



**FRANCE STRATÉGIE**  
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# SOLVING THE PRODUCTIVITY CONUNDRUM

The decline in productivity gains observed in all advanced countries over the past two decades represents one of the major policy challenges facing advanced economies today.

With this in mind, France Stratégie and the US Council of Economic Advisers (CEA) organized a closed-door, joint-seminar on the issue that took place in Paris on October 28, 2015, with:

Torsten BELL (Resolution Foundation); Flora BELLONE (CNRS); Matt BROWNE (Center for American Progress); Marco BUTI (European Commission); Gilbert CETTE (Banque de France); Peter CLINCH (Irish National Competitiveness Council); Chiara CRISCUOLO (OECD); John FERNALD (Federal Reserve Bank of San Francisco); Jason FURMAN (CEA); Giuseppe NICOLETTI (OECD); Jean PISANI-FERRY (France Stratégie) ; Xavier RAGOT (OFCE) ; Rebecca RILEY (NIESR) ; Jeromin ZETTELMEYER (Ministry of the Economy, Germany).

This paper sums up the main findings.

## THE FACTS ON DECLINING PRODUCTIVITY

*The macro picture:  
A global downward trend*

Long-term data presented by Gilbert Cetto<sup>1</sup> show an undisputable downward trend in productivity in all advanced economies over the second half of the 20<sup>th</sup> century (figure 1). While labour productivity growth increased by 3% in the US and the UK and more than 5% in the eurozone countries and Japan in the 1950s and

60s, it slowed to a 1-2% annual growth rate in the 2000s and has dropped below 1% today in most countries.

Over this period, the UK, the Eurozone and Japan have experienced a continuous decline, whereas productivity accelerated temporarily in the US due to the ICT revolution<sup>2</sup> between the mid-90s and the mid-00s. It went from around 1% per year to 2% on average over the course of the decade. Apart from some Scandinavian countries such as Sweden and Finland, no comparable positive effects of ICT on productivity were observed in any of the other countries.

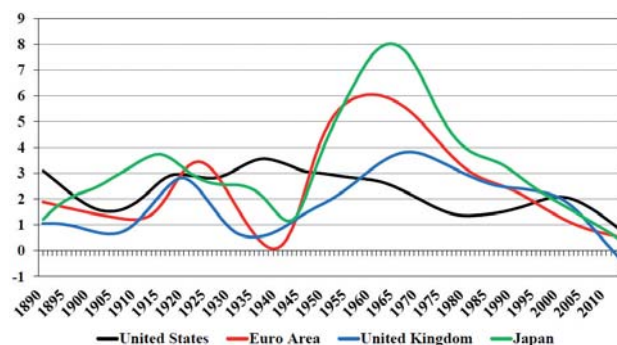
EXECUTIVE SUMMARY

FEBR.  
2016

Arthur Sode  
Economy and Finance  
Department,  
France Stratégie

1. Cetto G., Lecat R. and Bergeaud A. (2015), "GDP Per Capita in Advanced Countries over the 20th Century", April, Document de travail n° 549, Banque de France.  
2. Bart van Ark B. (2010), "Productivity, Sources of Growth and Potential Output in the Euro Area and the United States", *Intereconomics* 2010/1.

**Figure 1 - Labour Productivity Waves**



Source: Cette, Lecat and Bergeaud (2015).

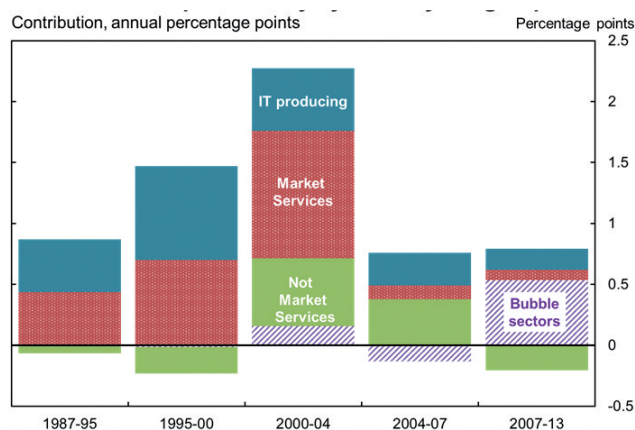
Referring to the US situation, John Fernald stressed that the productivity decline of the last 10 years cannot be attributed to any one specific sector. The observed slowdown is rather a broad-based phenomenon (figure 2).<sup>3</sup> The US productivity gains of the mid 90s began in the ICT sector and developed in the market services sector. Increased ICT use and organizational changes were the main driving factors as many small and unproductive firms were replaced by large and highly productive ones (the so-called Walmart effect). After the mid-2000s, productivity growth slowed down dramatically not only in ICT and the market services sector but also in the rest of the economy.

Fernald pointed out that sectors directly impacted by the financial bubble, such as construction, finance and mining, contributed to the TFP slowdown between 2004 and 2007 but not after the crisis. Due to rapid cost reduction in these sectors, their contribution to aggregate productivity has been substantial since 2008. By contrast, productivity gains in other sectors in recent years have been quite low.

If the US slowdown of the last decade has been relatively unexpected, the decoupling of its productivity growth from that of Europe and Japan since the mid-90s has been even more puzzling. While the US economy was experiencing its decade-long resurgence in productivity, European and Japanese productivity were slowing down conti-

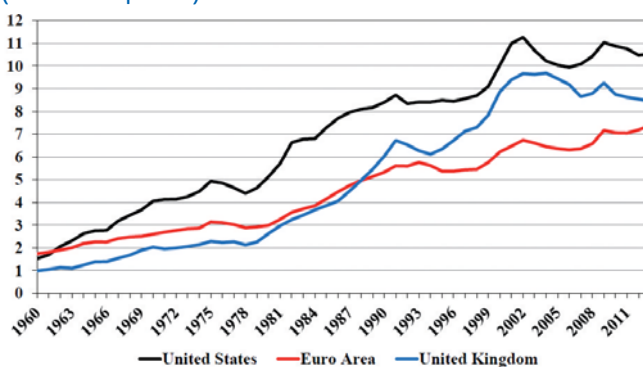
nuously, ending a 40-year productivity catch-up with the US. For Cette *et al.*<sup>4</sup>, the key factor was the limited spread of ICT in European and Japanese economies in comparison with the US (figure 3). ICT capital ratios show that the US accumulated much more ICT capital between 1960 and 2000 than other advanced economies. This stronger accumulation fostered US labour productivity directly through a capital-deepening effect and indirectly through higher TFP (i.e. efficiency gains from ICT use).

**Figure 2 - US Total Factor Productivity by Industry Subgroups**



Source: Bureau of Labor Statistics, Fernald (2014a). Bubble sectors are construction, real estate, finance, mining, agriculture, petrol.

**Figure 3 - ICT Capital Coefficient (at current prices)**



Source: Cette, Clerc and Bresson (2015).

3. Fernald J. (2014), "Productivity and Potential Output before, during, and after the Great Recession", Federal Reserve Bank of San Francisco Working Paper No. 2014-15, June.

4. Cette G., Clerc C. and Bresson L. (2015), "Contribution of ICT Diffusion to Labour Productivity Growth : The United States, Canada, the Eurozone, and the United Kingdom, 1970-2013", *International Productivity Monitor* Number 28, Spring.

In explaining the European and Japanese lag in ICT adoption, Cetté *et al.*<sup>5</sup> stressed the role of lower education levels in Europe and Japan, as well as heavier regulation of product and labour markets. At the same time, the UK did not experience a similar productivity revival despite its low level of product and labour market regulation.

### *The micro picture: Inadequate diffusion of technical progress*

Three economists from the OECD, Dan Andrews, Chiara Criscuolo and Peter Gal, recently published a firm-level study identifying and monitoring the 100 most productive firms ("frontier firms") globally in each sector.<sup>6</sup> They found the gap in productivity between the frontier firms and other companies has increased dramatically between 2000 and 2010. Productivity gains of frontier firms remained robust over the entire decade at around 3 to 5% a year, whereas the productivity of non-frontier firms stalled at an average of around 0% per annum (figure 4).

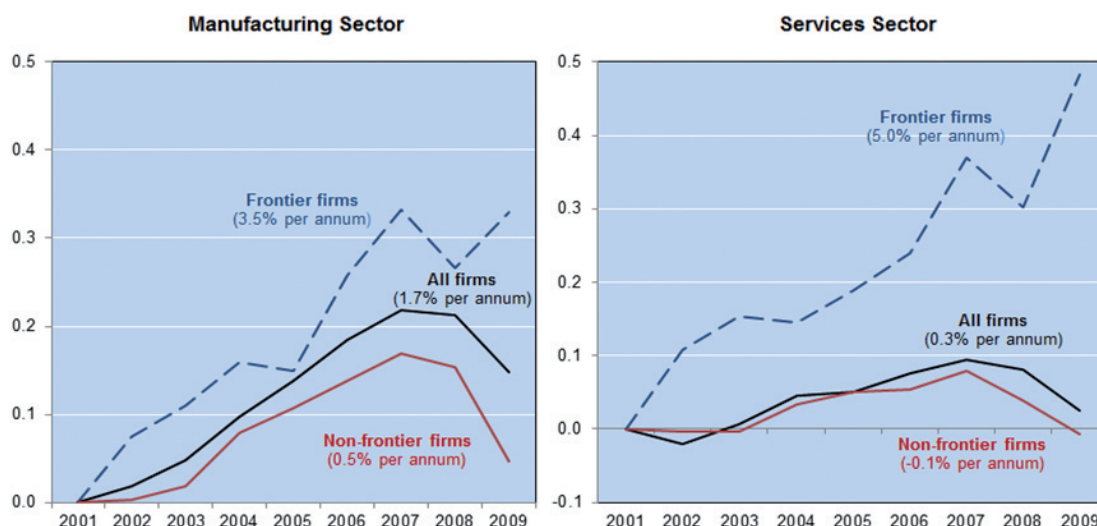
This is clearly in contrast with what economy theory tells us: namely, productivity gains should trickle down over time

from frontier firms to the rest of companies. The productivity slowdown observed at a macroeconomic level could therefore be more an issue of the diffusion of productivity gains rather than the lack of productivity growth per se.

Andrews *et al.* show that frontier firms tend to be younger, larger, more capitalized, more profitable, more patent intensive, with a wider international reach (it is important to note the main results of their study do not apply only to IT frontier firms but also companies in other sectors).

The seminar participants discussed these important results at length, concluding they were indeed solid. Alternative measures of productivity do not change the results. Moreover, setting a fixed number of firms in each sector or a proportion of firms, keeping the same frontier firms throughout the whole period or updating the list regularly do not change the results. They also hold true if multinationals are excluded from the sample (both headquarters and subsidiaries). One issue that deserves further attention is the representativeness problems of the ORBIS database, but OECD will conduct work with alternative data sources in the future.

**Figure 4 - Frontier Firms' and Non-Frontier Firms' Labour Productivity**



"Frontier firms" corresponds to the average labour productivity (value added per worker) of the 100 globally most productive firms in each 2-digit sector in 2001. "Non-frontier firms" is the average of all other firms. "All firms" is the sector total. Robust to: i) using different measures of productivity (e.g. TFP); ii) following a fixed group of frontier firms over time; and iii) excluding firms that are part of a multinational group (i.e. headquarters or subsidiaries) where profit shifting activity may be relevant.

Source: Andrews, Criscuolo and Gal (2015).

5. Ibid.

6. Andrews D., Criscuolo C. and Gal P. (2015), "Frontier Firms, Technology Diffusion and Public Policy: Micro Evidence from OECD Countries", The Future of Productivity: Main Background Papers, OECD.

### *From micro to macro?*

The link between microeconomic evidence and macroeconomic trends is not straightforward, nor are the consequences for future developments productivity. On the surface, the apparent decrease in the diffusion of productivity from the global frontier firms to the laggards appears to explain the aggregate slowdown. Yet, due to a lack of available data, we do not know enough about the extent of diffusion before the turn of the century. In other words, the slowdown in productivity gains both of frontier and non-frontier firms cannot be excluded as the explanation for the overall decrease.

Furthermore, the apparent decoupling of productivity between the two types of firms in the 2000s could also be a normal cycle of diffusion, where productivity takes some years to spread from frontier firms. If this is the case, we should expect a productivity resurgence in the years to come, even if its scale remains highly uncertain.

## EXPLAINING THE PRODUCTIVITY SLOWDOWN

### *An issue of measurement?*

There is a recurrent debate on productivity and GDP statistics in that improvement in the quality of goods and services may be greatly underestimated.<sup>7</sup> By undervaluing quality, real value added may be underestimated, leading to an undervaluation of real GDP growth and productivity. David Byrne and Eugenio Pinto of the San Francisco Federal Reserve Bank concluded as much in a recent study<sup>8</sup> on high-tech equipment. However, they believe that impact should remain limited given the relatively minor weight of such equipment on the overall GDP. For the mismeasurement thesis to explain the productivity slowdown, there has to have been a substantial increase in measurement errors – and this is far from evident.

Fernald pointed out to the extent the mismeasurement comes from understating real growth of capital investment (equipment and software), it raises labour producti-

vity growth but actually reduces TFP growth. But this is only one source of measurement errors. Another one stems from the improvement in the quality of services provided to consumers thanks to new digital business models. In effect, there is still little conclusive work on the effect of this on real GDP measurement.

All in all, productivity measurement is clearly prone to errors, but it remains quite difficult to measure their extent. While seminar participants concurred that productivity had indeed been underestimated in recent years, this was insufficient to alter the fact that we are in the midst of a significant slowdown.<sup>9</sup>

### *A policy-induced slowdown?*

Using cross-sector and cross-country variations of the gap between global frontier firms, national frontier firms and laggard firms, Andrew *et al.* identify a set of policies that have a positive effect on all firms' productivity growth. Their work highlights a certain number of policies that bolster productivity:

- Better education systems, less cumbersome regulations in the goods and services sector, increased R&D cooperation between businesses and universities and better development of risk capital markets all enhance the productivity of national frontier firms.
- Flexible product, labour and risk capital markets allow productive firms in each country to attract a larger share of the working population and of the disposable capital, while unproductive firms downsize or even disappear. Efficient bankruptcy laws also increase allocative efficiency since they reduce exit costs.
- Pro-competition policies and less stringent labour market protection help less productive firms increase their productivity.

Andrew *et al.* also show that some pro-productivity policies have less clear-cut effects. R&D tax incentives for SMEs, for example, help foster firm productivity performance but tend to favour unproductive firms at the cost of lower allocative efficiency. The legislation on patent pro-

7. Hatzius J. and Dawsey K. (2015), "Doing the Sums on Productivity Paradox 2.0.", Research Paper, Goldman Sachs Global Economics and Markets Research.

8. Byrne D. and Pinto E. (2015), "The Recent Slowdown in High-Tech Equipment Price Declines and some Implications for Business Investment and Labor Productivity", March 26, FEDS Notes.

9. A recent working paper published in the NBER series reaches the same conclusion. Syverson C. (2016), "Challenges to Mismeasurement Explanations for the U.S. Productivity Slowdown", NBER Working Paper No. 21974.

tection influences productivity in different ways depending on the sector. For example, stronger patent protection is beneficial to productivity in traditional R&D-intensive sectors but detrimental to some of the most dynamic sectors such as the services industry. The usual tradeoff regarding patent protection can also be made: it favours innovation but deters imitation and therefore diffusion. Given the growing influence of patents, this may play a role in the overall productivity slowdown.

### *Allocative efficiency and the role of finance*

A substantial share of aggregate productivity comes from the right allocation of workers and capital between firms.<sup>10</sup> An economy can become much more productive if the most productive firms become bigger (i.e. they attract more workers and capital) and if unproductive firms downsize or even disappear. Less efficient allocation may have played a role in explaining the productivity slowdown both before and after the crisis:

- Before the crisis the financial bubble fuelled misallocation of capital, especially in southern Europe but also in the US.<sup>11</sup> Less productive firms expanded due to easy credit conditions at the expense of more productive ones. This misallocation apparently existed both between sectors (non-tradable against tradable) and within sectors (the least productive firms expanding at the expense of the most productive).
- A lack of access to credit since the crisis may have limited the creation of new firms, whereas expansionary monetary policy and inefficient bankruptcy procedures have limited<sup>12</sup> the demise of unproductive firms.

### *The role of aggregate demand*

Another question is whether or not the productivity slowdown is a direct consequence of the prolonged weakness of aggregate demand since the onset of the global financial crisis. Statistics on productivity may have overestimated capacity utilization rate, therefore leading to an underestimation of current productivity levels. Firms do use

their capital and workers less intensively during recessions. It could mean that some pent-up productivity reappears when aggregate demand bounces back.

In addition, prolonged recessions may hinder productivity through the reduction of investment and the loss of human capital due to unemployment (i.e. the hysteresis effect). In a context of secular stagnation, a prolonged period of perceived lack of opportunities could also have a long-term effect on investment and hence on productivity.

### *A deeper change in the nature of technological progress?*

Policies and institutions have played a role in the intensity of the decoupling between frontier and non-frontier firms. However, the phenomenon concerns all sectors and countries despite the variety of policies implemented and institutions. Therefore, there must be another overarching factor at play. One possible explanation is the nature of technical progress, which may have changed profoundly.

Technology has strengthened the winner-takes-all dynamic, with one dominant firm or group of firms in each market. Success depends on the ability to harness factors such as innovation, skills, effective management, marketing and sourcing. This ensemble is more dependent on human skills and tacit knowledge, making it harder for followers to replicate than traditional technological progress. Barriers to new entrants may be more difficult to overcome as incumbents may master infrastructure essential to the market – such as digital platforms – from which they can easily exclude potential competitors.

The widening productivity gap between frontier and non-frontier firms is also consistent with other findings,<sup>13</sup> showing that if the speed of the spread of new technology is increasing from one country to another, the rate of adoption inside most economies is decreasing and tends to diverge greatly across countries. New technologies take time to be widely used in a given economy, meaning that existing technologies remain unexploited by a large num-

10. See for instance: Foster L., Haltiwanger J.C. and Krizan C.J. (2001), "Aggregate Productivity Growth: Lessons from Microeconomic Evidence", Chapter in NBER book *New Developments in Productivity Analysis*; Hsieh C.T. and Klenow P.J. (2009) "Misallocation and Manufacturing TFP In China And India", *The Quarterly Journal of Economics*, Vol. CXXIV(4); Bartelsman E.J., Haltiwanger J.C. and Scarpetta S. (2009), "Cross-Country Differences in Productivity: The Role of Allocation and Selection", NBER Working Paper No. 15490.

11. Gopinath G., Kalemli-Ozcan S., Karabarbounis L. and Villegas-Sanchez C. (2015), "Capital Allocation and Productivity in South Europe," NBER Working Paper No. 21453.

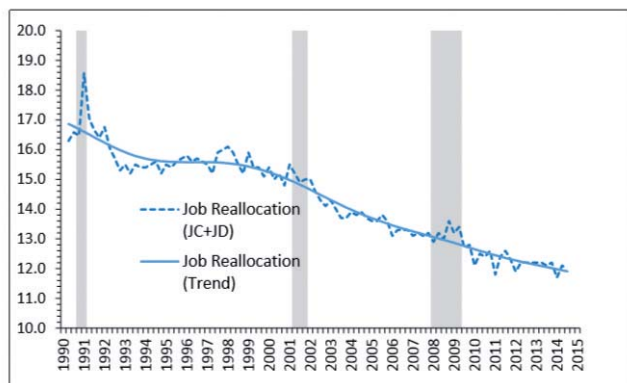
12. Petrosky-Nadeau N. (2013), "TFP during a Credit Crunch", *Journal of Economic Theory* 148(3), May.

13. Comin D.A. and Mestieri-Ferrer M. (2013), "If Technology Has Arrived Everywhere, Why Has Income Diverged?," NBER Working Paper No. 19010.



Figure 5 - Job Reallocation Rate and Start-Up and Exit Rates for Firms in the US

Figure 1a: Job Reallocation Rate, U.S. Private Non-Farm, Quarterly 1990:2-2014:3



Source: BED

Source: Haltiwanger (2015).

ber of firms for a certain period of time. For the time being, there is no robust explanation for the reduction in the rate of adoption.

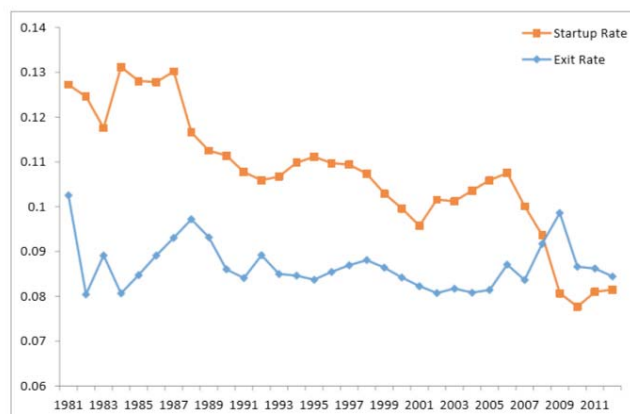
### The business dynamic and super-rents at the firm level

OECD findings echo some of the recent research done on the US economy and the evolution of its productive structure.

Haltiwanger *et al.*<sup>14</sup> have shown that the US has suffered a decline of business dynamism over the last couple of decades (figure 5). This lower intensity of creative destruction -both regarding firms and jobs- could be an explanation for the widening gap between frontier and non-frontier firms observed in the US. The business dynamic, entrepreneurship and labour market fluidity are in fact essential elements for the spread of productivity gains through the economy. According to Haltiwanger<sup>15</sup>, the declining business dynamic remains puzzling and cannot be explained by a sectoral shift of the US economy, namely, the growing service and retail sectors exhibit structurally higher business dynamism than the declining manufacturing sector.

For their part, Jason Furman and Peter Orszag<sup>16</sup> have recently made the assumption that rising wage inequali-

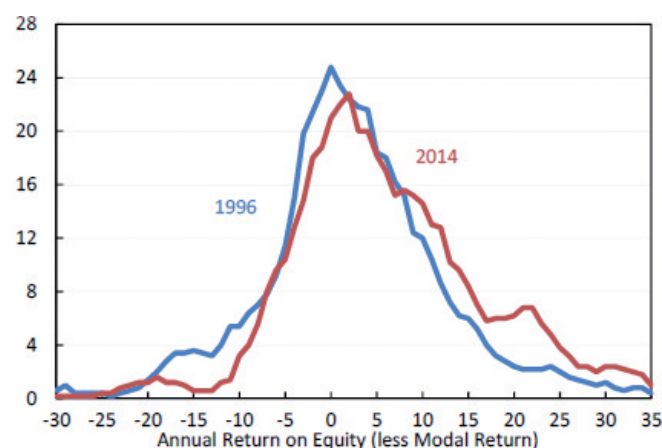
Figure 2a: Startup and Exit Rates for Firms in the U.S. Non-Farm Sector, 1981-2012



Source: BDS

ties observed in the US since 1980 could be explained by increasing rent heterogeneity at the firm level (figure 6). The authors show that a small number of firms enjoy much higher rents. Supernormal rents help them pay higher wages, thus fueling inequality. The parallel with OECD findings is striking, since in both studies a small number of firms are increasingly successful in distinguishing themselves from the rest of the economy. A microeconomic phenomenon could here as well be at the root of a macroeconomic trend: rising wage inequality in Furman and Orszag; a productivity slowdown in Andrews *et al.*

Figure 6 - Distribution of Annual Returns on Equity across the S&P 500



Source: Furman and Orszag (2015).

14. Decker R., Haltiwanger J.C., Jarmin R. S. and Miranda J. (2014a): "The Role of Entrepreneurship in US Job Creation and Economic Dynamism," *The Journal of Economic Perspectives*, 28(3). (2014b): "The Secular Decline in Business Dynamism in the U.S.," mimeo.
15. Haltiwanger J.C. (2015), "Top Ten Signs of Declining Business Dynamism and Entrepreneurship in the U.S.," paper for the Kauffman Foundation New Entrepreneurial Growth conference, June.
16. Furman J. and Orszag P. (2015), "A Firm-Level Perspective on the Role of Rents in the Rise in Inequality", October 16, presentation at "A Just Society" Centennial Event in Honor of Joseph Stiglitz, Columbia University.



## MAIN TAKEAWAYS

### *A long list of “no-regret” reforms*

Macro and firm-level econometric studies corroborate that a workforce with less skills, less competitive product markets, less access to risk financing, less R&D investment and less R&D cooperation between firms and universities all lead to national frontier firms lagging way behind global frontier firms. The effect is even more pronounced for national laggard firms. It therefore follows that countries must take action to revive the productivity growth of national frontier firms and close the gap between frontier and laggard firms.

An institutional environment unconducive to productivity can indeed lead to a relative economic decline as shown by the widening income per capita gap between the US and Europe. Other policies that influence productivity growth, albeit with less clear-cut effects –such as patent protection or R&D fiscal incentives– also need to be carefully designed.

The need to implement various competitive reforms is clearly more pressing in Europe, especially in the Eurozone. Most of the productivity determinants identified in the economic literature are weak for continental Europe and even more so for peripheral Eurozone countries.

In the wake of the euro crisis important product and market reforms have been undertaken –but more still needs to be done. Reforms to strengthen human capital, investment in R&D and intangible capital are still missing, in part due to the priority granted to fiscal consolidation.

For the US, more research needs to be done on the decrease in business dynamism to be fully understood. A recent paper of the US administration<sup>17</sup> put forward an interesting lead: the rise of burdensome and unnecessary occupational licensing requirements in most US states. Such regulations may create economic rents, increasing inefficiencies and inequality, and may explain lower business

dynamism overall.

Nevertheless, defining an agenda of reforms raises a number of tricky questions. How should reforms be prioritized to tackle the key binding constraints to productivity growth?<sup>18</sup> How can political roadblocks due to existing private rents and resistance to change in existing social models be overcome? A possible way forward may be found in local experimentation before scaling up reforms nationally.

### *Pending questions*

Given its importance for income per capita, the productivity slowdown should clearly remain at the top of the economic policy agenda in the years to come. Evidence gathered during the seminar led to some interesting conclusions regarding the trend, along with some policy measures worth exploring. At the same time, several unanswered questions remain:

- The role of reallocation and business dynamism. Are other advanced economies experiencing the same decline in business dynamism as the US? If so, are the same factors at play? What can be done to revive business dynamism?
- The changing nature of technological progress. The reduced diffusion of productivity gains and new technologies call for further work to be done. Apart from the policy-driven explanation, is there something more structural about it? Could a scarcity of skilled human capital explain the lower penetration rate of new technologies observed recently?
- The role of increasing firm-level rents. The concomitance of the rising number of firms with high rents and the increasing productivity gap between frontier and non-frontier firms raises additional questions. Have high-rent firms gained enough market power to durably deter new entrants? Are higher wages resulting from higher rents leading to a diversion of talent from entrepreneurship?

17. The Department of the Treasury Office of Economic Policy, the Council of Economic Advisers and the Department of Labor (2015), “Occupational Licensing: A Framework for Policymakers”.

18. Hausman R., Rodrik D. and Velasco A. (2005), “Growth Diagnostics,” John F. Kennedy School of Government, Harvard University, revised March.

- The role of demand. It is not clear to what extent the observed productivity slowdown since the crisis is a consequence of lower aggregate demand.<sup>19</sup> The low investment and high net savings of firms observed in most advanced economies since before the global financial crisis could be a sign of a demand-driven explanation of low productivity. If this is the case, expansive macroeconomic policy, especially through public investment, could also play a role in fostering productivity in the future.
- What if this is definitively the end of productivity growth? A simple extrapolation of long-term trends

leads to a straightforward yet somber conclusion: the end of productivity growth at the aggregate level is in sight. Factors explaining this could include the “servicification” of the economy and the resulting rise in Baumol’s cost disease, the possible changing nature of technological progress and the likelihood we have reached a plateau in terms of potential productivity gains in the most important sectors of the economy (retail sectors in the US, for instance) or in terms of gains from globalization. Such developments would of course call for a radical rethinking of the social models of the most advanced countries as they remain highly dependent on economic growth.

19. A recent paper explores this hypothesis and finds some convincing evidence that the contraction in demand has played a role in the productivity slowdown; see Anzoategui D., Comin D., Gertler M., Martinez J. (2016), “Endogenous Technology Adoption and R&D as Sources of Business Cycle Persistence”, NBER Working Paper No. 22005.

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