs? Do the effects of IPs spillover across sectors? To tackle these questions, we combine a novel industry-level database of industrial policies from Juhász et al. (2023) with firm-level data from ORBIS. The resulting dataset covers 2 million firms in 38 countries from 2011 to 2018. We define industrial policies as "state actions aimed at transforming the structure of economic activity, typically by altering relative prices across sectors or directing resources toward specific industries or activities like exporting and R&D." We leverage information on the instruments through which governments conduct IPs. The analysis focuses on the most prevalent forms of IPs: those that discriminate against foreign interests—namely, *protectionist* domestic subsidies and *protectionist* export incentives—and those that *liberalize* trade through reductions in trade barriers. With this information at hand, we estimate the dynamic association between IPs and firm outcomes using local projection methods (Jordà, 2005) while incorporating a rich set of fixed effects to account for industry, time, country-specific, and firm-specific factors.

Our results point to a nuanced relationship between IPs and the performance of an average firm in the targeted industry.[1] We find that an additional protectionist domestic subsidy is associated with a 1 percent increase in value added (VA), payroll, and total factor productivity (TFP) after one to two years of implementation. However, the effects are short-lived — these outcomes decline over the medium term. We find more sustained effects on capital, for which one additional subsidy is associated with a gradual increase of more than 1 percent after three years. In contrast, the link between export incentives and firm-level outcomes is mostly negative in the short term. Our estimates point to a contraction of up to one percent in all firm-level variables after one to two years. These negative associations tend to fade over time and, in the case of TFP, even turn positive in the medium term. For liberalizing IPs—those reducing trade barriers—we find a robust positive association with value added and TFP, both increasing by 1 to 2 percent after two years. Unlike

[1] In this paper, we consider a sector to be a collection of industries. For example, industries refer to NACE Rev. 2 4-digit codes, whereas sectors refer to more aggregated NACE Rev. 2 2-digit groupings.

protectionist policies, liberalizing policies show limited association with capital accumulation or payroll.

Our results also show that the relationship between IPs and firm performance varies across different firms within targeted industries. IPs often target specific firms, especially those perceived to face larger frictions (Juhász et al., 2023). Motivated by this, we explore heterogeneity along two key dimensions: firm age and the cash-to-assets ratio, a proxy for credit constraints. We find that the positive link between domestic subsidies and firm-level outcomes is typically stronger for younger firms. Specifically, younger (older) firms experience a 2 percent (0.5 percent) increase in value added in one year. Similarly, more credit constrained firms exhibit larger increases in capital after the introduction of a subsidy. In the case of export incentives, younger and more credit-constrained firms tend to experience smaller short-term declines in value added and TFP, as well as faster and stronger recoveries. These patterns suggest that IPs may generate heterogeneous effects across firms, creating potential winners and losers through shifts in market shares and the reallocation of factors of production. While determining whether these reallocations enhance aggregate efficiency goes beyond the scope of this paper, our results highlight the uneven impacts of IPs by firm type, a dimension that has to be factored in when assessing the welfare implications of industrial policies. In fact, suggestive empirical evidence show that the efficiency of resource allocation across firms within industries increases in the aftermath of export incentive policies (Baquie et al., 2025). By contrast, liberalizing policies appear to have a more homogeneous effect across firms. This may reflect that these policies are less targeted, and their direct impact is more widespread.

We also find that industry-level characteristics matter. We build a simple industry-specific gauge that combines information on a sector's external financial dependence (EFD) that make firms more vulnerable to country-level financial constraints, and on markups, which may reflect economies of scale or market power. We strip out country-specific factors from EFD and markups, and construct dummy variables that capture the extent of industry-specific distortions. We find that the positive relationship between IPs and firm-level value added is stronger in sectors with higher levels of distortions. This pattern is stronger and more durable for factor accumulation (capital and payroll). In contrast, industry-level distortions appear to play a less central role for TFP.

Beyond the relationship between IPs and firm performance in the targeted industry, we also explore cross-sectoral spillovers through input-output linkages. Our findings suggest that the direction of these spillovers depends on the stage of the value chain that is targeted by IPs. There is a positive relationship between firm-level outcomes and exposure to upstream IPs. That is, IPs in input-providing sectors are linked to improvements in the performance of firms buying those inputs. This suggests that, by temporarily lifting productivity and raising capital stock in the targeted industries, IPs alleviate capacity constraints and increase the productivity of inputs that flow downstream. By contrast, there is a negative relationship between firm performance and exposure to downstream IPs. That is, IPs directed at sectors in the final stages of the value chain are associated with weaker economic performance of firms supplying inputs to those sectors. Intuitively, by temporarily increasing productivity and lowering input demand in the targeted industries, IPs push down the demand for inputs from upstream sectors. Liberalizing IPs again show distinct patterns compared to the above-mentioned protectionist IPs. Specifically, liberalizing IPs are associated with positive spillovers regardless of the stage of the value chain, and the magnitudes of these spillovers are typically larger than those found for protectionist IPs.

Most of our findings are robust to alternative methodologies and extensions. On the methodological front, our robustness exercises leverage the local projection difference-in-difference (LP DiD) method proposed by Dube et al. (2024) to take into account the staggered nature of IP treatment. We find that LP DiD results are broadly consistent with the baseline specification. One exception is export incentives, for which we find a larger and more significant medium-term association with firms' value added and TFP. We also find little evidence of pre-trends, particularly for the case of domestic subsidies and export incentives. This is reassuring, as it assuages concerns that policies are targeting growing sectors. Finally, we conduct several robustness exercises that address, among other issues: (i) the count nature of our IP proxy; (ii) the set of policies included in the exercise; (iii) the sample of countries used in the analysis; and (iv) the set of controls included and the lag structure of our local projection specification. In all cases, results are robust.

Related Literature. Our paper contributes to two strands of literature. First, we complement a growing empirical literature that studies the economic impacts of IPs. We offer new firm-level analysis assessing the relationship between IPs and economic performance from a cross-country, cross-sector, perspective. In fact, most papers rely on country-specific case studies (Juhász et al., 2024; Cherif and Hasanov, 2019; Lane, Forthcoming; Choi and Levchenko, 2024). More recently, a number of studies have leveraged data stemming from the Global Trade Alert (GTA) project to study the relationship between IPs and different economic outcomes in a cross-country setting. For example, using the GTA data and following a similar large language model as Juhász et al. (2023), Barwick et al. (2024) study the relationship between IPs and innovation in the global automobile industry. Rotunno and Ruta (2024) use the GTA database to assess the impacts of domestic subsidies (both IPs and non-IPs) on trade flows. Huang et al. (2025) also explore the dynamic relationship between IPs and trade outcomes, focusing on differences across IP instruments and export products.

Two studies closely related to ours are Criscuolo et al. (2019) and Brandão-Marques and Toprak (2024), which leverage detailed information on state aid in Europe to gauge the impact of subsidies on firms and labor market performance. The information used in these studies is well suited to tackle endogeneity concerns. Both studies also find positive links between IPs and firm revenue and payroll, and Criscuolo et al. (2019) highlights stronger effects for younger firms. However, they are confined to data from Europe, which makes their conclusions more specific to the set of countries in the analysis. In this regard, the broader data coverage of over 30 countries in our analysis makes our results more general. In addition, the rich firm-level and industry-level information used in the analysis allows us to explore heterogeneity by firm characteristic and spillovers of IPs along the supply chain, dimensions that are not fully explored in the literature.

Second, we contribute to a long-standing literature on how government policies interact with firm performance. Studies span across a variety of government policies. These look at, for example, how labor market policies such as minimum wages affect firm productivity (Harasztosi and Lindner, 2019; Drucker et al., 2021; Link, 2024); how trade liberalization episodes impact innovation and product upgrading of firms (Bustos, 2011; Fajgelbaum and Khandelwal, 2022); how credit market policies help firms grow and cope with aggregate crises (Heo, 2024; Levine and Warusawitharana, 2021); and how policies to improve the quality of tax administration attenuate the productivity gap of young firms relative to older firms (Dabla-Norris et al., 2017). We contribute to this literature by studying a different type of government policy: industrial policies enacted as governments attempt to reshape economic activity across sectors.

The rest of the paper is organized as follows. Section 2 describes the data sources. Section 3 describes the econometric strategy. Section 4 presents the main findings and associated robustness exercises. Section 5 concludes. Results of the robustness exercises are found in the Online Appendix.

2 Data and Summary Statistics

We combine information on IPs at the industry level, data on firm-level economic performance, and sector-level input-output (IO) linkages in different countries over time.

2.1 Industrial policies

Data on IPs comes from Juhász et al. (2023). The authors define IPs as "state actions aimed at transforming the structure of economic activity, typically by altering relative prices across sectors or directing resources toward specific industries or activities like exporting and R&D". They construct a global database of industrial policies from 2009–2022 by leveraging machine learning techniques on policy text descriptions from the GTA database (Evenett and Fritz, 2022), allowing for systematic quantification of the number of IPs in place in each country, product, industry, and year.

We aggregate IPs from HS product code and CPC industry codes to NACE Rev. 2 industry codes using correspondences from the UN Statistics Division.[2] We apply the recommended reporting-lag adjustment and only keep GTA policies announced and published within the same calendar year. This ensures consistent comparison of policy counts across time. For each country and industry in a given year, we count the *stock of active* IPs that were announced but not yet removed. Our main outcome of interest is the change in the stock of IPs in a given country and industry between two years, which we refer to as the IP shock.

In addition to including information on the implementing country, targeted product/industry, announcement/removal years, and a policy description, the GTA reports two characteristics key to this paper: the GTA evaluation and the policy instrument. The GTA evaluation indicates the *direction* of the policy change assessed by GTA experts. There are three categories: Red, Amber,

[2] https://unstats.un.org/unsd/classifications/Econ.

and Green. Red GTA policies are protectionist, as they almost certainly discriminate against foreign commercial interests (e.g., export subsidy for agricultural products). Green GTA policies are liberalizing towards foreign commercial interests (e.g., elimination of export bans on mineral fertilizers). Amber GTA policies are ambiguous as they "likely involve discrimination against foreign commercial interests", and are not the focus of this paper. The GTA also assigns each policy to one of 66 policy instruments. We follow Goldberg et al. (2024) and Evenett et al. (2024) and aggregate these policy instruments into 5 broad groups according to the UN Multi-Agency Support Team (MAST) Chapter classification for non-tariff measures: trade barriers (export and import), domestic subsidies, export incentives, local content requirements, and other instruments (FDI/public procurement measures, among others).

Although the IP data allows for an assessment of how IPs interact with firm performance, there are three caveats worth highlighting. First, because the analysis does not identify firms specifically targeted by IPs, it will capture both the potential direct effect of policies on targeted firms and the second-round impacts on other firms within the industry due firm-to-firm relations, competition in product and factor markets, and other potential externalities. Second, IPs in some key emerging markets, notably China, could be missing because: (i) the database starts in 2009 and large emerging markets have been implementing IPs before that year; and (ii) the database focuses on national-level economic activities, while the implementation of IPs in countries like China are fairly decentralized (Goldberg et al., 2024). Third, IP counts—our measure of IPs—do not capture the money value of the intervention, missing the policy intensity. However, according to the New Industrial Policy Observatory (NIPO; Evenett et al., 2024), the correlation between IP counts and the log of their value in 2023 is 0.52 and statistically significant, implying that IP counts are indicative of size of the policies. Moreover, in sections 3 and 4 we discuss how our results are robust to a measure of IPs that accounts for the share of a country's trade covered by these policies.

2.2 Firm-level data

Firm-level data comes from ORBIS, provided by Bureau van Dijk. ORBIS contains data on around 300 million companies across the globe. Its main strength lies in the availability of harmonized cross-country financial information for both private and public firms from the mid-90s until 2021.

We follow closely the cleaning procedure of the raw data proposed by Kalemli-Ozcan et al. (2015), Gopinath et al. (2017) and Gal (2013), which ensures that the data accounts on average for at least 40% of the total output reported in official sources. Importantly, both Brazil and the US are included in the sample despite lower coverage in some years, as these are important countries in the implementation of IPs. The main firm-level variables included in the analysis are: (i) value added, measured as the difference between a firm's operating turnover and material costs; (ii) capital stock, measured as a firm's tangible fixed assets; (iii) total wage bill; and (iv) productivity measured by TFPQ, following Hsieh and Klenow (2009) and IMF (2024). We also use information on firms' age, cashflow to assets ratio and leverage ratio when analyzing the impact of IPs across firms. All nominal variables are converted to U.S. dollars of 2015. See Díez et al. (2021) for more details on the cleaning and processing of the data.

Moreover, we follow Magud and Pienknagura (2024) and drop firms in Financial Activities (NACE Rev 2 2-digit 64-66), Public Administration and Education (Nace 2-digits 84-85), Utilities (NACE 2-digits 35-39), and Activities of Households as Employers and Extraterritorial Organizations (NACE 2-digits above 97). Following Kalemli-Ozcan et al. (2015), we winsorize all firm-level variables at the 1 and 99 percent. We also follow Duval et al. (2024) and restrict the analysis to firms that report at least four consecutive periods. Lastly, we restrict attention to the 2009-2021 period to match the firm-level data to the database on IPs.

2.3 Other data

This paper uses data on country-specific IO matrices and bilateral trade flows. IO matrices are calculated with the Global Trade Analysis Project (GTAP) database, which provides a consistent and detailed representation of global economic interactions by integrating national IO tables, trade flows, and other economic data into a unified framework. We assign each NACE Rev. 2 4-digit industry code to one or more of the 65 GTAP sectors. The main variable used from GTAP tracks the "domestic purchases by firms at basic prices" between all GTAP sectors. These are then normalized and used as the IO coefficients in each country, as discussed in Section 3. Trade data comes from the BACI database, which is a detailed and harmonized international trade dataset developed by the Centre d'Études Prospectives et d'Informations Internationales (CEPII). It provides bilateral trade flows at the HS 6-digit level, covering more than 200 countries and spanning multiple years. We use this information to construct the IP trade intensity index detailed in Section 3.

2.4 Final sample and summary statistics

We further restrict the sample to IPs introduced in the 2011–2018 period in order to construct a balanced panel for the local projection analyses. This is due to the fact that our specification controls for two lags of both the dependent and independent variables, and considers outcomes up to three years ahead. Thus, this restriction ensures that all observations used in the estimation have non-missing values for the required lags and horizons.[3] After these various steps and once merging the resulting IP, firm-level, and IO databases, we are left with a dataset containing over 2 million firms from 38 countries (11 EMDEs and 27 AEs; see Table A.1 in the Appendix) over the period of 2011-2018, with a total of more than 8 million observations.

Table 1 summarizes the main firm-level outcomes and IP shocks in the sample. First, there is a strongly balanced panel of firms with no missing observations for all outcomes of interest. Second, the average firm received 0.039 new protectionist (red) IPs in its industry between two consecutive years, with over 90% of this shock being explained by the introduction of protectionist subsidies (0.018) and protectionist export incentives (0.020). Third, the average firm experienced 0.029 more liberalizing IPs, mostly capturing reductions in trade barriers (0.027). Lastly, the average

[3]See Section 3 for more details on the econometric specification.

Table 1: Summary statistics of the main regression sample, 2011-2018

Variable	Non-missing obs.	Mean	Std. dev.	Min	Max
ln(VA)	8,515,018	13.2	1.7	1.7	25.7
ln(Capital)	8,515,018	11.7	2.3	-0.2	26.3
ln(Payroll)	8,515,018	12.2	1.8	-0.2	24.3
ln(TFPQ)	8,515,018	7.8	1.2	-1.5	21.5
ΔIP^{red}	8,515,018	0.039	0.304	-3	11
$\Delta IP^{red,subsidies}$	8,515,018	0.018	0.180	-2	6
$\Delta IP^{red,expinc}$	8,515,018	0.020	0.234	-3	11
ΔIP^{green}	8,515,018	0.029	0.170	-6	7
$\Delta IP^{green,tradebar}$	8,515,018	0.027	0.165	-6	7
ΔUpstr^{red}	8,515,018	0.171	0.397	-2.5	5.6
$\Delta\text{Dwnstr}^{red}$	8,515,018	0.181	0.446	-2.0	11.7

Notes: The first four lines display summary statistics on firm-level value-added, capital stock, payroll, and TFPQ measured following Hsieh and Klenow (2009) and IMF (2024), respectively. ΔIP^{red} denotes the change in the stock of Protectionist (Red) IPs between two consecutive years. $\Delta IP^{red,subsidies}$ ($\Delta IP^{red,expinc}$) denotes the change in the stock of Red Domestic Subsidies (Export Incentives), a sub component of Red IPs. ΔIP^{green} denotes the change in the stock of Liberalizing (Green) IPs, and $\Delta IP^{green,tradebar}$ counts the change in the stock of Green Trade Barriers, a sub component of Green IPs. ΔUpstr^{red} ($\Delta\text{Dwnstr}^{red}$) represents the change in the stock of Red IPs in the average sector upstream (downstream) of the industry of a given firm. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

firm saw 0.171 (0.181) more protectionist IPs being implemented in the average sector upstream (downstream) from its own sector.

Figure 1 highlights three insights about the composition of protectionist IPs across instruments over time. First, there is a sharp increase in the total number of protectionist (Red) IPs implemented after 2016. Second, about a third of IPs implemented in 2016 were in the form of protectionist export incentives. Third, there was a compositional change, whereby in 2018 protectionist domestic subsidies now accounted for over a third of total protectionist IPs. The substantial changes in the composition of IPs from year to year make the case for restricting the sample to 2011-2018 and thus having a balanced sample of firms across all the horizons of the local projections.

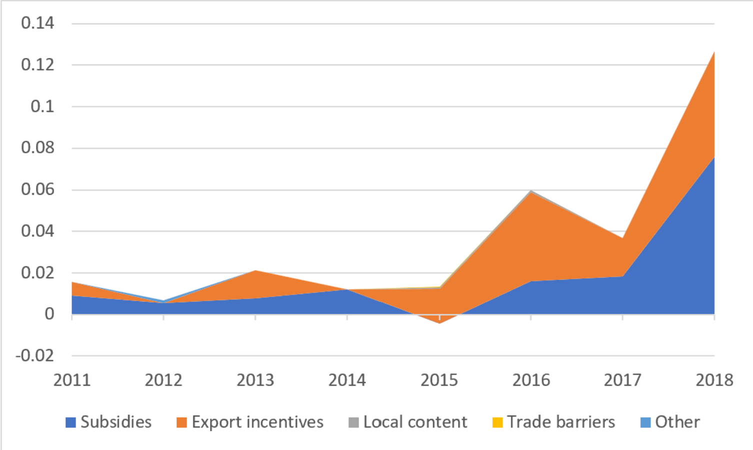
3 Empirical Specifications

This section describes the baseline empirical specification that connects IPs to firm-level economic performance, highlights the main threats to identification, and discusses alternative methodologies and robustness checks on the main findings.

3.1 Baseline local projections

The baseline regression analysis relates the implementation of different types of IPs in a given year to the evolution of firm-level outcomes over multiple time horizons in the spirit of the local

Figure 1: Protectionist IPs implemented across instruments



Notes: This figure decomposes the average change in the stock of Red IPs (ΔIP^{red} in Table 1) across the 5 broad instruments categories: domestic subsidies, export incentives, trade barriers, local content requirements, and other instruments from 2011 to 2018. Negative values mean that, between two years, more policies were removed than implemented. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

projection method proposed by Jordà (2005). Namely, it regresses:

$$\begin{aligned}\ln Y_{ft+h} - \ln Y_{ft-1} = & \sum_{\text{instr } k} \sum_{\text{GTA eval } e} \beta_h^{ke} \Delta IP_{ict}^{ke} + \sum_{j=1}^{2} \sum_{\text{instr } k} \sum_{\text{GTA eval } e} \lambda_{t-j}^{ke} IP_{ict-j}^{ke} \\ & + \theta_h^{up} \Delta Upstr_{sct} + \sum_{j=1}^{2} \phi_{t-j}^{up} Upstr_{sct-j} \\ & + \theta_h^{dwn} \Delta Dwnstr_{sct} + \sum_{j=1}^{2} \phi_{t-j}^{dwn} Dwnstr_{sct-j} \\ & + \sum_{j=1}^{2} \mu_{t-j} \ln Y_{ft-j} + \delta X_{ict} \\ & + \alpha_f + \alpha_{ct} + \alpha_{it} + \varepsilon_{ft}, \quad h = 0, ..., 3\end{aligned} \tag{1}$$

where Y_{ft} denotes the main outcome of interest (value added, productivity measured as TFPQ, capital stock and payroll) of firm f in year $t = 2011, ..., 2018$. The main independent variable ΔIP_{ict}^{ke} denotes the change in the stock of IP instrument $k = \{$subsidies, export incentives, trade barriers, local-content requirements, other instruments$\}$ and GTA evaluation $e = \{$Protectionist (Red), Likely protectionist (Amber), Liberalizing (Green)$\}$ in country c and NACE Rev 2 4-digit industry code i between years t and $t-1$.

We construct three measures of firm-level exposure to IPs along the value chain in the spirit of Amiti and Konings (2007). First, we measure how many protectionist IPs are in place in the average sector upstream of a given firm:

$$\text{Upstr}_{sct} = \sum_{\text{sectors } s' \neq s} io_{cs' \to s} \cdot IP_{s'ct}, \qquad \sum_{\text{sectors } s' \neq s} io_{cs' \to s} = 1 \quad \forall s \tag{2}$$

where $io_{cs' \to s}$ denotes, for each country c, the share of inputs of sector s that comes from sector s' calculated from GTAP data. Second, a similar measure is constructed for downstream exposure to IPs:

$$\text{Dwnstr}_{sct} = \sum_{\text{sectors } s' \neq s} io_{cs \to s'} \cdot IP_{s'ct}, \qquad \sum_{\text{sectors } s' \neq s} io_{cs \to s'} = 1 \quad \forall s \tag{3}$$

where $io_{cs \to s'}$ measures the share of output in country c and sector s that is used as input in industry s'. Importantly, both IO coefficients are normalized to sum up to one. Third, we construct a measure of firms' exposure to IPs in other industries in the same sector:

$$\text{OtherInd}_{ict} = \sum_{\text{ind } i' \neq i,\ i' \in s} io_{cs \to s} \cdot IP_{i'ct}, \quad \forall s \tag{4}$$

where the stock of IPs in industries $i' \neq i$ within the same sector s of a firm is scaled down by the IO coefficient on how much of a sector's output is used as inputs in the same sector.

Control variables X_{ict} include the change and 2 lags of the stock of other GTA policies not IPs but targeting industry i and IPs in other industries within the same sector of firm f. All regressions include firm, country-year, and industry-year fixed effects (FEs), denoted by the α coefficients, and 2 lags of the dependent and independent variables in line with the rule of thumb proposed by Chudik and Pesaran (2015). Standard errors are clustered by country and industry.

There are two sets of coefficients of interest. First, β_h^{ke} tracks the evolution of outcomes in the average firm within a country and industry after the implementation of one additional IP, controlling for spillovers of IPs in other sectors, unobserved country- and industry-specific shocks, and unobserved time-invariant firm characteristics. Second, θ_h^{up} and θ_h^{dwn} track the indirect impacts of IPs through the value chain of a firm. These assess how firm outcomes respond to an additional IP in the sector upstream/downstream of a given firm, conditional on the number of IPs that directly target the industry of the firm.

3.2 Firm-level heterogeneity

We expand the baseline specification to assess how the link between IPs and firm outcomes varies by type of firms. Namely, we regress:

$$
\begin{aligned}
\ln Y_{ft+h} - \ln Y_{ft-1} = & \sum_{q=1}^{3} \sum_{\text{instr } k} \sum_{\text{GTA eval } e} \beta_h^{qke} \Delta IP_{ict}^{ke} \cdot 1\{Z_{ft-1} \in Q_{qct-1}^{Z}\} \\
& + \sum_{q=1}^{3} \gamma^q 1\{Z_{ft-1} \in Q_{qct-1}^{Z}\} \\
& + \theta_h^{up} \Delta Upstr_{sct} + \sum_{j=1}^{2} \phi_{t-j}^{up} Upstr_{sct-j} \\
& + \theta_h^{dwn} \Delta Dwnstr_{sct} + \sum_{j=1}^{2} \phi_{t-j}^{dwn} Dwnstr_{sct-j} \\
& + \sum_{j=1}^{2} \sum_{\text{instr } k} \sum_{\text{GTA eval } e} \lambda_{t-j}^{ke} IP_{ict-j}^{ke} + \sum_{j=1}^{2} \mu_{t-j} \ln Y_{ft-j} + \delta X_{ict} \\
& + \alpha_f + \alpha_{ct} + \alpha_{it} + \varepsilon_{ft}, \quad h = 0, ..., 3
\end{aligned}
\tag{5}
$$

where Z_{ft} denotes the firm characteristic (i.e., age, cash flow-to-assets ratio, leverage ratio) and Q_{qct}^{Z} represents the tercile q of the distribution of firm characteristic Z among all firms in country c and year t. The coefficients of interest, β_h^{qke}, capture the dynamic relationship between IPs and firm outcomes for firms in different terciles of firm characteristic Z.

3.3 Industry-level heterogeneity: The role of distortions

We also explore how industry characteristics affect the relationship between firm-level outcomes and IPs. We focus on industry-level distortions, given their relevance for the economic rationale for conducting IPs. We rely on two variables associated with industry distortions: (i) markups,[4] a gauge of both market power, which makes firms under-supply compared to social optimal, and of economies of scale; and (ii) the reliance on external financial dependence[5] (EFD) which makes firms in the industry vulnerable to financial imperfections. We proceed in two steps. First, for each country-industry pair, we calculate the median markup and external financial dependence and run a regression of each of these variables on industry and country fixed effects. We then use the industry fixed effects, which strip country-specific factors, such as policies affecting these two variables, as the industry's gauge of distortions. In a second step, we construct four dummy variables to capture the extent to which distortions are prevalent in the industry—a high-high dummy that equals one if both the industry's markup and EFD levels are above the median across industries, a low-low dummy that equals one if both the industry's markup and EFD levels are below the median, a

[4]We calculate markups following the methodology in Ackerberg et al. (2015).

[5]We calculate EFD following Rajan and Zingales (1998).

high-low dummy that equals one if the industry's markup (EFD) if above (below) median, and a low-high dummy that equals one if the industry's markup (EFD) is below (above) median.

With these measures of distortion at hand, we estimate the following extension of Equation (1):

$$\begin{aligned}
\ln Y_{ft+h} - \ln Y_{ft-1} = & \sum_{\text{GTA eval } e} (D_i^{HH}\beta_h^{HH,e} + D_i^{HL}\beta_h^{HL,e} + D_i^{LH}\beta_h^{LH,e} + D_i^{LL}\beta_h^{LL,e})\Delta IP_{ict}^e \\
& + \sum_{j=1}^{2} \sum_{\text{GTA eval } e} \lambda_{t-j}^e IP_{ict-j}^e \\
& + \theta_h^{up}\Delta Upstr_{sct} + \sum_{j=1}^{2} \phi_{t-j}^{up} Upstr_{sct-j} \\
& + \theta_h^{dwn}\Delta Dwnstr_{sct} + \sum_{j=1}^{2} \phi_{t-j}^{dwn} Dwnstr_{sct-j} + \sum_{j=1}^{2} \mu_{t-j} \ln Y_{ft-j} + \delta X_{ict} \\
& + \alpha_f + \alpha_{ct} + \alpha_{it} + \varepsilon_{ft}, \quad h = 0, ..., 3
\end{aligned} \tag{6}$$

where D_i^{HH}, D_i^{HL}, D_i^{LH}, and D_i^{LL}, are the four dummies capturing whether industry i has high markups and high EFD, high markups and low EFD, low markups and high EFD, or low markups and low EFD. Our focus will be to compare $\beta_h^{HH,e}$ with $\beta_h^{LL,e}$, that is, the relationship between IPs and firm-level outcomes in industries with high distortions and in industries with low distortions.

3.4 Caveats to baseline specifications and alternative methodologies

The baseline specification includes a rich set of FEs and lags of the dependent and independent variables to control for potential omitted variables in the decision of countries to implement IPs and to capture past dynamics in both IPs and the variables of interest. For example, industry-year FEs control for global shocks to different industries (i.e., industry trends), country-year FEs control for growth shocks in different countries, and firm FEs control for firm-specific time-invariant differences across firms (e.g., underlying managerial ability). Endogeneity concerns are also alleviated by inspecting whether outcomes of firms in industries that received IPs were catching up to outcomes of firms in industries that did not receive IPs 3 years prior to the implementation of the policy (i.e., by checking for pre-trends in the same direction of estimated treatment effects).

Still, to further dispell endogeneity concerns, we implement two methodological robustness checks. First, the main independent variable counts the number of IPs that targeted each industry. In this sense, policies that affect small or large products (in how much they represent of an industry's economic activity) are given equal weight. In a robustness exercise, we construct an index of IP intensity that measures the share of trade in each industry that is affected by IPs and re-do the firm-level analysis. The IP intensity index is:

$$IP_{ict}^{\text{Trade}} = \sum_{\text{policy } p} \sum_{\text{product } q \in ic} \frac{\text{Trade}_{qic}}{\text{Trade}_{ic}} \cdot 1\{\text{policy } p \text{ affects product } q\} \tag{7}$$

where i denotes industry, c denotes country, t denotes year, p denotes the GTA policy and q marks each product in industry i. Importantly, Trade_{qic} denotes total trade trade flows (exports plus imports) of a given good in a given country and Trade_{ic} denotes total trade flows of a given country, both averaged between 2012 and 2022 to reflect long-run trade patterns; and $1\{\text{policy } p \text{ affects product } q\}$ marks whether IP p affects product q.

Second, we implement a LP difference-in-differences (LP DiD) method following Dube et al. (2024), Cugat and Manera (2024) and Ahn et al. (2024). The key difference is that we restrict the sample to two types of firms: clean treatment firms are those that were treated for the first time in 3 years—the stabilization lag—, and clean controls firms are those that were never directly exposed to IPs over the horizon of the analysis (2011-2018). Only considering clean treatment and clean control firms alleviates concerns that the control group may be contaminated with firms that were "just treated", biasing the estimates of the treatment effect. For example, this method prevents us from comparing a firm that just received an IP to a firm that received an IP two years ago and whose financial variables are still affected by this past treatment. Consequently, for the LP DiD exercise we restrict the sample to over 330,00 observations in the clean treatment group and over 5 million observations in the clean control group.

4 Results

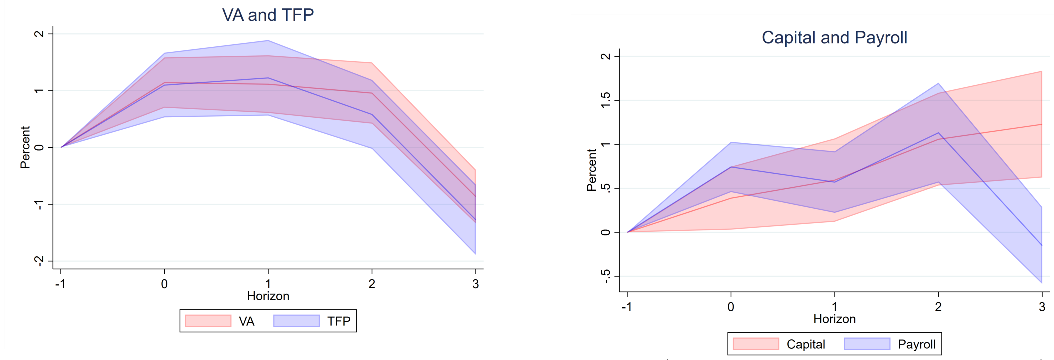
This section studies the link between industrial policies and firm performance. We begin by exploring how different IP instruments affect the performance of the *average* firm in the treated industries. Then, we explore potential heterogeneity in the relationship between IPs across firms with different characteristics within the targeted industries. Finally, we study the potential cross-sectoral spillovers of IPs, where we exploit IO linkages to structure the potential transmission of IPs along the supply chain.

An important caveat of our analysis is that our IP database does not identify treated firms. This means that the estimated effects capture both direct effects of IPs on targeted firms and potential indirect effects of IPs on firms in the same industry through, for example, product and factor market competition.

4.1 Baseline results by instrument

Figure 2 shows the dynamic relationship between domestic subsidies and firm-level outcomes in treated industries. One additional subsidy is associated with a sustained increase of over 1 percent in the capital stock for the average firm. This probably reflects the underlying nature of domestic subsidies in the data, most of which take the form of loan guarantees and financial grants (Huang et al., 2025). In contrast, the positive link between subsidies and value added, productivity, and payroll is short-lived and turns negative in the medium term. For example, we estimate that value added increases by 1 percent in the aftermath of a domestic subsidy, but this is fully reverted 3 years down the road. The short-lived association between subsidies and these firm-level outcomes

Figure 2: Protectionist domestic subsidies and firm performance.



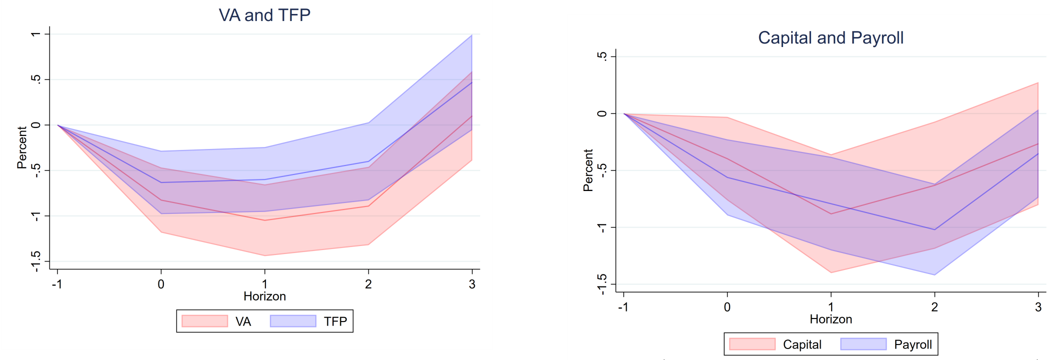
Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist domestic subsidy, estimated in Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

may reflect their short duration—on average, subsidies remain in place for 3 years—or an absence of positive medium-term externalities. It could also reflect that the adverse spillovers on non-treated firms in the industry outweigh the potential benefits experienced by targeted firms. For example, using information from a set of European countries, Brandão-Marques and Toprak (2024) find that IPs have negative effects on non-targeted firms. Regardless of the explanation, evidence suggests that, for the case of value added, TFP and payroll, subsidies do not lead to a self-sustaining virtuous cycle on the average firm of the treated industry.

We turn next to studying export incentives. One common aim of IPs is to help firms access international markets, enabling economies of scale over time that could not otherwise be achievable through domestic markets alone (Reed, 2024). Moreover, outward orientation and export growth are considered key ingredients in the seemingly successful IP cases in East Asia (Cherif and Hasanov, 2019; Choi and Levchenko, 2024).

Figure 3 shows that there is a mild positive medium-term association between export incentives and the productivity of the average firm, although at little statistical significance. However, there are short-term costs—an additional export incentive is associated with 0.5 percent lower productivity for the average firm in the first two years after implementation. Value added and capital also experience short-term declines followed by medium-term recoveries that offset the initial losses. However, these recoveries are insufficient to improve these variables within the considered horizon. Taken together, these results suggest that there could be potential adjustment costs that firms must incur in the short term to improve the quality of products and inputs to compete abroad (Bastos et al., 2018). The weak link between export incentives and average firm performance may also reflect the fact that these policies target a small number of highly productive firms (Bernard et al., 2007; Fernandes et al., 2016), which are likely not the average firm in the industry. Finally, results could also reflect that export incentives, by virtue of running counter to WTO rules, may trigger retaliation by other countries, thus affecting the performance of the average firm. This is

Figure 3: Protectionist export incentives and firm performance.



Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist export incentive, estimated in Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

an important caveat to the use of export incentives.

In addition to policies restricting trade flows, the GTA data records policies that are deemed to foster them. This happens, for example, when countries remove import barriers for a given product. Figure 4 shows that trade liberalizing IPs are associated with higher firm productivity and value added in the medium term, with negligible change in the stock of capital. An additional liberalizing policy is associated with improved medium-term performance of firms: 1.6 percent higher productivity, 1.2 percent higher value added, 0.8 percent more payroll (a proxy for wages and employment), and 0.4 percent more capital stock although the latter is not statistically significant. The positive association between liberalizing trade conditions, firm productivity, and firm value added relates to a long-standing literature on how lower trade barriers can strengthen competition in the liberalized industries, inducing firms to leverage economies of scale, improve efficiency, and innovate (Helpman and Krugman, 1985; Aghion et al., 2005; Melitz, 2003).

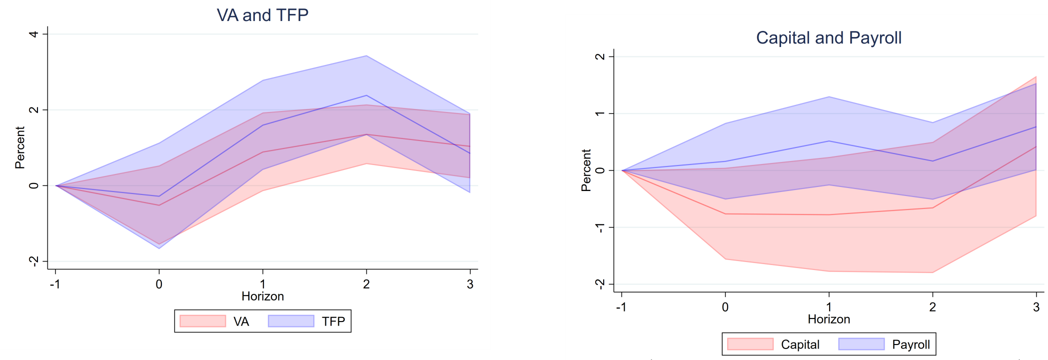
Overall, our findings point to a nuanced picture of the relationship between IPs and firm-level performance, with results varying across different IP instruments. On the one hand, protectionist subsidies are linked only to short-term improvements in the average firm performance, while export incentives are associated with short-term costs. On the other hand, liberalizing IPs yield results that are consistent with the predictions of trade models with heterogeneous firms, where import tariff reductions foster medium-term productivity and growth.

So far our results focused on the average firm in the treated industry. To gain further insights about the nuanced relationship between IPs and economic activity, we now study how the link between IPs and firm performance varies across different firms within the targeted industries.

4.2 Results by firm characteristics

This section zooms into two sources of potential heterogeneity across firms. First, it distinguishes how the association between IPs and firm performance varies with a firm's age. Second, we exploit

Figure 4: Liberalizing trade barriers and firm performance.



Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a liberalizing trade barrier policy, estimated in Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

firms' financial information to gauge the extent to which a firm is financially constrained. We do this by constructing a measure of reliance on internal funds (the cash flow to assets ratio)—a sign of financial constraints (Rajan and Zingales, 1998). The robustness section explores whether results hold when we use an alternative measure of firm-level financial constraints—a firm's leverage ratio.

We focus on these two firm characteristics because IPs typically target firms that are perceived to face larger frictions (Juhász et al., 2023). While the data does not contain direct information about firms benefiting from the policy considered, young and financially constrained firms are two potential targets of policymakers pursuing IPs.

Figure 5 shows that the link between subsidies and firm-level outcomes is stronger for younger firms compared to older ones. Moreover, results show that the association between IPs and the performance of older firms is negligible, and in some cases negative. Also, the patterns described for the average firm hold for younger firms—subsidies are associated with a temporary 2 percent improvement in value added and a temporary 1.5 percent increase in productivity, while they are more sustained in the case of capital. Indeed, a new subsidy is linked to a 3.6 percent increase in the capital stock of younger firms three years after announcement of the policy, with negligible effects for older firms. For all other variables, younger firms tend to experience more pronounced improvements in the variable of interest relative to older firms, although in the case of productivity the difference is less statistically distinguishable. Turning to financial constraints, results show that the difference in the link between IPs and firm-level outcomes between more and less financially constrained firms is larger for capital accumulation. An additional subsidy in a sector is associated with a 2 percent increase in the capital stock of firms with the largest cash flow to assets ratio, while it is close to zero for firms with a low ratio. These results suggest that, in the context of IPs, state loans and financial grants, an important part of subsidies, can play an important role in alleviating financial constraints, especially of young firms.

We also find that the adjustment period following the introduction of a new export incentive is less pronounced for younger firms compared to older ones (Figure 6). In fact, in most cases the initial change in the variable of interest is either non-significant or mildly positive in the case of young firms. Turning to medium-term effects, we find that the positive association between export incentives and firm-level variables occurs faster for younger firms. One additional export incentive measure is associated with 0.7 percent increase in productivity and value added of younger firms in the medium term, while for older firms the increase is close to zero. These gains take time to materialize as new firms need to increase scale, establish links to foreign customers and incorporate foreign technology into their production processes. Similar results are found when focusing on firms' cash flow ratio, but differences across firms are not statistically significant in most horizons.

In the case of liberalizing measures, we find differences in the response of value added and productivity to IPs across firms, both in terms of age and credit constraints, to be less pronounced. In the case of capital accumulation and payroll, however, evidence points to a more robust association for young and financially constrained firms. These potentially reflect that liberalizing trade barriers are less discretionary in nature, where the average trade liberalization IP represents a reduction in import tariffs of a given good or for a given industry, which will likely affect all producers in a similar fashion (Huang et al., 2025).

Taken together, the evidence thus far suggests that the positive association between IPs and firm performance is stronger for firms that are typically expected to face larger frictions. The positive link between IPs and the economic outcomes of younger, financially constrained firms is consistent with the fact that smaller firms, typically more financially constrained, experience stronger growth after being targeted by IPs in Europe Criscuolo et al. (2019). It also highlights the fact that IPs, especially those targeting specific firms, are expected to result in potential winners and losers within the targeted industry (Brandão-Marques and Toprak, 2024). This, in turn, should be an important consideration when assessing the aggregate welfare implications of IPs, as these policies cause a reallocation of resources across firms within an industry, which ex-ante has ambiguous effects on aggregate welfare. In fact, Figure A.1 in the Appendix shows that this reallocation of resources from older to younger firms in the aftermath of export incentive IPs improves the allocative efficiency of the targeted industry, as measured with the Hsieh and Klenow (2009) methodology.

4.3 The relevance of industry-level distortions and position in the supply chain

So far, we have examined the association between firm-level outcomes and IPs in the "average" industry. However, industrial characteristics are at the heart of IPs. Indeed, a common rationale to pursue IPs is to address industry-specific externalities that result in distortions. Thus, understanding the extent to which industry-specific distortions can affect the link between IPs and the performance of firms in targeted sectors is an important consideration.

Pinning down the exact nature of sectoral distortions (economies of scale, financial frictions, coordination problems) is both important for the purpose of thinking about the appropriateness of different instruments, but also challenging due to the lack of direct data counterparts. Given such challenges, in this section we take a simple approach, explained in Section 3, where we combine two industry-level characteristics (markups and external financial dependence) to construct a measure of distortions. This approach admittedly misses many of the sectoral specificities associated with specific market failures. Given the general measure sector of distortions and for simplicity of exposition, in this section we focus on the overall count of protective IPs.[6]

With our measure of distortions at hand, we estimate equation (6), which allows the response of the firm-level variables of interest to an additional industrial policy to vary with the industry's degree of distortions.[7] Figure 8 shows that IPs targeting industries with higher levels of distortions are associated with stronger performance by the average firm in the industry. There is a stronger relationship between IPs and firm-level value added in sectors with high markups and high external financial dependence (for example, ship building and manufacturing of pharmaceutical products) than in sectors with low markups and low external financial dependence (for example, manufacturing of bicycles or non-electric domestic appliances). An additional protectionist IP targeting a highly distorted industry is associated with a 1 percent increase in the value added of firms operating in that industry, while there is no increase in the value added of firms in low distortion industries when these are targeted. More pronounced and durable effects are observed for capital and payroll, which again respond strongly to IPs, when they target highly distorted industries. In the case of productivity, the difference in the response of firms in high and low distortion industries is less pronounced, likely due to the large prevalence of domestic subsidies in overall IPs and consistent with our previous findings that domestic subsidies do not appear to have sustained effects on productivity.

In addition to their effects on firms within the targeted industries, IPs can have cross-sector spillovers. One type of spillovers are those arising form input-output (IO) linkages. For example, a policy targeting an upstream sector can affect the quality of inputs purchased by end users. Similarly, IPs targeting downstream sectors can affect the demand for inputs by targeted firms, thus affecting the performance of firms in upstream sectors. Indeed, potential positive cross-sectoral spillovers are a common reason for the use of IPs (Harrison and Rodriguez-Clare, 2010). Yet, cross-sectoral spillover effects are ex-ante ambiguous. Coming back to the example of IPs targeting upstream sectors, these are expected to favor downstream sectors if IPs foster quality improvements of targeted firms. Targeting upstream activities may be particularly relevant in the presence of coordination problems, where investments in downstream activities hinge on the provision of high-quality inputs. IPs targeting upstream sectors, thus, can generate a virtuous cycle and "push" the economy to higher growth (Choi and Shim, 2024). On the other hand, to the extent that IPs limit competition, they can also affect the quality of the inputs provided by treated firms.

Against this backdrop, we turn to assessing empirically how IO relationships propagate IPs across sectors. Building on equation (1), we focus on the coefficients associated with IPs in upstream and downstream sectors relative to a firm to gauge how these affect a firm's performance. For

[6]Results by instrument are broadly consistent but differ in the timing of effects.

[7]We split industrial policies according to their GTA evaluation. In the discussion we focus only on protective ("Red") measures. Further, for simplicity we focus on the total stock of protective measures, without breaking down the different instruments.

simplicity, we present results for the last horizon of analysis.

Figure 9 shows that the cross-sectoral propagation of *protectionist* IPs depends on the position in the supply chain of targeted sectors. IPs targeting upstream sectors are linked to medium-term increases in the productivity, value added, capital stock, and payroll of firms in downstream sectors. This suggests that, by temporarily lifting productivity and raising capital stock in the targeted industries, IPs alleviate capacity constraints and increase the productivity of inputs that flow downstream. On the other hand, IPs targeting downstream sectors are negatively associated with firm performance. Intuitively, by temporarily increasing productivity and lowering input demand in the targeted industries, IPs push down the demand for inputs from upstream sectors. Thus, results suggest that IPs in upstream sectors may benefit the economy more widely than IPs targeting downstream sectors. However, some downstream sectors could face distortions and IPs could be desirable. This is the case, for example, in the process of de-carbonization of iron and steel production, where network externalities on the demand side are present (Aghion et al., 2024).

Further, both upstream and downstream liberalizing IPs (those fostering trade) are positively associated with firm performance in the medium term. This medium-term improvements follow short-term adjustments as firms create new relationships with their foreign counterparts (Hunneus, 2020). Moreover, in the case of IPs targeting upstream sectors, the magnitudes associated with liberalizing IPs are 2 to 3 times as large as those for protectionist IPs.

4.4 Robustness checks

Our baseline results using the count of industrial policies point to a nuanced relationship between IPs and firm performance, whereby domestic subsidies boost value added and TFP in the short term and capital in the medium term, while export incentives are linked to a short-term fall in firm outcomes followed by medium-term recoveries, particularly for the case of TFP. This section explores the robustness of these results to various extensions and additional exercises.

We turn first to studying how results change when we take into account the staggered treatment of different industries across countries. One common challenge when assessing the impact of policies through a difference-in-difference strategy is that the comparison group used to evaluate the performance of the treated unit may include units that were previously treated. In our case, the pre-IP and post-IP comparison may include sectors that were treated prior to the year in which industry i in country c was treated. To deal with this problem, Dube et al. (2024) propose a LP DiD approach, which constructs clean control (never treated) and clean treatment (first time treated) groups. In practice, the control group includes country-industry pairs that have not been treated between $t - j$ and t, where j is a stabilization period (a period where the effects of the policy are expected to level-off).

Figure A.2 shows results for the LP DiD exercise, both for the average firm and for firms of different characteristics. Results confirm the short-term positive association between subsidies and both value added and TFP. In the case of capital, the LP DiD exercise shows less marked improvements in capital after the introduction of subsidies compared to the baseline results. Turning to export incentives, as in the baseline results, the LP DiD suggests a negative or non-significant relationship between export incentives and value-added and capital. It also points to a medium-term improvement in productivity. However, by contrast to the baseline result, productivity improvements are found to happen more quickly. Quicker improvements in firm-level variables compared to the baseline results are also found in the case of liberalizing IPs—the positive association between export incentives and value added and productivity appears at shorter horizons in the case of the LP DiD exercise.

Consistent with the baseline exercise, Figures A.3-A.5 show that the performance of younger and capital constrained firms is more tightly related to IPs. In fact, the LP DiD points to a larger difference in the association between different IPs (domestic subsidies, export incentives, and liberalizing policies) and the performance of young versus old firms and of financially constrained firms versus firms with more access to credit.

Next, we study the presence of pre-trends. To do so, we run regressions of lagged firm-level outcomes on contemporaneous IPs. Because our specification includes lags the dependent variable, we can only perform the pre-trend analysis for lags greater than those included in the baseline specification. Our findings, shown in Table A.2, show that that there is no evidence of pre-trends in the case of domestic subsidies, while in the case of export incentives these are only present for some outcomes (most notably payroll). A statistically significant negative pre-trend is found in the case of liberalizing IPs. However, the fact that there is a change in trend in the pre- and post-implementation periods is suggestive that liberalizing IPs affect firm-level outcomes in the direction indicated by the local projections (Monras, 2019).

One limitation of our analysis is the use of IP counts, which miss the intensity of policies. We test the robustness of our results to using the share of trade in a given country and industry that is affected by IPs, according to Equation 7 (the trade coverage of the policy). Figure A.6 shows that in all cases, the association between each variable of interest and IPs follows a similar pattern as the one found in the baseline specification. However, the positive short-term (medium-term) association between value-added and TFP in the case of subsidies (export incentives) is less precise when using trade exposure.

In addition to the alternative methodologies discussed above, we perform a battery of additional robustness checks, with results summarized in Figure A.7. In particular we: 1) consider all policies of a given GTA evaluation instead of only IPs, to address concerns on the definition of IPs; 2) exclude China to alleviate coverage concerns in GTA data; 3) add firm-level controls, which restrict country coverage but enhances the comparison of firms; 4) drop firms that experience abnormal growth in each horizon to assess the role of outliers; 5) remove countries that are over-represented in ORBIS (Spain, Italy and France) and re-weight regressions by the inverse of the number of firms in each country and by firm size, to test whether results are driven by large, or a large number of, firms in specific countries; 6) control for 3 lags of both dependent and independent variables to better capture past dynamics in both IPs and outcomes. Results show that most of the general patterns described in the baseline exercises follow through in these alternative exercises. The only exception is the case of all GTA liberalizing policies, where we find that the increase in value added is observed in the short term (as opposed to the medium term recoveries) and the change in capital is not significant.[8]

To further test the robustness of our results, we aggregate firm-level information at the sectoral level and re-estimate Equation (1). Figures A.8-A.10 in the Appendix show similar links between IPs and economic performance at the sectoral level.

Lastly, Figure A.11 uses the leverage ratio as an alternative proxy for firm-specific financial constraint, and Figures A.12-A.14 break down the link between IPs and firm performance by firm characteristics including both age and CF ratio in the same specification. Results confirm that the link between firm-specific outcomes and IPs is stronger for younger and more financially constrained firms.

5 Conclusion

The recent rise of industrial policies calls for an assessment of their links with economic activity. This paper investigates how firm performance evolves following the introduction of IPs, combining a database of firm-level financial statements with a novel cross-country database of policy interventions. We trace the dynamics of key firm-level outcomes—value added, productivity, capital, and payroll—after IPs are introduced in firms' industries of operation.

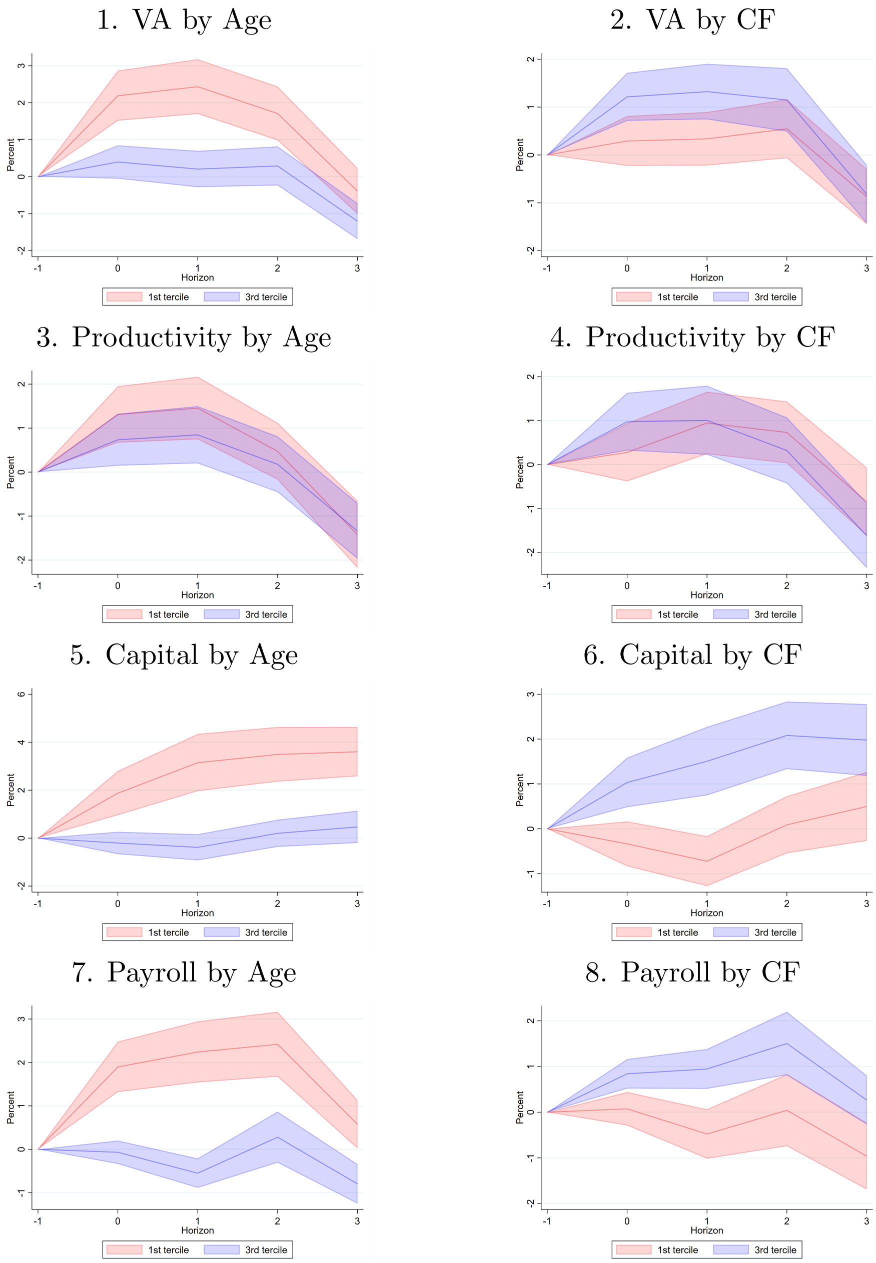
Our findings point to a nuanced relationship between IPs and firm performance. Protectionist domestic subsidies are associated with short-term gains in value added, TFP, and payroll, and more sustained increases in capital. Export incentives, by contrast, are linked to short-term declines in all firm-level indicators, followed by medium-term recoveries, including an increase in productivity within the considered horizon. Liberalizing IPs—those that reduce trade barriers—are associated with medium-term improvements in value added and productivity, consistent with prior evidence from the trade literature. We also document significant heterogeneity in responses of different firms within industries. The positive associations between IPs and firm outcomes are stronger for younger and more credit-constrained firms, aligning with common policy rationales. These patterns also underscore the importance of within-sector, across-firms reallocations, which may have important implications for aggregate economic consequences of IPs. Finally, we find evidence that sectoral characteristics affect the relationship between IPs and firm-performance and of cross-sectoral spillovers. IPs targeting sectors with higher levels of distortions are typically associated with larger improvements in firm-level outcomes. In addition, IPs targeting upstream sectors are associated with improved downstream firm performance, while those targeting downstream sectors correlate with weaker upstream outcomes. Spillovers from liberalizing IPs are uniformly positive and larger in magnitude than those from protectionist interventions.

The nuanced relationship between IPs and firm-level performance documented in this paper suggests that IPs should be handled with care. Furthermore, our analysis provides a partial picture

[8]For brevity, Figure A.7 only shows results for the average firm. Results by firm characteristics are also robust and are available upon request.

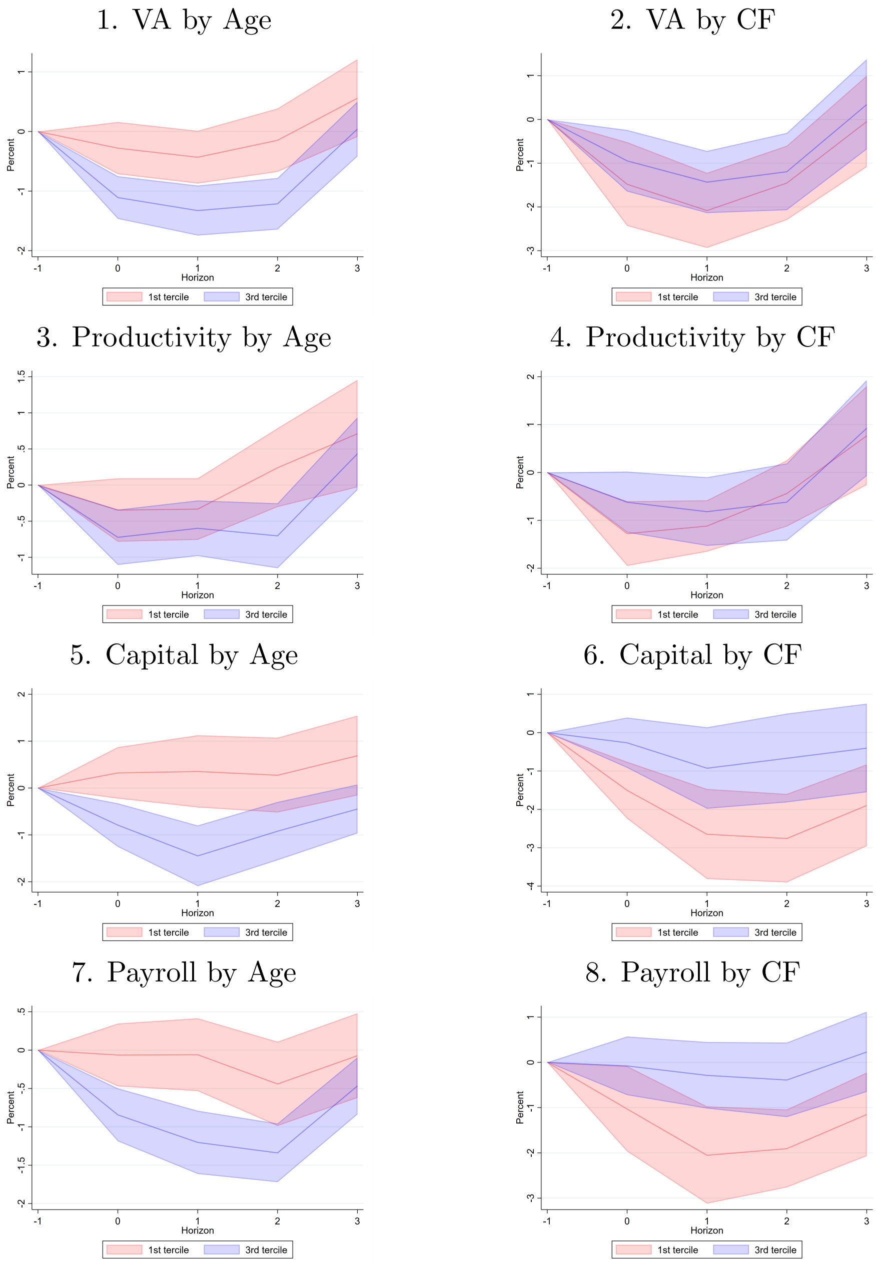
of the potential implications of IPs, as it does not fully account for general equilibrium effects, potential retaliatory measures by other countries, or the fiscal costs of IPs—all of which could attenuate the benefits of these policies. Studying these elements through the lens of a model that incorporates firm-level heterogeneity could be a fruitful avenue for future research.

Figure 5: Protectionist domestic subsidies and firm performance by firm characteristics.



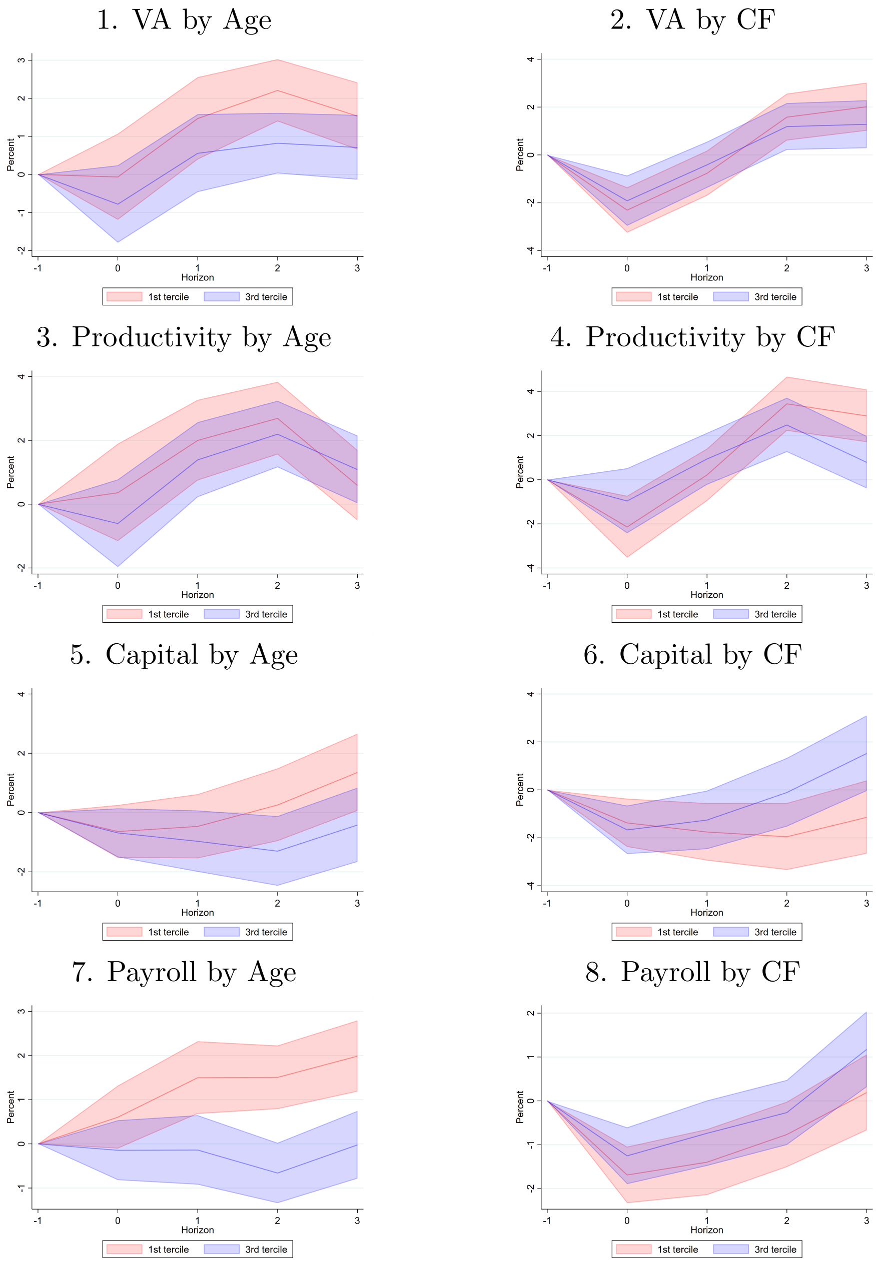
Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist domestic subsidy, for firms in the 1st (red) and 3rd (blue) terciles of the distribution of firm characteristics (age and cash flow to assets ratio). These are estimated following Equation (5): $100 \times (exp(\beta_h^{qke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure 6: Protectionist export incentives and firm performance by firm characteristics.



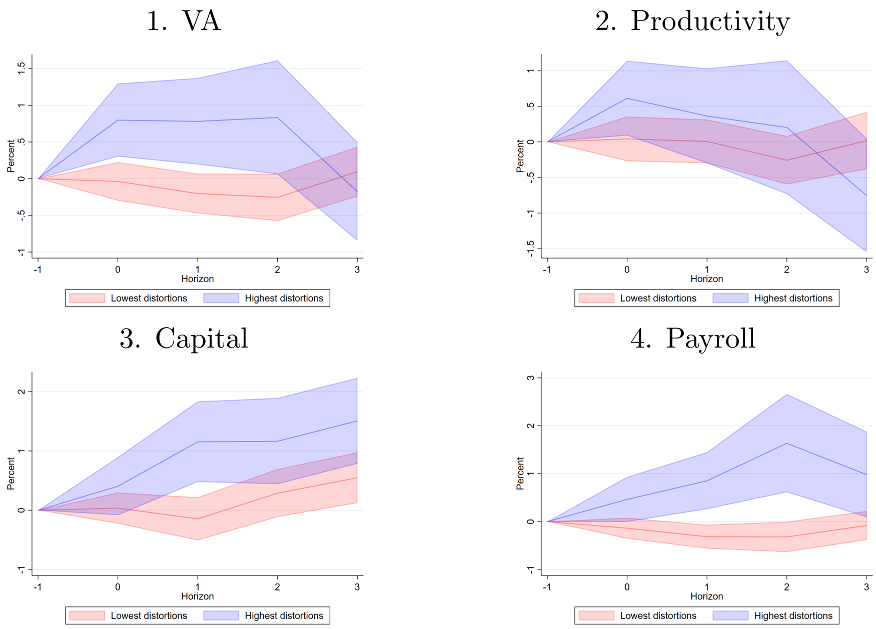
Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist export incentive, for firms in the 1st (red) and 3rd (blue) terciles of the distribution of firm characteristics (age and cash flow to assets ratio). These are estimated following Equation (5): $100 \times (exp(\beta_h^{qke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure 7: Liberalizing trade barriers and firm performance by firm characteristics.



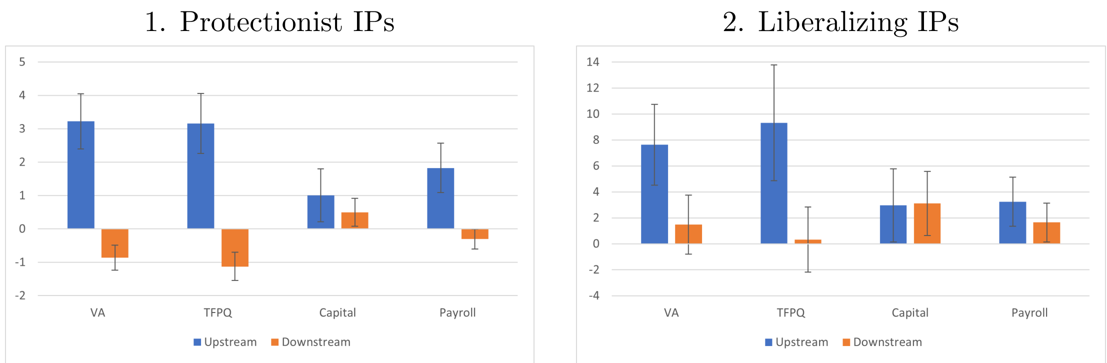
Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a liberalizing trade barrier policy, for firms in the 1st (red) and 3rd (blue) terciles of the distribution of firm characteristics (age and cash flow to assets ratio). These are estimated following Equation (5): $100 \times (exp(\beta_h^{qke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure 8: Protectionist IPs by industry-level distortions.



Notes: This figure plots the percent change in firm-level outcomes, 0,1,2 and 3 years after the implementation of a protectionist IP in sectors with the lowest (red) and highest (blue) distortions. A sector has lowest (highest) distortions if both its external finance dependency ratio and its mean markup levels are below (above) median. The local projections are estimated following equation (6), which aggregates across all instruments of a given GTA evaluation and allows the response of firm-level variables to vary according to the targeted industry's level of distortions. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure 9: IPs along the supply chain and firm performance in the medium term.



Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 3 years after the implementation of a protectionist IP (left panel) and a liberalizing IP (right panel) in the average sector upstream (blue) and downstream (red) of the industry of a given firm. These are estimated following Equation (1): $100 \times (exp(\theta_3^{up/dwn}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

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Industrial Policies and Firm Performance: A Nuanced Relatioship

Rafael Machado Parente, Samuel Pienknagura, Sandra Baquie, Yueling Huang, Florence Jaumotte, and Jaden Kim

Online Appendix

A Additional figures and tables

This Appendix contains additional figures and tables referenced in the main text.

Table A.1: List of countries in the main regression sample

iso3 code	Obs.	iso3 code	Obs.
AUS	9,801	ITA	1,881,755
AUT	10,107	JPN	548,631
BEL	60,095	KOR	487,555
BGR	246,281	LTU	28
BRA	185	LUX	436
CHE	1,747	LVA	35
CHL	64	MYS	1,793
CHN	484	NLD	1,904
CZE	100,120	NOR	255,361
DEU	53,362	NZL	1,552
DNK	14,400	POL	204,967
ESP	1,422,124	PRT	584,470
EST	93,408	ROU	561,703
FIN	143,545	SVK	168,365
FRA	874,514	SVN	188,435
GBR	145,801	SWE	353,157
HUN	42,380	THA	4,503
IND	41,119	USA	2,465
IRL	6,464	VNM	1,902

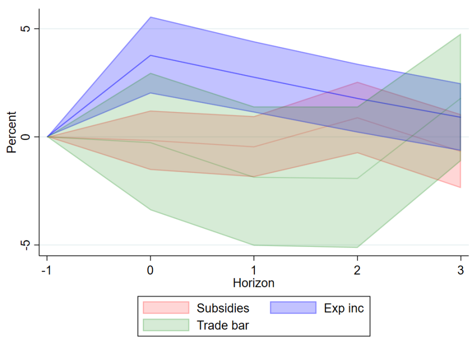
Sources: ORBIS.

Table A.2: Pre-trend analysis to baseline results.

Outcome	IP Instrument	Coefficient	Std	t-stat	p-value
VA	Red subsidies	0.001	0.0037	0.35	0.728
VA	Red export incentives	-0.007	0.0036	-1.86	0.062
VA	Green trade barriers	-0.025	0.0052	-4.82	0.000
TFPQ	Red subsidies	0.003	0.0044	0.68	0.497
TFPQ	Red export incentives	-0.006	0.0040	-1.58	0.114
TFPQ	Green trade barriers	-0.016	0.0068	-2.32	0.020
Payroll	Red subsidies	-0.001	0.0025	-0.28	0.779
Payroll	Red export incentives	-0.006	0.0029	-2.20	0.028
Payroll	Green trade barriers	-0.021	0.0044	-4.75	0.000
Capital	Red subsidies	0.001	0.0026	0.46	0.644
Capital	Red export incentives	0.001	0.0025	0.47	0.635
Capital	Green trade barriers	-0.013	0.0052	-2.43	0.015

Notes: This table shows estimates of a placebo regression of change in log outcome between $t-3$ and $t-1$ on changes in IPs between $t-1$ and t to test for existing pre-trends. All control variables are the same as in specification 1. Standard errors are clustered by country and industry. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

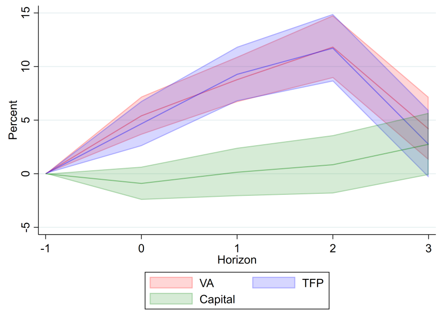
Figure A.1: Industrial policies and industry-level allocative efficiency



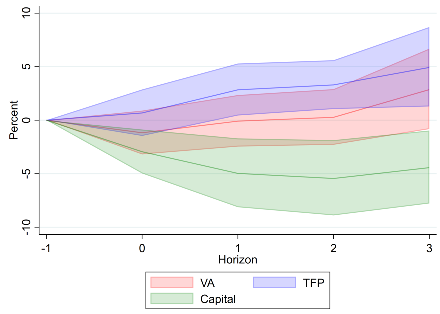
Notes: This figure plots the percent change in each industries allocative efficiency, 0,1,2 and 3 years after the implementation of an industrial policy, estimated in an aggregate version of Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Allocative efficiency is calculated based on the (Hsieh and Klenow, 2009) methodology. Standard errors are clustered at the country level country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.2: LP DiD: IPs and firm performance

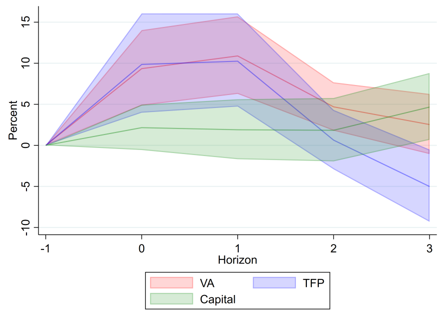
1. Protectionist Domestic Subsidies



2. Protectionist Export Incentives

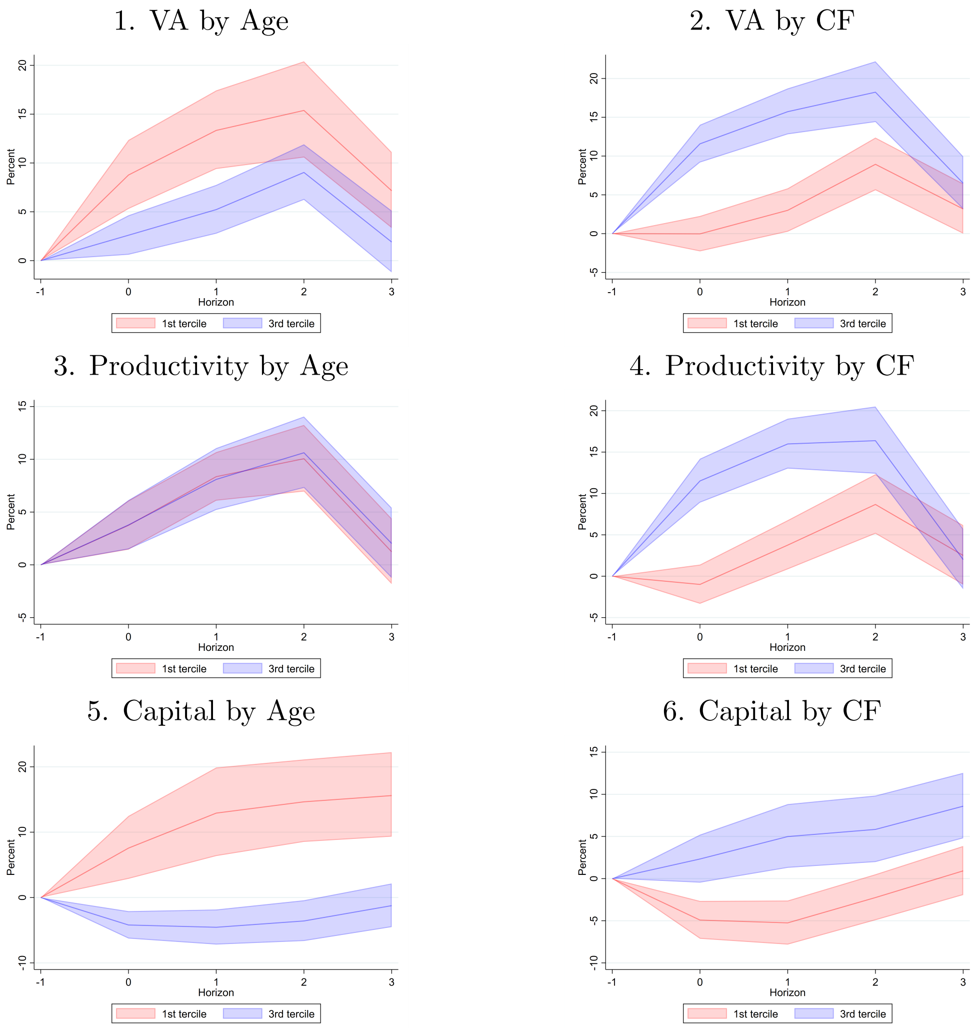


3. Liberalizing Trade Barriers



Notes: Sources: Juhász et al. (2023), GTA, ORBIS, GTAP.

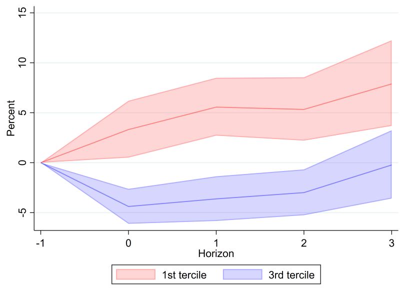
Figure A.3: LP DiD: Protectionist domestic subsidies and firm performance by firm characteristics.



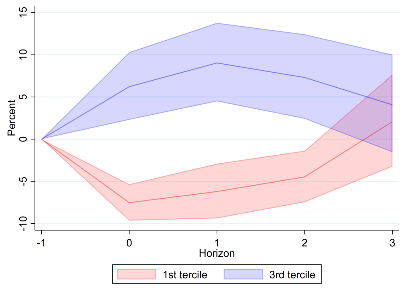
Notes: Sources: Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.4: LP DiD: Protectionist export incentives and firm performance by firm characteristics.

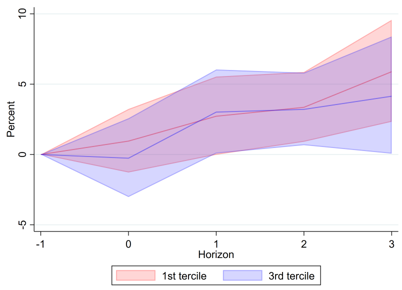
1. VA by Age



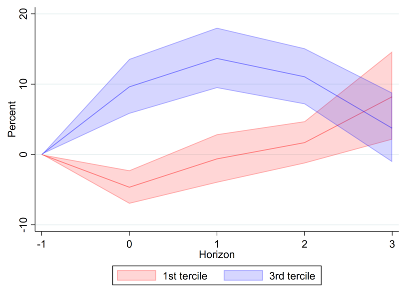
2. VA by CF



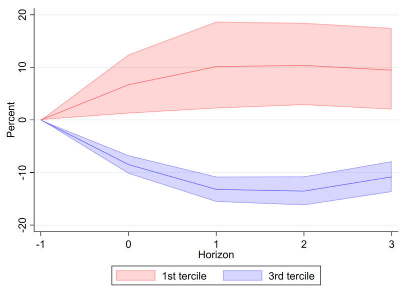
3. Productivity by Age



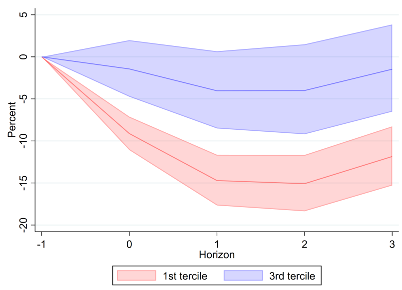
4. Productivity by CF



5. Capital by Age

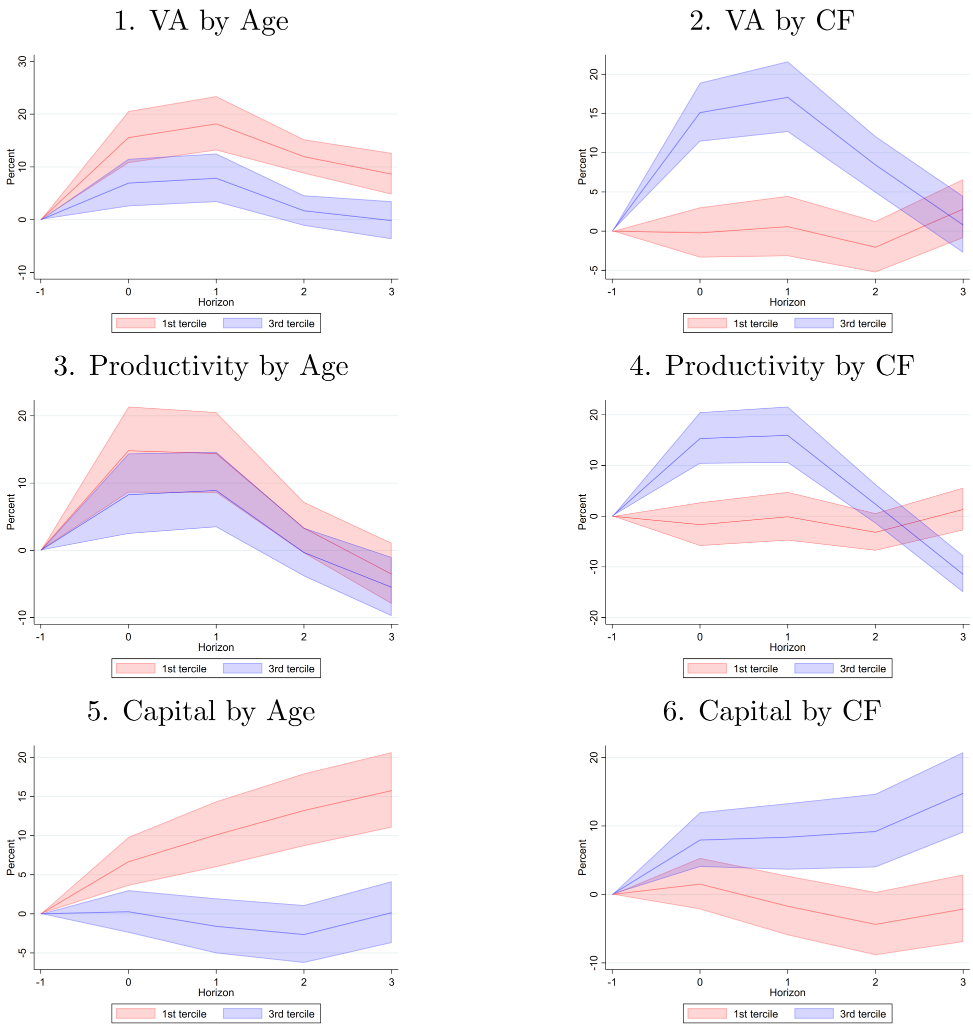


6. Capital by CF



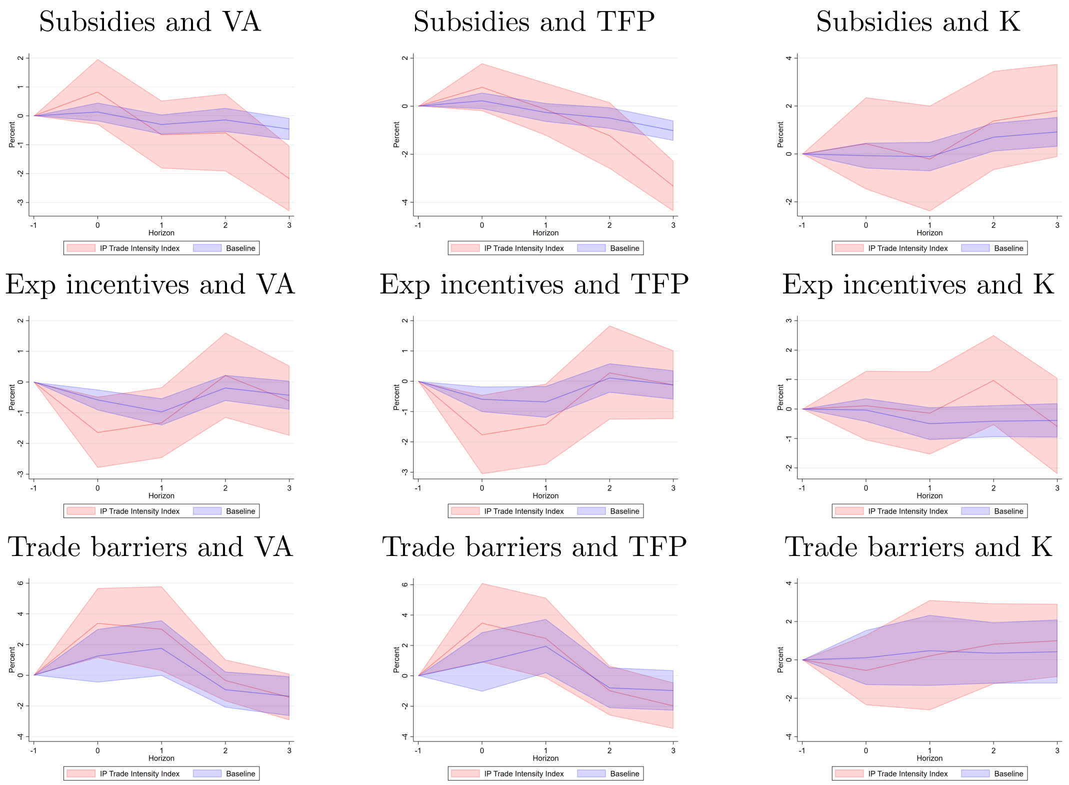
Notes: Sources: Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.5: LP DiD: Liberalizing trade barriers and firm performance by firm characteristics.



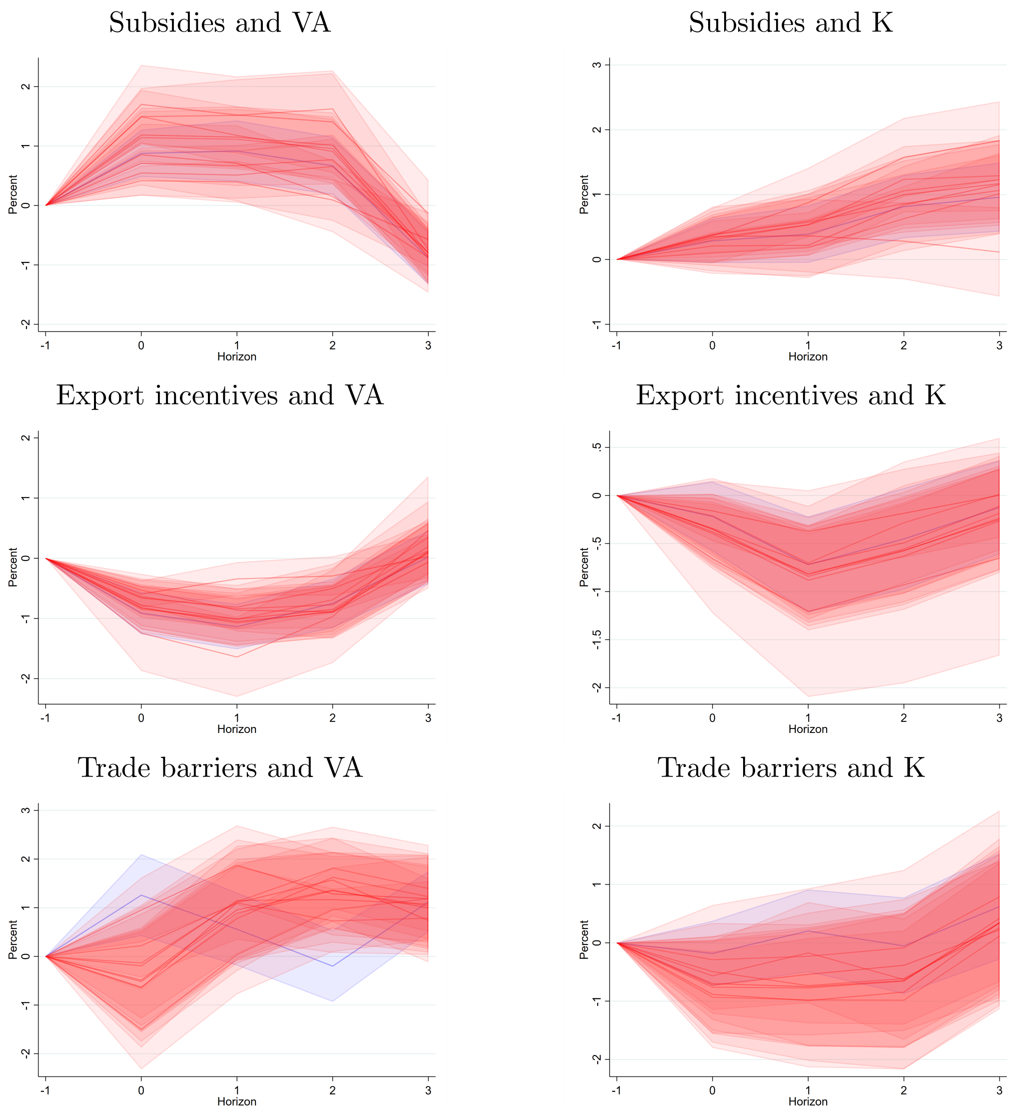
Notes: Sources: Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.6: IP Trade Intensity Index and firm performance.



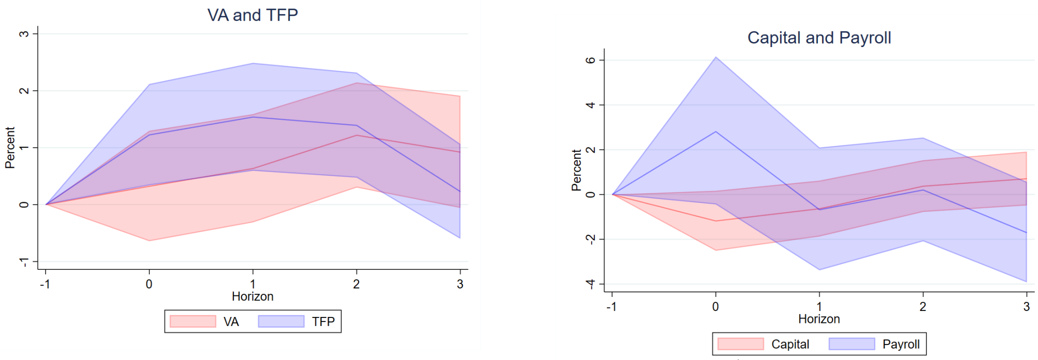
Notes: This analysis excludes firms and policies in services, which are not assigned a HS product code. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.7: Additional robustness exercises.



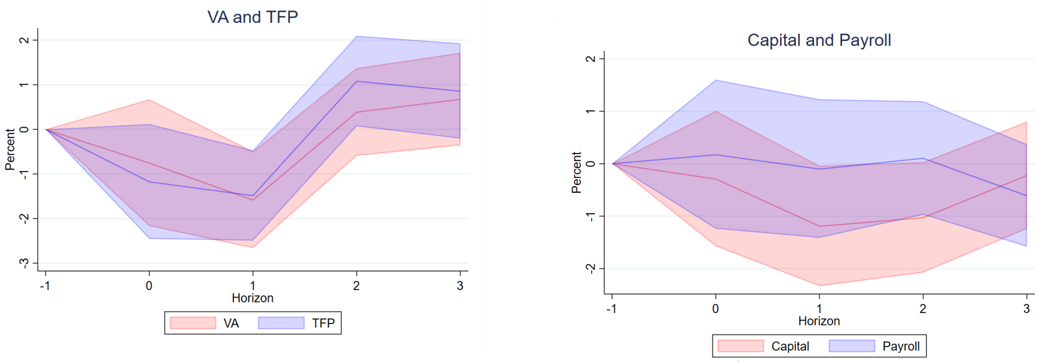
Notes: This figure overlays the 10 additional robustness checks on the link between IPs and firm performance for the average firm. The exercises are: 1) considering all GTA policies for each evaluation instead of focusing on IPs; 2) including 3 lags of dependent and independent variables; 3) adding firm controls; 4) dropping extreme growth outliers in each horizon; 5) dropping firm from China; 6) dropping firms from Spain; 7) dropping firms from France; 8) dropping frims from Italy; 9) weighting regressions by the inverse of the number of firms in each country; 10) weighting regressions by lag firm value added. Exercise 1) is highlighted in blue. Results for TFP closely follow results for VA and are omitted for brevity. Results by exercise are available upon request. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.8: Protectionist domestic subsidies and industry-level performance



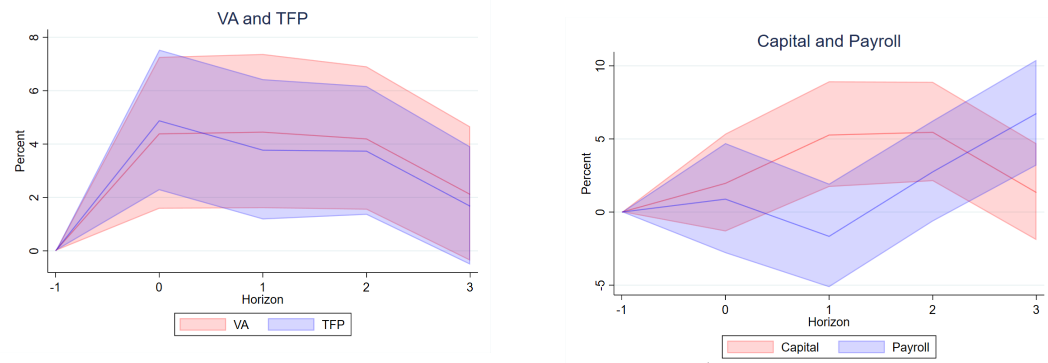
Notes: This figure plots the percent change in each industry-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist domestic subsidy, estimated in an aggregate version of Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Standard errors are clustered at the country level country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.9: Protectionist export incentives and industry-level performance



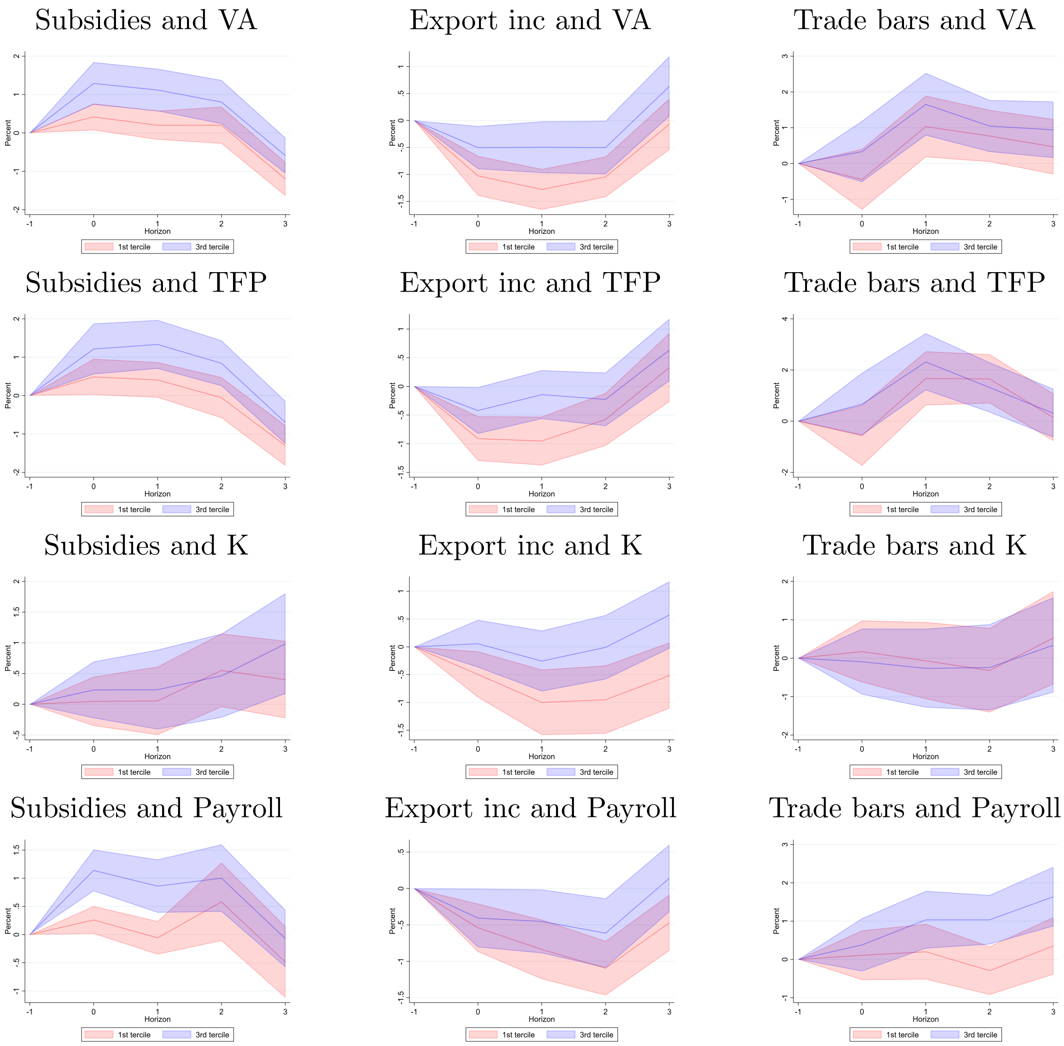
Notes: This figure plots the percent change in each industry-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist export incentive, estimated in an aggregate version of Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Standard errors are clustered at the country level country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.10: Liberalizing trade barriers and industry-level performance



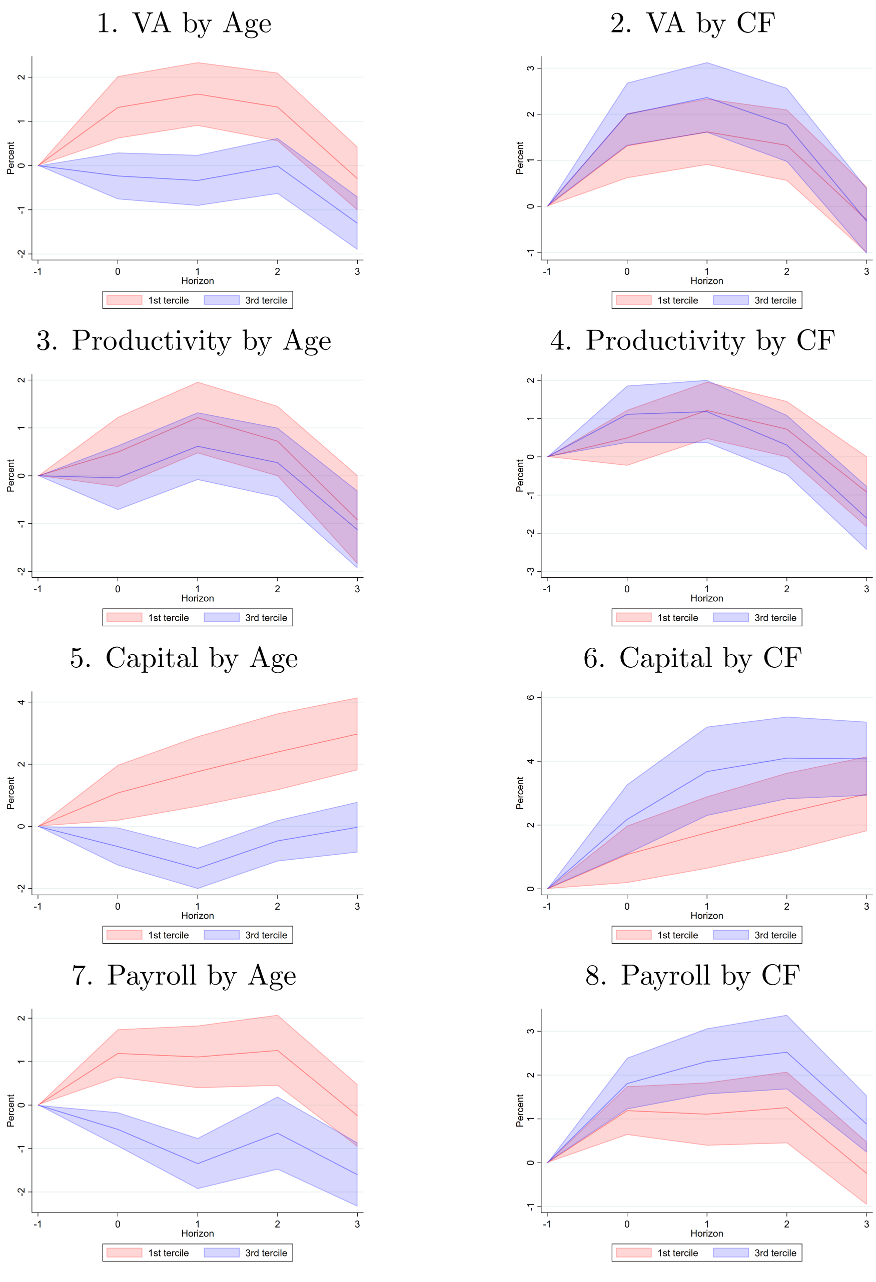
Notes: This figure plots the percent change in each industry-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a liberalizing trade policy, estimated in an aggregate version of Equation (1): $100 \times (exp(\beta_h^{ke}) - 1)$. Standard errors are clustered at the country level country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.11: IPs by firms' leverage ratio.



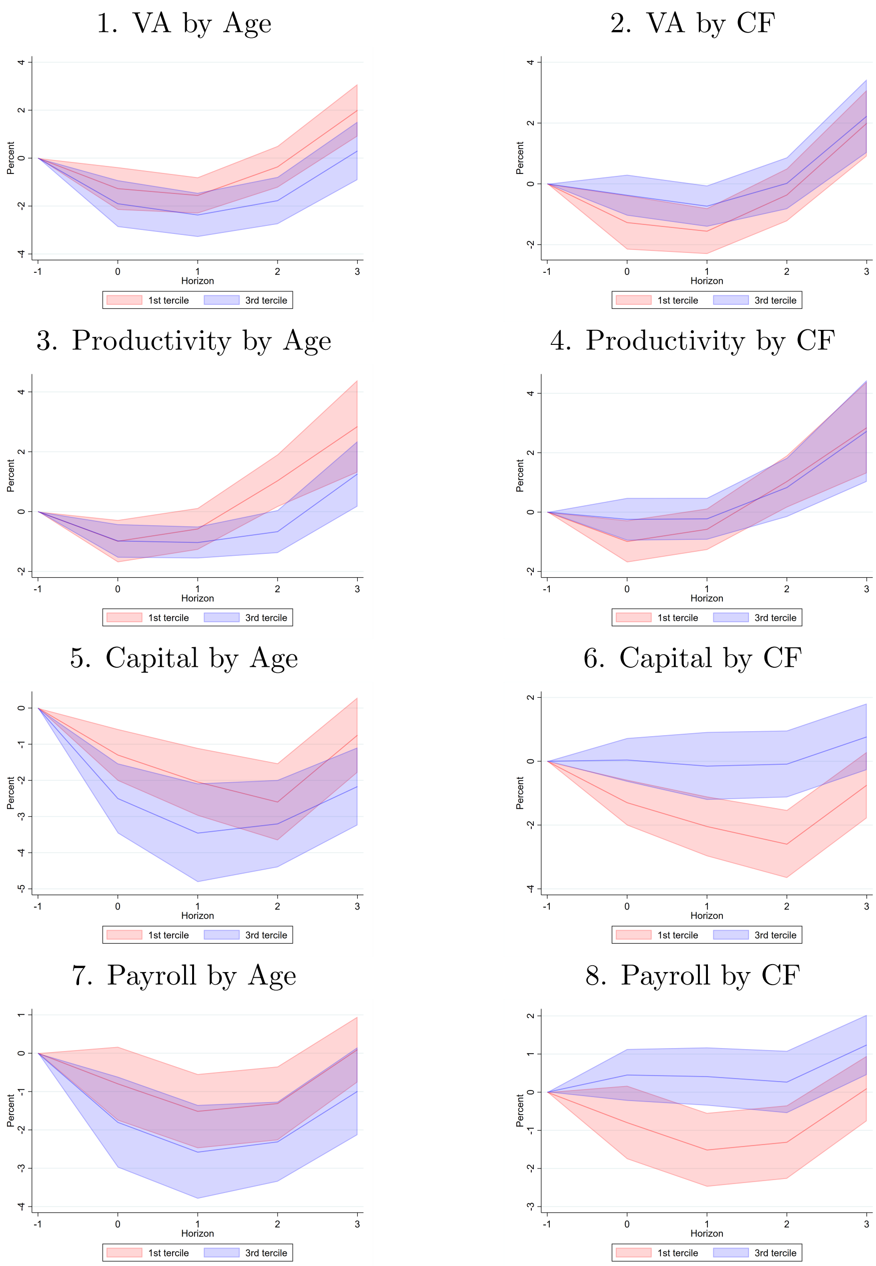
Notes: Sources: Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.12: Protectionist domestic subsidies and firm performance by firm characteristics: Age and CF included in same specification.



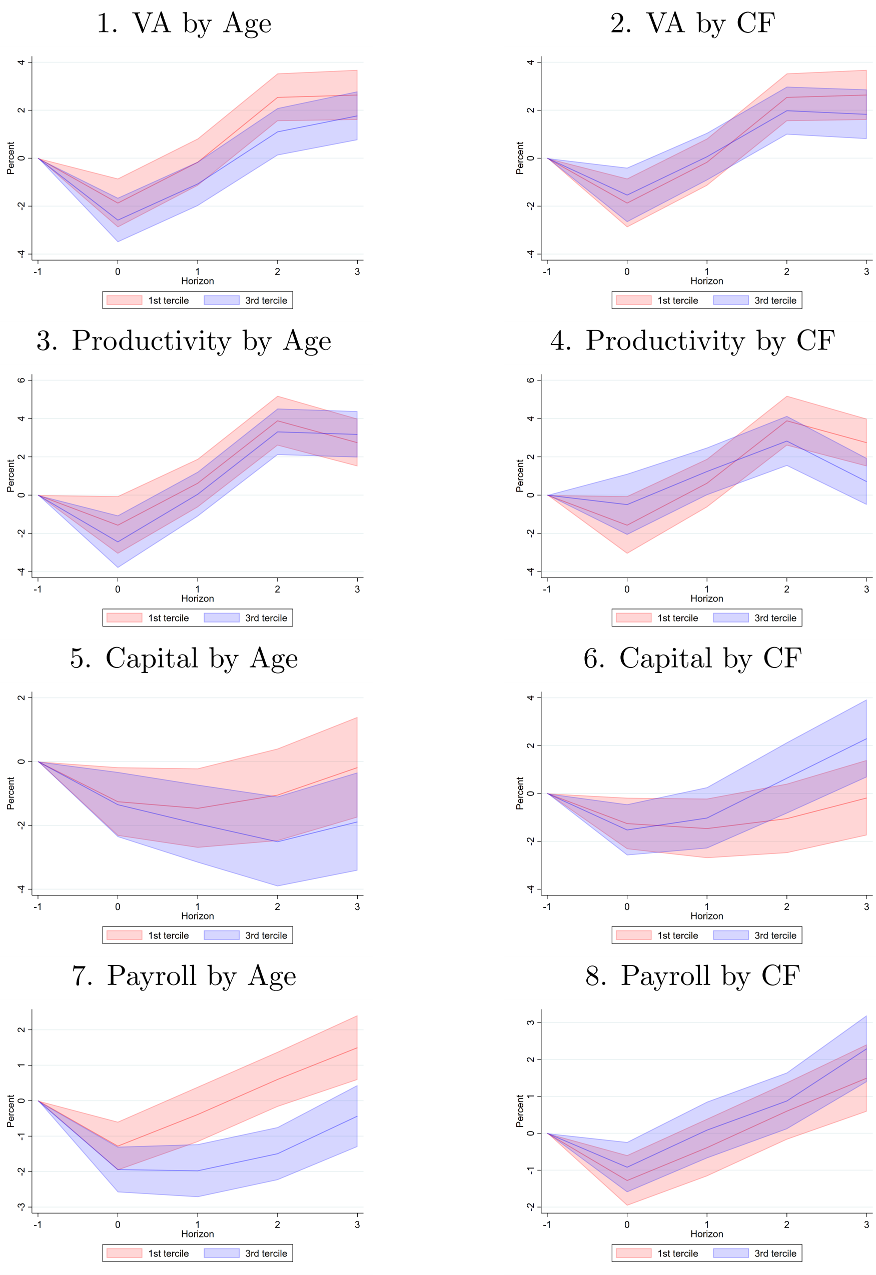
Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist domestic subsidy, for firms in the 1st (red) and 3rd (blue) terciles of the distribution of firm characteristics, where age and cash flow to assets ratio are included in the same specification. These are estimated following Equation (5): $100 \times (exp(\beta_h^{qke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.13: Protectionist export incentives and firm performance by firm characteristics: Age and CF included in same specification.



Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a protectionist export incentive, for firms in the 1st (red) and 3rd (blue) terciles of the distribution of firm characteristics, where age and cash flow to assets ratio are included in the same specification. These are estimated following Equation (5): $100 \times (exp(\beta_h^{qke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.

Figure A.14: Liberalizing trade barriers and firm performance by firm characteristics: Age and CF included in same specification.



Notes: This figure plots the percent change in each firm-level outcome (VA, TFP, payroll and capital stock), 0,1,2 and 3 years after the implementation of a liberalizing trade barrier policy, for firms in the 1st (red) and 3rd (blue) terciles of the distribution of firm characteristics, where age and cash flow to assets ratio are included in the same specification. These are estimated following Equation (5): $100 \times (exp(\beta_h^{qke}) - 1)$. Standard errors are clustered by country and NACE Rev. 2 4-digit industry. Shaded areas represent 90 percent confidence intervals. *Sources:* Juhász et al. (2023), GTA, ORBIS, GTAP.