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Globalization, Productivity Growth, and Labor Compensation

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Globalization, Productivity Growth, and Labor Compensation*

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Abstract

We analyze how changes in international trade integration affect productivity and the functional income distribution. To account for endogeneity, we construct a leave-out measure for international trade integration for country-industry pairs using international input-output tables. Our findings corroborate on the country-industry level that international trade integration increases productivity. Moreover, we show that both trade in intermediate inputs and trade in value added is associated with lower labor shares in emerging markets. For advanced countries, we document a positive effect of trade in value added on the labor share of income. Further, we show that the effects on productivity and labor share are heterogeneous across different sectors. Finally, we discuss the implications of our results for a possible throwback in international trade integration due to experiences from recent crises.

Keywords: global value chains, globalization, income distribution, labor share, productivity

JEL classification: F4, F6, J3

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1 Introduction

That international trade has positive effects on welfare has been a core element of economic wisdom for a long time. Already Adam Smith has identified the main mechanism through which international trade reduces the costs of production and therefore contributes to welfare: "It is the maxim of every prudent master of a family, never to attempt to make at home what it will cost him more to make than to buy ... What is prudence in the conduct of every private family, can scarce be folly in that of a great kingdom." (Smith, 1776, Book IV, Chapter II, pp. 456-457). Empirical evidence supports the hypothesis that international trade has positive effects on overall macroeconomic performance (Frankel and Romer, 1999; Dollar and Kraay, 2004; de Loecker, 2013).

The distributional effects of the gains from international trade, however, are less clear. Although there is a great amount of literature on the wage inequality of workers, little is known about how international trade integration affects the division of gains between labor and capital. Moreover, although the labor shares around the world are declining since the early eighties, only few researchers examine the role of international trade integration for the decline. Elsby et al. (2013), for example, show for the US that industries which are exposed to a higher degree of import competition experience larger decreases in the labor share. Similarly, Abdih and Danninger (2018) show that there is a negative relationship between labor share and both import competition and the foreign input intensity in US industries. However, with the US being the largest importer of goods, a generalization of findings to other countries is misleading.

In this paper, we empirically explore the relationship between international trade integration, productivity and the functional income distribution for both advanced and emerging countries as well as for different sectors. We focus on the trade aspects of globalization and do not consider international capital flows or international migration which do also contribute to the globalization of markets. Therefore, we use the terms *globalization* and *international trade integration* interchangeably. We examine the hypotheses that a higher degree in trade integration leads to productivity gains and that these gains are distributed unequally to the detriment of employees. Our contribution to the literature is twofold. First, we provide empirical evidence that the formation of global value chains strongly contributed to the acceleration in productivity, in particular in emerging countries. Second, and perhaps even more important, the response of the labor share to increasing trade integration is heterogeneous both across sectors and country groups.

As indicators for international trade integration we use the foreign share in intermediate inputs and the foreign share in value added, extracted from international input-output tables. Our empirical analysis, based on local projections, addresses the endogenous nature of international trade variables by constructing a leave-out measure. This measure infers changes in interna-

tional trade intensity in a specific country-industry pair from the changes in other industries of the same country.

Our major findings underpin a positive relationship between the degree of international trade integration and productivity for both advanced and emerging countries. Regarding our second hypothesis, which explores the unequal distribution of productivity gains between labor income and capital income or profits, results vary across country groups and sectors. In emerging countries, the labor share is in general negatively related to the degree of trade integration, driven primarily by the agricultural and mining industries, manufacturing industries, as well as industries for trade and market services. For advanced countries, we document a positive effect on the labor share from increasing trade in value added, while the effect of trade in intermediate inputs is less clear. This discrepancy can be partly explained by technological complementarity, where foreign intermediate inputs substitute for domestic labor, while foreign value added enhances domestic labor capabilities, contributing positively to the labor share in advanced countries. Our findings that employment reacts more sensitive to changes in foreign value added share supports this view. The structure of the paper is organized as follows. In section 2, we explain our main hypotheses and the conceptual framework from which we derive these hypotheses. In section 3, the data that we use are introduced and described. The empirical analysis of our hypotheses is presented and discussed in section 4. Finally, section 5 offers conclusions.

2 Conceptual framework and hypotheses

2.1 Main hypotheses

We understand international trade integration as the increase in foreign contributions (foreign intermediate inputs or foreign value added) to domestic total output or value added. Driven by lower trade and investment barriers and advances in information and communication technologies, production and trade have become increasingly fragmented and organized in global value chains (GVC). GVC include firms from different countries and the full range of activities that producers undertake to bring a product from its conception to its final use by consumers. Firms can enter these networks by focusing on specialized tasks, without the need of developing a complete product from scratch. Due to the finer division of tasks, productivity gains should be expected. Moreover, the changing production pattern alters the impact of policies conducted at the national level. For instance, restrictions on imports of foreign intermediaries can have adverse effects on domestic exports and final products.[1] The formation of GVC is behind the

[1] Baldwin and Lopez-Gonzalez (2015) and Johnson and Noguera (2012) provide evidence on the evolution of the production networks.

spectacular increase in international trade in the early 2000. At the current edge, more than one half of global trade in manufacturing and services are based on intermediate inputs (De Backer and Miroudot, 2013).

We test two hypotheses:

1. Globalization (international trade integration) is associated with productivity gains.
2. Productivity gains are distributed unequally to labor and capital or profits: the labor share decreases in the degree of international trade integration.

Both hypotheses are analyzed empirically for advanced and emerging economies.

2.2 Globalization and productivity

International trade is positively related to aggregate productivity. Alcalá and Ciccone (2004) report a positive and robust impact of trade on productivity for a huge set of countries, even after controlling for institutional quality and geographic conditions. They employ a measure for real openness as a proxy for trade and control for potential endogeneity of trade and institutional quality. According to Melitz (2003) and Bernard et al. (2006) falling transportation costs and tariffs lead to a reallocation of activities from less to high-productive firms. The larger the decline in trade costs, the stronger the productivity gains in manufacturing industries.

The effect of trade in intermediate inputs has been studied theoretically in Gibson and Graciano (2018) and Grossman and Helpman (2018). Both studies show that trade in intermediate inputs raises productivity. Halpern et al. (2015) show empirically that trade in intermediate inputs boosts firm-level productivity in Hungary. Ahn et al. (2019) show that reducing tariffs has positive effects on productivity via both an output and an intermediate input channel. Following Coe and Helpman (1995) and Coe et al. (2009) the foreign R&D stock embodied in exports can exert positive technology spillovers to the importing country, with subsequent positive effects on productivity, see also Lind and Ramondo (2018). Using Norwegian data, Bøler et al. (2015) show that improved access to imported inputs promotes R&D investments and technological change. Formai and Caffarelli (2015) found a positive impact of participation in GVC on total factor productivity. Similarly, Thomson and Athukorala (2020) show that GVC participation accelerates industrial upgrading at a faster pace compared to trade in products that have been exclusively produced within a single country. For middle and high income countries, Kummritz (2015) argues that participation in GVC is positively related to domestic value added and Ignatenko et al. (2019) found beneficial effects on productivity and investment. The established explanation is that productivity gains arise due to lower costs, since richer countries outsource activities to low-wage countries.

The situation may be different in emerging economies. On the one hand, the inclusion in GVC provides opportunities for fast-track development and economic upgrading, as positive spillovers to the domestic economy are generated (Kowalski et al., 2015). Bos and Vannoorenberghe (2019) report a positive impact of access to intermediate inputs on firm-level product innovation in developing countries. Pahl and Timmer (2020) show that GVC participation benefits productivity in manufacturing industries of developing countries. Similarly, using data of Chinese manufacturing firms, Ding et al. (2016) show that intra-industry trade in intermediate inputs reduces the dispersion of productivity by pushing the least productive firms out the market. On the other hand, these benefits cannot be exploited on a broader level, if the countries lack sufficient absorptive capacities. Moreover, the remuneration of firms specialized in standardized tasks is usually low, implying that productivity gains are rather limited. Hence, GVC participation may not work as a catching-up strategy for emerging economies (Rodrik, 2018).

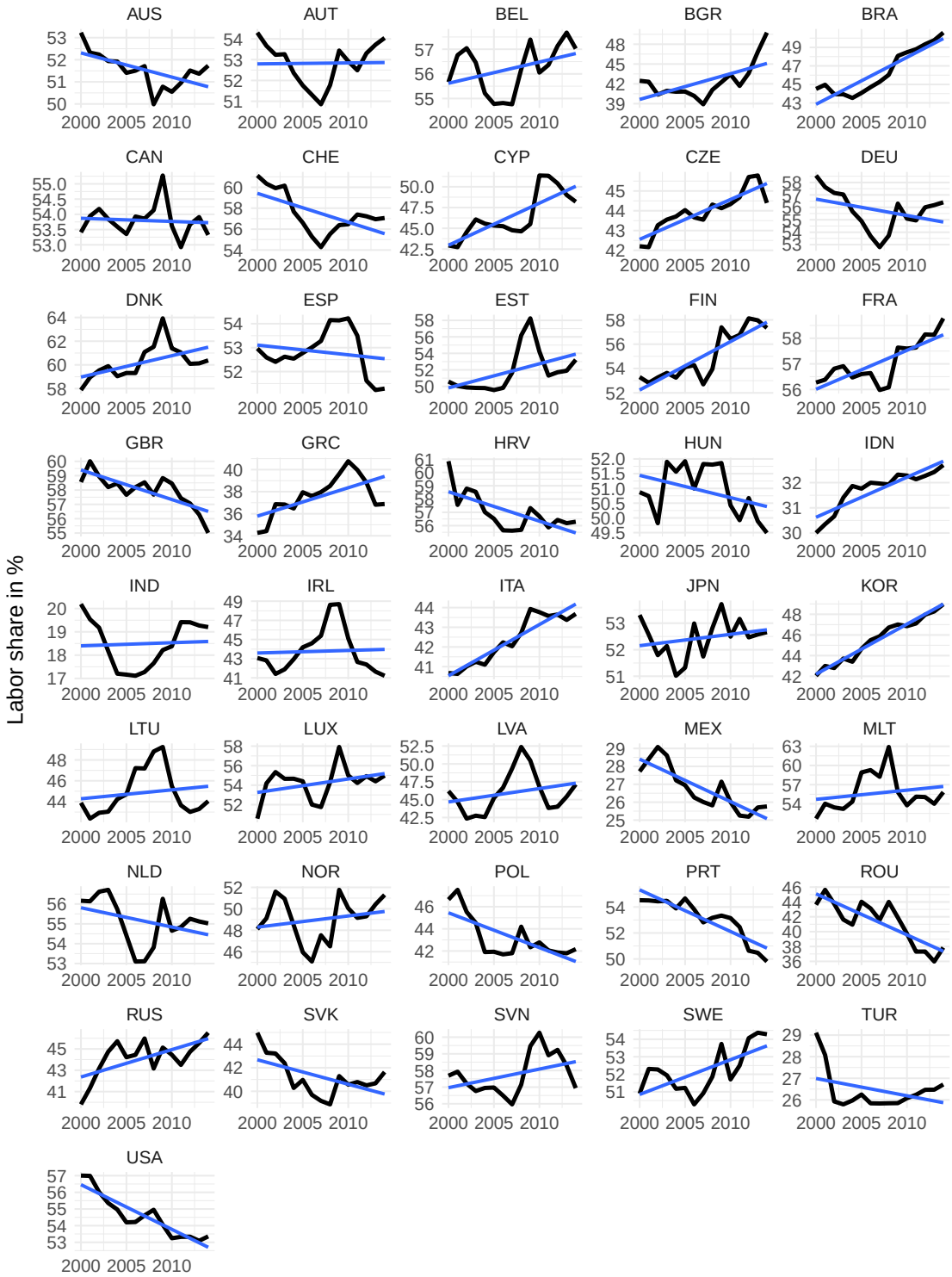
2.3 Globalization and labor compensation

The international phenomenon of declining labor shares aroused in the early eighties (IMF, 2007; ILO, 2012; Karabarbounis and Neiman, 2014). For some advanced countries, in particular the US and the UK, the downward trend is also persistent for the two recent decades (Figure 1). The decrease is even more pronounced in the manufacturing sector: For the period from 2000 to 2014 the labor share in this sector decreased from 59% to 47% in the US and from 68% to 64% in the UK. (Figure A.1 in the Appendix). Accordingly, there is a growing body of literature on the determinants of functional income distribution. For the US, Elsby et al. (2013) found that offshoring of labor-intensive activities is a potential explanation for the decline. Dao et al. (2020) argue that global integration chiefly explains the decrease in labor share for emerging countries and identify technological change as the predominant driver for the decline in advanced countries.[2] According to the ILO and the OECD (2015) and Bourguignon (2015) the decrease in labor share is accompanied by eroding support for market-oriented policies and globalization.

Another cause for diminishing labor shares may be increasing market power of firms (Barkai, 2020; Díez et al., 2018; Eggertsson et al., 2021; Naidu et al., 2018; Young and Tackett, 2018). The relationship between the labor share and market power can formally be described as follows. Suppose production is determined by the following production function:

[2]Capital-labor substitution triggered by automation is also seen by other researchers as a substantial cause for the fall in the labor share (Karabarbounis, 2023; Autor and Salomons, 2018; Ray and Mookherjee, 2022; Peralta Alva and Roitman, 2018). Abdih and Danninger (2018), for example, show for the US that there is downward pressure on wages for individuals with occupations that are exposed to automation and offshoring, and in industries with a higher concentration of large firms.

Figure 1: Labor share of income (total economy, in percent)



Source: World Input Output Database (WIOD), own calculations.

$$Y = K^{\alpha}(AN)^{1-\alpha}, \tag{1}$$

where Y denotes output, K capital and N labor. Changes in A capture technological progress and α is a constant parameter. Marginal productivity of labor is then given by:

$$\begin{aligned} MPL &= K^{\alpha}A^{1-\alpha}(1-\alpha)N^{-\alpha} = (1-\alpha)\frac{K^{\alpha}A^{1-\alpha}N^{-\alpha}N}{N} \\ &= (1-\alpha)\frac{K^{\alpha}A^{1-\alpha}N^{1-\alpha}}{N} = (1-\alpha)\frac{Y}{N}. \end{aligned} \tag{2}$$

Furthermore, suppose that firms set prices according to markup-pricing:

$$P = (1+\mu)MC = (1+\mu)\frac{W}{MPL} = \frac{(1+\mu)W}{(1-\alpha)Y/N} = \frac{1+\mu}{1-\alpha}\frac{WN}{Y}, \tag{3}$$

where MC denotes marginal cost, W nominal wage and μ markup. The markup drives a wedge both between prices and marginal cost as well as real wage and labor productivity. In this simple setting, it therefore reflects market power on both goods and labor markets. The labor share is then given by:

$$\frac{WN}{PY} = \frac{1-\alpha}{1+\mu}. \tag{4}$$

In case of a constant-elasticity-of-substitution (CES) production function with labor and capital as production factors,

$$Y = \left[(1-\alpha)^{\frac{1}{\eta}}N^{\frac{\eta-1}{\eta}} + \alpha^{\frac{1}{\eta}}K^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}, \tag{5}$$

the labor share also depends on the output-labor ratio (Cette et al., 2019):

$$\frac{WN}{PY} = \frac{(1-\alpha)^{\frac{1}{\eta}}}{1+\mu}\left(\frac{Y}{N}\right)^{\frac{1-\eta}{\eta}}. \tag{6}$$

Hence, a rise in market power of firms, given by an increase in μ, may partially explain declining labor shares. Autor et al. (2017) and Autor et al. (2020) argue that globalization is in particular beneficial to the most productive firms and contributes to increasing product market concentration and market power. Böckerman and Maliranta (2012), for example, found that globalization in Finnish manufacturing plants negatively affects the aggregated industry labor shares by shifting value-added to plants with high capital shares and forcing plants with high labor shares to exit. Eggertsson et al. (2021) argue that globalization leads to higher concentration of market shares and rising markups of superstar firms. Using data on over 70,000 firms

in 134 countries de Loecker and Eeckhout (2018) show that markups have risen substantially between 1980 and 2016. Basu (2019) provides a critical review of the approaches to estimate markups.

Similarly, a rise in the mark up could be motivated by a decline in the power of trade unions to negotiate wages, see Arpaia et al. (2009), among others, or by employment protection deregulation (Ciminelli et al., 2022). Dimova (2019) argue that globalization and the erosion of labor market safety nets have contributed to the decline in the labor share in many advanced countries. A decreasing labor share is in general associated with increasing income inequality because capital income is distributed more unequally than labor income (ILO and OECD, 2015; Doan and Wan, 2017; Nolan et al., 2019).[3]

3 Data description

3.1 Coverage and data cleaning

Our main data source for the empirical analysis is the World Input Output Database (WIOD), where the 2016 edition is used.[4] It covers data from 2000 to 2014 for 43 countries and 56 industries (Timmer et al., 2015; Timmer et al., 2016).[5] The countries and the industries are listed in the Appendix. As we show in the following section, global trade integration has slowed down considerably after the financial crisis. Including periods of both strong and week changes in the degree of trade intensity, the sample thus carries information on productivity and labor share's response to globalization shocks. We clean the data in the following way:

- For $K = 43$ countries, $T = 15$ years, and $L = 56$ industries, we have in total $N = K \times T \times L = 36.120$ observations.
- We exclude China and Taiwan due to data problems (missing data on hours worked).[6]

[3]There are also other explanations for the decline in the labor share. Karabarbounis and Neiman (2014), for example, attribute a substantial part of the decline to an increase in capital intensity due to lower investment prices, see also Río and Lores (2019). Another driver may be the reallocation to highly productive low-labor share firms (Kehrig and Vincent, 2021). The statistically increasing capital share could also be a consequence of increasing income for intangibles (Chen et al., 2021). Doan and Wan (2017) show that trade affects the labor compensation. Specifically, exports depress and imports tend to increase labor share. For a more general overview on the various explanations for the decrease in the labor share, see Karabarbounis (2023) and Grossman and Oberfield (2022).

[4]http://www.wiod.org/home

[5]The previous release of WIOD contained labor compensation for skilled and unskilled workers. However, the current release 2016 does not provide this information.

[6]Accounting for the increasingly important role of these countries in globalization, they are included in the construction of the indicators for international trade integration in other country-industry pairs. However, industries in China and Taiwan are excluded from the analysis of the effects of international trade integration on productivity and labor share.

- We exclude the industry 55 and 56 (activities of households as employers and of extraterritorial organizations and bodies).
- We exclude country-industry pairs with incomplete information (MLT 43, IND 51, MEX 54) or with unreasonable data (employment ≤ 0, value added ≤ 0, or capital ≤ 0).
- Remaining observations: $N = 30.840$.

3.2 Measuring international trade integration

We use the following indicators for international trade integration:

- The share of foreign (imported) intermediate inputs in all intermediate inputs used in an industry ($FIIS$),
- The foreign value added share ($FVAS$, Timmer et al., 2015).

3.2.1 Foreign intermediate input share

Denote intermediate inputs used in industry j and country i from industry ℓ in country k by $ii_{ij}^{k\ell}$. Then total intermediate inputs ii_{ij} of industry j of country i are given by

$$ii_{ij} = \sum_{k} \sum_{\ell} ii_{ij}^{k\ell} \tag{7}$$

and the share of foreign (imported) intermediate inputs $FIIS$ in total intermediate inputs is

$$FIIS_{ij} = \frac{\sum_{k \neq i} \sum_{\ell} ii_{ij}^{k\ell}}{ii_{ij}} = \frac{fii_{ij}}{ii_{ij}} = 1 - \frac{dii_{ij}}{ii_{ij}} = 1 - DIIS_{ij}, \tag{8}$$

where fii denotes foreign (imported) intermediate inputs and dii denotes domestic intermediate inputs. The extent to which foreign intermediate inputs contribute to gross output (go) in a specific industry is $\frac{fii_{ij}}{go_{ij}}$. Gross output is the sum of intermediate inputs and value added (va):

$$go_{ij} = ii_{ij} + va_{ij} = fii_{ij} + dii_{ij} + va_{ij}. \tag{9}$$

3.2.2 Foreign value added share

The calculation of the foreign share in value added ($FVAS$) is based on the global value chain (GVC) of a final good which is "the set of all value-adding activities needed in its production" (Timmer et al., 2015, p. 582). A GVC includes the value added in the industry where the last

stage of production takes place, as well as in all other industries in the same country or abroad where previous stages of production take place.

$FVAS$ can be calculated from the input-output tables using Leontief's decomposition method. Define $\mathbf{Q}$ as a vector with total output levels across all countries and industries, $\mathbf{B}$ as the matrix of technical coefficients and $\mathbf{F}$ as a diagonal matrix with the ratios of value added to total output. Let $\mathbf{D}$ be a column vector which includes the value for the final demand in the country and industry of interest, and zeroes elsewhere. The final output for that country and industry is therefore equal to $\mathbf{D}$. The vector $\mathbf{BD}$ contains the values of the first-stage number of intermediates necessary to produce the output of the selected country and industry. The second stage intermediates need to be produced as well. Adding over every stage of production results in a geometric sequence:

$$\mathbf{D} + \mathbf{BD} + \mathbf{B^2D} + \mathbf{B^3D} + ... = (\mathbf{I} - \mathbf{B})^{-1}\mathbf{D}, \tag{10}$$

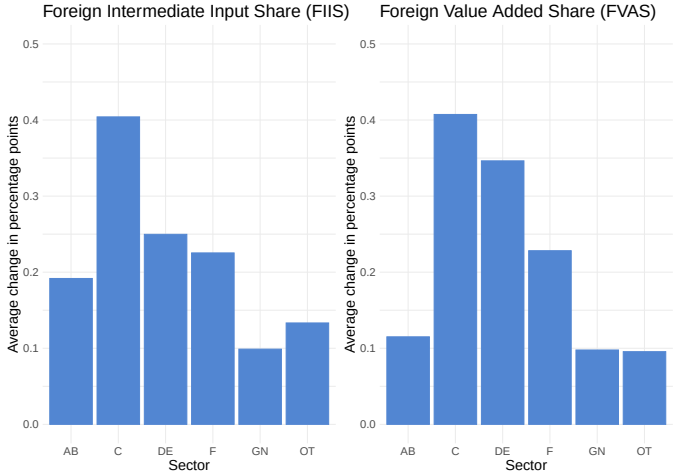
with $\mathbf{I}$ being an identity matrix. Multiplying the above sequence with the value added vector $\mathbf{F}$ indicates the total value added involved in every stage of production for the specific country and industry. Setting the values of the resulting vector to zero for domestic sectors for each individual country and summing up by industry yields the foreign value added included in domestic industries. Relating the foreign value added to total value added of a country-industry combination gives the share of foreign value added in total value ($FVAS$) added by country and industry.

3.2.3 Stylized facts

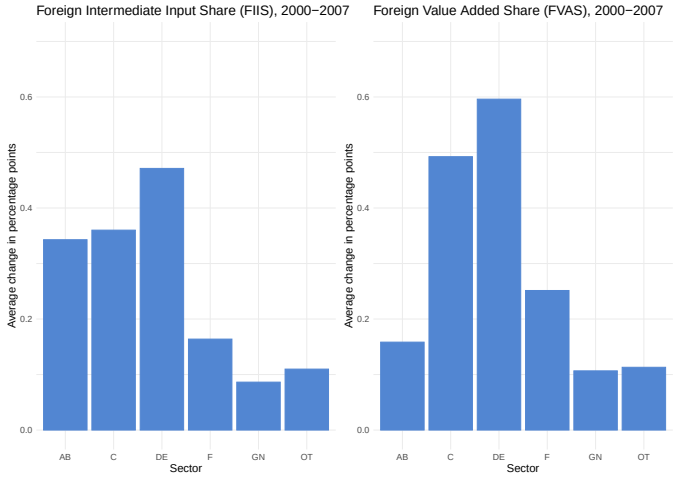
Import shares and the foreign share in value added have on average increased in the period from 2000 to 2014, see Figure 2. The speed of international trade integration, however, has decreased after the financial crisis. Both measures $FIIS$ and $FVAS$ are positively correlated with a coefficient of 0.62. According to both measures, international trade integration has been most pronounced in manufacturing. Within manufacturing, all industries exhibit an increase in the share of foreign intermediate inputs and in the foreign value added share. Figure 3 shows time series for selected industries in Germany and in the US. Both measures $FIIS$ and $FVAS$ pick up the same underlying trend, but there are differences in detail. For example, $FVAS$ has been stagnating in German motor vehicle production recently, while $FIIS$ has been increasing until the end of the sample.

Figure 2: Measuring globalization

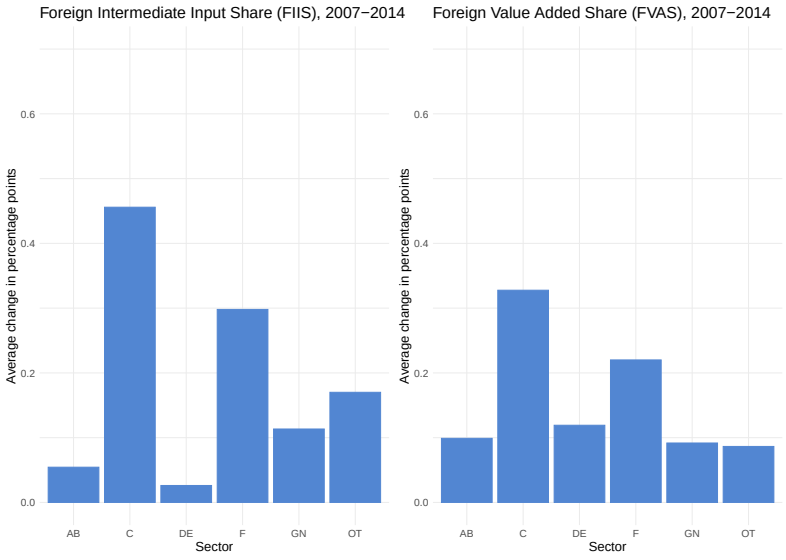
(a) Average annual change, full sample 2000-2014, by sector



(b) Average annual change, before financial crisis, by sector

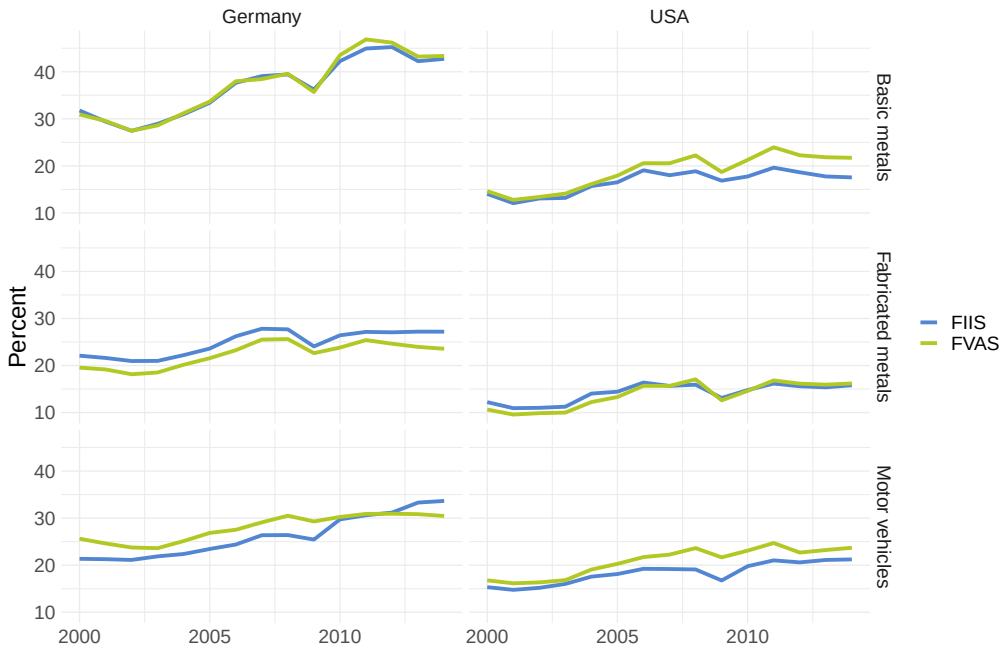


(c) Average annual changes, after financial crisis, by sector



Notes: AB: agriculture, forestry and fishing, mining and quarrying, C: manufacturing, DE: utilities, F: construction, GN: trade and market services, OT: other services. *Source:* WIOD and own calculations.

Figure 3: Globalization in selected manufacturing industries in Germany and in the USA



Source: WIOD and own calculations.

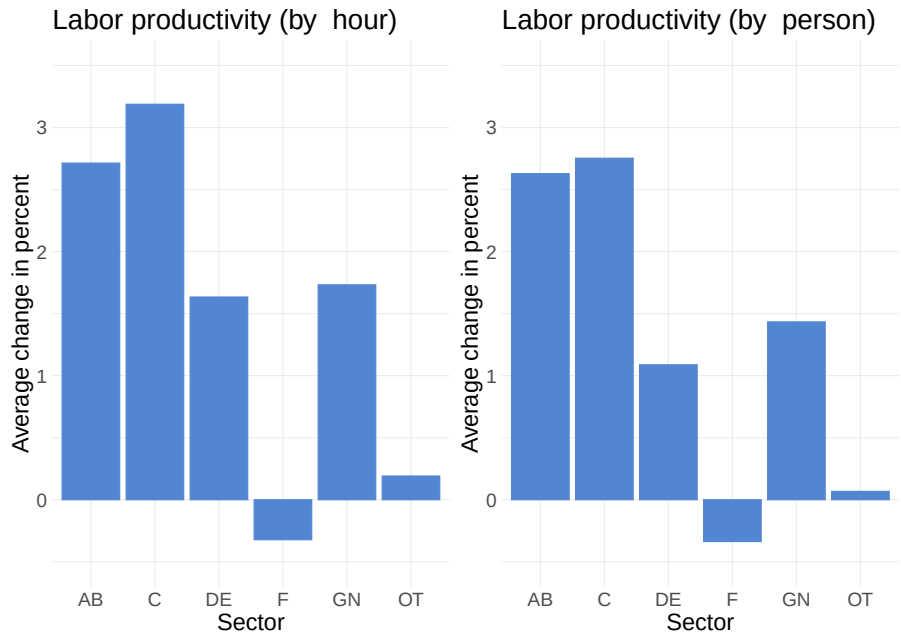
3.3 Productivity growth

Productivity in country i and industry j is measured in terms of value added per employed person ($prodn$) and value added per hour worked ($prodh$), respectively:

$$prodn_{ij} = \frac{va_{qi,ij}}{empe_{ij}} \qquad \text{and} \qquad prodh_{ij} = \frac{va_{qi,ij}}{h_{empe,ij}}, \tag{11}$$

where va_{qi} denotes gross value added in volume indices with 2010=100. $empe$ and h_{empe} denote the number of employees and the total hours worked by employees, respectively. Both $prodn$ and $prodh$ are normalized to 100 in 2000. Figure 4 shows the development of productivity by sector. Productivity growth has been highest in the manufacturing sector. Within this sector, the production of computers, electronic and optical products has exhibited the highest growth rates. However, in some countries like for example Brazil or Greece, average productivity growth has been negative between 2000 and 2014. Productivity growth was also particularly low in Italy, while central and eastern European countries which joined the European Union have realized relatively large productivity gains.

Figure 4: Change in labor productivity 2000-2014



Source: WIOD and own calculations. Weighted by employed persons and by hours worked, respectively.

3.4 Change in labor compensation

The distribution of income to production factors is measured by the labor share ($labs$):

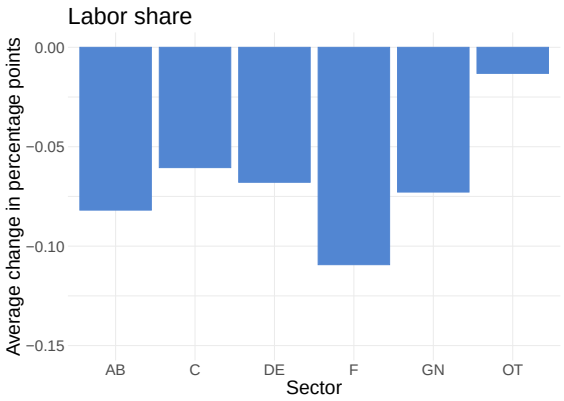
$$labs_{ij} = \frac{comp_{ij}}{va_{ij}}, \tag{12}$$

where $comp$ denotes the compensation of employees and va value added in current prices.[7] The changes in the labor share by sector are exhibited in Figure 5. Averaged over all countries, the labor share has decreased in all sectors during the observation period. However, there is a substantial degree of variation between countries and industries (see Figure A.1 in the Appendix). In the US and in Germany, for example, overall labor shares in manufacturing are on a declining trend, but the evidence is heterogeneous across sectors. Specifically, the labor share decreased in the wood, paper and paper products industry, but increased in the manufacturing of food, basic pharmaceutical products and pharmaceutical preparations.

To get some insights into the components of a changing labor share, we conduct a shift-share analysis. It decomposes the country-specific labor shares into changes linked to within-industry developments and changes linked to changing weights of specific industries. The latter can be

[7] Various possibilities to define and to measure the labor share are discussed in Mućk et al. (2018).

Figure 5: Change in labor share 2000-2014



Source: WIOD and own calculations. Weighted by value added in USD.

seen as a proxy for structural change. The labor share in country i is given by:

$$labs_{i,t} = \sum_j w_{ij,t} \times labs_{ij,t}, \qquad w_{ij,t} = \frac{va_{ij,t}}{\sum_j va_{ij,t}}. \tag{13}$$

The shift-share analysis decomposes the change of the labor share into the two components:

$$\Delta labs_{i,t} = \underbrace{\sum_j \frac{w_{ij,t} + w_{ij,t-1}}{2} \times \Delta labs_{ij,t}}_{\text{within}} + \underbrace{\sum_j \Delta w_{ij,t} \times \frac{labs_{ij,t} + labs_{ij,t-1}}{2}}_{\text{between}}. \tag{14}$$

The total change in the labor shares is depicted on the horizontal axis of Figure 6, while the part of the change in the labor share that is explained by within-industry variation is exhibited on the vertical axis. The fitted line almost resembles a 45-degree-line. While structural change, i.e. changes in the relative weights of the industries, dominates in some countries the change of the labor share can be mainly attributed to changes within industries.[8]

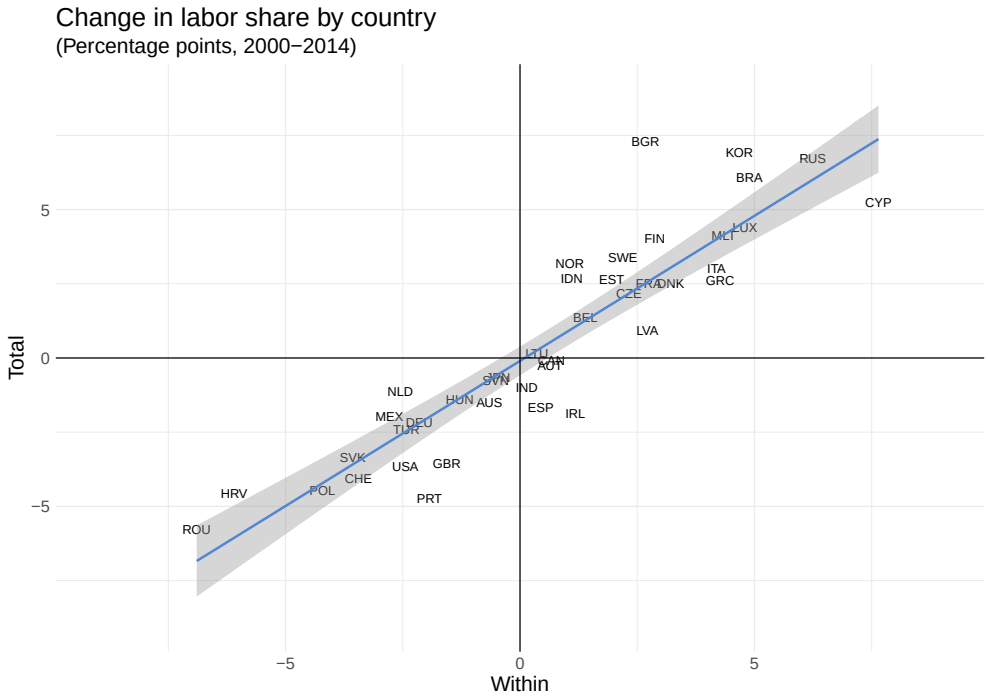
4 Empirical analysis

4.1 Estimation approach: Endogeneity and timing

In order to explore the dynamic relationship between international trade integration, productivity, and labor compensation, we employ the local projections approach pioneered by Jordà (2005). This approach estimates impulse responses at each forecast horizon and thus allows for

[8]For the period before our sample (1979 to 2001), Lawless and Whelan (2011) report for European countries that most of the variation in aggregate labor shares is also explained by within sector developments while composition effects played a minor role.

Figure 6: Shift-share analysis of country-specific labor shares (2000-2014)



Notes: Labor shares weighted by value added in USD. The shaded area represents the 95% confidence level interval. *Source:* WIOD and own calculations.

more flexibility than a parametric model. However, estimating the effects of internationalization on productivity and labor share introduces potential biases due to endogeneity issues. Specifically, the internationalization variables may be correlated with the error term, as the outcome variables and internationalization variables in a given industry of a country might be influenced by the same global supply and demand shocks. To address this concern, we augment the local projection approach with an instrumental variable strategy, as done by Jordà and Taylor (2016), Jordà et al. (2022), and Ramey and Zubairy (2018), among others. As instrument, we adopt a leave-out measure that excludes the international trade intensity in the own industry, similar to Autor and Salomons (2018). Specifically, for a country-industry pair (ij) we leave out the values of $FIIS$ for industry j in the construction of the weighted mean of $FIIS$:

$$z_{ij,t}^{FIIS} = \frac{\sum_{j' \neq j} FIIS_{ij',t} \times va_{ij',t}}{\sum_{j' \neq j} va_{ij',t}}. \tag{15}$$

Hence, in the first stage the change of $FIIS$ in a specific industry is inferred from the change in all other industries of a country in the sample:

$$\Delta \ln FIIS_{ij,t+h} = \theta_0^h + \theta_1^h \Delta \ln z_{ij,t}^{FIIS} + \gamma^h X + \varepsilon_{ij,t}^h, \tag{16}$$

where $h = 1, \dots H$ and X is a vector of control variables from the second stage including a set of fixed effects and lags of the outcome variables. The same approach is applied to $FVAS$. Overall, the instruments are relevant and have a good predictive power for actual $FIIS$ and $FVAS$, see Table 1. Another advantage of this approach is that extreme short-term fluctuations are smoothed.[9] This gives us the following second stage:

$$\begin{aligned} y_{ij,t+h} - y_{ij,t} &= \beta_0^h + \beta_1^h \Delta \ln \widehat{FIIS}_{ij,t+1} \\ &\quad + \beta_2^h \Delta y_{ij,t} + \beta_3^h \Delta y_{ij,t-1} \\ &\quad + \alpha_i^h + \alpha_j^h + \alpha_{ij}^h + \alpha_t^h + \varepsilon_{ij,t}^h, \end{aligned} \tag{17}$$

where y stands for log productivity, log real wage, log employment, log value added or log labor share, respectively, in country i and industry j at time t. The coefficient we are interested in is β_1^h. It measures the percentage change in the respective outcome variable's response from time t to $t + h$, caused by the impulse variable $\Delta \widehat{FIIS}_{ij,t+1}$. The simulated shock is a one percent increase in foreign intermediate input shares. To allow for feedback effects within the model, we control for lagged values of the outcome variable, $\Delta y_{ij,t}$ and $\Delta y_{ij,t-1}$. Country, industry, country-industry and time fixed effects are denoted by α_i^h, α_j^h, α_{ij}^h and α_t^h, respectively. The model specification remains the same when we substitute the impulse variable for the change in foreign value added share ($\Delta \ln \widehat{FVAS}_{ij,t+1}$).

4.2 Baseline results

In this section, we present the estimated impulse response functions obtained from the local projection framework. First, we report the results for the full sample consisting of 41 countries and 54 industries for the period from 2000 to 2014. Subsequently, we further disentangle the effects of globalization on productivity and labor share by splitting the sample into advanced and emerging countries. Keeping the distinction between country groups, we also report estimates for different sectors and globalization's impact on capital intensity.

Full sample. Averaged over all countries, our hypothesis that international trade integration is associated with productivity gains is compatible with the data (Figure 7). An impulse caused

[9] However, while our approach leads to fitted values of $FIIS$ that are independent from global shocks, we acknowledge that there may be local shocks which affect both the outcome variables and the internationalization variables (see Dauth et al. (2014) for a discussion). An intuitive solution would be to infer the change in the internationalization variables in a country-industry pair from the same industry of other countries in the sample. While this approach may alleviate concerns regarding the exclusion restriction, we found that a same-industry (other country) measure is not a relevant predictor for the actual internationalization in a country-industry pair. In the robustness section, we provide an alternative approach by inferring the change in the internationalization variables in a country-industry pair from the change in the same broad sector of a country.

Table 1: Predictive relationship between other-industry (same country) international trade integration and own-industry international trade integration

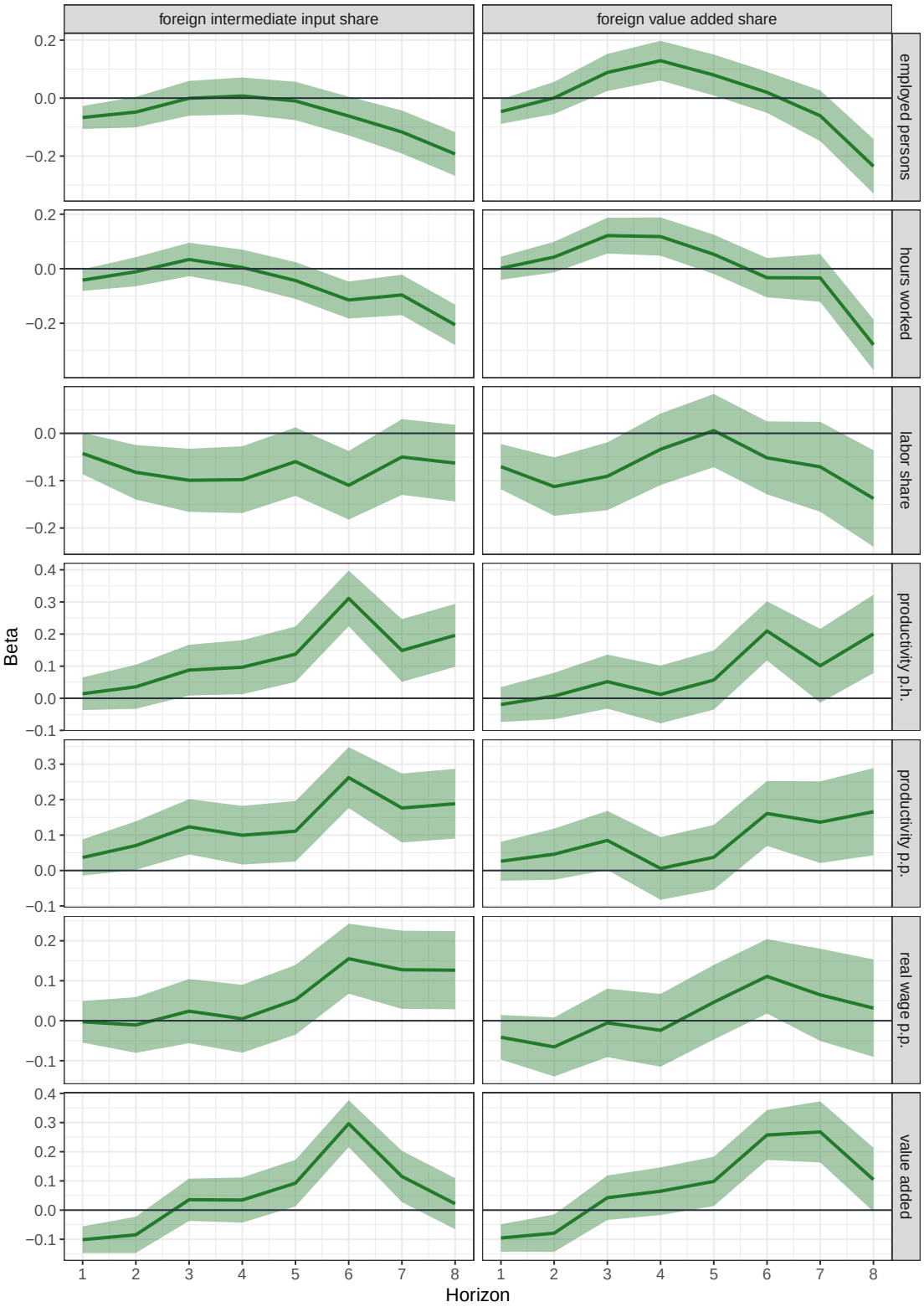
	Horizon							
	1	2	3	4	5	6	7	8
Panel A								
$\Delta \ln z_{ij,t}^{FIIS}$	0.850	0.844	0.844	0.857	0.869	0.865	0.866	0.876
	[46.557]	[43.845]	[42.195]	[40.929]	[39.332]	[39.133]	[35.198]	[30.380]
Observations	24672	22616	20560	18504	16448	14392	12336	1028
Effective F-Statistic	2177	1933	1789	1684	1557	1542	1249	932
Adj.R^2	0.289	0.289	0.296	0.315	0.325	0.334	0.253	0.266
Panel B								
$\Delta \ln z_{ij,t}^{FVAS}$	0.819	0.817	0.815	0.816	0.816	0.833	0.834	0.813
	[46.562]	[44.615]	[42.576]	[41.578]	[41.764]	[41.376]	[33.590]	[28.015]
Observations	24672	22616	20560	18504	16448	14392	12336	10280
Effective F-Statistic	2177	2000	1822	1738	1755	1724	1137	792
Adj.R^2	0.237	0.239	0.249	0.271	0.277	0.306	0.172	0.188

Notes: t-statistics are reported in brackets. Standard errors are clustered at the country-industry level. In Panel A (B), the dependent variable is the log difference in foreign intermediate input share (foreign value added share). The instrument $z_{ij,t}^{FIIS}(z_{ij,t}^{FVAS})$ is the weighted leave-out mean for the foreign intermediate input share (foreign value added share) in a country-industry pair, constructed by using all other industries of the same country. We used the effective F-Statistic from Olea and Pflueger (2013).

by an increase in the foreign intermediate input share ($FIIS$) or the foreign value added share ($FVAS$), measured by a one percent increase, leads to a significant increase in both productivity per person and per hour worked. For $FIIS$ ($FVAS$), the effect peaks at a 0.25-0.30 (0.15-0.25) percent increase in both productivity measures before exhibiting a slight decline after the sixth year. Interestingly, the impact on both employed persons and total hours worked differs: an increase in $FIIS$ leads to a negative effect over time, while for $FVAS$, the responses are comparable but positively shifted, particularly in the third to fifth year after the shock. Despite an initial negative effect on value added in the first year, the long-term effect of increasing international trade intensity becomes positive, reaching a peak of an approximately 0.3 percent increase around six years after the shock. Real wage per person is positively affected by an increase in international trade intensity over the long run as well. In terms of the labor share of income, a one percent increase in $FIIS$ or $FVAS$ corresponds to a 0.05-0.15 percent decrease. Considering the full sample encompassing all countries and industries, our second hypothesis positing a decline in labor share with increasing GVC participation is supported by the data.

Advanced vs. emerging countries. In the definition of advanced and emerging economies we follow the IMF classification; eleven of 41 countries in our sample are classified as emerging economies, see Table A.1 in the Appendix. Figure 8 illustrates the estimated impulse response functions for both advanced and emerging countries. For both groups, the results indicate that an increase in $FIIS$ and $FVAS$ leads to heightened productivity per person and per hour worked.

Figure 7: Impulse responses - full sample



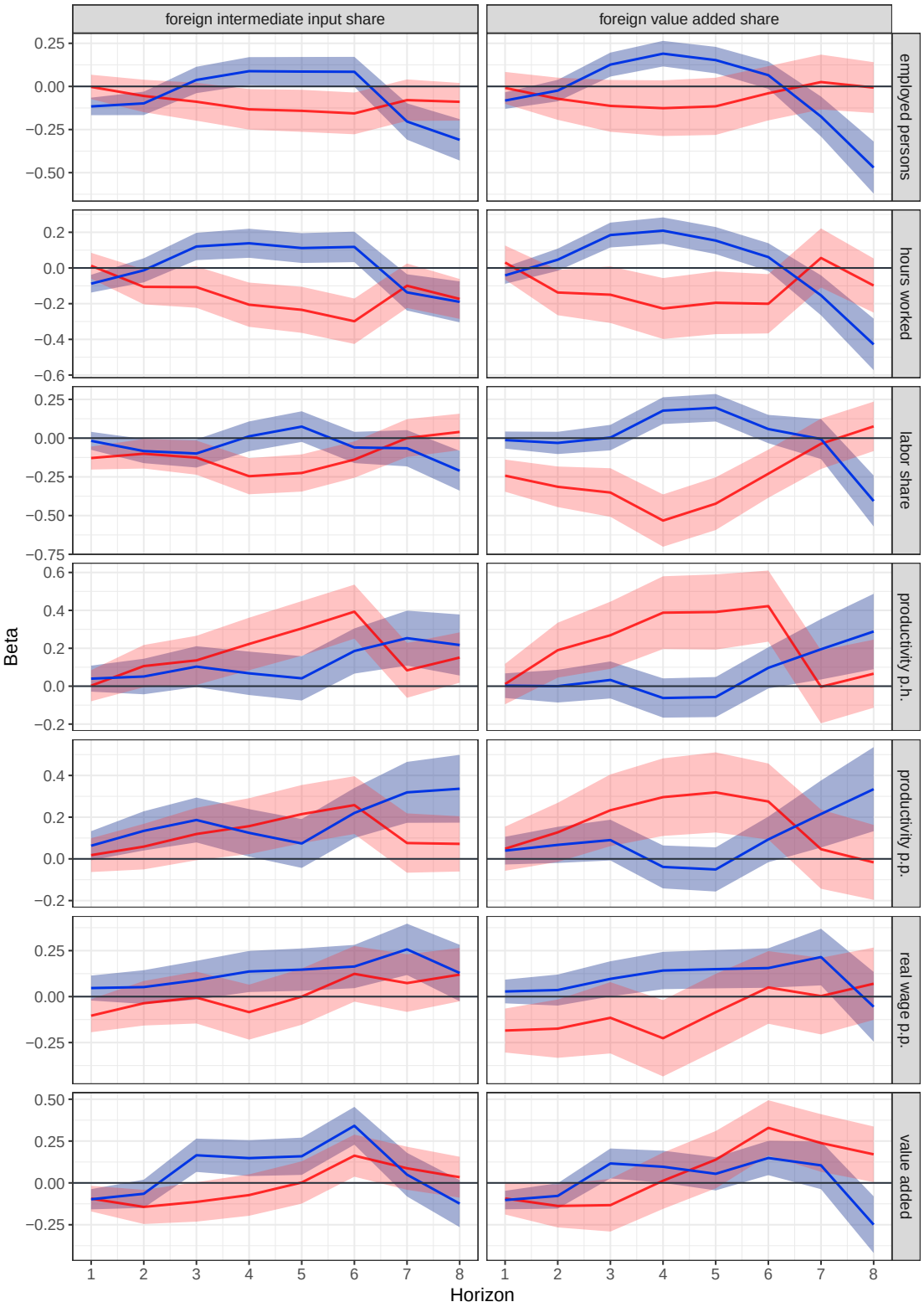
Notes: Responses to a one percent increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

The impact of increased international trade intensity diverges when considering employment and hours worked. For advanced countries, positive associations are observed around years three to six following the shock, while emerging countries experience negative associations during the same period. Real wage per person is positively affected in advanced countries, whereas the effect is statistically insignificant for emerging countries. Turning to the labor share of income, a one percent increase in $FIIS$ induces a negative effect that is more pronounced for emerging countries, particularly within the first six years post-shock. Interestingly, the effect of $FVAS$ on labor share demonstrates more pronounced distinctions between the two country groups. While the negative impact intensifies for emerging countries, the effect on advanced countries becomes positive during years three to six before reverting to a negative trend eight years after the shock.

Sectoral Analysis. We group the 54 industries into 6 broad sectors: AB (agriculture, forestry and fishing, mining and quarrying), C (manufacturing), DE (utilities), F (construction), GN (trade and market services), and OT (other services), see Tables A.2 and A.3 in the Appendix. Figure 9 displays the estimated impulse responses for each of these sectors, with a focus on labor share and productivity per hour for clarity. In emerging countries, the sectors C, GN, and OT experience significant productivity gains from heightened international trade intensity, while sector F exhibits a decrease in productivity. For the impact on labor share, sectors AB, C, and GN in emerging countries are negatively affected by an increase in international trade intensity, with a more pronounced effect for an increase in $FVAS$. In sectors DE and OT of emerging countries, only increases in $FVAS$ lead to a noteworthy decrease in labor share. In advanced countries, negative effects on the labor share of income are primarily observed in sectors DE and OT. It is worth noting that a substantial portion of the previously identified positive impact of $FVAS$ on labor share in advanced countries is attributed to sector C. This sector, representing the largest segment of our sample with approximately one-third of all observations, displays an impulse response function that aligns with the positive trend observed for the broader advanced country grouping.

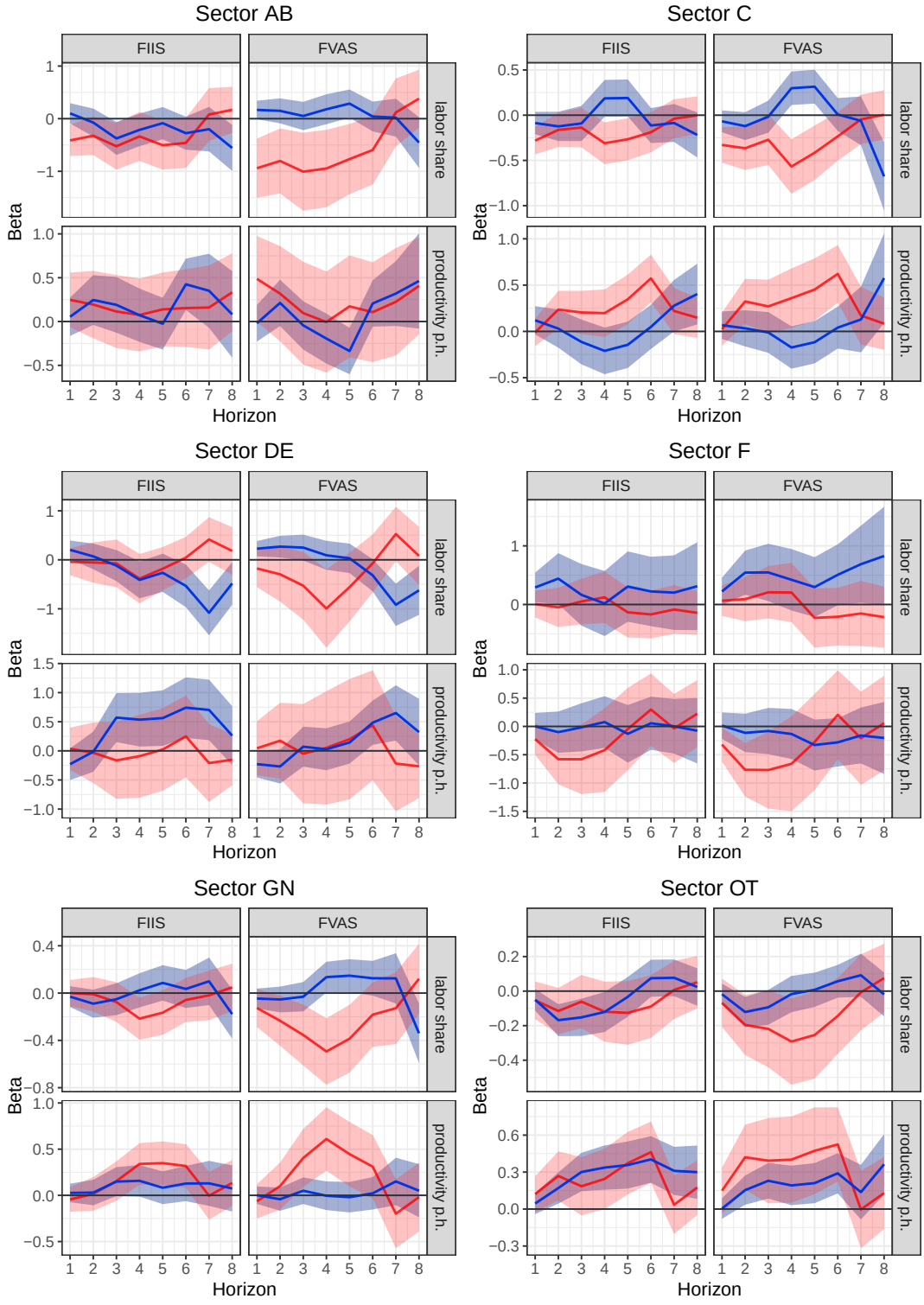
Capital intensity. The estimated impulse response functions with capital intensity per person and per working hour as dependent variables are reported in Figure 10. In emerging countries, an impulse triggered by an increase the foreign intermediate input share or foreign value added share leads to a consistent and steady increase in capital intensity. The peak is observed approximately six years after the shock, resulting in an approximate 0.75 percent increase in capital intensity per working hour and a roughly 0.45 percent increase in capital intensity per person. Contrastingly, in advanced countries, a negative impact on both capital intensity measures is evident during the first five years following the shock, reaching a decline of around 0.25 percent. However, this negative effect transforms into a positive trend in the long run, mirroring the patterns observed in emerging countries.

Figure 8: Impulse responses - advanced countries (blue) vs. emerging countries (red)



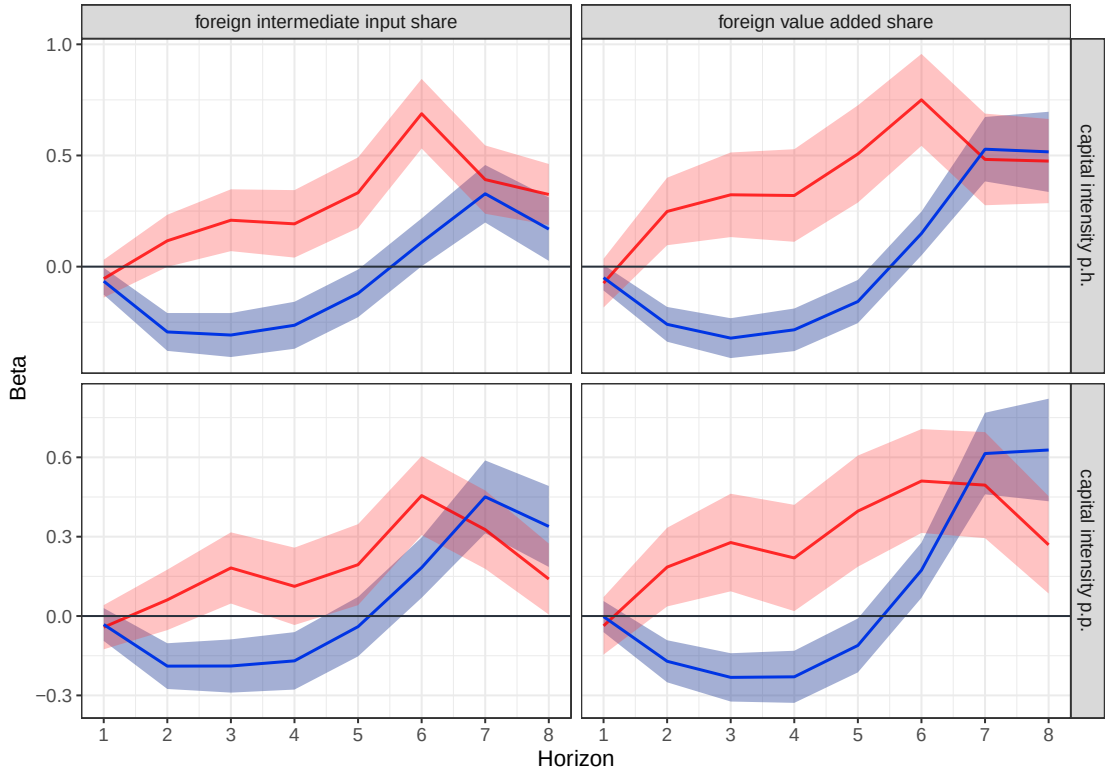
Notes: Responses to a one percent increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

Figure 9: Impulse responses - sectoral analysis - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to a one percent increase in the foreign intermediate input share ($FIIS$) or foreign value added share ($FVAS$). P.h. denotes per hour worked. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands. AB: agriculture, forestry and fishing, mining and quarrying, C: manufacturing, DE: utilities, F: construction, GN: trade and market services, OT: other services.

Figure 10: Impulse responses - capital intensity - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to one percent increase in the foreign intermediate input share or foreign value added share. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

4.3 Discussion

Although our first hypothesis that GVC participation is positively related to productivity holds for both country groups, the estimated effects differ in magnitude, being higher in emerging countries. This result is mainly driven by the country groups' different responses of capital intensity to increasing trade integration and it contributes to assessing the impact of GVC participation on catching-up mechanisms for productivity growth. A possible explanation for the fact that emerging countries' participation in GVC increases capital intensity are positive spillovers, embodied in fast-track development and technological upgrading. Advanced countries, however, accumulate more capital relative to labor due to lower cost of production by shifting labor-intensive activities to low-wage countries. The estimated difference for the two country groups regarding the relationship between international trade integration and capital intensity therefore suggests that the positive spillovers for emerging countries outweigh the positive effects from lower cost of production for advanced countries, ultimately leading to higher productivity growth in emerging countries.

Regarding the labor share of income, multiple interesting findings stand out. There is a strong

negative effect of increasing trade integration for emerging emerging countries while we find a positive effect of increasing the foreign value added share in advanced countries. This disparity can be explained by two important factors. Firstly, increasing international trade integration leads to negative shifts in employment for emerging countries versus positive shifts in advanced countries over the medium term. Notably, the negative effect on hours worked is slightly larger than the estimated reduction in employment, indicating an extension of working hours for the remaining workforce. Secondly, the different responses can be explained by the fact that only workers in advanced countries experience increases in real wage per person as a result of increasing international trade integration.

Abstracting from these direct observable channels and referring to formula (4) in section 2.3, we offer further explanations for the labor share's negative response in emerging countries. We derived the labor share of income as $(1 - \alpha)$ relative to $(1 + \mu)$ with α denoting output elasticity of capital and μ denoting markup. The first possibility is that capital's contribution to the production process becomes more severe due to the internationalization, leading to a higher α and consequently a lower labor share. This channel is supported by the strong correlation between international trade integration and capital intensity in emerging countries. The second explanation may be that the firms who enlarge their participation in GVC are fast growing firms with high domestic market power. Accordingly, they are able to further increase the markups due to internationalization, ultimately leading to declining labor shares. Hence, determining the predominate of these two channels through which GVC participation leads to decreasing labor shares leaves room for further research.

Lastly, we find a positive effect of increasing the foreign value added share on the labor share in advanced countries. However, the effect of increasing the foreign intermediate input share in this country group is less clear. A possible explanation for this ambiguity may be attributed to the nature of technological complementarity. While foreign intermediate inputs can be substituted for domestic labor in specific tasks, foreign value added might involve technologies that complement and enhance the capabilities of domestic labor, contributing positively to the labor share in advanced countries. The finding that the impact of $FVAS$ on employment and hours worked in advanced countries is more pronounced compared to the impact of $FIIS$ supports this possible channel.

However, it is worth mentioning that the positive relationship between the $FVAS$ and labor share does not hold for every advanced country. For the US, there is a significant negative effect of the change in $FVAS$ on labor share (Figure A.2 in the Appendix). This is in line with the findings of Elsby et al. (2013), who argue that offshoring is one of the determinants responsible for the decline in labor share in the US. Similarly, Dorn and Levell (2021) show that US industries which are strongly exposed to increasing net imports from China experience a larger decrease in wages and employment.

4.4 Robustness

So far, we inferred the change in $FIIS$ and $FVAS$ from the change in all other industries of the same country in the sample, intending to dodge possible issues with endogeneity. Although the predictive power of this instrument confirms its relevance, we can not rule out that unobserved local supply and demand shocks simultaneously affect both the outcome variables in a specific country-industry pair and the internationalization variables in the other industries of the same country, resulting in biased estimates. Alleviating this concern, we construct a weighted leave-out measure that derives the change in $FIIS$ and $FVAS$ in a specific industry from the change in other industries of the same broad sector of the same country. By focusing on the broader sector, we acknowledge the shared characteristics and economic dynamics within that sector, which can provide a measure of insulation against local (country-specific) shocks. While no instrument is entirely immune to externalities, using a sector-specific instrument is expected to be, on average, less sensitive to country-specific idiosyncratic shocks compared to the previous used instrument. However, it is important to recognize that this choice introduces a trade-off, as it may also introduce complexities related to sector-specific shocks that could impact both the outcome variable and internationalization variables. Confirming the relevance of this alternative measure, we regress the new instruments on the actual change in $FIIS$ and $FVAS$, respectively, see Table 2. Overall, the instruments are relevant and have a good predictive power for the actual values of $FIIS$ and $FVAS$ for every horizon. Accordingly, we re-estimate the impulse response functions for the baseline results. The results for the full sample as well as for advanced and emerging countries are reported in the Appendix (Figures A.3-A.4). Taken together, the results are slightly more pronounced, but qualitatively identical, ultimately supporting the baseline findings.

Up to this point we considered labor share as the compensation paid to employees relative to value added in current prices. Intuitively, this measure ensures that the labor share accounts for the share of income that is distributed to workers, but as pointed out by Gollin (2002), leaving out the compensation of the self-employed undervalues labor share and affects the variation over time. An accompanying feature is that the underestimation is dependent on the level of development of a country as shares of self-employed workers are higher in emerging countries. By including this group of workers in the measurement of labor share, we can thus account for a larger part of workforce in emerging countries. The estimated impulse responses for both country groups and both measures of labor share are shown in Figure A.5 in the Appendix. Despite a slight upward shift in the impulse response functions for emerging countries, the previous results remain robust to the inclusion of self-employed workers.

Table 2: Predictive relationship between other-industry (same sector and country) international trade integration and own-industry international trade integration

	Horizon							
	1	2	3	4	5	6	7	8
Panel A								
$\Delta \ln \tilde{z}_{ij,t}^{FIIS}$	0.644	0.633	0.639	0.651	0.675	0.683	0.677	0.665
	[27.332]	[26.054]	[25.655]	[25.664]	[26.953]	[29.381]	[25.577]	[21.421]
Observations	24120	22110	20100	18090	16080	14070	12060	10050
Effective F-Statistic	750	682	662	662	731	869	659	463
Adj.R^2	0.277	0.277	0.281	0.298	0.312	0.310	0.224	0.227
Panel B								
$\Delta \ln \tilde{z}_{ij,t}^{FVAS}$	0.607	0.605	0.603	0.611	0.624	0.637	0.588	0.563
	[30.218]	[29.191]	[27.553]	[27.315]	[28.087]	[29.171]	[23.664]	[19.617]
Observations	24120	22110	20100	18090	16080	14070	12060	10050
Effective F-Statistic	917	856	763	750	794	857	565	389
Adj.R^2	0.215	0.217	0.227	0.248	0.256	0.276	0.144	0.161

Notes: t-statistics are reported in brackets. Standard errors are clustered at the country-industry level. In Panel A (B), the dependent variable is the log difference in foreign intermediate input share (foreign value added share). The instrument $\tilde{z}_{ij,t}^{FIIS}(\tilde{z}_{ij,t}^{FVAS})$ is the weighted leave-out mean for the foreign intermediate input share (foreign value added share) in a country-industry pair, constructed by using all other industries within the same broad sector of the same country. We used the effective F-Statistic from Olea and Pflueger (2013).

5 Conclusions

Using data from input-output tables for 41 countries we have tried to shed light on the relationship between international trade integration, productivity growth and the functional income distribution. Our first hypothesis that international trade integration is positively associated with productivity growth is compatible with the data; the hypothesis that there is no relation is clearly rejected. The results for our second hypothesis that productivity gains are unequally distributed to labor income and capital income or profits depend on the sample under consideration. In emerging countries, the relationship between labor share and trade integration is predominantly negative, influenced mainly by the agricultural and mining sector, the manufacturing sector, and the sector for trade and market services. Conversely, in advanced economies, the nature of internationalization matters as we find that trade in value added has a more substantial impact on the labor share compared to trade in intermediate inputs. Furthermore, our research will be beneficial in assessing the economic consequences of the COVID-19 pandemic. Global trade integration has slowed down immediately after the financial crisis for a short period and we expect at least a similar decline in the degree of globalization for the current crisis. Due to the regionalization of international supply chains and the subsequent reduction in the dependency on these, the share of productivity growth that can be attributed to GVC participation will likely decrease and the effects on the labor share will be suppressed.

A weakness of our findings is that we are not able to distinguish between skilled and unskilled workers in our sample.[10] Since efficiency gains might not be equally distributed across different groups of workers, the rewards of factor inputs are potentially affected; moreover individual effects interact with general equilibrium effects (Hornbeck and Moretti, 2018). In contrast to the Kuznets hypothesis, income inequality did not fall with rising per capita income. It increased in many advanced economies over the recent decades, most notably in the US and the UK. While owners of capital and high-skilled labor benefited from the evolution, income shares for the medium and low skilled workers declined (Timmer et al., 2014). The role of GVC in explaining these shifts is still unclear. Helpman (2017) concluded that international trade integration has an impact on inequality only over long periods, but the effects are minor compared to other drivers like skill-biased technological progress. Autor et al. (2003) and Autor et al. (2008) argued that increased computerization crowded out jobs for routinized tasks and contributed to relative income losses of the medium skilled. According to Lopez Gonzalez et al. (2015) GVC can reduce inequality in industrial countries, if production is close to final demand. Outsourcing of low skilled tasks leads to productivity gains of the remaining low-skilled workers in the home country and rising wages, i.e. wage differentials between high and low skilled decline. In principle, this response could outweigh the initial downward pressure on wages of the low skilled (Grossman and Rossi-Hansberg, 2008). However, international trade integration can also increase skill premiums (Lee and Yi, 2018). Therefore, in future research we will extend our analysis to the relationship between international trade integration and inequality.

[10]International trade integration does not only affect skilled and unskilled workers but also other groups of workers in different ways. Galle et al. (2022) set-up a model in which workers in export-oriented and import-oriented industries are affected differently by international integration. Luck (2019) shows that the effects of outsourcing and offshoring depend on labor market frictions.

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Appendix

Table A.1: Countries

Acronym	Country	Acronym	Country	Acronym	County
AUS	Australia	GBR	United Kingdom	NLD	Netherlands
AUT	Austria	GRC	Greece	NOR	Norway
BEL	Belgium	HRV	Croatia (e)	POL	Poland (e)
BGR	Bulgaria (e)	HUN	Hungary (e)	PRT	Portugal
BRA	Brazil (e)	IND	India (e)	ROU	Romania (e)
CAN	Canada	IDN	Indonesia (e)	RUS	Russian Federation (e)
CHE	Switzerland	IRL	Ireland	SVK	Slovakia
CYP	Cyprus	ITA	Italy	SVN	Slovenia
CZE	Czech Republic	JPN	Japan	SWE	Sweden
DEU	Germany	KOR	South Korea	TUR	Turkey (e)
DNK	Denmark	LTU	Lithuania	USA	United States
ESP	Spain	LUX	Luxembourg		
EST	Estonia	LVA	Latvia		
FIN	Finland	MEX	Mexico (e)		
FRA	France	MLT	Malta		

Notes: Emerging economies are marked by (e). Classification of emerging economies from IMF (`https://www.imf.org/external/pubs/ft/weo/2018/01/weodata/groups.htm#ae`).

Table A.2: Industry classification (A-F)

No.	NACE Code	Description
	A	*Agriculture, forestry and fishing*
1	A01	Crop and animal production, hunting and related service activities
2	A02	Forestry and logging
3	A03	Fishing and aquaculture
	B, C, D, E	*Manufacturing, mining and quarrying and other industry*
4	B	Mining and quarrying
5	C10-C12	Manufacture of food products, beverages and tobacco products
6	C13-C15	Manufacture of textiles, wearing apparel and leather products
7	C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
8	C17	Manufacture of paper and paper products
9	C18	Printing and reproduction of recorded media
10	C19	Manufacture of coke and refined petroleum products
11	C20	Manufacture of chemicals and chemical products
12	C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
13	C22	Manufacture of rubber and plastic products
14	C23	Manufacture of other non-metallic mineral products
15	C24	Manufacture of basic metals
16	C25	Manufacture of fabricated metal products, except machinery and equipment
17	C26	Manufacture of computer, electronic and optical products
18	C27	Manufacture of electrical equipment
19	C28	Manufacture of machinery and equipment n.e.c.
20	C29	Manufacture of motor vehicles, trailers and semi-trailers
21	C30	Manufacture of other transport equipment
22	C31_C32	Manufacture of furniture; other manufacturing
23	C33	Repair and installation of machinery and equipment
24	D35	Electricity, gas, steam and air conditioning supply
25	E36	Water collection, treatment and supply
26	E37-E39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services
	F	*Construction*
27	F	Construction

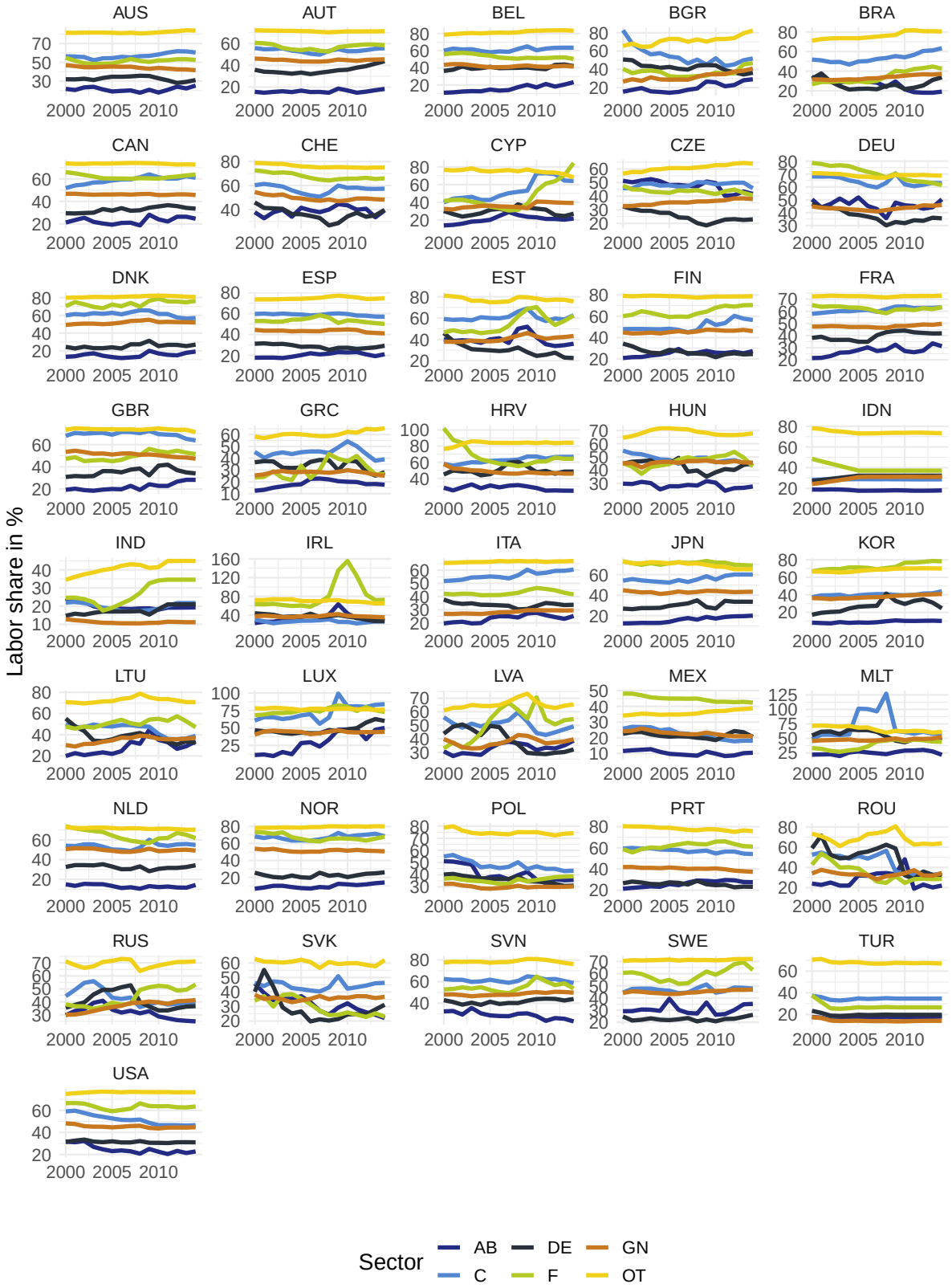
Source: European Commission (2008).

Table A.3: Industry classification (G-U)

No.	NACE Code	Description
	G-T	*Trade and Services*
28	G45	Wholesale and retail trade and repair of motor vehicles and motorcycles
29	G46	Wholesale trade, except of motor vehicles and motorcycles
30	G47	Retail trade, except of motor vehicles and motorcycles
31	H49	Land transport and transport via pipelines
32	H50	Water transport
33	H51	Air transport
34	H52	Warehousing and support activities for transportation
35	H53	Postal and courier activities
36	I	Accommodation and food service activities
37	J58	Publishing activities
38	J59_J60	Motion picture, video and television programme production, sound recording and music publishing activities; programming and broadcasting activities
39	J61	Telecommunications
40	J62_J63	Computer programming, consultancy and related activities; information service activities
41	K64	Financial service activities, except insurance and pension funding
42	K65	Insurance, reinsurance and pension funding, except compulsory social security
43	K66	Activities auxiliary to financial services and insurance activities
44	L68	Real estate activities
45	M69_M70	Legal and accounting activities; activities of head offices; management consultancy activities
46	M71	Architectural and engineering activities; technical testing and analysis
47	M72	Scientific research and development
48	M73	Advertising and market research
49	M74_M75	Other professional, scientific and technical activities; veterinary activities
50	N	Administrative and support service activities
51	O84	Public administration and defense; compulsory social security
52	P85	Education
53	Q	Human health and social work activities
54	R_S	Other service activities
55	T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
56	U	Activities of extraterritorial organizations and bodies

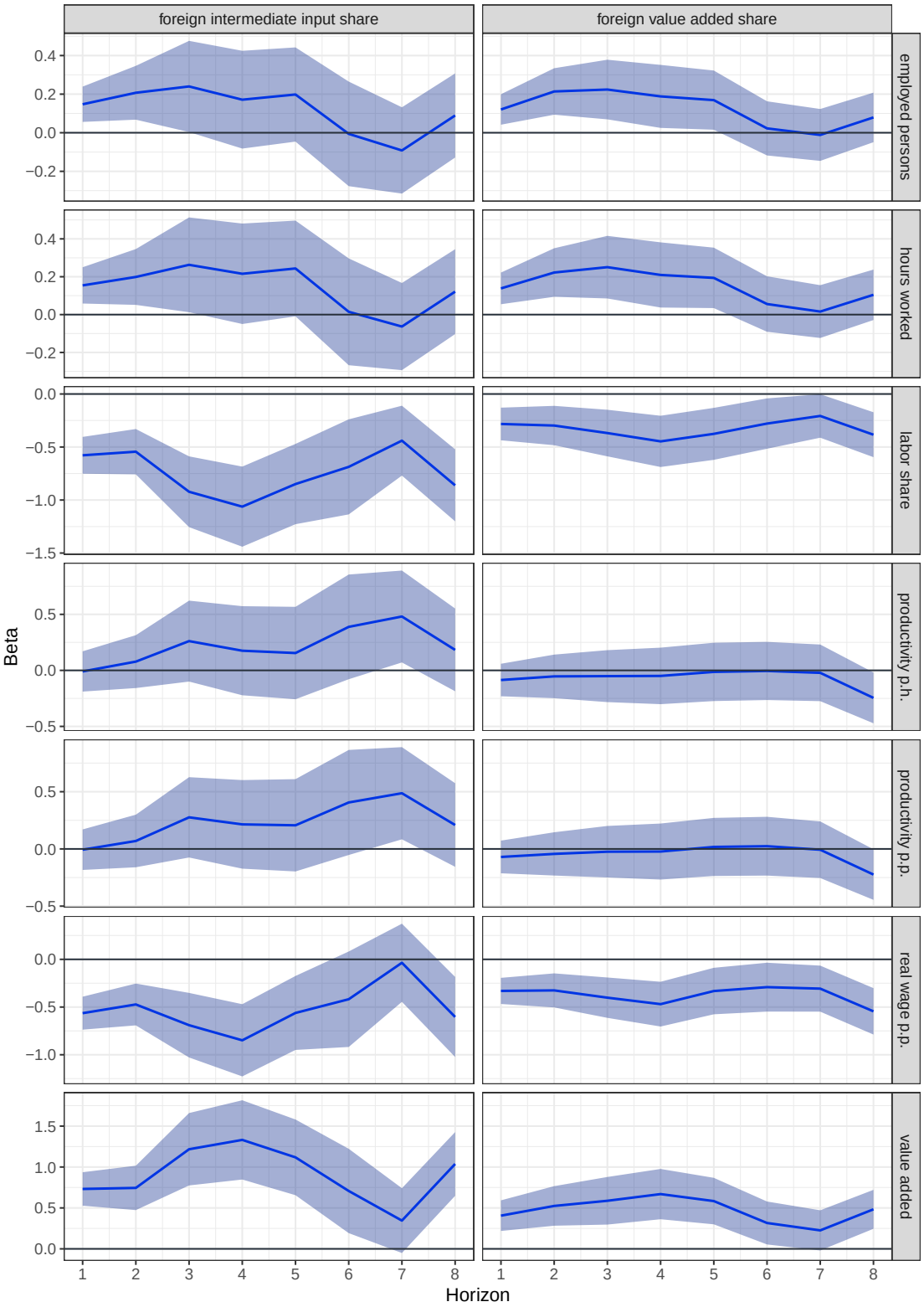
Source: European Commission (2008).

Figure A.1: Labor shares by country and sector



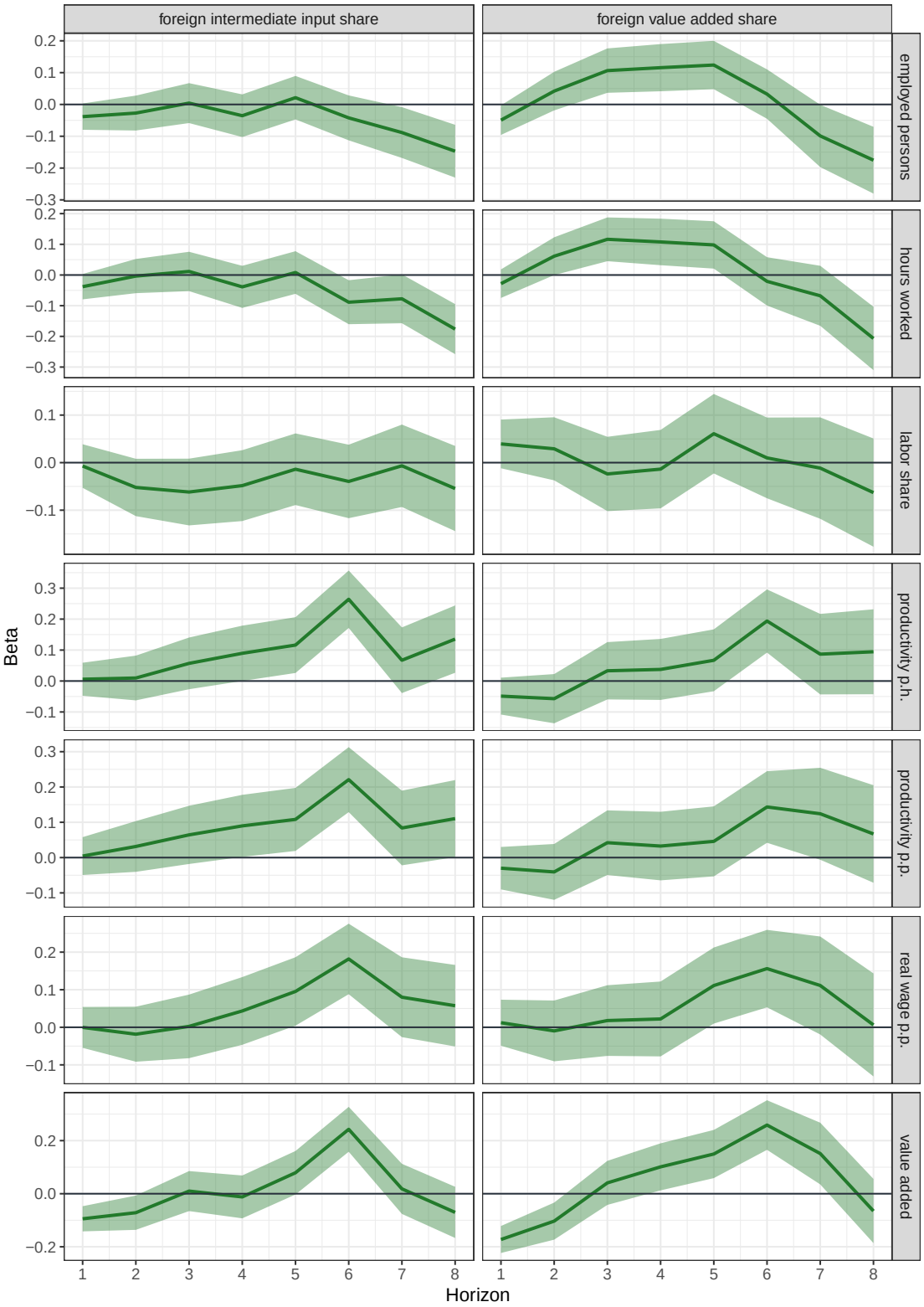
Source: Word Input-Output Database, own calculations.

Figure A.2: Impulse responses - USA



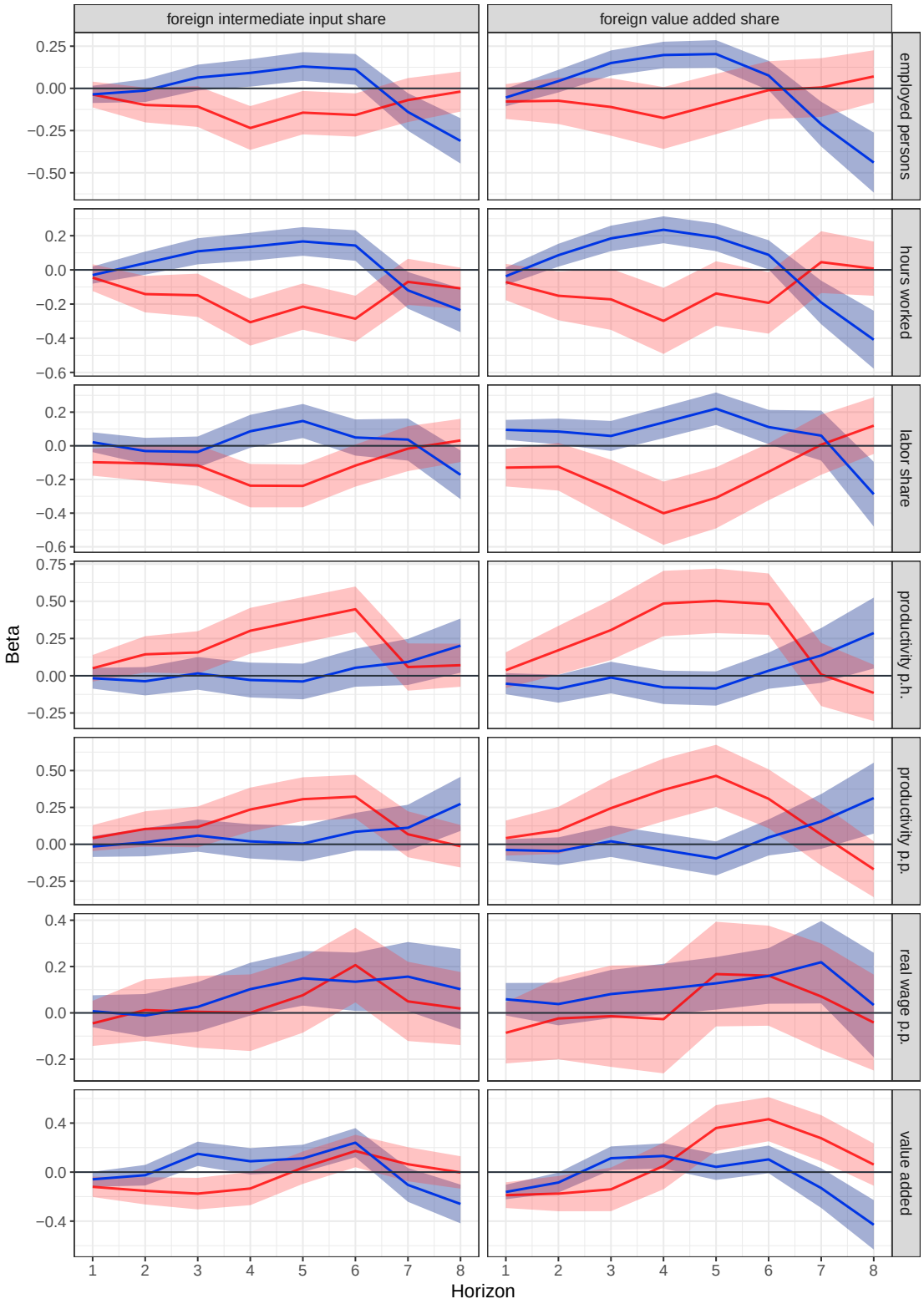
Notes: Responses to a one percent increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

Figure A.3: Impulse responses - alternative instruments - full sample



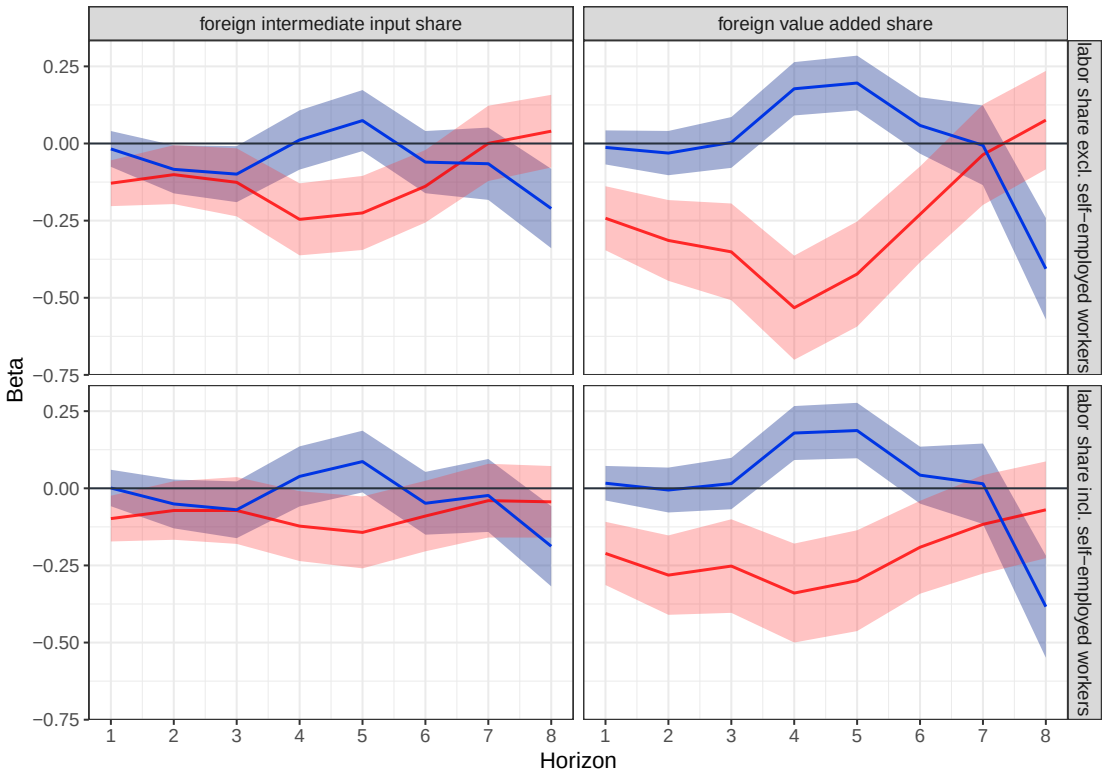
Notes: Responses to a one percent increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

Figure A.4: Impulse responses - alternative instruments - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to a one percent increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

Figure A.5: Impulse responses - labor share including self-employed workers - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to one percent increase in the foreign intermediate input share or foreign value added share. Standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

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