The shift in US wage share

- The share of wages in value added was stable for decades in the United States, before it started diminishing in the 2000s. The wage share historically fluctuated around an average 63 percent, before declining by nearly 6 percentage points from its 1948-2001 level. Similarly, the wage share has fallen in most advanced and emerging countries, with the exception of France.

- The decline of the aggregate wage share observed in the United States is concentrated in specific sectors, most notably manufacturing, which explains half of the decline, as well as telecommunication, wholesale and retail, and transport.

- The decline of the wage share in manufacturing may be explained by the expansion of international trade, as globalisation prompted firms to offshore the more labour-intensive stages in their production processes, thus reducing the US labour share. Technical progress may have also played a role, though the impact is difficult to assess at this time.

- Moreover, reduced competitive pressures in some service sectors may have raised profits and thus return on capital. The growing prominence in the US economy of "superstar" firms, which enjoy a relatively high degree of concentration, is therefore considered to contribute to the decline of the aggregate wage share.

Wage share (nonfarm business sector)
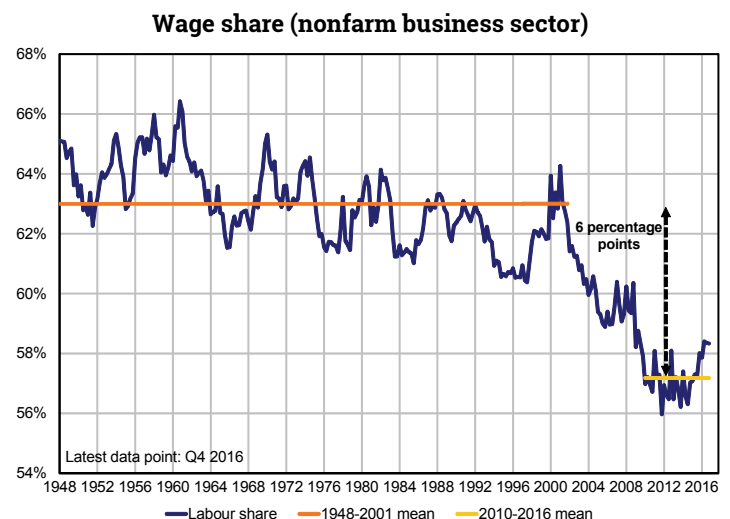
Source: US Bureau of Labor Statistics (BLS), DG Trésor calculations.

1. The wage share has declined in the United States and many other countries

1.1 The decline of the wage share has had a profound effect on the US economy since 2000

The division of value added in the United States[1] was stable for decades, before an accelerated shift against labour starting in the 2000s. From 1948 to 2001, the labour share in the nonfarm business sector fluctuated around a mean of 63 percent. The stability led some economists to characterise this stylised fact as a "miracle".[2] Yet since the early 2000s, the labour share has declined sharply, stabilising at 57 percent in the period 2010-2016 (Chart 1, below), before rebounding slightly since 2015.

The division of value added is a key issue in recent economic debates, particularly regarding the major rise in inequalities in the United States.

Chart 1: Average US pre-tax income, by quintile
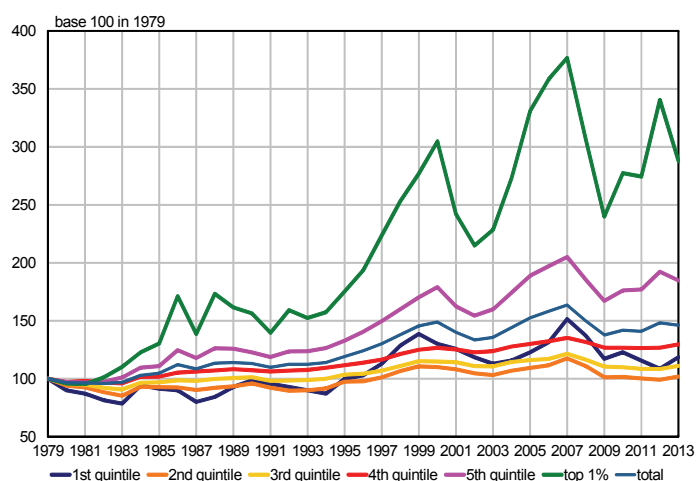
Source: CBO, DG Trésor calculations.

The reduction of labour share has contributed to the increase in inequalities, because capital income is distributed more unequally among households than labour income.[3] (The distribution of capital income could become less unequal in the future, however, as retirees come to make up a greater percentage of the US population.) At the same time, wage inequalities have risen substantially in recent decades, owing to the nature of technological progress and the growth of the high-paying financial sector.[4] To take one example, the real income of the highest quintile of the income distribution rose by close to 85 percent between 1979 and 2013, compared with only 19 percent for the bottom quintile, and 30 percent for the fourth quintile (Chart 1).

As the marginal propensity to consume is greatest among poorest households, the decline in the wage share has weighed on private consumption. Similarly, the division of income between labour and capital can reduce government tax receipts if capital income is subject to lower taxes than labour income.

1.2 The decline of the wage share is observed across the globe, but not in France

The share of income going to wages and salaries has declined in many advanced countries (Chart 2),[5,6] The wage share has also fallen in emerging countries, notably China and Mexico (Chart 3). In France, by contrast, the wage share has been relatively stable for over twenty years.

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(1)   An economy's value added corresponds to its annual output produced by labour and capital. The income generated by this output is divided between these two factors of production: for labour, in the form of wages and social security contributions, plus self-employment labour income; and for capital in the form of mark-ups, which are used primarily to pay interest and dividends. Self-employment labour income appears to play only a minor role in the decline of the labour share.
(2)   R. Armenter (2015), "A Bit of a Miracle No More: The Decline of the Labor Share", Federal Reserve Bank of Philadelphia, *Business Review*.
(3)   M. Jacobson and F. Occhino (2012), "Labor's Declining Share of Income and Rising Inequality", Federal Reserve Bank of Cleveland, *Economic Commentary.*
(4)   B. Guannel, E. Masson and W. Perdrizet (2015), "Inequalities, poverty and social mobility in the United States: a major economic and social issue", *Trésor-Economics* No. 147.
(5)   OECD (2012), "Labour Losing to Capital: What Explains the Declining Labour Share?" *OECD Employment Outlook 2012*.
(6)   IMF (2017), "Understanding the Downward Trend in Labor Income Share", chapter 3 of *World Economic Outlook,* April 2017.

Chart 2: Change in wage share of GDP in advanced countries (1991-2013)

percentage points

Spain · Italy · Japan · Canada · US · Gernamy · UK · France
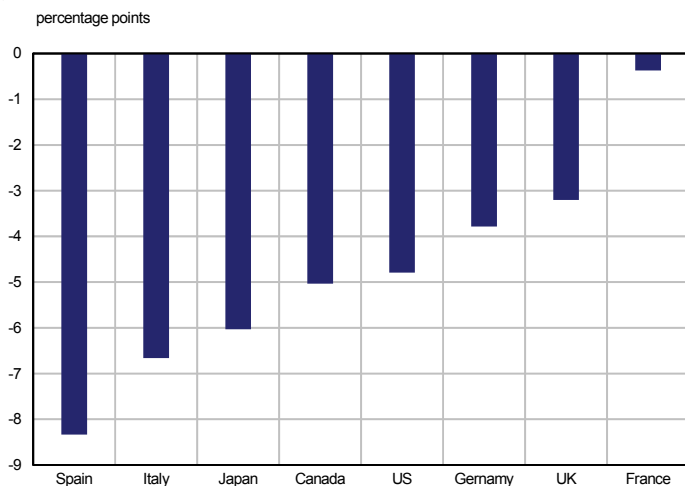
Source: ILO, DG Trésor calculations.

Chart 3: Change in wage share of GDP in emerging countries (1995-2013)

percentage points

Turkey · China · Mexico · Russia
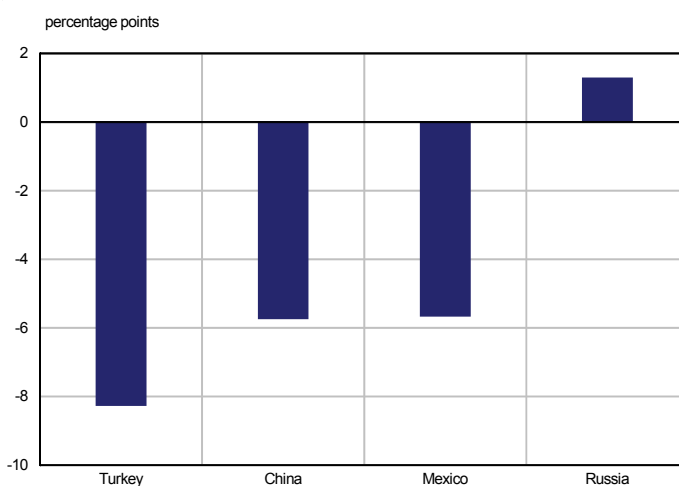
Source: ILO. Data to 2012 for Russia and 2011 for China.

2. The recent decline of the wage share in the United States is primarily due to changes in the manufacturing sector

2.1 The wage share was stable from 1948 to 2001, despite major sectoral shifts

Between 1948 and 2001, the wage share of US was virtually unchanged despite major structural changes in the composition of the US economy (shift from manufacturing to services). "Structural" effects[7] had a negative 2.7-point impact on the wage share between 1948 and 2001 (Chart 4), reflecting the contraction of manufacturing as a percentage of the total economy, because the wage share was higher in manufacturing than in services as a whole. But at the same time, strong growth of the wage share in certain service sectors (education, healthcare, and professional services) made a positive 2.4-point contribution to the total wage share

Chart 4: Decomposition of change in aggregate wage share between composition effects and within-sector wage variations

pourcentage points

1948-2001 · 2001-2014

■ "Structural" effect ■ "Wage" effect ■ "Total" effect
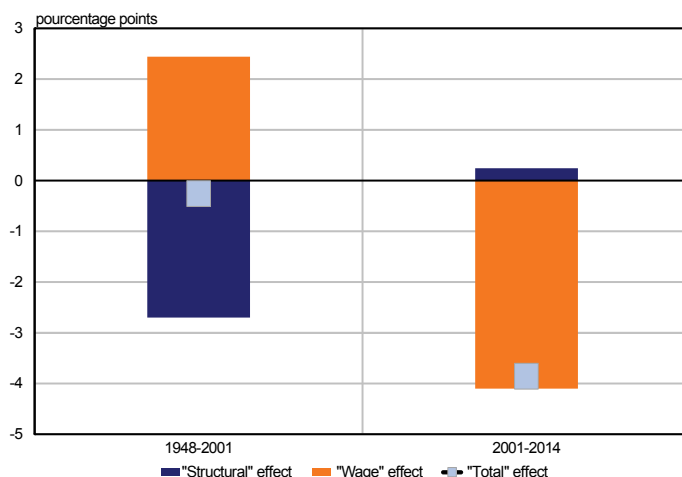
Source: US Bureau of Economic Analysis (BEA), DG Trésor calculations.

How to read this chart: Between 1948 and 2001, the aggregate wage share was virtually unchanged owing to: (i) an average increase in the wage share in individual sectors (+2.4 points) largely offsetting a structural shift, as a greater percentage of value added was generated in sectors with a lower wage share (−2.7 points).

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(7)   The variation in the aggregate wage share may be broken down into two effects. For each sector, the "wage" effect represents the impact of a variation in the wage share for that sector upon the aggregate wage share, considering the sector's share in the economy to be fixed. The "structural" (or compositional) effect represents the variation in the structure of the economy; a decline in the relative size of a sector with an above-average wage share (e.g., the manufacturing sector) will reduce the wage share at the aggregate level. The variation in the aggregate wage share between 2001 and 2014 is therefore equal to:

$$\underbrace{\sum_{sectors_i} (\overline{VAS}_{i,\,2001-2014} \times \Delta WS_{i,\,2001-2014})}_{wage\ effetcs} + \underbrace{\sum_{sectors_i} ((\overline{WS}_{i,\,2001-2014} - \overline{WS}_{2001-2014}) \times \Delta VAS_{i,\,2001-2014})}_{structural\ effects}$$

where VAS_i denotes sector i's share in value added, WS_i denotes the wage share in sector i, WS denotes the aggregate wage share, Δ is the time variation operator for the indicated period, and a bar indicates the simple mean between the two indicated dates.

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2.2 Since 2001, the aggregate wage share has declined owing to the lower wage share in manufacturing, trade, and information

BEA industry-level data for the nonfarm business sector[8] show that the aggregate wage share fell by roughly 4 points between 2001 and 2014 (Table 1). This decline is not explained by structural effects. Education and health services, which have higher-than-average wages, increased as a percentage of the total economy, thus contributing to a higher wage share, but this was offset by an opposite effect in natural resources and mining.

The roughly 4-points decline in the aggregate wage share can be attributed in equal measure to the decline of the wage share in manufacturing (−2.0 points), on the one hand, and to declines in certain services sectors, most notably information (−0.7 points) and trade (−0.7 points) on the other. The greatest decline in the wage share (−13.4 points) occurred in manufacturing, which thus made the greatest contribution to the aggregate labour share decline.[9] Between 2001 and 2014, not only did the wage share fall sharply in manufacturing, but the sector had net job losses of 30 percent (Chart 5), and productivity gains of 50 percent that far outstripped the 11 percent increase in real wages. These developments coincide with China's accession to the World Trade Organisation[10] in 2001, suggesting that greater exposure to international trade may have played a role.

Chart 5: Employment in US manufacturing

Latest data point: December 2016

Source: BLS.

Table 1: Wage share by sector (2001-2014)

	Sector's share in total value added			Wage share in sector			Breakdown between wage effect and structural effect	
	2001	**2014**	**Change 2001-2014**	**2001**	**2014**	**Change 2001-2014**	**Wage effect**	**Structural effect**
Mining	1.6%	3.3%	1.7pt	33.4%	24.8%	−8.6pt	−0.2pt	−0.4pt
Construction	5.3%	4.5%	−0.9pt	66.7%	63.5%	−3.2pt	−0.2pt	−0.1pt
Manufacturing	16.2%	14.1%	−2.1pt	59.6%	46.3%	−13.4pt	−2.0pt	0.0pt
Transportation/Wharehousing	3.4%	3.4%	0.0pt	67.6%	57.9%	−9.7pt	−0.3pt	0.0pt
Informations	5.5%	5.5%	0.1pt	49.3%	36.8%	−12.5pt	−0.7pt	0.0pt
Utilities	2.0%	1.9%	−0.1pt	29.3%	26.5%	−2.8pt	−0.1pt	0.0pt
Retail/Wholesale Trade	14.6%	13.7%	−0.8pt	56.1%	50.9%	−5.2pt	−0.7pt	0.0pt
Arts, Entertainment, and Recreation	4.3%	4.4%	0.2pt	61.9%	61.7%	−0.2pt	0.0pt	0.0pt
Professional, Scientific, and Technical Services	12.7%	13.8%	1.1pt	73.3%	73.6%	0.3pt	0.0pt	0.2pt
Educational Service, and Health Care and Social Assistance	8.0%	9.5%	1.5pt	82.4%	84.6%	2.2pt	0.2pt	0.5pt
Finance and Insurance	23.6%	23.3%	−0.3pt	24.4%	23.3%	−1.1pt	−0.3pt	0.1 pt
Other	2.9%	2.6%	−0.4pt	66.5%	71.7%	5.1pt	0.1pt	−0.1 pt
Total	100.%	100%		53.7%	49.9%	−3.9pt	−4.1pt	0.2 pt

Sources: BEA, NAICS (North American Industry Classification System) categories, DG Trésor calculations.

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(8)   In the BEA industry-level data, the labour share is measured only on the basis of wages and salaries (payroll compensation), and the reported decline is therefore -4 points, compared with -6 points for the aggregate labour share, which includes the labour income of self-employed workers.
(9)   M. Elsby, B. Hobijn and A. Sahin (2013), "The Decline of the US Labor Share", *Brookings Papers on Economic Activity*, and R. Armenter (2015).
(10) J. Pierce and P. Schott (2016), "The Surprisingly Swift Decline of US Manufacturing Employment", *American Economic Review*.

3. The decline of the wage share in the manufacturing sector can be explained by higher exposure to international trade

The literature identifies two main factors to explain the decline of the wage share in manufacturing: substitution of capital for labour in connection with either technical progress or reduction in the price of equipment, and competition with low-wage countries. Other factors relating to the decline in the bargaining power of workers (owing to deunionisation, greater industry concentration, and so on) may also have played a role.

3.1 Technical progress and globalisation may have influenced the labour intensity of production processes in the United States

Technological developments may have contributed to changing the labour share in the production function and thus to changing the division of value added. This effect, however, remains difficult to evaluate and to segregate from other possible contributions to the shift in the division of value added.

Further, the globalisation process, by opening up low-wage countries, may have induced firms to offshore the most labour-intensive parts of their production processes.[11] The US production function may thus have become more capital intensive, changing division of value added toward capital and away from labour. This may have been amplified by exposure to international competition, which reduces workers' wage bargaining power.

According to Elsby *et al.*,[12] the greatest declines in the wage share are in the sectors with the greatest exposure to import competition. They demonstrate that the degree of import exposure can explain close to 85 percent of the aggregate decline of the wage share.

3.2 Lower prices of investment goods do not currently appear to explain the decline of the aggregate wage share

The reduction in the price of investment goods (Chart 6), attributable at least in part to technical progress, has sometimes been suggested as an explanation for the decline of the wage share.

The idea, as argued by Karabarbounis and Neiman,[13] is that the lower cost of investment goods has induced firms to shift away from labour and toward capital. This argument supposes, however, that labour and capital are substitutable factors, whereas the empirical literature points more in the opposite direction, suggesting factor complementarity (Box 1). This makes it hard to conclude that the decrease in the price of investment goods plays a role in the decline of the wage share.

However, if technical progress were to significantly increase capital-labour substitutability, and thus change the production function, this would lend support to Karabarbounis and Neiman's argument. This would especially be the case if improvements in automation technology (e.g., robots and artificial intelligence) were to induce firms to substitute capital for labour in areas that previously required human intervention.[14]

Chart 6: Unit labour costs in manufacturing sector and price of investment goods
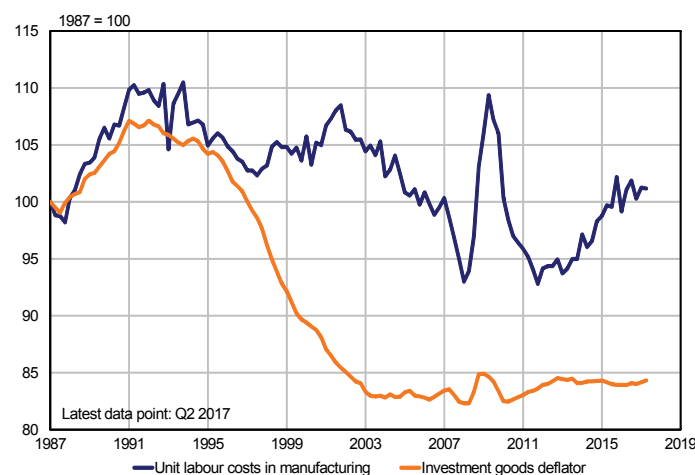
Sources: BEA, BLS.

A relatively simple empirical exercise (Box 2) suggests that exposure to international trade could explain the greater part of the decline of the wage share in manufacturing over the period 2001-2011.[15]

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(11) This explanation is not necessarily inconsistent with the decline of the wage share observed in China (Chart 3), if the offshored activities are more capital-intensive than the average for the Chinese economy.

(12) Elsby *et al.* (2013).

(13) L. Karabarbounis and B. Neiman, B. (2014), "The Global Decline of the Labor Share", *Quarterly Journal of Economics*.

(14) See, for instance, the results in D. Acemoglu and P. Restrepo (2017), "Robots and Jobs: Evidence from US Labor Markets", *NBER Working Paper* 23285, March 2017, which finds that the negative effects of robots on employment and wages are not offset by the positive effects on productivity.

(15) The slope coefficient in Chart 7 (in Box 2) suggests that exposure to international trade may explain 71% of the decline of the wage share in manufacturing.

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Box 1 : Relative cost of labour and capital, and elasticity of substitution

How value added is divided between labour and capital ultimately depends on the elasticity of substitution between the two factors. The elasticity of substitution is negative given that an increase in the relative price of one factor leads to a reduction in the amount of that factor used. For instance, if the elasticity of substitution is equal to one, each unit increase in the relative cost of capital is offset by a unit decrease in the amount of capital per worker.

The absolute value of the elasticity of substitution has a major impact on the division of income between labour and capital:

- An elasticity of substitution equal to one signals a stationary division of value added between labour and capital (as in the Cobb-Douglas production function);
- An elasticity of substitution less than one indicates that labour and capital are complementary;
- An elasticity of substitution greater than one indicates that labour and capital are substitutable.

In the case of an elasticity of substitution greater than one (substitutable factors), the relative fall in the price of investment goods leads to an increase in the amount of capital per worker and thus to a decline in the wage share.

At the aggregate level, according to a literature review by Chirinko (2008),[a] the elasticity of substitution between capital and labour has a median value of 0.5 and is generally in the range of 0.4 to 0.6. Further, 26 of the 31 studies examined find an elasticity of substitution of less than one. The literature thus tends to suggest that the factors are complementary, which would indicate that the fall in the price of investment goods should have increased, rather than lowered, the wage share.

a. . R. Chirinko (2008), " σ : The long and short of it", *Journal of Macroeconomics*.

Box 2 : Factors explaining the decline of the wage share in manufacturing

Following Elsby *et al.*, we wish to highlight graphically the respective roles of import exposure and capital-labour substitution in the decline of the wage share in the manufacturing sector. We compare the change in the wage share in 18 subsectors of the manufacturing sector between 2001 and 2011 with (1) the change in the import penetration rate (where a negative correlation is expected), as a measure of exposure to international trade, and (2) the variation in the price of investment goods, which aims to capture the effect of capital-labour substitution.

An examination of the correlation suggests that import penetration has a negative impact on the change in the wage share. On the other hand, no correlation is found between wage share and the price of equipment. This approach tends to confirm that exposure to international trade is the decisive factor in the decline of the wage share in manufacturing in the 2000s. These very simple results, however, must be interpreted with great caution.

Chart 7: Changes in import penetration and changes in wage share in 18 manufacturing subsectors


Sources: BEA, Economic Census, DG Trésor calculations.
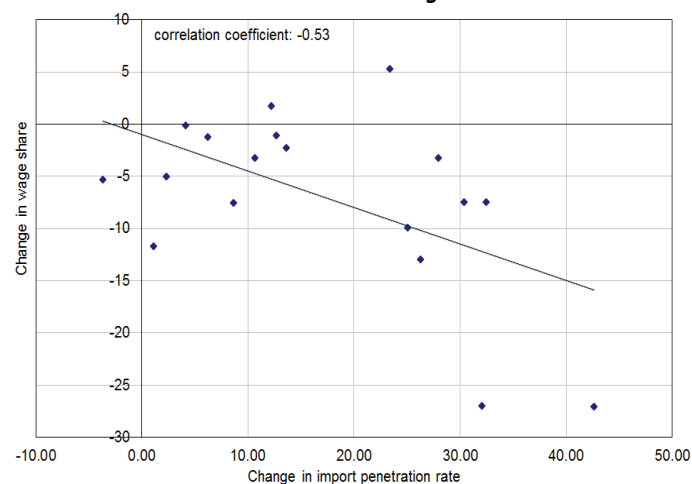
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4. Reduced competitive pressures in certain services sectors may have led to higher profits

The industry-level breakdown shows that the decline of the aggregate wage share is not restricted to manufacturing, but is also observed in trade, transportation, and information (Chart 8).

Chart 8: Wage share in retail/wholesale trade, information and transportation/wharehousing
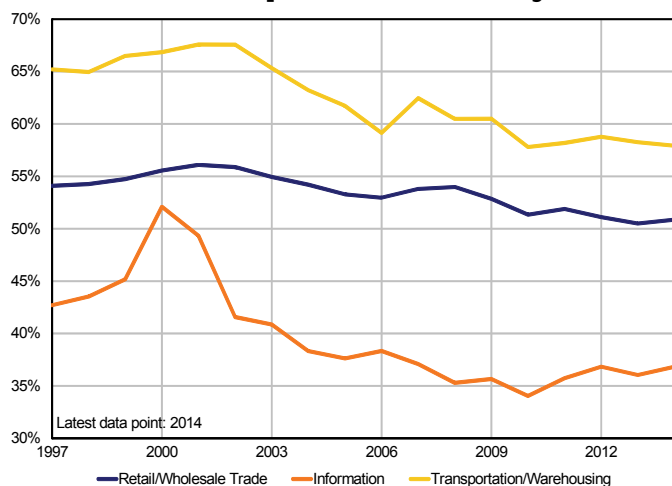
Source: BEA, DG Trésor calculations.

4.1 The role of market concentration in the decline of the wage share

Exposure to international trade and the substitution between labour and capital emerge as less relevant in sectors such as trade, transportation and information. Recent studies[16] have shed light on the role of market concentration to explain the decline of the wage share.

According to Autor *et al.*,[17] the decline of the wage share arises from the increasing prominence of "superstar" firms, where relatively low fixed labour costs and high mark-up rates[18] reduce the labour share in value added. As a

consequence, the aggregate wage share declines with growth in the relative weight in the economy of the "superstar" firms, which are not limited to the digital sector.

4.2 A reduction in competitive pressures has induced a decline of the wage share in certain service sectors

The CEA[19] connects the decline of the wage share to rising market concentration in the US, which could reflect reduced competition in goods and services markets, or economic rents arising from innovations or from increasing returns in network industries. In both cases, certain US firms exert downward pressure on real wages, given their greater wage-setting power and a redistribution of value added from wages to profits.

Chart 9: Changes in market concentration and changes in wage share in 14 sectors (1997-2012)
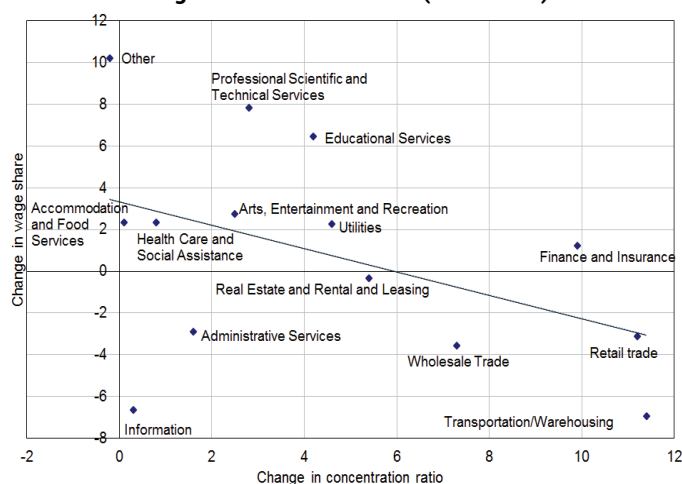
Sources: BEA, Economic Census, DG Trésor calculations.

Note: Concentration is estimated by the percent of output accounted for by the largest 50 companies in each industry. Data available only for 1997, 2002, 2007 and 2012.

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(16) S. Guilloux-Nefussi (2018), "Are monopolies a danger to the United States?" *Eco Notepad*, Banque de France, February.

(17) D. Autor, D. Dorn, L.F. Katz, C. Patterson and J. Van Reenen (2017), "Concentrating on the Fall of the Labor Share", *NBER Working Paper* 23108.

(18) The 2016 OECD Economic Survey of the United States, in an examination of 105 industries, finds a significant positive correlation between intensifying concentration and higher mark-ups.

(19) CEA (2016), "Labor Market Monopsony: Trends, Consequences and Policy Responses", *Council of Economic Advisers Issue Brief*.

These theoretical arguments lead one to expect a negative relationship between the change in concentration and the change in the wage share. A CEA report[20] and Furman[21] both point to numerous indicators of weakening competition between US firms. More specifically, the revenue share of the 50 largest firms has risen significantly in several sectors. The sectors that registered the highest concentrations - namely retail trade and transportation/warehousing - also saw the greatest contractions in the wage share. Similarly, an examination of 14 service sectors suggests a negative correlation between the change in concentration and the change in the wage share between 1997 and 2012 (Chart 9).

Gaëtan STÉPHAN

(20) CEA (2016), "Benefits of Competition and Indicators of Market Power", *Council of Economic Advisers Issue Brief*.
(21) J. Furman (2016), "Beyond Antitrust: The Role of Competition Policy in Promoting Economic Growth", *Council of Economic Advisors.*

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