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The decline of the labour share in Mexico

1990–2015

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Abstract: This paper studies the decline of the labour share in Mexico during the period 1990–2015. It calculates the wage share and alternative measures of the labour income share (which includes labour income of the self-employed) for the whole economy, the private business sector, and its major economic sectors. It carries out a shift–share analysis showing that the decline in the labour share is mostly explained by reductions within the economy's major sectors (including within manufacturing, tradables, and non-tradables) rather than by a recomposition of value added towards those with low labour shares. It distinguishes within each major area of economic activity a modern wage-employment sector and an informal self-employment one. In contrast to agriculture—where the labour share fell due a shift of labour force towards the wage-employment sector—in other major areas of the economy the fall in the labour share is explained by reductions within the wage-employment sector. Econometric estimations indicate that parallel declines in the wage share and relative productivity of non-tradables and in the US manufacturing labour share all played a large role in the reduction of the manufacturing wage share in Mexico. More generally, the analysis suggests that the lagging productivity of the informal non-tradable sector of the economy—itself a reflection of the country's low aggregate rate of economic growth—is a crucial factor in the fall of the labour share in the formal sectors. The paper concludes by discussing possible explanations for the paradox of the slow rate of economic growth in Mexico despite the rise in the profit share, and by pointing out remaining challenges for reconciling the different sources of data in the calculation of the labour share in Mexico.

Keywords: wage share, labour income share, shift–share analysis, tradable and non-tradable sectors, manufacturing, Mexico
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1 Introduction

Like many other developed and emerging countries, Mexico has featured for more than three decades a long-term decline of the labour income share. The wage share in total income fell from about 40 per cent in the mid-1970s to around 28 per cent in 2015. It fell gradually in the second half of the 1970s and then rapidly and deeply during the debt crisis and the adjustment process of the 1980s. With ups and downs—an increase in the early 1990s, a fall during the 1994–95 crisis, and a recovery in the second half of the 1990s—the wage share returned in the early 2000s to its level at the beginning of the 1990s and then resumed a gradual decline since 2003. As we shall see, the available information shows a similar trend for the labour income share since the mid-1990s. What factors account for this downward trend? What sectors of the economy show the sharpest reductions in the labour share and which have been relatively immune? How do these trends relate to the poor growth performance of the economy and its consequences in terms of persistence of informality and poverty? This paper documents the evolution of labour incomes (wages and self-employment incomes) for the period 1990–2015 in an attempt to shed light on these important questions.

More precisely, the paper examines the evolution of the wage and labour income shares in total income in Mexico during the periods 1990–2015 (wage share) and 1995–2015 (labour income share), distinguishing between what has happened in the whole economy, the private business sector, and a number of key sectors. Particular attention is given to the distinction between the tradable sector (particularly manufacturing where the decline in the labour share is most noticeable) and the non-tradable sector (where self-employment incomes are especially important). Besides documenting what has happened using alternative measures of the labour income share, the paper focuses on the following questions: How do labour share trends relate to different mechanisms of price and mark-up determination in various sectors as well as to different determinants of wages and other labour incomes? How have productivity trends affected the evolution of labour shares? And, key to understanding the persistence of the fall in the labour share, why the economy, and particularly the tradable goods sector, has continued since the early 2000s on a low-growth path despite the rising profit share?

In order to address these issues, we combine data from three sources: the Instituto Nacional de Estadística y Geografía (INEGI, National Institute of Statistics and Geography)-KLEMS[1] dataset, Mexico's National Accounts, and national employment surveys. For the period 1990–2015, the INEGI-KLEMS dataset and the National Accounts provide information on wages, employment, value added, intermediate consumption, and capital stocks for a large set of sectors at two and three digits in the National Accounts classification. The Encuesta Nacional de Empleo (ENE, National Employment Survey) and the Encuesta Nacional de Ocupación y Empleo (ENOE, National Survey of Occupation and Employment) provide necessary information to adjust the wage share to obtain the labour income share for the period 1995–2015. More precisely, these employment surveys contain the information to estimate employment and earnings ratios for a smaller number of more aggregated sectors, which allows us to adjust the wage share and estimate the share of labour (including the wage bill and self-employment income) in value added for these sectors.

[1] The abbreviation represents categories of input that industries consume for production of goods and services, and stands for capital (K), labour (L), energy (E), materials (M), and services purchased (S).

The distribution of factor incomes in Mexico has been a neglected topic for quite some time. Previous studies for the past two decades are scarce and have mainly focused on the evolution of the wage share using National Accounts information. Using a Kaleckian analytical framework, Hernández Laos (2000) examines the evolution of the share of wages in non-agricultural gross domestic product for the period 1950–95, showing the rising trend of the wage share from 1950 to the mid-1970s followed by a sharp decline from then to the late 1980s, an increase until 1994 and another sharp drop during the 1995 crisis. Samaniego (2014) presents for the whole economy estimates of the wage share from 1970 to 2012 based on the National Accounts and estimates of the labour income share from the late 1980s to 2012 based on the National Accounts estimates of mixed incomes. For the period 2003–12, Samaniego (2014) adjusts the wage share assuming, alternatively, that 75 per cent of mixed income is labour income and using the Gollin adjustment equating labour income of the self-employed to the income of wage earners.

Ros (2015) examines the evolution of the wage share in total income in Mexico during the period 2003–13, distinguishing between tradable and non-tradable goods sectors. The main stylized fact of the period is that the fall in the wage share is due to an acute reduction of this share in the tradable goods sector, particularly manufacturing, and not to the performance in the non-tradable goods sector where the wage share is approximately constant. This contrast is attributed to differences between sectors in price formation mechanisms together with contrasting labour productivity trends (fast growth in the tradable sector and stagnation, with few exceptions, in the non-tradable sector). Also within a Kaleckian framework, López and Malagamba-Morán (2016) study the evolution of the share of wages in manufacturing value added during the period 1994–2009, and show that the fall in the wage share since the early 2000s had, as counterpart, a rise in the gross profit margin (calculated as the ratio of price to unit variable cost). In econometric estimations for a panel of manufacturing industries, they find that among other variables the profit margin is positively correlated with the real exchange rate (the inverse of the real value of the peso) and the share of manufacturing exports in output. The marked fall in the labour share in Mexico since the early 2000s contrasts with the experience of countries like Argentina, Brazil, or Chile—which had higher and more stable labour shares during the 2000s (see Abeles et al. 2014)—and with the group of emerging market and developing countries as a whole—where the labour share fell in the early 2000s but then recovered (see International Monetary Fund 2017).

The present paper departs from previous studies in the use of a wider set of sources and a more disaggregated analysis. Previous studies are all based on National Accounts data and focus [with the exception of Samaniego (2014)] on the wage share while keeping the analysis at a high level of aggregation. Also, the methodology used in the present paper allows us to estimate alternative measures of the labour income share depending on the assumptions made regarding the labour component of self-employment incomes. Making mutually consistent the National Accounts and employment surveys for 17 sectors of the whole economy and 11 activities of the private business sector, we are able to carry out a more disaggregated analysis than previously attempted and identify the role of inter-sectoral and intra-sectoral changes in the evolution of the labour income share. We also carry out a more disaggregated analysis of the wage share in 20 industries within manufacturing, the sector that leads the fall in the labour income share within the economy as a whole.

The main results can be summarized as follows. Labour shares faced a long-term decline in the tradable and non-tradable sectors, larger for the tradable sector, especially manufacturing, in the case of wage share and similar in the case of labour income share. Intra-industry changes rather than compositional changes (the between-industry component of a shift–share analysis) account for the fall in the labour shares. This is the case both for the private business sector and for the manufacturing industries. The wage share in the wage-employment sectors within each industry

has in turn been the main driver of the evolution of sectoral labour income shares (with the exception of agriculture and commerce where the wage-employment ratio plays a significant role).

The fall in the aggregate labour income share over the past two decades is associated with the following major trends. A first trend is a decline in the labour income share in agriculture in the context of a stable wage share in its wage-employment sector. The decline is the result of a falling share of self-employment incomes caused by the reallocation of labour force towards the wage-employment sector, with a lower labour share in the context of a wide and increasing productivity differential in favour of the wage-employment sector. A second trend is the acute fall in the wage share in manufacturing (overall and in the wage-employment sector). Econometric analysis allows us to assess the main contributors to this decline, and suggests that the fall in the wage share and relative productivity in the non-tradable sector together with the decline of the US manufacturing labour share are the most robust determinants.

The third trend is a decline of the wage share in the wage-employment sector of non-tradable activities, more moderate than in manufacturing, determined by the steady increase (especially after 2001) in the productivity differential between the modern and informal subsectors of non-tradable activities in the context of a stable aggregate earnings differential between these subsectors. The rising productivity differential is in turn the result of an increasing productivity level in the wage-employment sector, a cumulative 25 per cent increase from 1995 to 2015, together with stagnant productivity in the self-employment sector, in fact a cumulative decline of the order of 3 per cent over the same period. One implication of these trends taken together is that a major factor behind the fall in the wage shares in the formal sectors of the economy has been the poor performance of labour productivity in the informal sectors of the economy. This poor performance is behind the rising productivity differential between formal and informal sectors in the non-tradable sector, which is a factor in the falling adjusted wage share in non-tradables and also in the falling relative productivity of the non-tradable sector vis-à-vis manufacturing which is partly responsible for the fall in the manufacturing wage share.

The paper is divided into four sections besides this introduction. The second section describes the methodology and discusses the data sources and problems faced in constructing alternative estimates of the labour shares. It also presents these estimates for the whole economy, the private business sector, and a number of key sectors together with the main stylized facts of the period regarding the evolution of the labour shares. The third section presents a shift–share analysis for the private business sector and manufacturing that disentangles the role of inter-sectoral and intra-sectoral change in the evolution of labour shares. The fourth section looks at the determinants of the labour income shares and offers an explanation of the stylized facts by looking at the mechanisms of price and mark-up determination and the determinants of wages in different sectors of the economy. The fifth section concludes by assessing future work in terms of improving the measurement of the labour income shares and deepening our understanding of its evolution. In particular, it highlights the paradox—which is key to understanding the persistence of the fall in the labour share—of why the economy, and particularly the tradable goods sector, has continued since the early 2000s on a low growth path despite the rising profit share. Two annexes present details on the methodology and the analytical framework used.

2 Evolution of the labour income share in Mexico

2.1 Methodology

The relationship between the labour income share (*LIS*) and the wage share in value added ($WS = W/VA$) in a given sector can be shown as:[2]

$$LIS = \left[(1-a) + aL/L_w\right] WS = \left(1 + aL_s/L_w\right) WS \quad (1)$$

where W represents the nominal wage bill in the National Accounts (which includes the earnings of subordinated workers, both wage and non-wage earners), VA represents the nominal value added in the National Accounts, L represents total employment in ENE and ENOE (after subtracting employers and non-remunerated workers), L_w represents employment of subordinated workers in ENE and ENOE (including wage and non-wage earners), L_s represents self-employed (*cuenta propia*) in ENOE, L_w/L represents wage-employment ratio, and a represents the ratio of labour earnings per hour of the self-employed to earnings per hour of subordinated workers.

Two methods were followed to obtain the labour income share per sector.

*2.1.1 Method 1 (*LIS1*): $a = 1$*

This method assumes that labour earnings of the self-employed in a given sector are equal to earnings of subordinated workers. In this case, $a = 1$ and the expression above reduces to $LIS = (L/L_w)\, WS = (1 + L_s/L_w)\, WS$. Adjusting for differences between subordinated workers and self-employed in hours worked implied multiplying L_s/L_w by the ratio b, equal to hours worked per employee in the self-employment sector to hours worked per employee among subordinated workers.

*2.1.2 Method 2 (*LIS2*)*

This method attributes all the earnings of the self-employed to the contribution of labour. In this case, a is the ratio of earnings per hour of the self-employed to earnings per hour of subordinated workers in the same sector, which can be obtained from ENE and ENOE. Again, adjusting for differences in hours worked implies multiplying L_s/L_w by the ratio b.

We also obtained an alternative measure of *LIS2*, which we call *LIS3*. In this measure, available only for 2005–14, we imputed missing labour earnings in order to adjust for the apparently increasing underreporting of labour incomes in ENOE. For this, we used the hot-deck imputation procedure described by Campos-Vázquez (2013), which takes into account gender, age, education, and location groups to impute earnings to workers that do not answer the labour earnings question. This led to an alternative estimate of ratio a that we used in estimating *LIS3*.[3]

Sectoral information is directly available from ENOE for 11 sectors and can also be constructed at a more disaggregated level for 17 sectors based on the North American Industry Classification

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[2] This expression is obtained as follows: $LIS = [wL_w + aw(L - L_w)]/VA = [(1 - a)wL_w + awL]/VA = (1 - a)W/VA + awL/VA = (1 - a)W/VA + awL_wL/VAL_w = (1 - a)W/VA + a(W/VA)(L/L_w) = [(1 - a) + aL/L_w]W/VA$, where w is earnings per hour of subordinated workers.

[3] We are very grateful to Luis Monroy Gomez-Franco for providing us with the estimate of ratio a by sector using the hot-deck imputation procedure.

System (NAICS), or Sistema de Clasificación Industrial de América del Norte (SCIAN,[4] in Spanish). We opted for this more disaggregated classification that involved homologating the information of the National Accounts with that of ENOE for the period 2005–15, and with that of ENE for 1995–2004, on the basis of NAICS (see Annex A). The aggregate labour income share is obtained by adding up the labour incomes ($LI = LIS \times VA$) of all relevant sectors and estimating its share in total value added.

We estimated two aggregate labour income shares. One refers to the economy as a whole and the second, which will be our main focus, refers to what may be loosely called the private business sector, which includes 11 activities and excludes a number of sectors from the whole economy. The main adjustments involved the exclusion of (i) real-estate services, where value added is largely reported as capital income and results from the imputation of owner-occupied housing in the National Accounts; (ii) public administration and social services, which are mostly provided by the public sector, where value added, as measured in the National Accounts, is almost equal to the sum of labour costs; and (iii) mining, electricity, and oil and coal derivatives (sector 324 in the National Accounts), which are also largely dominated by the public sector and public sector industries and services (see Annex A for details).

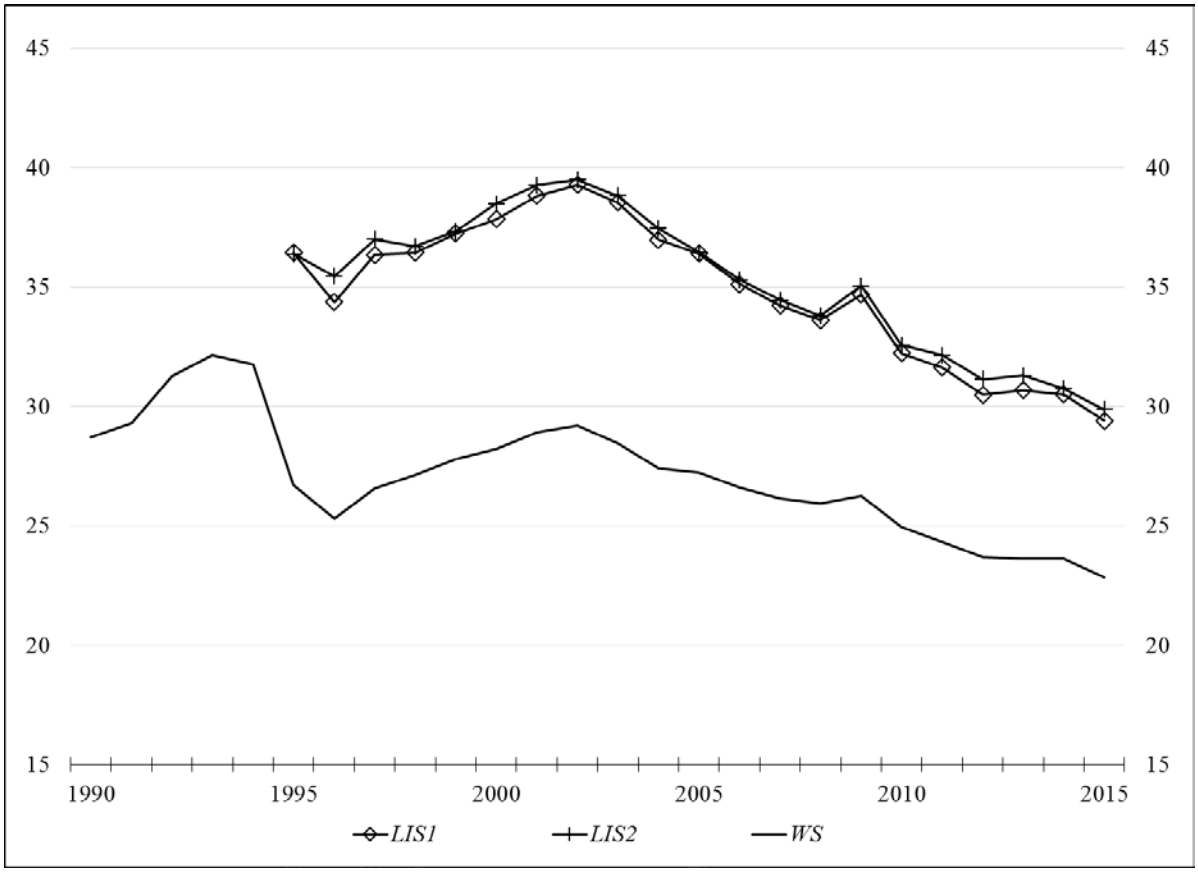
2.2 Aggregate wage and labour income shares

Figure 1 shows the wage share since 1990 and the labour income shares *LIS1* and *LIS2* since 1995, while Annex Figure A1 shows *LIS3* since 2005, all in the private business sector. *LIS1* and *LIS2* behave very similarly in their levels, trends, and fluctuations, suggesting that in the aggregate self-employment earnings per hour are very similar to earnings of subordinated workers.[5] While also behaving in a similar way, *LIS3* shows a slightly higher level, which suggests that underreporting of labour earnings is marginally higher among the self-employed than among subordinated workers. All the alternative measures recorded a downward trend during the periods covered. The wage share fell from 28.7 per cent in 1990 to 22.8 per cent in 2015, after reaching a peak of 31.8 per cent in 1994. *LIS1* fell from 36.4 per cent in 1995 to 29.4 per cent in 2015, a larger 7 percentage point drop, with *LIS2* falling by a similar amount.

[4] Sistema de Clasificación Industrial de América del Norte (SCIAN) is the Industrial Classification System of North America, common to Canada, Mexico, and the United States.

[5] As can be seen from Figures 2 and 3, and Annex Tables A8 and A10, self-employment earnings are inferior to wages in the tradable sector (particularly in agriculture, Figure 2 and Annex Tables A8 and A10, as *LIS2* is less than *LIS1*) whereas the opposite happens in the non-tradable sector (Figure 3, which shows that *LIS2* is there greater than *LIS1*).

Figure 1: Wage and labour income shares in the private business sector, 1990–2015



Source: Authors' calculation based on data from INEGI. See Equation (1) and Annex section A1 for details.

For comparative purposes, Annex Tables A5–A8 show the evolution of the wage share and *LIS1* for the whole economy and the private business sector. As it turns out, the wage share in the private business sector follows that of the whole economy very closely, although the downward trend is more marked in the case of the private business sector. The similarity is due to the fact that some of the sectors excluded to estimate the wage share in the private business sector (oil and real estate) have very low wage shares whereas others (social and government services) have very high wage shares, thus compensating the absence of the former.

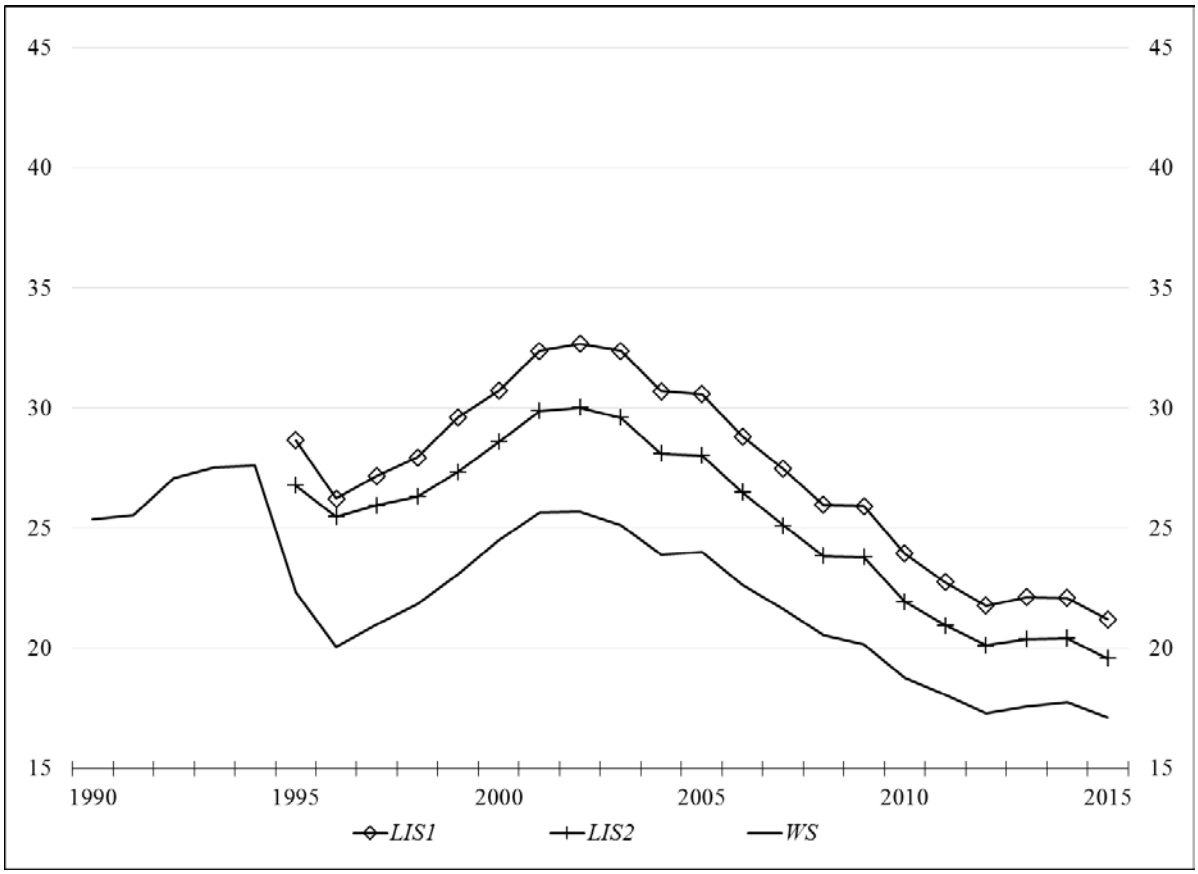
LIS1 in the private business sector also follows that in the whole economy closely, although at a higher level. This is because self-employment income is relatively unimportant in the sectors excluded when estimating the labour shares in the private business sector. At the end of the period, the labour income share of the whole economy turns out to be higher than that of the business sector, which is consistent with the gap in the wage share that opens up from 2001 onwards in favour of the whole economy. This implies that the downward trend of the labour income share is more marked in the business sector than in the whole economy, similar to what happens for the wage share. Identical conclusions apply to a comparison of *LIS2* in the private business sector and the whole economy (Annex Tables A9 and A10).

2.3 Tradables and non-tradables in the private business sector

Similarly to what is observed in the aggregate, the labour share in the tradable and non-tradable sectors faced a long-term decline, although the role of wages and self-employment incomes in accounting for the decline differs in the two sectors. Between 1990 and 2015, the wage share declined by more in the tradable (8.3 percentage points) than in the non-tradable (5.4 points)

sector. The labour share, in contrast, shows a similar decline (of more than 7 points during 1995–2015) in both sectors (see Figures 2 and 3).[6] In turn, the fall in the labour share in the tradable sector is mainly determined by what happens in manufacturing, where the wage share records a 11.4 percentage point drop from 1990 to 2015 and *LIS1* a 6.7 percentage point fall from 1995 to 2015 (and a 11.9 point drop from its peak in 2002 to 2015; see Figure 4). In agriculture, by contrast, the wage share is relatively stable at around 16 per cent from 1990 to 2015, whereas the drop (of the order of 8 percentage points) in the labour income share is driven by the increase in the wage employment ratio (more on this below; see Annex Tables A6, A8, and A10).

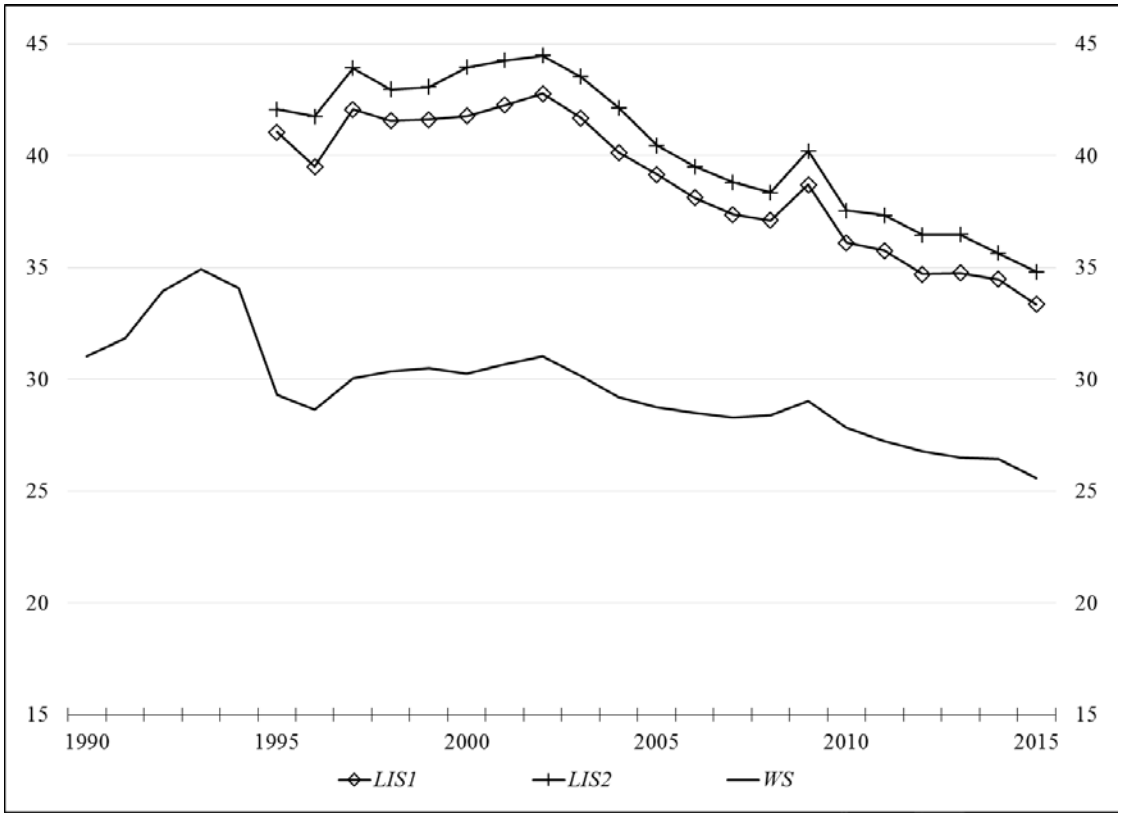
Figure 2: Wage and labour income shares in the tradable sector, 1990–2015



Source: Authors' calculation based on data from INEGI. See Equation (1) and Annex section A1 for details.

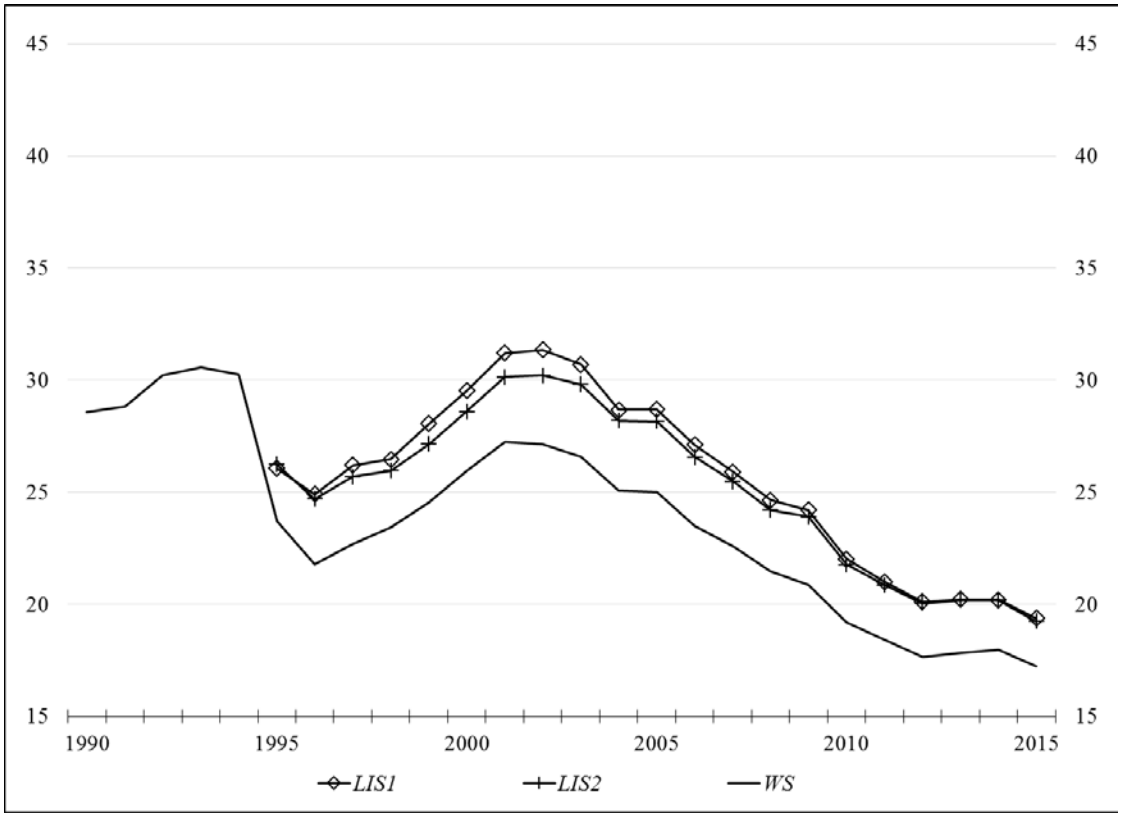
[6] *LIS3* behaves similarly to *LIS2* in both the tradable and non-tradable sectors (not shown).

Figure 3: Wage and labour income shares in the non-tradable sector, 1990–2015



Source: Authors' calculation based on data from INEGI. See Equation (1) and Annex section A1 for details.

Figure 4: Wage and labour income shares in manufacturing, 1990–2015



Source: Authors' calculation based on data from INEGI. See Equation (1) and Annex section A1 for details.

In the non-tradable sector, we find two main different patterns. First, the bulk of the non-tradable sector features relatively stable or moderate declines in wage shares and slightly larger falls in labour income shares. This is the case of the largest sectors, namely, construction and commerce (although commerce shows significant fluctuations), together with transport and warehousing, accommodation and food services, and other services (see Annex Tables A6, A8, and A10). In these sectors, self-employment income, declining as percentage of value added throughout the period, represented (measured by method 2) around 10 per cent of value added in construction, commerce, and accommodation and food services, 8 per cent in transportation and warehousing, and 13 per cent in other services at the end of the period. These sectors, in particular commerce and construction, account for the overall pattern of moderate reductions in wage shares together with larger declines in the labour income shares. Second, sectors with very small presence of self-employment—information, and finance and insurance—record drops in the wage and labour shares, very sharp in the first sector (similar to manufacturing) and very moderate in the second one. Large drops in the wage and labour shares also take place in professional, scientific, and technical services and, less sharply, in arts, entertainment, and recreation.

3 The role of composition effects and intra-sectoral changes

3.1 Analysis for the private business sector

The shift–share methodology allows us to decompose the change in a given variable into the contribution of changes of that variable within sectors and changes in sectoral composition. In the case of the labour share, a shift–share decomposition would be:

$$LIS_t - LIS_{t-1} = \sum va_i \sim \left(lis_{it} - lis_{it-1}\right) + \sum \left(va_{it} - va_{it-1}\right) lis_i \sim \qquad (2)$$

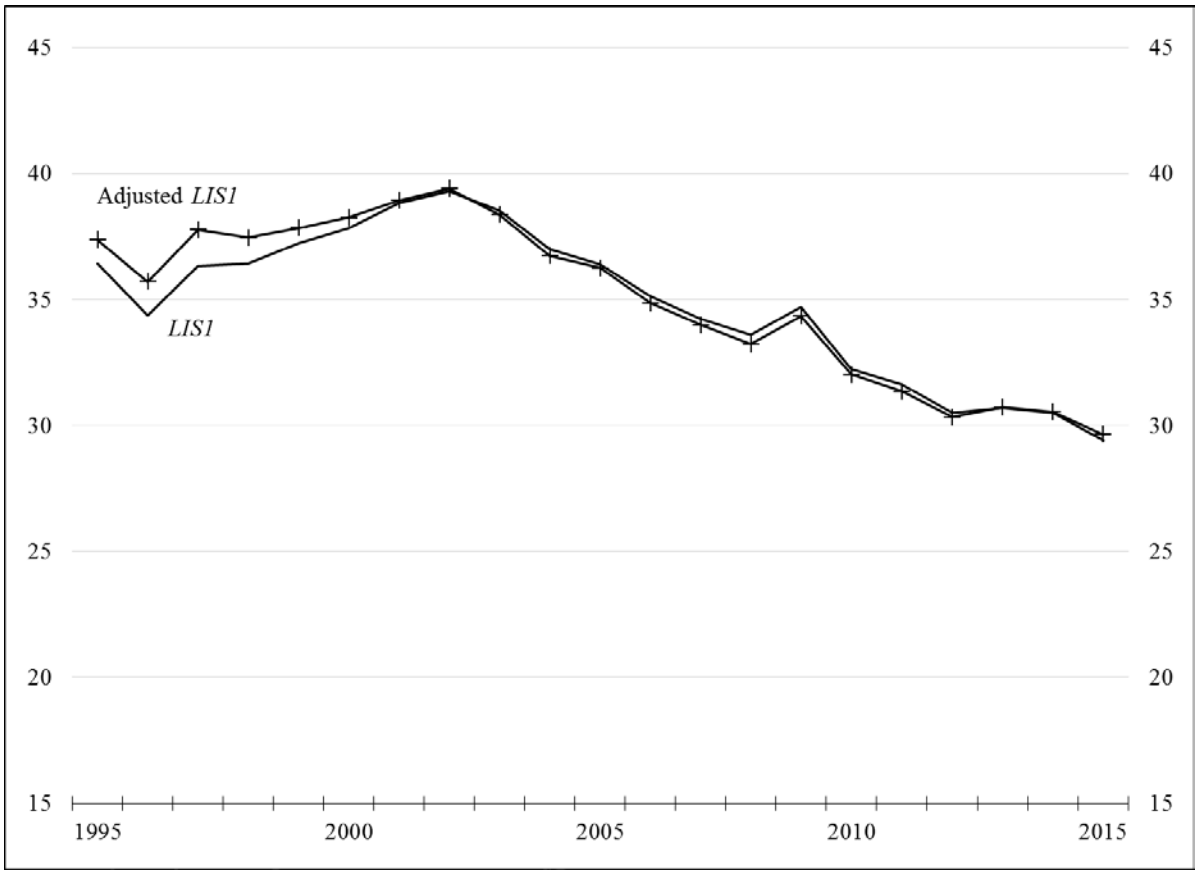
where *LIS* and *lis* refer to the aggregate and sector labour income shares, respectively, va_i is the share of sector *i* in nominal value added, and a tilde represents averages between the start and end dates (see de Serres et al. 2002; OECD 2012). The first term on the right-hand side is the weighted sum of the change in wage shares within sectors, i.e. a weighted average of *within-industry* changes in the labour income share (the shift component). The second term represents the effect of the change in the weights of each sector, i.e. the contribution of sectoral reallocation across industries with different labour shares (the share or *between-industry* component, or compositional effect).

The effect of compositional changes and intra-industry changes in the labour income share can be gauged by comparing the observed labour income share with an alternative aggregate measure obtained by keeping constant the sectoral weights at their average value. This adjusted labour income share is thus estimated year by year as $ALIS = \sum va_i \sim lis_i$, where $va_i \sim$ is the average value of the share of sector *i* in nominal value added during the whole period.

Figure 5 shows the observed and adjusted values for *LIS1* for the period 1995–2015, using the sectoral disaggregation presented in Table 1. As can be seen, the adjusted labour share replicates very closely the evolution of the observed labour share, suggesting that the between-industry component, due to compositional change, has been relatively unimportant. The same conclusion applies to *LIS2* (not shown). The result can be explained by a relatively stable industry structure together with the fact that the process of resource reallocation has taken place not between sectors with high labour shares and sectors with low labour shares but rather among sectors with a relatively high labour income share. More precisely, reallocation has taken place from agriculture, manufacturing, accommodation and food services, and other services towards construction,

commerce, transportation and warehousing, and professional, scientific, and technical services. Most, although by no means all, of these sectors feature higher than average labour income shares at the start and end of the period.

Figure 5: Observed and adjusted aggregate labour income share (*LIS1*), 1995–2015



Source: Authors' calculation based on data from INEGI. See Equation (2) and Annex section A1 for details.

Table 1: Sectoral shares in value added and labour income shares (private business sector)

	Share in value added (%)		*LIS1* (%)		*LIS2* (%)	
	1995	2015	1995	2015	1995	2015
Agriculture	7.3	5.1	39.2	31.0	29.0	21.4
Manufacturing	29.8	27.3	26.1	19.4	26.2	19.2
Construction	9.5	11.6	53.7	49.9	58.6	51.7
Commerce	23.8	26.5	36.4	24.5	32.4	25.4
Transportation and warehousing	8.7	9.9	40.1	36.5	45.3	37.7
Information	3.0	3.2	33.7	25.3	33.9	25.2
Finance and insurance	6.1	5.5	31.5	27.4	31.5	27.7
Professional, scientific, and technical services	2.4	3.5	63.9	42.0	72.8	47.8
Arts, entertainment, and recreation	1.0	0.7	37.5	30.3	39.5	34.1
Accommodation and food services	4.3	3.6	37.9	30.3	41.0	32.5
Other services	4.0	3.2	51.0	49.5	58.7	52.5
Total	100.0	100.0	36.4	29.4	36.4	29.9

Source: Authors' calculation based on data from INEGI. See Equation (1) and Annex section A1 for details.

3.2 Wage share in the manufacturing sector

In the case of the manufacturing sector, we focus on the wage share (rather than on the labour income share) as this gives us a longer period of analysis (1990–2015) and a higher level of disaggregation without much analytical loss, given the small and stable share (of between 15 and 18 per cent) of self-employment in this sector. The fall in the manufacturing wage share took place in two phases. In an early one, from 1990 to 2002, the wage share fluctuated widely without following a marked trend: it increased moderately in the early 1990s, fell sharply after the currency crisis of 1994–95, and began to recover gradually in 1997—although without returning to its early-1990s levels. In a late phase, in contrast, from 2003 to 2015, the wage share fell steadily, accumulating a loss of nearly 10 points.

To decompose these changes, we use a more disaggregated version of the shift–share formula, namely,

$$\Delta WS = \Sigma_j va_{j0} \Delta ws_j + \Sigma_j ws_{j0} \Delta va_j + \Sigma_j \Delta ws_j \Delta va_j \qquad (3)$$

where Δ indicates the change during the period, ws_j is the wage share in manufacturing industry j, and va_j is the share of industry j in nominal manufacturing value added, and where now the formula uses the initial values of the variables instead of their averages as weights (see Elsby et al. 2013). The first two terms on the right-hand side measure the change in the manufacturing wage share due to changes in the wage share within each manufacturing industry (the shift effect) and the composition of value added by industry (the share effect). The third term, a covariance component, captures the joint effect of changes in the wage share within industries and in the industry composition of value added; this term will be negative if, for example, the wage share falls in industries whose contribution to manufacturing value added is rising (e.g. see Vollrath 2016).

For the analysis, the manufacturing sector was disaggregated into 20 industries at the three-digit level,[7] and calculations were carried out for the whole 1990–2015 period and its two main phases. Table 2 presents the results. For the whole period, the shift component is by far the largest one, accounting for 9.9 points of the total fall of 11.3 points in the wage share and reflecting a widespread decline in the wage share across industries. Large contributions came from transportation equipment and non-metallic minerals (due to a large fall in their wage share), and from food products and chemicals (due to their large share in manufacturing value added).[8] The share component, in contrast, is irrelevant in the aggregate, with positive and negative contributions at the industry level tending to offset each other. The remaining two points of the fall in the manufacturing wage share are explained by a negative covariance effect, concentrated in one industry (transportation equipment), which combined the largest gain in share of manufacturing value added (12 percentage points) with the largest decrease in wage share (a remarkable 23 points).

[7] Here, as in the rest of the paper, subsector 324 (petroleum and coal products) was excluded from the manufacturing sector.

[8] To save space, the tables disaggregated by industry are not shown but they are available from the authors upon request.

Table 2: Shift–share analysis for the manufacturing wage share, 1990–2015

Period	(1)	(2)	(3)	(4)	(5)	(6)
	Wage share in initial year (%)	Cumulative change in wage share (percentage points)	Shift component	Share component	Covariance term	Total[a]
1990–2015	28.6	–11.3	–9.9	0.4	–1.8	–11.3
1990–2002	28.6	–1.4	–0.2	0.0	–1.2	–1.4
2002–15	27.2	–9.9	–9.2	–0.2	–0.5	–9.9

Note: [a]Equal to the horizontal sum of columns (3) to (5) and to the sum of the individual total across the 20 manufacturing industries (not shown).

Source: Authors' calculations based on data from KLEMS. See Equation (3).

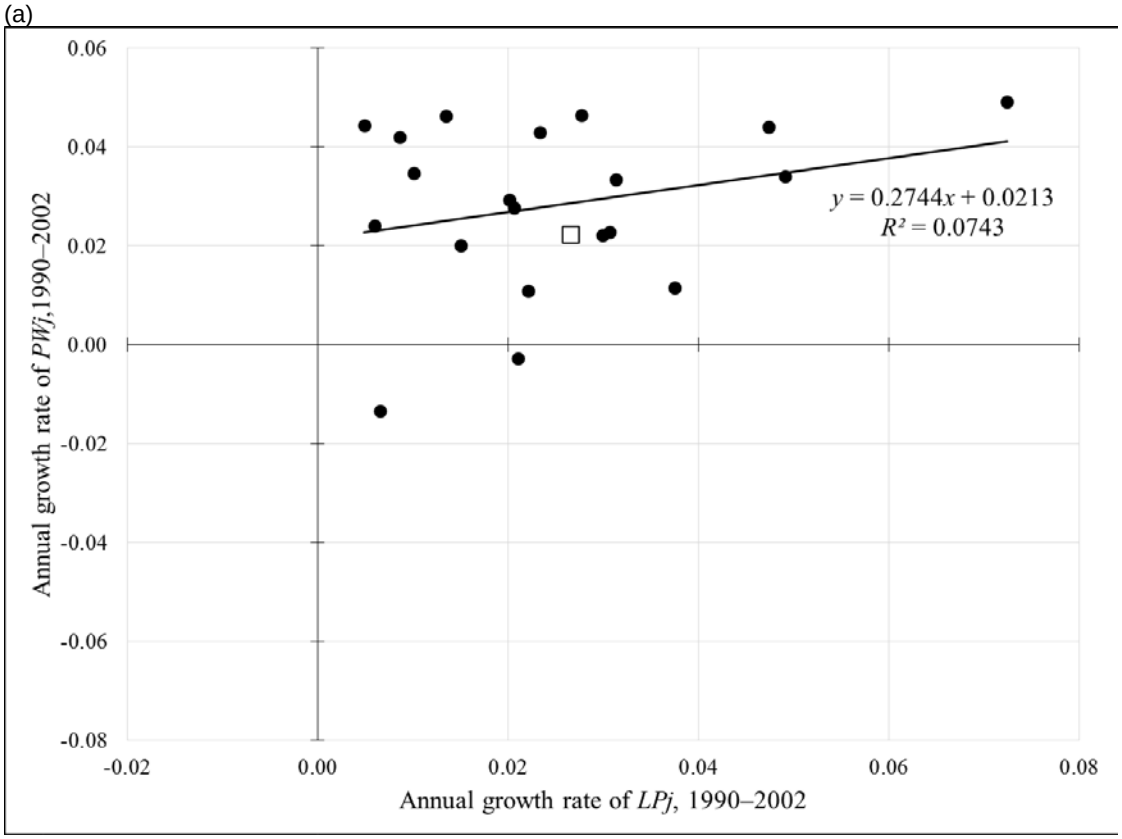
The change in the wage share over the whole period hides sharp differences between the early and late phases. As already pointed out, during the early phase there was no major (cumulative) change in the manufacturing wage share, which recorded a fall of only 1.4 points. However, behind the small aggregate change, there were large but mostly offsetting changes across industries, with relatively large falls (of about 10 points) in leather products and transportation equipment, and increases (also of about 10 points) in textiles, metallic products, and electrical appliances. Although the offsetting changes in the wage share across industries during this phase suggest the presence of idiosyncratic factors, it is also true that the short-term fluctuations in the aggregate share appear to follow the evolution of macroeconomic variables like the real exchange rate (see below).

In contrast, during the late phase the wage share fell in all but one industry (computing and electronics). In many industries the fall was larger than 10 points. The widespread reductions suggest that the fall in the wage share reflects the operation of macroeconomic forces rather than industry-specific shocks. Consistent with this view, the shift component accounts for most of the fall in the wage share (9.2 points out of 9.9). Standing out are the contributions of transportation equipment (due to a large fall in wage share and its high contribution to manufacturing value added), and food products and chemicals (due to their large contribution to value added).

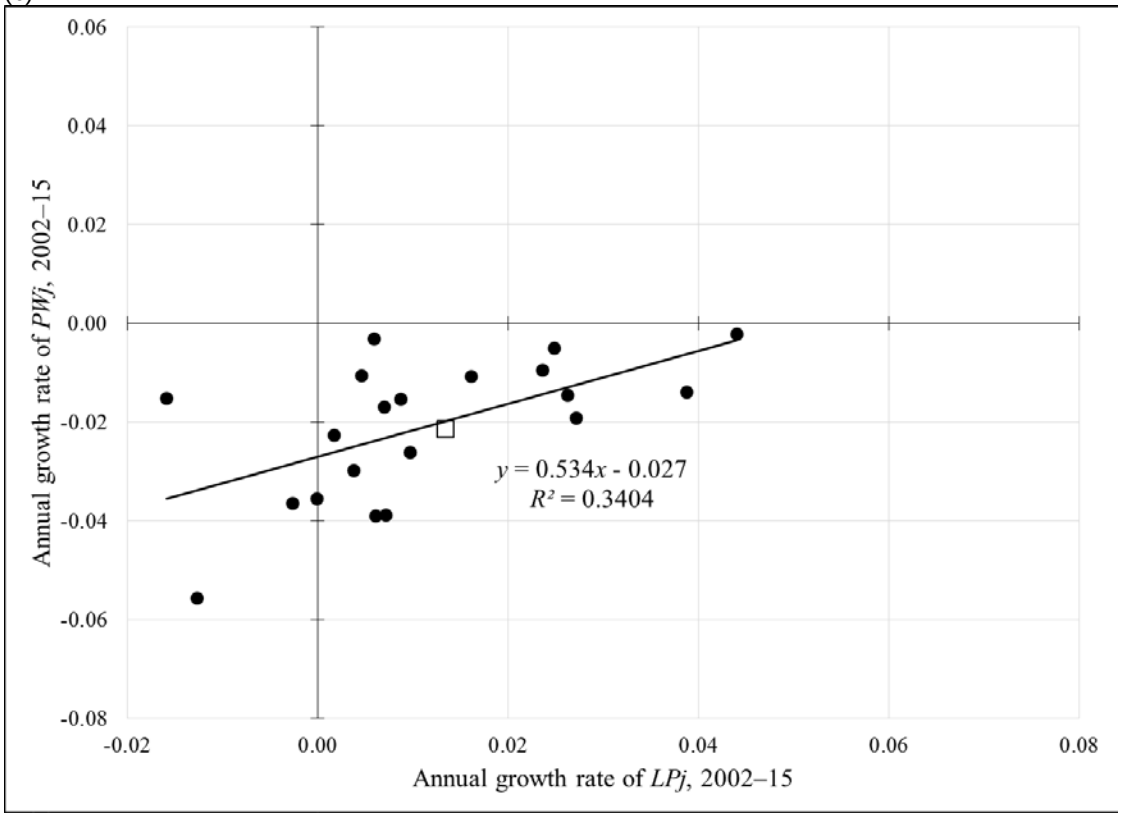
By definition, the reduction in the wage share within the manufacturing industries reflects a negative gap between the growth of the product wage (i.e., the wage deflated the sector's price index) and labour productivity. Indeed, as shown by the scatter plots in Figure 6, the relationship between these two variables changed between the early and late phase. In both phases, the growth rates of labour productivity and product wage are positively correlated across industries, so that the increase in the product wage tends to be larger in industries where the increase in labour productivity is also large. In the late phase, however, there is a distinct downward shift in the schedule linking the growth of the two variables, so that the product wage decreased in most industries regardless of the pace of increase in productivity. In other words, the growth of productivity was not transmitted to the product wage. As we will see, this downward shift coincided with erosion in the productivity of self-employment activities within the non-tradable sector and also a sharp fall in the labour share in the US manufacturing sector.

Figure 6: Product-wage and labour-productivity growth rate in the manufacturing industries: (a) 1990–2002; (b) 2002–15

(a)



(b)



Notes: Points on the scatter plot represent geometric growth rates for 20 manufacturing industries. The square marker corresponds to the manufacturing sector as a whole.

Source: Authors' calculations based on data from INEGI-KLEMS.

3.3 Intra-sectoral change in the labour income share

Given that the within-industry factor is the main component behind the fall in the aggregate labour income share, we now investigate the proximate determinants of the fall in the labour income share within each economic activity. For this, we can think of each industry consisting of a wage-employment and a self-employment sector (see the model in Annex B). The labour income share can then be decomposed as follows:[9]

$$LIS = 1 - (1 - AWS)(L_w / L)(p_w / p) \quad (4)$$

where AWS is the wage share within the wage-employment sector (W/VA_w, what we call the adjusted wage share), L_w/L is the share of subordinated workers in total employment (or wage-employment ratio), and p_w/p is the ratio of the productivity of the wage-employment sector (p_w) to average sector labour productivity (p). Since AWS is less than 1, increases in L_w/L and p_w/p tend to reduce LIS.

Thus, the change in the labour income share can be seen as a result of three forces. First, a change in the wage share within the wage-employment sector, which has to be attributed to the fact that the product wage in this sector grew at a different pace than labour productivity. Second, a change in the wage-employment ratio, resulting from a reallocation of labour force between self-employment and wage employment within the industry, which to the extent that the labour share is lower in the wage-employment sector than in self-employment will result in a change in the sector's overall labour income share. Third, given the wage share in the wage-employment sector and the wage-employment ratio, a change in the productivity differential between the two sectors will also affect the labour income share. A lower productivity in the self-employment sector, for example, will tend to depress self-employment income and the labour income share.

The role of these forces can be gauged by looking at the evolution of the adjusted wage share, which can be estimated as the ratio of the wage bill to value added excluding self-employment income: $AWS = W/[VA - (LI - W)]$, where as before AWS is the adjusted wage share, W the wage bill, VA the industry value added, and LI labour incomes (estimated from *LIS2* so that $LI - W$ is self-employment income[10]). If, for example, the adjusted wage share in a given industry with a falling labour income share has been rather stable, it is clear that the main forces behind the falling labour income share must be the reallocation of the labour force from self-employment into wage employment or changes in relative productivities.

Figures 7 and 8 show the adjusted wage share and *LIS2* in the private business sector, and the tradable and non-tradable sectors. The similarity in the behaviour of the adjusted wage share and the labour income share suggests that overall the evolution of the adjusted wage share, rather than reallocation or relative productivity effects, has been the main force behind the decline in the labour share.

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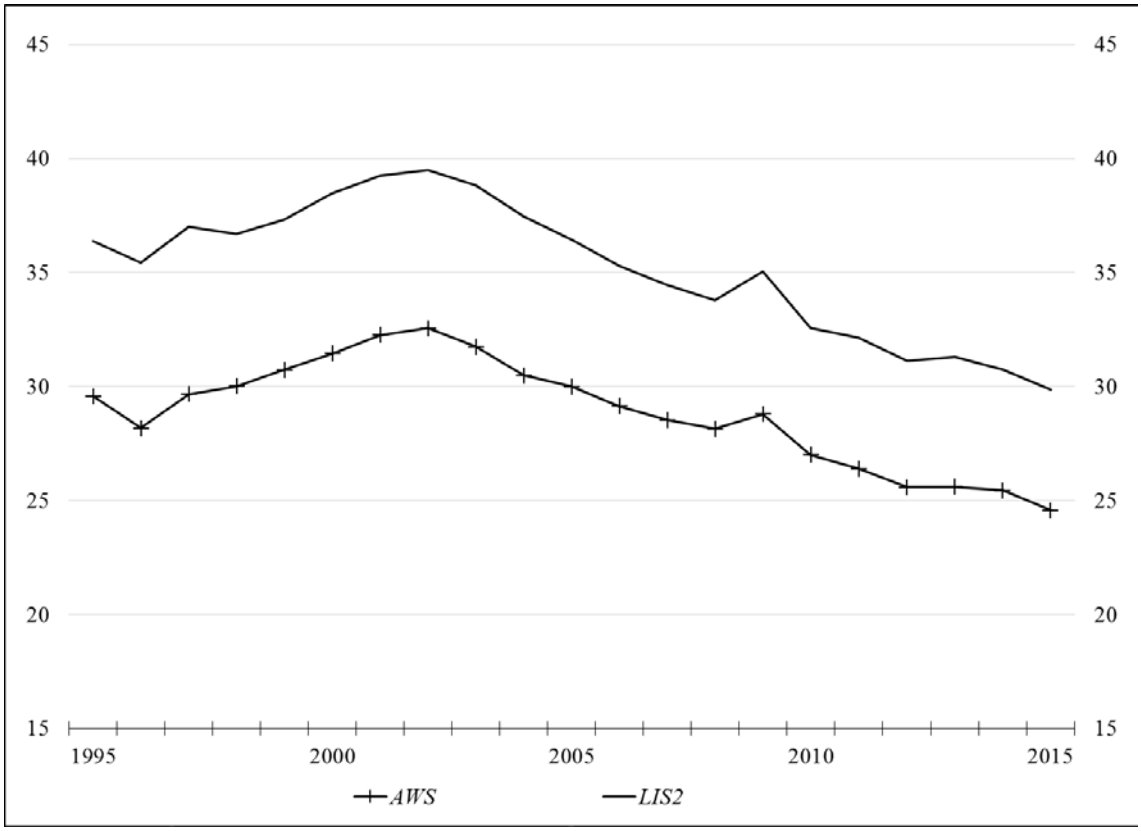
[9] The decomposition, which assumes that value added in the self-employment sector consists entirely of labour income, is obtained as follows: $LIS = (1 - VA_w/VA) + (W/VA_w)(VA_w/VA) = 1 + (AWS - 1) VA_w/VA = 1 - (1 - AWS)(p_w/p)(L_w/L)$, where VA_w is value added in the wage-employment sector.

[10] In this calculation $LI - W$ should be all self-employment income (labour and non-labour, since non-labour self-employment income is not part of value added in the wage employment sector). This implies that LI should be estimated by the second method (*LIS2*).

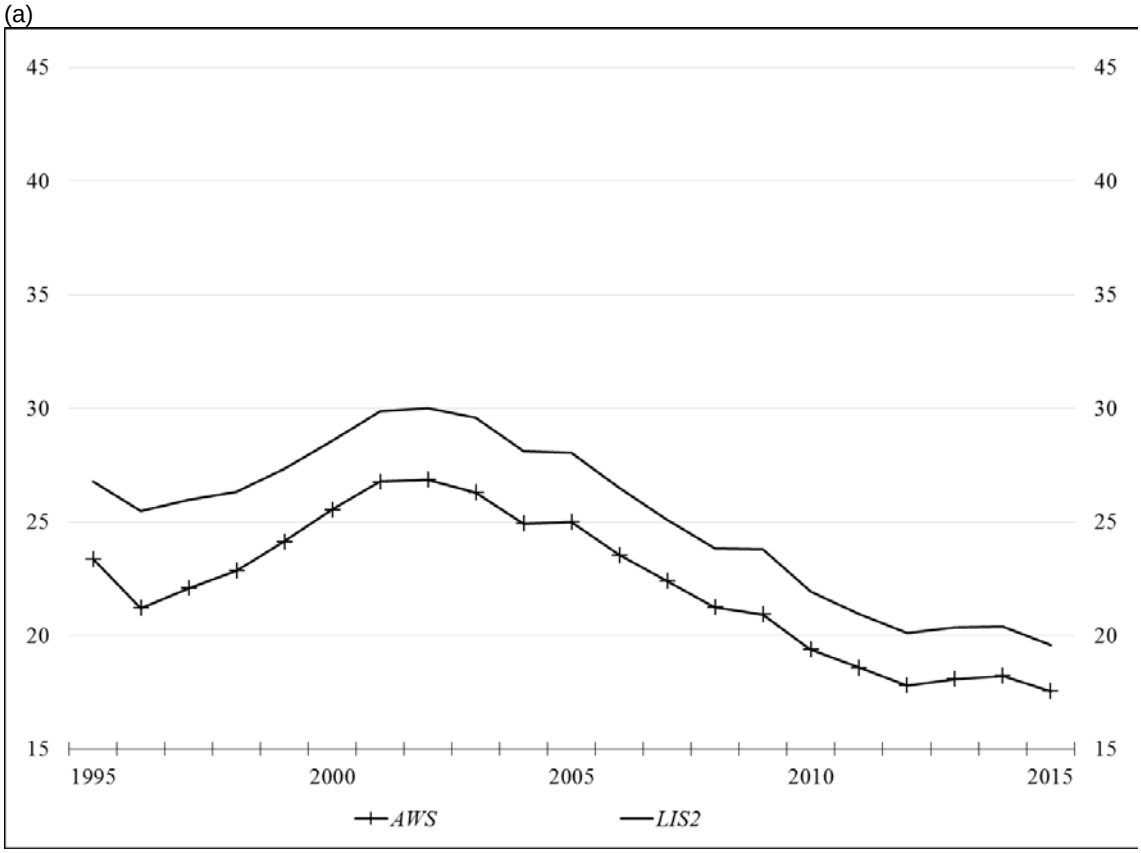
Figure 7: Adjusted wage share (*AWS*) and *LIS2* in the private business sector, 1995–2015



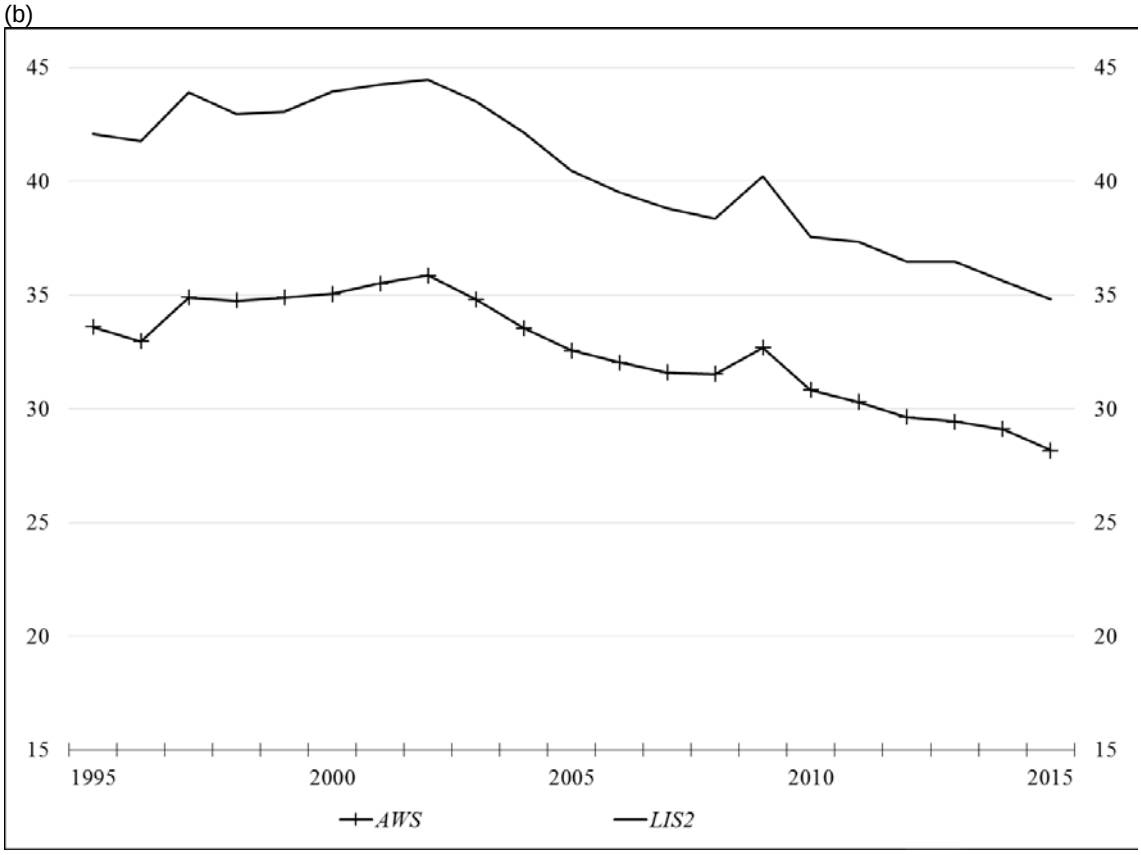
Source: Authors' calculation based on data from INEGI. See Equation (4) and Annex section A1 for details.

Figure 8: *AWS* and *LIS2* in the (a) tradable and (b) non-tradable sectors, 1995–2015

(a)



(b)



Source: Authors' calculation based on data from INEGI. See Equation (4) and Annex section A1 for details.

There are only two sectors, agriculture and commerce (see Annex Figures A2 and A3), where the decline in the labour income share is significantly more pronounced than that of the adjusted wage share, this being especially so in agriculture where despite a very significant fall in the labour income share the adjusted wage share remains relatively stable during the period. These two sectors are precisely those with the sharpest increases in the wage-employment ratio (see Table 3). That the sharp increase of this ratio in commerce had little effect on the gap between the adjusted wage share and the labour income share is because, contrary to what happens in agriculture, the productivity differential in favour of the wage-employment sector declined during the period, thus restraining the fall in the labour income share (see Figures 10 and 13).

Table 3: Wage-employment ratio, 1995 and 2015

Sector	1995	2015
Agriculture	0.30	0.44
Commerce	0.41	0.53
Other services	0.70	0.78
Construction	0.72	0.80
Transportation and warehousing	0.80	0.80
Accommodation and food services	0.60	0.59
Finance and insurance	0.99	0.98
Information	0.97	0.96
Manufacturing	0.85	0.82
Arts, entertainment, and recreation	0.77	0.74
Professional, scientific, and technical services	0.70	0.66
Total	0.56	0.66

Note: Ratio of subordinated workers to total employment (excluding employers) according to ENE and ENOE.

Source: Authors' calculation based on data from INEGI. See Equation (1) and Annex section A1 for details.

4 Towards an explanation: Price and wage determination in the tradable and non-tradable sectors

A conclusion from the previous section is that with the exception of agriculture, changes in the adjusted wage share—the share of wages in the wage-employment sector—rather than reallocation or relative productivity effects, have been the main force behind the decline in the labour income share. We now search for an explanation of the evolution of the adjusted wage share in the main sectors of the economy. As explained above, in the case of manufacturing we focus on the wage share (instead of the adjusted wage share) to have a longer period of analysis. In the non-tradable activities, we focus on the adjusted wage share over the period 1995–2015 given the much larger proportion of self-employment in the largest non-tradable sector (commerce in particular; see Table 3).

4.1 Non-tradable sector

The model presented in Annex B distinguishes in each non-tradable activity a modern or wage-employment sector and an informal or self-employment one. The modern sector operates under imperfect competition in the goods market, in which it also competes with the informal sector. Its wage share, which is the 'adjusted wage share' of this activity estimated in Section 3, is inversely related to the mark-up set by modern firms. As shown in Annex B, the key driving force affecting the mark-up and thus the adjusted wage share is the labour productivity ratio between the modern and informal sectors. The mechanisms operating can be seen in the following two scenarios.

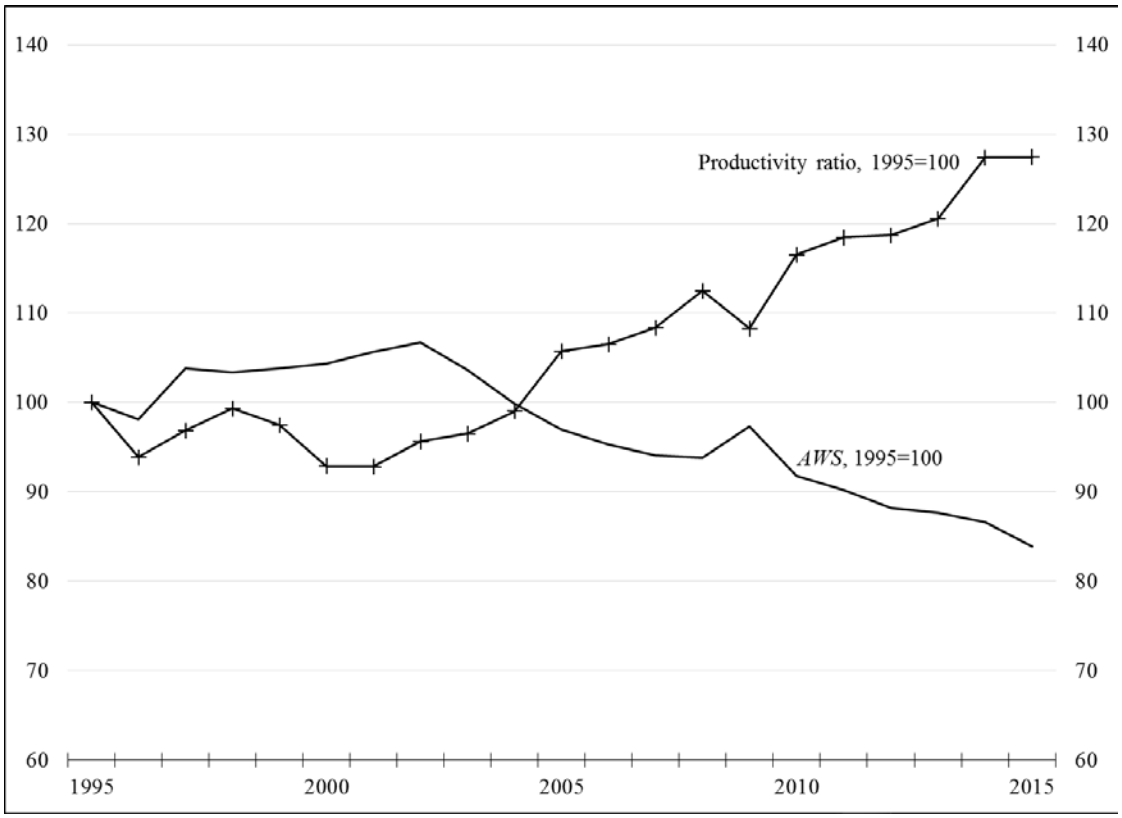
In the simplest case, labour earnings in the informal and modern sectors are equalized through competition in the labour market, and the two sectors produce very close substitutes so that prices in the modern sector are subject to limit pricing. With full wage and price equalization (and leaving aside intermediate inputs), the mark-up in the modern sector and the adjusted wage share of the non-tradable activity are fully determined by the productivity differential in favour of the modern sector: a higher labour productivity in the modern sector (given productivity in the informal sector) reduces labour unit costs in this sector and increases the mark-up.

In a second scenario, informal earnings and formal wages are assumed to be related as in a Todaro-like unemployment model so that informal earnings are equal to *expected* formal wages, given by the formal wage times the probability of finding a formal job (a negative function of unemployment). Firms in the modern sector set their mark-up as a function of their monopolistic power in the goods market and their monopsonistic power in the labour market. In this case, an increase in labour productivity in the modern sector (given labour productivity in the informal sector) increases the product wage in the modern sector for a given mark-up. The formal wage premium increases and informal workers enter the formal labour market, thus increasing unemployment until again the wage premium stabilizes at a higher level of unemployment. The increase in unemployment allows firms in the modern sector to raise their mark-up with the result that the wage share in the modern non-tradable sector falls.

In both cases, the key factor driving the wage share in the modern sector is its relative productivity vis-à-vis the informal sector. Figure 9 shows a clear inverse relationship in both the short and long run between the adjusted wage share of the non-tradable sector and the productivity ratio between the wage-employment and self-employment sectors estimated from KLEMS and the INEGI

employment surveys.[11] The adjusted wage share increases up to 2002 at a time when the productivity ratio is mostly decreasing, falls from 2002 to 2008 during the recovery of the productivity ratio, rises again during the recession of 2009 when the productivity ratio falls, and declines again from 2010 to 2015 mirroring the recovery of the productivity ratio.

Figure 9: *AWS* and productivity ratio in the non-tradable sector, 1995–2015



Note: Productivity ratio of wage-employment to self-employment sector.

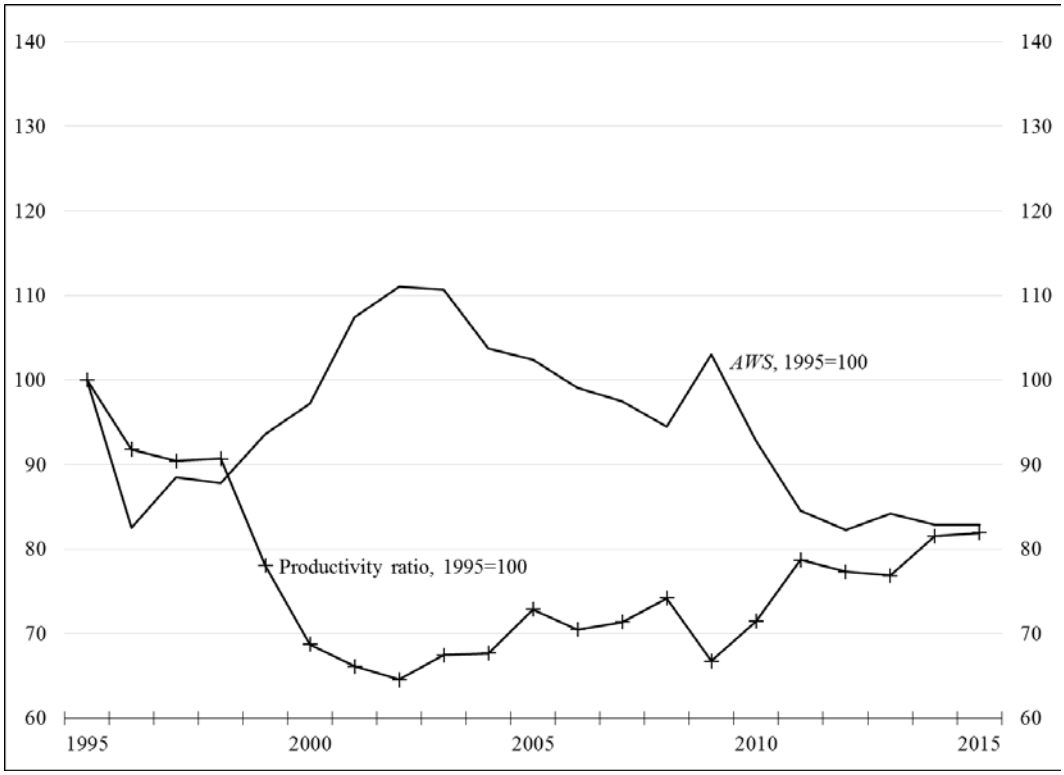
Source: Authors' calculation based on data from INEGI. See Equation (4) and Annex sections A1 and A3 for details.

Figure 10 and Annex Figures A4–A7 show the same relationship for the non-tradable sector with a self-employment ratio of 20 per cent or more at the end of the period (i.e. with relatively high ratios of self-employed and non-remunerated workers to total employment). The inverse relationship is particularly clear in the commerce sector, which has the highest self-employment ratio in the non-tradable sector (47 per cent in 2015; see Table 3) and is also apparent in the short and long run in the rest of the non-tradable sector with a high self-employment share.

Thus, the decline of the adjusted wage share in the non-tradable sector was determined by the steady increase (especially after 2001) in the productivity differential between the modern and informal subsectors of non-tradable activities in the context of a stable aggregate earnings differential between these subsectors (see Figure 11). The rising productivity differential is in turn the result of an increasing productivity level in the wage-employment sector, a cumulative 25 per cent increase from 1995 to 2015, together with a stagnant productivity (in fact, a cumulative decline of the order of 3 per cent) over the same period in the self-employment sector (see Figure 12).

[11] The estimation of labour productivity in the wage-employment and self-employment sectors within each economic activity is described in Annex section A3.

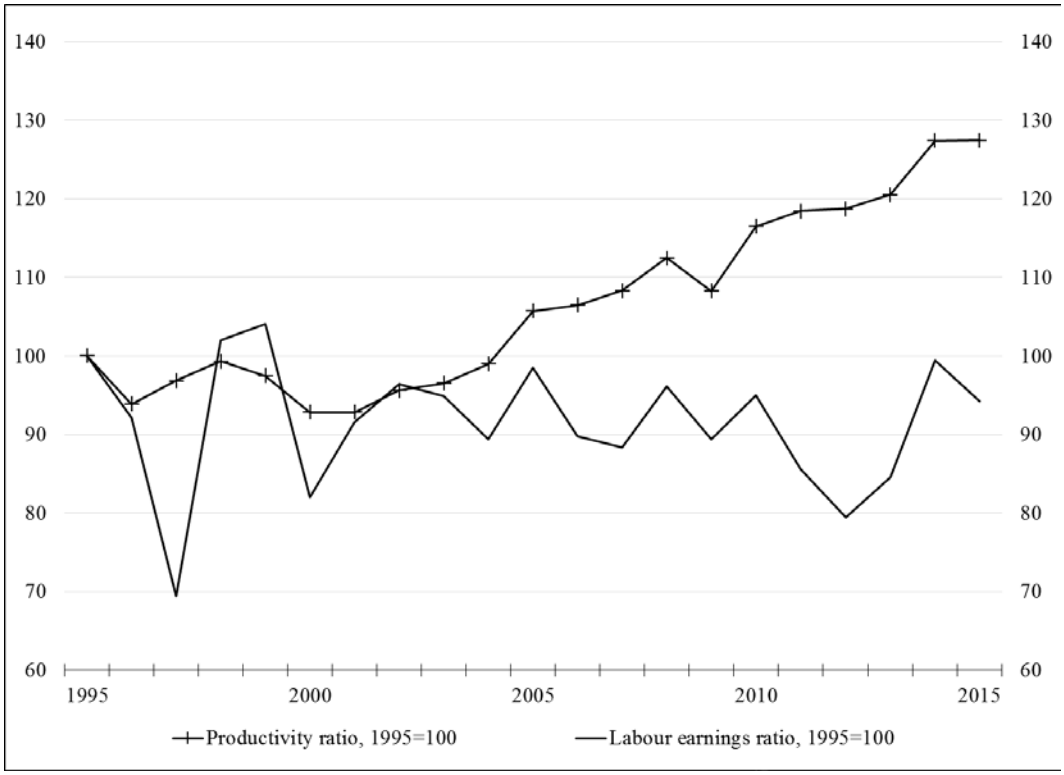
Figure 10: *AWS* and productivity ratio in commerce, 1995–2015



Note: Productivity ratio of wage-employment to self-employment sector.

Source: Authors' calculation based on data from INEGI. See Equation (4) and Annex sections A1 and A3 for details.

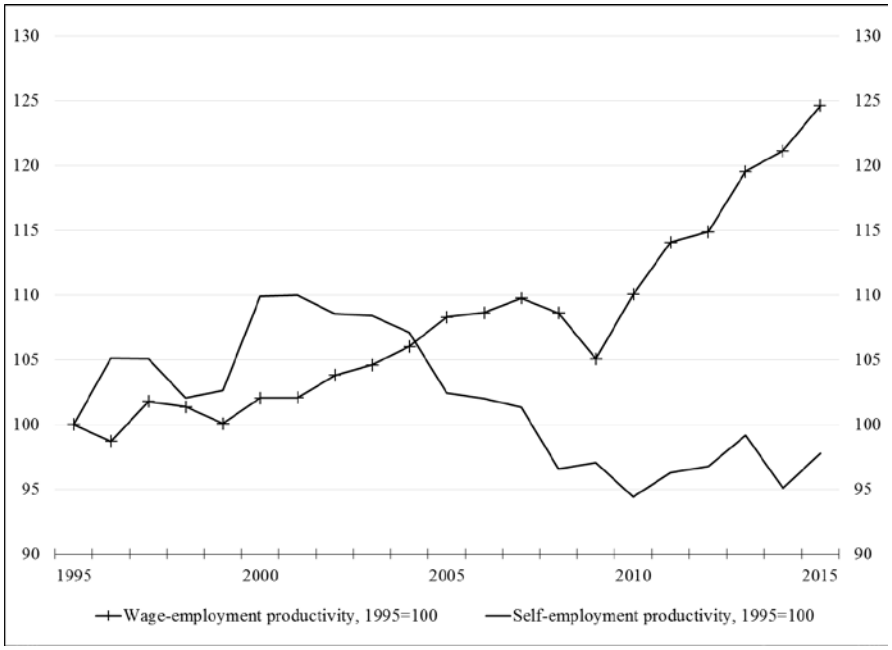
Figure 11: Productivity and earnings ratios in the non-tradable sector, 1995–2015



Note: Productivity and labour earnings ratios of wage-employment to self-employment sector.

Source: Authors' calculation based on data from INEGI. See Annex sections A1and A3 for details.

Figure 12: Productivity in self-employment and wage-employment in the non-tradable sector, 1995–2015

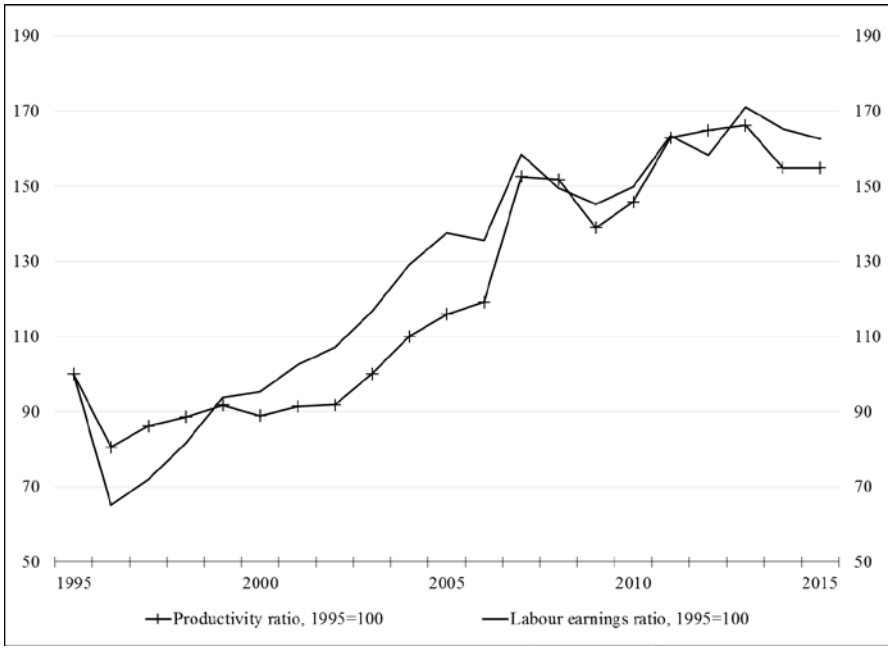


Source: Authors' calculation based on data from INEGI. See Annex sections A1and A3 for details.

4.2 Agriculture

In agriculture, we observe a decline in the labour income share in the context of a stable wage share in its wage-employment sector. The decline is the result of a falling share of self-employment incomes caused by the reallocation of labour force towards the wage-employment sector with a lower labour share [see Equation (4)] in the context of a wide and increasing productivity differential in favour of the wage-employment sector (see Figure 13).

Figure 13: Productivity and earnings ratios in agriculture, 1995–2015



Note: Productivity ratios of wage-employment to self-employment sector.

Source: Authors' calculation based on data from INEGI. See Annex sections A1and A3 for details.

4.3 Manufacturing industries

Following the model in Annex B, consider a small open economy with two sectors: an imperfectly competitive non-tradable sector, where firms follow a mark-up pricing rule; and a tradable sector (here understood as manufacturing), where firms take prices as exogenously given in the world market. Setting aside intermediate inputs, in the non-tradable sector the product wage will equal the ratio of labour productivity to gross mark-up: $w_N/p_N = b_N/(1 + z)$. With mobility of labour across sectors, the nominal wage in the tradable sector will tend to equal that in the non-tradable sector: $w = w_N$. Substituting from the previous equation for the product wage of non-tradables, and recalling that the wage share of tradables equals the ratio of product wage to labour productivity (b_T), we arrive at $WS_T = (b_N/b_T)/(p_T/p_N)(1 + z)$. This shows the wage share of tradables depends positively on the relative productivity of labour of non-tradables, and negatively on the relative price of tradables and the mark-up in non-tradables.

While the expression for wage share is an identity, under the simplifying assumptions being made the three determinants can be seen as largely (although not completely) autonomous from the manufacturing wage share and among themselves: the relative price of tradables versus non-tradables, given the influence of the exchange rate on prices of tradables, is crucially determined by monetary and exchange rate policies; the relative productivity of the non-tradable sector is affected by productivity trends in tradables and non-tradables; and the mark-up in non-tradables is affected by market structures in the goods and labour markets and the relative productivity of modern versus informal activities in the non-tradable sector.[12]

Figure 14 presents log series for the determinants of the manufacturing wage share. As shown in Figure 14a, during the early phase (1990–2002) the relative productivity of non-tradables declined. After a partial, transitory recovery due to a discrete fall in manufacturing productivity in 2003, during the late phase (2003–15) productivity growth accelerated in non-tradables and decelerated in manufacturing (not shown here), both trends slowing the decline of relative productivity in the non-tradable sector. Figure 14b shows that the wage share of non-tradables—an inverse measure of the mark-up in that sector—also fell, again with a partial, transitory recovery in the late 1990s and early 2000s. According to the previous analysis, both factors—the fall in the wage share and relative productivity in non-tradables—may have contributed to the drop in the manufacturing wage share.[13]

Figures 14c and 14d show two alternative indicators of the relative price of manufactures: the relative price of manufacturing value added with respect to that of non-tradables and—as a more general indicator of the relative price of tradables—the Bank of Mexico's real effective exchange rate index based on aggregate consumer prices. Both indicators exhibit a decrease from the early 1990s until the mid-2000s (including a transitory upward jump after the peso crisis of 1994–95), and a gradual recovery—more evident when using value-added prices—since the second half of the 2000s.

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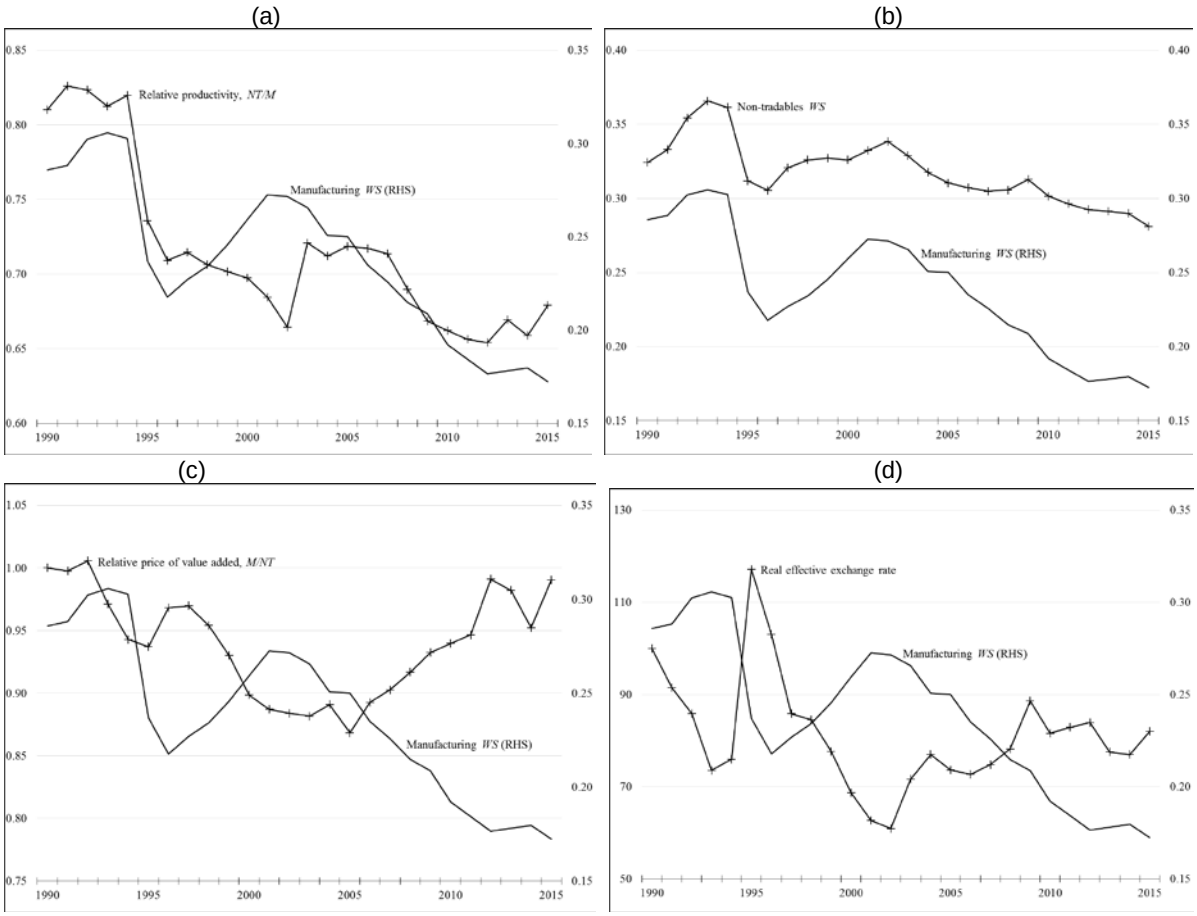
[12] To undertake an analysis for the 1990–2015 period, we take the relative productivity of non-tradables as a whole as a proxy for the relative productivity of the wage-employment sector in non-tradables (the relevant variable in the model of Annex B) and the wage share in non-tradables as a proxy for the adjusted wage share of this sector (the relevant variable in the model).

[13] See Sommer (2009) and Maarek and Orgiazzi (2015) for empirical evidence on the influence of an economy's dual structure on the evolution of the wage share across different country and industry samples. For a general presentation of dual-economy models in the tradition of classical development theory, see Ros (2013, Part II).

Figure 14: Basic determinants of the manufacturing wage share, 1990–2015: (a) Relative productivity; (b) wage share of non-tradables; (c) relative prices; (d) real effective exchange rate



Notes: WS, wage share; LP, labour productivity; NT, non-tradables; M, manufacturing. An increase in the real effective exchange rate index—based on consumer price indices for 111 countries—means a real depreciation of the peso.

Source: Authors' calculations based on data from INEGI-KLEMS and Bank of Mexico.

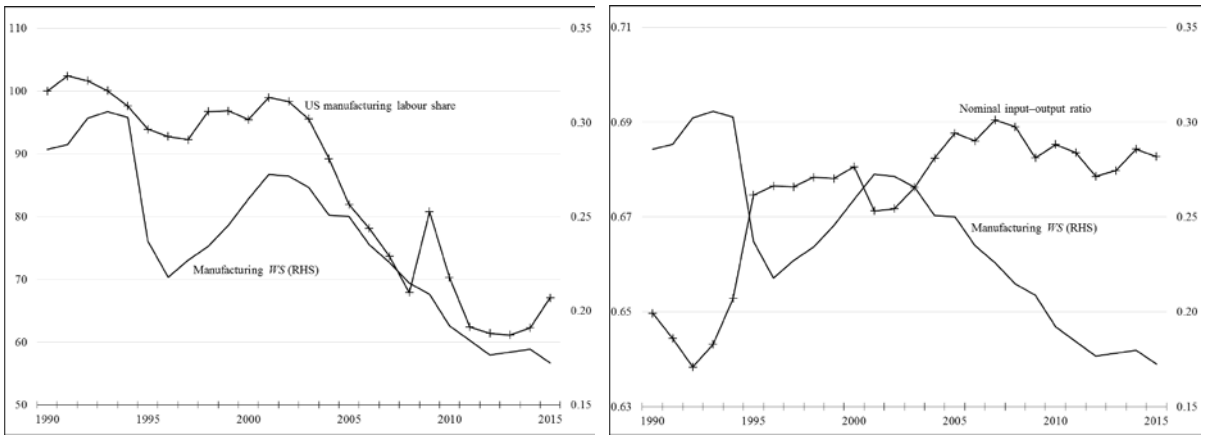
According to the previous analysis, the increase in the relative price of manufactures (or alternatively, the real depreciation of the peso) since the mid-2000s was a likely factor in the fall of the manufacturing wage share recorded during the late phase. Moreover, the short-term fluctuations in relative prices help to explain those observed in the product wage and wage share during the early phase, with a real appreciation of the peso, fall in the relative price of manufactures, and rise in the wage share in the early 1990s; a sharp depreciation of the peso, increase in relative prices, and fall in the wage share in 1995–96; and a peso appreciation, gradual decline in relative prices, and increase in the wage share until the early 2000s. Note, however, that over the whole 1990–2015 period relative prices—which definitively show no upward trend—cannot explain the downward trend in the wage share.

In the model in Annex B, firms in the tradable sector are price takers, home prices are fully determined by international prices and the nominal exchange rate, and intermediate inputs are set aside in the specification of production. In a more general setting, the wage share may be affected by variables like the foreign wage share. A lower foreign share, for example, implies that unit labour costs abroad have fallen, which may induce domestic firms to reduce their own. While the specific channels cannot be studied here, recent studies have argued that globalization—and in particular

the threat by firms to relocate in other countries—may strengthen the bargaining position of firms in relation to workers, and thus result in a reduction in domestic labour costs and the wage share.[14]

As an indicator of foreign wages to Mexico, Figure 15a shows the evolution of the labour share in the US manufacturing sector. The US labour share experienced a dramatic fall—from an index level of about 100 in the early 2000s to nearly 60 a decade later—beginning at the same time it did in Mexico and suggesting the existence of a link between the two variables. Moreover, given the relatively small size of the Mexican manufacturing sector, it seems plausible to assume that, if a significant correlation does exist, causality runs mainly from the United States to Mexico.[15]

Figure 15: Additional determinants of the manufacturing wage share, 1990–2015: (a) US manufacturing labour share and (b) nominal input/output (IO) ratio, 1990–2015



Source: Authors' calculations based on data from INEGI-KLEMS and US Bureau of Labor Statistics.

Although in the model in Annex B activity levels are measured by value added, in practice firms may make price and activity decisions in terms of gross production rather than value added, where the difference between the latter two variables corresponds to the amount of intermediate goods used in production. Given the intensive use of intermediate goods in manufacturing, the latter variable may be important for the pricing decisions of firms, and hence for the behaviour of mark-ups and the wage share.

Consider the price identity

$$p_q = (1+k)\left[(wL/Q)+(p_i I/Q)\right] \tag{5a}$$

where p_q is the price index of gross production, k the mark-up on the unit cost (where the latter consists of the cost of labour and intermediate goods, wL/Q and p_iI/Q, respectively), Q is real

[14] Hutchinson and Persyn (2012) present empirical evidence of a positive correlation between the home wage share and foreign wage levels, and argue that a higher wage abroad strengthens the bargaining position of labour unions at home. Jaumotte and Tytell (2007) show a negative correlation between the labour share and the degree of offshoring in advanced economies. Stockhammer (2013) and Sommer (2009) present evidence of a negative effect of trade openness on the labour share. See OECD (2012) and Bassanini and Manfredi (2012) for further results and a general discussion of the empirical literature on the determinants of the wage share.

[15] Of course, the correlation may also reflect the influence of a third factor, such as the worldwide impact of China joining the World Trade Organization in 2001. Hung and Hammett (2013) show that the decline in the US manufacturing labour share took place as the share of imports from non-OECD countries, including from China, began to increase (see their Figure 4).

gross production, p_i the price of intermediate goods, and I the real amount of intermediate goods. Dividing both sides of Equation (5a) by p_q we get

$$1=(1+k)\left[\left(PW_q / LP_q\right)+\left(p_i I / p_q Q\right)\right] \tag{5b}$$

where p_iI/p_qQ is the nominal input/output (IO) ratio and $PW_q/LP_q = (w/p_q)/(Q/L)$ is the ratio of product wage to labour productivity in terms of gross production. The relation between these variables and the wage share is given by

$$WS = wL / VA = \left(PW_q / LP_q\right)\left(p_q Q / VA\right) = \left(PW_q / LP_q\right) / \left[1-\left(p_i I / p_q Q\right)\right] \tag{6a}$$

where VA is nominal value added, and the last term on the right side uses the definition $p_qQ = p_iI + VA$ rewritten as $(p_qQ/VA) = 1/[1 - (p_iI/p_qQ)]$.

While Equations (5b) and (6a) are identities and thus cannot clarify issues of causality, they are nonetheless helpful in identifying restrictions that must hold ex-post. Thus, according to Equation (5b), if the nominal IO ratio increases exogenously, this must be matched by a reduction in the mark-up, the ratio of product wage to labour productivity, or both. In turn, by Equation (6a), if the adjustment involves a lower ratio of product wage to labour productivity, this would reduce the wage share (and thus increase the profit share) to an extent that depends on the relative changes in the product wage/productivity ratio and the nominal IO ratio itself.

Assume, for example, that firms are able to keep their mark-up constant after an increase in the nominal IO ratio. In this case, PW_q/LP_q must decrease by the same amount in which the nominal IO ratio increased. The decrease may occur because the more intensive use of inputs raises labour productivity (LP_q) and/or because firms are able to adjust their final prices, depressing the product wage (PW_q). Calculating the total change in Equation (6a) shows that the fall in the wage share will be

$$\Delta WS = -\left\{(1-WS) / \left[1-\left(p_i I / p_q Q\right)\right]\right\} \Delta\left(p_i I / p_q Q\right) \tag{6b}$$

More generally, if the ratio of product wage to labour productivity falls by less than the increase in the nominal IO ratio, then according to Equation (5b) the mark-up must fall, while the wage share will fall (and the profit share will rise) by less than the amount indicated in Equation (6b).[16]

Figure 15b shows the series for the nominal IO ratio in the Mexican manufacturing sector. Within a general upward trend, the ratio increased markedly during the peso crisis of 1994–95, and again in the early 2000s. Over the whole period, the ratio rose by 0.033 (or 3.3 percentage points), from 0.65 in 1990 to 0.683 in 2015. The potential impact on the wage share is large: using average values

[16] Bentolila and Saint Paul (2013) argue theoretically that changes in the relative price of intermediate goods will affect the labour share in a direction that depends on the degree of substitution between capital and labour. Building on this insight, Hutchinson and Persyn (2012) find empirically a positive correlation between the labour share and the relative price of intermediate goods, which in their theoretical model holds when capital and labour are complements in production. López and Malagamba-Morán (2016) study the evolution of the wage share in the Mexican manufacturing sector during the period 1994–2009, and show graphically that the wage share is negatively correlated with the ratio of materials cost to wage cost. Their econometric estimations support the view that variations in the latter ratio are positively related to changes in the peso's real exchange rate.

of 0.24 for the wage share and 0.67 for the nominal IO ratio, Equation (6b) implies that an increase of 0.035 in the nominal IO ratio would require a fall of nearly 0.08, or 8 percentage points, in the manufacturing wage share.

4.3.1 Econometric analysis

Based on the previous analysis, equations for the manufacturing wage share were estimated as a function of the relative productivity of labour in non-tradables with respect to manufacturing, the wage share of non-tradables (as an inverse indicator of the mark-up in that sector), and the relative price of manufacturing. An extended specification adds the US manufacturing labour share index and the nominal IO ratio. All the variables were converted to natural logs.

Standard tests showed that all the variables have unit roots and become stationary only after taking their first difference. In consequence, the equations were estimated within a cointegration framework. Given the small number of observations, the estimations followed the two-step Engle–Granger approach, which has the advantage of not requiring the use of lags or first differences, and thus maximizes the number of observations available for estimation; being single-equation, it also minimizes the number of coefficients to be estimated. The approach consists of estimating an ordinary least-squares equation with the variables in levels, and then testing for the presence of a unit root in the regression residuals, which in this case was done through the augmented Dickey–Fuller and Phillips–Perron tests. If the unit-root hypothesis is rejected, then the equation can be interpreted as representing a 'long-run' or cointegration relationship between the variables in levels.

To address possible concerns about reverse causality, the equations were also estimated using the lagged values of the explanatory variables, which facilitates a causal interpretation of the estimated coefficients. Finally, as a further robustness test, the equations were estimated as error-correction autoregressive distributed lag (ARDL) models, following for that purpose the bounds-testing approach of Pesaran et al. (2001). In this approach, the existence of a long-run relationship can be tested by means of so-called *F* and *t* bounds tests. Among its main advantages, the approach can combine stationary and non-stationary variables (i.e. variables integrated of order zero or one), yield in a single step estimates of both the long-error coefficients and the error-correction term of the long-run relationship, and correct for possible endogeneity bias through the use of lags of all the variables.

Table 4 presents a first set of estimated Engle–Granger equations. In the majority of cases the diagnostic tests are satisfactory, while the unit-root tests support the hypothesis of a long-run relationship. As expected from the theoretical model, the estimated coefficients on the relative productivity of labour and the wage share of non-tradables show a positive sign, whereas those on either the real exchange rate or the relative price of manufacturing show a negative one. The estimated elasticities are large (more on this below) and their *p*-values suggest that they are statistically significant individually (although the individual *p*-values are only indicative, since the variables are non-stationary).

Table 4: Engle–Granger regressions for the manufacturing wage share, I

	(1)[a]	(2)[b]	(3)[b]	(4)[c] (lagged regressors)	(5)[d] (lagged regressors)	(6)[d] (lagged regressors)
Relative labour productivity NT/M, *lpnm*	1.23 (0.00)	1.09 (0.00)		1.31 (0.00)	1.04 (0.00)	
Wage share in NT, *wsn*	2.11 (0.00)	1.57 (0.00)	1.51 (0.00)	2.36 (0.00)	2.27 (0.00)	1.81 (0.00)
Real effective exchange rate, *reer*	–0.21 (0.00)			–0.02 (0.02)		

Relative price of value added, M/NT,		–1.49 (0.00)	–1.24 (0.00)		–0.60 (0.06)	–0.79 (0.00)
Labour productivity in NT, *lpn*			0.79 (0.00)			0.58 (0.19)
Labour productivity in M, *lpm*			–1.00 (0.00)			–0.98 (0.00)
Diagnostics (*p*-values)						
Normality (Jarque–Bera)	0.924	0.986	0.788	0.331	0.759	0.393
Serial correlation (Breusch–Godfrey)	0.113	0.128	0.063*	0.991	0.557	0.364
ARCH	0.561	0.513	0.721	0.596	0.650	0.667
RESET	0.028**	0.255	0.535	0.456	0.214	0.495
Adjusted R^2	0.951	0.973	0.975	0.939	0.905	0.913
Unit-root tests						
Augmented Dickey–Fuller[e]	–3.85 +++	–3.68 ++	–3.33 ++	–4.69 +++	–4.34 +++	–4.00 +++
Phillips–Perron	–3.48 ++	–3.85 ++	–3.37 ++	–4.69 +++	–4.34 +++	–3.98 +++

Notes: NT, non-tradables; M, manufacturing. Dependent variable = wage share in manufacturing (*wsm*). Ordinary least-squares estimation. Sample period: 1990–2015, 26 annual observations. All the variables are expressed in natural logs. For illustrative purposes, *p*-values are shown in parentheses, next to the estimated coefficients. All the equations include an intercept (not shown), except in column (6), from which it was removed due to lack of significance. [a]Includes outlier year dummies for 1992, 1993, and 1994 (not shown). [b]Includes outlier year dummies for 1990 and 1994 (not shown). [c]Includes outlier year dummies for 1993, 1994, and 1995 (not shown). Regressors were lagged one year. Sample was reduced to 1991–2015. [d]Includes outlier year dummies for 1994 and 1995 (not shown). Regressors were lagged one year. Sample was reduced to 1991–2015. [e]Maximum lag of 1, defined by Akaike's criterion. +, ++, +++: Rejects the unit-root hypothesis at 10, 5, and 1 per cent, respectively.

Source: Authors' estimations.

Table 5 presents extended wage-share equations that include the IO ratio and the US manufacturing labour share. In all cases the unit-root tests keep supporting the existence of a long-run relationship. Moreover, the previous results concerning the sign and statistical significance of the coefficients on relative labour productivity, the relative price of manufacturing, and the wage share in non-tradables continue to hold. Regarding the new variables, the Mexican manufacturing wage share is positively correlated with the US labour share, as expected, and negatively so with the nominal IO ratio [column (1)]. Similar estimation results are obtained when relative labour productivity is decomposed into productivity in non-tradables and manufacturing [column (2)]. Again, using the lagged values of the explanatory variables does not change qualitatively the results, but quantitatively there is an increase in the size of the estimated coefficient on the wage share in non-tradables, and a decrease in the coefficients on the relative price of manufacturing and the IO ratio, where the latter in the final equation approaches zero in economic terms [see columns (3) and (4)].

Table 5: Engle–Granger regressions for the manufacturing wage share, II

	(1)[a]	(2)[b]	(3)[b] (lagged regressors)	(4)[c] (lagged regressors)
Relative labour productivity NT/M, *lpnm*	0.69 (0.00)		0.76 (0.00)	
Wage share in NT, *wsn*	0.62 (0.00)	0.60 (0.00)	0.98 (0.01)	0.96 (0.04)
Relative price of value added, M/NT, *pamn*	–1.69 (0.00)	–1.74 (0.00)	–0.61 (0.03)	–0.33 (0.27)
US manufacturing labour share index, *uslsm*	0.25 (0.00)	0.20 (0.01)	0.39 (0.00)	0.58 (0.06)
Nominal input/output ratio in M, *iorm*	–2.56 (0.00)	–2.71 (0.00)	–0.60 (0.00)	–0.03 (0.91)
Labour productivity in NT, *lpn*		0.56 (0.00)		1.27 (0.09)
Labour productivity in M, *lpm*		–0.68 (0.00)		–0.85 (0.00)
Diagnostics (*p*-values)				
Normality (Jarque–Bera)	0.624	0.511	0.144	0.412

Serial correlation (Breusch–Godfrey)	0.197	0.179	0.467	0.622
ARCH	0.308	0.144	0.548	0.647
RESET	0.090*	0.129	0.908	0.530
Adjusted R^2	0.988	0.987	0.916	0.911
Unit-root tests				
Augmented Dickey–Fuller[e]	–4.11 +++	–3.58 ++	–4.10 +++	–4.36 +++
Phillips–Perron	–3.41 ++	–3.57 ++	–4.09 +++	–4.36 +++

Notes: NT, non-tradables; M, manufacturing. Dependent variable = wage share in manufacturing (*wsm*). Ordinary least-squares estimation. Sample period: 1990–2015, 26 annual observations. All the variables are expressed in natural logs. For illustrative purposes, *p*-values are shown in parentheses, next to the estimated coefficients. [a]Includes intercept and an outlier year dummy for 1990 (not shown). [b]Includes an outlier year dummy for 1995 (not shown) and an intercept. Sample was reduced to 1991–2015. [c]Maximum lag of 1, defined by Akaike's criterion. +, ++, +++: Rejects the unit-root hypothesis at 10, 5, and 1 per cent, respectively.

Source: Authors' estimations.

Finally, Table 6 presents wage-share equations estimated as error-correction ARDL models. Consistent with the previous results, both the F and t bounds tests support the existence of a long-run relationship. Consistent with these tests, the equations show a large, negative error-correction coefficient. The new results confirm those obtained previously: the wage share in manufacturing is positively correlated with the relative productivity in non-tradables, the wage share in that sector, and the US manufacturing labour share, and it is negatively correlated with the relative price of manufactures and the IO ratio, although the latter may not be statistically significant.

Table 6: Bounds-testing regressions for the manufacturing wage share

	(1)	(2)
Error correction coefficient	–0.58 (0.00)	–0.42 (0.00)
Long-run coefficients		
Relative labour productivity NT/M, *lpnm*	1.09 (0.01)	0.92 (0.02)
Wage share in NT, *wsn*	0.89 (0.05)	0.88 (0.07)
Relative price of value added, M/NT, *pamn*	–1.14 (0.01)	–1.08 (0.02)
US manufacturing labour share index, *uslsm*	0.26 (0.00)	0.25 (0.01)
Nominal input/output ratio in M, *iorm*	–0.11 (0.30)	
Diagnostics (*p*-values)		
Normality (Jarque–Bera)	0.905	0.561
Serial correlation (Breusch–Godfrey)	0.912	0.632
ARCH	0.772	0.935
RESET	0.525	0.193
Adjusted R^2	0.979	0.977
Bounds tests		
t-test	–3.78*	–3.48*
F-test	4.53**	5.11***

Notes: NT, non-tradables; M, manufacturing. Dependent variable = wage share in manufacturing (*wsm*). Error-correction ARDL models estimated by ordinary least squares. Sample period: 1992–2015, 24 annual observations. All the variables are expressed in natural logs. For illustrative purposes, *p*-values are shown in parentheses, next to the estimated coefficients. All the equations include an outlier year dummy for 2006 (not shown) and no intercept. Bounds testing: Rejects the null of no long-run relationship at *10, **5, and ***1 per cent.

Source: Authors' estimations.

The results suggest that the evolution of the wage share and relative productivity in the non-tradable sector and the US labour share contributed significantly to the fall in the Mexican share. More specifically, during the period 1991–2015 the Mexican manufacturing wage share fell by 0.51 in natural logs, or 40 per cent with respect to its value in 1990. Using the observed change in the explanatory variables and the value of the estimated coefficients in column (3) in Table 5, it can be calculated that the fall in the relative productivity of non-tradables, in the wage share in the same sector, and in the US manufacturing labour share each tended to produce a fall of between 0.15 and 0.17 in natural logs in the Mexican wage share. In contrast, the relative price of

manufacturing played a minor role, which is not surprising since over the whole period the change in the relative price was small. However, changes in relative prices appear to play a significant role in the short-term fluctuations of the manufacturing wage share, as initially pointed out.

4.4 Summary

According to the previous analysis, a major factor behind the fall in the wage shares of the formal sectors of the economy has been the poor performance of labour productivity in the informal sectors of the economy. This poor performance is behind the rising productivity differential between formal and informal sectors in the non-tradable sector, which is a factor in the falling adjusted wage share in non-tradables and also in the falling relative productivity of the non-tradable sector vis-à-vis manufacturing—which in turn is partly responsible for the fall in the manufacturing wage share. The overall role of declining productivity levels in the self-employment activities of the non-tradable sector in the fall of the wage and labour income shares in the private business sector was remarkably conveyed by Figure 12: the productivity decline of the self-employment sector starts in the early 2000s (especially after 2003) at precisely the time when the relationship between product-wage and labour-productivity growth shifts down in manufacturing (recall Figure 6) and the overall wage and labour income shares start falling after the ups and downs in the period 1990–2002.

The poor productivity performance of the informal sectors can be attributed in part to the poor growth performance of the formal ones. Slow economic growth, by preserving low or producing even declining levels of productivity in the informal sectors, contributes to the fall in the wage share; the slower the growth of productivity in the informal sectors, *ceteris paribus* the stronger the tendency for the wage shares of the formal sectors to fall. If the productivity of the informal sectors is inversely related to the size of the informal sectors, due to some form of diminishing returns to labour in this sector, there is here a link between the downward trend in the formal wage shares and the slow expansion of the capital stock in the formal sectors. The next question is why has growth remained sluggish in the face of increasing profit shares in the formal sectors of the economy. Why has growth not accelerated as a result, thus stabilizing or even reversing the decline in the wage share? This question, on which we can only speculate at this stage, is addressed in the conclusions.

5 Conclusions

This paper documents the generalized fall in the labour share in Mexico, and has analysed some of its factors. In the previous section, we argued that the poor productivity performance of the informal sectors, itself a consequence of slow growth in the economy as a whole, is a major factor behind the decline of the labour income share. Put succinctly, in the face of stagnant informal earnings in the informal sectors, real wages in the formal sectors fail to keep pace with productivity growth in these sectors so that productivity gains accrue to profits (this corresponds to the case in the Annex B model in which the informal non-tradable sectors produce similar products to those of the formal sectors). This, however, raises further questions for future work. The counterpart of a falling labour income share is a rising profit share: why has growth and capital accumulation failed to accelerate in the face of a rising profit share?

To be sure, there is some evidence of the operation of this self-correcting mechanism in Mexico: changes in the wage share are followed, with some lag, by changes in the opposite direction in the accumulation rate, which in turn are followed by changes in the same direction in the wage share. Beyond these short-run fluctuations, however, the relationship between capital accumulation and

the wage share appears to have shifted over time, leaving the wage share at a permanently lower level without a corresponding gain in the accumulation rate. The weaker response of capital accumulation to the wage share in manufacturing is summarized in the trends followed by the two variables over the whole 1990–2015 period: while the wage share followed a clear downward trend, the accumulation rate, rather than sloping upwards, remained flat.

Why have the reduction in the labour share and its positive impact on profitability failed to raise the accumulation rate? In what follows we point to three hypotheses, whose detailed study is left for future research. A first hypothesis centres on the stagnation of real wages and its negative effect on domestic demand. By restraining the size of the domestic market, the stagnant real wages may depress utilization rates and profit rates (as opposed to profit shares), and discourage firms from accumulating capital and expanding their capacity.

To some extent, firms in the tradable sector may avoid this outcome by shifting from domestic to foreign markets. In the non-tradable sector, however, this option is not available, and thus capital accumulation may more fully reflect the negative impact of stagnant real wage. Moreover, even in the tradable sector there could be a negative impact, as an imperfectly elastic foreign demand may limit the extent of shift to foreign markets by domestic firms. This shift, finally, may have been complicated by the medium-term appreciation of the real exchange rate of the peso, which was not fully offset by the depreciation episodes of 2003–04 and 2008–09 (recall Figure 14d). In an unfortunate combination, over the whole 1990–2015 period the real appreciation of the peso did not have at least the side benefit of raising the real product wage.

5.1 Profitability in the US manufacturing sector

A second hypothesis focuses on the evolution of profitability in the US manufacturing sector. As shown previously, as the labour share in the Mexican manufacturing sector fell from levels of about 30 per cent at the start of the 2000s to about 20 per cent 15 years later, the US labour share experienced a similarly sharp fall, from an index level of about 100 to 65 during the same period (recall Figure 15a). This implies that if investment decisions in the Mexican manufacturing sector (and perhaps in other sectors as well) depend not on the domestic profitability alone but on relative profitability with respect to the United States—an assumption that seems plausible in a setting of high capital mobility and industrial integration between the two countries, and where therefore the decision to be made is not only whether to invest but where to do it—then capital accumulation in Mexico may have been inhibited by the increasing profit share in the United States, offsetting the potentially positive effect of higher profit shares in Mexico.

Ibarra (2016) finds support for this hypothesis. In estimated equations for private investment for the whole Mexican economy, he finds a negative and highly significant effect of relative unit labour costs in Mexico's manufacturing vis-à-vis US manufacturing on private investment. Thus, an equivalent way of explaining the slow pace of capital accumulation under decreasing labour costs is that private investment responds not to the profit margin in the tradable sector but to the relative profit margin vis-à-vis the United States, the main source of foreign direct investment in Mexico's manufacturing sector.

5.2 Marx-biased technical change and the elasticity of factor substitution

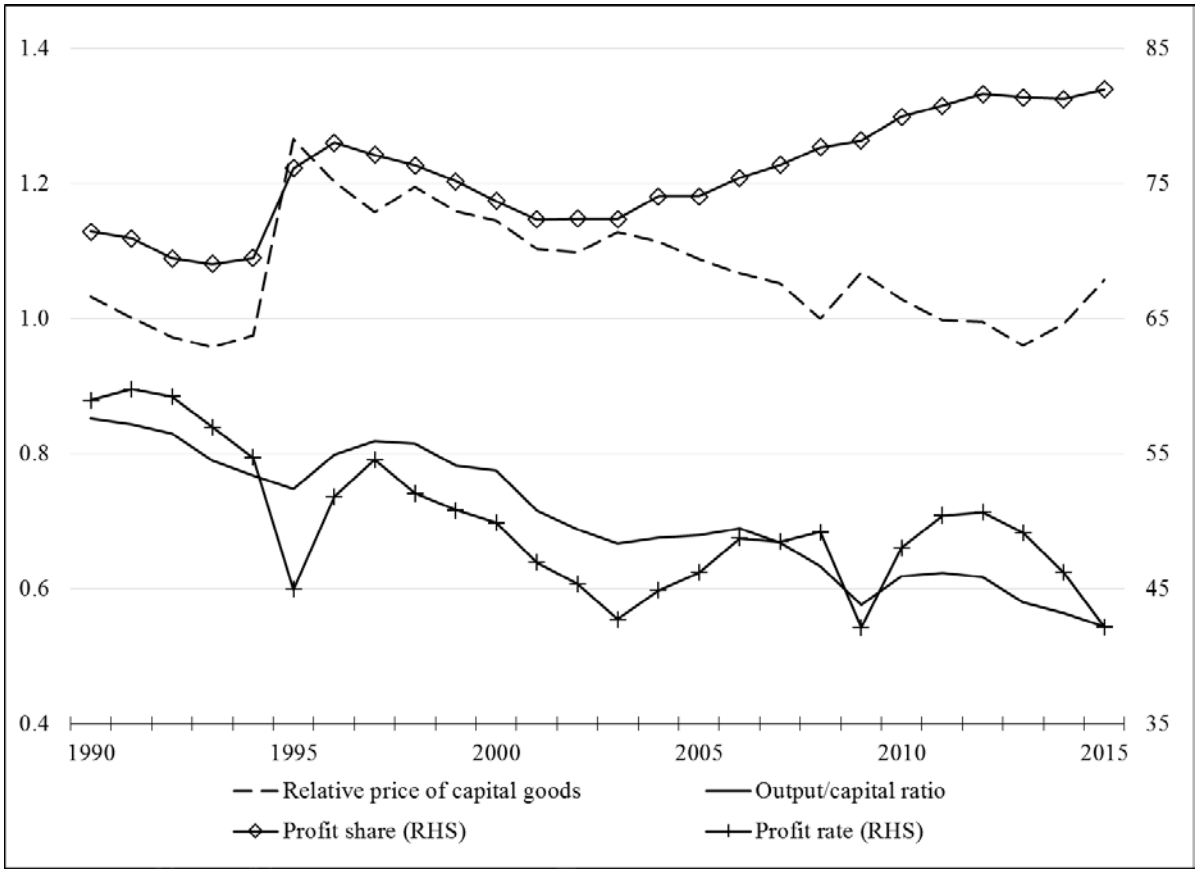
In a final hypothesis, the lack of response of capital accumulation to the falling labour share may be explained by a disconnection between the profit share and profit rate, due to the type of technical change taking place in Mexico. This may cause the profit rate to fall even as the profit share rises.

By definition the profit rate can be written as $r = su/p_k$, where s is the profit share (the ratio of gross operation surplus to gross value added in nominal terms), u the output/capital ratio (the ratio of gross value added to net capital stock in real terms), and p_k the relative price of capital goods (the ratio of the implicit price index of gross capital formation to that of gross value added). Figure 16 shows series for these variables in the Mexican manufacturing sector during the period 1990–2015.[17] As must be the case, the profit share mirrors the evolution of the wage share. Beyond short term fluctuations, the profit share increased over the whole period, rising from levels of about 70 per cent to more than 80 per cent. In the more recent period, when the wage share experienced a sharp fall, the profit share rose from about 72 per cent in 2001–03 to 82 per cent in 2015. Yet, despite the increase in the profit share, the profit rate fell, from nearly 60 per cent in the early 1990s to about 45 per cent in 2014–15. In the more recent period, while the profit share rose by ten percentage points, the profit rate fluctuated but eventually remained flat. The rise in the profit share was not transmitted to the profit rate.

By definition, the disconnection between the share and rate of profit must be explained by the combined evolution of the output/capital ratio and the relative price of capital goods. The latter variable showed no permanent change over the whole 1990–2015 period. Moreover, in the more recent period it tended to fall (after increasing sharply in the aftermath of the 1994–95 peso crisis), which by itself must have pushed up the profit rate. The fall of the profit rate in the medium run—and its flat trend in the more recent period—must therefore be explained by a fall in the output/capital ratio, strong enough to offset the effect from the rise in the profit share and, in the more recent period, the fall in the relative price of capital goods. Indeed, as shown in Figure 16, the output/capital ratio fell from more than 0.8 in the early 1990s to less than 0.6 in recent years.

[17] While the analysis focuses on the manufacturing sector, a preliminary exploration of data suggests that, despite the fall in the wage and labour shares, the profit rate may have failed to increase also in both the whole tradable and non-tradable sectors. On the other hand, in order to use manufacturing data for the entire 1990–2015 period the calculations do not adjust for non-wage (self-employment) labour income (nor for net production taxes, which are a very small and constant share of value added), and thus they over-estimate the *level* of the profit share, which actually would be given by $s = 1 - WS - (LIS - WS)$. However, since during the period under analysis the share of non-wage *labour* income in value added ($LIS - WS$) was small and approximately constant, the *change* in the profit share is not being over-estimated.

Figure 16: Manufacturing profit rate and its components, 1990–2015

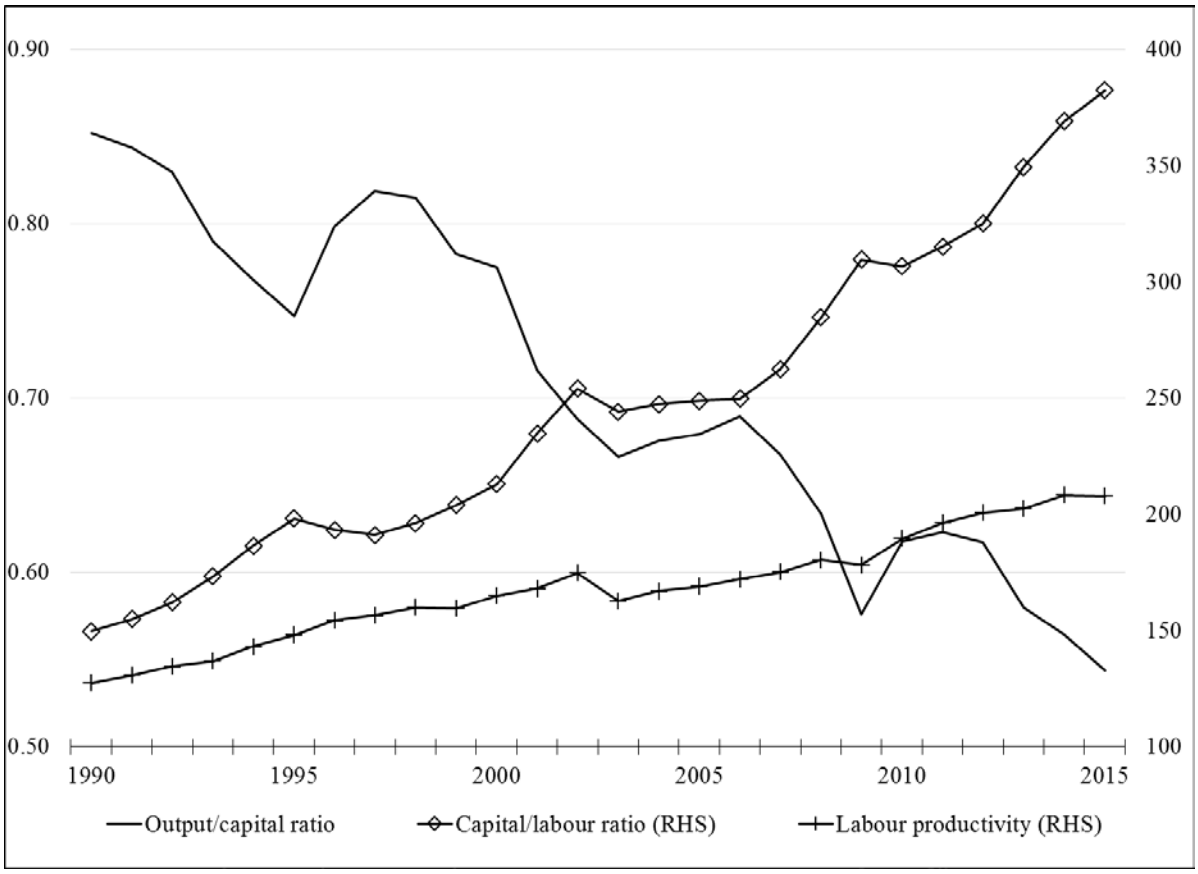


Source: Authors' calculations based on data from INEGI-KLEMS.

In the short run, the output/capital ratio can reflect changes in aggregate demand and capacity utilization. However, a steady fall over a quarter century cannot be plausibly attributed to a decrease in capacity utilization. As an alternative explanation, consider that by definition the output/capital ratio equals the ratio of labour productivity to the capital/labour ratio, $u = (VA'/L) / (K'/L)$, where VA' is real value added, L the amount of labour, and K' the real capital stock. From this definition, the output/capital ratio will fall when changes in production conditions are such that labour productivity increases proportionally less than does the capital/labour ratio, in what is sometimes called a pattern of Marx-biased (i.e. labour-saving and capital-using) technical change (see Foley and Marquetti 1999).

Figure 17 shows series for the output/capital ratio, labour productivity, and the capital/labour ratio in manufacturing. Both labour productivity and the capital/labour ratio increased over time. As expected, however, labour productivity lagged behind. Thus, during 1991–2015 labour productivity grew at a (geometric) average rate of 2 per cent per year, whereas the capital/labour ratio grew at 3.8 per cent. The gap in the growth rates between labour productivity and the capital/labour ratio implied a fall in the output/capital ratio at an annual rate of 1.8 per cent, with a negative effect on the profit rate.

Figure 17: Labour productivity and the output/capital and capital/labour ratios in the manufacturing sector, 1990–2015



Notes: Labour productivity and the capital/labour ratio are measured in constant pesos (at 2008 prices) per worked hour.

Source: Authors' calculations based on data from INEGI-KLEMS.

These trends—falling labour share and rising capital/output ratio—are also consistent with movements along a production function with a high (greater than unity) elasticity of factor substitution. This appears to be Piketty's (2013) conjecture about the technological factors accounting for increasing income concentration at the top over the past few decades. However, we believe that biased technical progress is a more satisfactory explanation in the context of an economy, like the Mexican one, where real wages are not rising and triggering substitution of capital for labour along a given production function. The Mexican economy has been characterized over the past decade, in which we have witnessed more clearly those trends, by real wage stagnation or even decline.

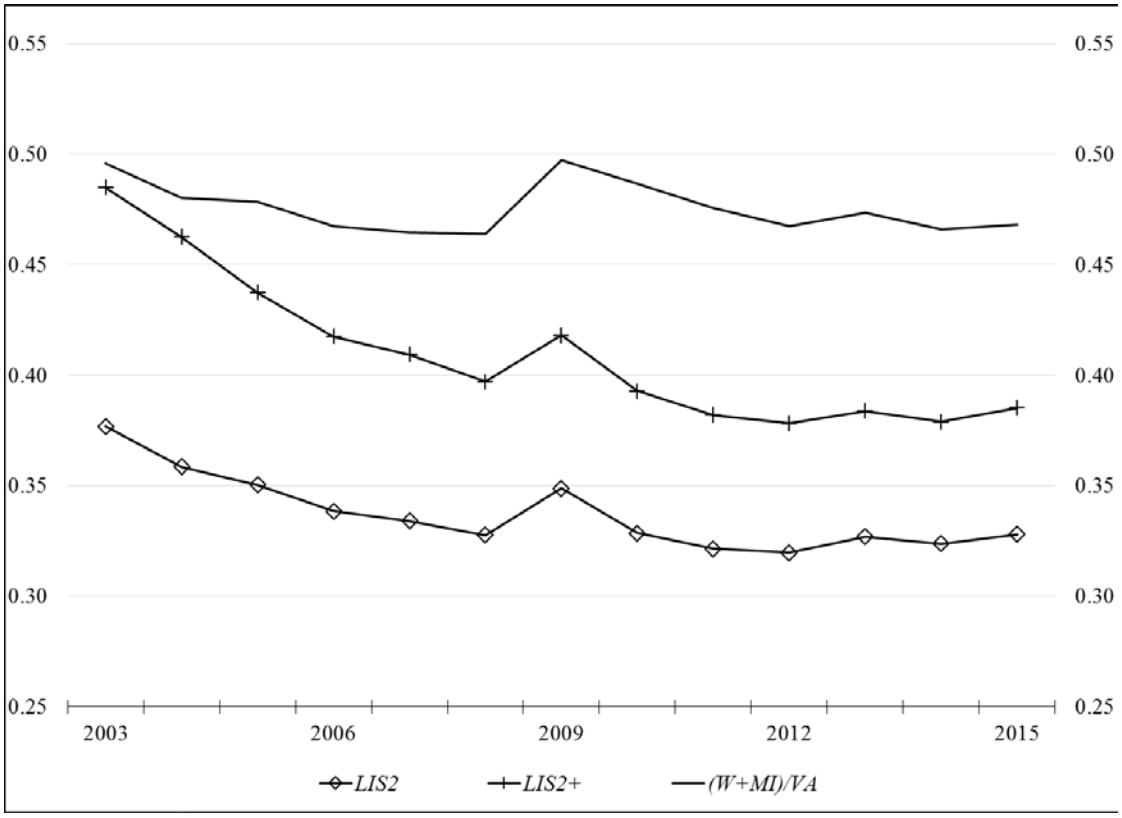
These three hypotheses are not mutually exclusive in the sense that some factors may be constraining accumulation in some sectors whereas investment in other sectors in the economy is inhibited by other mechanisms. For example, real wage stagnation may be a demand-side constraint on accumulation in the modern non-tradable sector whereas manufacturing industries are subject to problems of relative profitability vis-à-vis the United States or to the negative effects on the rate of profit and accumulation of capital-using and labour-saving technical progress.

5.3 Self-employment income and mixed income in the National Accounts

On the empirical front, the main challenge for the future is to continue to integrate and combine information from different sources. Some steps have been taken along this road, by providing series for *LIS1* and *LIS2* for 18 sectors of the whole economy and 11 sectors of the private business sector. However, more needs to be done to explain the gaps in the National Accounts and the employment surveys.

INEGI's National Accounts provides information on mixed incomes for the whole economy in the period 2003–15, which allows us to estimate the share of wages plus mixed incomes in total value added. Figure 18 presents these estimates together with our estimate of *LIS2* for the whole economy and an estimate (*LIS2+*) that includes, for the whole economy and besides self-employment incomes, the incomes of employers recorded by the employment surveys.

Figure 18. *LIS2*, *LIS2+*, and the wage plus mixed incomes share for the whole economy, 2003–15



Source: Authors' calculations based on data from INEGI. See text and Annex section A1 for details.

As can be seen, the three series show a downward trend that, however, is more marked in the case of *LIS2* (a fall of the order of 6 percentage points) than in the case of the National Accounts estimate based on mixed incomes (of the order of 3 percentage points). The National Accounts estimate is also higher than *LIS2* based on the employment surveys (a 10 points difference in 2003 and one of 13 points in 2015). About half of this gap may be explained by the fact that mixed incomes in the National Accounts explicitly include employers' incomes, which we excluded from our definition of self-employment income and treated as capital income. Indeed, the gap with *LIS2+*, which includes employers' incomes, is about half of the gap between *LIS2* and the National Accounts estimate for the average of the period (6–7 percentage points). The rest of the gap is probably to be attributed to the use of sources other than the employment surveys in the estimation of mixed incomes in the National Accounts.

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Annex A: Labour shares and productivity levels—Data and methodology

A1 Measurement issues in estimating the labour income share

The main issues involved in estimating the labour income share refer to the different concepts of labour income and employment and the different classification systems used by the National Accounts and the INEGI-KLEMS database, on the one hand, and the national employment surveys (ENE and ENOE) on the other. In addition, the classification systems of the two employment surveys are different.

The INEGI-KLEMS database contains for a large number of sectors at the two- and three-digit levels information on each sector's wage bill (excluding self-employment income but including non-wage remuneration of subordinated workers), total value added, and total employment (including the self-employed and non-remunerated workers). The employment surveys include the Encuesta Nacional de Empleo (ENE, National Employment Survey), which is available for 1995–2004, and the Encuesta Nacional de Ocupación y Empleo (ENOE, National Survey of Occupation and Employment), which substitutes the former from 2005 onwards. Both surveys are quarterly surveys. From 1995 to 1999 the ENE is only available for the second quarter of the year, for 2000 for the last three quarters, and from 2001 the survey is available quarterly. These surveys provide information on earnings and the composition of employment that includes wage earners, subordinated and remunerated workers with non-wage remuneration, employers, self-employed (*trabajadores por cuenta propia* or freelance), and non-remunerated workers. For example, Table A1 shows ENOE data for the fourth quarter of 2015.

Table A1: Employment and its composition according to ENOE 2015 – IV

	Millions	Percentage
Total employed population	42.9	100
Wage earners	25.6	59.7
Self-employed	10.1	23.5
Subordinated and remunerated workers with non-wage remuneration	2.2	5.1
Non-remunerated workers	3.0	7.0
Employers	2.0	4.7

Source: Authors' calculation based on data from ENOE.

The ENOE merged the Encuesta Nacional de Empleo Urbano (ENEU, National Urban Employment Survey) and the ENE, and replaced both surveys starting in 2005. In the ENOE the sectors are classified according to the SCIAN-Hogares classification, while in the ENE they are classified according to the Clasificación de Actividades Económicas de la Encuesta Nacional de Empleo Urbano (CAE-ENEU-94, Classification of Economic Activities of the ENEU) system. Due to these disparities in the classification systems it was necessary to homologate the employment series of the ENE and the ENOE to estimate employment series from 1995 to 2014. The homologation between the ENOE and ENE databases was made using the microdata available (see INEGI, n.d.a, n.d.b) and an INEGI comparative between sectors codes according to CAE-ENEU-94 and SCIAN-Hogares, based on an unpublished document provided by INEGI.

ENOE's SCIAN classification was used as a reference for the homologation, and then this was matched with the SCIAN classification of the INEGI-KLEMS project. In both classifications there are 20 economic sectors. However, due to differences in the classification systems of ENE and ENOE, sectors 43 and 46 were combined into a single sector, Commerce, and sectors 53 and 55 were also combined, while sector 56 (Administrative and support, waste management, and remediation services) was dismissed for showing very erratic behaviour of total employment. This left a classification system for the whole economy with 17 sectors (see Annex Table A2).

Table A2: Economic sectors of the whole economy

SCIAN-ENOE	SCIAN-KLEMS	Sector
1	11	Agriculture, forestry, fishing, and hunting
2	21	Mining, quarrying, and oil and gas extraction
3	22	Utilities
4	23	Construction
5	31–33	Manufacturing
6, 7	43 and 46	Wholesale trade; retail trade
8	48–49	Transportation and warehousing
9	51	Information and cultural industries
10	52	Finance and insurance
11, 12	53 and 55	Real estate and rental and leasing; management of companies and enterprises
13	54	Professional, scientific, and technical services
15	61	Educational services
16	62	Health care and social assistance
17	71	Arts, entertainment, and recreation
18	72	Accommodation and food services
19	81	Other services, except public administration
20	93	Public administration

Source: Authors' elaboration based on information from ENOE and INEGI-KLEMIS.

To estimate the labour share in the private business sector several activities, mostly government-related, were excluded from the whole economy. The sectors excluded are 21 (Mining, quarrying, and oil and gas extraction), 22 (Utilities), 53 and 55 (Real estate and rental and leasing), 61 (Education services), 62 (Health care and social assistance), and 93 (Public administration). In addition, subsector 324 (Petroleum and coal products manufacturing) was subtracted from 31–33 (Manufacturing). The resulting private business sector has 11 activities (see Annex Table A3). Once the series from the ENE was homologated, the homologated 11-sector classification of INEGI (n.d.c) was used to calibrate (using the variable RAMA_EST2) and verify that there were no missing data. This classification is shown in Annex Table A4.

Table A3: Economic activities of the private business sector

SCIAN-KLEMS	Sector
11	Agriculture, forestry, fishing, and hunting
23	Construction
31–33	Manufacturing (less subsector 324, Petroleum and coal products manufacturing)
43 and 46	Commerce
48–49	Transportation and warehousing
51	Information
52	Finance and insurance
54	Professional, scientific, and technical services
71	Arts, entertainment, and recreation
72	Accommodation and food services
81	Other services, except public administration

Source: Authors' elaboration based on information from INEGI-KLEMIS.

Table A4: Classification of economic sectors

SCIAN-ENE		Classification used to calibrate	
11	Agriculture, forestry, fishing, and hunting	1	Agriculture, forestry, fishing, and hunting
21	Mining, quarrying, and oil and gas extraction	2	Mining, quarrying, and oil and gas extraction and utilities
22	Utilities		
23	Construction	4	Construction
31–33	Manufacturing	3	Manufacturing
43 and 46	Wholesale trade and retail trade	6	Commerce
48–49	Transportation and warehousing	7	Transportation and warehousing and information and cultural industries
51	Information and cultural industries		
52	Finance and insurance	8	Finance and insurance; professional, scientific, and technical service; real estate and rental leasing and management of companies and enterprises; and administrative and support, waste management and remediation services
53 and 55	Real estate and rental and leasing; management of companies and enterprises		
54	Professional, scientific, and technical services		
56	Administrative and support, waste management and remediation services		
61	Educational services	9	Social services
62	Health care and social assistance		
71	Arts, entertainment, and recreation	10	Diverse services
72	Accommodation and food services	6	Restaurants and accommodation
81	Other services, except public administration	10	Diverse services
93	Public administration	11	Public administration

Source: Authors' elaboration based on information from ENE and INEGI-KLEMIS.

A2 Supplementary tables and figures

Table A5: Wage share for the whole economy and its main sectors, 1990–2015

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.29	0.29	0.31	0.32	0.32	0.27	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.30	0.29	0.29	0.28	0.28	0.27	0.29	0.27	0.27	0.27	0.27	0.27	0.28
Tradables	0.20	0.21	0.22	0.23	0.23	0.19	0.17	0.18	0.19	0.19	0.21	0.22	0.21	0.22	0.20	0.19	0.18	0.17	0.16	0.17	0.16	0.14	0.14	0.15	0.15	0.16
Non-tradables	0.35	0.34	0.36	0.36	0.36	0.31	0.30	0.31	0.31	0.32	0.32	0.33	0.34	0.34	0.33	0.32	0.32	0.32	0.32	0.33	0.32	0.32	0.32	0.32	0.32	0.32
Agriculture, forestry, fishing, and hunting	0.16	0.16	0.17	0.17	0.18	0.17	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.18	0.18	0.19	0.18	0.17	0.16	0.17	0.17	0.16	0.16	0.16	0.17	0.17
Mining, quarrying, and oil and gas extraction	0.05	0.07	0.06	0.07	0.07	0.06	0.06	0.06	0.07	0.06	0.08	0.08	0.09	0.09	0.07	0.06	0.06	0.06	0.06	0.08	0.07	0.06	0.06	0.07	0.08	0.11
Utilities	0.24	0.25	0.25	0.30	0.27	0.23	0.21	0.21	0.21	0.20	0.22	0.23	0.23	0.21	0.21	0.20	0.20	0.20	0.19	0.19	0.18	0.21	0.24	0.23	0.20	0.20
Construction	0.46	0.46	0.46	0.47	0.41	0.42	0.45	0.50	0.51	0.51	0.48	0.48	0.47	0.46	0.45	0.45	0.45	0.45	0.45	0.44	0.43	0.43	0.43	0.43	0.42	0.42
Manufacturing	0.28	0.28	0.29	0.30	0.29	0.23	0.21	0.22	0.23	0.24	0.26	0.27	0.27	0.27	0.25	0.25	0.23	0.23	0.21	0.21	0.19	0.19	0.18	0.18	0.18	0.17
Wholesale trade and retail trade	0.21	0.23	0.26	0.27	0.26	0.19	0.16	0.17	0.17	0.18	0.18	0.20	0.21	0.21	0.19	0.19	0.19	0.19	0.18	0.19	0.18	0.16	0.16	0.16	0.16	0.15
Transportation and warehousing	0.31	0.30	0.35	0.38	0.38	0.33	0.31	0.30	0.30	0.31	0.32	0.33	0.33	0.34	0.33	0.33	0.31	0.32	0.32	0.33	0.31	0.31	0.30	0.30	0.30	0.29
Information and cultural industries	0.37	0.33	0.32	0.32	0.32	0.33	0.34	0.34	0.34	0.33	0.30	0.29	0.29	0.27	0.27	0.26	0.25	0.24	0.24	0.24	0.23	0.25	0.24	0.24	0.24	0.25
Finance and insurance	0.30	0.33	0.34	0.33	0.35	0.31	0.44	0.57	0.53	0.48	0.50	0.39	0.44	0.32	0.30	0.26	0.27	0.26	0.27	0.27	0.27	0.29	0.29	0.27	0.28	0.27
Real estate and rental and leasing; management of companies and enterprises	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Professional, scientific, and technical services	0.57	0.52	0.50	0.47	0.50	0.46	0.41	0.40	0.38	0.35	0.33	0.32	0.32	0.30	0.28	0.28	0.28	0.28	0.27	0.28	0.29	0.29	0.28	0.29	0.30	0.30
Educational services	0.91	0.91	0.94	0.93	0.93	0.91	0.91	0.92	0.92	0.92	0.92	0.91	0.91	0.90	0.89	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Health care and social assistance	0.90	0.87	0.84	0.81	0.80	0.79	0.77	0.75	0.76	0.76	0.76	0.75	0.74	0.75	0.75	0.75	0.73	0.73	0.75	0.76	0.77	0.78	0.78	0.79	0.80	0.80
Arts, entertainment, and recreation	0.41	0.36	0.35	0.34	0.32	0.32	0.31	0.27	0.26	0.25	0.24	0.26	0.25	0.24	0.23	0.23	0.23	0.22	0.22	0.23	0.24	0.24	0.24	0.24	0.25	0.25
Accommodation and food services	0.24	0.25	0.25	0.27	0.28	0.28	0.27	0.25	0.25	0.24	0.23	0.23	0.23	0.24	0.23	0.23	0.23	0.23	0.23	0.25	0.25	0.24	0.24	0.24	0.23	0.22
Other services, except public administration	0.41	0.40	0.40	0.41	0.42	0.39	0.38	0.38	0.39	0.38	0.38	0.38	0.38	0.37	0.36	0.37	0.38	0.38	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.40
Public administration	0.97	0.97	0.97	0.98	0.98	0.98	0.97	0.97	0.98	0.98	0.98	0.98	0.98	0.99	0.99	0.99	0.98	0.98	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98

Source: Authors' calculation based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Table A6: Wage share for the private business sector and its main subsectors, 1990–2015

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.29	0.29	0.31	0.32	0.32	0.27	0.25	0.27	0.27	0.28	0.28	0.29	0.29	0.28	0.27	0.27	0.27	0.26	0.26	0.26	0.25	0.24	0.24	0.24	0.24	0.23
Tradables	0.25	0.26	0.27	0.28	0.28	0.22	0.20	0.21	0.22	0.23	0.25	0.26	0.26	0.25	0.24	0.24	0.23	0.22	0.21	0.20	0.19	0.18	0.17	0.18	0.18	0.17
Non-tradables	0.31	0.32	0.34	0.35	0.34	0.29	0.29	0.30	0.30	0.31	0.30	0.31	0.31	0.30	0.29	0.29	0.29	0.28	0.28	0.29	0.28	0.27	0.27	0.27	0.26	0.26
Agriculture	0.16	0.16	0.17	0.17	0.18	0.17	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.18	0.18	0.19	0.18	0.17	0.16	0.17	0.17	0.16	0.16	0.16	0.17	0.17
Construction	0.46	0.46	0.46	0.47	0.41	0.42	0.45	0.50	0.51	0.51	0.48	0.48	0.47	0.46	0.45	0.45	0.45	0.45	0.45	0.44	0.43	0.43	0.43	0.43	0.42	0.42
Manufacturing	0.29	0.29	0.30	0.31	0.30	0.24	0.22	0.23	0.23	0.25	0.26	0.27	0.27	0.27	0.25	0.25	0.23	0.23	0.21	0.21	0.19	0.18	0.18	0.18	0.18	0.17
Commerce	0.21	0.23	0.26	0.27	0.26	0.19	0.16	0.17	0.17	0.18	0.18	0.20	0.21	0.21	0.19	0.19	0.19	0.19	0.18	0.19	0.18	0.16	0.16	0.16	0.16	0.15
Transportation and warehousing	0.31	0.30	0.35	0.38	0.38	0.33	0.31	0.30	0.30	0.31	0.32	0.33	0.33	0.34	0.33	0.33	0.31	0.32	0.32	0.33	0.31	0.31	0.30	0.30	0.30	0.29
Information	0.37	0.33	0.32	0.32	0.32	0.33	0.34	0.34	0.34	0.33	0.30	0.29	0.29	0.27	0.27	0.26	0.25	0.24	0.24	0.24	0.23	0.25	0.24	0.24	0.24	0.25
Finance and insurance	0.30	0.33	0.34	0.33	0.35	0.31	0.44	0.57	0.53	0.48	0.50	0.39	0.44	0.32	0.30	0.26	0.27	0.26	0.27	0.27	0.27	0.29	0.29	0.27	0.28	0.27
Professional, scientific, and technical services	0.57	0.52	0.50	0.47	0.50	0.46	0.41	0.40	0.38	0.35	0.33	0.32	0.32	0.30	0.28	0.28	0.28	0.28	0.27	0.28	0.29	0.29	0.28	0.29	0.30	0.30
Arts, entertainment, and recreation	0.41	0.36	0.35	0.34	0.32	0.32	0.31	0.27	0.26	0.25	0.24	0.26	0.25	0.24	0.23	0.23	0.23	0.22	0.22	0.23	0.24	0.24	0.24	0.24	0.25	0.25
Accommodation and food services	0.24	0.25	0.25	0.27	0.28	0.28	0.27	0.25	0.25	0.24	0.23	0.23	0.23	0.24	0.23	0.23	0.23	0.23	0.23	0.25	0.25	0.24	0.24	0.24	0.23	0.22
Other services	0.41	0.40	0.40	0.41	0.42	0.39	0.38	0.38	0.39	0.38	0.38	0.38	0.38	0.37	0.36	0.37	0.38	0.38	0.38	0.38	0.38	0.38	0.39	0.39	0.39	0.40

Source: Authors' calculation based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Table A7: *LIS1* for the whole economy and its main sectors, 1995–2015

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.34	0.32	0.34	0.34	0.35	0.35	0.36	0.37	0.37	0.35	0.35	0.34	0.33	0.33	0.35	0.33	0.32	0.31	0.32	0.32	0.32
Tradables	0.24	0.22	0.23	0.24	0.25	0.25	0.27	0.27	0.28	0.25	0.24	0.22	0.21	0.20	0.22	0.19	0.17	0.17	0.18	0.18	0.20
Non-tradables	0.39	0.37	0.39	0.39	0.39	0.40	0.41	0.41	0.41	0.40	0.39	0.39	0.38	0.38	0.39	0.38	0.38	0.38	0.38	0.38	0.37
Agriculture, forestry, fishing, and hunting	0.39	0.31	0.31	0.34	0.37	0.37	0.38	0.39	0.41	0.41	0.41	0.38	0.35	0.33	0.34	0.34	0.32	0.30	0.32	0.32	0.31
Mining, quarrying, and oil and gas extraction	0.07	0.06	0.06	0.08	0.07	0.08	0.09	0.09	0.10	0.08	0.06	0.06	0.06	0.06	0.09	0.07	0.06	0.06	0.08	0.08	0.11
Utilities	0.23	0.21	0.21	0.21	0.20	0.22	0.23	0.23	0.22	0.21	0.20	0.20	0.20	0.19	0.19	0.18	0.21	0.24	0.23	0.20	0.20
Construction	0.54	0.60	0.67	0.66	0.67	0.65	0.64	0.61	0.59	0.58	0.56	0.55	0.53	0.53	0.53	0.50	0.52	0.50	0.52	0.51	0.50
Manufacturing	0.25	0.24	0.26	0.26	0.28	0.29	0.31	0.31	0.31	0.28	0.29	0.26	0.26	0.25	0.25	0.22	0.21	0.20	0.20	0.20	0.19
Wholesale trade and retail trade	0.36	0.28	0.32	0.30	0.31	0.31	0.35	0.36	0.36	0.34	0.33	0.32	0.31	0.30	0.33	0.29	0.27	0.26	0.27	0.26	0.24
Transportation and warehousing	0.40	0.38	0.36	0.38	0.37	0.41	0.41	0.42	0.43	0.42	0.42	0.41	0.40	0.40	0.43	0.39	0.39	0.37	0.37	0.37	0.36
Information and cultural industries	0.34	0.34	0.35	0.36	0.34	0.31	0.29	0.30	0.28	0.27	0.28	0.27	0.25	0.24	0.24	0.24	0.25	0.24	0.24	0.24	0.25
Finance and insurance	0.31	0.44	0.57	0.54	0.48	0.51	0.40	0.45	0.32	0.30	0.26	0.27	0.26	0.28	0.27	0.28	0.29	0.29	0.27	0.28	0.27
Real estate and rental and leasing; management of companies and enterprises	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.03	0.02	0.02
Professional, scientific, and technical services	0.64	0.64	0.57	0.55	0.49	0.47	0.47	0.48	0.45	0.42	0.40	0.38	0.40	0.39	0.41	0.42	0.40	0.39	0.42	0.42	0.42
Educational services	0.92	0.93	0.92	0.93	0.94	0.93	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.92	0.92	0.92	0.91	0.92
Health care and social assistance	0.86	0.84	0.86	0.83	0.85	0.83	0.82	0.82	0.84	0.84	0.84	0.81	0.80	0.82	0.84	0.85	0.86	0.86	0.87	0.86	0.88
Arts, entertainment, and recreation	0.38	0.38	0.33	0.34	0.34	0.31	0.34	0.32	0.32	0.29	0.31	0.30	0.29	0.29	0.31	0.31	0.32	0.30	0.30	0.30	0.30
Accommodation and food services	0.38	0.38	0.35	0.33	0.33	0.31	0.31	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.35	0.34	0.33	0.32	0.32	0.31	0.30
Other services, except public administration	0.51	0.49	0.49	0.50	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.49	0.48	0.49	0.48	0.48	0.49	0.49	0.49	0.50
Public administration	0.99	0.98	0.98	0.98	0.99	0.99	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98

Source: Authors' calculation based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Table A8: *LIS1* for the private business sector and its main subsectors, 1995–2015

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.36	0.34	0.36	0.36	0.37	0.38	0.39	0.39	0.39	0.37	0.36	0.35	0.34	0.34	0.35	0.32	0.32	0.30	0.31	0.31	0.29
Tradables	0.29	0.26	0.27	0.28	0.30	0.31	0.32	0.33	0.32	0.31	0.31	0.29	0.27	0.26	0.26	0.24	0.23	0.22	0.22	0.22	0.21
Non-tradables	0.41	0.40	0.42	0.42	0.42	0.42	0.42	0.43	0.42	0.40	0.39	0.38	0.37	0.37	0.39	0.36	0.36	0.35	0.35	0.34	0.33
Agriculture	0.39	0.31	0.31	0.34	0.37	0.37	0.38	0.39	0.41	0.41	0.41	0.38	0.35	0.33	0.34	0.34	0.32	0.30	0.32	0.32	0.31
Construction	0.54	0.60	0.67	0.66	0.67	0.65	0.64	0.61	0.59	0.58	0.56	0.55	0.53	0.53	0.53	0.50	0.52	0.50	0.52	0.51	0.50
Manufacturing	0.26	0.25	0.26	0.26	0.28	0.30	0.31	0.31	0.31	0.29	0.29	0.27	0.26	0.25	0.24	0.22	0.21	0.20	0.20	0.20	0.19
Commerce	0.36	0.28	0.32	0.30	0.31	0.31	0.35	0.36	0.36	0.34	0.33	0.32	0.31	0.30	0.33	0.29	0.27	0.26	0.27	0.26	0.24
Transportation and warehousing	0.40	0.38	0.36	0.38	0.37	0.41	0.41	0.42	0.43	0.42	0.42	0.41	0.40	0.40	0.43	0.39	0.39	0.37	0.37	0.37	0.36
Information	0.34	0.34	0.35	0.36	0.34	0.31	0.29	0.30	0.28	0.27	0.28	0.27	0.25	0.24	0.24	0.24	0.25	0.24	0.24	0.24	0.25
Finance and insurance	0.31	0.44	0.57	0.54	0.48	0.51	0.40	0.45	0.32	0.30	0.26	0.27	0.26	0.28	0.27	0.28	0.29	0.29	0.27	0.28	0.27
Professional, scientific, and technical services	0.64	0.64	0.57	0.55	0.49	0.47	0.47	0.48	0.45	0.42	0.40	0.38	0.40	0.39	0.41	0.42	0.40	0.39	0.42	0.42	0.42
Arts, entertainment, and recreation	0.38	0.38	0.33	0.34	0.34	0.31	0.34	0.32	0.32	0.29	0.31	0.30	0.29	0.29	0.31	0.31	0.32	0.30	0.30	0.30	0.30
Accommodation and food services	0.38	0.38	0.35	0.33	0.33	0.31	0.31	0.32	0.32	0.31	0.31	0.31	0.31	0.31	0.35	0.34	0.33	0.32	0.32	0.31	0.30
Other services	0.51	0.49	0.49	0.50	0.49	0.49	0.49	0.49	0.48	0.48	0.48	0.48	0.49	0.48	0.49	0.48	0.48	0.49	0.49	0.49	0.50

Source: Authors' calculation based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Table A9: *LIS2* for the whole economy and its main sectors, 1995–2015

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.34	0.33	0.34	0.34	0.35	0.36	0.37	0.37	0.38	0.36	0.35	0.34	0.33	0.33	0.35	0.33	0.32	0.32	0.33	0.32	0.33
Tradables	0.22	0.21	0.22	0.23	0.23	0.24	0.25	0.25	0.26	0.23	0.22	0.20	0.20	0.18	0.20	0.18	0.16	0.16	0.17	0.17	0.18
Non-tradables	0.40	0.39	0.41	0.40	0.41	0.42	0.42	0.42	0.42	0.41	0.40	0.40	0.39	0.39	0.41	0.39	0.39	0.39	0.39	0.39	0.38
Agriculture, forestry, fishing, and hunting	0.29	0.28	0.27	0.28	0.28	0.28	0.29	0.29	0.29	0.28	0.27	0.26	0.23	0.22	0.23	0.23	0.21	0.21	0.21	0.22	0.21
Mining, quarrying, and oil and gas extraction	0.07	0.06	0.06	0.08	0.06	0.08	0.08	0.09	0.10	0.08	0.06	0.06	0.06	0.06	0.09	0.07	0.06	0.06	0.08	0.08	0.11
Utilities	0.23	0.21	0.21	0.21	0.20	0.22	0.23	0.23	0.22	0.21	0.20	0.20	0.20	0.19	0.19	0.18	0.21	0.24	0.23	0.20	0.20
Construction	0.59	0.63	0.70	0.68	0.70	0.67	0.67	0.64	0.62	0.62	0.58	0.57	0.55	0.55	0.55	0.52	0.54	0.52	0.54	0.53	0.52
Manufacturing	0.25	0.24	0.25	0.26	0.27	0.28	0.30	0.30	0.30	0.28	0.29	0.26	0.25	0.24	0.24	0.22	0.21	0.20	0.21	0.20	0.19
Wholesale trade and retail trade	0.32	0.28	0.31	0.30	0.31	0.33	0.35	0.36	0.36	0.34	0.33	0.32	0.32	0.31	0.34	0.30	0.28	0.27	0.28	0.27	0.25
Transportation and warehousing	0.45	0.43	0.38	0.41	0.38	0.43	0.43	0.44	0.46	0.44	0.44	0.42	0.42	0.41	0.44	0.40	0.40	0.38	0.38	0.38	0.38
Information and cultural industries	0.34	0.34	0.35	0.34	0.34	0.31	0.29	0.30	0.28	0.27	0.28	0.27	0.24	0.24	0.25	0.24	0.26	0.24	0.24	0.24	0.25
Finance and insurance	0.31	0.44	0.59	0.54	0.48	0.52	0.40	0.45	0.32	0.30	0.27	0.28	0.27	0.28	0.28	0.28	0.29	0.30	0.27	0.29	0.28
Real estate and rental and leasing; management of companies and enterprises	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Professional, scientific, and technical services	0.73	0.76	0.64	0.61	0.56	0.53	0.55	0.55	0.51	0.47	0.45	0.43	0.45	0.44	0.47	0.47	0.45	0.45	0.48	0.48	0.48
Educational services	0.93	0.93	0.92	0.93	0.94	0.93	0.92	0.92	0.91	0.91	0.91	0.91	0.91	0.91	0.92	0.92	0.92	0.92	0.92	0.92	0.93
Health care and social assistance	0.90	0.90	0.92	0.88	0.86	0.86	0.86	0.86	0.89	0.86	0.86	0.85	0.84	0.85	0.86	0.87	0.87	0.90	0.89	0.89	0.90
Arts, entertainment, and recreation	0.39	0.40	0.39	0.39	0.36	0.40	0.40	0.37	0.36	0.32	0.35	0.35	0.33	0.34	0.34	0.33	0.38	0.34	0.33	0.34	0.34
Accommodation and food services	0.41	0.41	0.39	0.37	0.34	0.34	0.34	0.34	0.36	0.34	0.33	0.33	0.31	0.33	0.37	0.36	0.36	0.35	0.35	0.33	0.33
Other services, except public administration	0.59	0.54	0.55	0.55	0.53	0.54	0.52	0.53	0.52	0.53	0.52	0.52	0.53	0.52	0.51	0.52	0.52	0.52	0.53	0.52	0.52
Public administration	0.99	0.99	0.98	0.99	1.00	0.99	1.00	1.00	1.00	1.00	0.99	0.98	0.98	0.99	0.98	0.98	0.98	0.98	0.98	0.98	0.98

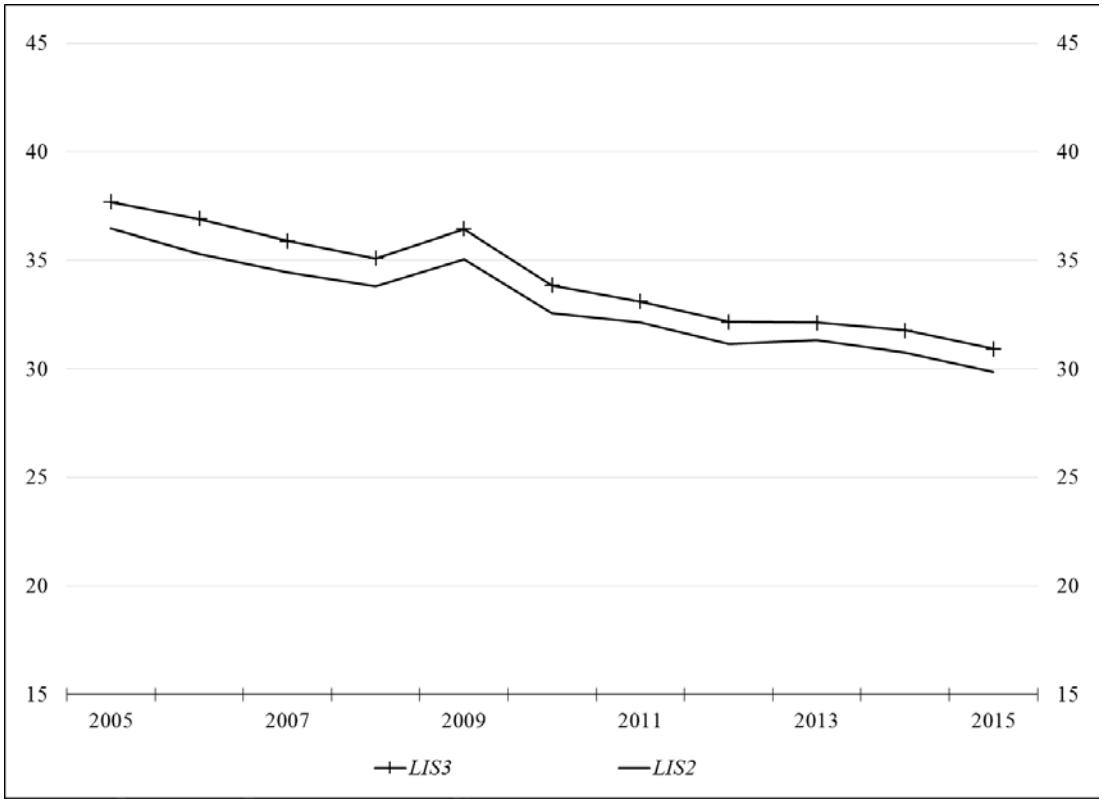
Source: Authors' calculation based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Table A10: *LIS2* for the private business sector and its main subsectors, 1995–2015

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total	0.36	0.35	0.37	0.37	0.37	0.38	0.39	0.39	0.39	0.37	0.36	0.35	0.34	0.34	0.35	0.33	0.32	0.31	0.31	0.31	0.30
Tradables	0.27	0.25	0.26	0.26	0.27	0.29	0.30	0.30	0.30	0.28	0.28	0.26	0.25	0.24	0.24	0.22	0.21	0.20	0.20	0.20	0.20
Non-tradables	0.42	0.42	0.44	0.43	0.43	0.44	0.44	0.44	0.44	0.42	0.40	0.40	0.39	0.38	0.40	0.38	0.37	0.36	0.36	0.36	0.35
Agriculture	0.29	0.28	0.27	0.28	0.28	0.28	0.29	0.29	0.29	0.28	0.27	0.26	0.23	0.22	0.23	0.23	0.21	0.21	0.21	0.22	0.21
Construction	0.59	0.63	0.70	0.68	0.70	0.67	0.67	0.64	0.62	0.62	0.58	0.57	0.55	0.55	0.55	0.52	0.54	0.52	0.54	0.53	0.52
Manufacturing	0.26	0.25	0.26	0.26	0.27	0.29	0.30	0.30	0.30	0.28	0.28	0.27	0.25	0.24	0.24	0.22	0.21	0.20	0.20	0.20	0.19
Commerce	0.32	0.28	0.31	0.30	0.31	0.33	0.35	0.36	0.36	0.34	0.33	0.32	0.32	0.31	0.34	0.30	0.28	0.27	0.28	0.27	0.25
Transportation and warehousing	0.45	0.43	0.38	0.41	0.38	0.43	0.43	0.44	0.46	0.44	0.44	0.42	0.42	0.41	0.44	0.40	0.40	0.38	0.38	0.38	0.38
Information	0.34	0.34	0.35	0.34	0.34	0.31	0.29	0.30	0.28	0.27	0.28	0.27	0.24	0.24	0.25	0.24	0.26	0.24	0.24	0.24	0.25
Finance and insurance	0.31	0.44	0.59	0.54	0.48	0.52	0.40	0.45	0.32	0.30	0.27	0.28	0.27	0.28	0.28	0.28	0.29	0.30	0.27	0.29	0.28
Professional, scientific, and technical services	0.73	0.76	0.64	0.61	0.56	0.53	0.55	0.55	0.51	0.47	0.45	0.43	0.45	0.44	0.47	0.47	0.45	0.45	0.48	0.48	0.48
Arts, entertainment, and recreation	0.39	0.40	0.39	0.39	0.36	0.40	0.40	0.37	0.36	0.32	0.35	0.35	0.33	0.34	0.34	0.33	0.38	0.34	0.33	0.34	0.34
Accommodation and food services	0.41	0.41	0.39	0.37	0.34	0.34	0.34	0.34	0.36	0.34	0.33	0.33	0.31	0.33	0.37	0.36	0.36	0.35	0.35	0.33	0.33
Other services	0.59	0.54	0.55	0.55	0.53	0.54	0.52	0.53	0.52	0.53	0.52	0.52	0.53	0.52	0.51	0.52	0.52	0.52	0.53	0.52	0.52

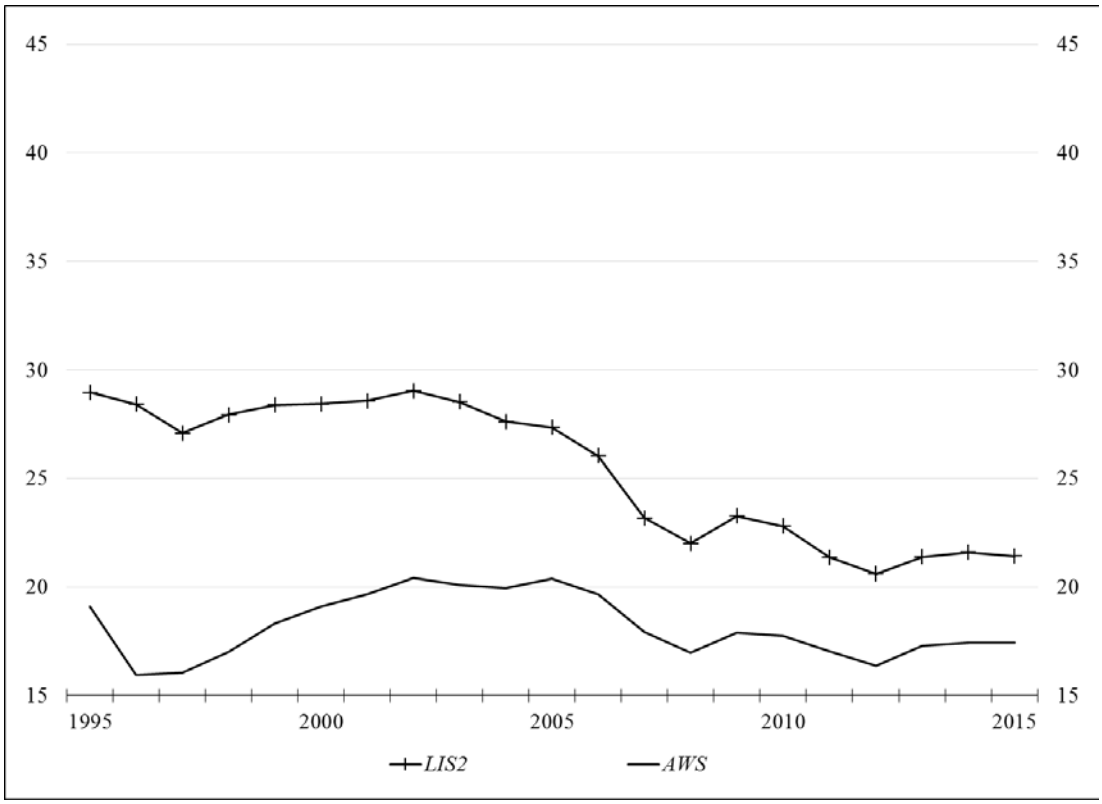
Source: Authors' calculation based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Figure A1: *LIS2* and *LIS3* in the private business sector, 1995–2015



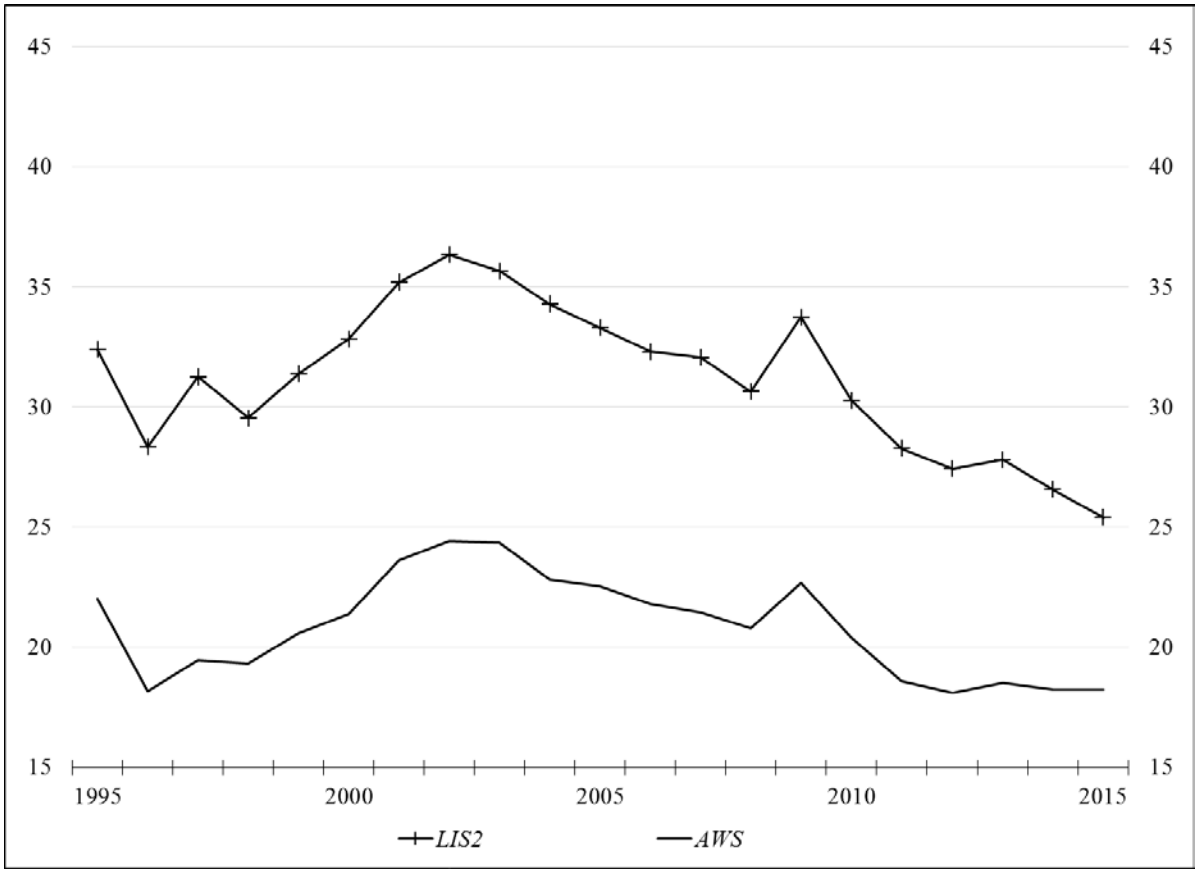
Source: Authors' calculations based on data from INEGI. See Equation (1) in the text and Annex section A1 for details.

Figure A2: Adjusted wage share (*AWS*) and *LIS2* in agriculture, 1995–2015



Source: Authors' calculations based on data from INEGI. See Equation (4) in the text and Annex section A1 for details.

Figure A3: *AWS* and *LIS2* in commerce, 1995–2015



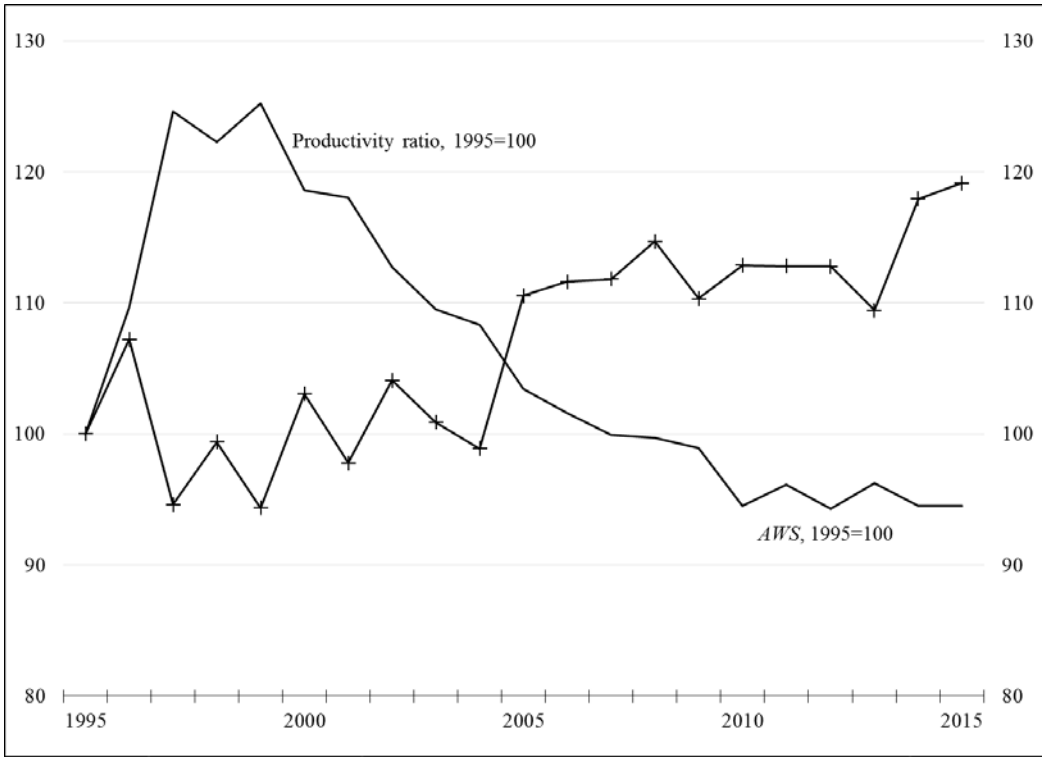
Source: Authors' calculations based on data from INEGI. See Equation (4) in the text and Annex section A1 for details.

A3 Labour productivity in the wage-employment and self-employment sectors

Labour productivity can be estimated for the wage employment and self-employment sectors in each economic activity. To obtain value added at constant prices for each wage employment sector, we estimate the share of this sector in total value added at current prices (i.e. $[VA - (LI - W)]/VA$) and multiply this share by total value added at constant prices. This series is then divided by an estimate, based on ENOE, of the employment of subordinated workers obtained from the share of subordinated workers in total employment (adjusting for differences in hours worked per employee between subordinated workers and the average) and the INEGI-KLEMS estimate of total hours worked. Total employment here includes subordinated workers, self-employed and non-remunerated workers, and excludes employers.

Estimation of labour productivity in each self-employment sector is symmetrical. To obtain value added at constant prices, we multiply the share of self-employment income in value added at current prices [i.e. $(LI - W)/VA$] by total value added at constant prices. This series is then divided by an estimate, based on ENOE and KLEMS, of self-employment and non-remunerated workers (assumed to be working primarily in the self-employment sector) obtained from multiplying total hours worked in INEGI-KLEMS by an estimate of the share of the self-employed and non-remunerated workers in total employment (defined as previously and adjusted for differences in hours worked per employee) according to ENOE.

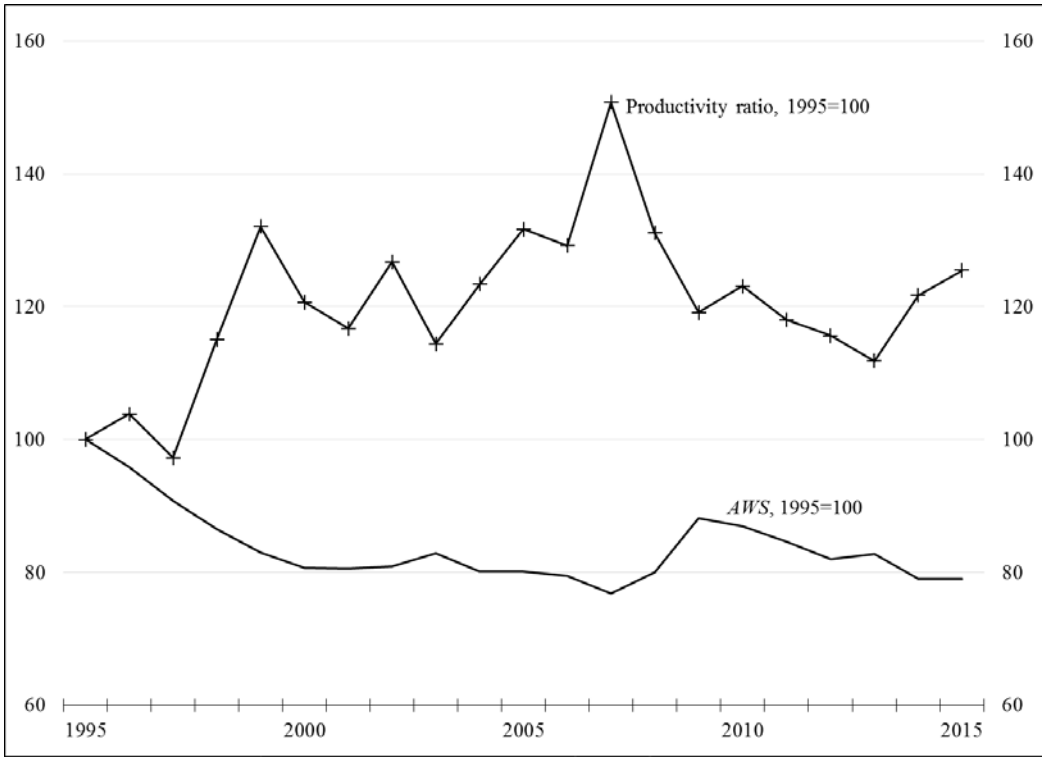
Figure A4: *AWS* and productivity ratio in construction, 1995–2015



Note: Productivity ratio of wage-employment to self-employment sector.

Source: Authors' calculations based on data from INEGI. See Equation (4) in the text and Annex sections A1 and A3 for details.

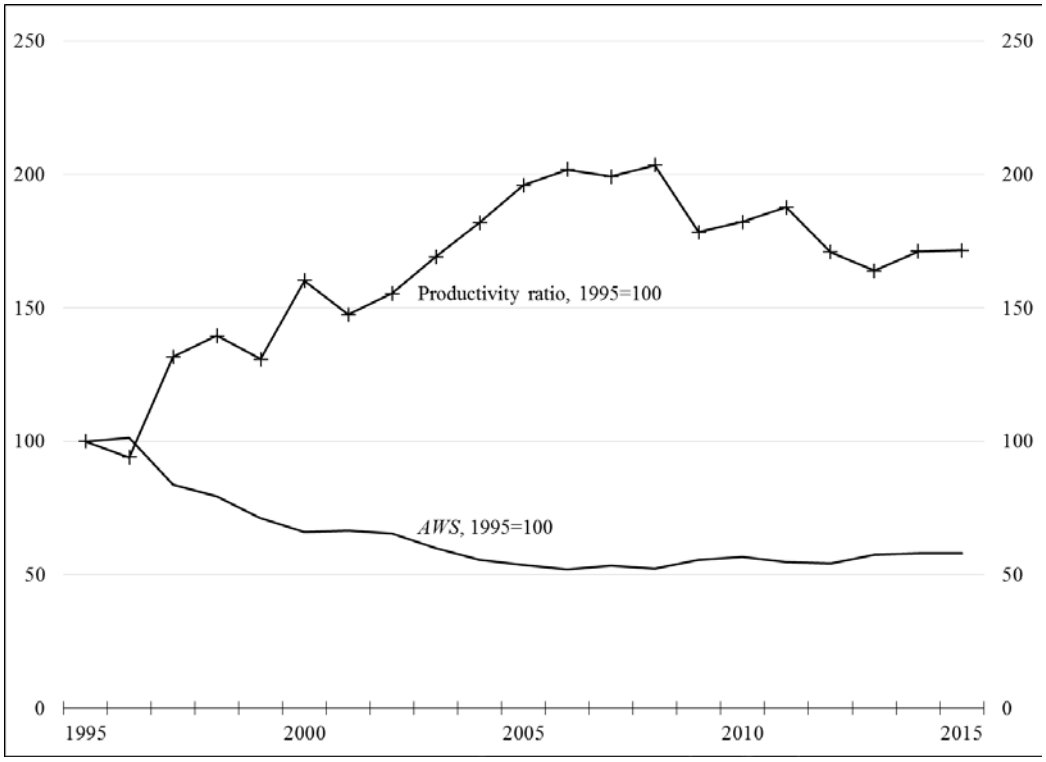
Figure A5: *AWS* and productivity ratio in accommodation and food services, 1995–2015



Note: Productivity ratio of wage-employment to self-employment sector.

Source: Authors' calculations based on data from INEGI. See Equation (4) in the text and Annex sections A1 and A3 for details.

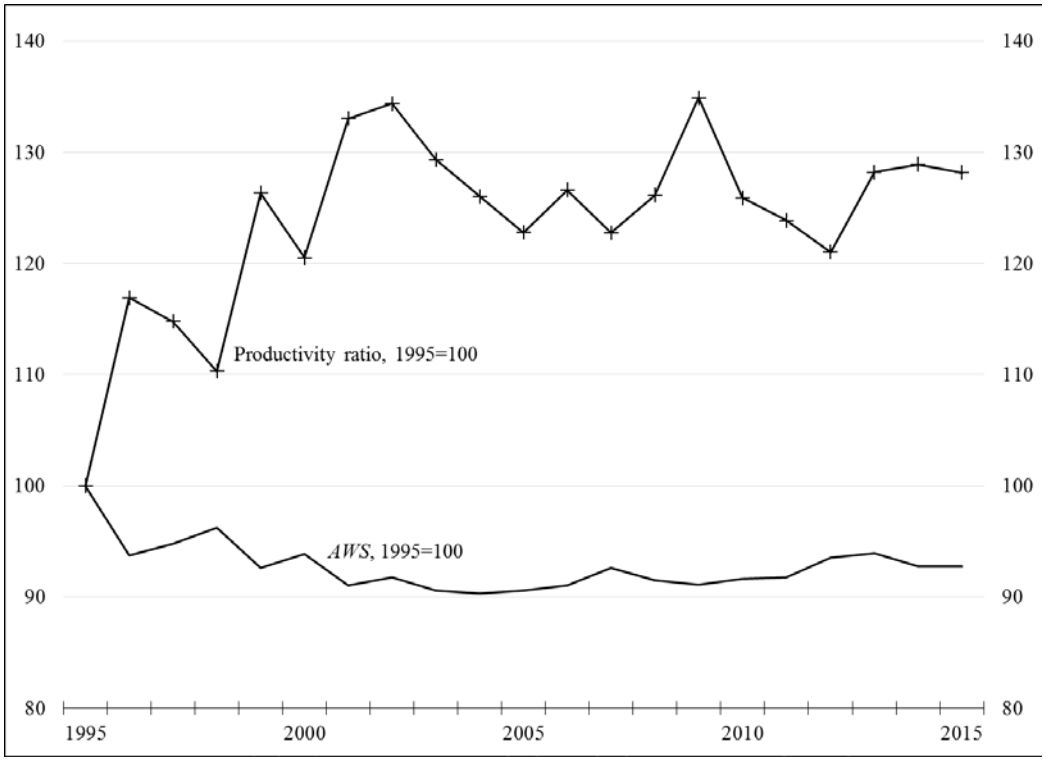
Figure A6: *AWS* and productivity ratio in professional, scientific, and technical services, 1995–2015



Note: Productivity ratio of wage-employment to self-employment sector.

Source: Authors' calculations based on data from INEGI. See Equation (4) in the text and Annex sections A1 and A3 for details.

Figure A7: *AWS* and productivity ratio in other services, 1995–2015



Note: Productivity ratio of wage-employment to self-employment sector.

Source: Authors' calculations based on data from INEGI. See Equation (4) in the text and Annex sections A1 and A3 for details.

Annex B: Pricing and the wage share in a small open developing economy

B1 Production, technology, and pricing

Consider a small open developing economy with two main sectors producing tradable goods and non-tradable goods. Tradable goods (T) are produced with a fixed-coefficient production function: $Y_T = \min (aK_T, b_T L_T)$, where Y is output, K is the capital stock, and L is the level of employment. T goods are exported (in negative amounts when they are imported) in addition to being sold internally, and firms in this sector are price takers in domestic and foreign markets. They thus produce up to full capacity since this is the level of output that maximizes their profits. This implies:

$$Y_T = aK_T \tag{B1}$$

and

$$p_T = ep_T^* \tag{B2}$$

where p_T is the price of tradables in domestic currency, p_T^* is the price in foreign currency, and e is the nominal exchange rate.

The non-tradable goods sector, which produces for the domestic market, includes two subsectors. In a modern subsector (N), goods are produced with a fixed-coefficient production function: $Y_N = \min (aK_N, b_N L_N)$, and firms in this subsector operate under imperfect competition, pricing their goods by adding a mark-up over labour costs (more on the determinants of the mark-up below). They normally produce at less than full capacity so that changes in domestic demand affect their output, unlike what happens in the T sectors where changes in domestic demand crowd out (or in) net exports. Thus, in the modern N sector:

$$Y_N = b_N L_N \tag{B3}$$

and

$$p_N = (1+z)\, w / b_N \tag{B4}$$

where z is the mark-up and w the nominal wage (assumed to be uniform across the tradable and modern non-tradable sectors). Note that according to Equation (B4), the product wage in the N sector (w/p_N) is determined by productivity and the mark-up: $w/p_N = b_N/(1 + z)$.

Coexisting with the modern non-tradable sector is an informal labour-intensive sector (S) producing non tradable goods according to:

$$Y_S = b_S L_S \tag{B5}$$

Since in this sector $p_S Y_S = w_S L_S$, where w_S is earnings per worker in the informal sector, we have:

$$p_S = w_S / b_S \tag{B6}$$

which implies that the product wage w_S/p_S in this sector is determined by labour productivity $w_S/p_S = b_S$.

B2 Determinants of the mark-up in the *N* sector and wage differentials

Before looking at the demand side, let us examine some implications of the assumptions made so far. Consider first the case in which the N and S sectors produce the same good so that: $p_S = p_N$. In this case, firms in the imperfectly competitive N sector will be constrained by limit pricing to sell at the same price as the self-employed in the S sector. If, in addition, labour earnings in S and N sectors are equalized, the mark-up in the N sector will be uniquely determined by the relative productivity b_N/b_S. Indeed, from Equations (B6) and (B4) $p_S = p_N$ implies that $w_S/b_S = (1 + z)w/b_N$. If, in addition, $w = w_S$, it follows that $(1 + z) = b_N/b_S$. The wage share, inversely related to the profit mark-up, varies in this case inversely with the relative productivity of the N sector vis-à-vis the S sector.

Similar results are obtained in a more general setting without full equalization of labour earnings. Suppose a uniform wage prevails in the formal sectors of the economy (the tradable and modern non tradable sectors) whereas informal earnings (w_S) and formal wages (w) are related as in a Todaro-like unemployment model so that informal earnings are equal to *expected* formal wages, given by the formal wage times the probability of finding a formal job:

$$w_S = w\left[L_F/\left(L_F+U\right)\right],\quad L_F = L_T + L_N \tag{B7a}$$

which implies

$$w/w_S = 1 + U/L_F \tag{B7b}$$

where L_F is total formal employment and U is open unemployment. Equation (B.7b) implies that the formal wage premium, $(w - w_S)/w_S$, is an increasing function of the unemployment rate (expressed as a fraction of formal employment, L_F). An increase in the unemployment rate reduces expected formal wages and the equalization of expected earnings takes place at a relatively higher level of the formal wage.

Assume again that the N and S sectors produce the same good so that: $p_S = p_N$ (or alternatively that there is a constant formal price premium given by the price elasticity of demand for N goods). As already mentioned, from Equations (B6) and (B4) it follows that $w_S/b_S = (1 + z)w/b_N$, which implies

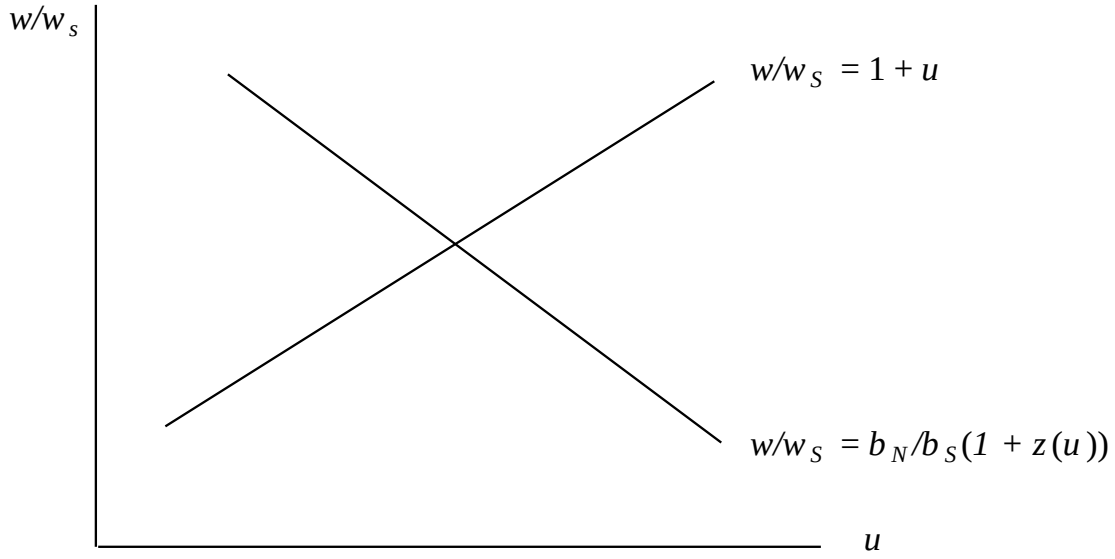
$$w/w_S = b_N/b_S(1+z) \tag{B8}$$

establishing that the formal wage premium increases with the relative productivity (b_N/b_S) of the N sector and decreases with the mark-up. We also assume the mark-up in the N sector to be a function not only of market power in the goods market (as reflected in the price elasticity of demand for firms in this sector) but also of monopsonistic power in the labour market which depends on the unemployment rate, u, expressed as a fraction of the formal labour force: $z = z(u)z' > 0$, where $u = U/L_F$. If the price elasticity of demand is acyclical, the model implies a countercyclical behaviour of the mark-up in the N sector, rising when unemployment increases and declining when unemployment falls.

Equations (B7b) and (B8) determine simultaneously the wage differential between formal and informal earnings and the unemployment rate (see Figure B1). Note, in particular, that an increase in b_N/b_S, a faster increase in labour productivity in the N sector than in the S sector, will tend to raise u, w/w_S, and the mark-up z in the N sector. With a higher mark-up, the wage share in the N sector will tend to fall. The mechanism is as follows. An increase in b_N (given b_S) increases w/p_N

for a given z [Equation (B4)]. The formal wage premium increases (as w/w_S rises) and informal workers enter the formal labour market, thus increasing unemployment until w/w_S is again equal to $1 + u$. The increase in u allows firms in the N sector to raise their mark-up with the result that the wage share in the N sector falls. The real consumption wage w/p_N increases (although less than productivity) since w_S/p_S has not changed, $p_S = p_N$, and w/w_S has increased. It follows that a key factor driving the wage share in the N sector is its relative productivity vis-à-vis the informal sectors.

Figure B1: Wage differential and unemployment rate



B3 Demand and equilibrium employment levels

On the demand side, we assume that the tradable sector produces only investment and intermediate goods for export and the N and S sectors produce only consumer goods. Workers do not save and capitalists consume a given fraction (c) of their profits. Thus,

$$p_N C_N + p_S C_S = w\left(L_T + L_N\right) + w_S L_S + c\left(P_T + P_N\right) \tag{B9a}$$

where P and C denote profits and consumption levels, respectively. Since $C_S = Y_S$ and $p_S Y_S = w_S L_S$, Equation (B9) simplifies to

$$p_N C_N = w\left(L_T + L_N\right) + c\left(P_T + P_N\right) \tag{B9b}$$

Given Equation B1, we also have

$$L_T = \left(a / b_T\right) K_T \tag{B10}$$

And, using the definition of profits, P_T and P_N can be shown to be

$$P_T = \left(p_T - w / b_T\right) a K_T \tag{B11}$$

and

$$P_N = z w L_N \tag{B12}$$

Substituting Equations (B10), (B11), and (B12) into Equation (B9b) and using Equations (B3), (B.4), and the fact that $Y_N = C_N$, we can solve for the equilibrium level of L_N as well as $L_F = L_T + L_N$:

$$L_N = AK_T, \text{ where } A = a\left[(1-c)/b_T + cp_T/w\right]/z(1-c) \tag{B13}$$

$$L_F = \left[(a/b_T) + A\right]K_T \tag{B14}$$

which show L_N (and L_F) determined by the capital stock in the T sector. The logic is as follows. Demand for T goods is perfectly elastic at the world market price, and total employment and income in the T goods sector is determined by existing capacity in this sector. Income derived in the T sector then provides autonomous domestic demand for the N goods sector, triggering an income–expenditure multiplier process in the N sector. Employment levels are also affected by a number of parameters or exogenous variables. A lower product wage in the T sector (w/p_T), which does not reduce the real consumption wage (w/p_N), raises L_N and L_F as profits and capitalist consumption increase in the T sector. A higher mark-up z, as determined by Equations (B7b) and (B8), leads to a lower level of employment in the N and the formal sectors as it reduces real consumption wages and demand for N goods. Equation (B11), which implies that $P_T/p_T Y_T = 1 - w/p_T b_T$, shows that the profit share in the T sector increases with a lower product wage (w/p_T) and a higher labour productivity b_T.

Finally, the level of employment in the S sector is residually determined as

$$L_S = L - L_F - U \tag{B15a}$$

where L is the exogenous total labour force, L_F is determined by Equation (B14), U is determined as uL_F with u determined by Equations (B7b) and (B8). Note that in the model the relative size of the informal sector L_S/L depends inversely on the ratio of the capital stock in the T sector to the total labour force. Dividing both sides of Equation (B15a) by L and using Equation (B14):

$$L_S/L = 1 - \left[(a/b_T) + A\right]K_T/L - U/L \tag{B15b}$$

B4 Determinants of the wage shares in the formal sectors

The wage share in the tradable goods sector (WS_T) is $wL_T/p_T Y_T$ or $w/p_T b_T = (w/p_N)(p_N/p_T)/b_T$, which, using the expression for the real consumption wage in the formal sectors, $w/p_N = b_N/(1 + z)$, can be expressed as

$$WS_T = (b_N/b_T)(1/(1+z))(1/rer) \tag{B16}$$

where $rer = p_T/p_N$, which shows the wage share in the tradable sector as an inverse function of the relative productivity (b_T/b_N) of the T sector vis-à-vis the N sector, the mark-up in the N sector (a higher mark-up implies a lower real consumption wage in the formal sectors), and the real exchange rate (p_T/p_N) (a higher rer raises profits in the T sector). These implications are in conformity with the stylized facts that show: (i) a sharp long-term decline of WS_T along with relatively fast growth in T sector productivity and a long-term increase in the N sector mark-up; (ii) fluctuations in WS_T that are inversely correlated to those of the real exchange rate; and (iii) a close correlation across the T sector between the fall in the wage share and the rate of increase in productivity.

The wage share in the modern non-tradable sector (WS_N) is inversely related to the mark-up in the N sector:

$$WS_N = wL_N / p_N Y_N = 1/(1+z), \text{ using Equation (B4)} \qquad \text{(B17)}$$

In turn, the mark-up is crucially determined, according to Equations (B7b) and (B8), by the relative productivity b_N/b_S of the N sector vis-à-vis the informal sectors. This has two implications that appear also to be in conformity with the stylized facts: (i) the more moderate decline of the wage share in the N sector (compared with the T sector) as productivity growth in this sector has been relatively sluggish (although faster than that of the informal sectors); and (ii) the inverse correlation between the change in the wage share and productivity growth across the N sector.

Another implication of the model, as argued in Section 4.4, is that the slower the growth of productivity in the informal sectors, *ceteris paribus* the stronger will be the tendency for the wage shares of the formal sectors to fall. To the extent that slow rates of expansion of capital and output in the formal sectors produce low or even declining levels of productivity in the informal sectors, they contribute to the fall in the wage share. Another interesting implication is that policies to promote formal employment—including redistribution towards wages in the form of a lower mark-up in the N sector which raises employment in that sector [Equation (B13)]— contribute to a smaller size of the informal sectors [Equations (B15a) and (B15b)] and will lead to a higher level of productivity in this sector with a positive impact on the wage shares of the formal sectors. Indeed, the higher level of productivity in the S sector will tend to reduce the mark-up in the N sector with a positive effect on WS_N and WS_T [see equations (B16) and (B17)].