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Trade and factor intensity, and the transmission of the global shock to labor: A panel analysis of the fall of the labor income share in the Mexican manufacturing sector

Carlos A. Ibarra[a,*], Jaime Ros[b]

[a] Department of Economics, Universidad de las Américas Puebla, UDLAP, Ex-Hacienda Santa Catarina Mártir s/n, Cholula Pue 72810, Mexico
[b] School of Economics, Universidad Nacional Autónoma de México, UNAM, Circuito Interior, C. U., Ciudad de México 04510, Mexico

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With deep sadness, I report that professor Jaime Ros passed away as the initial stage of the research leading to this paper was under way. The paper is gratefully dedicated to his memory. I thank Alejandra Estrada and Claudia Córdova for their excellent research assistance.

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ABSTRACT

The paper studies the fall of the labor income share in Mexico, contrasting the role of trade and factor intensity as transmission channels of the China shock of 2001. It finds that, while the skill, technological and —more surprisingly— trade intensity of Mexican industries were largely irrelevant, capital intensity played a key role: in particular, the higher was the industries' initial capital intensity, the more vulnerable they were to the transmission of the global shock to labor. The finding is consistent with the proposition that industrial integration, concentrated in industries that are capital-intensive from the perspective of developing countries, facilitated the transmission of the shock. Results come from the estimation of panel equations for the annual change in the labor share across Mexican manufacturing industries, where transmission is measured by the correlation between changes in the United States and Mexican industry labor shares.

1. Introduction

In Mexico, as in many other countries, the labor share of income began to fall in the early 2000 s, cutting short an ongoing recovery from the impact of the peso crisis of 1994–1995. While affecting most sectors of the economy, the fall was particularly sharp

* Corresponding author.
E-mail address: carlos.ibarra@udlap.mx (C.A. Ibarra).

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in manufacturing, where in the course of ten years it led to a loss of ten percentage points in gross value added. The fall, moreover, was not linked to structural change (that is, a change in the industry composition of manufacturing value added) or to faster capital deepening or labor-productivity growth (both of which decelerated) but to widespread reductions in industry real wages. Although showing some improvement since 2013, the labor share remains well below the levels observed in the early 2000 s (not to mention the early 1990 s), suggesting the presence of a long-lasting shock.

Indeed, while domestic factors were important, several elements suggest that the fall also reflects the impact of a global shock to labor. These suggestive elements include: (a) the extensive nature of the fall, which affected much of the world (Stockhammer, 2017, Dao et al., 2019); (b) its close correlation in Mexico with similar changes observed in the United States (US), both in the entire manufacturing sector and across individual industries; and (c) its timing, which came right after the "China shock" triggered by the December 2001 accession of China to the World Trade Organization (WTO), a shock with effects that have proved very persistent (Autor et al., 2021).

Presumably, the large effects of the China shock were enabled by the globalization of production. In particular, central aspects of today's globalization —such as offshoring, the development of global value chains, and in general deep industrial integration— tend to increase the mobility of capital in relation to labor, weakening the latter's bargaining position and making it more vulnerable to the transmission of global (and domestic) shocks. A weaker bargaining position may result from the sheer fact of workers facing larger, hence more powerful multinational corporations.

The extent of a country's integration with the rest of the world can be gauged in different ways. A seemingly obvious one is through the industries' international trade intensity, as revealed for example by their use of imported inputs. For a highly exporter of manufactures like Mexico, a more intense use of imported inputs can be interpreted as an indicator of greater participation in global value chains. But the extent of integration may also be related to the industries' factor intensity, and in particular to their skill, technological and capital intensity. Recent studies argue, for example, that offshoring involves activities that are intensive in low skilled labor from the perspective of developed countries, but intensive in capital and high skilled labor from the perspective of developing ones. In developing countries, therefore, integration would tend to concentrate in capital and skill-intensive industries.

The paper tests the relative importance of trade and factor intensity as channels of transmission of the global shock to labor. Motivated by the close industrial integration of Mexico with the US (Blecker, 2016), the paper makes two assumptions. First, it interprets the fall in US industry labor shares as a measure of the global shock potentially affecting Mexico; and second, it interprets the correlation between the changes in US and Mexican labor shares as a measure of actual transmission.[1]

We will see that correlation was not affected by the Mexican industries' skill or technological intensity nor —more surprisingly— by their trade intensity, but was affected, statistically and economically, by the industries' capital intensity: in particular, the higher was the capital intensity of industries, the stronger was their correlation with changes in US labor shares. According to these results, it was not changes in capital intensity but rather its initial level that mattered for the negative evolution of the labor share. Capital intensity, in other words, made industries more vulnerable to the transmission of the global shock to labor. Results support the proposition that industrial integration, concentrated in industries that are capital-intensive from the perspective of developing countries, facilitated the transmission of the China shock.

Results come from the estimation of labor share equations for the Mexican manufacturing sector disaggregated into a panel of 20 industries at the NAICS (North American industry classification system) three-digit level, after excluding the state-dominated oil derivatives industry. Using first-differenced annual data, the estimations focus on two periods: 1996–2017 (the entire NAFTA period,[2] the longest one for which we have a complete set of data) and 2003–2017 (the post-China shock period). As part of the robustness analysis, the paper also estimates equations for longer periods (although with missing data for several variables) and using data in levels (with some problems in the diagnostic tests). Most of the data come from the Mexican KLEMS database and annual industrial surveys, and the US BLS. Some specifications, intended to test the role of different trade intensities of Mexico with China and the US, include information from the World Input–Output Database (WIOD).

To test the role of trade and capital intensity as transmission channels, the estimated equations interact the change in US industry labor shares with the initial levels (that is, the levels observed at the beginning of the estimation period) of the intermediate-import and capital/labor ratios. Similar interactions include indicators of skill and technological intensity. As we will see, in the estimated equations the interactions with the intermediate-import ratio (and with the skill and technological ratios) are non-significant, while the interaction with the capital/labor ratio is always highly significant, statistically and economically. These results obtain in the two main estimation periods and in different specifications: using industries' exports instead of intermediate imports; controlling as explained for skill and technological intensity; including the change in trade and capital/labor ratios in addition to their initial levels; omitting potential outliers like the Computing and Electronics and Transportation Equipment industries; and testing separately for the conditioning effect of either total intermediate imports or specifically those from China and the US.

Seeking to isolate the conditioning role of the industries' trade and factor intensity, the estimations control for macro, institutional, and industry determinants of the labor share. Results for these controls are consistent with previous findings for Mexico and

[1] Implicitly, it also assumes that changes in US labor shares are not caused by changes in Mexican ones. The assumption is supported both by the relatively small size of the Mexican manufacturing sector and by research showing that changes in labor demand in US industries affect labor demand in Mexico rather than the other way around. As noted in a recent study, "[estimation] results are consistent with the US being the driving force of North American global value chains and that labor demand in Mexico may take US shocks as exogenous" (Robertson, 2018, pp. 10–11).

[2] The North American Free Trade Agreement (NAFTA) between Canada, Mexico and the US took effect in January 1994. Due to incomplete data, the estimations leave aside the observations corresponding to the peso crisis of 1994–1995.

other countries, confirming the importance of domestic factors for the evolution of the labor share. Thus, results show negative correlations of industry labor shares with the unemployment rate and the real exchange rate (Onaran, 2009, López and Malagamba-Morán 2017), and positive ones with union density and informal labor productivity (Bosch and Manacorda, 2010, Ibarra and Ros, 2019). Regarding industry determinants, the results show a negative correlation of labor shares with labor productivity. Implicitly, this indicates an incomplete pass-through of labor-productivity gains to real (product) wages —even after controlling for a wide set of labor-share determinants— in a manner consistent with the recently-discussed broken-link hypothesis between productivity and pay (Bivens and Mishel, 2015).

In what follows, Section 2 reviews theoretical channels and stylized facts of Mexico, Section 3 develops the econometric analysis and presents the main results, and Section 4 concludes. An appendix includes descriptive statistics, additional estimation results, and details about definitions of variables and data sources.

2. Theoretical channels and stylized facts of Mexico

2.1. Theoretical channels

The worldwide fall in the labor income share has sparked a rapidly growing literature, which has discussed the influence of seemingly disparate factors like biased technical change, variations in the relative bargaining power of capital, and globalization and the rise of China (see Grossman and Oberfield, 2021 for a survey). Despite their different nature, however, these factors are likely to be interrelated, making it difficult to assess their relative role. Changes in relative bargaining power, for example, may reflect a greater mobility of capital and the globalization of production, itself facilitated by the type of technical change occurring over time. Among these factors, in what follows we will focus on results and issues that help to situate the Mexican case.

Many studies have found negative effects of higher international trade on the labor share (see a summary table in Wang and Tian, 2020). For US manufacturing industries, for example, Hung and Hammett (2016) show negative effects driven by a sharp increase in imports from China and other developing countries. But while the empirical evidence seems robust, interpretations are more controversial. In a widely-cited paper, Karabarbounis and Neiman (2014) question the relevance of explanations based on standard trade theory (Stolper–Samuelson), both because of the latter's implication that trade liberalization should lead to higher labor shares in developing countries and because of the paucity of evidence linking the fall in labor shares to structural change. Both reservations resonate in the Mexican case. In a recent study of India's manufacturing sector, however, Gupta and Helble (2021) argue that the effects of trade liberalization do depend on factor intensity, in the expected way; thus, while tariff reductions decrease the labor share in capital and technology-intensive industries, they increase it in labor-intensive ones.

Technical change and globalization may interact by enabling the offshoring of activities that alter the capital intensity of production. Since offshored activities can be intensive in low skilled labor from the perspective of developed countries but skill and capital intensive from the perspective of developing ones, offshoring can lead to higher levels of capital and skill intensity and decreasing shares of labor in both groups of countries (Elsby et al., 2013, Feenstra and Hanson, 1997). The empirical evidence for this channel, however, is mixed, with some studies finding a negative correlation between changes in capital intensity and the labor share (Stockhammer, 2013), others finding a positive one (Wang and Tian, 2020), and still others showing that the sign changes as we move from developed to developing economies (Doan and Wan, 2017). Consistent with the latter finding, Chortareas and Noikokyris (2021) show positive effects of changes in the investment/output ratio on the labor share that are larger among low and middle-income countries. Despite these results, we will see that in Mexico it was the initial level rather than the change in capital intensity that mattered for the (negative) evolution of the labor share.

Some studies show that closer industrial integration —as measured by higher intermediate-import ratios and greater participation in global value chains— reduces the labor share, particularly so in industries with high exposure to routinization (Dao et al., 2019). Although important for developed countries, the latter channel appears to be quantitatively marginal for developing economies, at least when the channel is related to reductions in the relative price of investment goods. Van Treeck and Wacker (2020) show moreover that the labor share in developing countries, particularly in those with low capital/labor ratios, may be positively rather than negatively correlated with other measures of integration, like the stock of foreign direct investment.

Focusing on the case of developing countries, Elsby et al. (2013) argue that offshoring and industrial integration may accelerate the growth of labor productivity. If real wages remain anchored by the low earnings available in traditional activities, faster productivity growth will reduce the labor share. More generally, Mendieta-Muñoz et al. (2020) argue that traditional activities represent a source of surplus labor a la Lewis, putting downward pressure on labor shares. While in Mexico there was no acceleration in labor productivity growth (or in capital deepening), lower earnings in informal activities do appear to hold down increments in formal wages (Ibarra and Ros, 2019).

Besides its effects on technical and structural change, globalization may affect the labor share by increasing the mobility of capital, thus weakening the bargaining power of workers (Harrison, 2005, Stockhammer, 2017). More generally, the workers' bargaining position may be compromised by the sheer fact of facing larger, hence more powerful multinational corporations. In this way, industrial integration may increase the vulnerability of labor to the transmission of global shocks. Of course, relative bargaining power may also be affected by domestic factors, as stressed in the current debate that contrasts the hypotheses of increasing firm power in product markets (Autor et al., 2017) versus decreasing worker power in labor markets (Taylor, 2020, Stansbury and Summers, 2020). Building on these insights, and seeking to isolate the role of the industries' trade and factor intensity, in our estimations we will control for a set of macroeconomic and institutional variables that may affect workers' bargaining position.

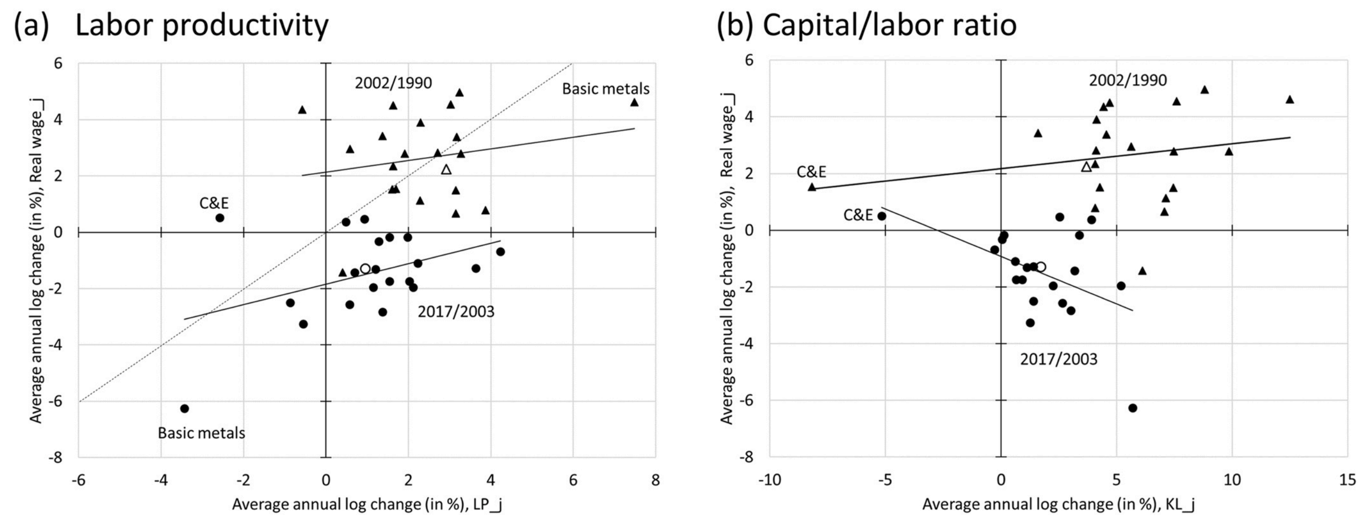

Fig. 1. Real wage, labor productivity, and capital/labor ratio (manufacturing sector and 20 industries, average annual log change, two periods). *Note*: Real wage = real product wage. Transparent markers = entire manufacturing sector (ex oil derivatives). Solid lines = cross-industry regression lines. Dotted line: 45-degree line. To avoid an undue influence from the anomalous fall in labor productivity observed in 2003, the latter year was omitted from the calculations.
Source: Authors' calculations with data from INEGI KLEMS.

Table 1
Within–between industry decomposition.

	Labor share, first year of period, %	Labor share, cumulative change, p.p.	Within	Static between	Dynamic between
(A) 20 industries, 3-digit level					
2017/1990	36.7	-12.5	-9.2	-0.4	-2.9
2002/1990	36.7	-2.8	-0.4	-1.0	-1.5
2017/2002	33.8	-9.7	-6.8	-1.1	-1.8
(B) 228 industries, 6-digit level					
2009/2003	26.3	-6.3	-5.4	-0.2	-0.7

Source: Authors' calculations with data from INEGI KLEMS (section A) and annual industrial surveys (B).

2.2. Stylized facts of Mexico

As mentioned above, technical change —in the sense of an acceleration in the rates of capital deepening and labor-productivity growth— does not seem to have played a major role in the fall of the manufacturing labor share in Mexico. Fig. 1 shows scatter plots of the annual change in the real product wage (that is, the wage divided by the implicit price index of gross value added) against the change in labor productivity (in panel a) and the capital/labor ratio (panel b). Data are for the 20 manufacturing industries (excluding the state-dominated oil derivatives industry) observed at the NAICS three-digit level, during the periods 1990–2002 and 2003–2017.

As shown in the plots, during the more recent period the relationship between the change in the real wage and those in labor productivity and the capital/labor ratio shifted down and to the left —revealing that in most industries, as capital deepening and labor-productivity growth decelerated, the real wage declined. Moreover, during this period all industries in panel (a) (except computing and electronics, C&E) lie below a 45-degree line, indicating that the average change of real wages was below that of labor productivity, and therefore that the average change in the labor share was negative. Thus, rather than responding to faster technical change, the fall in the labor share reflected a reduction of industry real wages under sluggish capital deepening and labor productivity growth.

The role of structural change (that is, of changes in the industry composition of value added) can be assessed through a within–between (industry) decomposition of the change in the manufacturing labor share. Denoting by σ_{jt} the share of industry j in manufacturing value added in year t, the cumulative change in the manufacturing labor share from year t to $t+n$ can be decomposed as:

$$\Delta LS_{t\_t+n} = \sum_{j=1}^{20} \sigma_{jt} \Delta LS_{jt\_t+n} + \sum_{j=1}^{20} LS_{jt} \Delta \sigma_{jt\_t+n} + \sum_{j=1}^{20} \Delta LS_{jt\_t+n} \Delta \sigma_{jt\_t+n} \quad ,(1)$$

where the labor share (*LS)* corresponds to the share of total payments to workers in gross value added, as measured in national accounts. The first term on the right side of the equation represents the within-industry component, while the sum of the last two terms does the between-industry one.

The within component is a weighted sum of the change in the labor share across industries, yielding a negative value when the labor share falls in most industries and/or the falls occur in industries with a large participation in manufacturing value added. The between component, on the other hand, can be separated into a static part (the second term on the right) and a dynamic one (the last term). The static part will be negative when industries with high labor shares lose participation in manufacturing value added, while the dynamic part will be negative when industries with a rising labor share lose participation in manufacturing value added and those with a falling labor share, gain it.

Table 1, section A, applies Eq. (1) to the 20 manufacturing industries presented previously in Fig. 1. The results show a clear predominance of the within component. During 1990–2017, this component accounts for 9.2 out of a 12.5%-point fall. In the post-China shock period 2002–2017, the same component accounts for 6.8 out of 9.7 points. The within component, moreover, reflects widespread reductions across industries (rather than reductions within a few large ones), with only one industry (C&E) showing an increment, as noted above (see Fig. 2, panel a).

Similar conclusions hold for a more disaggregated analysis, using data for 228 industries (again, excluding the oil derivatives industries) at the six-digit level, available from Mexico's industrial surveys for the period 2003–2009. During this period, the labor share in the manufacturing surveys (which in this source does not include social benefits and contributions, and therefore is lower than in the KLEMS database) fell from 26.3% to 20%.[3] Applying Eq. (1), the fall came mainly from within-industry reductions, which accounted for 5.4 points, or 86% of the total fall. Once more, the within component reflects widespread reductions across industries, with the labor share falling by at last one point in 162 industries (see Table 1, section B, and Fig. 2, panel b).

As in Mexico, the US manufacturing labor share began a sharp fall after the China shock of 2001. By 2011, the cumulative fall had

[3] While KLEMS uses national accounts data, the industrial surveys are based on a sample of plants drawn from the economic census and belonging to different industrial (manufacturing) sectors. Coverage has increased over time, from 205 industrial sectors in the surveys based on the year 1993, to 231 classes in the 2002-based surveys (which in addition shifted to NAICS, making them more directly comparable with the classification used in KLEMS), and 240 classes in the 2008-based surveys.

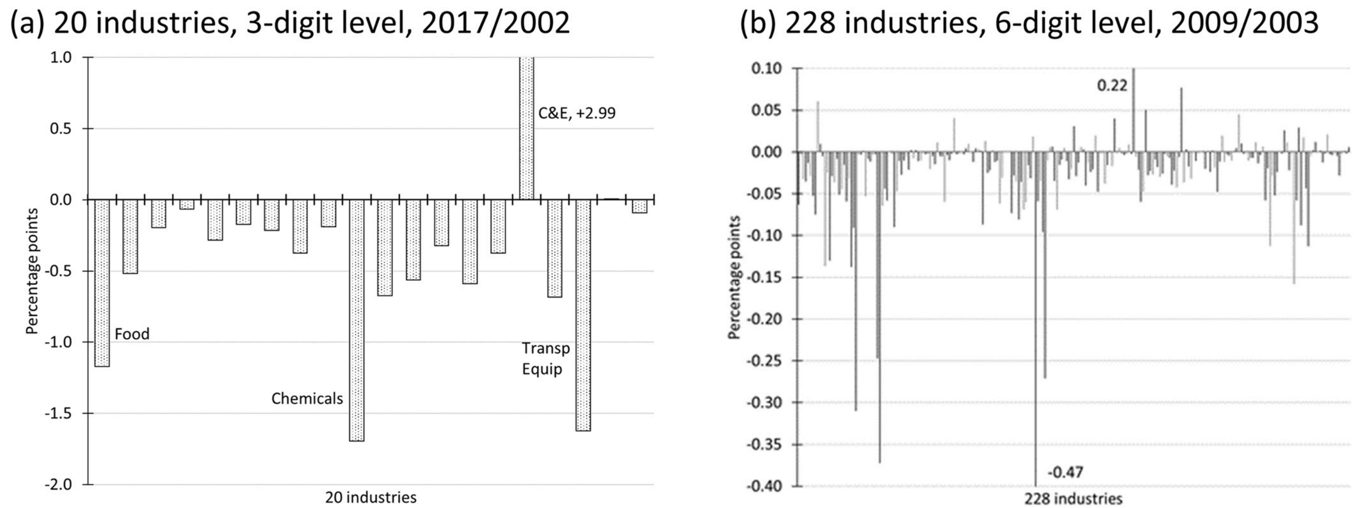

Fig. 2. Within–between industry decomposition: within component. *Notes*: The sum across industries equals the total within effect for the entire manufacturing sector (see Eq. 1 in the text). Source: Authors' calculations with data from INEGI KLEMS (panel a) and industrial surveys (panel b).

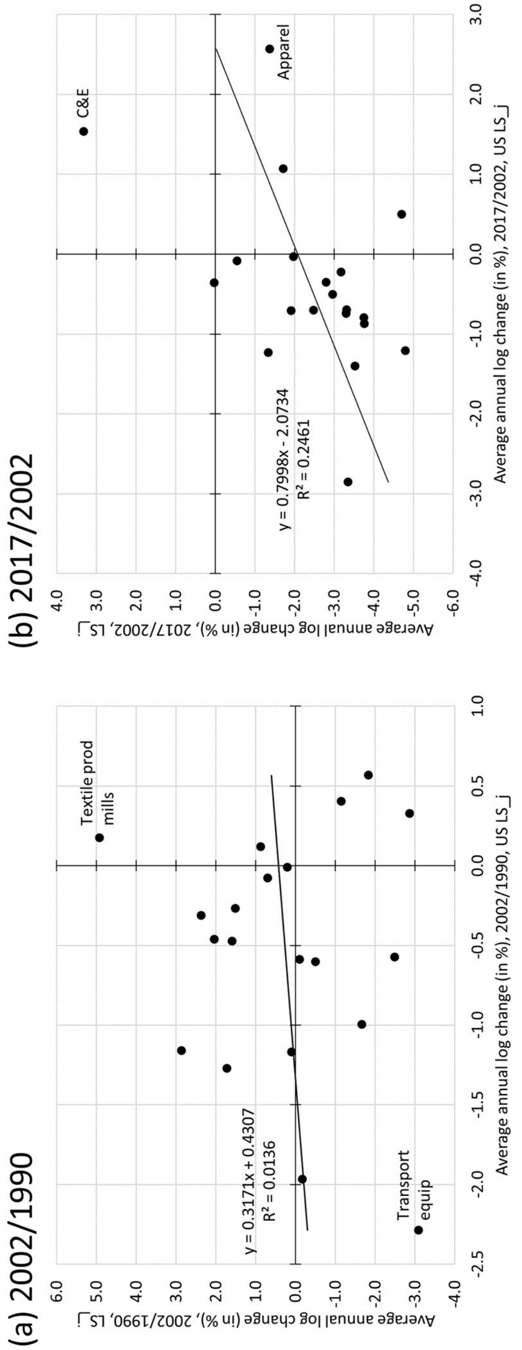

Fig. 3. Labor share in US and Mexican manufacturing industries, (20 industries, average annual log change, two periods).
Source: Authors' calculations with data from INEGI KLEMS and US BLS.

reached 30%, a similar figure to that recorded in Mexico between 2002 and 2012 (see Appendix Figure A1, panel a). A close correlation between the two countries is observed also at the industry level. Fig. 3 shows scatter plots of the average annual change in the labor share in the US and Mexican manufacturing industries during the periods 1990–2002 (panel a) and 2002–2017 (panel b). While in the early period there is no clear correlation, in the more recent one the majority of industries lie on the south-west quadrant, indicating parallel reductions in the two countries.

As explained in the introduction, we will interpret the fall in US industry labor shares as a measure of the global shock potentially affecting Mexico, and the correlation between US and Mexican industries as a measure of actual transmission. Transmission is expected from the close industrial integration of Mexico with the US. The underlying assumption is that transmission (that is, correlation between the change in the two countries' industry labor shares) will be larger, the more integrated the industries are.

A key question is which characteristics of Mexican industries facilitated the transmission. To address this question, in the econometric analysis we will contrast the role played by the Mexican industries' trade intensity, as measured by their intermediate-import ratios, versus their capital intensity, as measured by their capital/labor ratios (while also controlling for skill and technological intensity). In both cases, the logic is that industrial integration is closer, the greater is trade intensity (as this means greater reliance on imported inputs in production) and/or the greater is capital intensity (as capital-intensive industries are expected to concentrate offshored activities from developed countries).

As motivation for the econometric analysis, Fig. 4 shows the average annual log change in industry labor shares in Mexico during 2002–2017, plotted against the initial level of the intermediate-import ratio (panel a) and the initial level of the capital/labor ratio (panel b). To reduce the possible influence of cyclical variations, both trade and capital intensity are calculated as averages over 1999–2001. As shown in the figure, there is practically no relationship between the initial level of the import ratio and the subsequent change in the labor share (the apparent positive relationship disappears once C&E, a clear outlier, is removed from the plot). In contrast, there is a negative relationship between the initial level of the capital/labor ratio and the subsequent change in labor share —which in this case would be stronger if C&E were removed from the plot. The data suggest that the industries' capital intensity played a more significant role as transmission channel than did trade intensity, a possibility that we will test formally in the following econometric analysis.

3. Econometric analysis

We will begin by estimating equations of the form,

$$\Delta \ln LS_{jt} = \sum \alpha_i \Delta \ln MACRO_{it} + \sum \beta_i \Delta \ln INSTIT_{it} + \sum \delta_i \Delta \ln INDUS_{it} + (\tau - 1)\Delta \ln LP_{jt} + \gamma_1 \Delta \ln USLS_{jt} + e_{jt} \tag{2}$$

where LS_{jt} is the labor share (as defined above in Eq. 1) in industry j and year t, Σ indicates summations over sub-index i, Δ the first difference, and *ln* the natural logarithm. $MACRO_{it}$ and $INSTIT_{it}$ are macroeconomic and institutional determinants (varying over time but common to all industries), LP_{jt} is the industry j's labor productivity, $INDUS_{ijt}$ are other industry determinants, and $USLS_{jt}$ is the labor share index for US industry j (see Appendix A for definitions and sources, and Appendix Tables A1 and A2 for descriptive statistics).

To help in the interpretation of Eq. (2), recall that the proportional change in the labor share is equal to the difference between the change in the real (product) wage and that in labor productivity: $\Delta\ln LS_{jt} = \Delta\ln RW_{jt} - \Delta\ln LP_{jt}$. If among other determinants the change in the real wage depends on the change in labor productivity, we can write $\Delta\ln RW_{jt} = \tau\, \Delta\ln LP_{jt} + \Delta\ln RW_{0jt}$, where $\Delta\ln RW_{0jt}$ represents the change due to factors other than productivity and $0 \le \tau \le 1$ measures the pass-through of labor productivity to real wages. Substituting the latter expression into the definition of the change in the labor share yields:

$$\Delta\ln LS_{jt} = (\tau - 1)\Delta\ln LP_{jt} + \Delta\ln RW_{0jt} \tag{3}$$

which shows that, under incomplete pass-through, the labor-productivity coefficient in Eq. (2) will be negative: the lower the pass-through, the larger the negative value of τ–1. Moreover, since estimations control for the change in labor productivity, the remaining terms in Eq. (2) represent the estimated change in the real wage not related to changes in productivity (i.e., $\Delta\ln RW_{0jt}$ in Eq. 3).

In a second stage of the analysis, we will add interactive terms in order to test whether the correlation between changes in US and Mexican industry labor shares depends on, or is conditioned by, the trade and factor intensity of Mexican industries. The specification takes the form,

$$\begin{aligned}\Delta \ln LS_{jt} = {} & \sum \alpha_i \Delta \ln MACRO_{it} + \sum \beta_i \Delta \ln INSTIT_{it} + \sum \delta_i \Delta \ln INDUS_{it} + (\tau - 1)\Delta \ln LP_{jt} + \gamma_1 \Delta \ln USLS_{jt} + \omega_1 TRADE_j \\ & + \omega_2 FACTOR_j + \gamma_2 (\Delta \ln USLS_{jt})(TRADE_j) + \gamma_3 (\Delta \ln USLS_{jt})(FACTOR_j) + e_{jt}\end{aligned} \tag{4}$$

where $TRADE_j$ and $FACTOR_j$ refer to the industries' trade and factor intensity, respectively.

Trade intensity is measured by the industries' intermediate-import ratio, but alternative specifications use the export ratio and one specification adds the ratio of inward foreign direct investment (FDI) to fixed investment as a measure of the industries' external orientation. Indicators of factor intensity include the industries' capital/labor ratio (capital intensity), the share of workers with high and medium years of schooling in total hours worked (skill intensity), and the share of information and communication technology ICT in total fixed investment (technological intensity). In all cases, $TRADE_j$ and $FACTOR_j$ represent initial levels calculated as three-year averages for industry j at the beginning of the estimation period.[4]

Positive values for the estimated gamma coefficients mean that changes in the labor share in the US and Mexican industries are positively correlated (γ_1), and that such correlation is higher, the greater is the Mexican industries' trade intensity (γ_2) and/or their

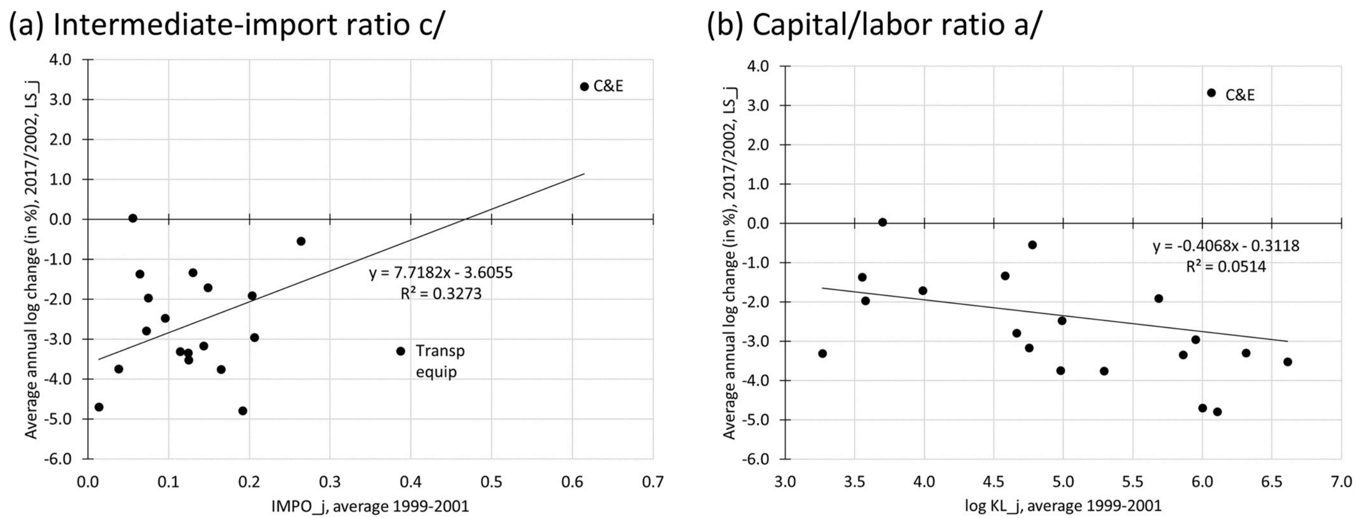

Fig. 4. Change in labor share versus industries' initial trade and capital intensity.*Note*: If C&E is omitted from the plots, slope changes to 0.20 (R^2 =0.00) and –0.75 (R^2 =0.35), in panels (a) and (b) respectively.
Source: Authors' calculations with data from INEGI KLEMS and industrial surveys.

Table 2
Estimated panel labor share equations: alternative periods, Dependent variable: Δ ln Labor share_j. GLS with cross-section weights and White period robust standard errors.

Period	(2.1) 1991–2017	(2.2) 1993–2017	(2.3) 1996–2017	(2.4) 1996–2002	(2.5) 2003–2017
Estimated coefficients					
Δ ln Real exchange rate	– 0.353***	– 0.326***	– 0.294***	0.057	– 0.205***
Δ ln Unemployment rate	n.a.	– 0.001	– 0.011	– 0.472***	– 0.190***
Δ ln Informal labor prod	n.a.	n.a.	0.170***	0.626***	0.339***
Δ ln Union density	– 0.062*	0.089**	0.190***	0.291*	0.088*
Δ ln Real minimum wage	0.412***	0.520***	0.438***	1.384***	– 1.184***
Δ ln Input/output ratio_j	1.427***	1.433***	1.454***	1.431***	1.470***
Δ ln Labor productivity_j	– 0.531***	– 0.518***	– 0.531***	– 0.269***	– 0.525***
Δ ln US labor share_j	0.338***	0.342***	0.311***	0.255***	0.382***
Diagnostics					
Adj R-sq (weighted)	0.573	0.605	0.485	0.507	0.593
Jarque-Bera, p-value	0.589	0.753	0.584	0.431	0.753
Durbin-Watson stat	1.967	1.959	1.860	1.855	2.101
Correlogram a/	0.799	0.573	0.490	0.798	0.405
Redundant fixed effects b/	0.892	0.884	0.805	0.052*	0.675
Nr years/industries/obs	27/20/540	25/20/500	22/20/440	07/20/140	15/20/300

Subindex *j* indicates an industry variable.
a/ Smallest p-value, first three lags.
b/ F-test, p-value
Source: Authors' estimations. See appendix for definition and source of variables.
* $p < 0.10$, + $p < 0.15$
** $p < 0.05$
*** $p < 0.01$

capital, skill or technological intensity (γ_3). Thus, the latter coefficients test whether and to what extent the transmission of the global shock to labor, as measured by the correlation between changes in Mexican and US industry labor shares, depends on the Mexican industries' trade and factor intensity.

The panel used in the estimations consists of the entire manufacturing sector divided into 20 industries at the NAICS three-digit level, always excluding the state-dominated oil derivatives industry. We will review estimates for different periods, but focus on 1996–2017 (the entire NAFTA period, leaving aside the peso crisis of 1994–1995) and 2003–2017 (the post-China shock period). As shown in Eqs. (2) and (4) above, and to avoid the risk of spurious results due to non-stationarity, the estimations use first-differenced data (except for $TRADE_j$ and $FACTOR_j$, which are measured in levels). Compared with level estimates, the use of first differences also yields better diagnostics —particularly for serial correlation and normality— and more robust coefficient estimates. For illustrative purposes, though, the appendix includes a sample of level estimates that support the existence of a long-run relationship.

The first-difference estimations are carried out by generalized least squares (GLS) with cross-section weights (necessary to pass the normality test in the residuals) and White period robust standard errors; in these estimations industry fixed effects were redundant (as confirmed by the tests included in Table 2 below), which is not surprising given the use of first differences. The level estimates, on the other hand, are obtained from GLS with industry fixed effects and pooled mean ARDL (autoregressive distributed lag) models —which have the attractive feature of reducing any endogeneity bias (more on the issue of endogeneity in footnotes 5 and 6 below).

3.1. Basic specification

Table 2 shows estimates for different periods, from 1991–2017 (with missing data for several variables) to 2003–2017. Estimates come from the basic specification (Eq. 2, above), which excludes the trade and factor-intensity interactions. Point estimates for the macro and institutional variables show some variability across periods (particularly when compared with the estimates for industry variables, which are quite stable), which may be expected since macro and institutional variables have only time-series effects and the number of annual observations in some equations is small.

The coefficients obtained on the macroeconomic variables are consistent with the results of previous studies of Mexico and other countries. They show that the labor share is negatively correlated with both the unemployment rate (suggesting unemployment adversely affects the bargaining position of workers) and the real exchange rate (so that a real depreciation of the peso reduces the labor share). On the other, the labor share is positively correlated with informal labor productivity, consistently with a dual-economy or surplus-labor hypothesis: a fall in informal labor productivity, for example, reduces labor earnings in that sector, which affects negatively formal wages.

Institutional variables also show the expected coefficients, indicating that the labor share is positively correlated with both the

[4] All the estimated equations reported below include the $TRADE_j$ and $FACTOR_j$ variables alone, but to save space their coefficients (the omega coefficients in equation 4) are not included in the tables. In most cases, the coefficients are not statistically significant.

real minimum wage and union density. Results are not completely robust, however. In the more recent period, the correlation with union density appears to lose significance, while that with the minimum wage becomes negative —an anomalous result that may reflect the recent spike in the minimum wage.

The coefficients on industry variables are highly significant. In contrast with the prediction from a basic Kaleckian model (López and Malagamba-Morán 2017), the labor share is positively correlated with the input/output coefficient, a pattern that may reflect the outsourcing of relatively capital-intensive activities by firms (Giannoni and Mertens, 2019). On the other hand, the labor share is negatively correlated with labor productivity, indicating an incomplete pass-through of labor productivity. The point estimate, of about –0.5 in most periods, indicates that only half of the proportional gains in labor productivity are passed-through to real wages, with the rest increasing the share of profits in gross income. After the China shock, moreover, there was a sharp fall in pass-through, with the estimate on labor productivity decreasing from –0.27 in 1996–2002 to –0.53 in 2003–2017.[5]

These results show that the fall of the labor share in the Mexican manufacturing industries since the early 2000 s reflected in part a combination of domestic factors. These include increments in the unemployment rate and the real exchange rate, and decrements in union density and informal labor productivity (see the time series in Appendix Figure A1). In addition to domestic factors, though, the estimates show a large, robust positive correlation between changes in the US and Mexican industry labor shares. This suggests that global factors, as measured by the fall in US labor shares, played a significant role in the fall of the labor share in Mexico.

3.2. Level estimates

While our analysis relies on the use of first-differenced data, Appendix Table A3 presents for comparison a sample of level estimates. Rejection of the unit-root hypothesis in the residuals and the negative, highly-significant coefficient on the error-correction term (available in the ARDL models) both suggest the existence of a long-run relationship. Diagnostic results are problematic, however, particularly so for serial correlation in the fixed-effect estimates. The ARDL approach moreover does not yield satisfactory results for the post-China shock period (not shown), presumably because of the small number of annual observations. Beyond these limitations, the level estimates are similar to the first-difference ones: the unemployment rate and real exchange rate show negative correlations with the labor share; informal labor productivity and union density show positive ones; and the coefficient on the real minimum wage again becomes negative in the more recent period.

The level equations also show a negative labor-productivity coefficient, confirming the existence of an incomplete pass-through of labor productivity. Importantly, this means that incomplete pass-through applies not only to the potentially transitory changes in productivity captured by the variables in first differences, but also to the more permanent ones captured in levels. The equations, finally, also show a positive coefficient on the US industry labor share, indicating a long-lasting link with Mexican labor shares.

3.3. Interactions with trade and factor intensity, 1996–2017

Next, we review estimates from equations that include interactions of the change in US industry labor shares with the trade and factor-intensity ratios of Mexican industries (following the specification in Eq. 4, above). As explained, the interactions test whether the correlation between changes in US and Mexican industry labor shares depends on, or is conditioned by, the industries' trade and factor intensity.

Table 3 shows estimates for the period 1996–2017, the longest one for which we have a complete set of industry, macro and institutional determinants. In the simplest specification, column (3.1) includes interactions with the initial levels of the intermediate-import and capital/labor ratios. Unexpectedly, the import interaction lacks any statistical significance, with a p-value of 0.51 (not shown, to avoid cluttering the table), while in contrast the coefficient on the capital/labor interaction is positive and statistically significant. The latter interaction is also economically significant. The point estimate, equal to 0.196, implies that correlation with the US increases from 0.16 for a low capital-intensive industry like apparel ($-0.538 + 0.196 * ln35$, where 35 is the initial capital/labor ratio), to 0.71 for a high capital-intensive industry like chemical products, with a capital/labor ratio of 584..

One way to interpret the results is that industrial integration facilitated the transmission of the negative global shock to labor, and that integration is stronger the more capital-intensive industries are. Perhaps surprisingly, the same kind of conditioning effect is not found using intermediate-import ratios as a measure of trade intensity. To explore the robustness of these results, the remaining columns proceed as follows. Column (3.2) and the rest add interactions of the change in US industry labor shares with other indicators of factor intensity, namely, the skilled labor ratio and the ICT investment share. Column (3.3) replaces the intermediate-import ratio with the export ratio, which however remains non-significant. Column (3.4) adds the log change in the capital/labor and intermediate-import ratios, testing whether changes in capital and trade intensity —apart from their role in levels as transmission channels— affect our results. Column (3.5), finally, omits the C&E industry, given its likely outlier status.

[5] The estimated coefficient on labor productivity may have an upward bias if firms react to higher labor shares by introducing labor-saving innovations (see Marquetti, 2004 and De Souza 2017 for empirical evidence, and Petach and Tavani, 2020 for a formal treatment in a model of capital accumulation and distribution). Studies of Mexico, however, indicate that changes in the capital intensity of manufacturing industries have been independent from labor-share changes or levels and been driven instead by a convergence to US levels (Ibarra, 2019). If nonetheless such upward bias existed, it would mean that actual pass-through is smaller than the one implicitly shown in our estimates. As for the remaining estimates, they are unlikely to be affected by an endogeneity bias, either because correlates are measured at an aggregate level (like the macro and institutional determinants) presumably unaffected by changes in industry labor shares, or because industry variables like trade and factor ratios are held constant at the beginning of the estimation period.

Table 3
Estimated panel labor share equations: 1996–2017, Dependent variable: Δ ln Labor share_j. GLS with cross-section weights and White period robust standard errors.

	(3.1)	(3.2)	(3.3)	(3.4)	ex C&E (3.5)
Estimated coefficients					
Δ ln Real exchange rate	– 0.298***	– 0.298***	– 0.294***	– 0.259***	– 0.252***
Δ ln Unemployment rate	– 0.020	– 0.019	– 0.020	– 0.051**	– 0.050**
Δ ln Informal labor prod	0.142***	0.131***	0.133***	0.143***	0.146***
Δ ln Union density	0.160***	0.163***	0.169***	0.187***	0.190***
Δ ln Real minimum wage	0.480***	0.482***	0.472***	0.395***	0.380***
Δ ln Input/output ratio_j	1.466***	1.422***	1.399***	1.334***	1.333***
Δ ln Labor productivity_j	– 0.499***	– 0.504***	– 0.500***	– 0.571***	– 0.552***
Δ ln Capital/labor ratio_j				0.188***	0.200***
Δ ln Interm-import ratio_j				– 0.031	– 0.024
Δ ln US labor share_j	– 0.538*	– 0.537*	– 0.461**	– 0.452*	– 0.458*
Interactions of Δ ln US labor share_j with initial trade and factor intensity ratios a/ b/					
Interm-import ratio_ij	– 0.504	– 0.620		– 0.817	– 0.508
ln Capital/labor ratio_ij	0.196**	0.353***	0.318***	0.310***	0.245**
Skilled labor ratio_ij		– 1.299*	– 1.268 +	– 1.202*	– 1.002*
ICT investment share_ij		– 0.969	– 2.400 +	0.740	– 10.40
Export ratio_ij			0.026		
Diagnostics					
Adj R-sq (weighted)	0.502	0.495	0.495	0.526	0.521
Jarque-Bera, p-value	0.648	0.674	0.674	0.639	0.463
Durbin-Watson stat	1.878	1.890	1.890	1.924	1.920
Correlogram c/	0.492	0.484	0.484	0.373	0.589
Nr years/industries/obs	22/20/440	22/20/440	22/20/440	22/20/440	22/19/418

Subindex *j* indicates an industry variable, while subindex *i* indicates constant initial value, at the start of the period.
a/ Initial import, export, skill ratios and ICT share are averages for 1996–1998.
b/ The estimated equations also include the initial ratios without interactions, which in general, were not statistically significant (not shown to save space).
c/ Smallest p-value, first three lags.
Source: Authors' estimations. See appendix for definition and source of variables.ratio).
* $p < 0.10$, + $p < 0.15$
** $p < 0.05$
*** $p < 0.01$

Results show that the Mexican industries' skill and technological intensity do not condition in a statistically significant way the correlation between changes in US and Mexican labor shares. Although the skilled-labor interaction is weakly statistically significant, we will see that its coefficient changes sign and loses all statistical significance in estimations for the period 2003–2017. The results also show that changes in capital intensity are positively correlated with changes in the labor share, which is consistent with previous studies of developing countries. While the correlation is statistically significant, the positive sign indicates that the (slow) increase in capital/labor ratios observed during the period cannot explain the fall in labor shares in Mexico; in addition, we will see that the estimated coefficient loses much of its economic significance in the post-China shock period.[6]

In all cases, the significance of the initial level of capital intensity —and the lack of significance of the import (or alternatively the export) ratio— as positive conditioning factor of the US–Mexican correlation remain. Omitting C&E reduces to some extent the significance of the capital/labor interaction, but the channel remains economically and statistically significant. Omitting the Transportation Equipment industry, another potential outlier due to its very high trade ratios (the second highest, after C&E), does not alter the previous results, and thus the equation is not shown, to save space.

3.4. Estimates for the post-China shock period, 2003–2017

Continuing with the exploration of robustness, Table 4 shows equations that focus on the post-China shock period 2003–2017 —that is, the period when the recent fall in the labor share took place. Column (4.1) includes interactions with the intermediate-import rate and all factor-intensity ratios; column (4.2) replaces the intermediate-import ratio with the export ratio; column (4.3) includes an interaction with the ratio of inward FDI to fixed investment (using FDI industry data that are available only for this shorter estimation period); column (4.4) adds the change in capital/labor and intermediate-import ratios; and column (4.5) repeats the latter specification but omitting the C&E industry.

Compared with the estimates in Table 3, in this shorter period the coefficient on the change in the capital/labor ratio becomes

[6] The estimated coefficient may have an upward bias if firms react to higher labor shares by introducing capital-intensive techniques (although, as noted in footnote 4, the empirical evidence for Mexico does not seem to support this type of reaction). This means that the positive effect of the capital/labor ratio on the labor share may be even smaller than the one shown in the tables. In any event, it is reassuring that our previous results remain practically unchanged by the introduction of changes in the capital/labor and import ratios as additional correlates in the equations.

Table 4
Estimated panel labor share equations: 2003–2017, I, Dependent variable: Δ ln Labor share_j. GLS with cross-section weights and White period robust standard errors.

	(4.1)	(4.2)	(4.3)	(4.4)	ex C&E (4.5)
Estimated coefficients					
Δ ln Real exchange rate	– 0.208***	– 0.207***	– 0.207***	– 0.194***	– 0.192***
Δ ln Unemployment rate	– 0.148***	– 0.153***	– 0.149***	– 0.149***	– 0.162***
Δ ln Informal labor prod	0.303***	0.303***	0.305***	0.294***	0.303***
Δ ln Union density	0.082 +	0.087 +	0.082 +	0.091*	0.115**
Δ ln Real minimum wage	– 0.997***	– 1.024***	– 1.003***	– 0.950***	– 0.999***
Δ ln Input/output ratio_j	1.512***	1.503***	1.502***	1.483***	1.394***
Δ ln Labor productivity_j	– 0.472***	– 0.474***	– 0.471***	– 0.493***	– 0.477***
Δ ln Capital/labor ratio_j				0.054*	0.057**
Δ ln Interm-import ratio_j				– 0.024	– 0.006
Δ ln US labor share_j	– 0.680**	– 0.619**	– 0.687**	– 0.612**	– 0.659**
Interactions of Δ ln US labor share_j with initial trade and factor intensity ratios a/ b/					
Interm-import ratio_ij	– 0.783		– 0.794	– 0.891	– 0.435
ln Capital/labor ratio_ij	0.236***	0.207***	0.237***	0.218***	0.164**
Skilled labor ratio_ij	0.087	0.225	0.091	0.063	0.269
ICT investment share_ij	– 0.700	– 1.471**	– 0.656	– 0.077	5.034
Export ratio_ij		– 0.387			
FDI ratio_ij			– 0.021		
Diagnostics					
Adj R-sq (weighted)	0.636	0.635	0.634	0.637	0.587
Jarque-Bera, p-value	0.753	0.819	0.654	0.638	0.691
Durbin-Watson stat	2.083	2.087	2.090	2.092	2.106
Correlogram c/	0.256	0.289	0.238	0.228	0.153
Nr years/industries/obs	15/20/300	15/20/300	15/20/300	15/20/300	15/19/285

Subindex *j* indicates an industry variable, while subindex *i* indicates constant initial value at the start of the period.
a/ Initial import, export, skill ratios and ICT share are averages for 1999–2001 (1999–2003 for FDI).
b/ The estimated equations also include the initial ratios without interactions, which in general, were not statistically significant (not shown to save space).
c/ Smallest p-value, first three lags.
Source: Authors' estimations. See appendix for definition and source of variables.
* $p < 0.10$, + $p < 0.15$
** $p < 0.05$
*** $p < 0.01$

much less significant, statistically and economically. Similarly, the (weak) significance of the skilled-labor interaction in Table 3 does not carry over to this shorter period. Thus, there is no robust evidence that skill intensity mattered as a factor conditioning the transmission of the global shock to labor in Mexico. The interaction with the FDI ratio is not significant, suggesting that FDI intensity (as a share of fixed investment) did not play a significant role as transmission channel either (although this does not necessarily apply to the FDI stock —rather than flow— for which we have no readily available industry data).

In all cases, the main conclusion about transmission continues to hold: the correlation between changes in US and Mexican labor shares does not depend on the industries' trade intensity but does depend, positively, on capital intensity. Omitting C&E reduces somewhat the significance of this effect, which however remains significant statistically and economically. Omitting Transportation Equipment (not shown, to save space) does not affect the results. In all cases, the industries' initial capital intensity remains the only significant factor conditioning the correlation between the two countries.

In the previous estimations, the lack of significance of trade intensity as transmission channel refers to total intermediate imports. More significant results —and in the expected positive direction— could be expected if imports are disaggregated by country of origin. A significant role could be played by imports from the US, for example, given the close industrial integration of Mexico with that country, or by imports from China, due to their rapid rise since the early 2000 s. We will explore this possibility by re-estimating the labor share equations while replacing total intermediate imports with imports from the US or China. Since Mexican industrial surveys do not present the necessary information, though, the import ratios by country will be calculated with data, available from 2000 to 2014, taken from the world input–output database (WIOD). The industry classification in WIOD, however, does not match exactly that of NAICS (the latter presents more disaggregated data), so the results should be taken with some caution [7]

Fig. 5 shows two indicators: the level in 2002 and the cumulative change from 2002 to 2014 of intermediate imports from the US (panel a) and China (panel b), with imports measured as a share of the Mexican industries' gross production and plotted against the Mexican industries' capital/labor ratio.[8] As shown in the figure, the extent of Mexican integration with the two countries in the early

[7] Most notably, WOID consolidates into three industries the following three sets of NAICS industries: (a) food, and beverages and tobacco; (b) textile mills, textile product mills, apparel, and leather; and (c) furniture and other industries. We use this correspondence in the plots in Fig. 5 and in the interactive terms of the estimated equations in Table 5.

[8] In the graphic and econometric analysis, 2002 was chosen as initial year (instead of 2000, the first year available from WIOD) not only to match

Table 5
Estimated panel labor share equations: 2003-2017, II, Dependent variable: Δ ln Labor share_j, GLS with cross-section weights and White period robust standard errors. *Source*: Authors' estimations. See appendix for definition and source of variables.

	(5.1)	(5.2)	(5.3)	ex C&E (5.4)	(5.5)	(5.6)
Estimated coefficients						
Δ ln Real exchange rate	− 0.191 ***	− 0.192 ***	− 0.191 ***	− 0.189 ***	− 0.189 ***	− 0.200 ***
Δ ln Unemployment rate	− 0.155 ***	− 0.162 ***	− 0.167 ***	− 0.168 ***	− 0.171 ***	− 0.151 ***
Δ ln Informal labor prod	0.305 ***	0.294 ***	0.301 ***	0.317 ***	0.315 ***	0.275 ***
Δ ln Union density	0.089 *	0.106 **	0.127 ***	0.125 ***	0.127 ***	0.110 **
Δ ln Real minimum wage	− 1.004 ***	− 1.040 ***	− 1.057 ***	− 1.067 ***	− 1.089 ***	− 0.949 ***
Δ ln Input/output ratio_j	1.461 ***	1.457 ***	1.345 ***	1.319 ***	1.330 ***	1.372 ***
Δ ln Labor productivity_j	− 0.487 ***	− 0.489 ***	− 0.468 ***	− 0.460 ***	− 0.459 ***	− 0.499 ***
Δ ln Capital/labor ratio_j	0.046 *	0.045 +	0.046 +	0.043 +	0.043 +	0.051 *
Δ ln Interm-import ratio_j	− 0.025	− 0.027	− 0.014	− 0.015	− 0.014	− 0.021
Δ ln US labor share_j	− 0.379 **	− 0.251	− 0.383 +	− 0.407 ***	− 0.378 **	− 0.655 ***
			Interactions of Δ ln US labor share_j with initial trade and factor intensity ratios a/			
US interm-import ratio_ij	− 0.022 **					
US interm-imp ratio_2014/2002j		0.061 **	0.051 *		0.041	
CHN interm-imp ratio_2014/2002j				− 0.088 *	− 0.029	
Interm-imp ratio_2014/2002j						− 0.035 ***
ln Capital/labor ratio_ij	0.198 ***	0.118 **	0.150 **	0.188 ***	0.160 **	0.211 ***
Diagnostics						
Adj R-sq (weighted)	0.644	0.636	0.597	0.594	0.593	0.594
Jarque-Bera, p-value	0.601	0.800	0.828	0.787	0.865	0.741
Durbin-Watson stat	2.089	2.116	2.132	2.113	2.128	2.074
Correlogram b/	0.171	0.202	0.087	0.123	0.078	0.158
Nr years/industries/obs	15/20/300	15/20/300	15/19/285	15/19/285	15/19/285	15/19/285

Subindex *j* indicates an industry variable and *i* indicates a fixed initial value.
The initial capital/labor ratio corresponds to the average between 1999 and 2001, while the initial US import ratio corresponds to 2002. 2014/2002 indicates the cumulative change between those two years.
US and CHN import ratios are the ratios of intermediate imports from the US and China to the gross production of Mexican industry *j*.
a/ The estimated equations also include the initial ratios without interactions, which in general were not statistically significant (not shown to save space).
b/ Smallest p-value, first three lags.
* $p < 0.10$, + $p < 0.15$
** $p < 0.05$
*** $p < 0.01$

2000 s was highly unequal. Thus, while intermediate imports from the US represented between 10% and 20% of the Mexican industries' gross production, imports from China did not reach even one percent (except in C&E, by a small margin). After China entered the WTO, however, imports from the US (as proportion of gross production) fell in many industries, while those from China increased, indicating an absolute and relative (versus the US) increase in integration of Mexican industries with China.

The plots also show that the initial level but particularly so the change in the US and Chinese import ratios were correlated, in opposite directions, with the Mexican industries' capital/labor ratios. Thus, while the initial level and change in import ratios from China was negatively correlated with the Mexican industries' capital intensity, correlation with the change in US import ratios was positive. This supports the idea that further integration with the US concentrated in industries that were relatively capital intensive, from Mexico's perspective, while the opposite pattern was observed in integration with China.

Next, we explore econometrically whether the origin country of imports mattered for the transmission of the global shock to labor. As mentioned, for this we will re-estimate the labor share equations while replacing, in the interactive terms, total intermediate imports with imports from the US and China. Table 5 shows the results. Column (5.1) begins by including an interaction of the change in the US labor share with the US intermediate import ratio. In the new specification, the interaction with the Mexican industries' capital/labor ratios continues to be positive and highly significant statistically, confirming the central role of capital intensity for the transmission of the global shock to labor. The US import ratio in contrast keeps showing a negative sign, as was the case with the overall intermediate import ratio. Not shown to save space, a similar result is obtained when including the import ratio from China. The results confirm the finding that import intensity did not increase transmission. This may be expected in the case of China, in light of the low import ratios from this country observed in the early 2000 s, but is surprising in the case of the US, given the close integration of Mexican industries with that country.

Results are more promising when including not the initial import ratios but their cumulative change (from 2002 to 2014, as shown in Fig. 5). In particular, the interaction with the cumulative change in the US import ratio does show a positive, statistically

(*footnote continued*)
the beginning of the estimation period in the equations reported below in Table 5 but also to improve the chances of obtaining significant results, given the extremely low import ratios from China observed in 2000. Results however were not affected by this choice (and those using 2000 as initial year are available from the authors upon request).

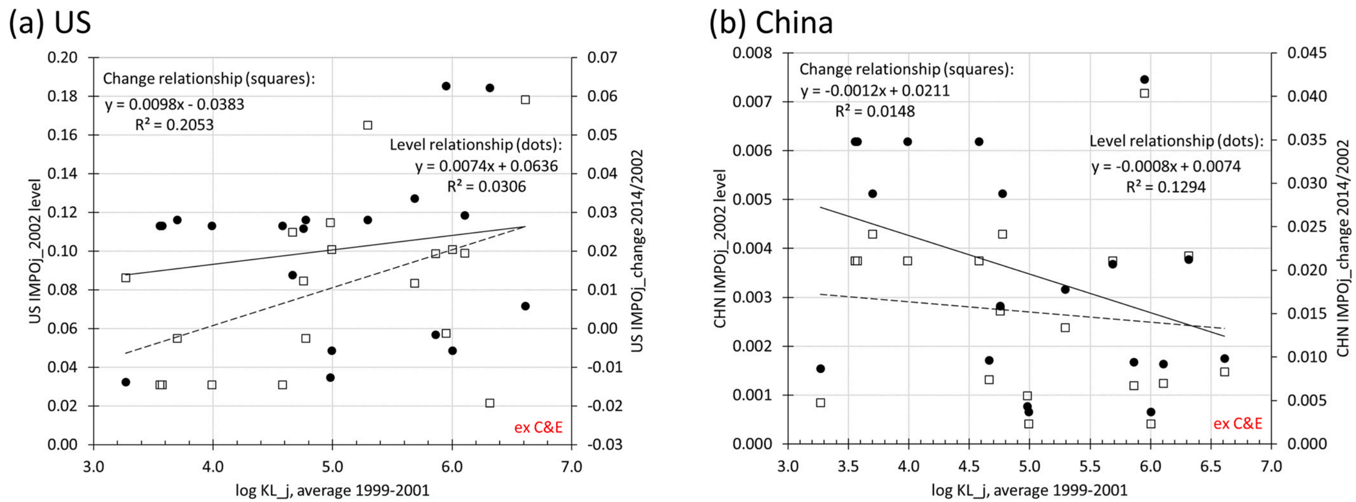

Fig. 5. Initial level and change in intermediate import ratios from US and China versus industries' initial capital intensity. *Note*: Plots exclude the C&E industry.
Source: Authors' calculations with data from WIOD (import ratios) and INEGI KLEMS (capital/labor ratios).

significant coefficient, whether the estimation includes the outlier C&E industry or not (columns 5.2 and 5.3). The interaction with the change in the import ratio from China, in contrast, shows a negative coefficient (column 5.4). The positive coefficient on the interaction with the US import ratio does not simply reflect the change in the overall import ratio (and hence the overall advance of industrial integration), as the interaction with the cumulative change in the overall import ratio also shows a negative coefficient (column 5.6). The results however are not particularly robust, as they become statistically insignificant when the interactions with the US and Chinese import rates are simultaneously included in the equation (column 5.5). In contrast, in all cases, the interaction with the capital/labor ratio remains positive and highly significant statistically.

With the above caveat, the results suggest that an increase in import ratios from the US (rather than their initial level) tended to increase the transmission of the global shock to labor, where the increase in import ratios was concentrated in relatively capital-intensive industries from Mexico's perspective. Interestingly, no such role was played by the increase in import ratios from China, which tended to occur in industries with relatively low capital intensity. Higher import ratios from China were correlated instead with lower transmission of the fall in labor shares.

4. Conclusions

The paper showed that the post-2002 fall in the manufacturing labor share in Mexico reflects a combination of global and domestic factors. The latter include both relatively transitory ones (like the real depreciation of the peso and higher unemployment rates) and others that may be more permanent (like an erosion in union density and informal labor productivity). All of them —except for the peso depreciation, which operates through variations in relative prices— affect the labor share by weakening the bargaining power of labor. A weaker bargaining power could also explain an incomplete and apparently declining pass-through of labor-productivity gains to real wages.

Beyond confirming the influence of domestic factors, the paper focused on the operation of global ones, contrasting the roles of the trade and factor intensity of Mexican industries in the transmission of the China shock to labor. Transmission was measured by the correlation between changes in Mexican and US industry labor shares. Unexpectedly, the paper found no evidence of a significant role played by trade intensity (or by skill and technological intensity), while in contrast capital intensity was key: thus, the higher was the capital intensity of Mexican industries, the closer was the correlation with the (mostly negative) changes in US industry labor shares. Capital intensity in other words increased the vulnerability of Mexican labor to the transmission of the China shock. The results are consistent with the proposition that industrial integration in developing countries involves activities that are capital intensive, and that such integration facilitated the transmission of the global shock to labor.

The results in the paper point to links, discussed elsewhere in the literature, between the pace of economic growth and changes in the functional distributional of income. A slow rate of economic growth, for example, will contribute to the residual expansion of the informal sector, with the latter acting as a reserve of surplus labor. Because of a limited market for its products, the residual expansion of the informal sector may decrease labor productivity and earnings there, putting downward pressure on wages in the formal sector. In this way, a slow rate of economic growth will tend to reduce the overall labor share. The same mechanism implies that the real exchange rate may affect income distribution in opposite directions at different time horizons. A real depreciation, for example, will reduce the labor share immediately, as shown in the paper. Over time, however, the depreciation may accelerate the rate of economic growth (particularly in tradables), which will absorb surplus labor and reduce the size of the informal sector, with positive effects on formal wages and the labor share (see Ros, 2013 for a formal analysis).

In addition to the links between growth and income distribution, the results in the paper suggest for future research at least two potentially interesting questions. First: why did straightforward measures of outward orientation like import and export ratios not play a significant role in the transmission of the global shock? Given the robust conditioning effect found for capital intensity, the irrelevance of trade ratios seems surprising. And second: what factors explain —after controlling for a wide set of industry, macro and institutional determinants— the incomplete and perhaps weakening pass-through of labor productivity to real wages? Future research could explore, for example, whether pass-through is also affected by the trade and factor intensity of industries.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ecosys.2022.101007.

References

Autor, D.H., Dorn, D., Hanson, G.H., 2021. On the persistence of the China shock, NBER working paper 29401, October.
Autor, D.H., Dorn, D., Katz, L.F., Patterson, C., van Reenen, J., 2017. The fall of the labor share and the rise of superstar firms, NBER working paper 23396, May.
Bivens, J., Mishel, L., 2015. Understanding the historic divergence between productivity and a typical worker's pay, Briefing Paper #406, Economic Policy Institute, September.
Blecker, R.A., 2016. Integration, productivity, and inclusion in Mexico: a macro perspective. In: Foxley, A., Stallings, B. (Eds.), Innovation and Inclusion in Latin America: Strategies to Avoid the Middle Income Trap. Palgrave Macmillan, New York, pp. 175–204.
Bosch, M., Manacorda, M., 2010. Minimum wages and earnings inequality in urban Mexico. Am. Econ. J. Appl. Econ. 2 (4), 128–149.
Chortareas, G., Noikokyris, E., 2021. Investment and labor shares. Econ. Change Restruct. 54, 807–820.
Dao, M.C., Das, M., Koczan, Z., 2019. Why is labour receiving a smaller share of global income? Econ. Policy 34 (100), 723–759.
De Souza, J.P.A., 2017. Real wages and labor-saving technical change: evidence from a panel of manufacturing industries in mature and labor-surplus economies. Int. Rev. Appl. Econ. 31 (2), 151–172.
Doan, H.T., Wan, G., 2017. Globalization and the labor share in national income, ADBI working paper 639, January.
Elsby, M., Hobijn, B., Sahin, A., 2013. The decline of the US labor share. Brook. Pap. Econ. Act. 1–63 (Fall).

Feenstra, R.C., Hanson, G.H., 1997. Foreign direct investment and relative wages: evidence from Mexico's maquiladoras. J. Int. Econ. 42, 371–393.
Giannoni, M., Mertens, K., 2019. Outsourcing, markups and the labor share," Federal Reserve Bank of Dallas and CEPR working paper, March.
Grossman, G.M., Oberfield, E., 2021. "The elusive explanation for the declining labor share", NBER working paper 29165, August.
Gupta, P., Helble, M., 2021. Adjustment to trade opening: the case of labor share in India's manufacturing industry. J. Int. Trade Econ. Dev. Adv. Online. https://doi.org/10.1080/09638199.2021.1949379
Harrison, A.E., 2005. Has globalization eroded labor's share? Some cross-country evidence, working paper, April.
Hung, J.H., Hammett, P., 2016. Globalization and the labor share in the United States. East. Econ. J. 42, 193–214.
Ibarra, C.A., 2019. Technical and structural change, and the fall in the manufacturing output–capital ratio in Mexico, 1990–2015. Camb. J. Econ. 43 (3), 649–675.
Ibarra, C.A., Ros, J., 2019. The decline of the labor income share in Mexico, 1990–2015. World Dev. 122, 570–584.
Karabarbounis, L., Neiman, B., 2014. The global decline of the labor share. Q. J. Econ. 129 (1), 61–103.
López, J., Malagamba-Morán, A.S., 2017. The wage-share in an open economy. Discussing Mexico's experience. Metroeconomica 68 (4), 833–858.
Marquetti, A.A., 2004. Do rising real wages increase the rate of labor-saving technical change? Some econometric evidence. Metroeconomica 55 (4), 432–441.
Mendieta-Muñoz, I., Rada, C., von Arnim, R., 2020 The decline of the US labor share across sectors, INET working paper 105, July.
Onaran, O., 2009. Wage share, globalization and crisis: the case of the manufacturing industry in Korea, Mexico and Turkey. Int. Rev. Appl. Econ. 23 (2), 113–134.
Petach, L., Tavani, D., 2020. Income shares, secular stagnation and the long-run distribution of wealth. Metroeconomica 71, 235–255.
Robertson, R., 2018. Are Mexican and US workers complements or substitutes? Mission Foods Tex. -Mex. Cent. Res. 3 (October).
Ros, J., 2013 "Demand-driven technical change, the real exchange rate, and growth," chapter 11 in Ros, J., Rethinking Economic Development, Growth, and Institutions, Oxford, UK: Oxford University Press, 246–258.
Stansbury, A., Summers, L.H., 2020. "The declining worker power hypothesis: an explanation for the recent evolution of the American economy," NBER working paper 27193.
Stockhammer, E., 2013. Why have wage shares fallen? A panel analysis of the determinants of functional income distribution, Conditions of work and employment. series 35.
Stockhammer, E., 2017. Determinants of the wage share: a panel analysis of advanced and developing economies. Br. J. Ind. Relat. 55 (1), 3–33.
Taylor, L., 2020. Macroeconomic Inequality from Reagan to Trump: Market Power, Wage Repression, Asset Price Inflation, and Industrial Decline (Studies in New Economic Thinking, p. I). Cambridge University Press, Cambridge.
Van Treeck, K., Wacker, K.M., 2020. Financial globalisation and the labour share in developing countries: the type of capital matters. World Econ. 43, 2343–2374.
Wang, T., Tian, J., 2020. Recasting the trade impact on labor share: a fixed-effect semiparametric estimation study. Empir. Econ. 58, 2465–2511.