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Are Your Labor Shares Set in Beijing? The View through the Lens of Global Value Chains

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Highlights

- Declines in labor shares (starting around 1980) accelerate in 2001-2007, after which labor shares recover somewhat. In contrast, skilled labor shares consistently increase.
- The acceleration in the decline in labor shares is associated with increased intensity of intermediate input exporting through global value chains (GVCs). China's global integration accounts for much of this.
- Declines in the price of investment together with capital-skill complementarity can explain both the consistent increase in skilled labor shares and the reversal of trend in overall labor shares.
- Compared to shares in GDP, labor shares in gross national product (GNP) are higher in countries with positive net FDI positions; the uneven spread of multinational activity contributes to greater inequality through this channel.

Abstract

We study the evolution of labor shares in 1995-2014 while taking into account international trade based on value added concepts. On average, the decline in labor shares (starting around 1980) accelerates in 2001-2007, after which labor shares recover somewhat. In contrast, skilled labor shares consistently increase. The acceleration in the decline in labor shares is associated with increased intensity of intermediate input exporting; this manifests in a sharp increase in the foreign component in upstreamness of industries and countries in global value chains (GVCs). China's global integration accounts for much of this. Declines in the price of investment together with capital-skill complementarity can explain both the consistent increase in skilled labor shares and the reversal of trend in overall labor shares. Compared to shares in GDP, labor shares in gross national product (GNP) are higher in countries with positive net FDI positions; the uneven spread of multinational activity contributes to greater inequality through this channel.

Keywords

Labor Share, Skilled Labor Share, Global Value Chains, Offshoring, Vertical Integration.

JEL

E25, F14, F15, F16, F66, J00.

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RESEARCH AND EXPERTISE
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1 Introduction

The decline in labor shares in recent decades in many advanced economies has caught the attention and concerns of both academics and policy makers. Apart from being a fascinating phenomenon in its own right (with important consequences for economic modeling), the interest in declining labor shares stems from concerns about its implications for income inequality.[1] Just like labor income, capital income accrues to people, but the ownership of capital is concentrated in the hands of relatively few; moreover, capital ownership among capital owners—and thus capital income—are more concentrated than human capital and labor income among workers.[2] A smaller share of value added that is paid to labor implies that income inequality among people rises. This is particularly acute given relatively weak productivity growth in recent times.[3]

We argue that globalization was an important contributor to recent declines in labor shares, in particular before 2007, through several channels. Significant increases in international integration through global value chains (GVCs) and cross-border investments imply that studying the evolution of factor shares from a closed economy perspective—as does most of the literature—is bound to miss some of the underlying mechanisms. Figure 1 illustrates that the decline in labor shares started around 1980 and accelerated in 2001–2007, as export intensity increased. Labor shares increased slightly after 2007, exactly when export intensity leveled off.[4]

However, standard gross trade sales statistics can be misleading, and this has become particularly acute since China joined the World Trade Organization in 2001 and its subsequent increase of global production sharing.[5] While Freeman (1995) asked "Are your wages set in Beijing?", the

[1] Changing shares contradict the first of the so-called "Kaldor facts" and lead to rejecting the Kaldor (1957) model of growth, along with other models that imply the same constancy of shares. Varying shares also have ramifications for computation of total factor productivity and long run macroeconomic projections.

[2] For example, see Piketty (2014), and up to date statistics from the World Inequality Database, https://wid.world/. This goes beyond the classic "functional inequality" between workers, "capitalists" and "rentiers", due to Adam Smith and David Ricardo.

[3] An additional concern relates to how income inequality affects overall growth and political economy; see, e.g., Persson and Tabellini (1994), Alesina and Rodrik (1994), Alesina and Perotti (1996), and more recently Ostry and Berg (2011).

[4] In Appendix C, Figure A3, we show that different concepts of the labor share in the Penn World Tables exhibit very similar trajectories, in particular the 2001–2007 acceleration in the delcine in labor shares and the change in trajectory after 2007.

[5] Trefler and Zhu (2010) show that taking into account intermediate inputs helps align factor content of trade predictions of the Heckscher-Ohlin with the data. Related to this, Ito, Rotunno, and Vézina (2017) show that predictions of Heckscher-Ohlin trade theory hold much better in value added trade data than in gross value added data. Timmer, Miroudot, and de Vries (2018) show that revealed comparative advantage indices based on gross trade statistics deviate significantly from those based on and trade in value added, which are more sensible. Jakubik and Stolzenburg (2018) use data on trade in value added to revisit the estimates in Autor, Dorn, and Hanson (2013) of the effect of imports from China on local labor markets in the U.S.—and find significantly weaker effects. Using gross instead of value added export data is also one of the the conceptual flaws underlying the so-called Leontief (1953) paradox. See Johnson (2014) for a portrait of differences between gross trade and value added trade flows, as well as

deepening of production sharing across international borders requires a different data approach in order to answer such questions.[6] Therefore, we study the relationship between labor shares and international trade using data from the World Input-Output Database (WIOD) in 1995–2014. This allows us to account for international integration in value added terms, the same concept in which labor shares are measured.

several implications. See also Koopman, Wang, and Wei (2014) and Los and Timmer (2018) on the importance of double-counting in gross exports data. Koopman, Wang, and Wei (2012) and Kee and Tang (2016) demonstrate the consequences of the rise of China for mis-representation of gross trade data. Johnson (2018) provides a recent survey of all these issues.

[6] As noted in the conclusion of Grossman and Rossi-Hansberg (2008): "...almost all current goods' trade data pertain to gross flows rather than to value added. The globalization of production processes mandates a new approach to trade data collection, one that records international transactions, much like domestic transactions have been recorded for many years."

Figure 1. Labor Shares in GDP and Globalization

Notes. The displayed series are year fixed effects from a regression of either labor shares or exports/GDP on year fixed effects and country fixed effects, weighted by real GDP. The year fixed effects are adjusted by the weighted (by GDP) average of the respective series in 1995. The sample includes 39 countries that correspond to the WIOD 2013 release sample of countries. The labor share series encompasses compensation of employees and labor income of self-employed; the latter is based on part of mixed income. For China the labor share includes only compensation of employees. Source: Penn World Tables mark 9.1; see Feenstra, Inklaar, and Timmer (2015) for documentation.

We find that the acceleration in the decline in labor shares in 2001–2007 is strongly associated with a concurrent intensification of forward foreign GVC integration. This manifests in a concurrent increase in "upstreamness" of production—i.e., increases in the distance of production from final users within a value chain. Increases in upstreamness and in forward foreign GVC integration are associated with reductions in labor expenditures in marketing and management, which are more important when selling to final users, i.e. households (directly or indirectly).

We decompose changes in labor shares into adjustment within industries and changes in composition, the latter driven by changes in production linkages and by changes in the pattern of global final demand. We find that changes in industry composition explain 35% of the decline in labor shares in 1995–2007, on average, and that this is associated with globalization: a shift towards greater reliance on foreign sources of factor income. This manifests both in terms of exports of intermediate inputs and even more so in terms of deepening of complex GVCs. These forces continue to reduce labor shares in 2007–2014, although much more modestly, as trade growth and international GVC deepening all but halt after 2007, visible in Figure 1 and Figure 4, respectively. In manufacturing, where trade and GVC participation are generally more intensive, changes in composition and globalization have more pronounced effects.[7]

We demonstrate that the integration of China into GVCs accounts for much of the decline in labor shares. China alone accounts for 30% of GVC deepening in 1995–2007 for the average country (weighted by GDP in 1995); this has benefitted capital more than labor because the industries supplying China with inputs are relatively capital intensive. The strongest association of labor shares with forward foreign GVC deepening coincides with China's accession to the WTO in 2001. These evolutions are less important in 2007–2014, when China's integration into GVCs slows down, along that of the rest of the world.

Despite significant declines in the overall labor share in 1995–2007, we find large and relatively uniform concurrent increases in the share of *skilled* labor throughout 1995–2014. An underemphasized corollary of this is that more than the entire drop in overall labor shares is shouldered by unskilled labor. Our finding of a negative association between globalization and labor shares while skilled labor shares increase is reminiscent of, *inter alia*, Richardson (1995) and especially Wood (1995). Consistent with this, Timmer, Los, Stehrer, and de Vries (2013) find that the rise of GVCs is associated with a shift towards skilled labor employment within total employment in 1995–2008.

We offer a technical explanation for the concurrent rise of skilled labor shares with the reversed-J pattern of overall labor shares. In the presence of capital-skill complementarity, a decline in the price of investment reduces the unskilled labor share through strong substitution towards capital. At the same time, the decline in the price of capital causes expenditures to shift towards skilled labor and away from capital. When unskilled labor shares are initially high, the substitution away from unskilled labor is greater than the substitution towards skilled labor, causing a decline in

[7] Within-industry changes, even at greater degrees of disaggregation than what we use here, can be significantly driven by changes in firm composition, which are associated with globalization. This can be seen by juxtaposing the 4-digit SIC industry level analysis of U.S. manufacturing in Berman, Bound, and Griliches (1994) with the analysis of the plant level data that underlies the 4-digit SIC industries in Bernard and Jensen (1997). Virtually all firm level evidence indicates that exporting firms are significantly more capital and skill intensive (see, for example, Bernard, Jensen, Redding, and Schott (2007) for the U.S., Harrigan and Reshef (2015) in Chile). Therefore, variations in firm composition due to trade liberalization can also lower labor shares within-industries.

the overall labor share. As this process continues, substitution away from unskilled labor becomes less than the substitution towards skilled labor, causing an increase in the overall labor share. We illustrate that this mechanism is not implausible by means of a simple "calibration", and we also find some support for it in regression analysis.

Finally, we associate variation in payments to domestically-installed capital to indicators of foreign ownership through multinational enterprise (MNE) activity and vertical integration. This enables us to link this dimension of globalization—the proliferation of MNEs—to labor shares. The entire debate about labor shares involves domestic production data, which says nothing about the local versus foreign composition of ownership of capital.

We find that capital income in country o due to sales of intermediate inputs to country d is associated with ownership by country d of capital installed in country o. This suggests that part of this capital income accrues to entities in d through vertical integration, and that compared to shares in GDP, labor shares in gross *national* product (GNP) are higher in countries with positive net FDI positions. We report estimates of how much capital shares in GNP differ from capital shares in GDP due to net FDI positions. Given the uneven spread of multinational activity, this dimension of globalization contributes to greater inequality in countries that have increased their net FDI position.[8]

By emphasizing the role of globalization, GVC deepening and upstreamness in the recent evolution of labor shares, our work contributes to a large body of work that studies the dynamics of labor shares. Since most countries have experienced declines in labor shares, it is plausible that the cause is common to all. One of the leading explanations for this change, due to Karabarbounis and Neiman (2014), is the widespread decline in the price of investment, which may have caused a shift in expenditures towards capital (this would be the case if the elasticity of substitution between capital and labor were greater than unity).[9] Indeed, they document that in countries and industries where the decline in investment goods' prices were deeper, labor shares dropped more. In contrast, Oberfield and Raval (2014) find that the drop in labor shares in United States man-

[8]Motivated by the observation that factor shares tend to converge across countries in 1995–2007, i.e. labor shares declined more where they were initially higher, we also study the relationship between factor income shares and factor abundances. In Appendix G we demonstrate that globalization contributes to the process of convergence through Heckscher-Ohlin forces, where activities that are intensive in the use of some factor are drawn to where this factor is relatively more abundant as trade barriers decline. We find that factor abundances can predict factor intensity of exports of intermediate inputs, and that this association has become stronger over time, with reductions in trade and investment barriers. This is consistent with Heckscher-Ohlin forces shaping the pattern of intermediate input trade.

[9]When the elasticity of substitution between labor and capital is greater than unity and when factor markets are competitive, then a lower relative price of capital causes an increase in the share of expenditures on capital due to strong substitution towards capital usage. This explanation can also capture embodied technological change (computers, robots, etc.), as argued in Martinez (2018). See also Graetz and Michaels (2018).

ufacturing cannot be associated with price reductions for capital because they estimate that the elasticity of substitution between labor and capital is less than unity.[10]

An alternative and equally pervasive phenomenon is the deepening of integration of economic units across the globe in recent decades. A salient characteristic of this process in recent decades is the geographic fragmentation of production within value chains. This is associated to declines in tariffs, and in transport and communication costs across countries. Changes in GVC participation are driven by how intermediate input production spreads across borders, including offshoring. For example, the share of manufacturing value added that is paid by foreign downstream industries increases by 7.1 percent points from 18.9 percent in 1995 to 26 percent in 2007. In 2007–2014 this share increased more modestly, by 1.6 additional percent points.[11]

Most previous research focuses on the United States and other developed economies, e.g., Blanchard (1997), Elsby, Hobijn, and Şahin (2013), Rognlie (2016).[12] Different forces play a role in these papers, while globalization is not studied in depth. Autor, Dorn, Katz, Patterson, and Van Reenen (2017) consider the role of market share concentration in few firms and greater competition. Related to this, Kyyrä and Maliranta (2008) also consider how changes in the size and age composition of firms accounts for changes in labor shares. The decline and then increase in labor shares may also be related to endogenous directed technological change as in Kennedy (1964) and Acemoglu (2003), where the decline in the relative price of capital leads to innovation that corrects initial changes in factors' income shares. Acemoglu and Restrepo (2018) discuss the possible implications of technological change and robotization, and vom Lehn (2018) discusses how this manifests across occupations. Bentolila and Saint-Paul (2003) study variations in labor shares in OECD countries and show how they are linked to technological change, prices of imported materials and labor market frictions. d'Albis, Boubtane, and Coulibaly (2019) link labor shares in OECD countries to fertility and immigration. Grossman, Helpman, Oberfield, and Sampson (2017) show that in a growth model with endogenous human capital accumulation, the decline in productivity growth can lead to declines in labor shares. Declines in the labor shares have been also related to structural change (Ngai and Pissarides (2007), Buera and Kaboski (2012), McAdam and Willman (2013)), the difference between capital returns and output growth (Piketty (2014)), deregulation of labor markets (Blanchard and Giavazzi (2003)), deregulation of bank branching in the U.S.

[10] Karabarbounis and Neiman (2014) consider the aggregate economy elasticity of substitution, while Oberfield and Raval (2014) consider only the elasticity in manufacturing. It is possible that the two differ markedly, as shown in Reshef (2013).

[11] Forward GVC participation for the entire economy increased less, by 2.8 percent points, and from more modest levels, from 8.9 percent in 1995 to 11.7 percent in 2007, on average. These figures are smaller compared to manufacturing (about half), because the non-manufacturing sectors (services and public) participate less in GVCs.

[12] For business cycle properties of the labor share see McAdam and Willman (2013), Young (2004) and Mućk, McAdam, and Growiec (2018).

(Weinberger and Leblebicioglu (forthcoming)), and to real estate dynamics (Gutiérrez and Piton (2019)). See Harrison (2005) and Rodriguez and Jayadev (2010) for treatments of less developed countries. Weinberger and Leblebicioglu (2018) study the effect of capital import liberalization in India, and find that this actually increased firm-level labor shares, probably by increasing quality of capital equipment while lowering it's effective price. Brooks, Kaboski, Li, and Qian (2019) argue that employers' monopsony power in China and India lowers labor shares there, and this effect has declined over time. Our sample covers mostly developed, mid-income and transition economies, but also important developing and emerging economies (e.g., India and China).

The rest of the paper is organized as follows. Section 2 describes the data and methodology underlying international input-output calculations. Section 3 describes changes in factor shares and in GVC participation, which we decompose along several dimensions in Section 4. Section 5 documents the association of labor shares to forward foreign GVC deepening and to declines in the price of investment goods in presence of capital-skill complementarity. In Section 6 we study the relationship between foreign ownership of capital and capital income. Section 7 offers concluding remarks.

2 Data and methodology

The main source of data is the World Input-Output Database (WIOD). We use the WIOD 2013 release to compute statistics over the pre-2008 financial crisis period of 1995–2007. Along with detailed Input-Output tables for 40 countries and 35 industries (of which 14 are in manufacturing, ISIC rev. 3), the 2013 release also provides Socio-Economic Accounts with data on employment, labor compensation and capital stocks, all by country and industry. In addition, the 2013 release reports employment and labor compensation by educational attainment within each industry and country. However, we use the breakdown by skill only at the country level, because there is too much imputation for industries within countries to make this variation informative. We also use the more recent 2016 WIOD release, covering 43 countries and 56 industries (of which 14 are in manufacturing, ISIC rev. 4) to compute statistics for 2007–2014. The Socio-Economic Accounts in the 2016 release do not include breakdowns of labor concepts by educational level. Instead, we use EU KLEMS 2017 release for skilled labor shares; these data are available for only 26 countries, in 2008–2014.[13] In all of these datasets the labor share includes compensation of employees and labor

[13] For WIOD 2013 release documentation see Timmer, Dietzenbacher, Los, Stehrer, and de Vries (2015). For WIOD 2016 release documentation see Timmer, Los, Stehrer, and de Vries (2016). See http://www.wiod.org/home for further details on WIOD country coverage and data availability. For EU KLEMS 2017 release documentation see Jäger (2017), available at http://www.euklems.net/.

income of self-employed (part of "mixed income").[14]

While changes in methodology preclude merging data from before and after 2007, we reclassify WIOD 2016 release data to conform with the 2013 release in two dimensions. First, we allocate countries that appear in the 2016 release but not in the 2013 release to the "Rest of World" (ROW) category. Second, since the sectors in the 2016 release are more disaggregate, we aggregate them to the same level of the 2013 release.[15] The correlation between factor shares and GVC participation indicators in 2007 coming from either release of the WIOD is over 0.85.

One major caveat in using these data arises from the proportionality assumptions in constructing WIOD. Value added shares within industry gross output and factor expenditure shares within value added are the same within an industry and country, regardless of the using industry and country or final consumption destination. For example, this means that the WIOD data do not allow the value added intensity in gross output to depend on the use of output (downstream industries or consumption, domestic or foreign). de Gortari (2017) demonstrates that the latter can have significant quantitative implications for measures of economic integration between the U.S. and Mexico. In contrast, Puzzello (2012) finds that similar proportionality assumptions lead to small bias in factor content of trade.

Data on the location, production and sales of multinational affiliate firms are from Ramondo, Rodríguez-Clare, and Tintelnot (2015). Control variables used in the estimation in Section 6 are from the CEPII gravity database.[16]

Our calculations rely on the methodology in Leontief (1936), applied to an international setting (made possible by the WIOD), and further extended to splitting value added (VA) into remuneration of primary factors, i.e. capital and labor.[17] We outline the main features of the methodology here and relegate other details to the Appendix. Gross output for any industry located in any country is the sum of intermediate demand from all other industries located in all other countries, plus final demand. In matrix notation, this is

$$X = AX + Y \ , \tag{1}$$

[14] WIOD 2013 release reports data until 2011, but the incidence of missing values for labor shares in the Socio-Economic Accounts increases significantly after 2009. This is not an issue in WIOD 2016. In both datasets and in all years, the input-output matrices do not have missing values.

[15] The sectoral reclassification is important for comparability across periods because the increase in the number of industries is due to splits of more aggregated categories into relatively upstream and relatively downstream industries.

[16] The labor share is defined as the total labor compensation divided by value added within a country. The capital share is one minus the labor share, and thus includes not only direct payments to capital but also profits, the latter reflecting markups among other things. Thus, an increase in the capital share can also reflect an increase in markups, which has been documented by De Loecker and Eeckhout (2017) and De Loecker and Eeckhout (2018), which is not distributed equally to capital and labor, as well as income from self-employment. The latter is not an important share of GDP, and does not alter materially trends in the labor share, as shown in Dao, Das, Koczan, and Lian (2017).

[17] See, for example, Timmer, Erumban, Los, Stehrer, and de Vries (2014).

where X is the vector of gross outputs, AX is intermediate demand and Y is final consumption, or demand for final goods by households. A is the matrix of technical coefficients, whose typical entry a_{ij}^{od} is the value of input from industry i located in country o that is needed to produce one dollar worth of product j in country d. From (1) one can derive

$$X = (I - A)^{-1} Y = BY \ , \tag{2}$$

where $B = (I - A)^{-1}$ is the well-known Leontief (inverse) matrix, which takes into account the indirect production linkages across industries. A typical entry of the B matrix b_{ij}^{od} indicates the value of production in industry i located in country o that is required in order to satisfy one unit of final demand for product j in country d, while taking into account direct and indirect intermediate demand from all other using industries. In other words, B summarizes all value chains, be they domestic or global. It is useful to define Y as a diagonal matrix, with the corresponding values on the diagonal, and zeros elsewhere. This implies that X is a matrix as well.

Equation (2) is expressed in gross output terms, in US dollars. In order to convert (2) into value added (VA) terms (also in US dollars), pre-multiply (2) by V, defined as a diagonal matrix with the value added to gross output ratios (intensities) of each sector on the diagonal, and zeros elsewhere:

$$VX = VBY \ . \tag{3}$$

The left hand side, VX, is industry value added produced and the right hand side, VBY, is demand for final goods in value added terms.[18]

We compute factor payments for labor L, high skill labor H, low skill labor N, and capital K as follows. For each factor $f \in \{L, H, N, K\}$ we pre-multiply (3) by a diagonal matrix of the corresponding factor share in value added in each industry and country F_f

$$F_f VX = F_f VBY \ .$$

Denote by

$$V_f = F_f V \tag{4}$$

the diagonal matrix of shares of factor f in gross outputs. Then we have

$$V_f X = V_f BY \ . \tag{5}$$

[18] By construction, summing all elements of VBY or of VX gives world GDP, i.e. the value of global expenditures on final goods accrues to primary production factors, which is also equal to their income. Summing all elements within the rows that pertain to a country's industries gives that country's GDP; summing all elements within the columns that pertain to a country's industries gives that country's production of final goods and services (in value added terms).

This is a square matrix with typical element $(v_f by)^{od}_{ij}$, which is the payments to factor f located in country o and employed in industry i (row o-i) that are induced by demand for final goods that are manufactured by industry j located in country d (column d-j). Total payments to factor f in country o are thus $(v_f by)^o = \sum_i \sum_j \sum_d (v_f by)^{od}_{ij}$ and this is equal to the GDP share of factor f. Once factor income for any factor in each location is calculated, factor income shares and changes thereof are straightforward, since $V_L BY + V_K BY = VBY$ and $V_H BY + V_N BY = V_L BY$.

An important caveat to the methodology leading to equation (5) is driven by a proportionality assumption for factor payments: factor shares in any industry in any country are invariant to the using industries. In particular, they are the same whether the using industry is domestic or foreign. If capital intensities are higher for exporting activities versus domestic sales, then we will underestimate the role of increases in GVC participation in driving down the labor share.[19] Another caveat is that we do not make allowances for capital depreciation. Dao, Das, Koczan, and Lian (2017) demonstrate that although affecting levels, adjusting for this hardly alters trends.

3 Facts: changes in factor shares and in GVC participation

In this section we characterize changes in factor shares and in GVC participation. Given our data constraints, and given the break in evolution of labor shares around 2007, we organize the discussion in two periods: 1995–2007 and 2007–2014.[20] We document four facts: on average, (1) labor shares decline in 1995–2007 and recover somewhat in 2007–2014, while (2) high skill labor shares increase throughout, (3) forward foreign GVC participation deepens in 1995–2007 and this process slows down considerably in 2007–2014, (4) upstreamness of production increases, particularly in 2001–2007 and this is driven by foreign transactions.[21]

3.1 The evolution of labor shares: reversed-J

Figure 2 illustrates the average decline in labor shares in 1995–2007 (Panel A), and the average increase in 2007–2014 (Panel B). This is evident also in Figure 1, which uses a different data source (Penn World Tables), but exhibits similar magnitudes of change in the corresponding years. In Appendix C, Figure A3, we show that different concepts of the labor share in the Penn World Tables exhibit very similar trajectories.

The weighted average (using GDP in 1995 as weights) decline in 1995–2007 is 2.4 percent

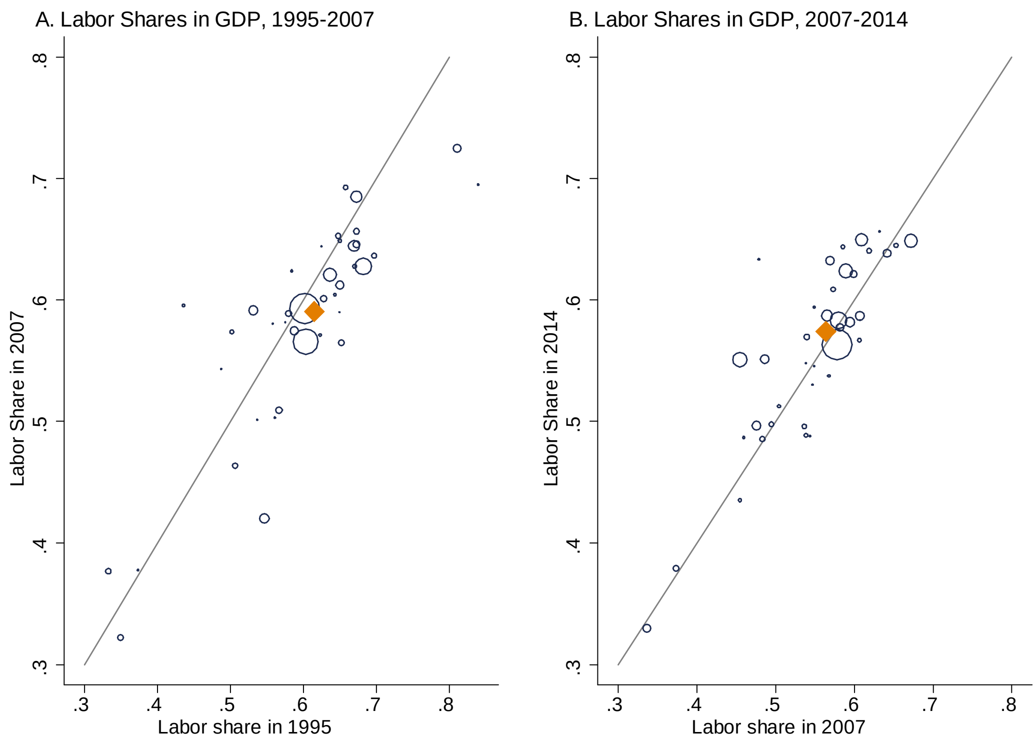
[19] It is well-known that within industries exporters are more capital and skill intensive; see, e.g., Bernard, Jensen, Redding, and Schott (2007) and Harrigan and Reshef (2015).

[20] We drop Poland from the analysis because it is an extreme outlier in 1995, and thus creates unreasonable variation from 1995 to 2007 for that country.

[21] Tables A1–A4 in the appendix contain all data for Figures 2, 3 and 4.

points. Labor shares do not decline everywhere in 1995–2007, and even when they do, the rates of change vary considerably across countries. Countries below the 45-degree line exhibit declines, and those that are above exhibit increases in labor shares. Among the 39 countries in the 1995–2007 sample, 25 see their labor shares decrease, while the others see increases. Among the largest declines in 1995–2007 we see India, Indonesia and China, three Asian countries experiencing rapid development; among the important countries that see large increases in labor shares we see Brazil, Turkey and the United Kingdom. Among the 42 countries in the 2007–2014 sample, 24 see their labor shares increase, while the others see decreases. Among the largest increases in 2007–2014 we see Brazil, China and Russia, as well as Germany and France; among the large countries that see their labor shares decrease significantly we see Canada, United Kingdom and the United States. Several countries reverse trend, notably China.

Figure 2. The Evolution of Labor Shares in GDP



Notes. Figure 2 display labor shares in GDP (total value added) by country. Each circle represents one country. The size of the circle is proportional to GDP in the first year (1995 in Panel A; 2007 in Panel B). The solid diamond represents the weighted average, using GDP in the first year as weights. The solid line represents the 45-degree line. Source: own computations using WIOD releases 2013 and 2016.

3.2 Rising skilled labor shares

In Figure 3 we demonstrate an overall increase in skill intensity across virtually all economies in our sample, where skill is captured by workers with tertiary education.[22] This increase manifests both as a share of total payments to labor (Panels A and C), i.e. an increase in skill intensity for a given level of overall labor intensity, but also as a share of GDP (Panels B and D).[23] Together with the overall decline in labor shares displayed in Figure 2 in 1995–2007, the corollary of this is that

[22] While the definition of tertiary education varies slightly across countries, it is consistently defined within a country over time, implying having at least a three-year university degree or equivalent.

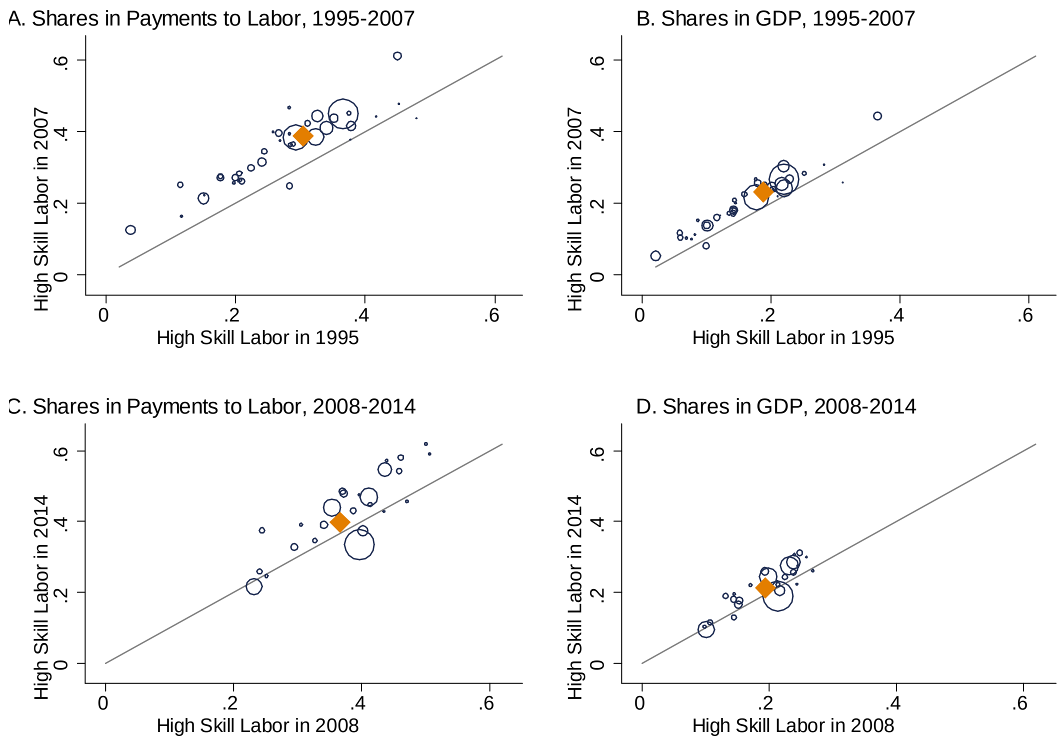
[23] Tables A1 and A2 in the appendix contains all data for Figure 3.

the decline in the share of payments to less-educated workers is greater than the decline in labor shares on average, and that variation in declines in labor shares are largely accounted by variation in unskilled labor shares.

The weighted average (using GDP in 1995 as weights) increase in the skilled labor share out of total payments to labor in 1995–2007 is 8.23 percent points (Panel A), and the weighted average increase in the skilled labor share out of GDP is 4.3 percent points (Panel B). Compared to the heterogeneity in changes in payments to labor overall (Figure 2), it is striking how uniformly all countries see their skilled labor shares increase. Only Mexico and Estonia see their skilled labor shares decline in this period.

The weighted average (using GDP in 2007 as weights) increase in the skilled labor share out of total payments to labor in 2008–2014 is 3.2 percent points (Panel C); the weighted average increase in the skilled labor share out of GDP is 1.9 percent points (Panel D). Notably, Germany, Italy and the Netherlands exhibit significant declines. Note that since these changes occur over half the time, the overall pace of change is similar to that exhibited in Panels A and B, on average.

Figure 3. The Evolution of Skilled Labor Shares



Notes. Panels A and C display shares of skilled labor in total payments to labor (skilled plus unskilled) by country. Panels B and D display shares of skilled labor in GDP by country. Each circle represents one country. The size of the circles in Panels A and B is proportional to GDP in 1995. The size of the circles in Panels C and D is proportional to GDP in 2007. The solid diamond represents the weighted average, using GDP in the first year as weights. The solid line represents the 45-degree line. There are only 26 countries in Panels C and D, compared to 39 countries in Panels A and B, where the missing countries include many large economies like Brazil, China, India and the USA. Source: own computations using WIOD 2013 release and EU KLEMS 2017 release.

3.3 Deepening of global value chains

Figure 4 illustrates the deepening in GVC participation, and that it has slowed down from 1995–2007 to 2007–2014. Participation in GVCs has two main dimensions: forward linkages and backward linkages. Forward linkages imply payments to domestic factors that are generated by downstream foreign industries. This is driven by more than just direct exports of intermediate goods and services to businesses, as it takes into account the entire network of GVCs, where value can "travel" across borders and return to the originating country (e.g., buyers of buyers' of my output, etc.).[24]

Each element of the VBY matrix in (3) contains all payments to factors that are employed in sector i in origin country o that contribute to the production of sector j in destination country d: $(vby)_{ij}^{od}$. By summing over all industries i and j within each country pair we obtain payments to factors that are located in country o by country d's industries: $vby^{od} = \sum_i \sum_j (vby)_{ij}^{od}$. Further summing over all destinations gives country o's GDP, because it encompasses all payments to capital and labor: $\sum_d (vby)^{od} = GDP^o$. By taking the share of payments by countries d that are not o to country o's GDP we have the contribution of forward linkages to domestic factors' income: $forward^o = \sum_{d \neq o} (vby)^{od} / GDP^o$. This is the share of payments to domestic factors that originate in foreign industries, and is what Panel A and Panel B of Figure 4 display, for 1995–2007 and 2007–2014, respectively.[25]

The weighted average (using GDP in 1995 as weights) increase in $forward$ in 1995–2007 is 2.8 percent points.[26] Apart for one country (Latvia), $forward$ increases everywhere in this period. Among the largest increases we see Taiwan, Germany, Ireland, Denmark and China. In addition, Hungary, Bulgaria and Slovenia also exhibit large increases in forward linkages, as their economies integrated into the European market by serving as sources of intermediate inputs.

In contrast to the almost uniform deepening of GVCs in 1995–2007 across all countries, the picture is more mixed in 2007–2014. The weighted average (using GDP in 2007 as weights) increase in $forward$ is only 0.6 percent points. Among the countries in this sample, 32 see increases in $forward$. Among the largest increases in $forward$ in 2007–2014 we see again eastern European and Baltic countries, as their economies integrated into the European supply chains and thus receive much of their inputs for assembly from Europe. In addition, The Netherlands and Ireland also exhibit large increases in $forward$ in this period. Among the largest decreases in $forward$ we see China, Indonesia and India.[27]

Next, in Section 3.4 we discuss how forward GVC participation is linked to upstreamness and lower labor shares.

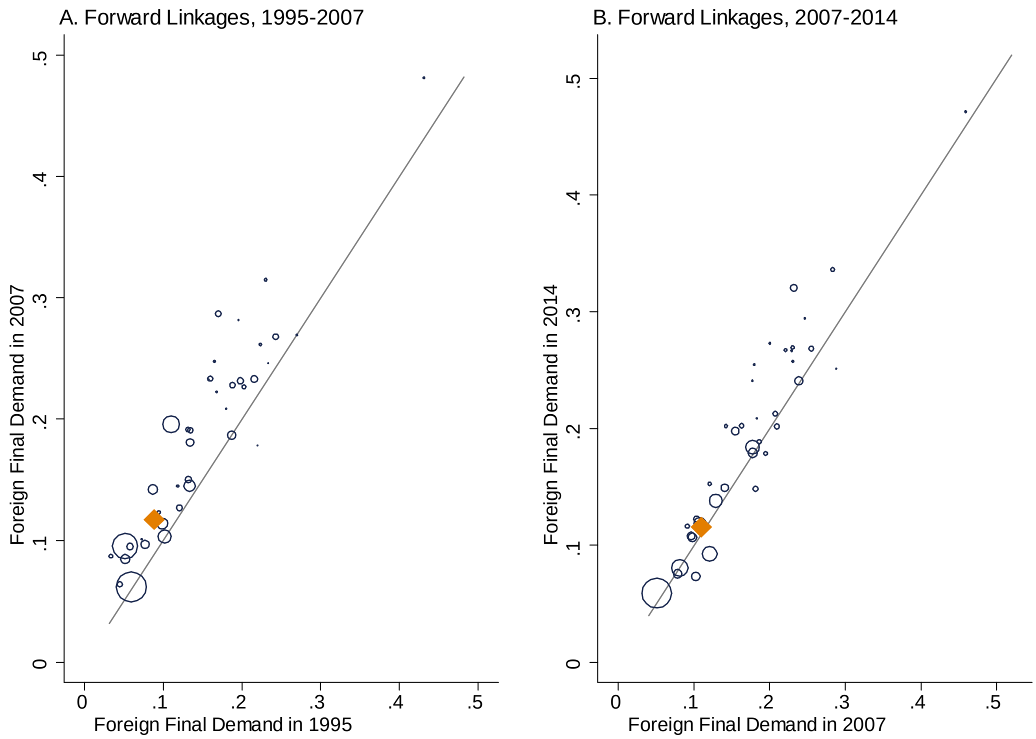
[24] See Hummels, Ishii, and Yi (2001) and Yi (2003) on the importance of vertical specialization and integration.

[25] An alternative view of GVC deepening is backward linkages, which imply payments to foreign factors by domestic industries though supply of intermediate inputs and services. Since the world is a closed economy (and this is taken into account in the WIOD data), the global (and, therefore, average) forward and backward linkages are the same, although within each country there can be differences between the two. We discuss backward linkages in Appendix B.

[26] The weighted averages here are smaller, as bigger economies are more likely to be their own suppliers.

[27] The slowdown in forward GVC deepening is consistent with Timmer, Los, Stehrer, and de Vries (2016), who rely on the same data. On the manifestation of the "so-called" trade collapse from 2008 on value added trade see Bems, Johnson, and Yi (2011) and Nagengast and Stehrer (2016).

Figure 4. Deepening of Global Value Chains



Notes. Forward linkages in GVCs are shares of foreign industries final demand (in value added terms) in GDP. Each circle represents one country. The size of the circle is proportional to GDP in the first year (1995 in Panel A; 2007 in Panels B). The solid diamond represents the weighted average, using GDP in the first year as weights. The solid line represents the 45-degree line. Source: own computations using WIOD releases 2013 and 2016.

3.4 Increasing upstreamness

One dimension in which changes in GVC participation manifest is "upstreamness", defined as the average distance of output of a particular industry (in a country) from final demand, across all possible value chains (domestic and global). Antràs and Chor (2018) use the following measure of upstreamness (their equation 5, adapted to our notation)

$$U_i^r = 1 \times \frac{Y_i^r}{X_i^r} + 2 \times \frac{\sum_s \sum_j a_{ij}^{rs} Y_j^s}{X_i^r} + 3 \times \frac{\sum_s \sum_j \sum_t \sum_k a_{ij}^{rs} a_{jk}^{st} Y_k^t}{X_i^r} + \dots , \quad (6)$$

where, as above, Y is final demand, X denotes gross output, and a_{ij}^{rs} denotes the amount of output of industry i located in country r that is required to produce one unit of output of industry j located in country s. If an industry produces only final goods ($X_i^r = Y_i^r$), then upstreamness is equal to 1, as there is only one step away from consumers. If part of the output is used for intermediate inputs for other industries, then upstreamness is greater than 1. Miller and Temurshoev (2017) show that (6) is equal to the row-sum of the inverse Ghosh (1958) matrix G, a matrix that is related to the inverse Leontief matrix B,

$$U = G\iota \ , \tag{7}$$

where ι is a column vector of ones.[28] This is useful, because it allows to easily separate the part of upstreamness that is generated by domestic linkages and foreign ones by isolating for each industry the domestic from the foreign block in U:

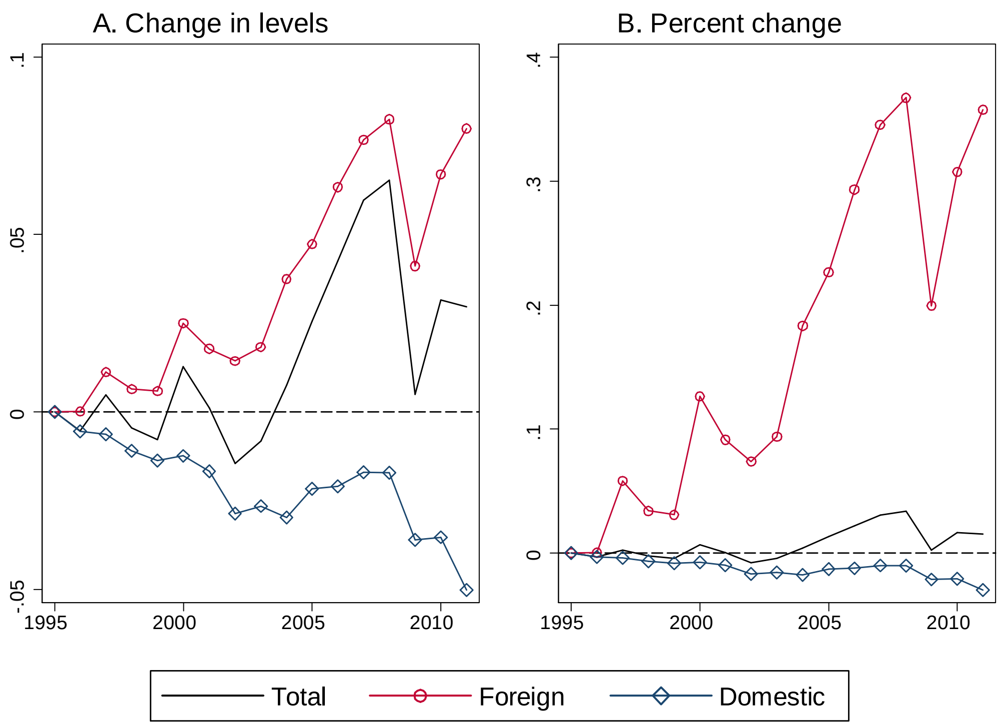
$$U = U^D + U^F \ . \tag{8}$$

We use (7) and replicate the finding of Antràs and Chor (2018), that global upstreamness increases. Overall, the weighted average of U (using value added as weights) increases by 0.1 step, on average, from 1.91 in 1995 to 2.01 in 2007. In line with Miller and Temurshoev (2017), we show that this increase is entirely driven by foreign transactions, not domestic ones. Using (8) we find that the increase in U is mostly driven by an increase in U^F (+0.086), compared to U^D (+0.014), which is a manifestation of increases in foreign forward participation. We illustrate this further graphically in Figure 5. For each country c and year t we compute upstreamness as the weighted average of industry values from (8) (using value added as weights): $U_{ct} = U_{ct}^D + U_{ct}^F$. We then fit panel regressions with country and year fixed effects for U_{ct} and its components in levels, as well as in logs, using GDP in 1995 as weights. Figure 5 reports the time fixed effects. Panel A of Figure 5 confirms that the increase in U is driven by U^F within countries; in fact, domestic upstreamness U^D decreases over time. Panel B illustrates that the increase for U^F has been much faster (starting from a lower base).

Upstreamness is relevant in our context because it is negatively correlated with labor shares, as Antràs, Chor, Fally, and Hillberry (2012) show in a cross section of U.S. manufacturing industries. We replicate this finding below in Section 5.3 using the WIOD and also show that this correlation holds over time: industries that increase their upstreamness—and in particular foreign-driven upstreamness—see labor shares decline.

[28] The "inverse Ghosh" matrix G relates changes in gross output across industries to changes in primary factor use in a particular industry, where primary factor use is value added: $X = G'V$. It is related to the Leontief inverse matrix B by the following formula $XGX^{-1} = B$. While total value added is equal to total final goods demand, $\iota'Y\iota = \iota'V\iota$, this is not so industry by industry. Therefore, despite the similarity to the Leontief model $X = BY$, the Ghosh model conveys different information about the global input-output structure. See chapter 12 in Miller and Blair (2009) for more details.

Figure 5. Upstreamness and its components



Notes. The displayed series are year fixed effects from a regression of either upstreamness (U_{ct}), its domestic (U_{ct}^D) and foreign (U_{ct}^F) components, or their natural logarithms ($\ln U_{ct}$, $\ln U_{ct}^D$, $\ln U_{ct}^F$) on year fixed effects and country fixed effects, weighted by real GDP in 1995. The sample includes 39 countries that correspond to the WIOD 2013 release sample of countries. See main text for details on the construction of these series.

4 Accounting for sources of change in labor shares

4.1 Composition versus within-industry intensities

We decompose changes in factor income $V_f BY$ into within-industry changes captured in V_f, and changes in composition due to evolving global input-output structure B, as well as changes in the pattern of global demand Y.

The change in the product $V_f BY$ (indeed, of any three conformable matrices) can be written as

$$\begin{aligned} V_{f2}B_2Y_2 - V_{f1}B_1Y_1 &= \Delta\left(V_fBY\right) \\ &= (\Delta V_f)B_1Y_1 + V_{f1}(\Delta B)Y_1 + V_{f1}B_1(\Delta Y) \\ &\quad + V_{f1}(\Delta B)(\Delta Y) + (\Delta V_f)B_1(\Delta Y) + (\Delta V_f)(\Delta B)Y_1 \\ &\quad + (\Delta V_f)(\Delta B)(\Delta Y)\ . \end{aligned} \tag{9}$$

where Δ denotes the element-by-element change operator.[29] While other decompositions of changes exist, (9) offers a natural way to contemplate counterfactual scenarios, where we consider the exclusive role of each component of V_fBY, while fixing other components to their values in the initial period (technically, setting changes in all other dimensions to zero):

- Changes only in V_f (within-industry)

$$(\Delta V_f)B_1Y_1$$

- Changes only in B (composition, I/O)

$$V_{f1}(\Delta B)Y_1$$

- Changes only in Y (composition, demand)

$$V_{f1}B_1(\Delta Y)$$

- Changes only in BY (composition, overall)

$$V_{f1}\Delta\left(BY\right) = V_{f1}(\Delta B)Y_1 + V_{f1}B_1(\Delta Y) + V_{f1}(\Delta B)(\Delta Y)$$

Considering changes in BY is methodologically desirable, because the same data are used to construct both B and Y. Once we perform these decompositions for V_fBY, we compute the corresponding factor shares.[30]

In order to identify the manifestation of globalization, we split factor payments into the part that arises from payments by domestic final goods (industries) producers, and payments by foreign final goods (industries) producers. The split is given by different column entries within rows of

[29] See Appendix for proof.

[30] Changes in the matrix of value added shares in output V do not matter for factor shares, because $V_f = F_fV$ and V is common in all factor shares in value added. Changes in factor shares that are driven by changes in F_f occur exclusively within industries; technically, this is because F_f is a diagonal matrix.

V_fBY. The contribution of domestic industries is given by

$$(v_f by)^o_{domestic} = \sum_i \sum_j \sum_{d=o} v_f by^{od}_{ij} \ , \tag{10}$$

which is the block-diagonal part of V_fBY. The contribution of foreign industries to factor payments in country o is given by

$$(v_f by)^o_{foreign} = \sum_i \sum_j \sum_{d\neq o} v_f by^{od}_{ij} \ , \tag{11}$$

which is the off-block-diagonal part of V_fBY, and is akin to $forward^o$ defined above, but differentiated by factor. Note that $\sum_{f\in K,L}[(v_f by)^o_{domestic} + (v_f by)^o_{foreign}] = GDP^o$. These concepts (and changes thereof) describe how domestic and foreign industries contribute to factor payments, taking into account all three dimensions of V_fBY (and changes thereof): global demand (Y), GVCs (B) and technique (V_f).

Table 1 reports the results for this decomposition of changes in factors shares in value added, along with other informative statistics. Panel A reports this for the entire economy, while Panel B focuses on manufacturing industries, which follow similar patterns and where changes are, in general, larger.[31] Columns 1–4 report the shares of income accruing to capital and labor from domestic industries and from foreign industries. All other columns are derived from these. Columns 5 and 6 report the overall capital and domestic shares in value added. Columns 7 and 8 report the shares in value added arising from all domestic and international sources (*forward*, as in Figure 4). Columns 9 and 10 report capital and labor shares in payments by domestic final goods industries, while columns 10 and 11 report capital and labor shares in payments by foreign final goods' industries. The rows labeled "Levels" report levels in 1995 and in 2007. Rows labeled as "Changes" report true and counterfactual changes. All numbers are weighted averages using GDP in 1995 as weights.

Table 1 reveals several interesting facts. First, the increase of 2.45 percent points in capital shares is driven both by domestic industries (0.87 pp), and even more so by foreign industries (1.57 pp). The decline in labor shares is driven by domestic industries (-3.72 pp), where the increase in payments from foreign industries (+1.27 pp) is far from enough to compensate for this decline. The upshot is that the decline in labor shares is at least partly due to a shift of income derived from domestic to foreign industries, where supplying factor services to foreign industries is more capital intensive. This point can also be seen by comparing columns 9 and 11 in levels. Moreover, the increase in capital intensity associated with supplying foreign industries is greater than the one for domestic industries. This can be seen by comparing the changes in columns 9 and 11.

[31] Although all factors in Panel B are employed in manufacturing, services industries, both domestic or foreign, can also be a source of income for manufacturing.

In line with these findings, Elsby, Hobijn, and Şahin (2013) rationalize declining labor shares along the lines of Feenstra and Hanson (1997): tasks or inputs that are relatively labor intensive within rich countries are offshored to poorer countries, in which they are relatively less labor intensive. Importantly, this can lower labor shares in both countries. Alternatively, the same task or input may be simply performed at a higher capital intensity abroad. This may be the case if offshored tasks are performed by vertically integrated firms, as suggested by Antràs (2003). While it is impossible to distinguish among these in our data, in Section 6 we provide evidence that is consistent with this last idea, where we find that capital income outflows are associated with foreign direct investment and with indicators of multinational activity.

Of the overall average decline of 2.45 percent points in labor share, 1.06 percent points—or 43 percent of the actual change—are accounted for by within-industry changes in factor shares ($V_{2007}B_{1995}Y_{1995} - VBY_{1995}$). This operates both through income from domestic and from foreign industries. Changes in composition due to ΔB alone account for 0.47 percent points, and changes due to ΔY account for 0.44 percent points. Together, $\Delta(BY)$ accounts for 0.87 percent points decline in the labor share—which is 35 percent of the change.[32]

A few additional interesting observations emerge when considering the breakdown for different counterfactuals in Table 1. In the $V_{2007} \times B_{1995} \times Y_{1995}$ counterfactual, changes in labor shares due to within domestic industries forces (−0.77 pp) are more than twice as large as changes due to within foreign industries forces (−0.29 pp)—but they work in the same direction. In contrast, in the $V_{1995} \times B_{2007} \times Y_{2007}$ counterfactual, changes in composition affect the labor share in opposite ways due to domestic industries activities (−2.71 pp) versus foreign industries (+1.85 pp). The upshot is that, while overall reducing the labor share, the forces of globalization combine opposite forces, while within-industry forces uniformly reduce the labor share.

We now describe changes in labor shares in 2007–2014. Table 2 has the exact same structure as Table 1. In contrast to the decline in the previous period, labor shares on average increase in 2007–2014, as observed in Figure 2. Also in contrast to the important role played by composition in the decline of labor shares in 1995–2007, composition has a small—and offsetting—effect on

[32] Our results imply an important role for industry composition in the decline of labor shares, which is associated with globalization. In contrast, both Dao, Das, Koczan, and Lian (2017) and Karabarbounis and Neiman (2014) find a much smaller role for industry composition. There are at least two reasons for this. The first is that they use industry value added shares to aggregate industry-level value added labor shares. This can generate misleading results on the role of composition, because it does not take into account changes in composition due to sourcing decisions. The second reason for differences in results is variation in data sources, measurement, and level of aggregation. For example, the data used by Dao, Das, Koczan, and Lian (2017) has only 10 industries, which mechanically causes more variation to occur within industries compared to our data, which include 35 industries. In the limit, if there is only one industry, all of the variation is within this single industry. The sample of countries is also different across studies. Karabarbounis and Neiman (2014) consider value added shares in corporate income, while we consider the entire economy.

the (more modest) increase in labor shares in 2007–2014. In both periods changes in composition contribute to lower labor shares, but much less in 2007–2014, which is consistent with the general slowdown in the increase in GVC deepening, depicted in Figure 4. This is seen also in columns 7 and 8 in Table 2, with a much more modest shift of income towards foreign sources.[33]

4.2 The role of China

We address the role of China in two ways. First, we split $(v_f by)^o_{foreign}$, defined in (11), into $(v_f by)^o_{foreign} = (v_f by)^o_{China} + (v_f by)^o_{other}$.[34] This allows separating Chinese payments to factor f located in country o from payments originating in other (foreign) countries. We then construct the appropriate factor shares. We do the same for changes. Second, we examine how much of the variation in changes in factor shares are driven by variation in income paid by domestic industries, China, and other countries' industries. We compare standardized coefficients in a regression of $\Delta(v_f by)^o$ on its components, where a larger "beta" coefficient means greater explanatory power, in the usual partial derivative sense of keeping all other components fixed. Given the identity $\Delta(v_f by)^o = \Delta(v_f by)^o_{domestic} + \Delta(v_f by)^o_{China} + \Delta(v_f by)^o_{other}$, this is equivalent to comparing the ratios of the standard deviations of each component of $\Delta(v_f by)^o$ to the standard deviation in $\Delta(v_f by)^o$.[35] We report weighted standard deviations, with GDP weights at the beginning of each sample.

Table 3 describes the results, from which we conclude that China contributed to the decline in labor shares in 1995–2007 by increasing the capital intensity of factor payments. First, we see that in levels, China has increased its importance in factor payments to other countries fourfold in 1995–2007, from 0.27 percent of GDP to 1.1 percent of GDP. Despite these relatively low levels, China accounts for much of the changes in factor payments. China accounts for 29% of the shift of sources of income towards supplying factor services to foreign industries (out of the total 2.84pp, as in Table 1, columns 7–8). China accounts for 37% of the shift towards foreign income for labor. The increase in percent points in labor income payments from China (0.46pp) is higher than the increase in capital income payments from China (0.37pp). However, the relative increase is much higher for capital (i.e., the base of the change was lower): 350% increase for capital versus 286%

[33] In the Appendix we report results for factor income shares in final demand in a similar fashion as Tables 1 and 2, for the weighted-average country, using GDP as weights. These results display very similar patterns as for shares in GDP. This is a mechanical consequence of the fact that we obtain global GDP whether we sum all rows or all columns in VBY.

[34] Of course, $(v_f by)^{China}_{foreign,\ China} = 0$.

[35] Estimating the regression $\Delta(v_f by)^o = \beta_i \Delta(v_f by)^o_{domestic} + \beta_2 \Delta(v_f by)^o_{China} + \beta_3 \Delta(v_f by)^o_{other} + \varepsilon^o$ yields $\beta_i = 1$ for all i and $\widehat{\varepsilon}^o = 0$ for all o (as well as in levels, without the Δ operator). Therefore, the standardized "beta" regression coefficients are equal to the ratios of standard deviations of each component of $\Delta(v_f by)^o$ to the standard deviation in $\Delta(v_f by)^o$.

increase for labor payments.

In the latter 2007–2014 period the magnitudes for the effect of China are smaller, in line with the general decline in the size of the shift towards foreign sources of factor income. Recall that labor shares actually increase in 2007–2014 on average, so the results are consistent with an important role for China again, with a greater effect on labor income than capital both in percent points and in relative terms.

4.3 Domestic versus foreign sources of compositional changes

We saw above that compositional changes in value chains captured in B and in the pattern of demand for final goods Y account for reductions in labor shares. Here we ask whether the sources of these changes due to domestic or foreign forces.

We decompose B using Stone's additive decomposition (see Appendix E for details):

$$B = I + (B^d - I) + B^x + B^g \ . \tag{12}$$

Here I captures the direct effect of demand, while the other components capture indirect effects: $B^d - I$ captures the effect of all strictly *domestic* indirect linkages, B^x captures effects induced by all strictly *bilateral trade* in intermediate inputs *that cross borders only once* (exports from the standpoint of the producing country), and B^g captures *complex global value chains.* In particular, B^g captures the effects that are induced by combining both domestic and foreign linkages, that cross borders more than once, and that may include return effects.[36] Equation (12) allows us to write

$$V_f(\Delta B)Y = V_f(\Delta B^d)Y + V_f(\Delta B^x)Y + V_f(\Delta B^g)Y \ . \tag{13}$$

Global demand for final goods Y can be written as

$$Y = Y^d + Y^f \ , \tag{14}$$

where Y^d is *domestic* demand for final goods and Y^f is *foreign* demand for final goods. Both domestic and foreign demand for a given country include goods produced anywhere in the world. For example, Y^d is the part of global demand for final goods by the country providing factor services (defined by matrix rows), including both domestic purchases and imports of final goods. Equation (14) allows us to write

$$V_f B(\Delta Y) = V_f B(\Delta Y^d) + V_f B(\Delta Y^f) \ . \tag{15}$$

[36] For example, consider a hypothetical German car door producer that ships doors to Czech Republic, where windows are manufactured and installed in the doors, which get shipped back to Germany and installed in cars that are either purchased domestically or are exported.

Table 4 displays the results of the analysis for labor shares ($V_f = V_L$) for both periods (1995–2007 and 2007–2014), for the entire economy level and separately for manufacturing. The "Total" rows report in columns 1–3 and 7–9 labor shares in value added that are paid by domestic industries, foreign industries, and overall in the initial year (1995 or 2007); these are the same numbers for the initial year in columns 2, 4 and 6 in Table 1 and Table 2. The "Total" rows report in columns 4–6 and 10–12 the changes in the same concepts; these are the same numbers in columns 2, 4 and 6 in Tables 1 and 2 for either changes in B or changes in Y. The rows above the "Total" rows indicate the contributions of sub-components of either B or Y to their levels and changes in the corresponding columns.

We start with describing the results for the breakdown of B. Overall, most payments to labor are generated due to domestic linkages (roughly 90% for all industries and 80% in manufacturing in 1995). Almost all of demand in levels from domestic industries occurs due to domestic linkages (B^d), while most of the demand from foreign industries occurs due to bilateral trade linkages (B^x) (roughly 84% in 1995 and 77% in 2007). Complex GVCs (B^g) originate mostly from foreign industries; "loop" value chains from domestic back to domestic are much less important in levels. These findings are consistent with Miroudot and Nordstrom (2015).

What is more interesting are the contributions to changes. The overall decline in labor shares in 1995–2007 due to ΔB is driven by a reduction in income from domestic industries (ΔB^d) that is not fully counterbalanced by both exports of intermediates (ΔB^x) and by more complex GVCs (ΔB^g). Complex GVCs account for 62% of this shift; in manufacturing ΔB^g account for 82% of the corresponding shift in 1995–2007. In 2007–2014 the parretns are similar at the aggregate level, although in manufacturing change in both domestic and foreign linkages contribute to declines in labor shares.

Turning to the breakdown of Y in 1995 we see that domestic demand for final goods (Y^d) accounts for the lion's share of labor payments (93% overall and 80% in manufacturing), although this declines by 2007 (90% overall and 73% in manufacturing). Considering the contributions to changes (ΔY), there are different patterns before and after 2007. In 1995–2007 the source of the decline in labor shares is a shift to foreign demand that does not fully compensate the decline in the contribution of domestic demand. In contrast, in 2007–2014 foreign demand accounts for the decline in the labor share driven by compositional changes in demand. In manufacturing this picture is even more pronounced.

The increase in importance of foreign demand (ΔY^f) in 1995–2007 operates both through domestic and foreign industries. The latter is due to how domestic labor paticipates in GVCs supplying foreign industries. In contrast, the incidence of the overall decline in importance of domestic demand (ΔY^d) in 1995–2007 is on domestic industries, while concurrently contributing to an increase in labor payments due to domestic demand for foreign final goods. The latter is also due to GVCs. The changes in manufacturing are larger, and overall in the same direction as the entire economy. In 2007–2014 change in domestic demand exhibit similar patterns, while changes in foreign demand overall decrease payments to labor.

Overall, Table 4 delivers two main messages. The first is that changes in complex GVCs account for much of the shift towards foreign sources of labor income. The second is that changes in both foreign and domestic demand affect labor shares through their incidence on both domestic and foreign goods.

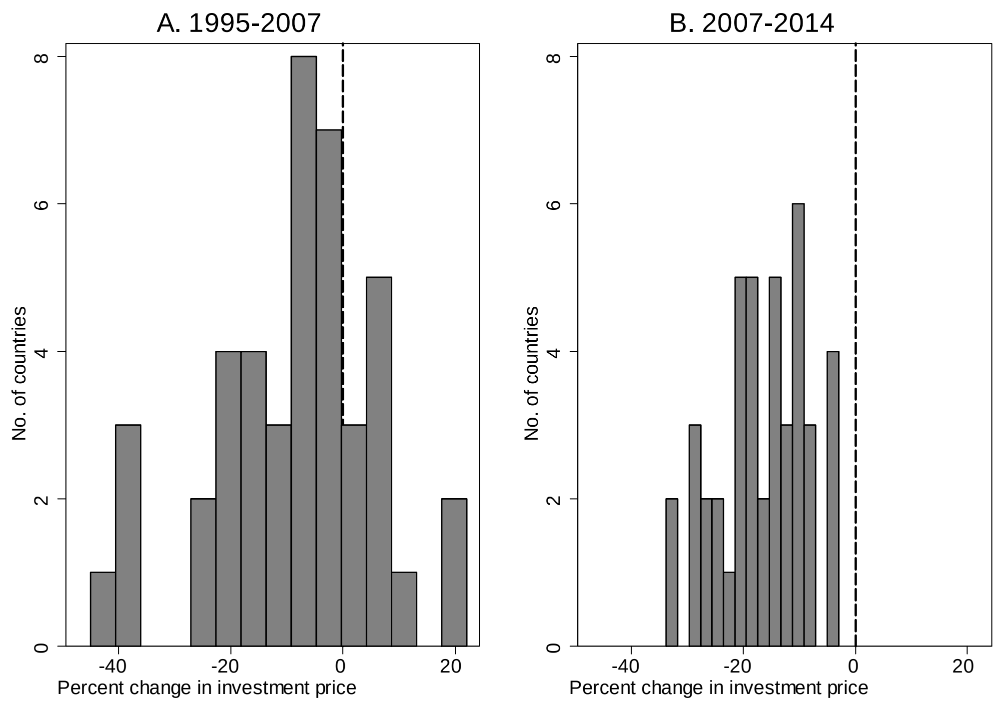
5 Explaining changes in labor shares

One of the central explanations for the evolution of labor shares within economic units (industries or countries) is the decline in the price of capital equipment investment, as in Karabarbounis and Neiman (2014).[37] In their model, when the elasticity of substitution between labor and capital is greater than unity (which they estimate to be so) the continuous decrease in the price of investment lowers the capital user cost r and causes a shift in expenditures towards capital. However, since r continues to decrease after 2007, then this mechanism cannot account for the increases in the labor share after 2007. Moreover, it is silent about the division of income between skilled and unskilled labor. In Figure 6 we report that indeed the price of investment has decreased on average across countries in our sample, and that this has continued after 2007 at a somewhat faster pace and in a more uniform fashion.[38] The weighted average decline in 1995–2007 is roughly 12%, or 1% per year, while the weighted average decline in 2007–2014 is roughly 15%, or 2% per year—twice the annual rate in the previous period.

[37] It is also possible that offshoring increases intra-industry capital intensity both for the source and destination country, along the lines of Feenstra and Hanson (1997). This may occur if the least capital intensive activities are offshored to locations where they become the most capital intensive activities.

[38] The data are from the Penn World Tables mark 9.0 (PWT, see Feenstra, Inklaar, and Timmer (2015)) and from the United States' Bureau of Economic Analysis (BEA), applying the same methodology as in Karabarbounis and Neiman (2014) with updated data (their sample ends in 2010). In particular, for each country c in year t we divide the investment price index (P_{ct}^{inv}) by the consumption price index (P_{ct}^{con}), both in terms of their corresponding PPP US prices (PWT data). This means that $P_{ct}^{inv}/P_{ct}^{con}$ is the relative price of investment *relative to that of the United States' ratio.* In order to convert this to the relative price from the domestic standpoint we divide $P_{ct}^{inv}/P_{ct}^{con}$ by $P_{USA,t}^{inv}/P_{USA,t}^{con}$ and then multiply by the ratio of the price index for private fixed investment ($P_{USA,t}^{pfi}$) to the personal consumption expenditures price index ($P_{USA,t}^{pce}$) (BEA data). We reports percent changes in the resulting $q_{ct} = (P_{ct}^{inv}/P_{ct}^{con})/(P_{USA,t}^{inv}/P_{USA,t}^{con}) \cdot (P_{USA,t}^{pfi}/P_{USA,t}^{pce})$.

Figure 6: Changes in Investment Price



Notes. The figure reports the change in investment prices (relative to the price of consumption). Source: authors' calculations using data from Penn World Tables mark 9.0 and from the United States' Bureau of Economic Analysis.

Can the continuous decrease in r explain both the decrease in labor shares before 2007 and the increase in labor shares after 2007, as well as the concurrent increase in skilled labor shares? In order to entertain this possibility consider a three factor nested CES production function as follows,

$$\begin{aligned} Q &= A\left[\alpha^{\frac{1}{\sigma}} X^{\frac{\sigma-1}{\sigma}} + (1-\alpha)^{\frac{1}{\sigma}} L^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \\ X &= \left[\beta^{\frac{1}{\eta}} K^{\frac{\eta-1}{\eta}} + (1-\beta)^{\frac{1}{\eta}} H^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}} \end{aligned}$$

so that

$$Q = A\left[\alpha^{\frac{1}{\sigma}}\left[\beta^{\frac{1}{\eta}} K^{\frac{\eta-1}{\eta}} + (1-\beta)^{\frac{1}{\eta}} H^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}\frac{\sigma-1}{\sigma}} + (1-\alpha)^{\frac{1}{\sigma}} L^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}}, \quad (16)$$

where L is low skilled labor, H is high skill labor, and K is capital. The elasticity of substitution between K and H is η, and the elasticity of substitution between L and the capital-skilled labor aggregate X is σ. Define cost shares of factor $f \in \{L, H, K\}$ in total value added as θ_f, and the cost share of factor f within X as θ_f^X ($\theta_L^X = 0$). We obtain the following results:

$$\frac{\partial \theta_L}{\partial r} r = (\sigma - 1)\, \theta_L \theta_K \tag{17}$$

$$\frac{\partial \theta_H}{\partial r} r = -\left[(\sigma - 1)\, \theta_L \theta_H^X + (1 - \eta)\, \theta_H^X\right] \theta_K \tag{18}$$

$$\frac{\partial \theta_K}{\partial r} r = -\left[(\sigma - 1)\, \theta_L \theta_K^X - (1 - \eta)\,(1 - \theta_K^X)\right] \theta_K \tag{19}$$

$$\frac{\partial \theta_K^X}{\partial r} r = (1 - \eta)\, \theta_K^X \theta_H^X\ . \tag{20}$$

Here $(\partial \theta_f / \partial r)\,/r$ is the half-elasticity of the factor share of f in percent points with respect to a one percent change in r.[39]

Suppose that $\sigma > 1$ and $\eta < 1$, implying capital-skill complementarity (Griliches (1969)). Then a decrease in r will (i) unambiguously lower unskilled labor's share (θ_L); (ii) unambiguously increase skilled labor's share (θ_H); and (iii) unambiguously decrease capital's share in X (θ_K^X). In addition, (iv) if θ_L and θ_K^X are large enough, then a decrease in r will increase capital's share θ_K and decrease the labor share $\theta_N = \theta_L + \theta_H = 1 - \theta_K$; and if the decrease in r continues for some time—contributing to decreases in θ_L and in θ_K^X—then it is possible that the derivative (20) changes sign, such that further a decrease in r lowers capital's share. The reason that the sign of $(\partial \theta_K / \partial r)/r$ can change is that it combines two opposing forces: substitution of expenditures towards X and substitution away from capital within X.[40]

By naively quantifying (18) and (20), we demonstrate that conjectures (ii) and (iv) are not implausible. We use $\sigma = 1.6$ and $\eta = 0.6$, quite close to the values estimated in Krusell, Ohanian, Rios-Rull, and Violante (2000), and compute (18) and (20) for average values of factor income shares in our data in 1995 and in 2007, taken directly from Tables 1 and 2 (see appendix Table A9).[41] This gives $(\partial \theta_H / \partial r) r < 0$ both in 1995 and in 2007; in contrast, $(\partial \theta_N / \partial r) r = -(\partial \theta_K / \partial r) r > 0$ in 1995 and < 0 in 2007.

We also develop expressions like (17)–(20) for half elasticities with respect to skilled and unskilled wages. This is informative, because of the general trend of increasing relative supply of skilled labor compared to unskilled labor. If $\sigma > 1$ and $\eta < 1$, then (v) an increase in relative

[39] See Appendix F for derivations.

[40] Substitution towards X arises from the fact that X becomes cheaper as the price of capital, one of it's components, becomes cheaper, combined with a large elasticity of substitution between L and X, $\sigma > 1$. Substitution away from capital within X arises from the reduction in the user cost of capital combined with a small elasticity of substitution between K and H, $\eta < 1$.

[41] One important difference between (16) and the production function in Krusell, Ohanian, Rios-Rull, and Violante (2000) is that the latter separates structures and machines within the capital stock. We are unable to do this in our data.

supply of skilled labor will unambiguously increase capital's (θ_K) share and lower the labor share ($\theta_N = 1 - \theta_K$); and this effect is larger when θ_L and θ_K^X are large. This happens because the relative increase in unskilled wages shifts expenditures away from unskilled labor and towards X; at the same time, within X, the decline in skilled wages relative to r (assumed constant in this comparative static) shifts expenditures away from skilled labor and towards capital.[42]

5.1 Regression analysis

In order to empirically evaluate conjectures (iv) and (v), as well as other mechanisms, we fit the following regressions

$$\begin{aligned} \Delta LS_{ic} &= \gamma_1 \Delta FWD_{ic} + \gamma_2 \Delta OFF_{ic} + \gamma_3 \Delta EXP_{ic} + \gamma_4 \Delta IMP_{ic} \\ &+ \kappa_1 \Delta \ln q_c + \kappa_2 \left[\Delta \ln q_c \cdot \theta_{ic}\right] \\ &+ \alpha_1 \Delta \ln \left(H/L\right)_c + \alpha_2 \left[\Delta \ln \left(H/L\right)_c \cdot \theta_{ic}\right] + \mu \theta_{ic} + \text{fixed effects} + \varepsilon_{ic} \ , \end{aligned} \tag{21}$$

where ΔLS_{ic} is the change in labor share in industry i located in country c. The first four variables on the right hand side of (21) capture dimensions of globalization: $FWD_{ic} = forward_{ic}/VA_{ic}$ is forward GVC intensity—including exports of intermediate inputs ($forward_{ic}$ is the industry-country equivalent of the country-level variable defined and described in 3.3), $OFF_{ic} = foreign\_inputs_{ic}/inputs_{ic}$ is intermediate inputs offshoring intensity in total input purchases, $EXP_{ic} = y_{ic}^{-c}/VA_{ic}$ is export intensity of final goods in value added (y_{ic}^{-c} is final demand for industry i in country c from other countries $-c$), and $IMP_{ic} = y_{i,-c}^{c}/absorption_{i,c}$ is import intensity of final goods in total absorption ($y_{i,-c}^{c}$ is demand of country c for final goods i produced in other countries $-c$).[43] The next two variables in (21) capture technical change, along the lines of the framework studied above: q_c is the relative price of investment (only country-level variation) and $\theta_{ic} = \theta_{K,ic}^X \cdot \theta_{L,ic}$ (we standardize both q_c and θ_{ic}). Conjecture (iv) predicts $\kappa_1, \kappa_2 > 0$ and that $|\kappa_2|$ is not too small in order to have the possibility of a sign change in the half elasticity (20). Following this, we have variables that capture relative supply of skilled labor: $(H/L)_c$ (only country-level variation, standardized) and

[42] See Appendix F for derivations. Our framework delivers the following additional predictions. If $\sigma > 1$ and $\eta < 1$, then an increase in relative supply of skilled labor will unambiguously (vi) lower the unskilled labor share (θ_L). In addition, (vii) if θ_L and θ_H^X are large enough, then an increase in relative supply of skilled labor will increase skilled labor share (θ_H); and (viii) if the increase in relative supply continues for some time—contributing to decreases in θ_L and in θ_H^X—then it is possible that the derivative changes sign, and additional increase in relative supply lowers skill labor's share. This is the result of two opposing forces: substitution of expenditures towards X and substitution away from skilled labor within X.

[43] $OFF_{ic} = foreign\_inputs_{ic}/inputs_{ic}$ accounts only for *direct* offshoring, i.e. only one stage of the value chain. Referring to appendix Figure A1, it is computed as $OFF_{ic} = \sum_{j,s \neq i} A_{ji}^{sc} / \sum_{j,s} A_{ji}^{sc}$. Dao, Das, Koczan, and Lian (2017) estimate that GVC deepening within an industry lowers within-industry labor shares, but they do not distinguish FWD from OFF, as we do.

$(H/L)_c$ interacted with θ_{ic}. Conjecture (v) predicts $\alpha_1, \alpha_2 < 0$.

We estimate versions of (21) for all industries and then separately for manufacturing industries in 1995–2007. Data to compute θ_{ic} is not available in 2007–2014, so we do not estimate (21) in that period. We estimate (21) by weighted least squares (WLS) with VA_{ic} in 1995 as weights, and we report robust standard errors clustered by country c, to accommodate the fact that q_c and $(H/L)_c$ vary only by country (Moulton (1990)).[44]

Table 5 reports results of estimating (21). Across specifications and sectors, we see a systematic and relatively precisely estimated negative association between increases in forward linkages and labor shares. This holds even when controlling for industry-specific or country-specific trends. However, statistical significance drops when including both industry and country fixed effects. Industries that have increased the intensity of supplying intermediate inputs to foreign industries have seen their labor share decline. It is consistent with the idea that supplying inputs requires less human and face-to-face interactions than producing final goods and selling them to final users, i.e. households (directly or indirectly), and is in line with findings in Antràs, Chor, Fally, and Hillberry (2012). We investigate this idea more systematically next in Section 5.3. Although not always precisely estimated, offshoring is also negatively associated with labor shares in manufacturing. This implies that offshoring tends to substitute mostly labor-intensive tasks, rather than capital- or machine-intensive tasks. Both the effect of intermediate input exporting and of offshoring on labor shares are stronger in manufacturing.

Turning to the effect of the price of investment, we find that on average reductions in q_c are associated with reductions in labor shares—although this is not precisely estimated. This effect is larger when θ_{ic} is larger, and the coefficient to the interaction is large and statistically significant in manufacturing, although not when controlling for country trends. Since θ_{ic} is standardized, and can therefore take negative values, the positive coefficient to the $\Delta \ln q_c \cdot \theta_{ic}$ interaction implies that declines in q_c can also increase labor shares when unskilled labor shares and the share of capital within X are smaller—consistent conjecture (iv). We do not find strong effects for relative supply of skilled labor on average, but in manufacturing we estimate $\alpha_2 < 0$, consistent with conjecture (v), i.e. increases in relative supply of skill lower the labor share when θ_{ic} is high.

In Table 6 we reports estimates of (21), but at the country level without any fixed effects. Of course, these regressions capture both within-industry changes and changes in industry composition. The number of observations drops to 39, making it hard to get precise estimates. Nevertheless, we find support for the negative relationship between foreign forward GVC deepening

[44] Not reported here, two-way clustering by country and by industry (Cameron, Gelbach, and Miller (2011)) generally yields slightly smaller standard errors compared to one-way clustering by country, as do "robust" standard errors.

and labor shares. The coefficient to ΔFWD is always negative and almost always statistically significant; when it is not, it is far from conventional levels of significance. We also find support for conjectures (iv) and (v). In particular, we estimate a positive coefficient to $\Delta \ln q \cdot \theta$ ($\kappa_2 > 0$) and a negative coefficient to $\Delta \ln (H/L) \cdot \theta$ ($\alpha_2 < 0$). The latter two are statistically significant in manufacturing, when the estimator is weighted least squares.

Overall, Table 5 and Table 6 provide strong evidence on the negative association between foreign forward GVC deepening and labor shares in 1995–2007. These tables also lend some support to the particular production function approach (16) and the predictions it makes for technical change. This helps rationalizing the constant increase in skilled labor shares being concurrent with a change in the trend for the overall labor share.

5.2 Strength of association over time

We now illustrate that the effect of foreign forward GVC participation is present mostly during the pre-crisis 2000s. This is the period in which upstreamness increases. In the next subsection, we show that increases in upstreamness are directly associated with declines in labor shares.

We cannot estimate (21) in 2007–2014 because data to compute H/L and θ is unavailable at the industry level. Moreover, changes in methodology preclude merging data from before and after 2007. Therefore, we start with a simpler version of (21) in 1995–2007. We estimate a series of regressions of the type

$$\begin{aligned}\Delta_{1995-\tau} LS_{ic} \;=\;& \gamma_1 \Delta_{1995-\tau} FWD_{ic} \\ & + \gamma_2 \Delta_{1995-\tau} OFF_{ic} + \gamma_3 \Delta_{1995-\tau} EXP_{ic} + \gamma_4 \Delta_{1995-\tau} IMP_{ic} \\ & + \kappa_1 \Delta_{1995-\tau} \ln q_c + \text{fixed effects} + \varepsilon_{ic} \qquad (22)\end{aligned}$$

and

$$\begin{aligned}\Delta_{\tau-2007} LS_{ic} \;=\;& \gamma_1 \Delta_{\tau-2007} FWD_{ic} \\ & + \gamma_2 \Delta_{\tau-2007} OFF_{ic} + \gamma_3 \Delta_{\tau-2007} EXP_{ic} + \gamma_4 \Delta_{\tau-2007} IMP_{ic} \\ & + \kappa_1 \Delta_{\tau-2007} \ln q_c + \text{fixed effects} + \varepsilon_{ic} \;, \qquad (23)\end{aligned}$$

where $\Delta_{1995-\tau}$ denotes changes from 1995 to year τ, and $\Delta_{\tau-2007}$ denotes changes from year τ to 2007, for $\tau = 1996, 1997, ...2006$. The results in Table 7 imply that the effect of FWD is weakest in (22) until $\tau = 2001$ and strongest in (23) after $\tau = 2001$, both in terms of magnitude and precision.[45] Given these results, we estimate versions of (21) in stacked differences over the periods

[45] Regressions like (22) and (23) using data aggregated to the country level imply the same conclusion, that 2001

1995–2001, 2001–2007, 2007–2014, both at the country by industry and country level. Here, we use the same right hand side variables as in (22) and (23). The results, reported in Table 8 imply that the effect of FWD is not present before 2001 or after 2007. We also estimate a much weaker positive effect of exporting of final goods within industries, which is not robust at the country level.

Why is the effect of FWD concentrated in 2001–2007? First, recall that in 2001 China joined the WTO, while 2007 marks the year before the trade collapse that coincided with the beginning of the Great Recession in 2008. Second, consider variation in upstreamness across activities and over time. Inspection of Figure 5 reveals that increases in upstreamness occur mostly in 2001–2007, and that this increase is associated with foreign, not domestic transactions. This offers an interpretation of the negative association of forward GVC participation with labor shares, and the incidence of this after 2001. More upstream production requires less human and more physical capital. Differently put, the closer we are in the production process to final products that are consumed by households, the more important are human inputs, for example in design, marketing, and service. The variable FWD is by definition relatively upstream, as it captures exports of intermediate inputs. And Figure 5 illustrates that this type of activity increased its upstreamness significantly in 2001–2007, which can explain why changes in this period are the ones that are more strongly associated with declines in labor shares.

Next, we demonstrate that upstreamness is directly and negatively associated with labor shares, and that this is driven by the foreign component of upstreamness.

5.3 Upstreamness and functional specialization

Here we ask whether the link between greater foreign forward GVC participation and declines in labor shares documented in Sections 5.1 and 5.2 is associated with increases in upstreamness. In order to do this, we fit country by industry × year panel regressions, and country by industry long difference regressions (as in (21)), where the dependent variable is labor shares and the explanatory variables are either upstreamness or its domestic and foreign components. The sample is always 1995–2007. We use different sets of fixed effects (FEs) in the panel regressions in order to illustrate different sources of variation. We report robust standard errors clustered at the country and industry level. In long differences we report robust standard errors without clustering.

Table 9 reports the results. Column (1), with only year FEs, demonstrates that upstreamness (U) is associated with lower labor shares in the cross section. This corroborates Antràs, Chor, Fally, and Hillberry (2012), who document a similar correlation in a cross section of U.S. manufacturing

is an important cutoff: regressions that include 2001 and the following years yield large and statistically significant estimates of the negative effect of FWD on labor shares.

industries. We find that this association also holds over time: column (2), with country by industry FEs, demonstrates that increases in upstreamness are associated with decreases in labor shares. This results is robust to adding year FEs in column (3). In column (4) we find that the domestic component of upstreamness (U^D) is associated with lower labor shares in the cross section, much more than the foreign component. In contrast, in columns (5) and (6) we see that increases in the foreign component of upstreamness (U^F) are associated with decreases in labor shares over time, not changes in the domestic component.

The long differences regression in column (7) exhibits only a very weak correlation between changes in upstreamness and changes in labor shares. However, in column (8) we see that increases in the foreign component of upstreamness are associated with lower labor shares, whereas increases in the domestic component are weakly positively associated with labor shares, which explains the weak relationship overall. Results for manufacturing industries are very similar to those in the sample of all industries.

The upshot from Table 9 is that increases in upstreamness that are driven by foreign transactions are associated with declines in labor shares. One explanation could be that producing and selling final goods involves more human effort in management, design, marketing and post-sales service—compared to exporting intermediate inputs abroad, where these human functions becomes less and less important compared to capital as we move up the value chain.

In order to entertain this hypothesis we draw on data from Timmer, Miroudot, and de Vries (2018), who split labor income into four categories of "functional specialization": management (MGT), R&D, fabrication (FAB), and marketing (MKT). This allows us to split changes in labor shares by function

$$\Delta LS_{ic} = \Delta MGT_{ic} + \Delta RD_{ic} + \Delta FAB_{ic} + \Delta MKT_{ic} \ .$$

Inspection of the occupational classifications that underlie these four functions reveals that they are particularly meaningful in manufacturing. In contrast, the occupational classifications are less clear in non-manufacturing industries; for example, the marketing category is very heterogeneous, resembling a residual of the other, relatively more consistently defined functions. With this caveat in mind, we fit regressions of each dimension of functional specialization on either upstreamness or globalization variables as follows

$$\Delta FUNCTION_{ic} = \beta^D \Delta U^D_{ic} + \beta^F \Delta U^F_{ic} + \text{fixed effects} + \varepsilon_{ic} \ , \tag{24}$$

or

$$\Delta FUNCTION_{ic} = \gamma_1 \Delta FWD_{ic} + \gamma_2 \Delta OFF_{ic} + \gamma_3 \Delta EXP_{ic} + \gamma_4 \Delta IMP_{ic} + \kappa_1 \Delta \ln q_c + \text{fixed effects} + \varepsilon_{ic} \ , \quad (25)$$

where $FUNCTION \in \{MGT, RD, FAB, MKT\}$, and changes are over 2001–2007. We weight regressions by value added in 2001 and cluster standard errors by country. In order to ease the exposition we report only estimates of γ_1 in (25), as other coefficients are not precisely estimated or imply much weaker effects.[46]

The estimates of (24) and (25) are reported in Table 10. They imply that across specifications of fixed effects, ΔU^F and ΔFWD are associated with declines in management and marketing. This is in line with the idea that moving farther away from households requires less expenditure on these activities, which are inherently human capital intensive. We also see that ΔU^F and ΔFWD are associated with declines in expenditures on labor employed in fabrication, and that this association is generally stronger, especially in manufacturing. This means that more upstream production is more capital intensive, over and above the lower intensity of management and marketing. R&D intensity in labor expenditures is unaffected, which implies that this type of activity becomes relatively more intensive within labor. This is in line with the overall increase in skilled labor shares, which is over represented in R&D occupations, where the declines in labor shares are shouldered by less-skilled labor, which is over represented in fabrication occupations.

We estimate opposite effects of ΔU^D on functional specialization over all industries, but not in manufacturing. This result is much less informative for two reasons. First, most of the variation in upstreamness comes from ΔU^F, so this effect has relatively little explanatory power. Second, the functional specialization data itself is less informative in services industries.

Overall, results in Table 9 and Table 10 help interpreting the results in Table 5 and Table 6. Labor share declines are associated with foreign forward GVC integration because it implies greater upstreamness, requiring less expenditure on management and marketing activities. The latter are associated with consumers of final goods, while greater upstreamness implies greater distance from consumers.

6 Foreign ownership and capital shares in GNP

Since capital ownership is much more concentrated than labor income, increases in capital shares imply a disproportionate increase in income for capital owners. But because the data is based on

[46] Full results are available upon request.

gross *domestic* product (GDP) concepts, it does not say whether the claimants to capital income—i.e., the owners of the underlying capital stocks—are local or foreign.[47]

In this section we illustrate how the rise of foreign direct investment (FDI) and multinational enterprise (MNE) activity affects inequality through variation in capital shares in gross national product (GNP). We do this in two steps. First, we demonstrate that foreign capital income flows that occur via GVCs are associated with FDI and MNE activity. Since much of world trade in intermediate inputs occurs within the boundaries of multinational enterprises (MNEs), this means that part of the income that accrues via GVCs to factors located in some country is actually paid to foreign entities due to ownership of productive factors, namely of capital. We then calculate how the uneven spread of FDI and MNE activity contributes to capital shares.

As suggested by Antràs (2003), vertical integration (within an MNE) is associated with greater capital intensity of the upstream supplier, compared to arms-length offshoring. Since this occurs through cost sharing of capital expenditures, i.e. foreign ownership of this capital, more MNE activity can also help explain the greater capital intensity for foreign upstream activities.[48]

6.1 Foreign capital income flows and foreign ownership

More specifically, we ask whether capital income in country o that is derived from value chains that involve end users of intermediate inputs in country d is associated with foreign ownership of capital installed in o by entities in country d, or with MNEs with headquarters in d and affiliates in o. In order to examine these ideas we estimate the following gravity equation in a cross section in 2007:

$$\ln V_K BY_{od} = \beta \cdot \ln ownership_{od} + \gamma' gravity_{od} + \alpha_o + \alpha_d + \varepsilon_{od} \ , \tag{26}$$

where $V_K BY_{od}$ is capital income accruing to capital installed in o that originates from supplying intermediate inputs (with the associated capital services embodied in them) for final goods production and sales from country d. We also estimate versions of (26) where the dependent variable is the log of $V_K B^z Y_{od}$, where B^z is either B^x or B^g (defined above in 12), implying capital income accruing to factors in o due to sales of intermediate inputs that are demanded in d either through direct bilateral exports of intermediate inputs ($V_K B^x Y_{od}$) or due to complex GVCs ($V_K B^g Y_{od}$). We

[47] This point is appreciated in Lipsey (2010). This may be more important in less developed countries in the so-called "South", where net inflows of foreign direct investment are large; see Timmer, Erumban, Los, Stehrer, and de Vries (2014).

[48] A well-known fact is that a very large share of global trade happens within the boundaries of MNEs. For example, 50% of U.S. total imports in 2010 occurred within MNE boundaries, i.e. between U.S foreign affiliates and their U.S. parents (or other affiliates located in the U.S.). MNEs account for 90% of total U.S. imports (and exports) in 2010. The difference between this and the 50% that takes place within MNE boundaries is trade between U.S. and other firms at arms length. Data from the U.S. Bureau of Economic Analysis and the World Trade Organization International Trade Statistics.

separate the two sources of income, because $V_K B^x Y_{od}$ should be more closely related to bilateral ownership links. Note that $V_K B^x Y_{od} + V_K B^g Y_{od}$ exhausts all foreign capital income accruing to o from final goods production in $d \neq o$ (this is illustrated in Table 4).[49]

The main coefficient of interest is β, indicating the elasticity of a flow of income with respect to $ownership_{od}$, a measure of ownership of capital installed in o by multinational corporations located in d (headquarters listed in d). We consider several such indicators. We use the stock of FDI in o that is owned by d (OECD data), as well as multinational production data (average in 1996–2001) from Ramondo, Rodríguez-Clare, and Tintelnot (2015): total sales of affiliates in o with parents in d and the number of affiliates that underlie these sales. Number of affiliates is a better indicator of MNE ownership compared to total sales of affiliates because affiliates in o may (and do) sell both domestically and to third countries, as well as due to other reporting issues. One caveat of using these indicators for our purposes is that they capture ownership for both vertical and horizontal motivations, whereas our dependent variables only include vertical supply chain income flows.

We control for standard bilateral control variables in $gravity_{od}$: distance, and indicators for common border, colonial ties, common language, free trade agreements, both countries in EU 15, one country in the EU enlargement (13 countries) while the other is an EU 15 member, common currency.[50] We include origin and destination fixed effects to control for overall attractiveness of o for production and investment, and overall prowess of d in MNE activity. We report estimates of (26) by ordinary least squares (OLS) and Poisson pseudo maximum likelihood (PPML). Differences in estimates arise from the fact that PPML emphasizes more large flows compared to OLS. We report robust two-way clustered standard errors at the country o and country d level in order to account for correlations in errors within origins and destinations (Cameron, Gelbach, and Miller (2011)).

After merging ownership variables into the bilateral $V_K BY_{od}$ dataset we have 868 observations with strictly positive FDI positions, 802 observations with strictly positive affiliate sales, and 790 observations with strictly positive number of affiliates. The rest of the observations (out of a total of 1190 possible bilateral flows) have zero values for the ownership variables.[51] We estimate (26) in samples with strictly positive ownership variables samples due to the log specification.

Table 11 reports the results. First, we see that all ownership indicators are associated with all types of income flows. Second, the strength of the relationship is much stronger for $V_K B^x Y$, compared to $V_K B^g Y$. This is true both on the margin, as the elasticities are much larger in columns

[49] When $o \neq d$ $V_K BY_{od} = V_K BY_{od} + V_K BY_{od}$. All capital income flows calculated in 2007 based on data from WIOD 2013 release.

[50] Data from the CEPII gravity dataset.

[51] There was one small negative FDI position.

7–12 compared to the corresponding columns 13–18, but also quantitatively: a one standard deviation increase in $\ln ownership$ is associated with a 4.2–4.8 times larger increase in $\ln V_K B^x Y$ compared to increases $\ln V_K B^g Y$ for OLS estimates of β, and 1.6–3.5 times for PPML estimates.[52] A few other interesting patterns emerge from Table 11. Bilateral distance, free trade agreements and common language matter much more so for $V_K B^x Y$ compared to $V_K B^g Y$. Common borders affect $V_K B^x Y$ positively and $V_K B^g Y$ negatively. These results make sense since $V_K B^g Y$ necessarily passes through third countries.

We examine the robustness of our results as follows. We demonstrate that the log specification is reasonable and is not identified by outliers. To do this we estimated a semi-parametric specification of (26), where we replace $\ln ownership_{od}$ with dummies for decile ranges on the positive support of the ownership variables.[53] We demonstrate in appendix Figure A4 that the prediction of the deciles closely resembles the predictions from the log specification in Table 11. Since tax havens tend to attract more FDI and are also bigger FDI investors for profit shifting and tax optimization motives, not for production reasons, we test the robustness of our results to dropping tax havens. The results hardly change when we drop the only so-called tax haven in the sample, which is Ireland. We also estimated (26) in a broader sample using the TiVA database, which corroborates our results using WIOD data, including the robustness to dropping tax havens.[54] Finally, we estimated (26) on the full bilateral sample of 1190 observations, where we "distort" the ownership variable by adding the minimal positive level, $\ln(ownership_{\min} + ownership_{od})$, thus allowing to include observations where $ownership_{od} = 0$. The minimal value for FDI positions and affiliate sales is 0.1 million US dollars, and the minimal number of affiliates is one. The estimates of β in this sample (reported in appendix Table A11) are somewhat smaller, but still statistically significant.[55]

[52] To make this statement we compute standardized coefficients, i.e. divide the estimate of β in (26) by the standard deviation of the dependent variable and then multiply by the standard deviation of the explanatory variable. The ratios of standardized coefficients for $\ln V_K B^x Y$ relative to $\ln V_K B^g Y$ are, for OLS: 7.2 for ln FDI stock, 5.5 for ln affiliate sales, and 4 for ln number of affiliates. The respective figures for PPML are: 2.7 for ln FDI stock, 3.5 for ln affiliate sales, and 1.4 for ln number of affiliates. Descriptive statistics for the variables underlying these regressions are in appendix Table A10.

[53] Decile range i dummy is equal to one for observations that lie in the range $(D_{i-1}, D_i]$, where D_i is decile i, $D_0 = -\infty$, and D_{10} is the maximum.

[54] These regressions are available upon request. TiVA (Trade in Value Added) was developed by a OECD-WTO partnership, using similar methodology to WIOD. The TiVA 2016 release covers 62 countries (plus the Rest of the World) with a breakdown into 34 industries (based on the ISIC Rev. 3) over the years 1995 to 2011. Social Economic Accounts, including capital and labor share of value added by country and industry, are also available over this period. TiVA 2016 does not include the further breakdown of labor income by education level as in WIOD 2013, which is a core component of our analysis. Once WIOD 2013 release data are matched with ownership data from Ramondo, Rodríguez-Clare, and Tintelnot (2015), there is only one tax haven country, as classified by Hines Jr and Rice (1994): Ireland. When we match the TiVA 2016 release to the ownership data there are three tax havens: Ireland, Singapore and Switzerland. Dropping these tax haven from the estimation sample hardly changes the results in any case.

[55] These regressions suffer from attenuation bias due to including many small values that were correctly censored before.

The interpretation of our estimates in Table 11 is not causal. However, the estimates are informative from an accounting perspective, as long as one accepts that foreign ownership of capital entitles the owners to part of the income that this capital generates, whatever the driving force may be.[56]

One caveat is worth mentioning at this point. Our indicators of FDI and MNE activity are for *direct* ownership, not final or *ultimate* ownership. This means that, e.g., a French multinational investing in Germany is recorded as French FDI in Germany, despite the fact that the owners of the French multinational (via stocks or otherwise) may be French, German, or any third country. In this sense, our measures of foreign ownership are limited. Nevertheless, these indicators are informative of nationality of final ownership, given the significant degree of "home bias" that is typically observed in national portfolio holdings.

Overall, the message from Table 11 is this: part of the payments to capital installed in country o that accrue due to sales of intermediate inputs to country d accrue to capital in o that is owned by entities in d. This is associated with ownership by country d of capital installed in country o through vertical integration within MNEs.

Given the uneven distribution of MNE headquarters and capital ownership across countries, these findings imply additional effects on income distribution that domestic production concepts do not reveal. The labor share in gross *national* product (GNP) may be smaller than it's share in GDP in countries that are hubs of MNE headquarters, with significant net external capital ownership positions. Conversely, countries which are net recipients of capital inflows may have smaller capital shares in GNP compared to shares in GDP, since part of capital payments to domestically-installed capital accrues to foreign owners. Indeed, the uneven spread of MNEs over time may be another channel by which globalization affects labor and capital shares. Next, we quantify this channel.

6.2 Quantifying the effect of foreign ownership on capital shares in GNP

We entertain the following thought experiment: how much would capital shares in GNP change if we eliminate (almost completely, as will be explained below) foreign ownership positions? We consider this as the contribution of globalization to capital share variation through cross-border ownership. We use our estimates of (26) in Table 11 to quantify the effect of *net* international

[56] For example, industry composition can potentially explain both levels of bilateral FDI positions and of bilateral flows of $V_K B^x Y$ and $V_K B^g Y$. FDI is more prevalent in R&D-intensive industries; e.g., see Markusen (2004). Suppose that this type of FDI also entails more imports of intermediate inputs within the boundaries of multinational enterprises. Alternatively, as Guvenen, Mataloni, Rassier, and Ruhl (2017) demonstrate, profit shifting through tax havens is more prevalent in R&D-intensive industries. Then variation in R&D intensiveness can help explain the patterns in the data. However, this does not mean that capital income does not flow bilaterally as a consequence, which is the point we are making.

ownership positions on capital income. The prediction of (26) in levels is

$$\widehat{V_K BY}_{od} = e^{\widehat{\beta}\cdot \ln ownership_{od} + \widehat{\gamma}' gravity_{od} + \widehat{\alpha}_o + \widehat{\alpha}_d} .$$

We predict the level of $V_K BY_{od}$ had there been almost no international cross-ownership as follows

$$\widehat{V_K BY}^{0}_{od} = e^{\widehat{\beta}\cdot \ln ownership_{\min} + \widehat{\gamma}' gravity_{od} + \widehat{\alpha}_o + \widehat{\alpha}_d} ,$$

where $ownership_{\min}$ is the smallest value in the sample, equal to 0.1 million dollars for FDI positions or 1 affiliate. We do not report quantifications using affiliate sales as ownership because, conceptually, this variable is an inferior predictor of ownership (e.g., affiliates may sell to third countries). This calculation assumes that all other covariates are unaffected by setting $ownership_{od} = ownership_{\min}$, including the origin and destination country fixed effects.[57]

We estimate the payments that accrue to capital that is installed in o and that is owned by d as follows

$$\widehat{V_K BY}_{od} - \widehat{V_K BY}^{0}_{od} = \left[e^{\widehat{\beta}\cdot \ln\left(\frac{ownership_{od}}{ownership_{\min}}\right)} - 1 \right] \widehat{V_K BY}^{0}_{od} .$$

We then aggregate this for a country d:

$$\widehat{V_K BY}^{in}_{d} = \sum_{o} \left(\widehat{V_K BY}_{od} - \widehat{V_K BY}^{0}_{od} \right) .$$

Here $\widehat{V_K BY}^{in}_{d}$ is the total capital income that d receives due to its ownership of capital installed in all other countries in the sample. The total outlay of payments from d to all other countries due to ownership of capital installed in d and owned by other countries estimated as

$$\widehat{V_K BY}^{out}_{d} = \sum_{o} \left(\widehat{V_K BY}_{do} - \widehat{V_K BY}^{0}_{do} \right)$$

(note the change in order of indices). Finally, the predicted FDI-driven net capital factor income in d is

$$\widehat{V_K BY}^{net}_{d} = \widehat{V_K BY}^{in}_{d} - \widehat{V_K BY}^{out}_{d} .$$

Note that, by construction, $\sum_d \widehat{V_K BY}^{net}_{d} = 0$.

Table 12 reports $\widehat{V_K BY}^{in}_{d}$, $\widehat{V_K BY}^{out}_{d}$, $\widehat{V_K BY}^{net}_{d}$ and other statistics that help evaluating the effect of international ownership on capital shares based on location of ownership (rather than

[57] In the structural trade gravity literature, variation in bilateral o-d covariates implies also changes in the origin and destination country fixed effects. Since we do not have a precise theoretical framework underlying (26), we cannot model how the fixed effects would have changed.

location of production), including

$$\text{Corrected capital share}_d = \frac{V_K BY_d + \widehat{V_K BY}_d^{net}}{GDP_d + \widehat{V_K BY}_d^{net}} \ , \tag{27}$$

which is akin to the capital share in Gross National Product (GNP), but using only $\widehat{V_K BY}_d^{net}$ for net factor income in order to make the adjustment from GDP to GNP. Labor income is a tiny part of net factor income in national accounts data, so conceptually our estimates of $\widehat{V_K BY}_d^{net}$ should not deviate much from net factor income. We report all prediction components based on PPML estimates using FDI ownership indicators; we report only the difference between (27) and the domestic production based capital share ($V_K BY_d/GDP_d$) for other specifications.[58]

We see in Table 12 that results using different ownership indicators and estimators are sensible, and broadly imply similar corrections for capital shares. In some cases, the differences between capital shares based on location of ownership (GNP concept) and those based on location of production (GDP concept) are large. Notably are China, Ireland, and many East European countries, which attract much FDI investment, with negative differences. On the other hand we see large positive differences in Western European countries (but not Germany), Japan, Korean and the US. For the US, we see that $\widehat{V_K BY}_{USA}^{net}$ =85,579, which is not too far from the net factor income for the same year (2007) that is reported by the Bureau of Economic Analysis, namely 109,024 million US dollars.[59] Estimates based on OLS, imply similar values.

The message from Table 12 is that capital shares (and the implied labor shares) based on nationality of factor ownership (GNP concept) can differ substantially from those based on location of production (GDP concept). The differences are substantial compared to observed *changes* in factor shares. Thus, the uneven spread of MNEs, GVCs and vertical integration over time is another channel through which labor and capital shares are affected. To the extent that this dimension of globalization has deepened, this may have important implications for how globalization affects changes in inequality across individuals through factor income shares.

7 Concluding remarks

In this paper we studied the evolution of labor shares in a sample of 40 countries, both developed and less developed, in 1995–2014. Our main message is that globalization, especially through

[58] PPML estimation with source and destination fixed effects has the advantage of imposing adding up constraints, which ensure that the sum of predicted values within a country add up to the sum of values in the data within the same country. See Fally (2015).

[59] The BEA's figure is from Table 1.17.5. Gross Domestic Product, Gross Domestic Income, and Other Major NIPA Aggregates: Gross national product - GDP. We deduct GDP from GNP in 2007 to obtain 109,024 million US dollars.

the deepening of forward foreign GVC participation, is strongly associated with declines in labor shares, especially in 2001–2007, after China joins the WTO and until the trade collapse. This is driven by increases in exporting—in value added terms—of intermediate inputs which tend to be more capital intensive. It manifests in an increase in industry upstreamness, and in a shift away from marketing and management activities. More upstream industries are farther away from final demand and households in the value chain, and therefore require less human capital in terms of design, marketing, sales, customer relations, and post-purchase service. The increase in foreign forward GVC participation and in upstreamness all but halt after 2007, when labor shares actually increase slightly. Skilled labor shares increase while the overall labor share declines, implying that unskilled labor shoulders the decreases in payments to labor.

We show that FDI and multinational activity are positively associated with foreign capital income flows in value added terms. We quantify the effect this has on differences between factor shares based on nationality of ownership (GNP concept) and factor shares based on location of production (GDP concept). Compared to shares in GDP, labor shares in GNP are higher in countries with positive net FDI positions. This implies that the uneven spread of multinational activity contributes to greater inequality through this channel.

Our findings have important implications. First, we find an important role for globalization in accounting for recent declines in labor shares. To the extent that inequality is a concern, and given that redistribution of the gains from globalization is far from perfect (and potentially very costly), this finding raises concerns about the costs of further economic integration. Second, our findings MNE activity imply that studying the effects of the evolution of the labor share and the effects of globalization on inequality should take into account a national product approach, rather than rely solely on domestic production approach.

One important caveat of our study is that we do not identify the underlying forces that drive globalization (for example, reductions in man-made trade barriers, or technological forces). Nevertheless, whatever the underlying causal forces, we demonstrate that they operate through forward foreign GVC participation. In addition, since we do not observe firms, we cannot study whether GVC deepening accounts for declines in labor shares by changing the composition of firms—along the lines Harrigan and Reshef (2015), Autor, Dorn, Katz, Patterson, and Van Reenen (2017) and Kyyrä and Maliranta (2008)—or by changes within firms. We leave the study of such dimensions for future research.

Appendix

A WIOD data and computations

A.1 Data structure

Our calculations are based on data from the World Input-Output database (WIOD). The 2013 release of the data covers the period 1995–2011. Along with detailed Input-Output tables for 40 countries and 35 industries (ISIC rev. 3), this release also provides the Socio-Economic Accounts with data on employment, labor compensation and capital stocks, all by country and industry. In addition, the 2013 release reports employment and labor compensation by educational attainment within each country and industry. We also use the more recent 2016 release, covering 43 countries and 56 sectors (ISIC rev. 4) for the period 2000–2014. The Socio-Economic Accounts in the 2016 release do not include employment breakdown by educational level. Figure A1 depicts a schematic outline for the structure of the WIOD for the exemplary case of 3 countries and 2 sectors. See http://www.wiod.org/home for further details on the country coverage and data availability.

Figure A1: Schematic Outline of a World Input-Output Table

		A						Y			
Cty	Ind	S		R		T		S	R	T	X
		1	2	1	2	1	2				
S	1	A_{11}^{ss}	A_{12}^{ss}	A_{11}^{sr}	A_{12}^{sr}	A_{11}^{st}	A_{12}^{st}	Y_1^{ss}	Y_1^{sr}	Y_1^{st}	$X_1^s = \sum_{c\in\{s,r,t\}}\sum_{i\in\{1,2\}} A_{1i}^{sc} + \sum_{c\in\{s,r,t\}} Y_1^{sc}$
	2	A_{21}^{ss}	A_{22}^{ss}	A_{21}^{sr}	A_{22}^{sr}	A_{21}^{st}	A_{22}^{st}	Y_2^{ss}	Y_2^{sr}	Y_2^{st}	$X_2^s = \sum_{c\in\{s,r,t\}}\sum_{i\in\{1,2\}} A_{2i}^{sc} + \sum_{c\in\{s,r,t\}} Y_2^{sc}$
R	1	A_{11}^{rs}	A_{12}^{rs}	A_{11}^{rr}	A_{12}^{rr}	A_{11}^{rt}	A_{12}^{rt}	Y_1^{rs}	Y_1^{rr}	Y_1^{rt}	$X_1^r = \sum_{c\in\{s,r,t\}}\sum_{i\in\{1,2\}} A_{1i}^{rc} + \sum_{c\in\{s,r,t\}} Y_1^{rc}$
	2	A_{21}^{rs}	A_{22}^{rs}	A_{21}^{rr}	A_{22}^{rr}	A_{21}^{rt}	A_{22}^{rt}	Y_2^{rs}	Y_2^{rr}	Y_2^{rt}	$X_2^r = \sum_{c\in\{s,r,t\}}\sum_{i\in\{1,2\}} A_{2i}^{rc} + \sum_{c\in\{s,r,t\}} Y_2^{rc}$
T	1	A_{11}^{ts}	A_{12}^{ts}	A_{11}^{tr}	A_{12}^{tr}	A_{11}^{tt}	A_{12}^{tt}	Y_1^{ts}	Y_1^{tr}	Y_1^{tt}	$X_1^t = \sum_{c\in\{s,r,t\}}\sum_{i\in\{1,2\}} A_{1i}^{tc} + \sum_{c\in\{s,r,t\}} Y_1^{tc}$
	2	A_{21}^{ts}	A_{22}^{ts}	A_{21}^{tr}	A_{22}^{tr}	A_{21}^{tt}	A_{22}^{tt}	Y_2^{ts}	Y_2^{tr}	Y_2^{tt}	$X_2^t = \sum_{c\in\{s,r,t\}}\sum_{i\in\{1,2\}} A_{2i}^{tc} + \sum_{c\in\{s,r,t\}} Y_2^{tc}$
Total intermediate consumption A_i^c		$A_1^s = \Sigma_{k,j} A_{j1}^{ks}$	$A_2^s = \Sigma_{k,j} A_{j2}^{ks}$	$A_1^r = \Sigma_{k,j} A_{j1}^{kr}$	$A_2^r = \Sigma_{k,j} A_{j2}^{kr}$	$A_1^t = \Sigma_{k,j} A_{j1}^{kt}$	$A_2^t = \Sigma_{k,j} A_{j2}^{kt}$				
Value added V_i^c		$V_1^s = X_1^s - A_1^s$	$V_2^s = X_2^s - A_2^s$	$V_1^r = X_1^r - A_1^r$	$V_2^r = X_2^r - A_2^r$	$V_1^t = X_1^t - A_1^t$	$V_2^t = X_2^t - A_2^t$				

In Figure A1 the area shaded in light grey includes intermediate value flows, A, among industries (indexed by $i \in \{1, 2\}$) located in countries (indexed by $c \in \{s, r, t\}$). For example, A_{12}^{sr} describes the total value of intermediate use by industry 2 located in country r (indicated by the column) of input from industry 1 located in country s (indicated by the row). The area shaded in dark grey indicates demand for final goods, Y. For example, Y_2^{rt} is total demand for final goods in country t for good 2 sourced from country r. The WIOD distinguishes among five final demand use categories. In order to conserve on space, these five categories are not displayed in Figure A1 (the categories are: final consumption expenditure by households, final consumption expenditure by non-profit organizations, final consumption expenditure by government, gross fixed capital formation and changes in inventories and valuables). Furthermore, X is a vector of total gross outputs for industries by location (indicated by the row). Total intermediate consumption for an industry i located in a country c (indicated by the column) A_i^c is the sum of all A elements within a column. Value added V_i^c of an industry i located in a country c (indicated by the column) is obtained by deducting A_i^c from the corresponding total gross output entry X_i^c for that industry i and country c (indicated by the row).

Summing all Y elements gives global consumption of final goods. From the expenditure approach to national accounting this is also global GDP.

A.2 Value added computations

Value added computations are based on Timmer, Los, Stehrer, and de Vries (2013), which is rooted in the seminal work of Leontief (1936). The goal is to decompose the value of final goods production (i.e., final demand) according to the industry and location where the value added originated. Conversely, one can also compute the allocation of payments to primary factors (capital and labor) according to the industries where these value added payments originate. Technically, the computation relies on a diagonal matrix of final demand Y, the Leontief inverse matrix B, as well as a diagonal matrix of direct value added coefficients per sector, V. All these are obtained from the values depicted in Figure A1.

The elements of the diagonal matrix of final goods demand Y are obtained by a row-wise summation of the "Y-area" in Figure A1 across all countries (and use categories; see above for details):

$$Y_i^c = \sum_k Y_i^{ck} \ .$$

The elements of the diagonal matrix of value added coefficients V are obtained by subtracting the entire intermediate consumption of a sector (column sum in the input-output matrix A) from the sectoral gross output and dividing this by the gross output of the sector

$$v_i^c = \frac{X_i^c - \sum_{k,j} A_{ji}^{kc}}{X_i^c} \ .$$

The Leontief inverse matrix is $B = (I - A)^{-1}$, where A is the matrix containing all sub-elements equal to

$$a_{ij}^{sr} = \frac{A_{ij}^{sr}}{X_j^r}$$

and I is the identity matrix. We compute the B matrix in a few steps. In the first, we derive the input-output coefficients, a_{ij}^{sr}. We obtain these coefficients by dividing each cell in the A region in Figure A1 along a column by the gross output X of the respective column sector. This gives the matrix A. A typical element a_{ij}^{sr} of A indicates the amount of output from industry i located in source country s (indicated by the row) that is needed to sustain the production of one unit of output in industry j in destination country r (indicated by the column). In the second step we compute an auxiliary matrix by subtracting the A matrix of input-output coefficients from an identity matrix I. Finally, we invert the auxiliary matrix to obtain the required Leontief matrix B. A typical element b_{ij}^{sr} of B indicates the amount of output from industry i located in source country s (indicated by the row) that is needed to sustain the production of one unit of final demand of product j in destination country r (indicated by the column).

In order to obtain the gross output needed to sustain final demand we multiply BY. In order to get the corresponding concept in value added terms, we pre-multiply BY by the diagonal matrix V

with elements V_i^c on the diagonal (appropriately ordered) to get VBY. For illustration, an example of the matrix VBY for the case of two countries and two industries is

$$
\begin{aligned}
VBY &= \begin{bmatrix} v_1^s & 0 & 0 & 0 \\ 0 & v_2^s & 0 & 0 \\ 0 & 0 & v_1^r & 0 \\ 0 & 0 & 0 & v_2^r \end{bmatrix} \begin{bmatrix} b_{11}^{ss} & b_{12}^{ss} & b_{11}^{sr} & b_{12}^{sr} \\ b_{21}^{ss} & b_{22}^{ss} & b_{21}^{sr} & b_{22}^{sr} \\ b_{11}^{rs} & b_{12}^{rs} & b_{11}^{rr} & b_{12}^{rs} \\ b_{21}^{rs} & b_{22}^{rs} & b_{21}^{rr} & b_{22}^{rr} \end{bmatrix} \begin{bmatrix} y_1^s & 0 & 0 & 0 \\ 0 & y_2^s & 0 & 0 \\ 0 & 0 & y_1^r & 0 \\ 0 & 0 & 0 & y_2^r \end{bmatrix} \\
&= \begin{bmatrix} v_1^s b_{11}^{ss} y_1^s & v_1^s b_{12}^{ss} y_2^s & v_1^s b_{11}^{sr} y_1^r & v_1^s b_{12}^{sr} y_2^r \\ v_2^s b_{21}^{ss} y_1^s & v_2^s b_{22}^{ss} y_2^s & v_2^s b_{21}^{sr} y_1^r & v_2^s b_{22}^{sr} y_2^r \\ v_1^r b_{11}^{rs} y_1^s & v_1^r b_{12}^{rs} y_2^s & v_1^r b_{11}^{rr} y_1^r & v_1^r b_{12}^{rs} y_2^r \\ v_2^r b_{21}^{rs} y_1^s & v_2^r b_{22}^{rs} y_2^s & v_2^r b_{21}^{rr} y_1^r & v_2^r b_{22}^{rr} y_2^r \end{bmatrix}.
\end{aligned} \tag{28}
$$

The elements of the VBY matrix can be interpreted in two ways. First, the values of the matrix along a *column* indicate *backward* linkages of production. The sum within a column is the value added that an industry located in a country generates in order to satisfy demand for final goods that it produces. Values within a column denote the value contribution of all industries and countries (given by the row) to the production of another industry located in a country (given by the column). For example, $v_1^r b_{12}^{rs} y_2^s$ indicates the value added of sector 1 located in country r that is supplied in order to produce final goods of industry 2 in country s. By summing across all rows within a column one obtains the total value of final goods production y_2^s, which is also final demand for industry 2 located in country s, no matter where this is sold around the world (i.e., no matter where demands arises from). For example, $\sum_{i,k} v_i^k b_{i2}^{ks} y_2^s = FD_2^s = y_2^s$. Summing all y_j^s across columns j within a country s does not give the GDP of country s because trade may not be balanced (if trade were balanced, then this sum does give GDP of country s). However, summing all y_j^s across all j and s gives global GDP.

The second interpretation considers the values of the VBY matrix within a *row*, indicating the *forward* linkages of production. In this interpretation values indicate how payments to primary factors employed in a country-industry (given by the row) are "financed" by the production processes that satisfy final demands (in terms of value added) of other industries and countries (given by the columns). Thus, in the context of forward linkages, $v_1^r b_{12}^{rs} y_2^s$ is the part of GDP paid to factors employed in industry 1 in country r by final demand for product 2 of country s. The sum across all columns within a row is thus equal to the country-industry's value added of the considered row, for example, $\sum_{j,k} v_1^r b_{1j}^{rk} y_j^k = VA_1^r$. Therefore, summing the industry rows for a given country gives GDP of that country, for example $\sum_i VA_i^r = \text{GDP}^r$.

A.3 Foreign value added shares

We compute two foreign value added shares. The first is foreign value added shares in final goods production based on the *backward* perspective. These are payments to factors located in foreign countries. This is calculated by summing within a column entries across rows of all industries located in foreign countries:

$$
backward_i^c = \frac{\sum_{s \neq c} \sum_j v_j^s b_{ji}^{sc} y_i^c}{y_i^c} = \frac{\sum_{s \neq c} \sum_j v_j^s b_{ji}^{sc} y_i^c}{\sum_s \sum_j v_j^s b_{ji}^{sc} y_i^c}
$$

Using the example in (28), the foreign value added (not share thereof) in production of sector 1 in country s, is the sum of $v_1^s b_{11}^{ss} y_1^s$ and $v_2^s b_{21}^{ss} y_1^s$. To get the foreign value added share divide by y_1^s.

The second foreign value added share concept entails shares in factor payments (value added) paid by foreign industries, based on the *forward* perspective. This is calculated by summing within a row entries across columns of all industries located in foreign countries:

$$forward_i^c = \frac{\sum_{s \neq c} \sum_j v_i^c b_{ij}^{cs} y_j^s}{\sum_s \sum_j v_i^c b_{ij}^{cs} y_j^s}$$

Using the example in (28), the foreign value added (not share thereof) in factor payments of sector 1 in country s, is the sum of $v_1^s b_{11}^{sr} y_1^r$ and $v_1^s b_{12}^{sr} y_2^r$. To get the foreign value added share divide by the sum $v_1^s b_{11}^{ss} y_1^s + v_1^s b_{12}^{ss} y_2^s + v_1^s b_{11}^{sr} y_1^r + v_1^s b_{12}^{sr} y_2^r$, which is the total value added of sector 1 in country s.

A.4 Production factors computations

As described in Timmer, Erumban, Los, Stehrer, and de Vries (2014), the methodology described above can also be applied to decompose the value of final goods production according to capital and labor. The only difference consists the use of a different vector of coefficients. The calculations above transform gross outputs $X = BY$ into value added by pre-multiplying by the diagonal matrix V. Instead, we only need to pre-multiply X by a different diagonal matrix, one that transforms gross outputs into factor payments.

In order to derive this it is necessary to divide sector level data on capital and labor compensation by sectoral output

$$v_{f,i}^c = \frac{F_i^c}{X_i^c} \ ,$$

where F and f denote payments and the share of payments to a particular factor. Thus, $v_{f,i}^c$ is the gross output share of factor f. Values for F_i^c are given by the Socio-Economic Accounts in the WIOD. Pre-multiplying BY by a diagonal matrix V_f with elements $v_{f,i}^c$ on the diagonal gives a matrix of factor shares in production, $V_f BY$, which can be read like the VBY matrix above, only in terms of payments to factor f. The decomposition of the final goods' value into to capital, high- and less-skilled labor incomes requires three different matrices.

B Backward GVC participation

Backward linkages imply payments to foreign factors by domestic industries though supply of intermediate inputs and services. As with forward linkages, this is driven by more than just direct imports of intermediate goods and services, as it takes into account the entire GVC network (e.g., suppliers of the suppliers, etc.).

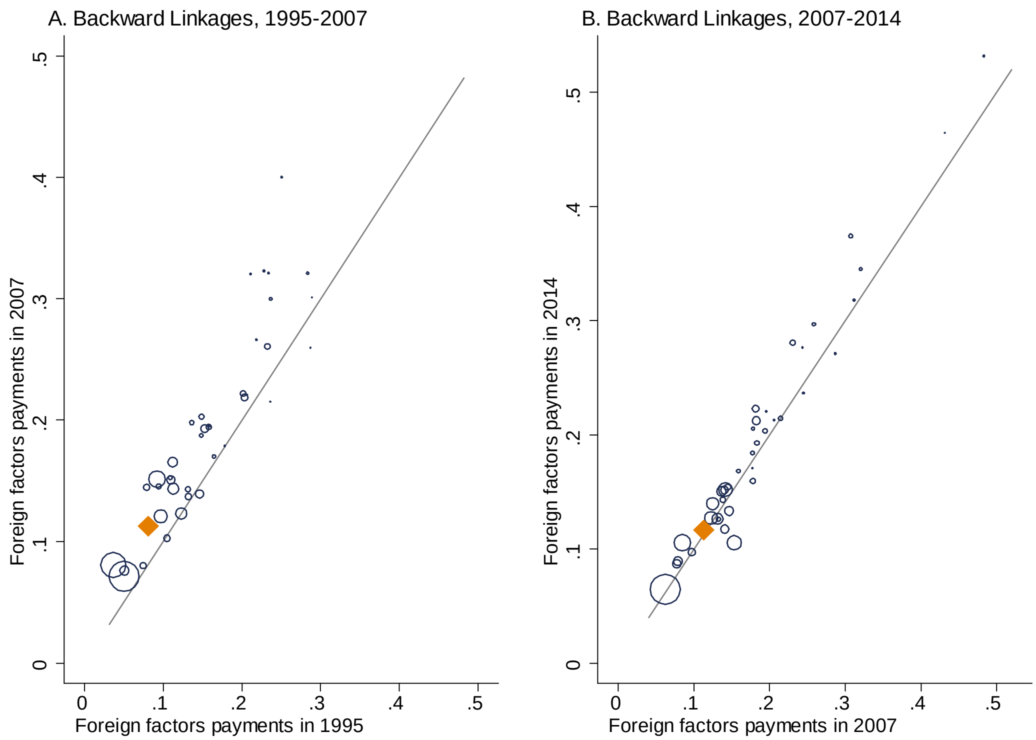
Each element of the VBY matrix (see above) contains the payments to factors (capital and labor) that are employed in sector i in origin country o that contribute to the production of sector j in destination country d: $(vby)_{ij}^{od}$. By summing over all industries i and j within each country pair we obtain payments to factors that are located in country o by country d's industries: $vby^{od} = \sum_i \sum_j (vby)_{ij}^{od}$. After obtaining payments to factors that are located in country o by country d, $(vby)^{od}$, we sum over all o's to get value added that is generated by all industries located in d, which is equal to final demand for country d's industries: $\sum_o (vby)^{od} = FD^d = Y^d$. By taking the share of payments to countries o that are not d to country d's final demand we have the share of payments to foreign factors (capital and labor) by domestic industries of country d, or backward linkages intensity: $backward^d = \sum_{o \neq d} (vby)^{od} / FD^d$. This is what Panel A and Panel B of Figure A3 display, for 1995–2007 and 2007–2014, respectively.

The average increase in *backard* in 1995–2007 is 3.5 percent points, while the weighted average (using GDP in 1995 as weights) increases by 3.1 percent points. Only two countries see significant declines in *backward* in 1995–2007 (Lithuania and Estonia). Among the largest increases we see eastern European countries (Bulgaria, Hungary and Slovakia), which integrated rapidly into the European market. India, China and Turkey also exhibit large increases, which indicates that much of their inputs originate in other countries. Germany and Denmark also feature large increases in *backward*, for the same reason.

In contrast to the almost uniform deepening of GVCs in 1995–2007 across all countries, the picture is more mixed in 2007–2014. The average increase in *backward* is only 1 percent point, while the weighted average (using GDP in 2007 as weights) increases by 0.5 percent points. Among the countries in this sample, 31 see increases in *backward*. Among the largest increases in *backward* in 2007–2014 we see centrally located European countries like Belgium, Luxembourg, The Netherlands and Ireland, as well as eastern European and Baltic countries like The Czech Republic, Estonia. Among the largest decreases in *backward* we see China and India.

Overall, levels of both measures of GVC participation—*backward* and *forward*—are strongly positively correlated across countries within each sample (correlation of 0.73–0.81), but changes are much less so (correlation of 0.36 in both cases). The correlations in changes within each measure are very low, −0.14 for *forward* and −0.06 for *backward*, and not statistically significant.

Figure A3. Deepening of Global Value Chains: Backward Linkages



Notes. Backward linkages in GVCs are shares of foreign factor payments (in value added terms) in domestic industries value added. Each circle represents one country. The size of the circle is proportional to GDP in the first year (1995 in Panel A; 2007 in Panel B). The solid diamond represents the weighted average, using GDP in the first year as weights. The solid line represents the 45-degree line. Source: own computations using WIOD releases 2013 and 2016.

C Labor share concepts in the Penn World Tables

The Penn World Tables report five different concepts of labor shares. Here we list them, and we denote their labels in Figure A3 in brackets:

1. Compensation of employees [**Employees**].
2. Compensation of employees + all income of self employed (mixed income) [**Employees + All mixed income**].
3. Compensation of employees + labor income of self employed (mixed income), computed by assuming that self-employed workers use labor and capital in the same proportion as the rest of the economy [**Employees + Self empl (K/L)**].
4. Compensation of employees + labor income of self employed (mixed income), computed by using the aggregate average wage of self-employed [**Employees + Self empl (avg wage)**].

5. Compensation of employees + value added in agriculture, assuming that all value added in agriculture is labor compensation (on average, it is 90%). This correction is useful for developing countries, where about half of self-employed workers are in agriculture [**Employees + Self empl (agric)**].

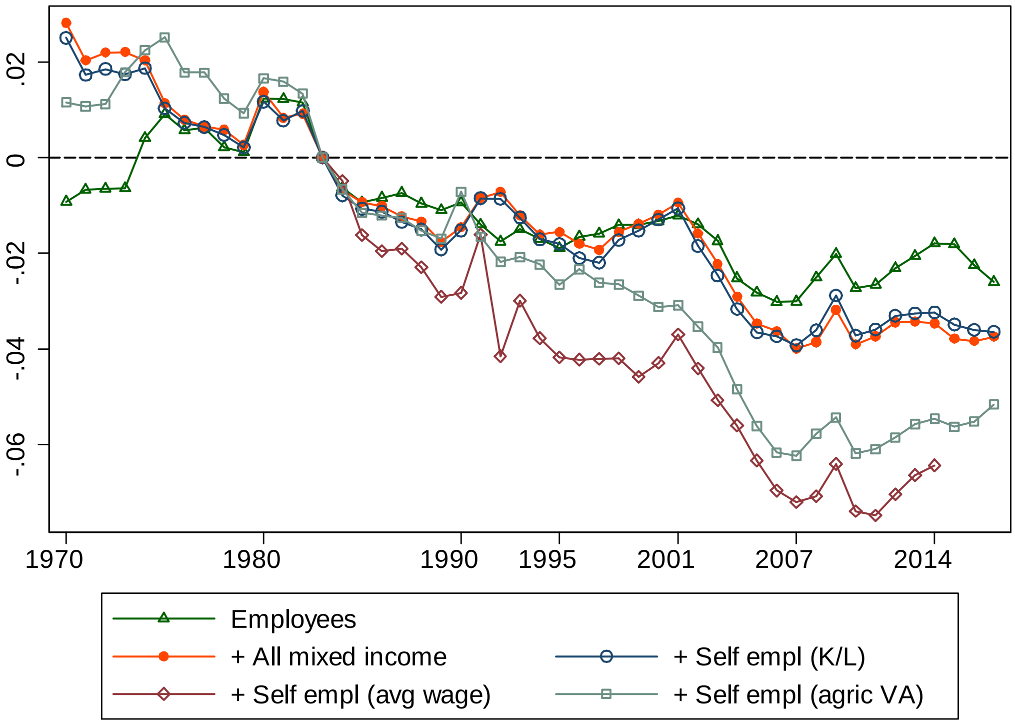
See Feenstra, Inklaar, and Timmer (2015) and their online appendix for fuller details. See also Mućk, McAdam, and Growiec (2018) for an overview of different measures of the labor share.

In Figure A3 we report year fixed effects from regressions of each labor share concept on year fixed effects and country fixed effects, weighted by real GDP. We use data from Penn World Tables 9.1 on all labor shares concepts, dropping all observations that are exptrapolated (extrapolated values are set to the first or last observed value, so they have no content for the evolution of labor shares). The year fixed effects are adjusted be equal to zero in 1983, the first year in which the fourth concept is available. The sample includes 39 countries that correspond to the WIOD 2013 release sample of countries.

Figure A3 demonstrates that all measures of the labor share exhibit similar trends, especially the acceleration in the decline in 2001–2007. Mućk, McAdam, and Growiec (2018) also show that for the United States, all measures of the labor share exhibit common trends from 2001 and on. This is important for us, because 2001 is the year after which the association of labor shares declines with forward foreign GVC deepening is strongest.

In Figure 1 all countries' labor shares are the Employees + Self empl (K/L) series, except for China (compensation of employees) and India and Indonesia (compensation of employees + value added in agriculture).

Figure A3. Different Labor Share Concepts in the Penn World Tables



D Proof of decomposition equation (9)

The change in the product VX (indeed, of any two conformable matrices) can be written as

$$\Delta(VX) = \Delta V X_1 + V_1 \Delta X + \Delta V \Delta X \ . \tag{29}$$

To see this, start with

$$\Delta VX = V_2 X_2 - V_1 X_1 \ .$$

Add and subtract $V_2 X_1$ and rearrange to get

$$\begin{aligned} \Delta VX &= V_2 X_2 - V_1 X_1 + (V_2 X_1 - V_2 X_1) \\ &= V_2 (X_2 - X_1) + (V_2 - V_1) X_1 \\ &= \Delta V X_1 + V_2 \Delta X \ . \end{aligned}$$

Now add and subtract $V_1 \Delta X$ and rearrange to get

$$\begin{aligned} \Delta VX &= \Delta V X_1 + V_2 \Delta X + (V_1 \Delta X - V_1 \Delta X) \\ &= \Delta V X_1 + V_1 \Delta X + V_2 \Delta X - V_1 \Delta X \\ &= \Delta V X_1 + V_1 \Delta X + (V_2 - V_1) \Delta X \\ &= \Delta V X_1 + V_1 \Delta X + \Delta V \Delta X \ . \end{aligned}$$

Applying the same algebra in (29) to $X = (BY)$ and plugging this back into (29) yields (9).

E Stone's additive decomposition

This is based on Miller and Blair (2009), pages 285–290, originally from Stone (1961).

Consider $\widetilde{A}$, an $n \times n$ matrix. Start with

$$X = AX + Y$$

and subtract $\widetilde{A}X$

$$X - \widetilde{A}X = AX - \widetilde{A}X + Y \implies (I - \widetilde{A})X = (A - \widetilde{A})X + Y$$

to get

$$X = (I - \widetilde{A})^{-1}(A - \widetilde{A})X + (I - \widetilde{A})^{-1}Y$$

Define

$$A^* \equiv (I - \widetilde{A})^{-1}(A - \widetilde{A})$$

and write

$$X = A^*X + (I - \widetilde{A})^{-1}Y \tag{30}$$

Pre-multiply by A^* to get

$$A^*X = (A^*)^2X + A^*(I - \widetilde{A})^{-1}Y \tag{31}$$

and use (31) in (30) to get

$$\begin{aligned} X &= (A^*)^2X + A^*(I - \widetilde{A})^{-1}Y + (I - \widetilde{A})^{-1}Y \\ &= (A^*)^2X + (I + A^*)(I - \widetilde{A})^{-1}Y \end{aligned}$$

Now solve again for X to get

$$X = \underbrace{[I - (A^*)^2)]^{-1}}_{M_3} \cdot \underbrace{(I + A^*)}_{M_2} \cdot \underbrace{(I - \widetilde{A})^{-1}}_{M_1} \cdot Y \tag{32}$$

Stone's additive decomposition starts with $X = M_3M_2M_1Y$ in (32) and arrives at:

$$X = IY + \underbrace{(M_1 - I)}_{\widetilde{M_1}} Y + \underbrace{(M_2 - I)\, M_1}_{\widetilde{M_2}} Y + \underbrace{(M_3 - I)\, M_2M_1}_{\widetilde{M_3}} Y \tag{33}$$

Here is the derivation of (33) starting with (32):

$$\begin{aligned} B &= M_1M_2M_3 \\ &= M_2M_1 + M_1M_2M_3 - M_2M_1 \\ &= M_2M_1 + (M_3 - I)\, M_2M_1 \\ &= M_1 + M_2M_1 - M_1 + (M_3 - I)\, M_2M_1 \\ &= M_1 + (M_2 - I)\, M_1 + (M_3 - I)\, M_2M_1 \\ &= I + (M_1 - I) + (M_2 - I)\, M_1 + (M_3 - I)\, M_2M_1 \end{aligned}$$

In the context of international analysis, $\widetilde{A} = A^d$ is the matrix of diagonal (or block-diagonal, if industries are not aggregated) elements such that

$$A^d = \begin{bmatrix} A_{11} & 0 & 0 & 0 \\ 0 & A_{22} & 0 & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & A_{nn} \end{bmatrix}$$

and

$$A^f = \begin{bmatrix} 0 & A_{12} & \cdots & A_{1n} \\ A_{21} & 0 & & \vdots \\ \vdots & & \ddots & A_{n-1,n} \\ A_{n1} & \cdots & A_{n,n-1} & 0 \end{bmatrix}.$$

Then

$$B^d = \left(I - A^d\right)^{-1} = \begin{bmatrix} (I - A_{11})^{-1} & 0 & 0 & 0 \\ 0 & (I - A_{22})^{-1} & 0 & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & (I - A_{nn})^{-1} \end{bmatrix}$$

Using these in A^* gives

$$\begin{aligned} A^* &= \left(I - A^d\right)^{-1} A^f = B^d A^f \\ &= \begin{bmatrix} (I - A_{11})^{-1} & 0 & 0 & 0 \\ 0 & (I - A_{22})^{-1} & 0 & 0 \\ 0 & 0 & \ddots & 0 \\ 0 & 0 & 0 & (I - A_{nn})^{-1} \end{bmatrix} \begin{bmatrix} 0 & A_{12} & \cdots & A_{1n} \\ A_{21} & 0 & & \vdots \\ \vdots & & \ddots & A_{n-1,n} \\ A_{n1} & \cdots & A_{n,n-1} & 0 \end{bmatrix} \\ &= \begin{bmatrix} 0 & (I - A_{11})^{-1} A_{12} & \cdots & (I - A_{11})^{-1} A_{1n} \\ (I - A_{22})^{-1} A_{21} & 0 & & \vdots \\ \vdots & & \ddots & (I - A_{n-1,n-1})^{-1} A_{n-1,n} \\ (I - A_{nn})^{-1} A_{n1} & \cdots & (I - A_{nn})^{-1} A_{n,n-1} & 0 \end{bmatrix} \end{aligned}$$

and also the related M_2 matrix $M_2 = I + A^*$. The typical off-diagonal $(i,j)_{i \neq j}$ element of A^* (and also of M_2) is $(I - A_{ii})^{-1} A_{ij}$; it captures demand for factors in i that originate from intermediate inputs demand in production in j that cross borders from j to i *once*.

Now consider

$$(A^*)^2 = \left[\sum_{l \neq i,j} (I - A_{ii})^{-1} A_{il} (I - A_{ll})^{-1} A_{lj} \right]_{i,j}$$

which has a typical (i,j) element $\sum_{l \neq i,j} (I - A_{ii})^{-1} A_{il} (I - A_{ll})^{-1} A_{lj}$. This captures demand for factors in i that originate from intermediate inputs demand in production in j that cross borders *twice* from j to i. The first matrix on the right A_{lj} gives demand from j's industries in l. The second matrix $(I - A_{ll})^{-1}$ calculates the output that needs to be produced in l in order to satisfy the demand from j. The third matrix A_{il} gives the implication of this for demand from i's industries. And the fourth matrix $(I - A_{ii})^{-1}$ calculates the output that needs to be produced in i in order to satisfy the demand from l.

Applying the above to Stone's additive decomposition gives

$$X = IY + \underbrace{[B^d - I]}_{\widetilde{M}_1} Y + \underbrace{B^d A^f B^d}_{\widetilde{M}_2} Y + \underbrace{(B - B^d - B^d A^f B^d)}_{\widetilde{M}_3} Y \ .$$

If we consider $\widetilde{A} = A^f$, we have

$$M_1 = B^f = \left(I - A^f\right)^{-1}$$

Here B^f captures total demand for output (including the initial injection of direct demand from Y) due to value chains that always cross borders. For example, B^f includes chains like $A_{ij}A_{jk}A_{kl}A_{lm}...$, where $i \neq j$, $j \neq k$, $k \neq l$, $l \neq m...$, but it is possible to have, for example, $i = k$. Thus domestic feedbacks are possible in B^f. Here $\widetilde{M}_1 = B^f - I$ in Stone's additive decomposition nets out the direct effect of the initial injection by deducting I. However, $\widetilde{M}_2 = B^f A^d B^f$ does not have a clear interpretation, despite clearly capturing some of the possible value chains. Similarly for $\widetilde{M}_3$. However, we can say that $\widetilde{M}_2 + \widetilde{M}_3$ gives the remainder of output that is induced by demand after taking into account the direct injection and $\widetilde{M}_1$.

In the main text equation (12) reads

$$B = I + (B^d - I) + \underbrace{B^d A^f B^d}_{B^x} + \underbrace{(B - B^d - B^d A^f B^d)}_{B^g} \ .$$

Here I captures the direct effect of demand on output. Next, $B^d - I$ captures output that is induced by all strictly *domestic* indirect linkages. To see this, note that $B^d = (I - A^d)^{-1}$, To see this, note that $B^d = (I - A^d)^{-1}$, where A^d is the matrix of block diagonal elements from A, capturing only domestic linkages. Next, B^x captures output that is induced by all strictly *bilateral trade* in intermediate inputs *that cross borders only once* (exports from the standpoint of the producing country). To see this, note that $A^f = A - A^d$, i.e. the off-block-diagonal elements of A. B^x takes all domestic output requirements (the first B^d on the right), computes the implied international demand for intermediate inputs captured in A^f, and then the implied total domestic requirements in the producing country (the second B^d on the left). Finally, B^g captures all other types of linkages, essentially net interregional feedback effects (net of strictly direct intra- and direct international effects captured B^d and B^x, respectively). I.e., B^g captures the effect of *complex global value chains*: output that is induced by combining both domestic and foreign linkages, that may cross borders more than once, and that may include return effects.

E.1 Domestic versus foreign sources of compositional changes: GDP

Here we describe the results of the Stone decomposition in changes

$$V\Delta BY = V\Delta B^d Y + V\Delta B^x Y + V\Delta B^g Y$$

and the decomposition of demand into domestic and foreign demand

$$VB\Delta Y = VB\Delta Y^d + VB\Delta Y^f \ ,$$

where, compared to (13) and (15), we set $V_f = V$, i.e. consider changes in sources of compositional changes of GDP.

Table A8 in the appendix displays the results of the analysis for both periods (1995–2007 and 2007–2014), for the entire economy level and separately for manufacturing. The four "Total" rows report in columns 1–3 and 7–9 shares of total factor payments (or GDP) that are paid by domestic industries versus foreign industries in the initial year (1995 or 2007); these are the same numbers for the initial year in columns 7 and 8 in Tables 1 and 2.[60] The "Total" rows report in columns 4–6 and 10–12 the changes in the same concepts; these are the same numbers in columns 7 and 8 in Tables 1 and 2 for either changes in B or changes in Y.[61] The rows above the "Total" rows indicate the contributions of sub-components of either B or Y to levels in columns 1–3 and 7–9, and to changes in columns 4–6 and 10–12.

We start with describing the results for the breakdown of B. Overall, almost all of demand in levels from domestic industries occurs due to domestic linkages (B^d), while most of the demand from foreign industries occurs due to bilateral trade linkages (B^x) (roughly 83% in 1995 and 77% in 2007). Not surprisingly, most the factor payments are generated due to domestic linkages (roughly 90% for all industries and 80% in manufacturing in 1995). Complex GVCs (B^g) originate mostly from foreign industries; "loop" value chains from domestic back to domestic are much less important.

What is more interesting are the contributions to changes (ΔB). The shift of income generated from domestic to foreign industries is driven by a reduction in the importance of domestic linkages which are counterbalanced by both exports (ΔB^x) and by more complex GVCs (ΔB^g). Complex GVCs account for slightly more than exports linkages in explaining the shift towards foreign industries. In manufacturing complex GVCs are twice as important as exports in explaining the shift towards foreign industries in 1995–2007; while the opposite is true in 2007–2014, the overall changes are much more modest in the latter period.

Turning to the breakdown of Y, we see that domestic demand for final goods (Y^d) accounts for the lion's share of factor payments (almost 93% for the entire economy in 1995), although less in manufacturing (81.5%), and less so over time (90% for the entire economy and 74% in manufacturing in 2007). Considering the contributions to changes (ΔY), there are different patterns before and after 2007. In 1995–2007 the source of factor payments shifts from domestic demand to foreign demand, while in 2007–2014 the opposite is true. This is likely a result of the 2007–8 crisis and the so-called "trade collapse".

The increase in importance of foreign demand in 1995–2007 operates both through domestic and—more so—through foreign industries. In contrast, the incidence of the overall decline in importance of domestic demand in the same period is on domestic industries, while concurrently contributing to an increase in factor payments due to foreign industries. This last point is the result of complex value chains by which increases in domestic demand for foreign final goods affects domestic factors. The changes in manufacturing are larger, and in the same direction as the entire economy, on average.

In 2007–2014 domestic demand increases in importance overall, but as in the previous period, domestic demand shifts from domestic to foreign final goods (industries). At the same time, the reduction in importance of foreign demand operates mostly though a reduction in domestic final goods (industries). As in the previous period, the cross-effects of domestic (foreign) demand through foreign (domestic) industries reflects the complexity of GVCs.

[60] For example, 91.12 is the same in the "Total" row of column 1 of Table A8 and the "VBY_{1995}" row of column 7 of Table 1.

[61] For example, −2.19 is the same in the "Total" row of column 4 of Table A8 and the "$V_{1995}{*}B_{2007}{*}Y_{1995} - VBY_{1995}$" row of column 7 of Table 1.

The overall message from Table A8 is as follows. Most income arises from domestic industries, but shift towards foreign ones; in 1995–2007 this is driven more by complex GVCs (1.25) than bilateral exports (1.04). Most income arises from domestic demand, but shift towards foreign; in 1995–2007 decline in the contribution of domestic demand occurs through a reduction in demand for goods that are more locally produced in the GVC sense (−3.08) that is not compensated by an increase in domestic demand for foreign industries (+1.05).

F Within-industry theoretical framework: derivations

Start with nested CES:

$$Q = A\left[\alpha^{\frac{1}{\sigma}} X^{\frac{\sigma-1}{\sigma}} + (1-\alpha)^{\frac{1}{\sigma}} L^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \tag{34}$$

$$X = \left[\beta^{\frac{1}{\eta}} K^{\frac{\eta-1}{\eta}} + (1-\beta)^{\frac{1}{\eta}} H^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}} \tag{35}$$

so that

$$Q = A\left[\alpha^{\frac{1}{\sigma}} \left[\beta^{\frac{1}{\eta}} K^{\frac{\eta-1}{\eta}} + (1-\beta)^{\frac{1}{\eta}} H^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}\frac{\sigma-1}{\sigma}} + (1-\alpha)^{\frac{1}{\sigma}} L^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} . \tag{36}$$

F.1 Cost shares

The unit cost function (marginal and average due to CRS) associated with X is

$$z \equiv c_X(r,s) = \left[\beta r^{1-\eta} + (1-\beta) s^{1-\eta}\right]^{\frac{1}{1-\eta}} \tag{37}$$

and for Q it is

$$c(z,w) = \frac{1}{A}\left[\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \tag{38}$$

$$= \frac{1}{A}\left[\alpha \left[\beta r^{1-\eta} + (1-\beta) s^{1-\eta}\right]^{\frac{1-\sigma}{1-\eta}} + (1-\alpha) w^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \tag{39}$$

$$= c(r,s,w) . \tag{40}$$

Using Shephard's Lemma, unit demand for L is

$$L^1(z,w) = \frac{\partial c(z,w)}{\partial w} \tag{41}$$

$$= \frac{1}{A}\frac{1}{1-\sigma}\left[\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}\right]^{\frac{1}{1-\sigma}-1} (1-\alpha)(1-\sigma) w^{-\sigma} \tag{42}$$

$$= \frac{1}{A}\left[\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}\right]^{\frac{1}{1-\sigma}} \frac{(1-\alpha) w^{-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \tag{43}$$

$$= c(z,w) \frac{(1-\alpha) w^{-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \tag{44}$$

$$= c(z,w) \frac{(1-\alpha) w^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \frac{1}{w} . \tag{45}$$

Unit demand for K is

$$K^1(r,s,w) = \frac{\partial c(r,s,w)}{\partial r} \tag{46}$$

$$= \frac{1}{A}\frac{1}{1-\sigma}\left[\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}\right]^{\frac{1}{1-\sigma}-1}\alpha(1-\sigma)z^{-\sigma}\frac{\partial z}{\partial r} \tag{47}$$

$$= \frac{1}{A}\left[\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}\right]^{\frac{1}{1-\sigma}}\frac{\alpha z^{-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}}\frac{\partial z}{\partial r} \tag{48}$$

$$= c(r,s,w)\frac{\alpha z^{-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}}\frac{\partial z}{\partial r}\ . \tag{49}$$

Now,

$$\frac{\partial z}{\partial r} = \frac{1}{1-\eta}\left[\beta r^{1-\eta}+(1-\beta)s^{1-\eta}\right]^{\frac{1}{1-\eta}-1}\beta(1-\eta)r^{-\eta} \tag{50}$$

$$= \left[\beta r^{1-\eta}+(1-\beta)s^{1-\eta}\right]^{\frac{1}{1-\eta}}\frac{\beta r^{-\eta}}{\beta r^{1-\eta}+(1-\beta)s^{1-\eta}} \tag{51}$$

$$= z\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)s^{1-\eta}}\frac{1}{r} \tag{52}$$

Using this in the above gives

$$K^1(r,s,w) = c(r,s,w)\frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}}\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)s^{1-\eta}}\frac{1}{r}\ . \tag{53}$$

Using similar steps gives

$$H^1(r,s,w) = c(r,s,w)\frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}}\frac{(1-\beta)s^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)s^{1-\eta}}\frac{1}{s}\ . \tag{54}$$

The cost share of labor θ_L is

$$\theta_L = \frac{wL^1(z,w)}{c(z,w)} \tag{55}$$

$$= \frac{(1-\alpha)w^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}}\ . \tag{56}$$

The cost share of capital θ_K is

$$\theta_K = \frac{rK^1(r,s,w)}{c(r,s,w)} \tag{57}$$

$$= \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)w^{1-\sigma}}\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)s^{1-\eta}} \tag{58}$$

$$= (1-\theta_L)\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)s^{1-\eta}}\ . \tag{59}$$

The cost share of high skill labor θ_H is

$$\theta_H = \frac{sH^1(r,s,w)}{c(r,s,w)} \tag{60}$$

$$= \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \tag{61}$$

$$= (1-\theta_L) \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \ . \tag{62}$$

The cost shares of capital and high skill labor are the product of the cost share of X ($\theta_X = 1-\theta_L$), multiplied by the corresponding shares in expenditures within X:

$$\theta_K^X = \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \tag{63}$$

$$\theta_H^X = \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \ , \tag{64}$$

so that writing concisely

$$\theta_K = (1-\theta_L)\,\theta_K^X \tag{65}$$

$$\theta_H = (1-\theta_L)\,\theta_H^X \ . \tag{66}$$

Summarizing all cost shares,

$$\theta_L = \frac{(1-\alpha) w^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \tag{67}$$

$$\theta_X = \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \tag{68}$$

$$\theta_K^X = \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \tag{69}$$

$$\theta_H^X = \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \tag{70}$$

$$\theta_K = \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} = \theta_X \theta_K^X \tag{71}$$

$$\theta_H = \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} = \theta_X \theta_H^X \ . \tag{72}$$

F.2 Changes in factor cost shares induced by changes in the price of capital

F.2.1 Unskilled labor's share

Start with unskilled labor

$$\frac{\partial \theta_L}{\partial r} = \frac{\partial}{\partial r} \frac{(1-\alpha) w^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \tag{73}$$

$$= \frac{(1-\alpha) w^{1-\sigma}}{\left[\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}\right]^2} (-1) \alpha (1-\sigma) z^{-\sigma} \frac{\partial z}{\partial r} \tag{74}$$

$$= (\sigma - 1) \frac{(1-\alpha) w^{1-\sigma}}{\left[\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}\right]^2} \alpha z^{-\sigma} z \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \frac{1}{r} \tag{75}$$

$$= (\sigma - 1) \frac{(1-\alpha) w^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha) w^{1-\sigma}} \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \frac{1}{r} \tag{76}$$

$$= (\sigma - 1) \theta_L \theta_X \theta_K^X \frac{1}{r} , \tag{77}$$

so that

$$\frac{\partial \theta_L}{\partial r} r = (\sigma - 1) \theta_L \theta_K . \tag{78}$$

F.2.2 Capital's share

Turning to capital,

$$\frac{\partial \theta_K}{\partial r} = \frac{\partial}{\partial r} \left[(1-\theta_L) \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \right] \tag{79}$$

$$= \frac{\partial}{\partial r} (1-\theta_L) \cdot \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} + (1-\theta_L) \cdot \frac{\partial}{\partial r} \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \tag{80}$$

$$= \underbrace{-(\sigma - 1) \theta_L \frac{\theta_K}{r}}_{-\partial \theta_L / \partial r} \theta_K^X + (1-\theta_L) \cdot \underbrace{\frac{\partial}{\partial r} \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}}}_{\partial \theta_K^X / \partial r} . \tag{81}$$

Focus on

$$\frac{\partial}{\partial r} \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} = \frac{(1-\eta) \beta r^{-\eta} \left[\beta r^{1-\eta} + (1-\beta) s^{1-\eta}\right] - \beta r^{1-\eta} \beta (1-\eta) r^{-\eta}}{\left[\beta r^{1-\eta} + (1-\beta) s^{1-\eta}\right]^2} \tag{82}$$

$$= \frac{\beta^2 (1-\eta) r^{1-2\eta} + (1-\eta) \beta r^{-\eta} (1-\beta) s^{1-\eta} - \beta^2 (1-\eta) r^{1-2\eta}}{\left[\beta r^{1-\eta} + (1-\beta) s^{1-\eta}\right]^2} \tag{83}$$

$$= (1-\eta) \frac{\beta r^{-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \tag{84}$$

$$= (1-\eta) \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \frac{(1-\beta) s^{1-\eta}}{\beta r^{1-\eta} + (1-\beta) s^{1-\eta}} \frac{1}{r} \tag{85}$$

$$= (1-\eta) \theta_K^X \theta_H^X \frac{1}{r} . \tag{86}$$

Plugging this back in the equation above gives

$$\begin{aligned}
\frac{\partial \theta_K}{\partial r} &= \left[-\left(\sigma-1\right)\theta_L\theta_K\theta_K^X + \left(1-\eta\right)\left(1-\theta_L\right)\theta_K^X\theta_H^X\right]\frac{1}{r} && (87)\\
&= \left[-\left(\sigma-1\right)\theta_L\theta_K\theta_K^X + \left(1-\eta\right)\theta_X\theta_K^X\theta_H^X\right]\frac{1}{r} && (88)\\
&= \left[-\left(\sigma-1\right)\theta_L\theta_K\theta_K^X + \left(1-\eta\right)\theta_K\theta_H^X\right]\frac{1}{r} && (89)\\
&= \left[-\left(\sigma-1\right)\theta_L\theta_K^X + \left(1-\eta\right)\left(1-\theta_K^X\right)\right]\frac{\theta_K}{r}\ , && (90)
\end{aligned}$$

so that

$$\frac{\partial \theta_K}{\partial r} r = \left[-\left(\sigma-1\right)\theta_L\theta_K^X + \left(1-\eta\right)\left(1-\theta_K^X\right)\right]\theta_K\ . \qquad (91)$$

F.2.3 Skilled labor's share

Turning to skilled labor,

$$\begin{aligned}
\frac{\partial \theta_H}{\partial r} &= \frac{\partial}{\partial r}\left[\left(1-\theta_L\right)\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}}\right] && (92)\\
&= \frac{\partial}{\partial r}\left(1-\theta_L\right)\cdot\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}} + \left(1-\theta_L\right)\cdot\frac{\partial}{\partial r}\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}} && (93)\\
&= \underbrace{-\left(\sigma-1\right)\theta_L\frac{\theta_K}{r}}_{-\partial\theta_L/\partial r}\theta_H^X + \left(1-\theta_L\right)\cdot\underbrace{\frac{\partial}{\partial r}\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}}}_{\partial\theta_H^X/\partial r}\ . && (94)
\end{aligned}$$

Focus on

$$\begin{aligned}
\frac{\partial}{\partial r}\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}} &= -\frac{\left(1-\beta\right)s^{1-\eta}\beta\left(1-\eta\right)r^{-\eta}}{\left[\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}\right]^2} && (95)\\
&= -\left(1-\eta\right)\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}}\frac{\beta r^{-\eta}}{\left[\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}\right]^2} && (96)\\
&= -\left(1-\eta\right)\frac{\left(1-\beta\right)s^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}}\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+\left(1-\beta\right)s^{1-\eta}}\frac{1}{r} && (97)\\
&= -\left(1-\eta\right)\theta_H^X\theta_K^X\frac{1}{r}\ . && (98)
\end{aligned}$$

Plugging this back in the equation above gives

$$\begin{aligned}
\frac{\partial \theta_H}{\partial r} &= \left[-\left(\sigma-1\right)\theta_L\theta_K\theta_H^X - \left(1-\eta\right)\left(1-\theta_L\right)\theta_K^X\theta_H^X\right]\frac{1}{r} && (99)\\
&= \left[-\left(\sigma-1\right)\theta_L\theta_K\theta_H^X - \left(1-\eta\right)\theta_X\theta_K^X\theta_H^X\right]\frac{1}{r} && (100)\\
&= \left[-\left(\sigma-1\right)\theta_L\theta_H^X - \left(1-\eta\right)\theta_H^X\right]\frac{\theta_K}{r} && (101)\\
&= \left[-\left(\sigma-1\right)\theta_L\theta_H^X - \left(1-\eta\right)\left(1-\theta_K^X\right)\right]\frac{\theta_K}{r}\ , && (102)
\end{aligned}$$

so that

$$\frac{\partial \theta_H}{\partial r} r = \left[-(\sigma - 1)\, \theta_L \theta_H^X - (1 - \eta) \left(1 - \theta_K^X\right) \right] \theta_K \ . \tag{103}$$

The first term is similar to the first term in $\partial \theta_K / \partial r$, because it captures substitution between L and X. The second term has the opposite sign and same magnitude in absolute value as for $\partial \theta_K / \partial r$, since it captures substitution between H and K in the opposite direction.

F.2.4 Shares within the capital-skill composite

This was solved above:

$$\frac{\partial \theta_K^X}{\partial r} = \frac{\partial}{\partial r} \frac{\beta r^{1-\eta}}{\beta r^{1-\eta} + (1 - \beta)\, s^{1-\eta}} = (1 - \eta)\, \theta_K^X \theta_H^X \frac{1}{r} \tag{104}$$

$$\frac{\partial \theta_H^X}{\partial r} = \frac{\partial}{\partial r} \frac{(1 - \beta)\, s^{1-\eta}}{\beta r^{1-\eta} + (1 - \beta)\, s^{1-\eta}} = -(1 - \eta)\, \theta_K^X \theta_H^X \frac{1}{r} \ , \tag{105}$$

so that

$$\frac{\partial \theta_K^X}{\partial r} r = (1 - \eta)\, \theta_K^X \theta_H^X \tag{106}$$

$$\frac{\partial \theta_H^X}{\partial r} r = -(1 - \eta)\, \theta_K^X \theta_H^X \ . \tag{107}$$

F.2.5 Sum of cost shares

One can verify that

$$\frac{\partial \theta_L}{\partial r} + \frac{\partial \theta_H}{\partial r} + \frac{\partial \theta_K}{\partial r} \tag{108}$$

$$= \left\{ \begin{array}{c} (\sigma - 1)\, \theta_L - \left[(\sigma - 1)\, \theta_L \left(1 - \theta_K^X\right) + (1 - \eta)\,(1 - \theta_K^X) \right] \\ - \left[(\sigma - 1)\, \theta_L \theta_K^X - (1 - \eta)\,(1 - \theta_K^X) \right] \end{array} \right\} \frac{\theta_K}{r} \tag{109}$$

$$= \left\{ (\sigma - 1)\, \theta_L - (\sigma - 1)\, \theta_L \left(1 - \theta_K^X\right) - (\sigma - 1)\, \theta_L \theta_K^X \right\} \frac{\theta_K}{r} \tag{110}$$

$$= \left\{ (\sigma - 1)\, \theta_L - (\sigma - 1)\, \theta_L \right\} \frac{\theta_K}{r} \tag{111}$$

$$= 0 \ . \tag{112}$$

And

$$\frac{\partial \theta_K^X}{\partial r} + \frac{\partial \theta_H^X}{\partial r} = 0 \ . \tag{113}$$

F.2.6 Summary

$$\frac{\partial \theta_L}{\partial r} r = (\sigma - 1)\, \theta_L \theta_K \tag{114}$$

$$\frac{\partial \theta_H}{\partial r} r = -\left[(\sigma - 1)\, \theta_L \theta_H^X + (1-\eta)\, \theta_H^X\right] \theta_K \tag{115}$$

$$\frac{\partial \theta_K}{\partial r} r = -\left[(\sigma - 1)\, \theta_L \theta_K^X - (1-\eta)\, (1-\theta_K^X)\right] \theta_K \tag{116}$$

$$\frac{\partial \theta_K^X}{\partial r} r = (1-\eta)\, \theta_K^X \theta_H^X \tag{117}$$

$$\frac{\partial \theta_H^X}{\partial r} r = -\,(1-\eta)\, \theta_K^X \theta_H^X \ . \tag{118}$$

F.3 Changes in factor cost shares induced by changes in supply of labor

F.3.1 Reduction in supply of L that increases unskilled labor's wage w

Start with the unskilled labor share

$$\frac{\partial \theta_L}{\partial w} = \frac{\partial}{\partial w} \frac{(1-\alpha)\, w^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha)\, w^{1-\sigma}} \tag{119}$$

Since $z = \left[\beta r^{1-\eta} + (1-\beta)\, s^{1-\eta}\right]^{1/(1-\eta)}$, it does not change with w. So

$$\frac{\partial \theta_L}{\partial w} = \frac{(1-\sigma)(1-\alpha)\, w^{-\sigma}\left[\alpha z^{1-\sigma} + (1-\alpha)\, w^{1-\sigma}\right] - (1-\alpha)\, w^{1-\sigma}(1-\alpha)(1-\sigma)\, w^{-\sigma}}{\left[\alpha z^{1-\sigma} + (1-\alpha)\, w^{1-\sigma}\right]^2} \tag{120}$$

$$= -\frac{(\sigma-1)(1-\alpha)\, w^{-\sigma} \alpha z^{1-\sigma}}{\left[\alpha z^{1-\sigma} + (1-\alpha)\, w^{1-\sigma}\right]^2} \tag{121}$$

$$= -\,(\sigma-1)\, \frac{(1-\alpha)\, w^{-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha)\, w^{1-\sigma}} \frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma} + (1-\alpha)\, w^{1-\sigma}} \tag{122}$$

$$= -\,(\sigma-1)\, \theta_L \theta_X \frac{1}{w} \tag{123}$$

$$< 0 \text{ if } \sigma > 1 \ . \tag{124}$$

An increase in w lowers unskilled labor share when $\sigma > 1$. A corollary is that the share of X, $\theta_X = 1 - \theta_L$, increases when w increases:

$$\frac{\partial \theta_X}{\partial w} = (\sigma - 1)\, \theta_L \theta_X \frac{1}{w} \tag{125}$$

$$> 0 \text{ if } \sigma > 1 \ . \tag{126}$$

Since w does not affect θ_H^X and θ_K^X, then this implies that both $\theta_H = \theta_X \theta_H^X$ and $\theta_K = \theta_X \theta_K^X$ increase when w increases because θ_X increases when w increases:

$$\frac{\partial \theta_H}{\partial w} = (\sigma - 1)\,\theta_L \theta_X \frac{1}{w} \theta_H^X \tag{127}$$

$$= (\sigma - 1)\,\theta_L \theta_H \frac{1}{w} \tag{128}$$

$$> 0 \text{ if } \sigma > 1 \tag{129}$$

and

$$\frac{\partial \theta_K}{\partial w} = (\sigma - 1)\,\theta_L \theta_X \frac{1}{w} \theta_K^X \tag{130}$$

$$= (\sigma - 1)\,\theta_L \theta_K \frac{1}{w} \tag{131}$$

$$> 0 \text{ if } \sigma > 1 \; . \tag{132}$$

Now consider the skilled wage bill share (share of skilled labor within total wage bill)

$$\theta_H^N = \frac{\theta_H}{\theta_L + \theta_H} = \frac{\theta_X \theta_H^X}{\theta_L + \theta_X \theta_H^X} = \frac{(1-\theta_L)\,\theta_H^X}{\theta_L + (1-\theta_L)\,\theta_H^X} = \frac{\theta_H^X - \theta_H^X \theta_L}{\theta_H^X + (1-\theta_H^X)\theta_L} \; . \tag{133}$$

Variation in w does not affect θ_H^X, so we can treat this as a constant. Invoking the chain rule

$$\frac{\partial \theta_H^N}{\partial w} = \frac{\partial}{\partial w} \frac{\theta_H^X - \theta_H^X \theta_L}{\theta_H^X + (1-\theta_H^X)\theta_L} \tag{134}$$

$$= \frac{\partial}{\partial \theta_L} \frac{\theta_H^X - \theta_H^X \theta_L}{\theta_H^X + (1-\theta_H^X)\theta_L} \frac{\partial \theta_L}{\partial w} \tag{135}$$

Then

$$\frac{\partial}{\partial \theta_L} \frac{\theta_H^X - \theta_H^X \theta_L}{\theta_H^X + (1-\theta_H^X)\theta_L} = \frac{-\theta_H^X[\theta_H^X + (1-\theta_H^X)\theta_L] - (\theta_H^X - \theta_H^X\theta_L)(1-\theta_H^X)}{[\theta_H^X + (1-\theta_H^X)\theta_L]^2} \tag{136}$$

$$= \frac{-(\theta_H^X)^2 - \theta_H^X(1-\theta_H^X)\theta_L - \theta_H^X(1-\theta_H^X) + \theta_H^X(1-\theta_H^X)\theta_L}{[\theta_H^X + (1-\theta_H^X)\theta_L]^2} \tag{137}$$

$$= \frac{-(\theta_H^X)(\theta_H^X + 1 - \theta_H^X)}{[\theta_H^X + (1-\theta_H^X)\theta_L]^2} \tag{138}$$

$$= -\frac{\theta_H^X}{[\theta_H^X + (1-\theta_H^X)\theta_L]^2} < 0 \tag{139}$$

and since we already know that $\partial\theta_L/\partial w < 0$ when $\sigma > 1$, then

$$\begin{aligned}
\frac{\partial\theta_H^N}{\partial w} &= -\frac{\theta_H^X}{[\theta_H^X+(1-\theta_H^X)\theta_L]^2}\left[-(\sigma-1)\,\theta_L\theta_X\frac{1}{w}\right] && (140)\\
&= \frac{\theta_H^X}{[\theta_H^X+(1-\theta_H^X)\theta_L]^2}(\sigma-1)\,\theta_L\theta_X\frac{1}{w} && (141)\\
&> 0 \ \text{ if } \ \sigma > 1\ . && (142)
\end{aligned}$$

An increase in w will increase skilled labor's wage bill share (share within total labor income).

Now consider $\theta_N = \theta_L + \theta_H = 1 - \theta_K$. Since

$$\begin{aligned}
\frac{\partial\theta_N}{\partial w} &= -\frac{\partial\theta_K}{\partial w} && (143)\\
&= -(\sigma-1)\,\theta_L\theta_K\frac{1}{w} && (144)\\
&< 0 \ \text{ if } \ \sigma > 1 && (145)
\end{aligned}$$

An increase in w will decrease the overall labor share. The reason is that part of the increase in $\theta_X = (1-\theta_L)$ is "spent" on capital, so the increase in θ_H is less than the decrease in θ_L.

F.3.2 Increase in supply of H that reduces skilled labor's wage s

Start with the unskilled labor share

$$\frac{\partial\theta_L}{\partial s} = \frac{\partial}{\partial s}\frac{(1-\alpha)\,w^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)\,w^{1-\sigma}} \qquad (146)$$

Since $z = \left[\beta r^{1-\eta}+(1-\beta)\,s^{1-\eta}\right]^{1/(1-\eta)}$, any effect comes from z.

$$\begin{aligned}
\frac{\partial z}{\partial s} &= \frac{\partial}{\partial s}\left[\beta r^{1-\eta}+(1-\beta)\,s^{1-\eta}\right]^{1/(1-\eta)} && (147)\\
&= \frac{1}{1-\eta}\frac{\left[\beta r^{1-\eta}+(1-\beta)\,s^{1-\eta}\right]^{1/(1-\eta)}}{\left[\beta r^{1-\eta}+(1-\beta)\,s^{1-\eta}\right]}(1-\beta)(1-\eta)\frac{s^{1-\eta}}{s} && (148)\\
&= \frac{(1-\beta)\,s^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)\,s^{1-\eta}}\frac{z}{s} && (149)\\
&= \theta_H^X\frac{z}{s} && (150)\\
&> 0\ . && (151)
\end{aligned}$$

Therefore

$$
\begin{aligned}
\frac{\partial \theta_L}{\partial s} &= \frac{\partial \theta_L}{\partial z}\frac{\partial z}{\partial s} && (152)\\
&= -\frac{(1-\alpha)\, w^{1-\sigma}}{\left[\alpha z^{1-\sigma}+(1-\alpha)\, w^{1-\sigma}\right]^2}\alpha\,(1-\sigma)\, z^{-\sigma}\frac{\partial z}{\partial s} && (153)\\
&= (\sigma-1)\,\frac{(1-\alpha)\, w^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)\, w^{1-\sigma}}\frac{\alpha z^{1-\sigma}}{\alpha z^{1-\sigma}+(1-\alpha)\, w^{1-\sigma}}\frac{1}{z}\frac{\partial z}{\partial s} && (154)\\
&= (\sigma-1)\,\theta_L\theta_X\frac{1}{z}\theta_H^X\frac{z}{s} && (155)\\
&= (\sigma-1)\,\theta_L\theta_H\frac{1}{s} && (156)\\
&> 0 \;\text{ if }\; \sigma>1\;. && (157)
\end{aligned}
$$

A reduction in s will reduce the unskilled labor share when $\sigma > 1$. This implies that $\theta_X = (1-\theta_L)$ increases when s drops:

$$
\begin{aligned}
\frac{\partial \theta_X}{\partial s} &= -\frac{\partial \theta_L}{\partial s} && (158)\\
&= -(\sigma-1)\,\theta_L\theta_H\frac{1}{s} && (159)\\
&< 0 \;\text{ if }\; \sigma>1\;. && (160)
\end{aligned}
$$

Now consider the share of capital. Start with the share of capital within X

$$
\begin{aligned}
\frac{\partial \theta_K^X}{\partial s} &= \frac{\partial}{\partial s}\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)\, s^{1-\eta}} && (161)\\
&= -\frac{\beta r^{1-\eta}\,(1-\beta)\,(1-\eta)\, s^{-\eta}}{\left[\beta r^{1-\eta}+(1-\beta)\, s^{1-\eta}\right]^2} && (162)\\
&= -(1-\eta)\,\frac{\beta r^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)\, s^{1-\eta}}\frac{(1-\beta)\, s^{1-\eta}}{\beta r^{1-\eta}+(1-\beta)\, s^{1-\eta}}\frac{1}{s} && (163)\\
&= -(1-\eta)\,\theta_K^X\theta_H^X\frac{1}{s} && (164)\\
&< 0 \;\text{ if }\; \eta<1\;. && (165)
\end{aligned}
$$

A reduction in s will increase capital's share within X when $\eta < 1$. A corollary is that a reduction in s will decrease high skill's share within X when $\eta < 1$ because $\theta_H^X = 1-\theta_K^X$:

$$
\begin{aligned}
\frac{\partial \theta_H^X}{\partial s} &= -\frac{\partial \theta_K^X}{\partial s} && (166)\\
&= (1-\eta)\,\theta_K^X\theta_H^X\frac{1}{s} && (167)\\
&> 0 \;\text{ if }\; \eta<1\;. && (168)
\end{aligned}
$$

Overall, since capital's share is $\theta_K = \theta_X\theta_K^X$ and both components of the product increase when s

decreases, then a decline in s increases capital's share:

$$\begin{aligned}
\frac{\partial\theta_K}{\partial s} &= \frac{\partial(\theta_X\theta_K^X)}{\partial s} && (169)\\
&= \frac{\partial\theta_X}{\partial s}\theta_K^X + \theta_X\frac{\partial\theta_K^X}{\partial s} && (170)\\
&= -(\sigma-1)\,\theta_L\theta_H\frac{1}{s}\theta_K^X + \theta_X\left[-(1-\eta)\,\theta_K^X\theta_H^X\frac{1}{s}\right] && (171)\\
&= -(\sigma-1)\,\theta_L\theta_H\frac{1}{s}\theta_K^X - (1-\eta)\,\theta_H\theta_K^X\frac{1}{s} && (172)\\
&= -\left[(\sigma-1)\,\theta_L\theta_K^X + (1-\eta)\,\theta_K^X\right]\frac{\theta_H}{s} && (173)\\
&< 0 \text{ if } \sigma>1 \text{ and } \eta<1\ . && (174)
\end{aligned}$$

Less clear is what happens to skilled labor's share:

$$\begin{aligned}
\frac{\partial\theta_H}{\partial s} &= \frac{\partial(\theta_X\theta_H^X)}{\partial s} && (175)\\
&= \frac{\partial\theta_X}{\partial s}\theta_H^X + \theta_X\frac{\partial\theta_H^X}{\partial s} && (176)\\
&= -(\sigma-1)\,\theta_L\theta_H\frac{1}{s}\theta_H^X + \theta_X\,(1-\eta)\,\theta_K^X\theta_H^X\frac{1}{s} && (177)\\
&= -(\sigma-1)\,\theta_L\theta_H\frac{1}{s}\theta_H^X + (1-\eta)\,\theta_H\theta_K^X\frac{1}{s} && (178)\\
&= -\left[(\sigma-1)\,\theta_L\theta_H^X - (1-\eta)\,\theta_K^X\right]\frac{\theta_H}{s} && (179)\\
&= -\left[(\sigma-1)\,\theta_L\theta_H^X - (1-\eta)\left(1-\theta_H^X\right)\right]\frac{\theta_H}{s} && (180)
\end{aligned}$$

This last expression cannot be signed even if $\sigma > 1$ and $\eta < 1$; it is more likely to be negative when θ_L and θ_H^X are large.

Turning to the labor's share, $\theta_N = \theta_L + \theta_H = 1 - \theta_K$, we have

$$\begin{aligned}
\frac{\partial\theta_N}{\partial s} &= -\frac{\partial\theta_K}{\partial s}\\
&= \left[(\sigma-1)\,\theta_L\theta_K^X + (1-\eta)\,\theta_K^X\right]\frac{\theta_H}{s}\\
&> 0 \text{ if } \sigma>1 \text{ and } \eta<1
\end{aligned}$$

A drop in s reduces θ_N if $\sigma > 1$ and $\eta < 1$. Why? The drop in s shifts income from L to X, which is spent on H and K, but within X income share for H drops.

Turning to the high skill labor share within overall labor income,

$$
\begin{aligned}
\frac{\partial \theta_H^N}{\partial s} &= \frac{\partial}{\partial s}\frac{\theta_H}{\theta_L+\theta_H} \\
&= \frac{\frac{\partial \theta_H}{\partial s}(\theta_L+\theta_H) - \theta_H\left(\frac{\partial \theta_L}{\partial s}+\frac{\partial \theta_H}{\partial s}\right)}{(\theta_L+\theta_H)^2} \\
&= \frac{\frac{\partial \theta_H}{\partial s}\theta_L + \frac{\partial \theta_H}{\partial s}\theta_H - \theta_H\frac{\partial \theta_L}{\partial s} - \theta_H\frac{\partial \theta_H}{\partial s}}{(\theta_L+\theta_H)^2} \\
&= \frac{\frac{\partial \theta_H}{\partial s}\theta_L - \theta_H\frac{\partial \theta_L}{\partial s}}{(\theta_L+\theta_H)^2} \\
&= \frac{-\left[(\sigma-1)\theta_L\theta_H^X - (1-\eta)\left(1-\theta_H^X\right)\right]\frac{\theta_H}{s}\theta_L - \theta_H(\sigma-1)\theta_L\theta_H\frac{1}{s}}{(\theta_L+\theta_H)^2} \\
&= \frac{\left[-(\sigma-1)\theta_L\theta_H^X + (1-\eta)\left(1-\theta_H^X\right) - \theta_H(\sigma-1)\right]\frac{\theta_L\theta_H}{s}}{(\theta_L+\theta_H)^2} \\
&= \frac{\left[-(\sigma-1)\theta_L\theta_H^X + (1-\eta)\left(1-\theta_H^X\right) - \theta_X\theta_H^X(\sigma-1)\right]\frac{\theta_L\theta_H}{s}}{(\theta_L+\theta_H)^2} \\
&= \frac{\left[-(\sigma-1)\theta_L\theta_H^X + (1-\eta)\left(1-\theta_H^X\right) - (1-\theta_L)\theta_H^X(\sigma-1)\right]\frac{\theta_L\theta_H}{s}}{(\theta_L+\theta_H)^2} \\
&= \frac{\left[-(\sigma-1)\theta_H^X + (1-\eta)\left(1-\theta_H^X\right)\right]\frac{\theta_L\theta_H}{s}}{(\theta_L+\theta_H)^2} \\
&= \frac{\left[-(\sigma-\eta)\theta_H^X + (1-\eta)\right]\frac{\theta_L\theta_H}{s}}{(\theta_L+\theta_H)^2}.
\end{aligned}
$$

This last expression cannot be signed even if $\sigma > 1$ and $\eta < 1$; it is more likely to be negative when θ_H^X is large. In fact, as long as $\sigma > \eta$ and $\eta < 1$, it is more likely to be negative when θ_H^X is large (we do not need $\sigma > 1$).

F.3.3 Summary

Half elasticities w.r.t. w:

$$\frac{\partial \theta_L}{\partial w}w = -(\sigma-1)\theta_L\theta_X \tag{181}$$

$$\frac{\partial \theta_H}{\partial w}w = (\sigma-1)\theta_L\theta_H \tag{182}$$

$$\frac{\partial \theta_K}{\partial w}w = (\sigma-1)\theta_L\theta_K \tag{183}$$

$$\frac{\partial \theta_N}{\partial w}w = -(\sigma-1)\theta_L\theta_K \tag{184}$$

$$\frac{\partial \theta_H^X}{\partial w}w = \frac{\partial \theta_K^X}{\partial w}w = 0 \tag{185}$$

If the price of unskilled labor increases, then we only need $\sigma > 1$ to get the following predictions:

- reduction in unskilled labor's share θ_L.
- increase in skilled labor's share θ_H.
- increase in skilled labor's wage bill share $\theta_H^N = \theta_H / (\theta_L + \theta_H) = \theta_H/\theta_N$.
- increase in capital's share θ_K and lower overall labor's share $\theta_N = \theta_L + \theta_H = 1 - \theta_K$.

Half elasticities w.r.t. s:

$$\frac{\partial \theta_L}{\partial s} s = (\sigma - 1)\,\theta_L \theta_H \tag{186}$$

$$\frac{\partial \theta_H}{\partial s} s = -\left[(\sigma - 1)\,\theta_L \theta_H^X - (1-\eta)\left(1 - \theta_H^X\right)\right]\theta_H \tag{187}$$

$$\frac{\partial \theta_K}{\partial s} s = -\left[(\sigma - 1)\,\theta_L \theta_K^X + (1-\eta)\,\theta_K^X\right]\theta_H \tag{188}$$

$$\frac{\partial \theta_N}{\partial s} s = \left[(\sigma - 1)\,\theta_L \theta_K^X + (1-\eta)\,\theta_K^X\right]\theta_H \tag{189}$$

$$\frac{\partial \theta_H^X}{\partial s} s = (1-\eta)\,\theta_K^X \theta_H^X \tag{190}$$

If the price of skilled labor declines, and if $\sigma > 1$ and $\eta < 1$, then a decrease in s will

- unambiguously lower unskilled labor's share θ_L;
- unambiguously lower skilled labor's share within X θ_H^X;
- unambiguously increase capital's share θ_K and lower overall labor's share $\theta_N = 1 - \theta_K$; this effectsis larger when θ_L and θ_K^X are large.
- if θ_L and θ_H^X $(= 1 - \theta_K^X)$ are large enough, then a decrease in s will increase skilled labor's share;
- but if the decrease in s continues for some time—causing decreases in θ_L and in θ_H^X—then it is possible that the derivative changes signs, and the additional decrease in s lowers skilled labor's share.

G Factor income shares and factor abundances

In this section we ask whether there is a systematic relationship between factor income shares—and in particular the part that is paid by foreign industries—and relative factor abundance. We start with an accounting exercise, by splitting the countries in our 1995–2007 sample into countries with high (above median) capital abundance and countries of low (median and below) capital abundance based on their ranking in 1995. Table A12 in the appendix lists these 38 countries. We aggregate Luxemburg with Belgium, in order to make an even number of countries by capital abundance. As in the entire analysis above, we drop Poland as a destination of factor income due to the extreme and volatile factor shares in the first years of the 1995–2007 sample. We define here factor abundance by relative expenditures on factors, not quantities, due to the nature of the data that we rely on. This means that a capital abundant country has a relatively high capital share. While this is non-standard, one can think of expenditures on factors as effective supplies of factor services in efficiency units, rather than physical units.

Table A13 uses the same data underlying Table 1 for factor income shares in GDP, and reports similar statistics by capital abundance of factor locations. We use GDP weights in 1995 to average data across countries within cells. One can recover exactly the entries in Table 1 by averaging over high and low capital abundance countries by using the GDP weights of each cell. The first three rows describe factor shares where factors are located without distinguishing their sources. In row 3 column 1 we see that the average country with above median capital abundance in 1995 is 8.84 percent points more capital abundant than the average country at or below the median. This difference shrinks by 1.19 percent points by 2007 (row 3 column 3), implying that relative factor shares tend to converge over this period. This is reflected in columns 10–15. Capital shares increase in both high and low capital abundance countries, but less so in capital abundant countries.

Rows 4–6 consider income flows due to domestic industries' final demand, and rows 7–9 consider income flows due to foreign industries' final demand. Here we see that high capital abundance countries rely more on domestic industries for overall factor income (columns 7–8, rows 4–9). Alternatively, high labor shares are associated with greater reliance on foreign sources of income. More than all of this difference is due to domestic capital income; high capital abundance countries are less reliant on foreign industries for their capital income relative to low capital abundance countries (columns 1–2 and 4–5, rows 6 and 9). At the same time, both domestic and foreign income flows are more capital intensive in capital abundant countries (columns 10–11 and 13–14). Convergence of aggregate capital shares is driven mostly by domestic industries (column 12). Capital intensity of both sources of income (domestic and foreign) increase, but more so for labor abundant countries (columns 12 and 15).

Overall, the results in Table A13 indicate that, on average, capital shares increase less in capital abundant countries, and this is driven by both domestic activities and by activities that provide inputs for foreign industries. Globalization, and in particular Heckscher-Ohlin forces, may play a role in this process, where activities that are intensive in the use of some factor are drawn to where this factor is relatively more abundant as trade barriers decline. The following regression analysis tries to address this issue.

We study the relationship between capital intensity of bilateral foreign income flows with bilateral relative capital abundance. We define the latter as

$$RKA_{od} = \ln\left(\frac{E_o^K}{E_o^K + E_d^K}\right) - \ln\left(\frac{E_o^L}{E_o^L + E_d^L}\right) ,$$

where E^f are expenditures on factor $f \in \{K, L\}$. We regress

$$\frac{(V_K BY)_{od} - (V_L BY)_{od}}{GDP^o} = \beta \cdot RKA_{od} + \gamma' gravity_{od} + \alpha_o + \alpha_d + \varepsilon_{od} , \tag{191}$$

where $V_K BY_{od}$ is capital income accruing to capital installed in o that originates from supplying intermediate inputs for final goods production in country d, and similarly for labor income in $V_L BY_{od}$. The dependent variable expresses the capital intensity (in value added terms) of intermediate input exports from o to d. The coefficient of interest is β, and given the discussion above, we expect a positive relationship. We control for standard bilateral control variables in $gravity_{od}$: distance, and indicators for common border, colonial ties, common language, free trade agreements, both countries in EU 15, one country in the EU enlargement (13 countries) while the other is an EU 15 member, and common currency. We also include in $gravity_{od}$ measures of similarity of GDP and capital abundance, defined as

$$\text{SYM}^x_{od} = \ln \left[1 - \left(\frac{x_o}{x_o + x_d} \right)^2 - \left(\frac{x_d}{x_o + x_d} \right)^2 \right] ,$$

where x can be either GDP or capital abundance (E^K/E^L) for origin o or destination d. SYM^x_{od} is larger when the difference between o and d in the x dimension is smaller. We include in (191) origin and destination fixed effects to control for overall attractiveness of o for capital intensive production, and overall tendency of d to produce final goods with capital intensive inputs structure (the source of income flowing from d to o).

We estimate (191) in cross sections in 1995 and in 2007, using both ordinary least squares (OLS) and Poisson pseudo maximum likelihood (PPML), the latter emphasizing larger values of the dependent variable. We report robust two-way clustered standard errors at the country o and country d level in order to account for correlations in errors within origins and destinations (Cameron, Gelbach, and Miller (2011)).

We report the results in Table A14. The first result is that relative capital abundance of o is associated with capital intensity of exports to d (alternatively, foreign income flows from d). Since we include both source and destination fixed effects, this result is not driven by overall abundances *per se*. Using the same classification of high and low capital abundance as in Table A13, we find that this association is much stronger for the most capital abundant countries; the coefficient to RKA_{od} is five times larger for these countries in 1995. When examining the list of countries in this group (Table A12 in the appendix) we find both developed and developing countries, in all regions of the world. Indeed, by including origin and destination fixed effects, the regression is designed to identify the relationship over and above income or geography.

If the elasticity of substitution between capital and labor is greater than one, then this implies that capital abundance, as we measure it, is associated with a lower relative price of capital. Under this assumption, the interpretation of the results is that countries import capital intensive intermediate inputs from where they are relatively cheaper (when capital is relatively "abundant" in our terminology).

The results in Table A14 indicate that the relationship between RKA_{od} and capital intensity of foreign income flows is much stronger in 2007 versus 1995. This is consistent with the idea that when trade and investment barriers are lower, factor income flows are more sensitive to factor abundances. All these results are similar for both OLS and PPML. Table A14 also reveals that factor income flows from EU 15 countries to EU enlargement countries are relatively labor intensive, i.e., EU members tend to import relatively labor intensive intermediate goods (in value added terms) from EU enlargement countries. This is consistent with casual observation of the nature of trade and investments involving these country groups.

Overall, the message from Table A14 is that factor abundances can predict factor intensity of foreign income flows, and that this association has become stronger over time, with reductions in trade and investment barriers. This is consistent with Heckscher-Ohlin forces shaping the pattern of intermediate input trade.

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Table 1: Payments to Domestic Factors (Forward Linkages), 1995-2007

A. All sectors

	Percent in GDP								Percent in domestic industries' VA		Percent in foreign industries' VA	
	K income from domestic industries (1)	L income from domestic industries (2)	K income from foreign industries (3)	L income from foreign industries (4)	K income (domestic + foreign) (5)	L income (domestic + foreign) (6)	Income from domestic industries (7)	Income from foreign industries (8)	K income (9)	L income (10)	K income (11)	L income (12)
Levels												
VBY 1995	35.01	56.11	3.48	5.40	38.49	61.51	91.12	8.88	38.42	61.58	39.22	60.78
VBY 2007	35.88	52.39	5.06	6.67	40.94	59.06	88.27	11.73	40.65	59.35	43.13	56.87
Changes												
V2007*B1995*Y1995 - VBY 1995	0.95	-0.77	0.11	-0.29	1.06	-1.06	0.18	-0.18	0.97	-0.97	2.07	-2.07
V1995*B2007*Y1995 - VBY 1995	-0.66	-1.53	1.13	1.07	0.47	-0.47	-2.19	2.19	0.21	-0.21	2.41	-2.41
V1995*B1995*Y2007 - VBY 1995	-0.12	-1.65	0.56	1.21	0.44	-0.44	-1.77	1.77	0.62	-0.62	-1.25	1.25
V1995*B2007*Y2007 - VBY 1995	-0.42	-2.71	1.28	1.85	0.86	-0.86	-3.13	3.13	0.89	-0.89	0.47	-0.47
VBY 2007 - VBY 1995	0.87	-3.72	1.57	1.27	2.45	-2.45	-2.84	2.84	2.23	-2.23	3.91	-3.91

B. Manufacturing

	Percent in GDP								Percent in domestic industries' VA		Percent in foreign industries' VA	
	K income from domestic industries (1)	L income from domestic industries (2)	K income from foreign industries (3)	L income from foreign industries (4)	K income (domestic + foreign) (5)	L income (domestic + foreign) (6)	Income from domestic industries (7)	Income from foreign industries (8)	K income (9)	L income (10)	K income (11)	L income (12)
Levels												
VBY 1995	31.84	49.30	6.89	11.96	38.73	61.27	81.14	18.86	39.24	60.76	36.56	63.44
VBY 2007	32.06	41.94	10.70	15.29	42.77	57.23	74.01	25.99	43.33	56.67	41.18	58.82
Changes												
V2007*B1995*Y1995 - VBY 1995	1.15	-1.02	0.36	-0.49	1.51	-1.51	0.13	-0.13	1.35	-1.35	2.17	-2.17
V1995*B2007*Y1995 - VBY 1995	-0.88	-2.49	1.79	1.57	0.92	-0.92	-3.36	3.36	0.57	-0.57	2.53	-2.53
V1995*B1995*Y2007 - VBY 1995	-1.22	-4.12	1.82	3.52	0.60	-0.60	-5.34	5.34	1.16	-1.16	-0.55	0.55
V1995*B1995*Y2007 - VBY 1995	-1.34	-6.00	2.97	4.37	1.63	-1.63	-7.34	7.34	2.08	-2.08	1.09	-1.09
VBY 2007 - VBY 1995	0.22	-7.36	3.81	3.32	4.04	-4.04	-7.13	7.13	4.09	-4.09	4.63	-4.63

Notes. Panel A reports decompositions of changes in factor shares in GDP, while Panel B reports decompositions of changes in factor shares within manufacturing industries' value added. Columns 1-4 report the shares of income accruing to capital and labor from domestic industries and from foreign industries. All other columns are derived from these. Columns 5 and 6 report the overall capital and domestic shares in value added. The split between domestic and foreign industries is given by different entries within rows in VfBY. The contribution of foreign industries to factor shares is given by the forward concept defined in the text. The contribution of domestic industries is given by the complement of the forward concept. Columns 7 and 8 report the shares in value added arising from all domestic and international sources (forward, as in Figure 3). Columns 9 and 10 report capital and labor shares in payments by domestic final goods industries, while columns 10 and 11 report capital and labor shares in payments by foreign final goods' industries. The rows labeled "Levels" report levels in 1995 and in 2007. Rows labeled as "Changes" report true and counterfactual changes. All numbers are weighted averages using GDP in 1995 as weights. Source: authors' calculations based on WIOD 2013 release.

Table 2: Payments to Domestic Factors (Forward Linkages), 2007-2014

A. All sectors

	Percent in GDP								Percent in domestic industries' VA		Percent in foreign industries' VA	
	K income from domestic industries (1)	L income from domestic industries (2)	K income from foreign industries (3)	L income from foreign industries (4)	K income (domestic + foreign) (5)	L income (domestic + foreign) (6)	Income from domestic industries (7)	Income from foreign industries (8)	K income (9)	L income (10)	K income (11)	L income (12)
Levels												
VBY 2007	38.17	50.68	5.43	5.71	43.61	56.39	88.85	11.15	42.96	57.04	48.74	51.26
VBY 2014	37.20	51.10	5.33	6.37	42.53	57.47	88.30	11.70	42.13	57.87	45.58	54.42
Changes												
V2014*B2007*Y2007 - VBY 2007	-1.02	1.04	-0.35	0.33	-1.37	1.37	0.02	-0.02	-1.16	1.16	-3.06	3.06
V2007***B2014***Y2007 - VBY 2007	-0.30	-0.06	0.27	0.09	-0.03	0.03	-0.36	0.36	-0.16	0.16	0.84	-0.84
V2007*B2007***Y2014** - VBY 2007	-0.17	-0.81	0.31	0.66	0.15	-0.15	-0.97	0.97	0.29	-0.29	-1.34	1.34
V2007***B2014*****Y2014** - VBY 2007	-0.14	-0.46	0.22	0.37	0.08	-0.08	-0.59	0.59	0.13	-0.13	-0.59	0.59
VBY 2014 - VBY 2007	-0.97	0.42	-0.10	0.65	-1.07	1.07	-0.55	0.55	-0.83	0.83	-3.16	3.16

B. Manufacturing

	Percent in GDP								Percent in domestic industries' VA		Percent in foreign industries' VA	
	K income from domestic industries (1)	L income from domestic industries (2)	K income from foreign industries (3)	L income from foreign industries (4)	K income (domestic + foreign) (5)	L income (domestic + foreign) (6)	Income from domestic industries (7)	Income from foreign industries (8)	K income (9)	L income (10)	K income (11)	L income (12)
Levels												
VBY 2007	37.51	39.70	10.89	11.90	48.40	51.60	77.21	22.79	48.58	51.42	47.79	52.21
VBY 2014	35.59	40.03	10.74	13.64	46.33	53.67	75.62	24.38	47.07	52.93	44.06	55.94
Changes												
V2014*B2007*Y2007 - VBY 2007	-1.88	2.01	-1.01	0.88	-2.89	2.89	0.13	-0.13	-2.51	2.51	-4.19	4.19
V2007***B2014***Y2007 - VBY 2007	-0.65	-0.27	0.90	0.02	0.25	-0.25	-0.92	0.92	-0.27	0.27	1.95	-1.95
V2007*B2007***Y2014** - VBY 2007	-0.48	-1.93	0.76	1.65	0.29	-0.29	-2.41	2.41	0.93	-0.93	-1.54	1.54
V2007***B2014*****Y2014** - VBY 2007	-0.36	-1.43	0.90	0.90	0.54	-0.54	-1.80	1.80	0.68	-0.68	0.15	-0.15
VBY 2014 - VBY 2007	-1.92	0.33	-0.15	1.74	-2.07	2.07	-1.59	1.59	-1.52	1.52	-3.73	3.73

Notes. Panel A reports decompositions of changes in factor shares in GDP, while Panel B reports decompositions of changes in factor shares within manufacturing industries' value added. Columns 1-4 report the shares of income accruing to capital and labor from domestic industries and from foreign industries. All other columns are derived from these. Columns 5 and 6 report the overall capital and domestic shares in value added. The split between domestic and foreign industries is given by different entries within rows in VfBY. The contribution of foreign industries to factor shares is given by the forward concept defined in the text. The contribution of domestic industries is given by the complement of the forward concept. Columns 7 and 8 report the shares in value added arising from all domestic and international sources (forward, as in Figure 3). Columns 9 and 10 report capital and labor shares in payments by domestic final goods industries, while columns 10 and 11 report capital and labor shares in payments by foreign final goods' industries. The rows labeled "Levels" report levels in 2007 and in 2014. Rows labeled as "Changes" report true and counterfactual changes. All numbers are weighted averages using GDP in 2007 as weights. Source: authors' calculations based on WIOD 2016 release.

Table 3. The Contribution of Domestic Industries, China and Other Countries to Payments to Domestic Factors

A. 1995-2007

	Percent in GDP				
	Overall	Domestic	China	Other	China/Foreign
Level					
1995	100	91.12	0.27	8.62	
2007	100	88.27	1.10	10.63	
Percent point changes in 1995-2007					
Income	0	-2.84	0.83	2.01	29%
Capital	2.45	0.87	0.37	1.21	23%
Labor	-2.45	-3.72	0.46	0.81	37%
Percent increase in 1995-2007					
Income	0	-3.1	311.1	23.4	
Capital	6.4	2.5	350.4	35.7	
Labor	-4.0	-6.6	285.9	15.4	
Variation in percent point changes of labor income in 1995-2007					
Standard deviation	3.37	4.09	0.38	1.26	
Std Dev/Overall Std Dev		1.21	0.11	0.37	23%

A. 2007-2014

	Percent in GDP				
	Overall	Domestic	China	Other	China/Foreign
Level					
2007	100	89.04	0.69	10.27	
2014	100	88.44	0.98	10.59	
Percent point changes in 2007-2014					
Income	0	-0.60	0.29	0.31	48%
Capital	-1.03	-1.01	0.12	-0.13	-762%
Labor	1.03	0.41	0.17	0.45	28%
Percent increase in 2007-2014					
Income	0	-0.7	42.2	3.0	
Capital	-2.4	-2.6	36.1	-2.7	
Labor	1.8	0.8	47.7	8.3	
Variation in percent point changes of labor income in 2007-2014					
Standard deviation	3.53	3.65	0.19	0.94	
Std Dev/Overall Std Dev		1.04	0.05	0.27	17%

Notes. The table reports contributions of domestic industries, China and other countries are payments to domestic factors originating in each source. These are defined in the text. From these we compute contributions to domestic factor income shares. Contributions to variation in labor shares are ratios of standard deviations of each component to the standard deviation of labor shares. All numbers are weighted averages, using GDP in 1995 as weights for 1995-2007 and using GDP in 2007 for 2007-2014.. Source: authors' calculations based on WIOD 2013 release and WIOD 2016 release.

Table 4: Sources of Compositional Changes in Payments to Labor

A. All sectors

	1995			Δ1995-2007			2007			Δ2007-2014		
	Income from domestic industries (1)	Income from foreign industries (2)	Domestic + foreign (3)	Income from domestic industries (4)	Income from foreign industries (5)	Domestic + foreign (6)	Income from domestic industries (7)	Income from foreign industries (8)	Domestic + foreign (9)	Income from domestic industries (10)	Income from foreign industries (11)	Domestic + foreign (12)
Value chains (B)												
Domestic	55.99	0	55.99	-1.59	0	-1.59	50.54	0	50.54	-0.09	0	-0.09
Bilateral trade	0	4.52	4.52	0	0.42	0.42	0	4.43	4.43	0	0.01	0.01
Complex GVCs	0.12	0.88	1.00	0.05	0.64	0.70	0.14	1.27	1.41	0.01	0.05	0.06
Total	56.11	5.40	61.51	-1.53	1.07	-0.47	50.68	5.71	56.38	-0.08	0.06	-0.02
Sources of demand (Y)												
Domestic	52.55	4.48	57.03	-2.45	0.75	-1.71	46.60	4.46	51.06	-0.71	0.69	-0.02
Foreign	3.56	0.92	4.48	0.80	0.46	1.27	4.08	1.24	5.32	-0.13	-0.01	-0.14
Total	56.11	5.40	61.51	-1.65	1.21	-0.44	50.68	5.71	56.38	-0.84	0.68	-0.16

B. Manufacturing

	1995			Δ1995-2007			2007			Δ2007-2014		
	Income from domestic industries (1)	Income from foreign industries (2)	Domestic + foreign (3)	Income from domestic industries (4)	Income from foreign industries (5)	Domestic + foreign (6)	Income from domestic industries (7)	Income from foreign industries (8)	Domestic + foreign (9)	Income from domestic industries (10)	Income from foreign industries (11)	Domestic + foreign (12)
Value chains (B)												
Domestic	48.99	0	48.99	-2.64	0	-2.64	39.04	0	39.04	-0.17	0	-0.17
Bilateral trade	0	9.91	9.91	0	0.30	0.30	0	9.34	9.34	0	-0.06	-0.06
Complex GVCs	0.31	2.06	2.37	0.15	1.27	1.42	0.35	2.78	3.13	0.01	-0.02	-0.01
Total	49.30	11.96	61.27	-2.49	1.57	-0.92	39.39	12.12	51.51	-0.16	-0.08	-0.24
Sources of demand (Y)												
Domestic	39.51	9.61	49.11	-6.43	2.24	-4.19	28.63	9.02	37.65	-1.27	1.74	0.47
Foreign	9.80	2.36	12.15	2.31	1.28	3.59	10.76	3.09	13.86	-0.74	0.04	-0.70
Total	49.30	11.96	61.27	-4.12	3.52	-0.60	39.39	12.12	51.51	-2.01	1.78	-0.23

Notes. Panel A reports decompositions of levels and changes in labor shares in GDP, while Panel B reports decomposition of levels and changes in labor shares within manufacturing industries' value added. The four "Total" rows report in columns 1-3 and 7-9 labor shares in value added that are paid by domestic industries, foreign industries, and overall in the initial year (1995 or 2007); these are the same numbers for the initial year in columns 2, 4 and 6 in Tables 1 and 2. The "Total" rows report in columns 4-6 and 10-12 the changes in the same concepts; these are the same numbers in columns 2, 4 and 6 in Tables 1 and 2 for either changes in B or changes in Y. The rows above the "Total" rows indicate the contributions of sub-components of either B or Y to levels in columns 1-3 and 7-9, and to changes in columns 4-6 and 10-12.
Source: authors' calculations based on WIOD 2013 and WIOD 2016 releases.

Table 5. Correlates of Within-Industry Variation in Labor Shares in 1995-2007

	Dependent variable: Δ labor share											
	All sectors						Manufacturing					
Δ forward	-0.291***	-0.208**	-0.194**	-0.277***	-0.197**	-0.169*	-0.448**	-0.403**	-0.167*	-0.513***	-0.483***	-0.211**
	(0.063)	(0.079)	(0.094)	(0.074)	(0.085)	(0.094)	(0.172)	(0.195)	(0.088)	(0.135)	(0.167)	(0.087)
Δ offshoring	-0.078	-0.081	0.020	-0.086	-0.110	0.064	-0.334*	-0.327	-0.232**	-0.456**	-0.377*	-0.384**
	(0.116)	(0.111)	(0.144)	(0.132)	(0.117)	(0.145)	(0.195)	(0.244)	(0.111)	(0.196)	(0.208)	(0.157)
Δ exports of final goods	-0.005	0.016	-0.018	-0.000	0.017	-0.014	-0.001	0.029	0.021	0.001	0.033	0.023
	(0.050)	(0.051)	(0.048)	(0.050)	(0.054)	(0.048)	(0.047)	(0.046)	(0.043)	(0.046)	(0.043)	(0.038)
Δ imports of final goods	0.014	0.009	0.010	0.013	0.008	0.011	0.044	-0.018	0.036	0.024	-0.044	0.021
	(0.012)	(0.010)	(0.011)	(0.012)	(0.010)	(0.011)	(0.063)	(0.069)	(0.050)	(0.059)	(0.061)	(0.045)
Δ log relative price of investment				0.007	0.005					0.020*	0.022*	
				(0.011)	(0.011)					(0.012)	(0.012)	
Δ log relative price of investment * θ				0.005	0.006	-0.000				0.015*	0.016*	-0.007
				(0.004)	(0.004)	(0.003)				(0.008)	(0.008)	(0.010)
Δ log H/N				-0.001	-0.004					0.016	0.014	
				(0.006)	(0.007)					(0.010)	(0.011)	
Δ log H/N * θ				0.005*	0.002	0.008***				-0.024**	-0.025**	-0.024**
				(0.003)	(0.004)	(0.002)				(0.010)	(0.010)	(0.011)
θ				-0.006**	-0.002	-0.005*				-0.018*	-0.020	-0.015
				(0.003)	(0.009)	(0.003)				(0.009)	(0.013)	(0.010)
Fixed effects	-	Ind	Cty	-	Ind	Cty	-	Ind	Cty	-	Ind	Cty
Observations	1,245	1,245	1,245	1,245	1,245	1,245	519	519	519	519	519	519
R-squared	0.028	0.173	0.150	0.038	0.181	0.159	0.091	0.204	0.460	0.214	0.319	0.486

Notes. The dependent variable is the change in 1995-2007 in industry-country specific labor shares. The following explanatory variables vary by industry and country: Δ forward is the change in intermediate inputs export and GVC intensity, Δ offshoring is the change in offshoring of intermediate inputs intensity in total input purchases, Δ exports of final goods is the change in export intensity of final goods in value added, Δ imports of final goods is the change in import intensity of final goods in total absorption, and θ is the unskilled labor share in value added multiplied by the share of capital in capital and skilled labor income, normalized (mean=0, S.D.=1). Δ log relative price of investment is the country-level log change in investment prices and Δ log H/N is country-level log change in skilled labor employment share (both normalized). All regressions estimated by weighted least squares with value added in 1995 as weights. Standard errors clustered by country in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6. Correlates of Aggregate Variation in Labor Shares in 1995-2007

	Dependent variable: Δ labor share															
	All sectors								Manufacturing							
Δ forward	-0.683***	-0.692***	-0.625**	-0.521*	-0.553**	-0.561***	-0.533**	-0.468*	-0.370	-0.716***	-0.379*	-0.621**	-0.372	-0.820***	-0.392	-0.763***
	(0.226)	(0.175)	(0.235)	(0.259)	(0.258)	(0.204)	(0.259)	(0.248)	(0.222)	(0.239)	(0.214)	(0.298)	(0.291)	(0.214)	(0.299)	(0.248)
Δ backward	-0.103	0.044	-0.055	0.017	0.020	-0.057	0.013	-0.001	-0.312	-0.770	-0.335	-0.828	-0.253	-0.261	-0.309	-0.487
	(0.397)	(0.251)	(0.435)	(0.314)	(0.421)	(0.331)	(0.458)	(0.337)	(0.358)	(0.522)	(0.433)	(0.632)	(0.429)	(0.379)	(0.452)	(0.482)
Δ exports of final goods	0.076	-0.208	0.106	0.020	0.059	-0.012	0.050	0.014	0.071	0.025	0.060	0.020	0.044	-0.025	0.052	0.008
	(0.222)	(0.298)	(0.236)	(0.278)	(0.229)	(0.275)	(0.229)	(0.283)	(0.093)	(0.133)	(0.100)	(0.148)	(0.098)	(0.107)	(0.100)	(0.127)
Δ imports of final goods	0.424	0.585	0.295	-0.093	0.105	-0.032	0.062	-0.207	-0.182	0.096	-0.073	-0.026	-0.081	0.213	-0.066	0.062
	(0.308)	(0.615)	(0.301)	(0.658)	(0.378)	(0.561)	(0.380)	(0.656)	(0.296)	(0.376)	(0.276)	(0.509)	(0.353)	(0.445)	(0.376)	(0.482)
Δ log relative price of investment			0.002	0.003			-0.006	-0.000			0.002	0.014			0.001	0.028
			(0.008)	(0.011)			(0.009)	(0.011)			(0.011)	(0.018)			(0.011)	(0.019)
Δ log relative price of investment * θ			0.008	0.010			0.002	0.009			0.020	0.036**			0.017	0.027***
			(0.006)	(0.008)			(0.007)	(0.009)			(0.016)	(0.013)			(0.014)	(0.008)
Δ log H/N					-0.013	-0.010	-0.014	-0.008					-0.001	0.010	0.001	0.025
					(0.011)	(0.009)	(0.011)	(0.008)					(0.023)	(0.020)	(0.023)	(0.019)
Δ log H/N * θ					-0.009**	-0.009**	-0.011°	-0.003					-0.013	-0.031**	-0.007	-0.018**
					(0.005)	(0.004)	(0.007)	(0.006)					(0.020)	(0.013)	(0.016)	(0.007)
θ			0.000	-0.006	0.004	0.004	0.007	-0.000			-0.023	-0.013	-0.023	0.004	-0.023	-0.021
			(0.009)	(0.008)	(0.010)	(0.009)	(0.010)	(0.010)			(0.015)	(0.014)	(0.018)	(0.013)	(0.017)	(0.016)
Estimator	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS	OLS	WLS
Observations	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
R-squared	0.144	0.347	0.174	0.47	0.214	0.463	0.226	0.486	0.116	0.303	0.236	0.447	0.209	0.502	0.243	0.589

Notes. The dependent variable is the change in 1995-2007 in aggregate labor shares. All explanatory variables vary by country: Δ forward is the change in intermediate inputs export and GVC intensity, Δ offshoring is the change in offshoring of intermediate inputs intensity in total input purchases, Δ exports of final goods is the change in export intensity of final goods in value added, Δ imports of final goods is the change in import intensity of final goods in total absorption, θ is the unskilled labor share multiplied by the share of capital in capital and skilled labor income, normalized (mean=0, S.D.=1), Δ log relative price of investment is the country-level log change in investment prices (normalized) and Δ log H/N is country-level log change in skilled labor employment share (normalized). Columns 1-3 are estimated by OLS, columns 4-6 estimimated by weighted least squares with value added in 1995 as weights. Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1, ° p<0.15.

Table 7. Effects of Changes in Forward Foreign GVC Participation (Δ forward) in Different Subsamples: All Industries

Dependent variable: Δ labor share

A. All industries

	Start year: 1995										
End year:	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
No fixed effects	-0.164	-0.306**	-0.093	-0.044	-0.027	-0.008	-0.088	-0.143	-0.260**	-0.307**	-0.339***
	(0.098)	(0.127)	(0.070)	(0.095)	(0.088)	(0.091)	(0.099)	(0.088)	(0.100)	(0.116)	(0.071)
Industry FEs	-0.172	-0.057	-0.048	-0.024	-0.003	-0.005	-0.078	-0.113	-0.155	-0.170	-0.223***
	(0.128)	(0.128)	(0.063)	(0.102)	(0.122)	(0.134)	(0.124)	(0.100)	(0.100)	(0.104)	(0.077)
Country FEs	0.112	-0.120	0.012	0.019	0.060	0.119	0.127	0.068	-0.068	-0.131	-0.193**
	(0.132)	(0.081)	(0.127)	(0.184)	(0.144)	(0.143)	(0.156)	(0.108)	(0.082)	(0.115)	(0.092)

	End year: 2007										
Start year:	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
No fixed effects	-0.270***	-0.297***	-0.256***	-0.341***	-0.362***	-0.591***	-0.609***	-0.564***	-0.379*	-0.189	-0.226
	(0.043)	(0.056)	(0.086)	(0.076)	(0.097)	(0.114)	(0.163)	(0.135)	(0.188)	(0.179)	(0.175)
Industry FEs	-0.228***	-0.206**	-0.150*	-0.235***	-0.241***	-0.393***	-0.368**	-0.370	-0.306	-0.175	-0.221
	(0.082)	(0.080)	(0.084)	(0.066)	(0.080)	(0.113)	(0.176)	(0.240)	(0.348)	(0.324)	(0.278)
Country FEs	-0.160*	-0.132	-0.189*	-0.345***	-0.315***	-0.592***	-0.739***	-0.650***	-0.330**	-0.128	-0.076
	(0.089)	(0.091)	(0.104)	(0.111)	(0.108)	(0.171)	(0.238)	(0.171)	(0.139)	(0.116)	(0.173)

B. Manufacturing

	Start year: 1995										
End year:	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
No fixed effects	-0.497**	-0.433***	-0.206	-0.240	-0.267*	-0.147	-0.089	-0.310**	-0.358***	-0.447***	-0.434***
	(0.217)	(0.142)	(0.133)	(0.166)	(0.138)	(0.164)	(0.213)	(0.134)	(0.099)	(0.096)	(0.115)
Industry FEs	-0.356*	-0.101	-0.180	-0.247*	-0.241	-0.203	-0.208	-0.382**	-0.392**	-0.448***	-0.447**
	(0.179)	(0.165)	(0.112)	(0.143)	(0.203)	(0.202)	(0.201)	(0.158)	(0.149)	(0.143)	(0.179)
Country FEs	-0.402	-0.393**	-0.034	-0.009	-0.134	-0.045	0.194	0.063	-0.054	-0.095	-0.129
	(0.253)	(0.185)	(0.202)	(0.252)	(0.207)	(0.207)	(0.256)	(0.149)	(0.100)	(0.093)	(0.114)

	End year: 2007										
Start year:	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
No fixed effects	-0.377**	-0.386**	-0.361**	-0.421***	-0.388**	-0.681***	-0.696***	-0.598***	-0.552**	-0.341	-0.374
	(0.152)	(0.144)	(0.136)	(0.112)	(0.145)	(0.157)	(0.204)	(0.182)	(0.253)	(0.259)	(0.305)
Industry FEs	-0.422*	-0.410**	-0.337**	-0.378***	-0.310**	-0.543***	-0.518*	-0.396	-0.492	-0.290	-0.292
	(0.211)	(0.182)	(0.143)	(0.119)	(0.130)	(0.161)	(0.265)	(0.325)	(0.394)	(0.405)	(0.439)
Country FEs	-0.096	-0.073	-0.148	-0.344**	-0.234***	-0.587***	-0.677***	-0.552***	-0.392***	-0.247**	-0.094
	(0.081)	(0.103)	(0.113)	(0.138)	(0.081)	(0.177)	(0.213)	(0.139)	(0.089)	(0.095)	(0.077)

Notes. The table reports the coefficient to Δ forward (the change in intermediate inputs export and GVC intensity) in regressions where the 1995-2007 sample is split according to different years. The top panels report coefficients from regressions where changes are from 1995 to the stated end year. The bottom panels report coefficients from regressions where changes are from the stated year to 2007. The dependent variable is the change in industry-country specific labor shares. The other control variables are: Δ offshoring (the change in offshoring of intermediate inputs intensity in total input purchases), Δ exports of final goods (the change in export intensity of final goods in value added), Δ imports of final goods (the change in import intensity of final goods in total absorption), and Δ log relative price of investment (the country-level log change in investment prices, normalized with mean=0, S.D.=1). In Panel A the sample is all countries and industries. In Panel B the sample is all countries and manufacturing industries. All regressions estimated by weighted least squares with value added in 1995 as weights. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Correlates of Variation in Labor Shares, Stacked Differences (1995-2001, 2001-2007, 2007-2014)

	Dependent variable: Δ labor share									
	All industries					Manufacturing industries				
	Country X Industry			Country		Country X Industry			Country	
Δ forward, 1995-2001	0.017	-0.010	-0.043	-0.508*	-0.191	-0.106	-0.164	-0.101	-0.335	-0.280
	(0.102)	(0.093)	(0.163)	(0.263)	(0.260)	(0.192)	(0.187)	(0.232)	(0.349)	(0.337)
Δ forward, 2001-2007	-0.571***	-0.648***	-0.575***	-0.634***	-0.356°	-0.724***	-0.824***	-0.748***	-0.474***	-0.784***
	(0.122)	(0.178)	(0.145)	(0.204)	(0.213)	(0.153)	(0.197)	(0.181)	(0.161)	(0.229)
Δ forward, 2007-2014	0.147	0.130	0.159	-0.139	-0.341	0.415	0.380	0.405	-0.279	-0.012
	(0.193)	(0.174)	(0.202)	(0.333)	(0.322)	(0.358)	(0.331)	(0.354)	(0.683)	(0.392)
Δ offshoring	-0.083	-0.063	-0.093	0.171	-0.046	-0.197	-0.230	-0.220	-0.000	-0.579
	(0.102)	(0.111)	(0.094)	(0.289)	(0.263)	(0.183)	(0.177)	(0.171)	(0.225)	(0.350)
Δ exports of final goods	0.042**	0.050**	0.041*	-0.104	-0.358**	0.042**	0.058***	0.046**	0.037	-0.054
	(0.020)	(0.022)	(0.020)	(0.118)	(0.171)	(0.019)	(0.018)	(0.018)	(0.076)	(0.088)
Δ imports of final goods	0.009*	0.008*	0.008	0.076	0.338	0.011	0.009	0.011	-0.031	0.339
	(0.005)	(0.004)	(0.005)	(0.198)	(0.316)	(0.009)	(0.007)	(0.008)	(0.125)	(0.218)
Δ log relative price of investment	0.001	0.001		0.013**	0.003	-0.001	-0.001		-0.000	0.002
	(0.006)	(0.006)		(0.005)	(0.006)	(0.010)	(0.010)		(0.007)	(0.011)
Fixed effects	-	Ind	Cty			-	Ind	Cty		
Estimator				OLS	WLS				OLS	WLS
Observations	3,712	3,712	3,712	116	116	1,536	1,536	1,536	116	116
R-squared	0.058	0.099	0.087	0.155	0.281	0.165	0.194	0.251	0.073	0.346

Notes. The dependent variable is the change in labor shares. Changes for all variables are computed for 1995-2001, 2001-2007, 2007-2014. The following explanatory variables are included: Δ forward is the change in intermediate inputs export and GVC intensity, Δ offshoring is the change in offshoring of intermediate inputs intensity in total input purchases, Δ exports of final goods is the change in export intensity of final goods in value added, Δ imports of final goods is the change in import intensity of final goods in total absorption, Δ log relative price of investment is the country-level log change in investment prices (normalized: mean=0, S.D.=1). Country by industry regressions estimated by weighted least squares with value added in 1995 as weights. Country level regressions estimated either by OLS or WLS with value added in 1995 as weights. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Upstreamness and Labor Shares

A. All industries

	Dependent variable: labor share						Dependent variable: Δ labor share	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Upstreamness	-0.092***	-0.060***	-0.047**				-0.013	
	(0.020)	(0.021)	(0.022)				(0.031)	
	[-0.265]	[-0.175]	[-0.136]				[-0.024]	
Domestic				-0.113***	-0.010	-0.015		0.046
				(0.024)	(0.025)	(0.024)		(0.037)
				[-0.271]	[-0.024]	[-0.035]		[0.070]
Foreign				-0.038	-0.135***	-0.108***		-0.096**
				(0.033)	(0.026)	(0.029)		(0.039)
				[-0.056]	[-0.199]	[-0.159]		[-0.128]
Fixed effects	Year	Cty X Ind	Cty X Ind, Yr	Year	Cty X Ind	Cty X Ind, Yr	-	-
Observations	16,653	16,653	16,653	16,653	16,653	16,653	1,247	1,247
R-squared	0.071	0.947	0.948	0.080	0.948	0.948	0.001	0.025

B. Manufacturing

	Dependent variable: labor share						Dependent variable: Δ labor share	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Upstreamness	-0.084***	-0.080***	-0.066**				-0.014	
	(0.026)	(0.023)	(0.028)				(0.046)	
	[-0.246]	[-0.233]	[-0.194]				[-0.026]	
Domestic				-0.105***	-0.025	-0.026		0.067
				(0.031)	(0.033)	(0.031)		(0.057)
				[-0.282]	[-0.068]	[-0.070]		[0.100]
Foreign				-0.018	-0.131***	-0.123***		-0.100*
				(0.045)	(0.030)	(0.038)		(0.055)
				[-0.031]	[-0.220]	[-0.208]		[-0.146]
Fixed effects	Year	Cty X Ind	Cty X Ind, Yr	Year	Cty X Ind	Cty X Ind, Yr	-	-
Observations	6,931	6,931	6,931	6,931	6,931	6,931	519	519
R-squared	0.063	0.925	0.927	0.080	0.926	0.927	0.001	0.038

Notes. Dependent variable is always the labor share. Columns (1)-(6) and (9)-(14) report country by industry by year panel regressions. Coulmns (7)-(8) and (15)-(16) report long difference regressions, where the dependent and explanatory variables are changes between 1995 and 2007. The explanatory variables are upstreamness and its domestic and foreign components, with variation that is commensurate with the dependent variable. All regressions estimated by weighted least squares with value added in 1995 as weights. The sample is always 1995-2007. Standard errors clustered by country and industry in coulmns (1)-(6) and (9)-(14). In columns (7)-(8) and (15)-(16) we report robust standard errors clustered by country. *** p<0.01, ** p<0.05, * p<0.1. Standardized, "beta" coefficients reported in brackets.

Table 10. Functional Specialization, Upstreamness and Forward Foreign GVC Integration, 2001-2007

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
A. All industries												
Dependent variable:	Δ MGT	Δ RD	Δ FAB	Δ MAR	Δ MGT	Δ RD	Δ FAB	Δ MAR	Δ MGT	Δ RD	Δ FAB	Δ MAR
Δ upstreamness, foreign	-0.051***	0.017	-0.115***	-0.053***	-0.058***	0.014	-0.041**	-0.037**	-0.024**	0.023	-0.124***	-0.052**
	(0.013)	(0.017)	(0.026)	(0.009)	(0.020)	(0.017)	(0.016)	(0.016)	(0.009)	(0.023)	(0.041)	(0.023)
Δ upstreamness, domestic	0.002	0.005	0.052***	0.031*	-0.000	0.004	0.032***	0.023	0.022**	0.007	0.066**	0.054***
	(0.009)	(0.007)	(0.018)	(0.018)	(0.012)	(0.008)	(0.010)	(0.016)	(0.008)	(0.006)	(0.032)	(0.014)
Δ forward	-0.145***	0.014	-0.281***	-0.134***	-0.152***	0.002	-0.113***	-0.101**	-0.062***	0.037	-0.379***	-0.139***
	(0.035)	(0.038)	(0.075)	(0.028)	(0.045)	(0.036)	(0.039)	(0.045)	(0.022)	(0.036)	(0.128)	(0.051)
Fixed effects	-	-	-	-	Ind	Ind	Ind	Ind	Cty	Cty	Cty	Cty
B. Manufacturing												
Dependent variable:	Δ MGT	Δ RD	Δ FAB	Δ MAR	Δ MGT	Δ RD	Δ FAB	Δ MAR	Δ MGT	Δ RD	Δ FAB	Δ MAR
Δ upstreamness, foreign	-0.058***	-0.004	-0.140***	-0.047***	-0.059**	0.010	-0.096***	-0.030***	-0.039***	-0.015	-0.140**	-0.032**
	(0.017)	(0.014)	(0.039)	(0.011)	(0.022)	(0.021)	(0.034)	(0.009)	(0.011)	(0.017)	(0.053)	(0.013)
Δ upstreamness, domestic	-0.018	0.002	0.029	-0.007	-0.012	0.009	-0.008	-0.014	-0.005	-0.005	0.030	0.008
	(0.016)	(0.011)	(0.018)	(0.015)	(0.016)	(0.012)	(0.026)	(0.012)	(0.013)	(0.011)	(0.026)	(0.022)
Δ forward	-0.167***	-0.019	-0.398***	-0.141***	-0.181***	-0.007	-0.256***	-0.102***	-0.091***	-0.018	-0.368**	-0.093***
	(0.047)	(0.047)	(0.099)	(0.028)	(0.062)	(0.056)	(0.069)	(0.027)	(0.020)	(0.029)	(0.170)	(0.024)
Fixed effects	-	-	-	-	Ind	Ind	Ind	Ind	Cty	Cty	Cty	Cty

Notes. The dependent variables are changes in labor income shares in value added of four categories of "functional specialization": management (MGT), R&D, fabrication (FAB), and marketing (MKT). Overall labor shares are the sum of shares over these four categories. Changes for all variables are computed for 2001-2007. The first two lines in each panel reoprt coefficients from regressions where foreign and domestic upstreamness are included. The third line reports the coefficient to Δ forward, the change in intermediate inputs export and GVC intensity, from regressions where the other explanatory variables are the change in offshoring of intermediate inputs intensity in total input purchases (Δ offshoring), the change in export intensity of final goods in value added (Δ exports of final goods), the change in import intensity of final goods in total absorption (Δ imports of final goods), and the country-level log change in investment prices (Δ log relative price of investment, normalized: mean=0, S.D.=1). Regressions estimated by weighted least squares with value added in 2001 as weights. Robust standard errors clustered by country in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 11: Foreign Direct Investment and Capital Income from Foreign Industries (Ownership > 0)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Dependent variable:	All foreign bilateral flows, VkBY = Vk(Bx)Y + Vk(Bg)Y						Direct bilateral exports of intermediate inputs, Vk(Bx)Y						Complex global value chains, Vk(Bg)Y					
Estimator	OLS	OLS	OLS	PPML	PPML	PPML	OLS	OLS	OLS	PPML	PPML	PPML	OLS	OLS	OLS	PPML	PPML	PPML
Log FDI stock	0.087***			0.076*			0.131***			0.094*			0.025***			0.046***		
	(0.015)			(0.040)			(0.022)			(0.052)			(0.006)			(0.012)		
Log affiliate sales		0.122***			0.156***			0.168***			0.206***			0.029***			0.049***	
		(0.016)			(0.034)			(0.026)			(0.047)			(0.009)			(0.011)	
Log number of affiliates			0.155***			0.101***			0.213***			0.124***			0.040***			0.063***
			(0.030)			(0.028)			(0.041)			(0.035)			(0.012)			(0.013)
Log distance	-0.603***	-0.566***	-0.525***	-0.319***	-0.291***	-0.303***	-0.798***	-0.748***	-0.683***	-0.368***	-0.322***	-0.342***	-0.247***	-0.226***	-0.209***	-0.125***	-0.135***	-0.118**
	(0.050)	(0.047)	(0.052)	(0.079)	(0.082)	(0.075)	(0.069)	(0.067)	(0.068)	(0.096)	(0.099)	(0.088)	(0.023)	(0.025)	(0.025)	(0.044)	(0.046)	(0.048)
Common border	0.317***	0.207**	0.229**	0.369***	0.180*	0.168	0.287**	0.176	0.220	0.467***	0.251**	0.240*	-0.202***	-0.221***	-0.212***	-0.244***	-0.255***	-0.256***
	(0.095)	(0.099)	(0.109)	(0.128)	(0.102)	(0.115)	(0.115)	(0.120)	(0.131)	(0.161)	(0.107)	(0.125)	(0.049)	(0.055)	(0.055)	(0.073)	(0.072)	(0.074)
Colonial ties	0.055	0.138	0.153*	0.119	0.075	0.137	0.080	0.188	0.214*	0.169	0.115	0.198	-0.073**	-0.028	-0.029	0.004	-0.005	-0.003
	(0.070)	(0.095)	(0.089)	(0.112)	(0.096)	(0.104)	(0.096)	(0.134)	(0.124)	(0.139)	(0.118)	(0.130)	(0.034)	(0.033)	(0.032)	(0.042)	(0.038)	(0.047)
Common language	0.319***	0.260***	0.254***	0.239**	0.237***	0.277***	0.419***	0.381**	0.366***	0.312**	0.310***	0.364***	0.098**	0.052	0.052	-0.024	-0.044	-0.038
	(0.063)	(0.092)	(0.086)	(0.098)	(0.077)	(0.088)	(0.094)	(0.141)	(0.132)	(0.130)	(0.102)	(0.116)	(0.040)	(0.045)	(0.043)	(0.052)	(0.060)	(0.059)
Free trade agreement	0.101	0.176	0.253**	0.643***	0.779***	0.868***	0.132	0.197	0.269	0.791***	0.948***	1.058***	0.048	0.146**	0.157**	0.076	0.063	0.082
	(0.099)	(0.111)	(0.124)	(0.222)	(0.203)	(0.199)	(0.144)	(0.169)	(0.167)	(0.266)	(0.250)	(0.249)	(0.062)	(0.057)	(0.061)	(0.077)	(0.062)	(0.068)
EU 15	0.031	-0.074	-0.094	-0.057	-0.220	-0.258	-0.060	-0.164	-0.128	-0.025	-0.197	-0.246	0.055	-0.009	-0.005	0.035	0.006	0.017
	(0.137)	(0.140)	(0.134)	(0.170)	(0.179)	(0.186)	(0.200)	(0.211)	(0.182)	(0.212)	(0.218)	(0.229)	(0.064)	(0.059)	(0.065)	(0.121)	(0.138)	(0.137)
EU enlargement exporter to EU 15	0.139	0.039	0.086	0.177	-0.011	0.009	0.197	0.090	0.214	0.212	0.017	0.038	0.142*	0.073	0.096	0.340***	0.305**	0.313**
	(0.157)	(0.178)	(0.158)	(0.142)	(0.168)	(0.172)	(0.254)	(0.284)	(0.234)	(0.186)	(0.222)	(0.225)	(0.079)	(0.083)	(0.087)	(0.129)	(0.143)	(0.141)
Common currency	-0.085	-0.030	-0.013	-0.168	-0.120	-0.080	-0.080	-0.029	-0.009	-0.226	-0.185	-0.128	-0.011	0.006	0.009	0.146***	0.173***	0.176***
	(0.103)	(0.092)	(0.097)	(0.138)	(0.117)	(0.131)	(0.147)	(0.131)	(0.136)	(0.185)	(0.153)	(0.173)	(0.035)	(0.035)	(0.035)	(0.041)	(0.040)	(0.040)
Observations	868	802	790	868	802	790	868	802	790	868	802	790	868	802	790	868	802	790
R-squared	0.949	0.943	0.941				0.907	0.893	0.890				0.990	0.989	0.989			
Fixed effects	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d
Clustered standard errors	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d

Notes. The dependent variables are capital income accruing to factors located in o due to sales of intermediate inputs that are demanded in destination d. In columns 1-6 it is the total capital income flows of this type; in columns 7-12 it is capital income flows due to direct bilateral exports of intermediate inputs [V(Bx)Y]; in columns 13-18 it is capital income flows due to complex GVCs [V(Bg)Y]. All regressions include origin and destination fixed effects. Data for Capital income flows calculated from WIOD 2013 release in 2007, ownership variables (FDI and affiliates) are averages in 1996-2001 from Ramondo, Rodriguez-Clare and Tintelnot (2015), and other variables from the CEPII gravity dataset. Standard errors in parentheses computed by two-way clustering by origin and destination. *** p<0.01, ** p<0.05, * p<0.1.

Table 12: International FDI Positions and Capital Shares in GNP

				PPML, No. of affiliates					Capital share difference (%)		
Country	GDP	VkBY	GDP capital share	VkBY_out	VkBY_in	VkBY_net	GNP capital share (%)	Capital share difference (%)	PPML, FDI	OLS, No. of affiliates	OLS, FDI
AUS	873935	348552	39.88%	24734	11304	-13430	38.94	-0.94	-0.93	-0.91	-0.75
AUT	337292	122651	36.36%	10680	9077	-1603	36.06	-0.30	-0.11	-0.33	-0.19
BEL	409029	146946	35.93%	18394	19373	978	36.08	0.15	0.56	0.54	1.62
BGR	33469	16693	49.87%	787	238	-549	49.04	-0.84	-0.79	-0.88	-0.51
BRA	1175044	480090	40.86%	17337	10396	-6940	40.51	-0.35	-0.43	-0.54	-0.58
CAN	1322736	562711	42.54%	58137	31997	-26139	41.38	-1.16	-1.15	-1.81	-1.77
CHN	3495140	2026432	57.98%	94401	65478	-28923	57.63	-0.35	-0.69	-0.58	-0.88
CZE	157153	63557	40.44%	5104	1957	-3147	39.23	-1.22	-0.94	-1.75	-1.19
DEU	2988690	1112987	37.24%	97081	95074	-2007	37.20	-0.04	-0.10	-0.14	-0.13
DNK	264103	81205	30.75%	5339	6936	1596	31.16	0.42	0.43	0.78	0.64
ESP	1294881	502128	38.78%	18059	24418	6359	39.08	0.30	0.74	0.39	0.75
FIN	215108	80124	37.25%	5741	4476	-1265	36.88	-0.37	0.00	-0.67	-0.17
FRA	2327698	882765	37.92%	31223	49860	18637	38.42	0.49	0.63	0.53	0.64
GBR	2556705	805412	31.50%	56442	55801	-641	31.48	-0.02	-0.22	0.09	-0.02
GRC	274145	116865	42.63%	3744	2344	-1401	42.33	-0.29	-0.13	0.02	0.27
HUN	118196	46773	39.57%	3496	2328	-1168	38.97	-0.60	-0.66	-0.70	-0.70
IDN	434598	233058	53.63%	15412	969	-14444	52.03	-1.59	-1.63	-1.77	-1.45
IND	1114066	546819	49.08%	15140	11750	-3390	48.93	-0.16	-0.53	-0.39	-0.68
IRL	227784	97683	42.88%	12007	7583	-4424	41.75	-1.13	-1.78	-1.33	-2.07
ITA	1895232	673908	35.56%	22958	43327	20369	36.24	0.69	0.91	0.69	0.77
JPN	4310707	1871693	43.42%	55879	76605	20727	43.69	0.27	0.18	0.29	0.05
KOR	944765	259928	27.51%	16689	27958	11269	28.37	0.85	0.81	1.22	0.66
LTU	35082	16022	45.67%	458	0	-458	44.95	-0.72	0.02	-0.85	-0.01
MEX	993285	673174	67.77%	39984	17362	-22623	67.02	-0.75	-0.91	-0.53	-0.71
NLD	695734	246604	35.45%	20920	26923	6003	36.00	0.55	-0.11	0.07	-0.83
POL	373265	164364	44.03%	10920	4945	-5975	43.12	-0.91	-0.73	-1.02	-0.65
PRT	199679	70155	35.13%	2687	1690	-997	34.81	-0.33	0.26	-0.52	0.12
ROU	151299	56918	37.62%	1015	274	-741	37.31	-0.31	-0.62	-0.49	-0.48
RoW	6786121			29504	5149	-24355					
RUS	1114313	458130	41.11%	255901	255036	-864	-0.01	-0.01	0.65	0.91	1.54
SVK	67859	42245	62.26%	2805	747	-2059	61.07	-1.18	-1.12	-1.43	-1.19
SVN	41583	12684	30.50%	150	0	-150	30.25	-0.25	-0.96	-0.23	-0.78
SWE	405845	140964	34.73%	12760	10840	-1920	34.42	-0.31	0.01	-0.32	0.21
TUR	571403	356116	62.32%	5256	3351	-1905	62.20	-0.13	-0.07	-0.16	-0.07
USA	14059790	5726721	40.73%	157494	243074	85579	41.09	0.36	0.34	0.29	0.26

Notes. VkBY are total payments to capital installed in a country, and the GDP capital share is the ratio of VkBY to GDP. VkBY_out are gross capital income outflows due to foreign ownership of locally installed capital. VkBY_in are gross capital income inflows due to ownership of capital installed abroad. VkBY_net = VkBY_in - VkBY_out. The GNP capital share is equal to (VkBY + VkBY_net)/(GDP + VkBY_net). The capital share difference is equal to GDP capital share - GNP capital share. This difference, as well as VkBY_ values, are estimated based on regressions reported in Table 10, using FDI ownership indicators or number of affiliates, using OLS or PPML estimators. See main text for additional details. RoW stands for Rest of World. We do not know the factor shares for RoW, but the calculations underlying this table take into account capital income flows to and from RoW. When taking RoW into account, by construction the sum of VkBY_out is equal to the sum of VkBY_in and the sum of VkBY_net is zero.

APPENDIX TABLES AND FIGURES

Table A1: Labor Shares and High Skill Labor Shares, 1995-2007

	Labor Shares in GDP			High Skill Labor Shares in GDP			High Skill Labor Shares in Total Labor Compensation			GDP in
Country	1995	2007	Change	1995	2007	Change	1995	2007	Change	1995
AUS	62.8	60.1	-2.7	14.1	17.9	3.9	22.4	29.8	7.4	352145
AUT	69.7	63.6	-6.0	14.3	18.0	3.7	20.6	28.3	7.7	214795
BEL	67.3	65.6	-1.7	14.1	17.2	3.1	21.0	26.2	5.2	256265
BGR	53.7	50.1	-3.5	8.1	11.1	3.0	15.2	22.2	7.0	12315
BRA	53.1	59.1	6.0	20.1	24.6	4.5	37.8	41.5	3.7	672762
CAN	58.8	57.5	-1.3	14.1	18.1	3.9	24.1	31.5	7.4	547035
CHN	54.7	42.0	-12.6	2.1	5.2	3.1	3.8	12.5	8.6	728005
CYP	62.5	64.4	1.9	28.2	30.7	2.5	45.2	47.7	2.5	8457
CZE	43.6	59.6	16.0	8.6	15.3	6.6	19.8	25.6	5.9	49985
DEU	68.2	62.8	-5.5	22.1	24.1	2.1	32.3	38.5	6.1	2283991
DNK	65.8	69.3	3.5	19.0	25.3	6.2	28.9	36.5	7.6	157483
ESP	65.0	61.2	-3.8	22.9	26.8	3.9	35.2	43.7	8.5	550710
EST	65.0	59.0	-6.0	31.1	25.7	-5.4	47.9	43.6	-4.3	3329
FIN	67.0	62.8	-4.3	25.1	28.3	3.1	37.5	45.1	7.6	114211
FRA	63.6	62.1	-1.6	21.7	25.4	3.8	34.0	41.0	7.0	1405135
GBR	67.3	68.5	1.2	21.9	30.3	8.4	32.6	44.3	11.7	1047517
GRC	50.2	57.4	7.2	14.3	20.8	6.5	28.4	36.3	7.8	119108
HUN	64.3	60.4	-3.9	18.2	23.8	5.6	28.3	39.4	11.1	38823
IDN	50.6	46.4	-4.3	5.8	11.6	5.8	11.5	25.1	13.6	241322
IND	56.6	50.9	-5.7	10.0	13.8	3.8	17.7	27.1	9.4	349731
IRL	62.3	57.1	-5.2	17.6	26.6	9.0	28.3	46.7	18.4	60023
ITA	67.0	64.4	-2.5	10.1	13.8	3.7	15.1	21.3	6.3	1015224
JPN	60.3	56.6	-3.8	17.7	21.7	4.0	29.3	38.3	9.0	5239622
KOR	81.1	72.5	-8.6	36.5	44.3	7.8	45.0	61.1	16.1	481503
LTU	48.7	54.3	5.6	20.3	24.0	3.7	41.7	44.2	2.5	6016
LUX	56.1	50.3	-5.8	14.4	20.0	5.6	25.8	39.8	14.1	18735
LVA	55.8	58.1	2.3	21.1	21.9	0.8	37.7	37.7	0.0	4362
MEX	35.0	32.2	-2.7	9.9	8.0	-1.9	28.3	24.8	-3.5	309604
MLT	57.5	58.2	0.7	12.1	16.6	4.5	21.0	28.5	7.5	3198
NLD	67.3	64.6	-2.7	17.9	25.6	7.6	26.6	39.6	13.0	378721
PRT	65.0	64.9	-0.1	13.5	17.2	3.7	20.7	26.5	5.8	99058
ROU	58.4	62.4	4.0	6.8	10.2	3.4	11.7	16.4	4.7	35878
RUS	58.0	58.9	0.9	11.6	16.0	4.4	19.9	27.1	7.2	315028
SVK	37.4	37.7	0.4	7.6	9.9	2.2	20.4	26.2	5.7	17566
SVN	84.0	69.5	-14.5	22.6	26.0	3.5	26.9	37.4	10.6	17824
SWE	64.8	65.3	0.5	15.8	22.5	6.7	24.4	34.4	10.0	221027
TUR	33.3	37.7	4.4	5.9	10.3	4.5	17.7	27.5	9.8	210799
TWN	65.2	56.5	-8.7	20.3	23.9	3.6	31.1	42.2	11.1	261669
USA	60.2	59.3	-0.9	22.0	26.6	4.6	36.6	44.9	8.3	7421307
Average	59.67	58.03	-1.64	16.40	20.49	4.09	26.98	34.62	7.64	
Weighted average	61.51	59.06	-2.45	18.83	23.09	4.26	30.42	38.65	8.23	

Notes. Weighted averages using GDP in 1995 as weights. Source: authors' calculations based on WIOD 2013 release.

Table A2: Labor Shares and High Skill Labor Shares, 2007-2014

	Labor Shares in GDP			High Skill Labor Shares in GDP			High Skill Labor Shares in Total Labor Compensation			GDP in
Country	2007	2014	Change	2008	2014	Change	2008	2014	Change	2007
AUS	58.1	57.7	-0.4							912442
AUT	57.3	60.9	3.6	15.2	17.7	2.4	29.4	32.8	3.4	345266
BEL	61.8	64.1	2.2							422059
BGR	47.9	63.3	15.5	14.4	19.5	5.1	36.1	41.3	5.2	38093
BRA	48.6	55.1	6.5							1204191
CAN	59.4	58.2	-1.3							1372537
CHN	45.4	55.1	9.6							3495060
CYP	54.9	54.6	-0.3	25.8	30.0	4.1	50.6	59.1	8.5	21436
CZE	50.4	51.3	0.9	10.7	11.5	0.9	24.0	25.9	1.9	171753
DEU	58.9	62.4	3.5	21.4	18.9	-2.5	39.7	33.5	-6.2	3099194
DNK	65.3	64.5	-0.8	23.8	25.6	1.8	38.7	43.1	4.4	271418
ESP	60.7	58.7	-2.0	23.8	28.5	4.7	43.6	54.7	11.1	1333298
EST	53.8	54.8	1.0	24.3	22.3	-2.0	43.5	42.9	-0.6	19507
FIN	58.5	64.4	5.8	24.8	31.1	6.4	45.9	54.3	8.5	224288
FRA	60.9	65.0	4.1	23.1	27.5	4.4	41.1	47.0	5.8	2394018
GBR	67.1	64.9	-2.3	19.8	24.4	4.5	35.4	44.0	8.6	2664476
GRC	53.6	49.6	-4.0	14.3	18.1	3.7	37.0	48.6	11.7	281318
HUN	56.7	53.7	-3.0	21.4	22.1	0.8	41.3	44.9	3.6	119649
IDN	48.3	48.5	0.2							455190
IND	47.6	49.7	2.1							1135324
IRL	53.9	48.8	-5.0	22.4	24.3	1.9	46.1	58.2	12.1	239541
ITA	56.5	58.7	2.2	10.1	9.5	-0.6	23.2	21.6	-1.6	1982454
JPN	58.0	58.3	0.4							4310742
KOR	64.1	63.8	-0.3							1013652
LTU	54.4	48.8	-5.6	24.5	27.4	2.9	50.1	61.9	11.9	35738
LUX	54.9	59.4	4.5	23.9	30.6	6.7	43.9	57.3	13.4	45275
LVA	54.7	53.0	-1.7	21.2	23.0	1.8	39.6	47.7	8.0	27594
MEX	33.6	33.0	-0.7							1003194
MLT	60.6	58.4	-2.2							6910
NLD	59.9	62.1	2.2	21.6	20.5	-1.1	40.2	37.4	-2.8	750373
POL	49.4	49.8	0.3	15.1	16.5	1.4	34.1	39.0	4.9	375515
PRT	60.6	56.7	-3.9	13.1	18.9	5.9	24.4	37.5	13.1	208568
ROU	45.4	43.5	-1.9	14.4	12.9	-1.5	32.7	34.6	2.0	151950
RUS	56.9	63.2	6.3							1114179
SVK	46.0	48.7	2.7	9.8	10.2	0.4	25.1	24.6	-0.5	69462
SVN	63.2	65.6	2.5	26.9	26.1	-0.8	47.1	45.7	-1.4	42223
SWE	54.0	57.0	3.0	19.3	25.9	6.6	37.2	48.0	10.8	430726
TUR	37.3	37.9	0.6							581365
USA	57.8	56.3	-1.5							14477638
Average	54.8	55.9	1.1	19.4	21.7	2.3	38.0	43.4	5.4	
Weighted average	56.4	57.4	1.0	19.4	21.3	1.9	36.6	39.9	3.2	

Notes. Weighted averages using GDP in 2007 as weights. Source: authors' calculations based on WIOD 2016 release (labor shares) and EU KLEMS 2017 release (high skill labor shares).

Table A3: Forward and Backward Linkages, 1995-2007

Country	Forward Linkages: Foreign Value added Share in GDP			Backward Linkages: Foreign Value Added Share in Domestic Industries VA			GDP in 1995
	1995	2007	Change	1995	2007	Change	
AUS	13.2	15.0	1.8	10.5	10.3	-0.2	352145
AUT	16.0	23.3	7.3	14.9	20.3	5.4	214795
BEL	24.3	26.8	2.5	23.2	26.1	2.8	256265
BGR	15.8	23.2	7.5	21.1	32.0	11.0	12315
BRA	5.2	8.5	3.3	5.1	7.6	2.5	672762
CAN	18.7	18.7	0.0	14.6	13.9	-0.7	547035
CHN	8.7	14.2	5.5	11.2	16.5	5.3	728005
CYP	7.3	10.1	2.8	17.8	17.9	0.1	8457
CZE	22.3	26.2	3.8	23.7	30.0	6.3	49985
DEU	11.0	19.6	8.6	9.2	15.1	5.9	2283991
DNK	13.2	19.2	6.0	13.6	19.8	6.2	157483
ESP	7.7	9.7	2.0	11.0	15.1	4.1	550710
EST	23.3	24.6	1.3	28.7	26.0	-2.8	3329
FIN	20.3	22.7	2.4	14.8	18.7	3.9	114211
FRA	10.2	10.3	0.1	9.7	12.1	2.4	1405135
GBR	13.4	14.5	1.2	12.3	12.3	0.0	1047517
GRC	3.4	8.7	5.4	10.9	15.3	4.4	119108
HUN	16.5	24.8	8.3	22.8	32.3	9.5	38823
IDN	13.5	19.1	5.6	13.1	14.3	1.2	241322
IND	5.8	9.5	3.7	7.9	14.5	6.6	349731
IRL	23.0	31.5	8.5	28.4	32.1	3.7	60023
ITA	9.9	11.4	1.5	11.3	14.4	3.1	1015224
JPN	5.2	9.6	4.4	3.7	8.1	4.4	5239622
KOR	13.4	18.1	4.7	15.3	19.3	4.0	481503
LTU	18.0	20.9	2.9	23.6	21.5	-2.1	6016
LUX	43.1	48.1	5.0	25.0	40.0	15.0	18735
LVA	22.0	17.8	-4.1	20.7	22.1	1.4	4362
MEX	12.1	12.7	0.6	13.2	13.7	0.5	309604
MLT	19.5	28.2	8.6	28.9	30.1	1.2	3198
NLD	21.5	23.3	1.8	20.3	21.8	1.5	378721
PRT	9.4	12.3	2.9	16.5	17.0	0.5	99058
ROU	11.9	14.5	2.6	15.9	19.5	3.7	35878
RUS	19.8	23.1	3.4	7.5	8.0	0.6	315028
SVK	27.0	26.9	0.0	23.4	32.1	8.7	17566
SVN	16.8	22.3	5.5	21.8	26.6	4.8	17824
SWE	18.8	22.8	4.0	15.8	19.4	3.6	221027
TUR	4.5	6.4	1.9	9.4	14.5	5.1	210799
TWN	17.0	28.7	11.7	20.1	22.2	2.1	261669
USA	6.0	6.2	0.2	5.1	7.1	2.1	7421307
Average	15.1	18.8	3.7	15.9	19.5	3.5	
Weighted average	8.9	11.7	2.8	8.1	11.3	3.1	

Notes. Weighted averages using GDP in 1995 as weights. Source: authors' calculations based on WIOD 2013 release.

Table A4: Forward and Backward Linkages, 2007-2014

Country	Forward Linkages: Foreign Value added Share in GDP			Backward Linkages: Foreign Value Added Share in Domestic Industries VA			GDP in 2007
	2007	2014	Change	2007	2014	Change	
AUS	14.0	14.8	0.9	9.6	9.6	0.0	912442
AUT	20.6	21.0	0.4	18.1	19.0	0.9	345266
BEL	24.8	26.1	1.3	22.4	27.4	5.0	422059
BGR	17.7	25.1	7.4	28.4	26.8	-1.6	38093
BRA	7.8	7.5	-0.3	7.8	8.9	1.0	1204191
CAN	17.7	17.9	0.2	13.6	15.0	1.5	1372537
CHN	11.9	9.2	-2.8	15.2	10.5	-4.8	3495060
CYP	18.6	21.1	2.6	17.9	17.3	-0.6	21436
CZE	23.0	26.8	3.8	25.8	29.6	3.8	171753
DEU	17.6	18.2	0.7	13.9	15.0	1.1	3099194
DNK	18.4	18.6	0.2	21.1	21.1	0.0	271418
ESP	9.7	10.5	0.9	14.5	13.2	-1.3	1333298
EST	24.5	29.2	4.7	24.1	27.3	3.2	19507
FIN	19.2	17.7	-1.5	17.3	18.1	0.8	224288
FRA	10.6	11.7	1.1	12.3	13.8	1.6	2394018
GBR	12.9	13.8	0.9	12.2	12.6	0.4	2664476
GRC	9.1	11.6	2.5	13.1	12.6	-0.6	281318
HUN	22.1	26.5	4.3	32.0	34.2	2.2	119649
IDN	18.1	14.8	-3.3	13.8	14.3	0.5	455190
IND	10.1	7.3	-2.8	13.9	11.7	-2.3	1135324
IRL	27.7	33.4	5.7	30.0	37.1	7.1	239541
ITA	10.9	11.4	0.5	12.9	12.4	-0.4	1982454
JPN	8.0	7.8	-0.2	8.3	10.3	2.0	4310742
KOR	15.2	19.5	4.3	17.9	20.9	3.0	1013652
LTU	20.0	27.1	7.1	19.5	21.8	2.3	35738
LUX	45.0	45.3	0.3	47.3	51.6	4.3	45275
LVA	17.7	24.0	6.2	20.5	21.2	0.6	27594
MEX	9.7	10.9	1.2	14.1	15.2	1.1	1003194
MLT	26.8	22.9	-3.9	41.2	44.7	3.6	6910
NLD	23.0	31.8	8.9	17.8	22.0	4.1	750373
POL	16.2	20.2	3.9	19.3	20.2	0.9	375515
PRT	11.9	15.1	3.2	15.7	16.7	1.0	208568
ROU	14.0	20.2	6.2	17.6	20.5	2.9	151950
RUS	23.8	24.1	0.2	7.7	8.7	1.0	1114179
SVK	23.1	25.8	2.7	31.1	31.8	0.7	69462
SVN	22.2	26.0	3.8	23.6	22.8	-0.7	42223
SWE	20.8	20.0	-0.8	17.5	15.7	-1.8	430726
TUR	10.3	12.3	2.0	14.4	15.4	1.0	581365
USA	5.1	5.9	0.8	6.2	6.4	0.3	14477638
Average	17.4	19.3	1.9	18.7	19.8	1.1	
Weighted average	10.9	11.5	0.6	11.2	11.5	0.4	

Notes. Weighted averages using GDP in 2007 as weights. Source: authors' calculations based on WIOD 2017 release.

Table A5: Payments to Foreign Factors (Backward Linkages), 1995-2007

A. All sectors

	Shares in domestic industries' final demand (VA)								Shares in payments to domestic factors (VA)		Shares in payments to foreign factors (VA)	
	Payments to domestic K (1)	Payments to domestic L (2)	Payments to foreign K (3)	Payments to foreign L (4)	Payments K (domestic + foreign) (5)	Payments L (domestic + foreign) (6)	Payments to domestic factors (7)	Payments to foreign factors (8)	K income (9)	L income (10)	K income (11)	L income (12)
Levels												
VBY 1995	35.28	56.59	3.19	4.95	38.47	61.53	91.87	8.13	38.40	61.60	39.17	60.83
VBY 2007	36.02	52.70	5.09	6.19	41.11	58.89	88.72	11.28	40.60	59.40	45.14	54.86
Changes												
V2007*B1995*Y1995 - VBY 1995	0.94	-0.83	0.10	-0.21	1.03	-1.03	0.11	-0.11	0.97	-0.97	1.74	-1.74
V1995***B2007***Y1995 - VBY 1995	-1.07	-2.35	1.71	1.72	0.63	-0.63	-3.43	3.43	0.27	-0.27	3.16	-3.16
V1995*B1995***Y2007** - VBY 1995	0.59	-0.45	-0.04	-0.10	0.55	-0.55	0.14	-0.14	0.58	-0.58	0.23	-0.23
V1995***B1995*Y2007** - VBY 1995	-0.53	-2.78	1.67	1.63	1.14	-1.14	-3.31	3.31	0.83	-0.83	3.32	-3.32
VBY 2007 - VBY 1995	0.74	-3.88	1.90	1.24	2.64	-2.64	-3.14	3.14	2.20	-2.20	5.96	-5.96

B. Manufacturing

	Shares in domestic industries' final demand (VA)								Shares in payments to domestic factors (VA)		Shares in payments to foreign factors (VA)	
	Payments to domestic K (1)	Payments to domestic L (2)	Payments to foreign K (3)	Payments to foreign L (4)	Payments K (domestic + foreign) (5)	Payments L (domestic + foreign) (6)	Payments to domestic factors (7)	Payments to foreign factors (8)	K income (9)	L income (10)	K income (11)	L income (12)
Levels												
VBY 1995	32.69	51.52	6.11	9.67	38.80	61.20	84.21	15.79	38.82	61.18	38.73	61.27
VBY 2007	32.63	43.98	10.57	12.83	43.20	56.80	76.61	23.39	42.59	57.41	45.17	54.83
Changes												
V2007*B1995*Y1995 - VBY 1995	1.31	-1.39	0.32	-0.24	1.63	-1.63	-0.08	0.08	1.59	-1.59	1.80	-1.80
V1995***B2007***Y1995 - VBY 1995	-1.96	-4.14	3.05	3.05	1.09	-1.09	-6.10	6.10	0.52	-0.52	3.14	-3.14
V1995*B1995***Y2007** - VBY 1995	0.61	-1.35	0.39	0.35	1.00	-1.00	-0.74	0.74	1.07	-1.07	0.61	-0.61
V1995***B1995*Y2007** - VBY 1995	-1.69	-5.73	3.72	3.71	2.02	-2.02	-7.43	7.43	1.55	-1.55	3.62	-3.62
VBY 2007 - VBY 1995	-0.06	-7.54	4.45	3.15	4.39	-4.39	-7.60	7.60	3.77	-3.77	6.44	-6.44

Notes. Panel A reports decompositions of changes in factor shares in aggregate final demand, while Panel B reports decompositions of changes in factor shares within manufacturing industries' final demand. Columns 1-4 report the shares of income derived from final demand accruing to foreign and domestic capital and labor. All other columns are derived from these. Columns 5 and 6 report the overall capital and domestic shares in final demand. The split between domestic and foreign factors is given by different entries within columns in VfBY. The payments to foreign factors are given by the backward concept defined in the text. The payments to domestic factors are given by the complement of the backward concept. Columns 7 and 8 report the shares in final demand paid to all domestic and international factors (backward, as in Figure 3). Columns 9 and 10 report capital and labor shares in payments to domestic factors, while columns 10 and 11 report capital and labor shares in payments to foreign factors. The rows labeled "Levels" report levels in 1995 and in 2007. Rows labeled as "Changes" report true and counterfactual changes. All numbers are weighted averages using GDP in 1995 as weights. Source: authors' calculations based on WIOD 2013 release.

Table A6: Payments to Foreign Factors (Backward Linkages), 2007-2014

A. All sectors

	Shares in domestic industries' final demand (VA)								Shares in payments to		Shares in payments to	
	Payments to domestic K	Payments to domestic L	Payments to foreign K	Payments to foreign L	Payments K (domestic + foreign)	Payments L (domestic + foreign)	Payments to domestic factors	Payments to foreign factors	K income	L income	K income	L income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Levels												
VBY 2007	38.13	50.57	5.34	5.96	43.47	56.53	88.70	11.30	42.99	57.01	47.28	52.72
VBY 2014	37.21	51.14	5.37	6.28	42.58	57.42	88.35	11.65	42.12	57.88	46.06	53.94
Changes												
V2014*B2007*Y2007 - VBY 2007	-0.95	1.16	-0.32	0.11	-1.27	1.27	0.21	-0.21	-1.17	1.17	-1.96	1.96
V2007***B2014***Y2007 - VBY 2007	-0.45	-0.62	0.61	0.46	0.16	-0.16	-1.07	1.07	0.02	-0.02	0.85	-0.85
V2007*B2007***Y2014** - VBY 2007	0.33	0.09	-0.19	-0.23	0.14	-0.14	0.42	-0.42	0.17	-0.17	0.08	-0.08
V2007***B2014***Y2014** - VBY 2007	-0.11	-0.51	0.40	0.22	0.29	-0.29	-0.62	0.62	0.18	-0.18	0.89	-0.89
VBY 2014 - VBY 2007	-0.92	0.57	0.03	0.33	-0.90	0.90	-0.36	0.36	-0.87	0.87	-1.21	1.21

B. Manufacturing

	Shares in domestic industries' final demand (VA)								Shares in payments to		Shares in payments to	
	Payments to domestic K	Payments to domestic L	Payments to foreign K	Payments to foreign L	Payments K (domestic + foreign)	Payments L (domestic + foreign)	Payments to domestic factors	Payments to foreign factors	K income	L income	K income	L income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Levels												
VBY 1995	36.01	40.82	11.01	12.16	47.02	52.98	76.83	23.17	46.88	53.12	47.51	52.49
VBY 2007	34.01	41.43	11.39	13.17	45.41	54.59	75.44	24.56	45.09	54.91	46.38	53.62
Changes												
V2014*B2007*Y2007 - VBY 2007	-1.78	2.13	-0.64	0.28	-2.42	2.42	0.36	-0.36	-2.52	2.52	-2.06	2.06
V2007***B2014***Y2007 - VBY 2007	-0.61	-1.22	1.13	0.71	0.51	-0.51	-1.84	1.84	0.33	-0.33	1.01	-1.01
V2007*B2007***Y2014** - VBY 2007	0.26	-0.19	0.00	-0.08	0.26	-0.26	0.07	-0.07	0.29	-0.29	0.17	-0.17
V2007***B2014***Y2014** - VBY 2007	-0.40	-1.47	1.16	0.71	0.76	-0.76	-1.87	1.87	0.63	-0.63	1.10	-1.10
VBY 2014 - VBY 2007	-2.00	0.61	0.38	1.00	-1.61	1.61	-1.39	1.39	-1.79	1.79	-1.12	1.12

Notes. Panel A reports decompositions of changes in factor shares in aggregate final demand, while Panel B reports decompositions of changes in factor shares within manufacturing industries' final demand. Columns 1-4 report the shares of income derived from final demand accruing to foreign and domestic capital and labor. All other columns are derived from these. Columns 5 and 6 report the overall capital and domestic shares in final demand. The split between domestic and foreign factors is given by different entries within columns in VfBY. The payments to foreign factors are given by the backward concept defined in the text. The payments to domestic factors are given by the complement of the backward concept. Columns 7 and 8 report the shares in final demand paid to all domestic and international factors (backward, as in Figure 3). Columns 9 and 10 report capital and labor shares in payments to domestic factors, while columns 10 and 11 report capital and labor shares in payments to foreign factors. The rows labeled "Levels" report levels in 2007 and in 2014. Rows labeled as "Changes" report true and counterfactual changes. All numbers are weighted averages using GDP in 2007 as weights. Source: authors' calculations based on WIOD 2017 release.

Table A7: Payments to Foreign Labor (Backward Linkages), 1995-2007

A. All sectors

	Shares in domestic industries' final demand (VA)						Shares in payments to labor (domestic + foreign)		Shares in payments to domestic labor (VA)		Shares in payments to foreign labor (VA)	
	Payments to domestic high skill labor (1)	Payments to domestic low skill labor (2)	Payments to foreign high skill labor (3)	Payments to foreign low skill labor (4)	Payments to high skill labor (domestic + foreign) (5)	Payments to low skill labor (domestic + foreign) (6)	High skill labor income (7)	Low skill labor income (8)	High skill labor income (9)	Low skill labor income (10)	High skill labor income (11)	Low skill labor income (12)
Levels												
VBY 1995	17.60	38.99	1.23	3.72	18.82	42.71	30.59	69.41	31.09	68.91	24.82	75.18
VBY 2007	20.88	31.82	1.86	4.33	22.74	36.15	38.61	61.39	39.62	60.38	30.04	69.96
Changes												
V2007*B1995*Y1995 - VBY 1995	3.66	-4.48	0.26	-0.47	3.92	-4.95	7.00	-7.00	7.02	-7.02	6.58	-6.58
V1995***B2007***Y1995 - VBY 1995	-0.38	-1.98	0.36	1.36	-0.02	-0.62	0.29	-0.29	0.66	-0.66	-1.03	1.03
V1995*B1995***Y2007** - VBY 1995	0.23	-0.67	-0.02	-0.08	0.21	-0.76	0.61	-0.61	0.65	-0.65	0.13	-0.13
V1995***B2007*Y2007** - VBY 1995	-0.16	-2.61	0.35	1.28	0.19	-1.33	0.89	-0.89	1.30	-1.30	-0.86	0.86
VBY 2007 - VBY 1995	3.29	-7.17	0.63	0.61	3.92	-6.56	8.02	-8.02	8.53	-8.53	5.22	-5.22

B. Manufacturing

	Shares in domestic industries' final demand (VA)						Shares in payments to labor (domestic + foreign)		Shares in payments to domestic labor (VA)		Shares in payments to foreign labor (VA)	
	Payments to domestic high skill labor (1)	Payments to domestic low skill labor (2)	Payments to foreign high skill labor (3)	Payments to foreign low skill labor (4)	Payments to high skill labor (domestic + foreign) (5)	Payments to low skill labor (domestic + foreign) (6)	High skill labor income (7)	Low skill labor income (8)	High skill labor income (9)	Low skill labor income (10)	High skill labor income (11)	Low skill labor income (12)
Levels												
VBY 1995	12.77	38.75	2.31	7.36	15.08	46.11	24.65	75.35	24.79	75.21	23.89	76.11
VBY 2007	14.37	29.61	3.68	9.15	18.05	38.75	31.78	68.22	32.68	67.32	28.69	71.31
Changes												
V2007*B1995*Y1995 - VBY 1995	3.19	-4.58	0.56	-0.80	3.76	-5.38	6.98	-6.98	7.06	-7.06	6.57	-6.57
V1995***B2007***Y1995 - VBY 1995	-0.76	-3.38	0.58	2.47	-0.18	-0.90	0.14	-0.14	0.56	-0.56	-1.19	1.19
V1995*B1995***Y2007** - VBY 1995	-0.22	-1.13	0.08	0.27	-0.13	-0.86	0.18	-0.18	0.23	-0.23	0.01	-0.01
V1995***B2007*Y2007** - VBY 1995	-1.06	-4.67	0.74	2.97	-0.33	-1.70	0.29	-0.29	0.78	-0.78	-1.13	1.13
VBY 2007 - VBY 1995	1.60	-9.14	1.37	1.78	2.97	-7.36	7.13	-7.13	7.88	-7.88	4.79	-4.79

Notes. Panel A reports decompositions of changes in factor shares in aggregate final demand, while Panel B reports decompositions of changes in factor shares within manufacturing industries' final demand. Columns 1-4 report the shares of final demand paid to domestic and foreign high skill and low skill labor. All other columns are derived from these four. Columns 5 and 6 report the overall shares of payments to high skill and low skill labor shares in final demand. Columns 7 and 8 report the shares of high skill and low skill labor in total labor income paid by final demand. Columns 9 and 10 report the shares of domestic high skill and low skill labor in labor income paid by final demand to domestic labor. Columns 11 and 12 report the shares of foreign high skill and low skill labor in labor income paid by final demand to foreign labor. All numbers are weighted averages using GDP in 1995 as weights. Source: authors' calculations based on WIOD 2013 release.

Table A8: Sources of Compositional Changes in Payments to All Domestic Factors (GDP)

A. All sectors

	1995			Δ1995-2007			2007			Δ2007-2014		
	Income from domestic industries (1)	Income from foreign industries (2)	Domestic + foreign (3)	Income from domestic industries (4)	Income from foreign industries (5)	Domestic + foreign (6)	Income from domestic industries (7)	Income from foreign industries (8)	Domestic + foreign (9)	Income from domestic industries (10)	Income from foreign industries (11)	Domestic + foreign (12)
Value chains (B)												
Domestic	90.92	0	90.92	-2.28	0	-2.28	88.78	0	88.78	-0.36	0	-0.36
Bilateral trade	0	7.43	7.43	0	1.04	1.04	0	8.48	8.48	0	0.19	0.19
Complex GVCs	0.19	1.45	1.64	0.09	1.16	1.25	0.26	2.48	2.74	0.01	0.15	0.17
Total	91.12	8.88	100	-2.19	2.19	0	89.04	10.96	100	-0.34	0.34	0
Sources of demand (Y)												
Domestic	85.56	7.41	92.97	-3.08	1.05	-2.03	81.50	8.63	90.12	-0.68	1.08	0.41
Foreign	5.56	1.48	7.03	1.31	0.72	2.03	7.54	2.33	9.88	-0.35	-0.06	-0.41
Total	91.12	8.88	100	-1.77	1.77	0	89.04	10.96	100	-1.03	1.03	0

B. Manufacturing

	1995			Δ1995-2007			2007			Δ2007-2014		
	Income from domestic industries (1)	Income from foreign industries (2)	Domestic + foreign (3)	Income from domestic industries (4)	Income from foreign industries (5)	Domestic + foreign (6)	Income from domestic industries (7)	Income from foreign industries (8)	Domestic + foreign (9)	Income from domestic industries (10)	Income from foreign industries (11)	Domestic + foreign (12)
Value chains (B)												
Domestic	80.67	0	80.67	-3.59	0	-3.59	76.27	0	76.27	-0.82	0	-0.82
Bilateral trade	0	15.62	15.62	0	1.18	1.18	0	17.75	17.75	0	0.58	0.58
Complex GVCs	0.47	3.24	3.71	0.23	2.19	2.41	0.67	5.32	5.98	0.03	0.21	0.24
Total	81.14	18.86	100	-3.36	3.36	0	76.93	23.07	100	-0.79	0.79	0
Sources of demand (Y)												
Domestic	66.28	15.25	81.53	-9.12	3.38	-5.74	56.73	17.32	74.05	-1.10	2.68	1.58
Foreign	14.86	3.61	18.47	3.78	1.96	5.74	20.20	5.75	25.95	-1.51	-0.08	-1.58
Total	81.14	18.86	100	-5.34	5.34	0	76.93	23.07	100	-2.61	2.61	0

Notes. Panel A reports decompositions of levels and changes in factor payments in GDP, while Panel B reports decomposition of levels and changes in factor payments within manufacturing industries' value added. The four "Total" rows report in columns 1-2 and 7-8 factor payment shares in value added that are paid by domestic industries, foreign industries, and overall in the initial year (1995 or 2007); these are the same numbers for the initial year in columns 7 and 8 in Tables 1 and 2. Columns 3 and 9 are the sums of columns 1-2 and 7-8, respectively. The "Total" rows report in columns 4-6 and 10-12 the changes in the same concepts; these are the same numbers in columns 7 and 8 in Tables 1 and 2 for either changes in B or changes in Y. The rows above the "Total" rows indicate the contributions of sub-components of either B or Y to levels in columns 1-3 and 7-9, and to changes in columns 4-6 and 10-12. Source: authors' calculations based on WIOD 2013 and WIOD 2016 releases.

Table A9: Quantification of Derivatives of Factor Shares w.r.t. *r*

A. Elasticities of substitution	
Between L and X (σ):	1.6
Between K and H within X (η):	0.6

B. Factor Shares (θ)

	L	H	N	K	X	K in X	H in X
1995	0.43	0.19	0.62	0.39	0.57	0.67	0.33
2007	0.36	0.23	0.59	0.41	0.64	0.64	0.36

C. Half-elasticities with respect to *r*

	L	H	N	K	X	K in X	H in X
1995	0.099	-0.083	0.016	-0.016	-0.099	0.088	-0.088
2007	0.088	-0.091	-0.003	0.003	-0.088	0.092	-0.092

Notes. Panel A reports elasticities of substitution that are used in the calculations underlying Panel C. Panel B factor shares that used in the calculations underlying Panel C. The factor shares are for the (weighted) average country in the WIOD sample, taken from Tables 1 and 2. Panel C reports the half-elasticities of each factor share with respect to *r* , the user cost of capital, in 1995 and in 2007, according to the formulae in the text. The half-elasticity is the change in the factor share in percent points with respect to a one percent change in r. The quantification uses elasticities reported in Panel A and factor shares that are reported in Panel B.

Table A10: Descriptive Statistics for Table 8

Ownership variable:	FDI sample (N = 868)				Affiliate sales sample (N=802)				Number of affiliates sample (N=790)			
	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.	Mean	Std. Dev.	Min.	Max.
Log VkBY	6.58	1.70	1.89	11.81	6.80	1.61	2.73	11.81	6.80	1.61	2.73	11.81
Log Vk(Bx)Y	6.09	1.89	0.18	11.67	6.33	1.78	1.42	11.67	6.33	1.78	1.42	11.67
Log Vk(Bg)Y	5.41	1.52	1.41	9.86	5.60	1.45	1.79	9.86	5.60	1.45	1.79	9.86
Log FDI stock	4.79	3.31	-2.30	12.16	5.91	2.78	-2.29	12.97	5.91	2.78	-2.29	12.97
Log ownership	8.10	1.10	4.09	9.83	8.12	1.12	4.09	9.83	8.12	1.12	4.09	9.83
Common border	0.07	0.25	0	1	0.08	0.26	0	1	0.08	0.26	0	1
Colonial ties	0.04	0.20	0	1	0.05	0.21	0	1	0.05	0.21	0	1
Common language	0.08	0.26	0	1	0.09	0.28	0	1	0.09	0.28	0	1
Free trade agreement	0.38	0.48	0	1	0.39	0.48	0	1	0.39	0.48	0	1
EU 15	0.19	0.39	0	1	0.22	0.42	0	1	0.22	0.42	0	1
EU enlargement exporter to EU 15	0.10	0.29	0	1	0.10	0.30	0	1	0.10	0.30	0	1
Common currency	0.12	0.32	0	1	0.13	0.34	0	1	0.13	0.34	0	1

Notes. Each set of statistics is computed for a sample that varies by the definition of the ownership variable, which can be either bilateral FDI stocks, affiliate sales or number of affiliates. The number of observations in each sample is denoted by N.

Table A11: Foreign Direct Investment and Capital Income from Foreign Industries, Full Bilateral Sample with Distorted Ownership Variabl

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Dependent variable:	All foreign bilateral flows, VkBY = Vk(Bx)Y + Vk(Bg)Y						Direct bilateral exports of intermediate inputs, Vk(Bx)Y						Complex global value chains, Vk(Bg)Y					
Estimator	OLS	OLS	OLS	PPML	PPML	PPML	OLS	OLS	OLS	PPML	PPML	PPML	OLS	OLS	OLS	PPML	PPML	PPML
Log FDI stock	0.036***			0.043**			0.054***			0.055**			0.006			0.016***		
	(0.008)			(0.017)			(0.014)			(0.024)			(0.004)			(0.005)		
Log affiliate sales		0.038***			0.066***			0.064***			0.091***			0.010**			0.020**	
		(0.009)			(0.025)			(0.016)			(0.034)			(0.004)			(0.008)	
Log number of affiliates			0.073***			0.075**			0.104**			0.093**			0.021**			0.051***
			(0.025)			(0.033)			(0.044)			(0.040)			(0.009)			(0.012)
Log distance	-0.757***	-0.750***	-0.748***	-0.378***	-0.368***	-0.361***	-1.063***	-1.045***	-1.054***	-0.436***	-0.418***	-0.414***	-0.310***	-0.304***	-0.302***	-0.160***	-0.159***	-0.139***
	(0.060)	(0.059)	(0.062)	(0.085)	(0.080)	(0.081)	(0.092)	(0.091)	(0.095)	(0.101)	(0.095)	(0.095)	(0.031)	(0.030)	(0.030)	(0.048)	(0.046)	(0.047)
Common border	0.247***	0.230**	0.219**	0.253**	0.224**	0.214*	0.186	0.161	0.143	0.342***	0.308***	0.296**	-0.215***	-0.217***	-0.220***	-0.232***	-0.245***	-0.252***
	(0.086)	(0.085)	(0.091)	(0.104)	(0.105)	(0.109)	(0.117)	(0.116)	(0.123)	(0.117)	(0.116)	(0.122)	(0.050)	(0.050)	(0.051)	(0.069)	(0.072)	(0.072)
Colonial ties	0.146	0.159	0.155	0.120	0.106	0.128	0.203	0.217	0.219	0.170	0.147	0.183	-0.040	-0.040	-0.043	0.019	0.019	0.009
	(0.100)	(0.103)	(0.109)	(0.115)	(0.107)	(0.106)	(0.137)	(0.140)	(0.153)	(0.146)	(0.135)	(0.134)	(0.042)	(0.043)	(0.043)	(0.045)	(0.042)	(0.046)
Common language	0.306***	0.302***	0.294***	0.282***	0.275***	0.275***	0.415***	0.406***	0.401***	0.369***	0.359***	0.361***	0.085*	0.082*	0.079	-0.029	-0.032	-0.039
	(0.081)	(0.092)	(0.093)	(0.087)	(0.086)	(0.089)	(0.121)	(0.136)	(0.139)	(0.116)	(0.115)	(0.120)	(0.047)	(0.048)	(0.049)	(0.056)	(0.057)	(0.060)
Free trade agreement	-0.050	-0.045	-0.049	0.621**	0.627***	0.678***	-0.094	-0.083	-0.092	0.759**	0.766***	0.834***	0.018	0.020	0.020	0.067	0.070	0.090
	(0.083)	(0.084)	(0.083)	(0.244)	(0.238)	(0.236)	(0.116)	(0.122)	(0.118)	(0.302)	(0.295)	(0.293)	(0.054)	(0.054)	(0.053)	(0.069)	(0.064)	(0.062)
EU 15	-0.026	-0.039	-0.047	-0.136	-0.163	-0.181	-0.207	-0.231	-0.236	-0.109	-0.140	-0.166	0.005	0.000	-0.003	-0.001	-0.013	-0.014
	(0.122)	(0.126)	(0.120)	(0.171)	(0.177)	(0.173)	(0.189)	(0.193)	(0.188)	(0.212)	(0.220)	(0.216)	(0.053)	(0.053)	(0.053)	(0.118)	(0.115)	(0.109)
EU enlargement exporter to EU 15	0.084	0.085	0.061	0.135	0.096	0.069	0.125	0.133	0.087	0.172	0.125	0.086	0.072	0.077	0.072	0.321***	0.308**	0.293***
	(0.134)	(0.135)	(0.131)	(0.147)	(0.142)	(0.151)	(0.241)	(0.243)	(0.239)	(0.193)	(0.189)	(0.200)	(0.063)	(0.063)	(0.064)	(0.122)	(0.121)	(0.113)
Common currency	-0.081	-0.063	-0.056	-0.097	-0.086	-0.072	-0.077	-0.044	-0.042	-0.146	-0.138	-0.117	-0.031	-0.026	-0.023	0.159***	0.168***	0.171***
	(0.084)	(0.085)	(0.084)	(0.133)	(0.133)	(0.138)	(0.113)	(0.112)	(0.114)	(0.177)	(0.176)	(0.182)	(0.040)	(0.039)	(0.040)	(0.039)	(0.036)	(0.037)
Observations	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190
R-squared	0.948	0.948	0.948				0.890	0.890	0.889				0.989	0.989	0.989			
Fixed effects	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d
Clustered standard errors	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d

Notes. The dependent variables are capital income accruing to factors located in o due to sales of intermediate inputs that are demanded in destination d. In columns 1-6 it is the total capital income flows of this type; in columns 7-12 it is capital income flows due to direct bilateral exports of intermediate inputs [V(Bx)Y]; in columns 13-18 it is capital income flows due to complex GVCs [V(Bg)Y]. The ownership variables are "distorted" by adding the minimal positive level, ln(ownership_{min} + ownership_{od}), thus allowing to include observations where originally ownership_{od}=0. All regressions include origin and destination fixed effects. Data for Capital income flows calculated from WIOD 2013 release in 2007, ownership variables (FDI and affiliates) are averages in 1996-2001 from Ramondo, Rodriguez-Clare and Tintelnot (2015), and other variables from the CEPII gravity dataset. Standard errors in parentheses computed by two-way clustering by origin and destination. *** p<0.01, ** p<0.05, * p<0.1.

Table A12: Capital Abundance

Above median	Median and below
BGR	AUS
BRA	AUT
CAN	BEL
CHN	CYP
CZE	DEU
GRC	DNK
IDN	ESP
IND	EST
IRL	FIN
JPN	FRA
LTU	GBR
LVA	HUN
MEX	ITA
MLT	KOR
ROM	NLD
RUS	PRT
SVK	SVN
TUR	SWE
USA	TWN

Notes. Capital abundance is the ratio of capital payments in GDP to labor payments in GDP in 1995. High means above median and low means the median and below. Source: authors' calculations based on WIOD 2013 release.

Table A13: Payments to Domestic Factors (Forward Linkages), 1995-2007, by Capital Abundance

	K income share			L income share			Total Income			K income share - L income shares			K income share / L income shares		
	1995	2007	Change	1995	2007	Change	1995	2007	Change	1995	2007	Change	1995	2007	Change
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Factor location	Income shares in GDP (domestic + foreign industries)														
(1) High capital abundance	41.58	43.54	1.96	58.42	56.46	-1.96	100	100	0	-16.84	-12.92	3.92	0.712	0.771	0.059
(2) Low capital abundance	32.74	35.89	3.15	67.26	64.11	-3.15	100	100	0	-34.52	-28.21	6.31	0.487	0.560	0.073
(3) High-low difference	8.84	7.65	-1.19	-8.84	-7.65	1.19	0	0	0	17.68	15.29	-2.39	0.225	0.211	-0.014
	Income shares in GDP from domestic industries														
(4) High capital abundance	39.39	40.44	1.05	55.77	53.09	-2.68	95.16	93.53	-1.63	-16.37	-12.64	3.73	0.706	0.762	0.055
(5) Low capital abundance	29.26	30.87	1.60	60.47	56.08	-4.39	89.73	86.95	-2.79	-31.20	-25.21	5.99	0.484	0.550	0.066
(6) High-low difference	10.13	9.58	-0.55	-4.70	-2.99	1.71	5.43	6.59	1.16	14.83	12.57	-2.26	0.222	0.211	-0.011
	Income shares in GDP from foreign industries														
(7) High capital abundance	2.19	3.10	0.91	2.65	3.37	0.72	4.84	6.47	1.63	-0.46	-0.27	0.19	0.825	0.919	0.094
(8) Low capital abundance	3.48	5.03	1.55	6.79	8.03	1.24	10.27	13.05	2.79	-3.31	-3.00	0.31	0.512	0.626	0.114
(9) High-low difference	-1.29	-1.93	-0.64	-4.14	-4.66	-0.52	-5.43	-6.59	-1.16	2.85	2.73	-0.12	0.313	0.293	-0.020

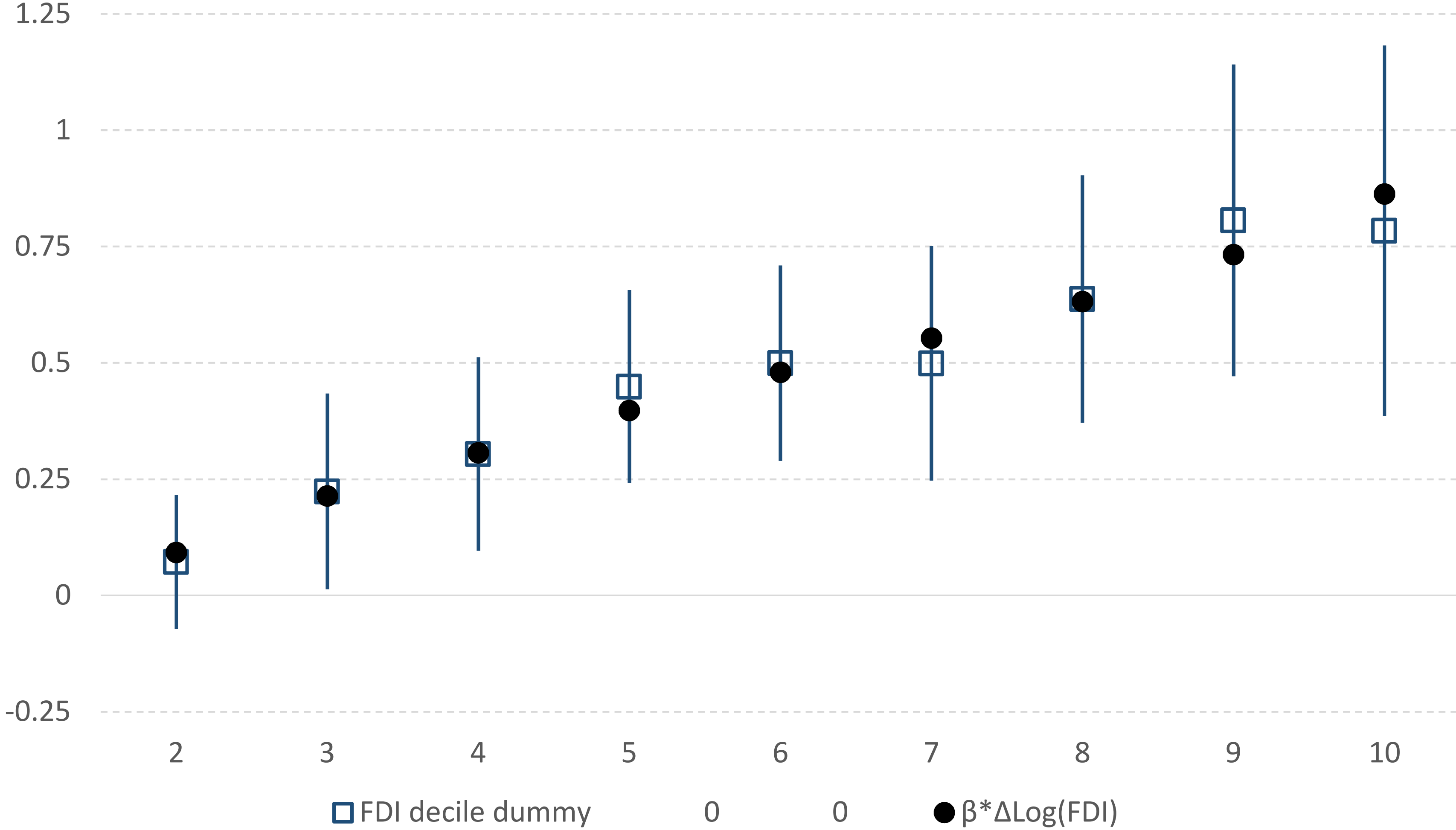
Notes. The table reports factor shares in GDP and changes thereof by source of income and capital abundance. Capital abundance is the ratio of capital payments in GDP to labor payments in GDP in 1995. The contribution of foreign industries to factor shares is given by the forward concept defined in the text. The contribution of domestic industries is the complement of the foreign part. All numbers are weighted averages using GDP in 1995 as weights. Columns with the heading "Change" are the difference between 2007 and 1995. Source: authors' calculations based on WIOD 2013 release.

Table A14: Capital Intensity of Bilateral Income Flows and Relative Capital Abundance

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable:	Capital income minus labor income from foreign industries as share of GDP							
Estimator	OLS	PPML	OLS	PPML	OLS	PPML	OLS	PPML
Year:	1995				2007			
Relative capital abundance (RKA) in 1995	0.198**	0.068**						
	(0.088)	(0.029)						
RKA*origin high capital abundance in 1995			0.325**	0.109**				
			(0.141)	(0.046)				
RKA*origin low capital abundance in 1995			0.061	0.021				
			(0.078)	(0.027)				
Relative capital abundance (RKA) in 2007					0.323**	0.281**		
					(0.152)	(0.121)		
RKA*origin high capital abundance in 2007							0.527**	0.444***
							(0.224)	(0.168)
RKA*origin low capital abundance in 2007							0.138	0.122
							(0.101)	(0.087)
GDP similarity	0.004	0.001	0.003	0.001	0.000	-0.000	0.000	-0.000
	(0.009)	(0.003)	(0.010)	(0.003)	(0.009)	(0.008)	(0.007)	(0.007)
Capital abundance similarity	-0.103	-0.035	0.046	0.014	-0.026	-0.027	0.103	0.081
	(0.126)	(0.042)	(0.079)	(0.026)	(0.072)	(0.063)	(0.081)	(0.061)
Log distance	0.033	0.011	0.033	0.012	0.000	0.001	0.000	0.001
	(0.021)	(0.007)	(0.021)	(0.007)	(0.022)	(0.019)	(0.020)	(0.017)
Common border	-0.032	-0.012	-0.029	-0.011	-0.039	-0.039	-0.038	-0.039
	(0.059)	(0.021)	(0.060)	(0.021)	(0.084)	(0.076)	(0.083)	(0.073)
Colonial ties	-0.006	-0.001	-0.008	-0.002	-0.053	-0.045	-0.054	-0.046
	(0.051)	(0.018)	(0.051)	(0.018)	(0.062)	(0.054)	(0.063)	(0.055)
Common language	-0.005	-0.002	-0.006	-0.002	0.056	0.049	0.056	0.048
	(0.056)	(0.019)	(0.054)	(0.019)	(0.074)	(0.061)	(0.073)	(0.060)
Free trade agreement	0.073*	0.025*	0.074*	0.025*	0.083	0.074*	0.078*	0.070*
	(0.040)	(0.013)	(0.040)	(0.013)	(0.056)	(0.045)	(0.047)	(0.038)
EU 15	-0.087*	-0.029*	-0.072	-0.025	-0.093**	-0.084**	-0.065*	-0.061*
	(0.049)	(0.017)	(0.049)	(0.017)	(0.044)	(0.038)	(0.036)	(0.033)
EU enlargement exporter to EU 15	-0.136***	-0.047***	-0.133***	-0.046***	-0.134***	-0.121***	-0.120***	-0.110***
	(0.042)	(0.014)	(0.041)	(0.014)	(0.044)	(0.038)	(0.039)	(0.033)
Common currency	-0.065	-0.024	-0.070	-0.025	-0.039	-0.039	-0.047	-0.045
	(0.068)	(0.024)	(0.068)	(0.024)	(0.035)	(0.035)	(0.035)	(0.035)
Observations	1,406	1,406	1,406	1,406	1,406	1,406	1,406	1,406
R-squared	0.339		0.348		0.294		0.313	
Fixed effects	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d
Clustered standard errors	o & d	o & d	o & d	o & d	o & d	o & d	o & d	o & d

Notes. The dependent variable is capital income accruing to capital located in o minus labor income accruing to labor in o that originates from supplying intermediate inputs for final goods production in country d, as a share of GDP. Relative capital abundance and similarity measures are described in the text. In columns 1-4 the dependent variable is calculated in 1995; in columns 5-8 it is calculated in 2007. The estimator is OLS with origin and destination fixed effects. Standard errors in parentheses are clustering by origin. *** p<0.01, ** p<0.05, * p<0.1.

Figure A4 : Non-Parametric versus Log Specification of Ownership Predictions



Notes. The figure reports estimates of the predicted effect of variation in ownership on international capital income flows. FDI decile dummy predictions (with 95% confidence intervals) are the coefficients to decile range dummies, denoted on the X axis (the omitted category is the first decile range). β*ΔLog(FDI) is the difference between the prediction at the average within decile range i, FDI_i, and the prediction of average within the first decile range, FDI_i, β*ΔLog(FDI) = β*[Log(FDI_i) - Log(FDI_i)]. β is estimated elasticity in Table 8 for VkBY, using OLS.