MINISTÈRE DE L'ÉCONOMIE ET DES FINANCES
Liberté Égalité Fraternité

Tresor-Economics

No. 273 • December 2020

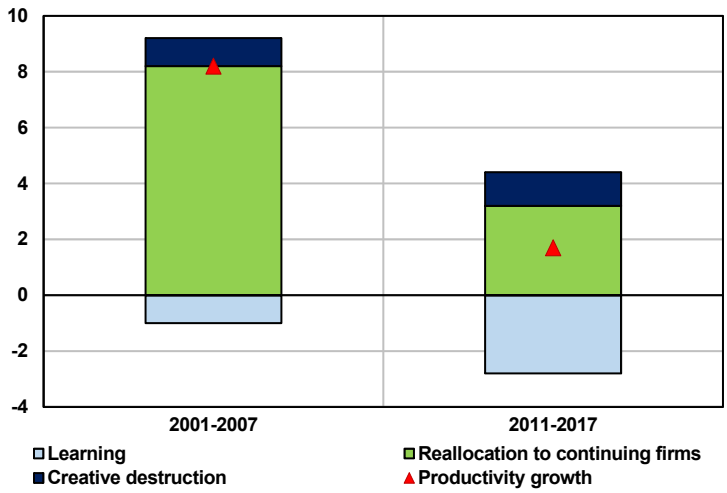
Direction générale du Trésor

The contribution of creative destruction to productivity growth in France

Clémentine David, Romain Faquet, Chakir Rachiq

- Job reallocation between firms, both within an industry and between industries, contributes to changes in productivity. While quantifying the contribution is challenging and a topic of continuing debate, empirical studies indicate that intra-industry reallocations, i.e., those between firms in the same sector, have a positive effect on productivity.
- Data for France indicates that reallocations made a strong positive contribution to productivity growth during a period of steady economic growth (2001-2007), and also considerably dampened the decline in productivity during the financial crisis (2008-2011). This reallocation takes two forms: the redistribution of jobs between firms that operate throughout the period, and Schumpeterian creative destruction, i.e. the entry and exit of firms.
- Changes in productivity can be decomposed into three components: productivity growth of continuing firms with no change in employment (firm-specific internal performance, here called the "learning" effect); reallocation of employment between continuing firms with no change in productivity ("reallocation to continuing firms"); and the net entry effect ("creative destruction").
- Recent microeconomic data provides an opportunity to decompose productivity growth and to compare the relative contributions of creative destruction in two periods, 2001-2007 and 2011-2017. Continuing firms made the largest contribution in the period prior to the 2008 financial crisis, while Schumpeterian creative destruction made a larger contribution after 2011.

Decomposition of market secteur productivity growth (cumulative, %)



Source : DG Trésor calculations. Coverage: Firms in market sector industries with two or more salaried employees.
Interpretation: Labor productivity increased by 8.2% between 2001 and 2007. Continuing firms contributed 7.2 points (with positive 8.2 points from reallocation to continuing firms and negative 1.0 point from the "learning" effect), while creative destruction contributed positive 1.0 point.

1. Reallocation of production between firms has spurred productivity growth

Productivity growth – the principal driver of higher living standards in the medium term – slowed substantially starting in 2011, as average annual growth fell from 1.1% in 2000-2007 to 0.7% in 2011-2017. The factors behind the productivity slowdown in France have been clearly identified.[1] Prominent among them is the apparent decline in the efficiency of job reallocation between firms.

Reallocation occurs between industries, and between firms within an industry. The reallocation of production between industries has been neutral for productivity growth in France since the 2000s.[2] The declining share of less-productive industries (agriculture, construction, textiles, and metalworking products) relative to the rest of the economy accounted for up to 20% of productivity growth in the 1980s, but that trend has been totally offset over the past twenty years by the tertiarisation of the economy that has weighed on productivity growth.

The impact of the reallocation of workers between firms in a given industry has been widely investigated since Aghion and Howitt proposed a model in the early 1990s[3] based on Schumpeter's notion of creative destruction.[4] Resource reallocation between firms has been found to make a significant contribution to productivity growth in most countries.[5] Analyses generally decompose productivity growth into three components: (i) productivity growth by continuing firms with no change in employment (the "learning" effect), (ii) job reallocation between continuing firms with no change in productivity (the "reallocation to continuing firms" effect); (iii) the effect of entrants and exiters (or Schumpeterian creative destruction).

Two recent studies of French data identify the major impact of reallocation since 2000. Guillou and Nesta (2015)[6] identify the effect of reallocation to continuing firms, which is always positive and often quantitatively large; it accounted for two thirds of productivity growth before the financial crisis (2002-2007) and acted as a considerable shock absorber between 2008 and 2011. On the other hand, Guillou and Nesta also find that creative destruction failed to make a positive contribution to productivity growth in the market economy. Ben Hassine (2017),[7] using a different method to estimate productivity, finds that Schumpeterian creative destruction had a non-negligible impact during a period of steady growth (2000-2007) and a large quantitative impact during a crisis (2008-2012), when it acts as a shock absorber reducing the fall in productivity observed in continuing firms. This positive effect is attributable to exits of the lowest-productivity firms, whereas the positive impact of new entrants declined following the financial crisis.

While these investigations provide some initial insight into the role of resource reallocation in the evolution of productivity in France, the post-crisis period analyzed to date (2008/2009 – 2012) is too short to identify any possible permanent effects (or "hysteresis") of financial crises, which would be expected as a key point in neo-Schumpeterian analyses of creative destruction.[8]

(1) "Productivité et compétitivité: Où en est la France dans la zone euro ?", Rapport du Conseil National de Productivité (CNP), April 2019. English-language version available as "Productivity and competitiveness: Where does France stand in the euro zone?" First report, National Productivity Board, July 2019.
(2) Schreiber, A. and A. Vicard (2011), "La tertiarisation de l'économie française et le ralentissement de la productivité entre 1978 et 2008," *Document d'études DARES*, no. 161. Data are updated in Annex 2 to the French National Productivity Board report cited above.
(3) Aghion, P. and P. Howitt (1992), "A Model of Growth through Creative Destruction," *Econometrica*, 60(2), 323-51.
(4) Schumpeter, J., *Capitalism, Socialism, and Democracy*, 1942.
(5) Bartelsman, E., Haltiwanger, J. and S. Scarpetta (2009), "Measuring and Analyzing Cross-Country Differences in Firm Dynamics," NBER chapter in *Producer Dynamics: New Evidence from Micro Data*, 15-76; Andrews, D., Cingano F. (2014), "Public policy and resource allocation: evidence from firms in OECD countries," *Economic Policy*, 29, 253-296.
(6) Guillou, S. and L. Nesta (2015), "La crise de 2008 et la productivité totale des facteurs des entreprises françaises," *Revue de l'OFCE*, 142 (6), 55-74.
(7) Ben Hassine, H. (2017), "Croissance de la productivité et réallocation des ressources: le tissu productif français depuis 2000," *Document de travail*, France Stratégie. English-language version available as Ben Hassine, H. (2019), "Productivity Growth and Resource Reallocation in France: The Creative Destruction Process," in Economie et Statistique/ Economics and Statistics, no. 507-508, pp. 115-133. Summary with graphs available here: https://www.comp-net.org/fileadmin/_compnet/user_upload/Documents/Posters/Productivity_Growth_and_Resource_Reallocation_in_France_-_The_Creative_Destruction_Process.pdf
(8) For a review of recent literature on the effects of financial crises on medium-term productivity growth, see Abele, C., Bénassy-Quéré, A. and Fontagné, L. (2020), "One Size Does Not Fit All: TFP in the Aftermath of Financial Crises in Three European Countries," *PSE Working Paper.*

2. Creative destruction explains most of the productivity growth observed since the Great Recession

Recent micro data can be used to compare the contribution of creative destruction in two periods, 2001-2007 and 2011-2017 (Box 1). This identifies a substantial change in productivity since the financial crisis. Whereas prior to the crisis, most productivity growth was attributable to continuing firms, since the crisis most productivity growth is attributable to the Schumpeterian effect of entrants and exiters.

Box 1: Decomposition of productivity growth

The economics literature proposes several methods for decomposing productivity growth. The decomposition proposed by Melitz-Polanec (2015)[a] also known as dynamic Olley-Pakes decomposition with entry and exit, attempts to measure the contribution of creative destruction while avoiding systematic bias. Entering firms make a positive contribution to productivity growth if and only if their productivity is higher than continuing firms' productivity measured at the end of the period; and exiting firms make a positive contribution to productivity if and only if their productivity is lower than continuing firms' productivity measured at the start of the period.

Let P_t denote aggregate labor productivity at time *t*, ddefined as the weighted average productivity of each firm *i* at time *t*.

$$P_t = \sum_i \theta_{it} p_{it}$$

where θ_{it} is firm i's share of total employment and p_{it} is the log of value added per worker, computed as the ratio of real value added (deflated by the value added price index for the relevant sector as defined in the national accounts) to full-time equivalent salaried employment.

Let Δ denote the change between year *t-k* and year *t*. Let *C*, *N* and *X* represent firms in three groups (continuers, entrants and exiters respectively). A firm is a continuer if it is active in *t-k* and in *t*. A firm is an exiter if it is active in *t-k* and no longer exists in *t*. A firm is an entrant if it did not exist in *t-k* and is active in *t*. Melitz and Polanec propose the following decomposition:

$$\Delta P_t = \overbrace{\Delta\bar{p}_t}^{Learning} + \overbrace{\Delta cov\left(\frac{\theta_{it}}{\sum_{i\in C}\theta_{it}}, p_{it}\right)}^{Reallocation\ to\ continuers} + \underbrace{\sum_{i\in N}\theta_{it}\left[\sum_{i\in N}\frac{\theta_{it}}{\sum_{i\in N}\theta_{it}}p_{it} - \sum_{i\in C}\frac{\theta_{it}}{\sum_{i\in C}\theta_{it}}p_{it}\right] - \sum_{i\in X}\theta_{it-k}\left[\sum_{i\in X}\frac{\theta_{it-k}}{\sum_{i\in X}\theta_{it-k}}p_{it-k} - \sum_{i\in C}\frac{\theta_{it-k}}{\sum_{i\in C}\theta_{it-k}}p_{it-k}\right]}_{Creative\ destruction}$$

where:

- $\Delta\bar{p}_t = \frac{1}{n_t}\sum_{i\in C} p_{it} - \frac{1}{n_{t-k}}\sum_{i\in C} p_{it-k}$
- $cov\left(\frac{\theta_{it}}{\sum_{i\in C}\theta_{it}}, p_{it}\right) = \sum_{i\in C}\left(\frac{\theta_{it}}{\sum_{i\in C}\theta_{it}} - \overline{\frac{\theta_{it}}{\sum_{i\in C}\theta_{it}}}\right)(p_{it} - \bar{p}_t)$
- $n_{t-k} = n_t$ the number of continuing firms in the period between *t-k* and *t*.

The data used are extracted from the FICUS and FARE firm-level databases (balance sheets and income statements) on French firms. The sample selected comprises all firms with strictly more than one salaried employee and covers sectors representing 90 percent of the market economy. The study thus covers approximately one million firms for each subperiod.[b].

a. Melitz M. et Polanec, S. (2015), "Dynamic Olley-Pakes Productivity decomposition with entry and exit", *The RAND Journal of Economics*, 46(2), 362-375.

b. Methodological choices are set out in the working paper that forms the basis for this issue. See David C., Faquet R. et C. Rachiq (2020), « Quelle contribution de la destruction créatrice aux gains de productivité en France ? », *Document de travail DG Trésor* no. 2020/5.

Specifically, the decomposition of productivity growth in the market economy yields the following results:[9]

- In both periods considered, creative destruction and reallocation to continuing firms both positively stimulate productivity growth, while "learning" makes a negative contribution. The negative impact of "learning" has also been observed in data for the United States.[10] This signifies that the average productivity of continuing firms declines when one fails to take into account the fact that the firms with the strongest productivity growth will, on average, experience stronger growth in their workforce relative to other firms. (This fact is reflected in the "reallocation to continuing firms" term.)
- For the period 2001-2007, continuing firms account for the lion's share – over three fourths – of productivity growth.
- For the period 2011-2017, on the other hand, two-thirds of productivity growth is attributable to creative destruction. This confirms that creative destruction acted as a shock absorber in the post-crisis period.
- The contribution of creative destruction to productivity growth in the two periods is linked exclusively to an exit effect; the entering firms' contribution is systematically negative. In concrete terms, this means that the lowest productivity firms are forced to exit, but new entrants' productivity – while higher than the exiters – is no greater than the average of the continuing firms at the end of the period.
- The decline in productivity growth between 2001-2007 and 2011-2017 can be explained by a very significant slowdown in the productivity of continuing firms, which resulted from the combination of two factors: the decline in the "learning" effect, and reduced efficiency in reallocating jobs towards firms with higher productivity.

Table 1 : Decomposition of productivity growth

Period	ΔP_t (%) (1)=(4)+(7)	Learning effect (2)	Réallocation interne (3)	Continuing firms (4)=(2)+(3)	Entering firms (5)	Exiting firms (6)	Creative destruction (7)=(5)-(6)
2001-2007	8.2	–1.0	8,.2	7.2	–4.6	–5.6	1.0
2011-2017	1.7	–2.8	3.2	0.5	–4.9	–6.1	1.2
Difference between the two periods	–6.6	–1.8	–5.0	–6.7	–0.3	–0.5	0.2

Source: DG Trésor calculations.

(9) The results for the market economy are consistent with those measured at the sector level. For details and robustness tests, see the related working paper: David C., Faquet R. and C. Rachiq (2020), "Quelle contribution de la destruction créatrice aux gains de productivité en France depuis 20 ans," *Documents de Travail DG Trésor* no. 2020/5.

(10) Decker, R., Haltiwanger, J., Jarmin, R. and J. Miranda (2017), "Declining Dynamism, Allocative Efficiency, and the Productivity Slowdown," *American Economic Review*, 107(5), 322-326.

Publisher:
Ministère de l'Économie, des Finances, et de la Relance
Direction générale du Trésor
139, rue de Bercy
75575 Paris CEDEX 12

Publication manager:
Agnès Bénassy-Quéré

Editor in chief:
Jean-Luc Schneider
(01 44 87 18 51)
tresor-eco@dgtresor.gouv.fr

English translation:
Centre de traduction
des ministères économique
et financier

Layout:
Maryse Dos Santos
ISSN 1962-400X
eISSN 2417-9698

Derniers numéros parus

Décembre 2020

No. 272 The economic determinants of social crises in Latin America
Colette Debever

November 2020

No. 271 Digitalisation in France's business sector
Romain Faquet, Vincent Malardé

No. 270 What do we know about the economic impacts of remote work?
Cyprien Batut, Youri Tabet

https://www.tresor.economie.gouv.fr/Articles/tags/Tresor-Eco

Direction générale du Trésor

@DGTrésor

Pour s'abonner à *Trésor-Éco* : tresor-eco@dgtresor.gouv.fr