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IZA DP No. 16010

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ABSTRACT

Globalization, Productivity Growth, and Labor Compensation*

We analyse 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. First, we corroborate on the country-industry level that international trade integration increases productivity. Second, we show that international trade integration is associated with higher labour shares in advanced countries but with lower labour shares in manufacturing industries in emerging markets. Finally, we briefly discuss the implications of our results for a possible throwback in international trade integration due to experiences from recent crises.

JEL Classification: F4, F6, J3

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

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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 individual industries. 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. Global economic growth has been largely driven by further advances in the international division of labor. Second, and perhaps even more important, the response of the labor share to increasing trade integration is heterogeneous both across industries 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 is based on local projections and we account for the endogenous nature of international trade variables by constructing a leave-out measure that infers the change in inter-

national trade intensity in a specific country-industry pair from the change in the same industry of other countries. Our major findings underpin a positive relationship between the degree of international trade integration and productivity for both advanced and emerging countries. For our second hypothesis that productivity gains are unequally distributed to labor income and capital income or profits, the results differ for the country groups and sectors under consideration. We find that in advanced countries the labor share is in general positively related to the degree of trade integration but not in the US, where it is negatively related. For manufacturing industries in emerging countries there is also evidence for a negative relationship. The structure of the paper is 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 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.

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

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 sectors.

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. 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. Similarly, Pahl and Timmer (2020) show that GVC participation benefits productivity in manufacturing sectors of developing countries. 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:

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

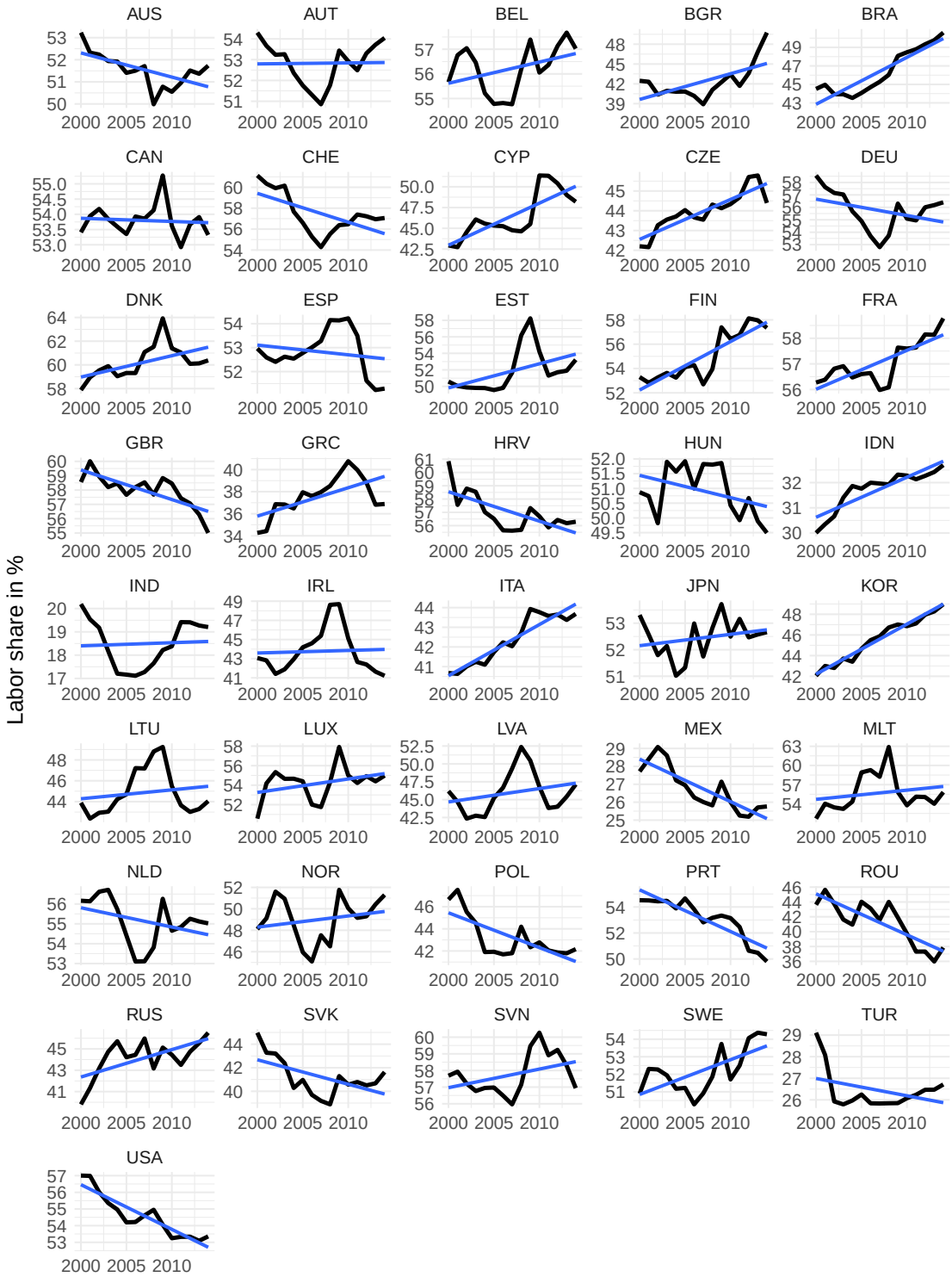
where Y denotes output, K capital and N labor. Changes in A capture technological progress and α is a constant parameter. Marginal productivity of labor is then given by:

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

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

[2]Capital-labor substitution triggered by automation is also seen by other researchers as a substantial cause for the fall in the labor share (Autor and Salomons, 2018; Ray and Mookherjee, 2020; 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.

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

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. Resources are accordingly shifted to firms with high profits and a low share of labor in value added which leads to a decline in aggregate labor shares. According to Eggertsson et al. (2021), globalization might lead 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., 2018). 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]There are also other explanations for the decline in the labor share. Karabarbounis and Neiman (2014), for example, attribute most 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

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 sectors (Timmer et al., 2015; Timmer et al., 2016).[5] The countries and the sectors 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]
- We exclude the sectors 55 and 56 (activities of households as employers and of extraterritorial organizations and bodies).
- We exclude country-sector 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).

and Vincent, 2018). 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 Grossman and Oberfield (2021).

[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.

3.2.1 Foreign intermediate input share

Denote intermediate inputs used in sector j and country i from sector ℓ in country k by $ii_{ij}^{k\ell}$. Then total intermediate inputs ii_{ij} of sector 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 sector 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 sector of interest, and zeroes elsewhere. The final output for that country and sector 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 sector. 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 sector. Setting the values of the resulting vector to zero for domestic sectors for each individual

country and summing up by sector yields the foreign value added included in domestic sectors. Relating the foreign value added to total value added of a country-sector combination gives the share of foreign value added in total value ($FVAS$) added by country and sector.

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.

3.3 Productivity growth

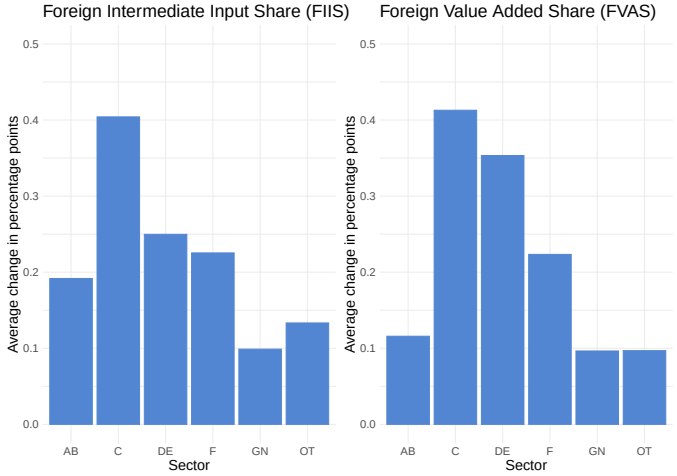
Productivity in country i and sector j is measured in terms of value added per employed person ($prodn$) and value added per hour worked ($prodh$), respectively:

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

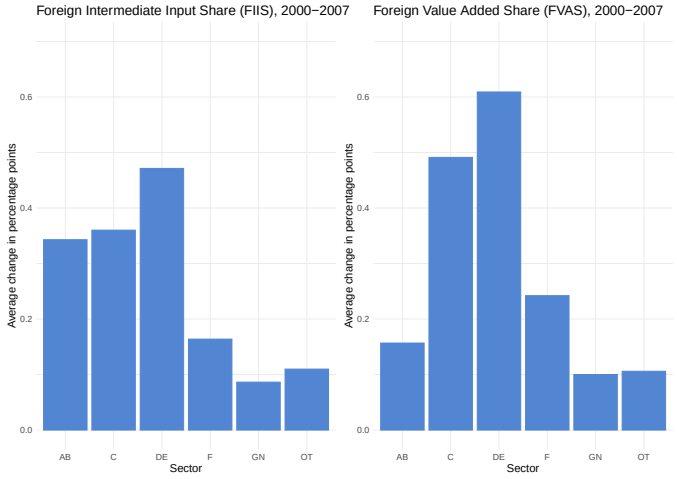
where va_{qi} denotes gross value added in volume indices with 2010=100. $empe$ and h_{empe} denote the number of employees and the total hours worked by employees, respectively. Both $prodn$ and $prodh$ are normalized to 100 in 2000. Figure 4 shows the development of productivity by sector. Productivity growth has been highest in the manufacturing sector. Within manufacturing, 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 2: Measuring globalization

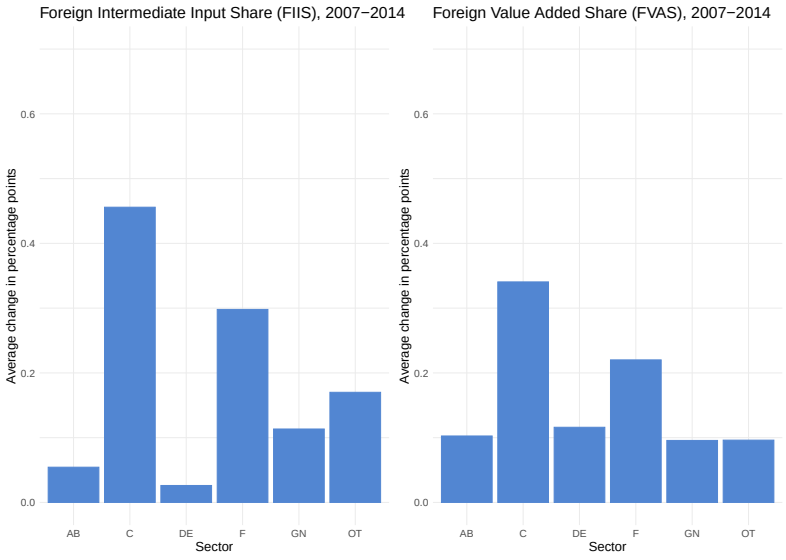
(a) Average annual change, full sample 2000-2014, by sector



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

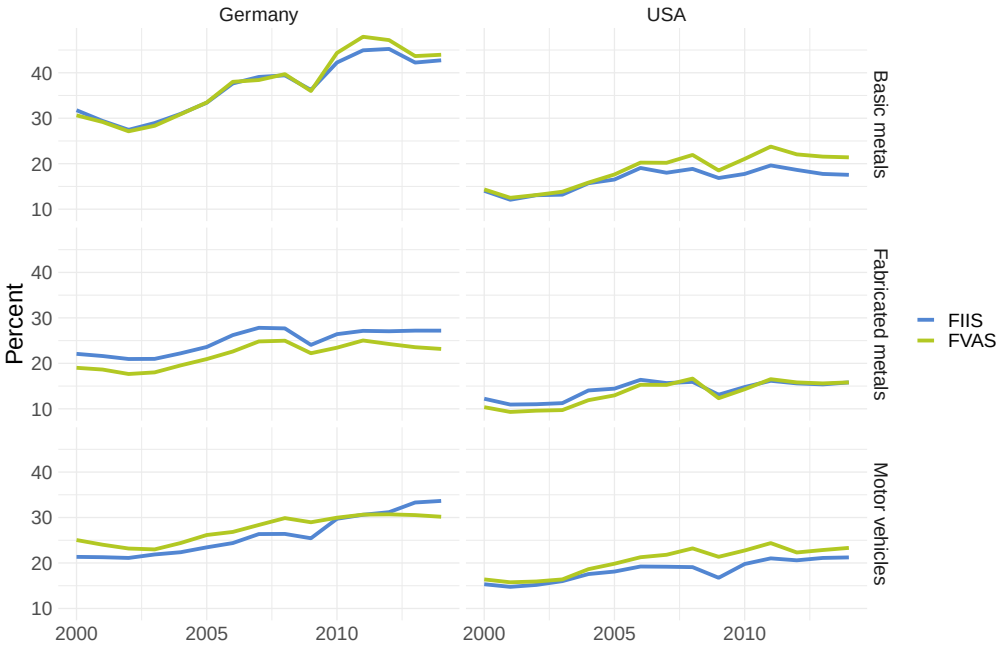


(c) Average annual changes, after financial crisis, by sector



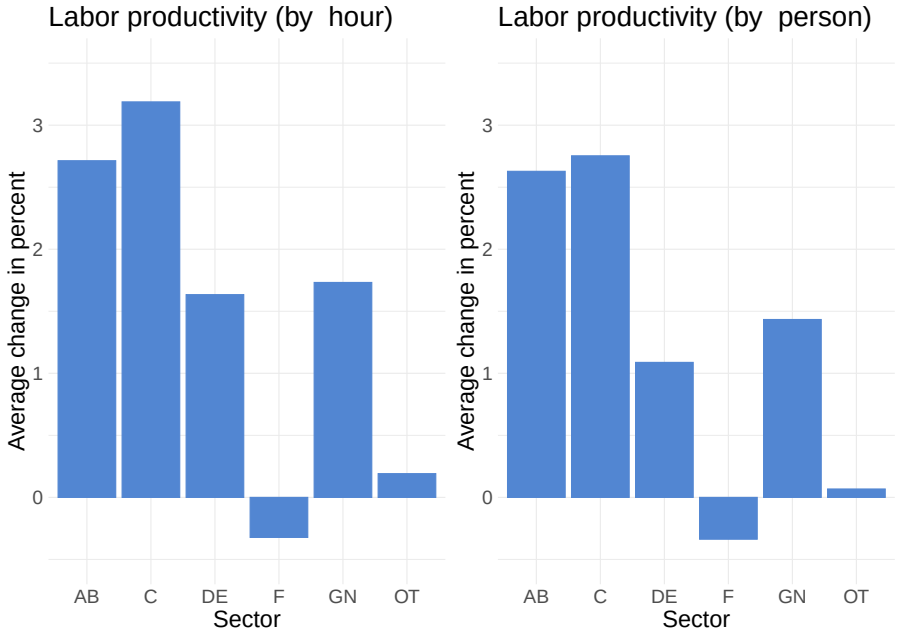
Notes: AB: agriculture, forestry and fishing, mining and quarrying, C: manufacturing, DE: utilities, F: construction, GN: trade and market services, OT: other services. *Source:* WIOD and own calculations.

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



Source: WIOD and own calculations.

Figure 4: Change in labor productivity 2000-2014



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

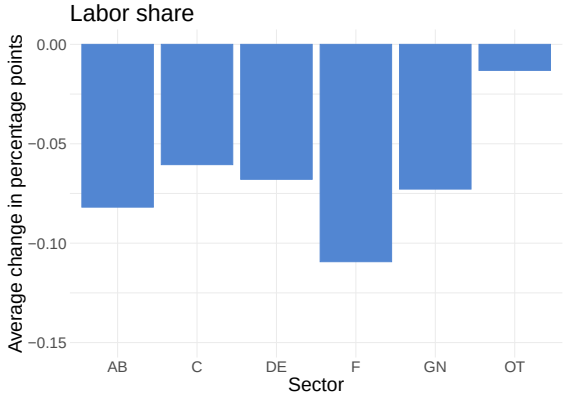
3.4 Change in labor compensation

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.

Figure 5: Change in labor share 2000-2014



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

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

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

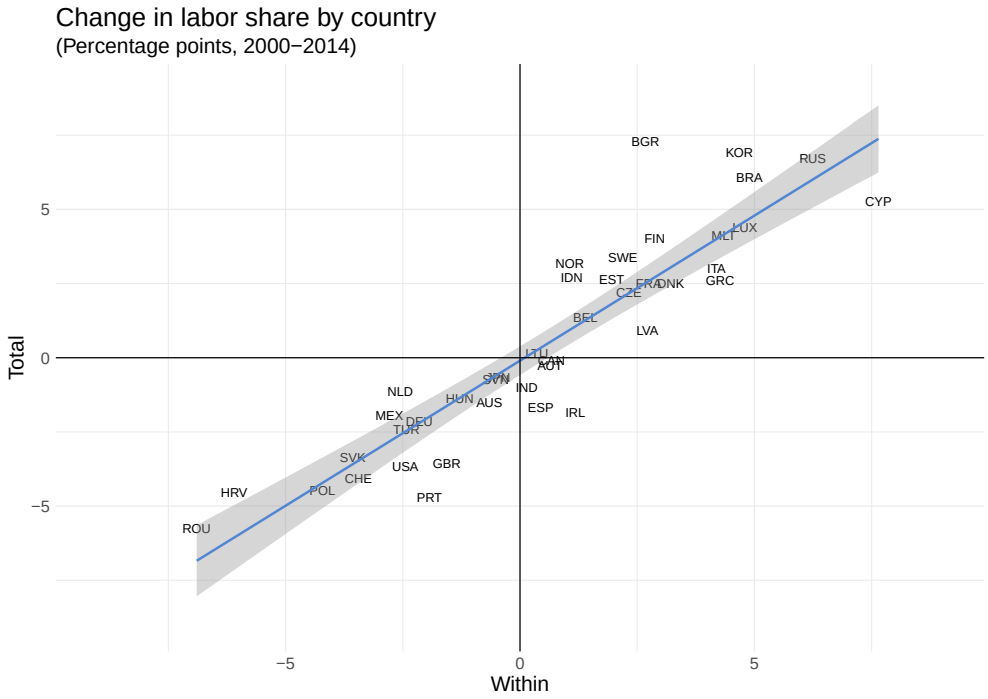
[7] Various possibilities to define and to measure the labor share are discussed in Mućk et al. (2018).

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]

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.

[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.

4 Empirical analysis

4.1 Estimation approach: Endogeneity and timing

Estimates of the effect of internationalization on productivity and labor share can be biased because internationalization variables may be endogenous, that is they are correlated with the corresponding error terms. In particular, the labor share and the internationalization variables in a specific industry of a country may be hit by the same local supply and demand shocks.[9] A possible solution is to use a leave-out measure that excludes the change in international trade intensity in the own industry, similar to Autor and Salomons (2018). We regress the change in $FIIS$ and $FVAS$ industry by industry on industry-time dummies (α_{jt}), and obtain information on $FIIS$ and $FVAS$, respectively, for the industry under consideration:

$$\Delta FIIS_{ijt} = \alpha_{jt}^{i'} + \varepsilon_{ijt}, \qquad i \neq i' \tag{15}$$

For a specific country-industry pair (i', j) we leave out the values of $FIIS$ for country i' in the estimation, that is, the change of $FIIS$ in a specific industry is inferred from the change in the same industry of all other countries in the sample:

$$\Delta \widehat{FIIS}_{ijt} = \widehat{\alpha}_{jt}^{i'}. \tag{16}$$

The same approach is applied to $FVAS$. Overall, the fitted values 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. However, a possible drawback is that the identification strategy requires that both the labor share in a specific country-industry pair and the internationalization variables of the same industry in other countries are independent from unobserved global shocks. In the robustness section, we provide an alternative approach and further discuss the strengths and weaknesses of both strategies.

In order to explore the dynamic relationship between international trade integration and productivity and labor compensation, we use local projections (Jordà, 2005). This approach estimates impulse responses at each forecast horizon and thus allows for more flexibility than a parametric model. We specify the model as follows:

[9] See Dauth et al. (2014) for a discussion.

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

	Dependent variable	
	$\Delta FIIS$	$\Delta FVAS$
$\Delta \widehat{FIIS}$	0.907	
	(0.030)	
	[30.375]	
$\Delta \widehat{FVAS}$		0.860
		(0.023)
		[37.152]
Observations	28,784	28,784
R^2	0.078	0.123
F-Statistic	2,440.639	4,029.092

Notes: All models weighted by industry value added shares within countries, multiplied by time-varying country shares in total value added. The number of observations is equal to the number of country-industry cells multiplied by the number of years. Standard errors are clustered by country-industry and reported in parentheses, t-statistics in brackets.

$$\begin{aligned} y_{ij,t+h} - y_{ij,t} &= \beta_0^h + \beta_1^h \Delta \widehat{FIIS}_{ij,t+1} \\ &\quad + \beta_2^h \Delta \widehat{FIIS}_{ij,t} + \beta_3^h \Delta y_{ij,t} + \beta_4^h \Delta y_{ij,t-1} \\ &\quad + \alpha_i^h + \alpha_j^h + \alpha_t^h + \varepsilon_{ijt}^h, \end{aligned} \tag{17}$$

where $h = 1, \ldots H$ and 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 percentage point increase in foreign intermediate input shares. To allow for feedback effects within the model, we control for lagged values of the change in foreign intermediate input share ($\Delta \widehat{FIIS}_{ij,t}$) and for lagged values of the outcome variable, $\Delta y_{ij,t}$ and $\Delta y_{ij,t-1}$. Country, industry and time fixed effects are denoted by α_i^h, α_j^h and α_t^h, respectively. We use employment or value added, respectively, as weights, and standard errors are clustered by country-industry. The model specification remains the same when we substitute the impulse variable for the change in foreign value added share ($\Delta \widehat{FVAS}_{ij,t}$).

4.2 Baseline results

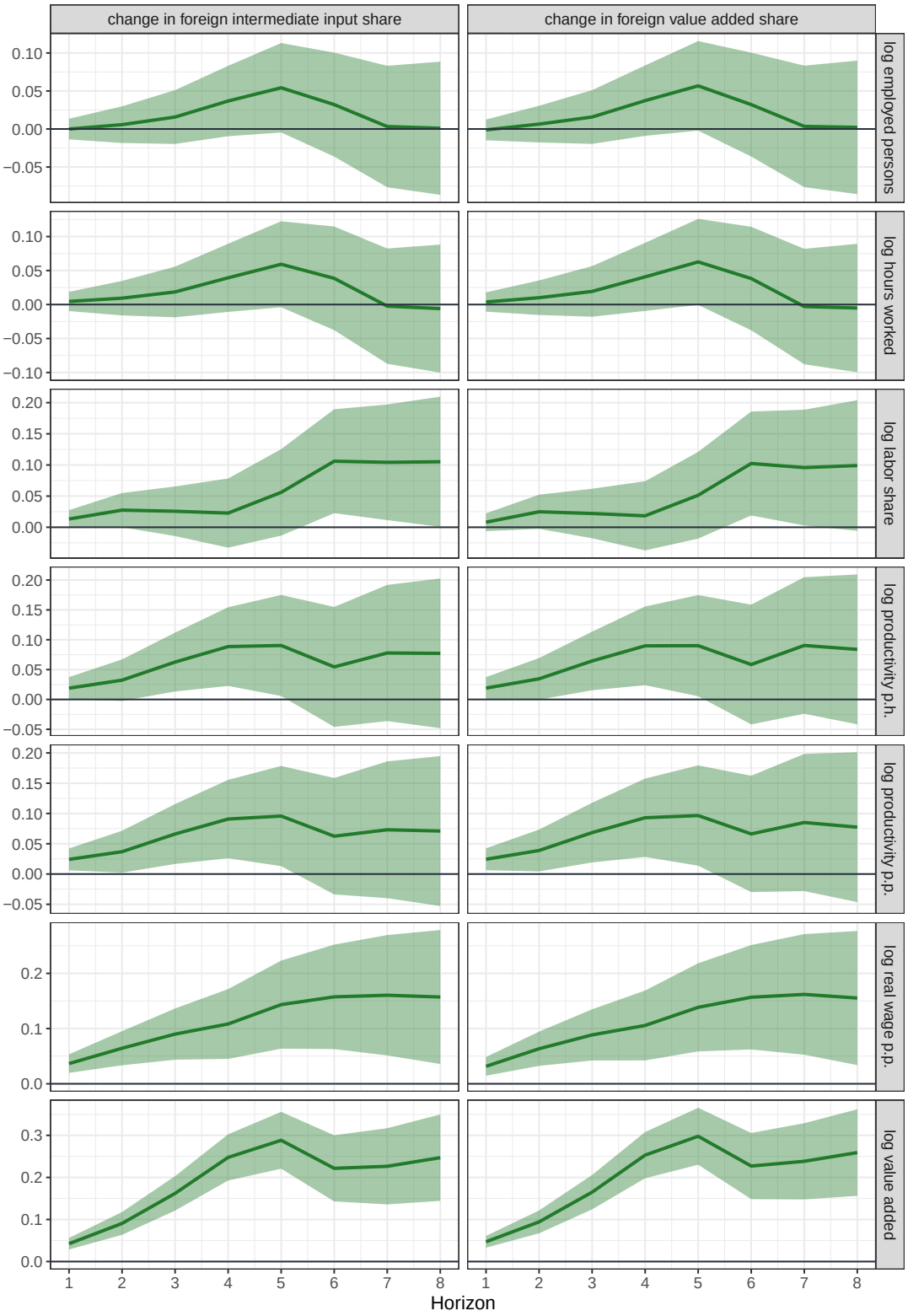
In this section, we present the estimated impulse response functions obtained from the local projection framework.[10] First, we report the results for the full sample consisting of 41 countries and 54 industries for the period from 2000 to 2014. Subsequently, we further disentangle the effects of globalization 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 industries 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 by an increase in the foreign intermediate input share ($FIIS$) or the foreign value added share ($FVAS$), measured by a one percentage point increase, leads to a significant increase in both productivity per person and per hour worked. The effect summits with a 0.1% increase in both productivity measures before slightly falling after the fifth year. For both employed persons and total hours worked, the results are insignificant. Value added and real wage per person are both strongly and positively affected by an increase in international trade intensity. Regarding the labor share of income, a one percentage point increase in $FIIS$ or $FVAS$ leads to a 0.1% increase, six years after the shock. Considering the full sample with all countries and sectors, our second hypothesis that increasing GVC participation is associated with a decline in labor share can clearly be rejected.

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. The estimated impulse response functions are presented in Figure 8. For both advanced and emerging countries, an increase in $FIIS$ and $FVAS$ leads to an increase in both productivity per person and per hour worked. However, the productivity gains are on average around double the size for emerging than for advanced countries. Additionally, international trade integration's positive impact on value added is substantially higher for emerging countries. For employed persons and hours worked, only advanced countries significantly benefit from a higher degree of globalization. Real wage per person is positively affected for both country groups. In contrast to our second hypothesis that labor share is decreasing in the degree of globalization, advanced countries experience a rise in labor share caused by an increase in $FIIS$ and $FVAS$. Being significant for all except for the four-year horizon, the effect accelerates to a roughly 0.15% increase over time. For emerging countries, the results suggest that the productivity gains are distributed equally to labor and capital as the labor share is unaffected by an increase in the degree of international trade integration.

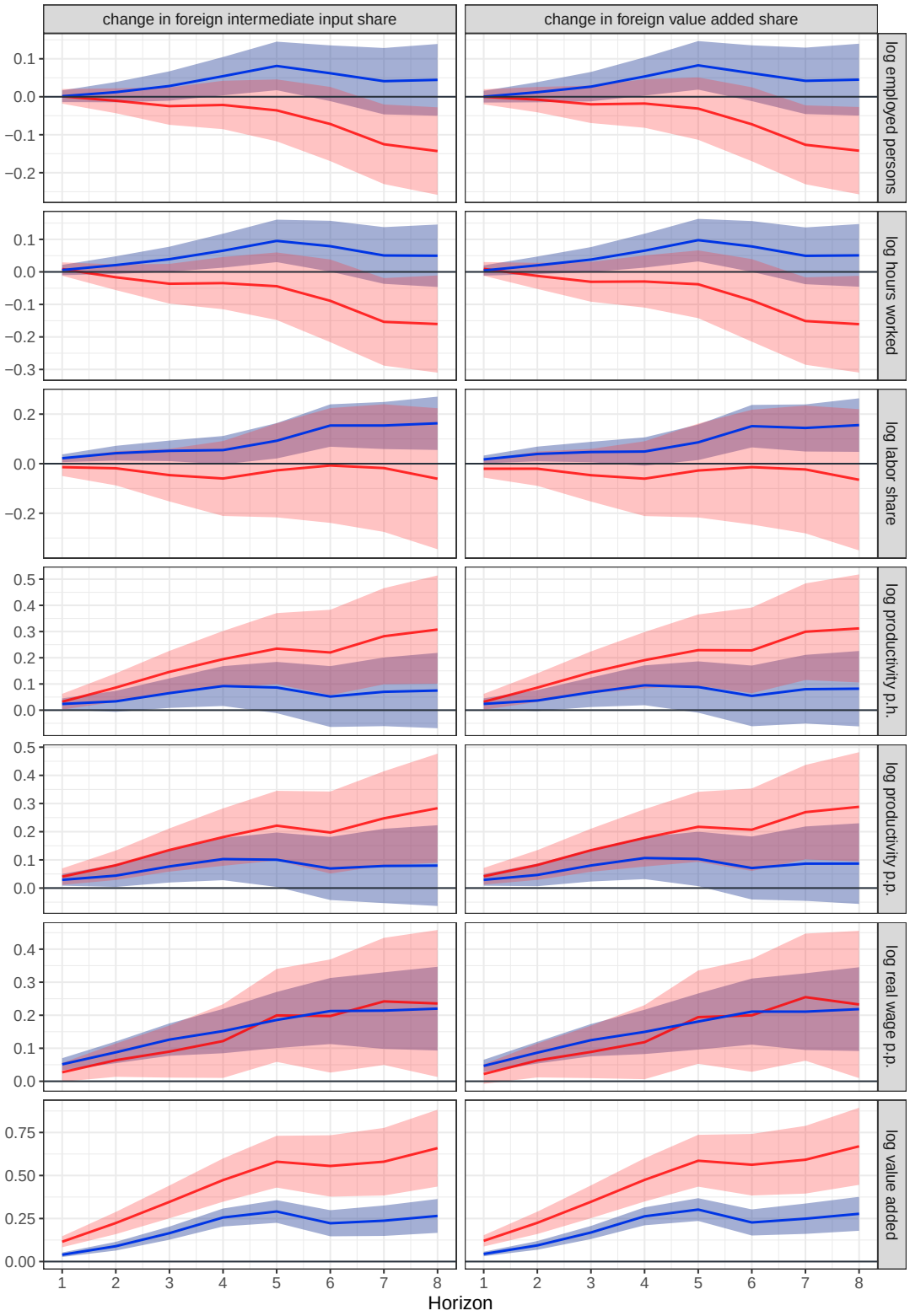
[10] For robustness, we also estimated impulse responses with the original values for the foreign intermediate input share and the foreign value added share. Albeit not presented, the results are qualitatively identical to the results obtained by using the proxies and can be obtained from the authors upon request.

Figure 7: Impulse responses - full sample



Notes: Responses to a one percentage point 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. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

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



Notes: Responses to a one percentage point 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. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

Sectoral Analysis. We group the 54 industries into 6 broad sectors: AB, C, DE, F, GN, and OT (see Tables A.2 and A.3 in the Appendix). We report estimated impulse response functions for sector C (Figure 9), the manufacturing sector, in detail as it is the sector which experienced the highest average annual increase in foreign intermediate input share and foreign value added share (see Figure 2). This sector accounts for around one third of observations in the data. Estimates for the other sectors can be found in the Appendix (Figures A.2-A.6). For advanced countries, an impulse caused by $FIIS$ or $FVAS$ leads to a roughly 0.1% increase in productivity per person, around 4 years after the shock. The effect is not persistent as it slowly decreases close to zero over the long run. Albeit being insignificant for every horizon, the impulse response function for productivity per hour has a similar shape. For emerging countries, the estimated effect on both productivity measures is substantially stronger for every horizon. In the long run, it rises to a roughly 0.45% increase in productivity per working hour and per person, respectively. Interestingly, there is a negative impact on labor share that accelerates over time in this country group, being significant for almost all periods.[11] Labor shares in the manufacturing sector of advanced countries, however, significantly benefit after the fifth year. Another remarkable difference between the country groups is the estimated impact on value added. Five years after the impulse, value added increases by around 0.3% and 0.7% for advanced and emerging countries, respectively. While this effect subsides for advanced countries, it continues to rise to a 0.9% increase for the manufacturing sector of emerging countries.

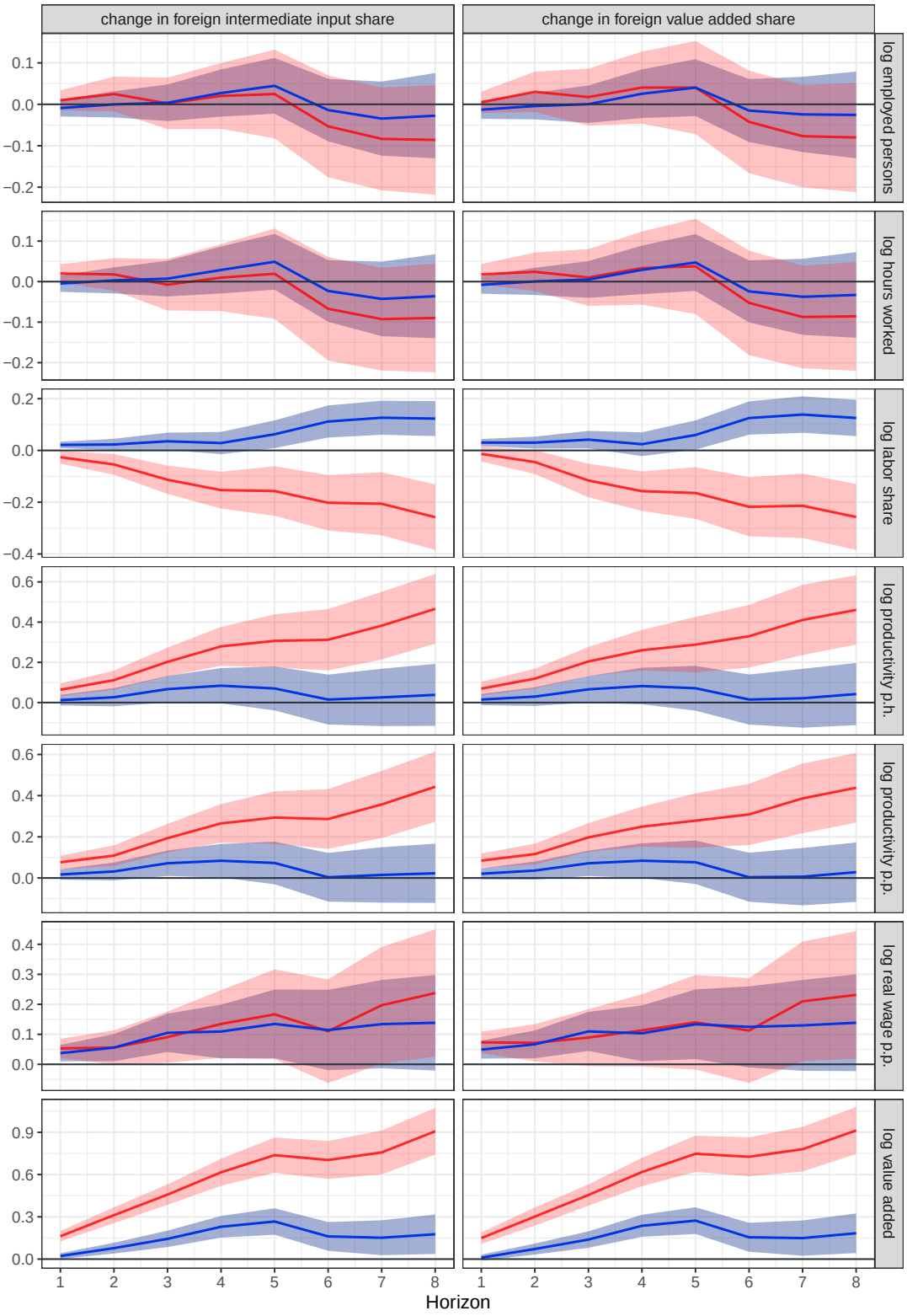
Capital intensity. For both country groups, the estimated impulse response functions with capital intensity per person and per working hour as dependent variables are reported in Figure 10. An impulse caused by the foreign intermediate input share or foreign value added share leads to a steady increase in capital intensity for both country groups. Once more, this effect is considerably stronger for emerging countries. Eight years after the shock, capital intensity increases by 1% for emerging countries as opposed to roughly 0.3% for advanced countries.

4.3 Discussion

Although our first hypothesis that GVC participation is positively related to productivity holds for both country groups, the estimated effects differ substantially 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

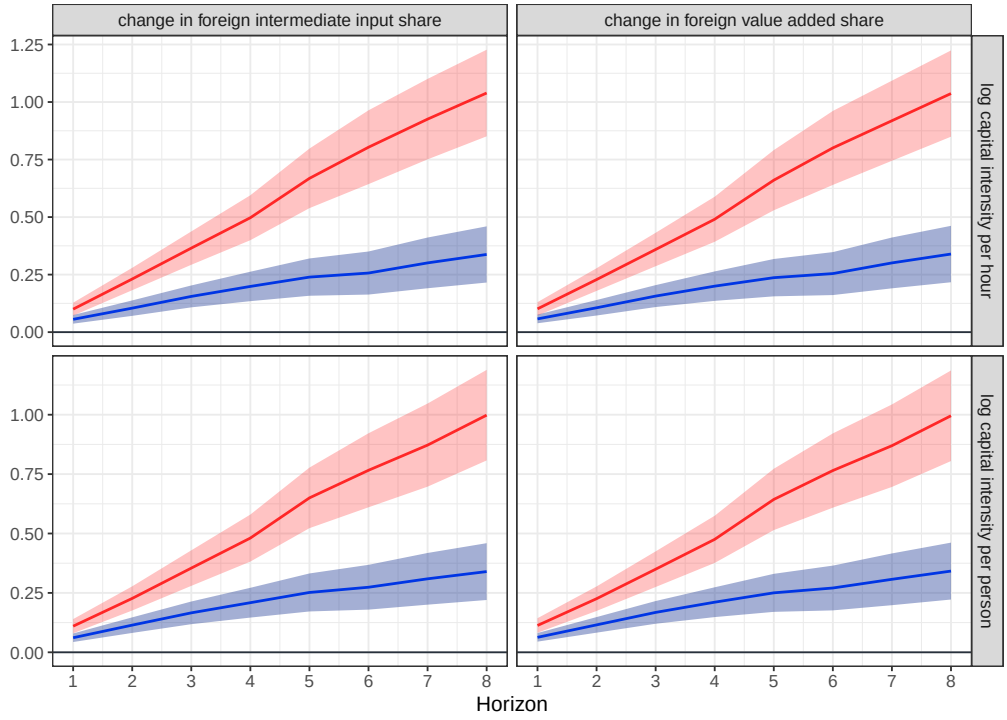
[11] This result is supported by the findings of Guschanski and Onaran (2021) as they also show that there is a negative correlation between increased global integration and labor shares in manufacturing industries of emerging countries.

Figure 9: Impulse responses - sector C (manufacturing) - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to a one percentage point 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. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

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



Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. Employed persons and hours worked, respectively, are used as weights, and standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

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.

We find a positive effect of an increase in the degree of international trade integration on labor shares in advanced countries while other researchers have also found indication for the opposite effect. The work by Dao et al. (2020) shares similar approaches with our study as they also consider variables capturing trade in intermediate inputs as measure for globalization. According to their findings, global integration is the second most important determinant responsible for the fall in labor share in advanced countries. For emerging countries, they find that global integration is the key driver for the decline in labor share. A serious drawback of their study is, however, that they do not account for a possible endogeneity bias caused by the internationalization variables. An explanation for our result may be that in industries experiencing a greater degree of outsourcing the remaining workers earn higher wages as real wage per person is posi-

tively affected as well. Moreover, it is reasonable to argue that, instead of an increase in overall unemployment due to the ceasing of workers in industries with a higher degree of outsourcing, the allocation of workforce shifts to other industries as overall employment is positively affected by trade integration. However, it is worth mentioning that the positive relationship between international trade intensity and labor share does not hold for every advanced country. For the US, there is a significant negative effect of the change in foreign intermediate input share on labor share (Figure A.7 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.

Interestingly, labor shares in manufacturing industries of emerging countries are negatively affected by increasing international trade integration. We offer two possible explanations for this result based on formula (4) in section 2.3. 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.

4.4 Robustness

So far, we inferred the change in $FIIS$ and $FVAS$ from the change in the same industry of other countries in the sample, intending to dodge possible issues with endogeneity. Although the predictive power of this instrument confirms its relevance, we can not entirely rule out that unobserved global supply and demand shocks simultaneously affect both the labor share in a specific country-industry pair and the internationalization variables in the same industry of other countries, resulting in biased estimates. Additionally, there may be a problem of reverse causality between labor share and the constructed variable. For example, as intra-industry trade became an increasingly important part of global trade, it may be that declining labor shares in a specific country-industry pair could facilitate the decision of firms in the same industry of other countries to further offshore their production to this country-industry pair. Circumventing these possible issues and considering alternative proxies, we construct a leave-out measure that derives the change in $FIIS$ and $FVAS$ in a specific industry from the change in all other

industries of the same country. The major advantage over the former identification strategy is that the variation in $FIIS$ and $FVAS$ of other industries in the same country is independent from industry-specific global shocks. A drawback is, however, that this approach does not entirely rule out the possibility that country-specific unobservable shocks may simultaneously affect the labor share of the industry under consideration and the internationalization variables of other industries in the same country. Confirming the relevance of this alternative measure, we regress the new proxies on the actual change in $FIIS$ and $FVAS$, respectively, see Table 2. Their predictive power for the actual values is similar to the proxies that are based on the other-country (same industry) procedure as the estimated coefficients are 1.09 and 1.13, both being statistically significant. Accordingly, we substitute the proxies for $FIIS$ and $FVAS$ and re-estimate the impulse response functions for the baseline results. The results for the full sample, for advanced and emerging countries, for the manufacturing sector and for capital intensity are reported in the Appendix (Figures A.8-A.11). To sum up, the differences are vanishingly small and thus negligible, ultimately supporting the evidence for a causal relationship.

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

	Dependent variable	
	$\Delta FIIS$	$\Delta FVAS$
$\Delta \widehat{FIIS}$	1.092	
	(0.021)	
	[51.618]	
$\Delta \widehat{FVAS}$		1.131
		(0.024)
		[47.626]
Observations	28,784	28,784
R^2	0.226	0.198
F-Statistic	8,385.988	7,083.741

Notes: All models weighted by industry value added shares within countries, multiplied by time-varying country shares in total value added. The number of observations is equal to the number of country-industry cells multiplied by the number of years. Standard errors are clustered by country-industry and reported in parentheses, t-statistics in brackets.

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 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 some emerging countries. The estimated impulse responses for both country groups and both measures of labor share are shown in Figure A.12 in the Appendix. Surprisingly, the positive relationship between international trade integration and labor share in advanced countries breaks down when the self-employed are included. However, an economic interpretation for this result might not be reliable due to the computation of self-employed compensation in the data. As reliable information on self-employed income is barely available, the average compensation paid to employees in a specific industry is used as a proxy. This measure could be significantly undervalued in advanced countries because the share of workers which are both skilled and self-employed tends to be higher in relation to emerging countries. Tangible implications are therefore difficult to derive from this result. For emerging countries, however, it is reasonable to assume that the compensation of self-employed workers is more similar to the income received by employees. The estimated impulse response for this country group, albeit the inclusion of self-employed workers, remains insignificant. Averaged over all industries, productivity gains are accordingly equally distributed to workers and firms in emerging countries.

5 Conclusions

Using data from input-output tables for 41 countries we have tried to shed light on 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. We find that in advanced countries the labor share is positively related to the degree of international trade intensity. Manufacturing industries in emerging countries, however, are faced with declining labor shares caused by a higher degree of global integration. 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.[12] Since efficiency gains might not be equally distributed across different

[12] International trade integration does not only affect skilled and unskilled workers but also other groups of workers in different ways. Galle et al. (2017) set-up a model in which workers in export-oriented and import-oriented

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.

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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

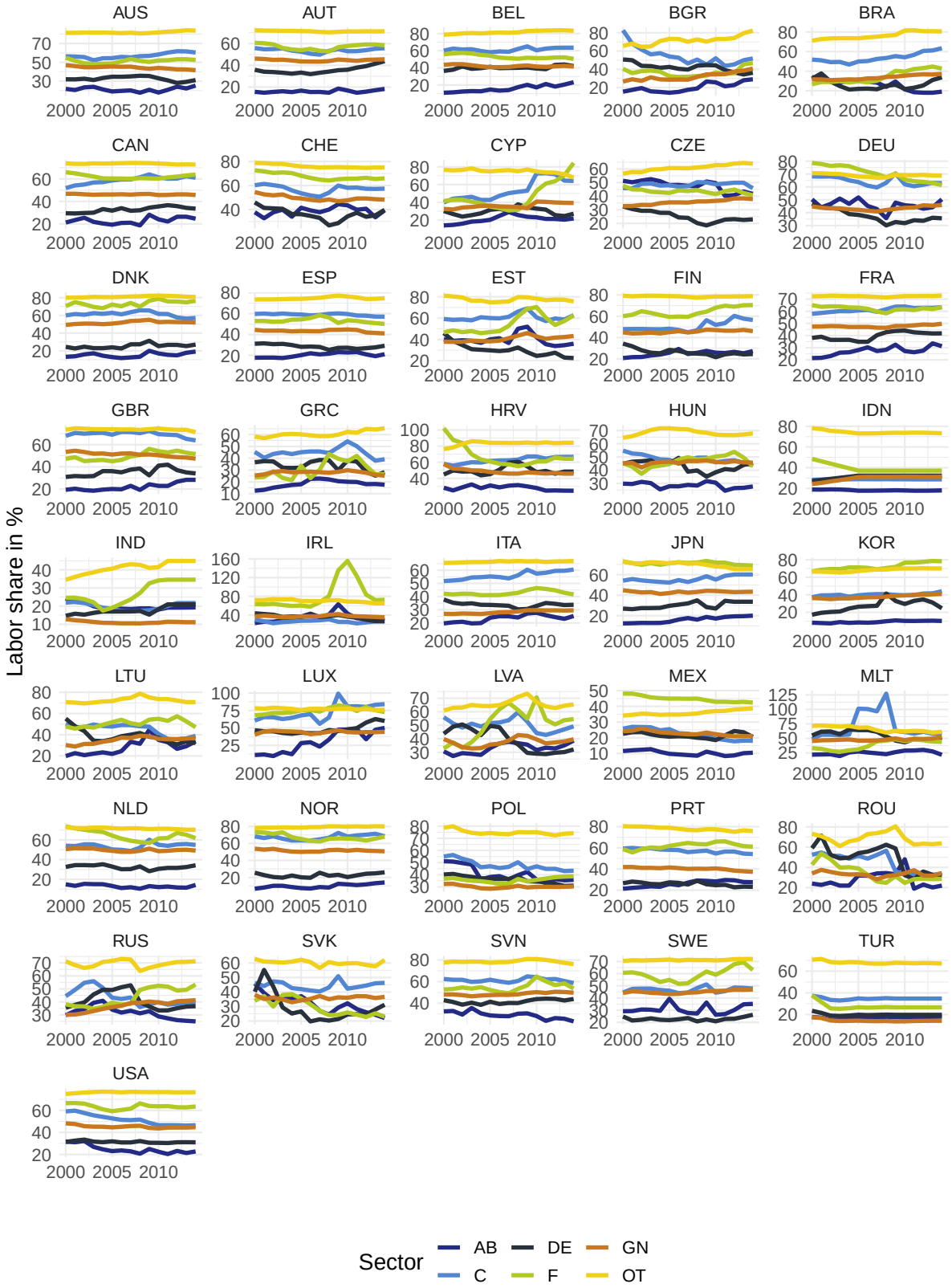
Source: European Commission (2008).

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

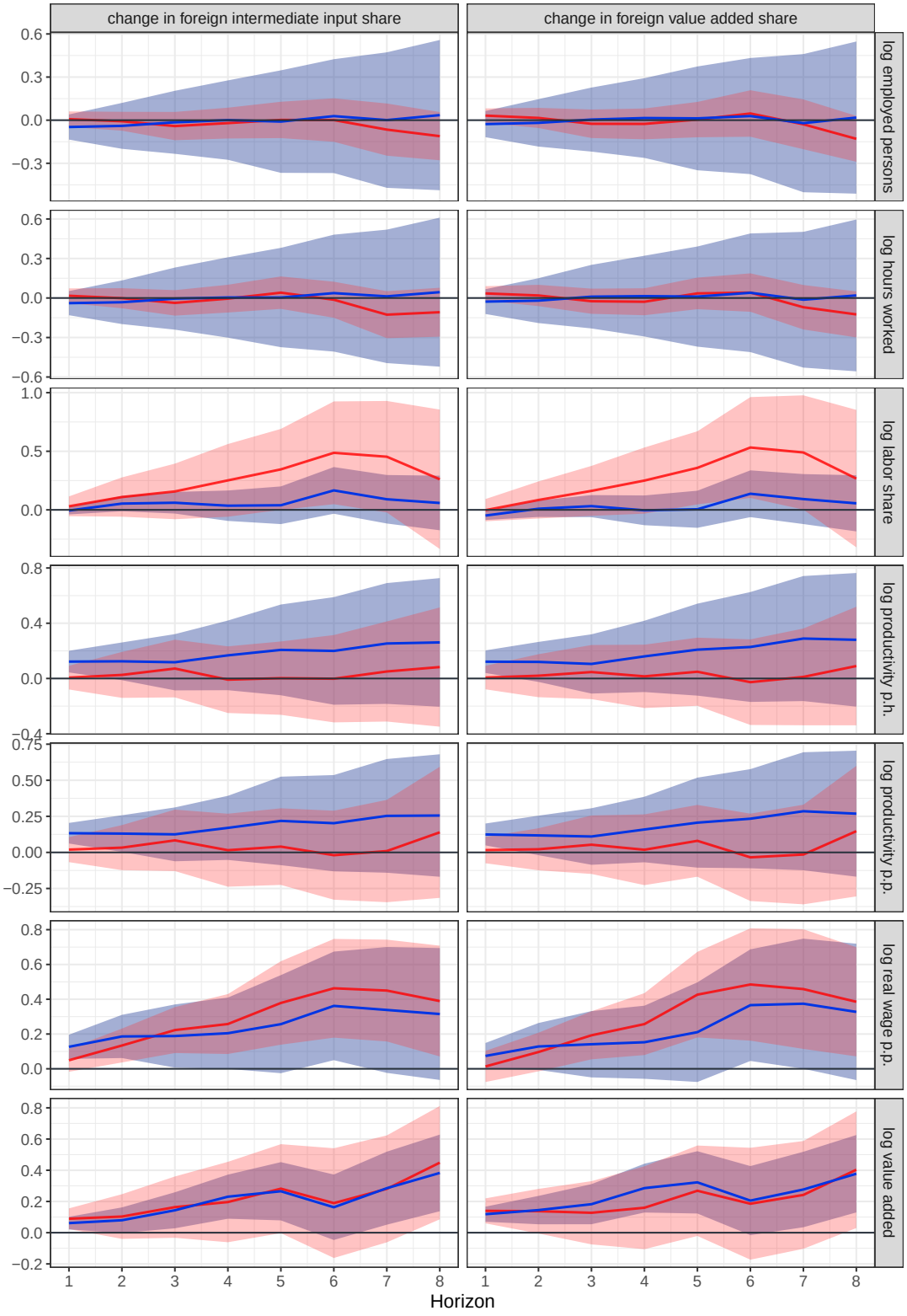
Source: European Commission (2008).

Figure A.1: Labor shares by country and sector



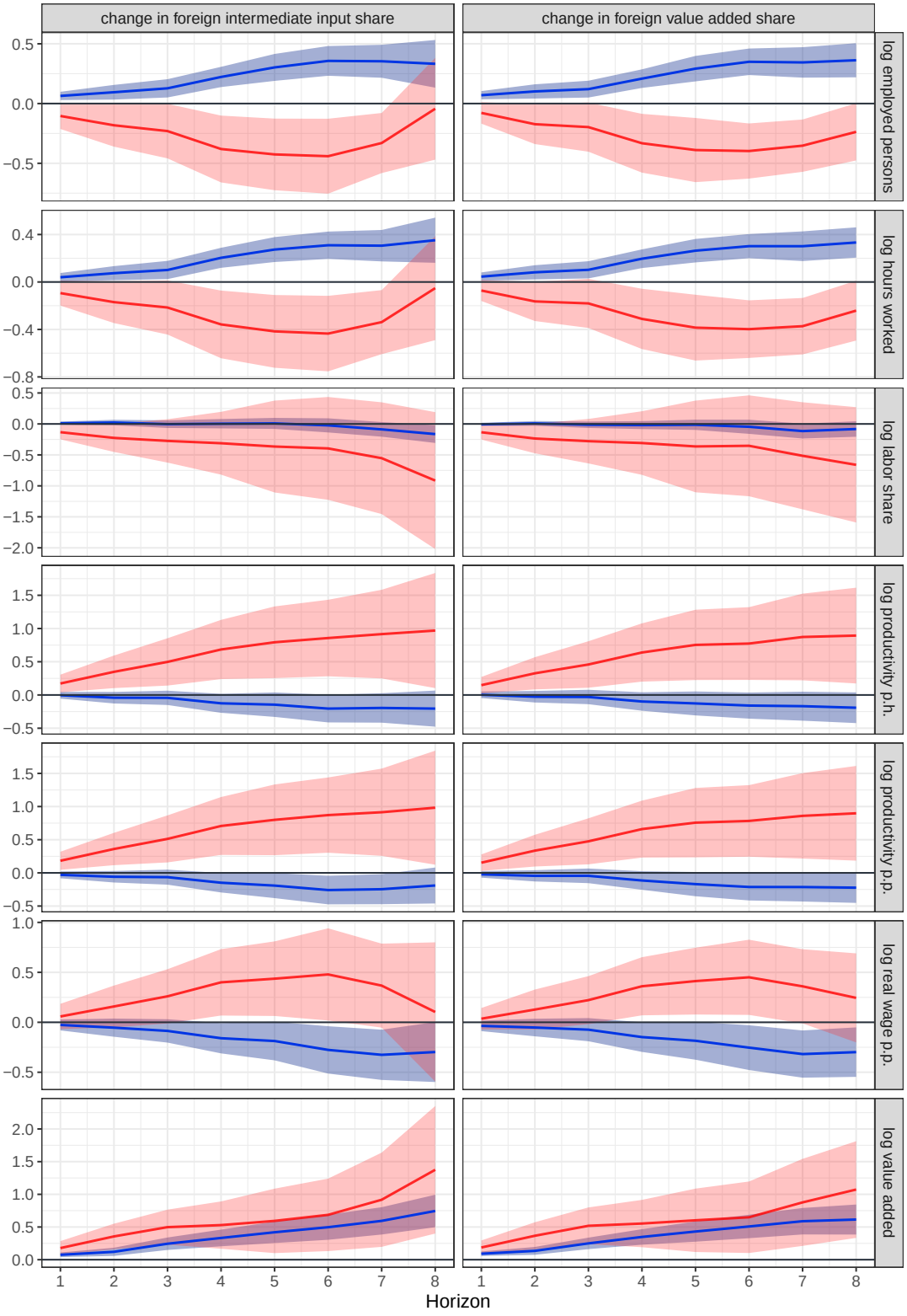
Source: Word Input-Output Database, own calculations.

Figure A.2: Impulse responses - sector AB - advanced countries (blue) vs. emerging countries (red)



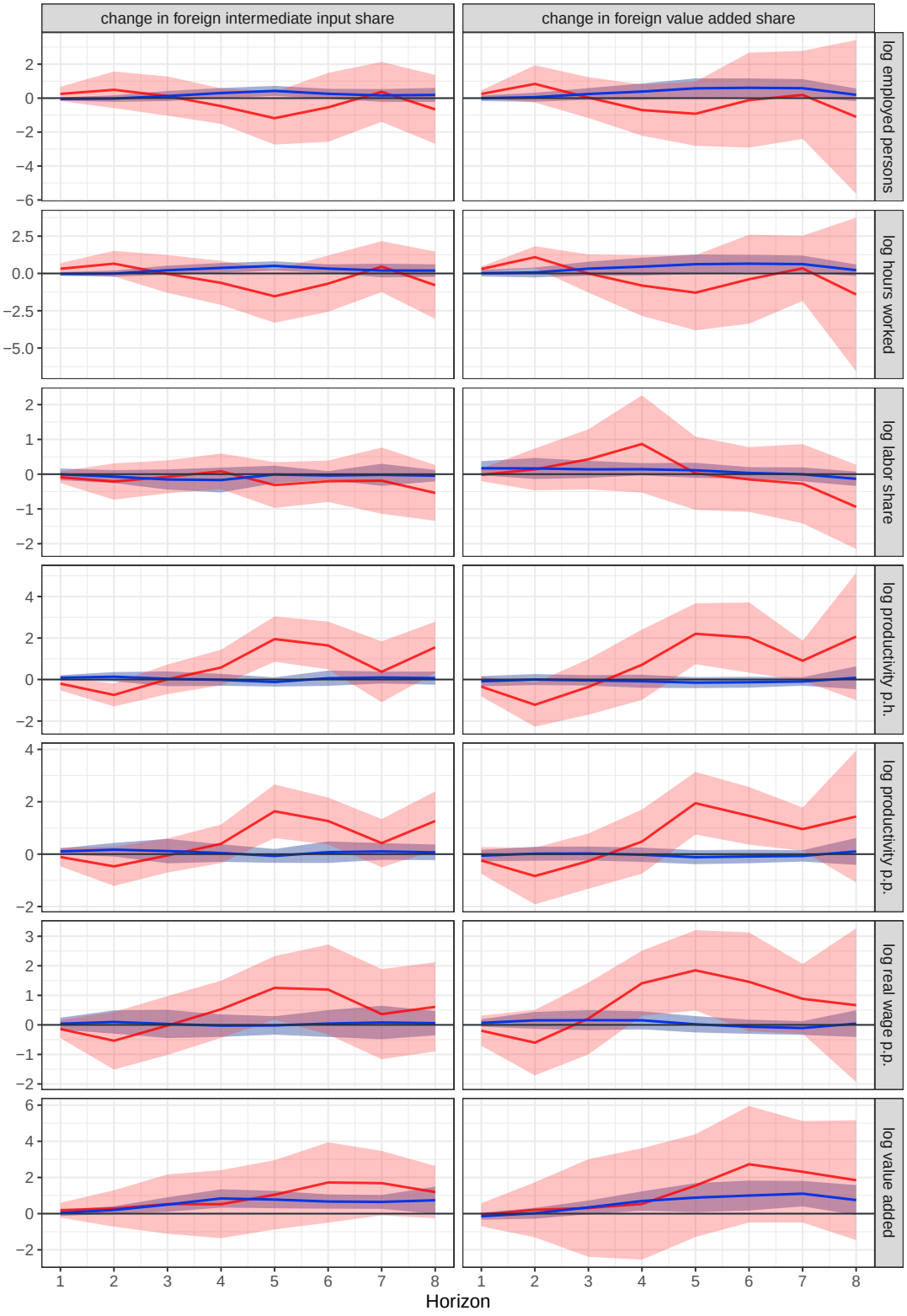
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.3: Impulse responses - sector DE - advanced countries (blue) vs. emerging countries (red)



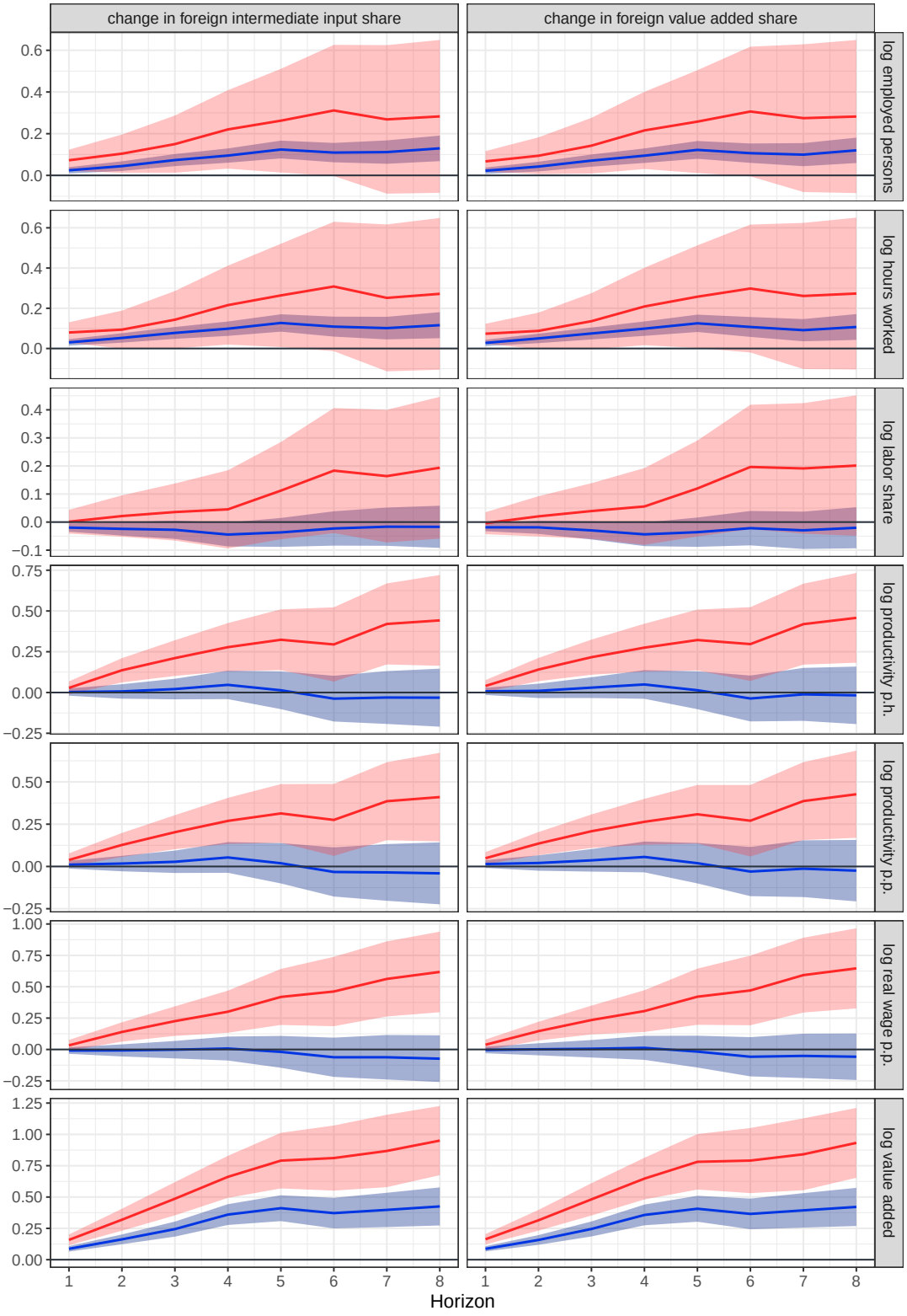
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

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



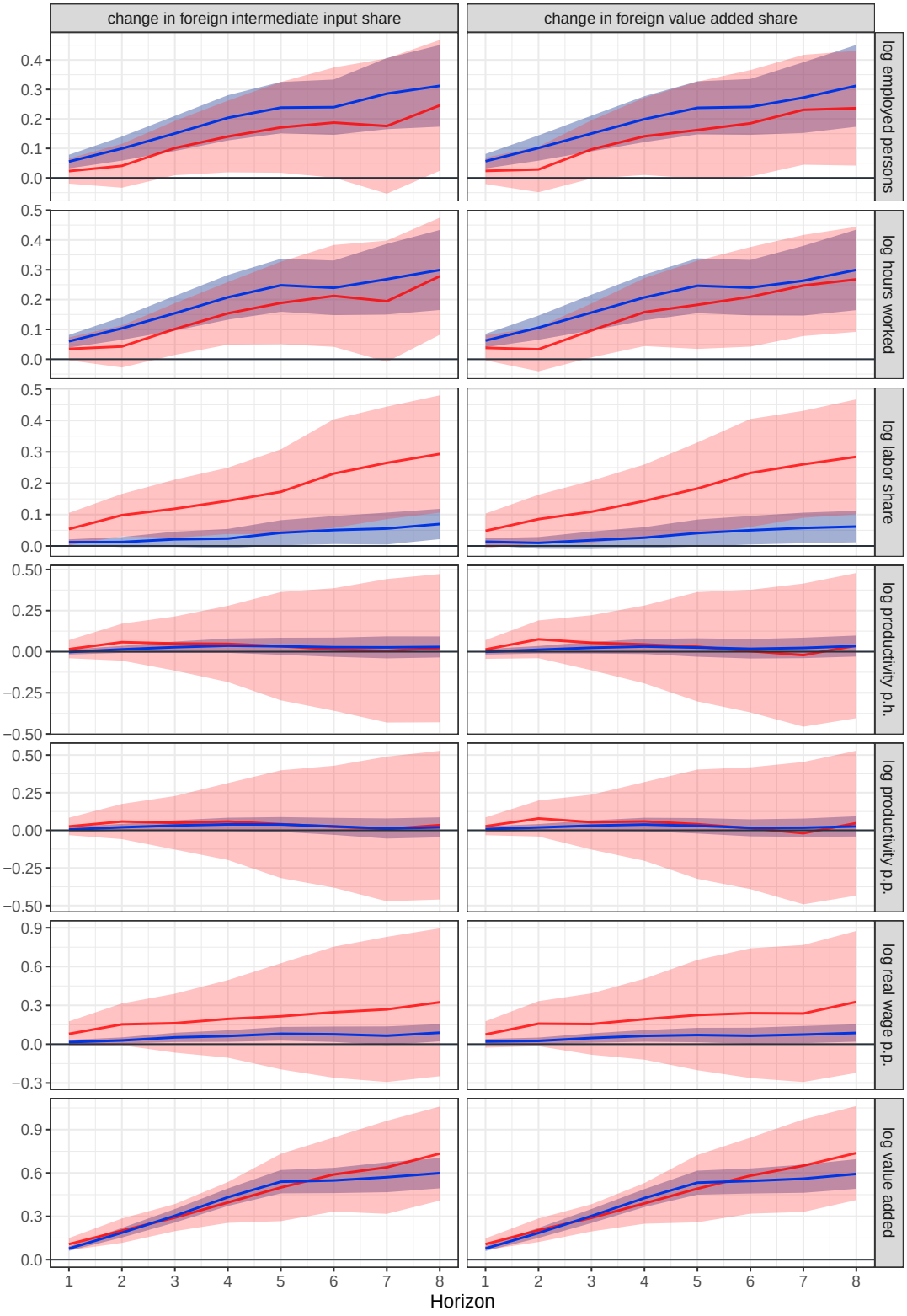
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.5: Impulse responses - sector GN - advanced countries (blue) vs. emerging countries (red)



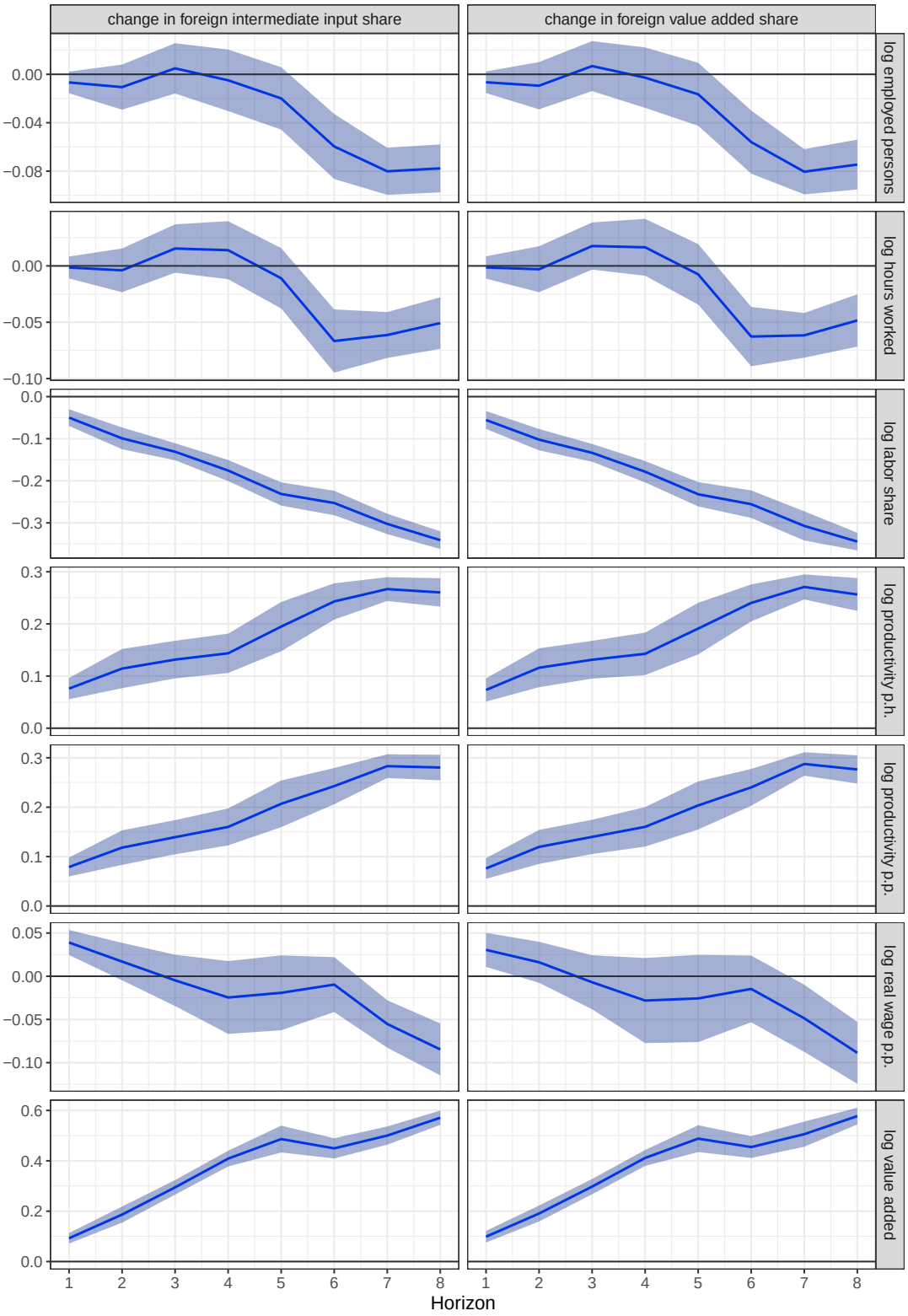
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.6: Impulse responses - sector OT - advanced countries (blue) vs. emerging countries (red)



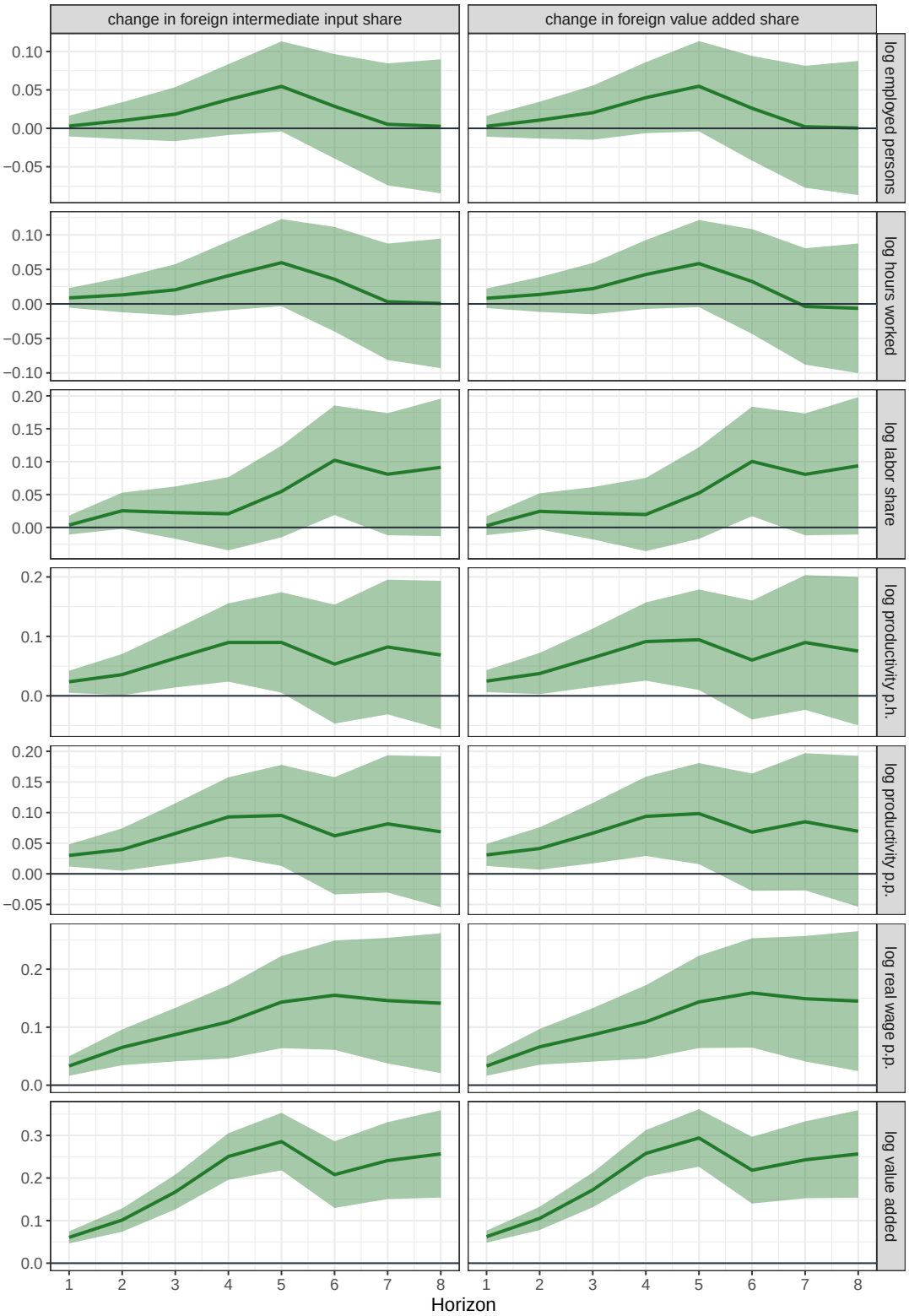
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.7: Impulse responses - USA



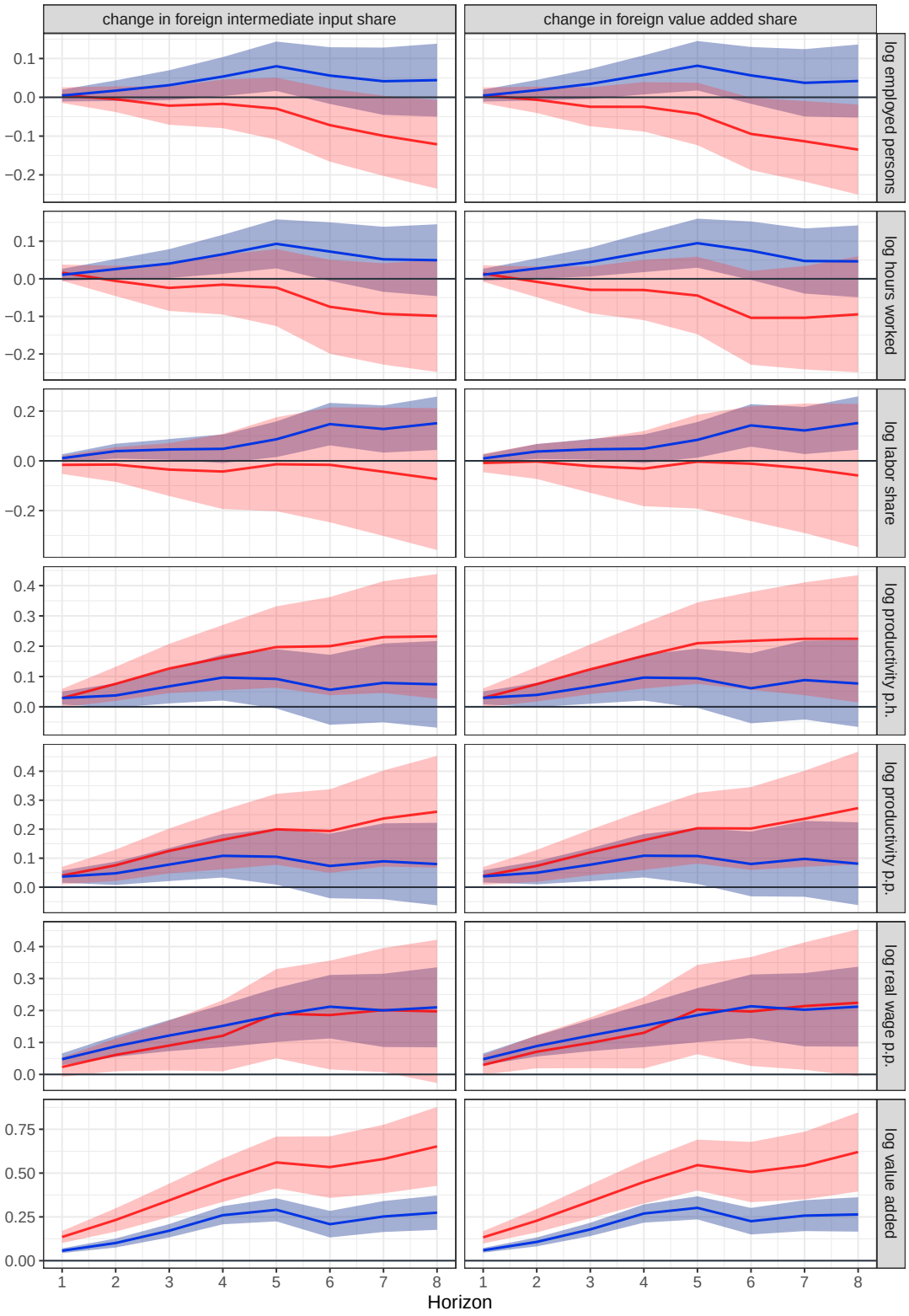
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.8: Impulse responses- alternative globalization proxies - full sample



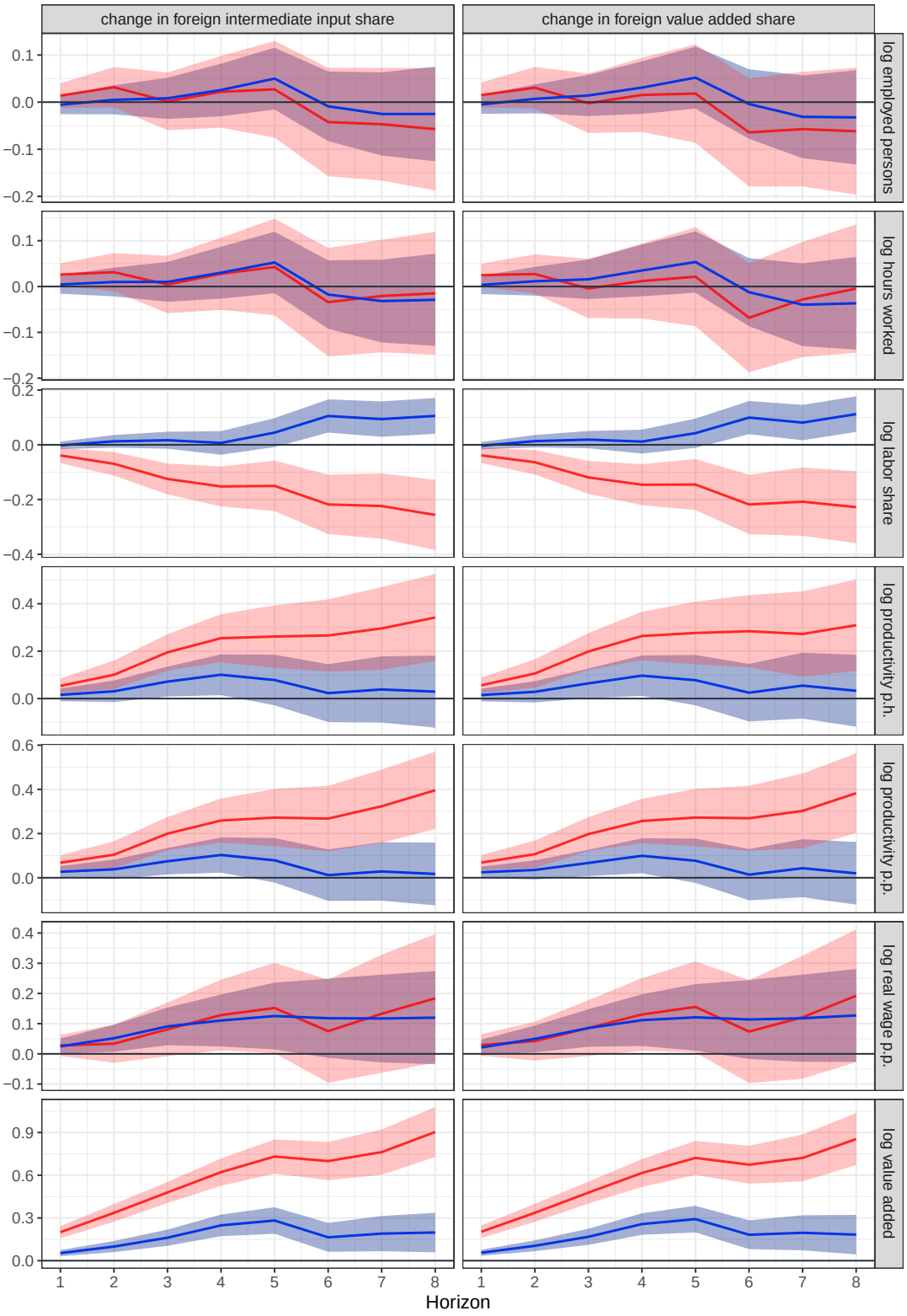
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.9: Impulse responses - alternative globalization proxies - advanced countries (blue) vs. emerging countries (red)



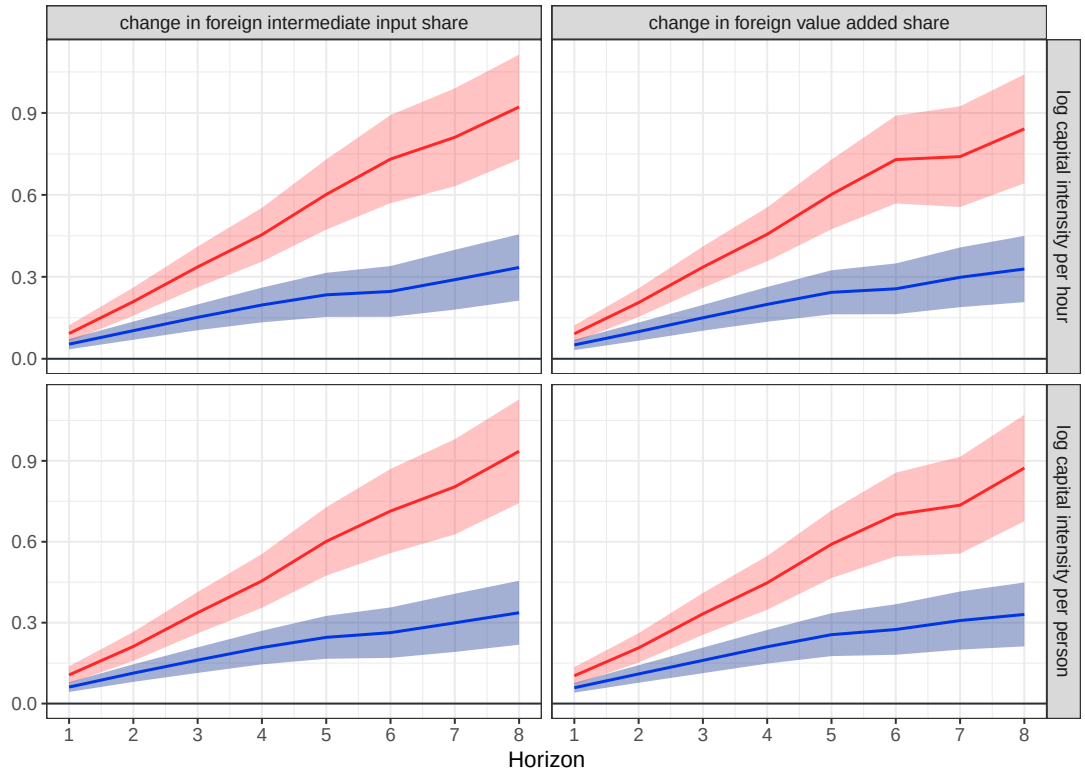
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.10: Impulse responses - alternative globalization proxies - sector C (manufacturing) - advanced countries (blue) vs. emerging countries (red)



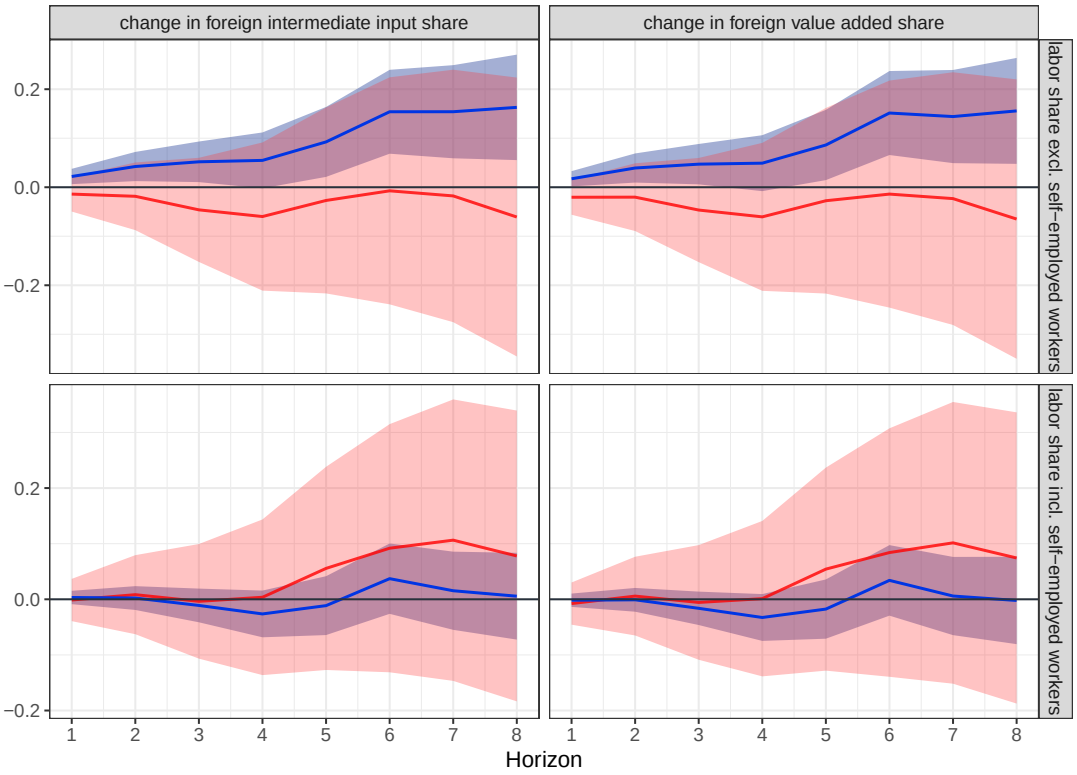
Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. P.p. and p.h. denote per person and per hour worked, respectively. Employment or value added, respectively, are used as weights, and standard errors are clustered by country-industry.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

Figure A.11: Impulse responses - alternative globalization proxies - capital intensity - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to a one percentage point increase in the foreign intermediate input share or foreign value added share. Employed persons and hours worked, respectively, are used as weights, and standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.

Figure A.12: Impulse responses - labor share including self-employed workers - advanced countries (blue) vs. emerging countries (red)



Notes: Responses to one percentage point increase in the foreign intermediate input share or foreign value added share. Value added in USD is used as weight and standard errors are clustered by country-industry. The shaded areas on the graphs represent 95% confidence bands.