

# The Lack of European Productivity Growth: Causes and Lessons for the U.S.

Jesús Fernández-Villaverde

*University of Pennsylvania*

Lee Ohanian\*

*UCLA and Hoover Institution*

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## Abstract

This paper draws lessons from post-World War II Western European economic performance for the current U.S. economy. We document that much of Western Europe grew very quickly from the end of World War II up to the mid-1970s, reflecting policies that incentivized technology adoption and investment in physical and human capital. But since then, European policies have changed considerably, with higher tax rates and increased regulatory barriers that have reduced competition and new business formation. We discuss how the U.S. has shown signs of becoming like Europe over the last decade, and argue why policy reforms are key to restoring U.S. growth.

**Keywords:** Productivity growth, Europe's economic performance, economic policy.

**JEL classification:** E02, E30, E60.

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\*Correspondence: [jesusfv@econ.upenn.edu](mailto:jesusfv@econ.upenn.edu) (Fernández-Villaverde) and [ohanian@econ.ucla.edu](mailto:ohanian@econ.ucla.edu) (Lee Ohanian). We thank Nicolas Véron for kindly sharing his data with us and Ryan Zalla for superb research assistance.

# 1 Introduction

Ten years after the Great Recession of 2007-09, U.S. real GDP, productivity, and other aggregate economic indicators remain well below their historical trend levels. This empirical pattern, in which the U.S. economy has not returned to its long-run trend following an economic downturn, is unprecedented.

For nearly 250 years, the U.S. has recovered from enormous economic and political shocks, including the Civil War, two World Wars, the Great Depression, and the high inflation and oil crises of the 1970s. Following each of these events, the U.S. economy returned to trend. Figure 1 shows the historical record of U.S. GDP per capita following these and other negative shocks and a linear trend from 1889 to 2007.

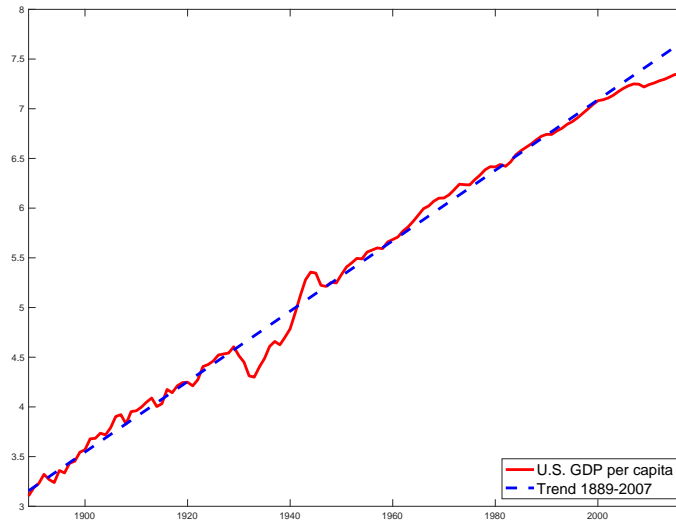


Figure 1: U.S. GDP per capita, 1889-2017

In sharp contrast to this historical record of recovery to trend, the current state of the U.S. economy shows no sign of recovering as it did following previous downturns. Figures 1-3 highlight this failure to recover by showing real GDP per capita, employment per adult, and business sector productivity. These figures show that all of these macroeconomic indicators are well below pre-2007 trends.

Economists are currently developing and testing various hypotheses for why the economy has not recovered, ranging across a broad set of ideas. These range from the possibility of

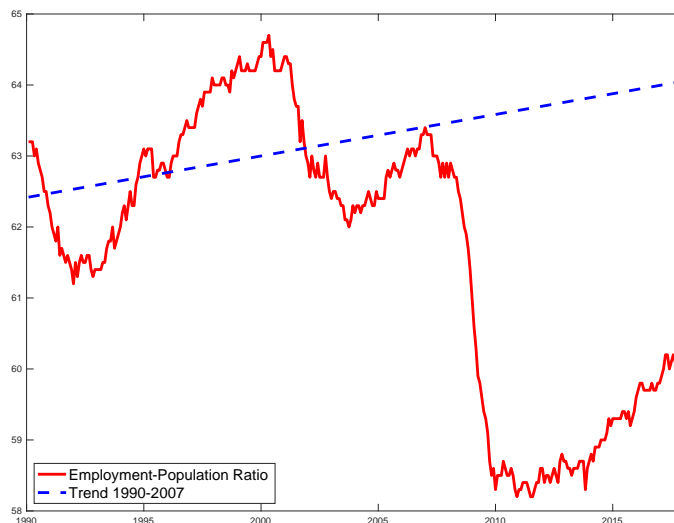


Figure 2: Employment-Population Ratio, 16 years and over: 1990.1-2018.5

very persistent effects from the financial and housing crises, as suggested, among others, by [Atif, Amir, and Francesco \(2015\)](#), to difficulties in understanding the relevant probability distributions of shocks, as hypothesized by [Kozlowski, Veldkamp, and Venkateswaran \(2015\)](#), to challenges in creating new technological innovations, as argued in [Gordon \(2016\)](#).

To date, nevertheless, we remain far from a satisfactory accounting of this failure to recover. Moreover, since this failure to recover is unprecedented, it is useful to compare other episodes of recovery failures to see how they may shed light on the U.S. experience. The paper makes such a comparison with the economic slowdown that occurred in several Western European countries much earlier.

The European economic slowdown began in the late 1970s and continues today. We make this comparison because the U.S. and Europe are similar in many respects and because the two episodes share many similar economic features. This chapter presents evidence that the post-World War II history of Western and Northern Europe provides insights into why the U.S. remains depressed relative to trend. We also argue that the European experience offers guidance in terms of constructive economic policy changes for today's U.S. economy.

We will show a number of parallels between Europe and the U.S. This will include a large shift in productivity from trend, as well as significant changes in what [Decker, Haltiwanger, Jarmin, and Miranda \(2017\)](#) call business dynamism, which includes declines in reallocation

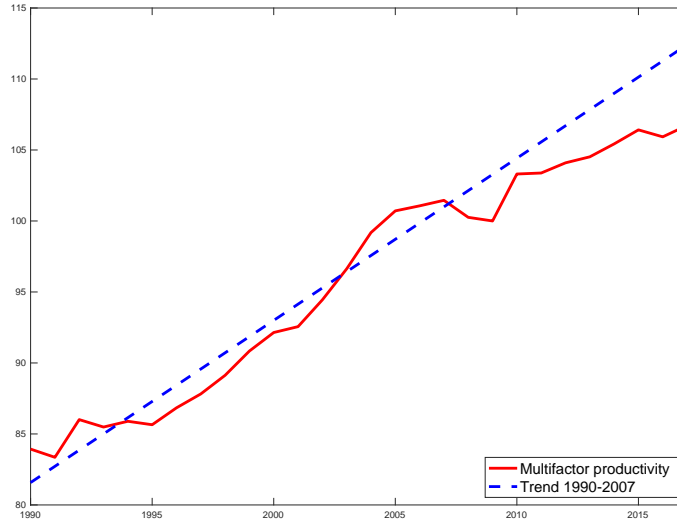


Figure 3: Multifactor productivity, 2009=100

and entrepreneurship. Europe’s slowdown was driven by a very sudden drop in productivity growth, very similar to the U.S. We will also describe how policies and entrepreneurship declined.

The paper is organized as follows. We start, in Section 2, by describing the 30 glorious years of post-World War II Western European economic growth and, in Section 3, how those years came to an end. Section 4 lists some prominent reasons for the lack of TFP growth in Europe during the last decades. Section 5 outlines a theory of the political economy of such slow TFP growth. Section 6 concludes by outlining some lessons for the U.S. and its economic policy.

## 2 The 30 glorious years of postwar Western European economic growth

In 1979, French economist Jean Fourastié published his classic monograph *Les Trente Glorieuses* (Fourastié, 1979). The title of the book, which translates into “The Glorious Thirty,” refers to the 30-year period in France between 1946 and 1975. It is clear why Fourastié looked at this period as a glorious one. Not only were these years when peace and

independence returned to France following the wars and economic crisis of 1914-1945, but also they were decades of unprecedented prosperity and structural transformation.

From 1950 to 1980, French real GDP per capita roughly tripled.<sup>1</sup> This fast growth raised France's living standard from about 54 percent of U.S. per capita GDP in 1950, to about 82 percent of the U.S. level in 1980. The very rapid catch-up with the U.S. occurred during one of the fastest periods of U.S. economic growth, in which U.S. real per capita GDP slightly more than doubled. This French record of economic growth is impressive. In the post-World War II era, France rose from a war-ravaged country with a large and archaic agricultural sector into one of the wealthiest countries in the world and a leader in (then) high-technology industries such as nuclear power generation (*EDF*), automobile manufacturing (*Citroën*), and aircraft construction (*Dassault Aviation*).

France was not the only Western European country to have enjoyed such prosperity. Most of its neighbors experienced similar growth episodes and associated structural transformations. Italy recorded an even faster growth episode, beginning with a per capita income below France's in 1950 and catching up to 81 percent of the U.S. by 1975. Germany, divided and with limited sovereignty, rose from about 45 percent of U.S. per capita GDP to about 88 percent of per capita GDP. The best performer among the large Western European nations was, however, Spain, which more than quadrupled its GDP per capita and moved from 31 percent of U.S. GDP per capita in 1950 to 62 percent of U.S. GDP per capita in 1980.

Figure 4 plots real GDP per capita relative to the U.S. for these countries plus the U.K. (the five largest in Western Europe) between 1950 and 1989. Figure 4 shows that all of these countries were able to considerably catch up with the U.S., except for the U.K., which was initially much wealthier than the other members of the group, and which had terrible tax policies in place for much of this period (Cooley and Ohanian, 1997).

The post-World War II Western European economic miracles demonstrate that economic recovery and very rapid per capita GDP growth occur even after the most devastating shocks. This is important, as it is often argued that the financial crisis and the resulting loss of

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<sup>1</sup>In the following paragraphs, we use data from the Penn World Table 9.0, which starts in 1950. We move, thus, "The Glorious Thirty," to 1950-1980. Choosing 1950 as a starting date is probably a better idea than using 1946, as the brisk economic recovery during the four years right after the end of World War II reflected the fruits of a return to normalcy. Indeed, France's GDP per capita had surpassed its pre-war peak already in 1949. And France's GDP per capita still increased 16 percent between 1975 and 1980, effectively prolonging the years of prosperity. To compute GDP per capita, we divide the variable `rgdpna` (real GDP using national accounts) by the variable `pop` (population).

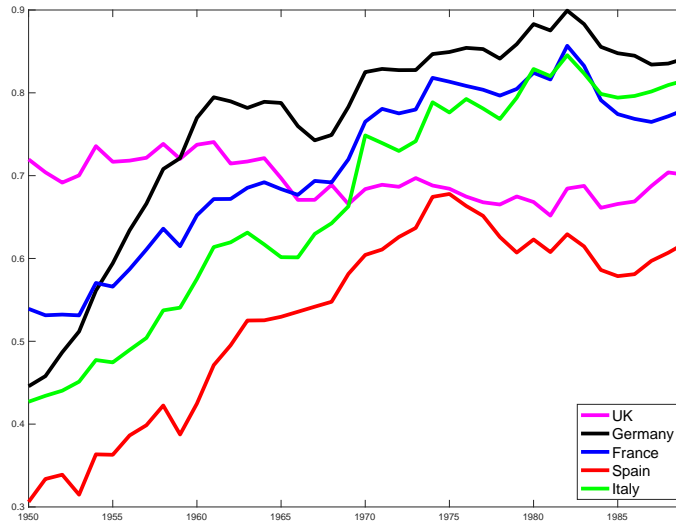


Figure 4: GDP per capita relative to the U.S.: 1950-1989

wealth necessarily mean that recovery following the Great Recession will be delayed for a long time (see [Taylor, 2015](#), for such a view). The systematic and rapid growth of these European economies, all of which had lost enormous wealth during the war, provides a very strong counterexample of this view and is an important reason why we focus on policies and institutional factors that may be impeding the normal market process of economic recovery.

Indeed, transitional dynamics of post-World War II capital stocks being below their steady-state levels does not plausibly account for these growth miracles (see [King and Rebelo, 1993](#)). While capital stock dynamics did play some role, productivity growth was the primary factor driving Western European economic growth. France, Germany, Italy, and Spain all experienced rapid yearly total factor productivity (TFP) growth between 2.6 and 3.2 percent over this period. These growth rates are even more impressive if we highlight that the Penn World Table subtracts the effects of increases in human capital in its computation of TFP.<sup>2</sup> In contrast, many traditional measures of TFP take labor as homogeneous over time and, therefore, tend to yield an unduly overoptimistic report of productivity growth.

To provide a graphical sense of this TFP growth, [Figure 5](#) plots the evolution of TFP for France, Germany, Italy, and Spain from 1950 to 1990. We normalize TFP in each country to 1 in 1950; that is, we look at how productivity evolved in each nation and not at a

<sup>2</sup>In particular, we use the variable `rtfpna` (real TFP using national accounts).

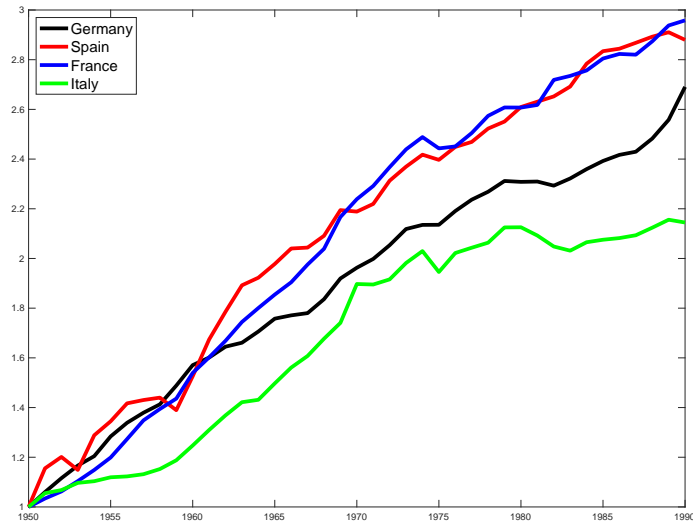


Figure 5: TFP: 1950-1989

comparison of TFP across countries at a given moment. France, Germany, and Spain nearly tripled their TFP between 1950 and 1990, with only Italy falling behind due to disappointing TFP growth starting in the mid-1970s (a harbinger of future troubles). As a comparison, TFP just grew 44 percent in the U.S. and 53 percent in the U.K. during the same period (a still respectable roughly 1 percent a year; recall that we subtract the effects of changes in the average education of the labor force and, thus, the number may be a bit lower than the number the reader may remember from other contexts).

Besides excellent demographics, some other factors drove postwar European productivity growth. One is that many technological innovations developed earlier in the century had not been adopted in Europe as a consequence of World War I and the Great Depression. As [Eichengreen \(2008\)](#) notes, much of Europe following World War II had yet to adopt natural gas utilities and lacked electricity. Assembly line manufacturing methods were still relatively new in Europe, and artisanal manufacturing production was more the norm than the exception. Recent chemical advances and products –such as nylon and Teflon– were mostly unknown on the continent.

A free Europe that was mired in 19th-century technologies posed a significant problem for collective security during the Cold War. Consequently, the U.S. implemented various programs to advance European technologies and productivity, including the Marshall Plan’s

Technical Assistance Program, and the U.S. Productivity Program. The Technical Assistance Program was developed to transfer technologies from the U.S. to Europe explicitly and brought European managers to the U.S. to learn U.S. management skills. The U.S. Productivity Program provided loans for European businesses to purchase technologically advanced American capital goods, and also brought European managers to the U.S. to learn U.S. organizational and personnel practices (Silberman, Weiss, and Dutz, 1996). Management schools, mainly unknown in Europe before 1945, quickly proliferated (Kaplan, 2014). INSEAD, founded in France in 1957 by Georges Doriot and collaborators with funding from the Ford Foundation, offered the first MBA program in Europe.<sup>3</sup> IESE, in 1958, and the London Business School, in 1964, soon followed.<sup>4</sup>

The successful implementation of these new technologies, techniques, and practices would not have been possible without well-functioning markets supported by growth-enhancing institutions. Parliamentary democracy grew throughout Western Europe after the war, featuring dominant moderate political parties and a broad consensus about the direction of foreign and economic policy. Even Spain and Portugal followed those lines after the 1970s. These institutions effectively managed potential capital-labor conflicts and supported competition, which in turn limited the impact of special interest groups (many of which had seen their political power eroded by the two world wars). More broadly, economic openness and trade grew throughout Europe following World War II, which also would not have been possible without supportive political institutions. As Milward (2000) famously put it, the process of European integration was the rescue of the European nation-state. Growth was further supported by expanding public education; significant public infrastructure investments in transportation, electricity, and structures; population flows out of rural agricultural regions into urban areas; as well as the confidence created by the U.S. security warranty. In short, Western Europe became a full participant in the 20th-century economy, as it rapidly adopted modern technologies and best practices and accomplished in 30 years what would reasonably have been expected to take twice as long to achieve.

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<sup>3</sup>Doriot was a French émigré in the U.S. who became a professor at Harvard Business School, a brigadier general in the U.S. Army during World War II, and the father of “venture capital.” See Ante (2008).

<sup>4</sup>Furthermore, Europeans performed a rather perfunctory purge of war criminals (except for the top echelon of National Socialist Germany). This limited *Vergangenheitsbewältigung* had the unintended consequence of leaving in crucial positions many managers with high human capital and, therefore, capable of importing new technologies and managerial practices.



### 3 The slowdown

Figure 4 shows, however, a stagnation in the convergence of Western European countries regarding GDP per capita relative to the U.S. after 1980. At the time, this long-run slowdown was challenging to identify. One reason was the global economic slowdown that occurred in the late 1970s and early 1980s, which masked the underlying long-run shift in Western European economies. A second reason was the slowdown in U.S. TFP growth, which began in the 1970s. This led some observers to believe that the European slowdown was merely the natural consequence of global factors.

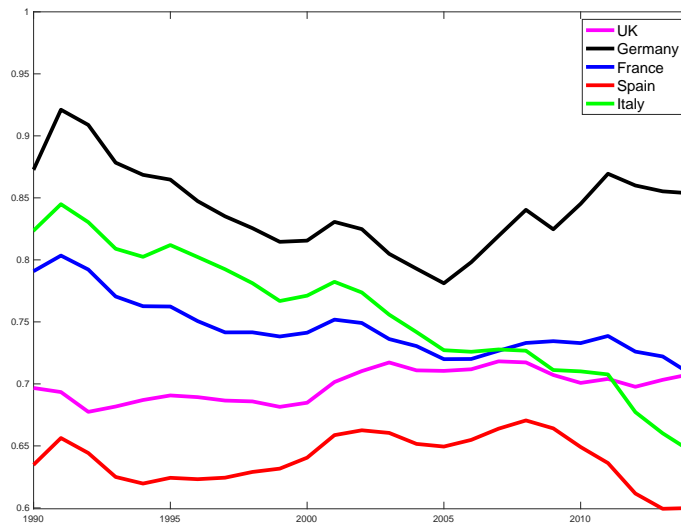


Figure 6: GDP per capita relative to the U.S.: 1990-2014

However, this view omits the important forces for continued catch-up in Europe. TFP levels in France, Germany, Italy, and other Western European countries remained about 40 percent below the U.S. level. This indicates there was additional room for European catch-up and, more broadly, an opportunity for Europe to become more competitive with the U.S. in its export markets. Moreover, even if the European catch-up was slowing down, theory suggests this should have been a much more gradual process, in which we should observe a very slowly declining rate of TFP growth over time, rather than the discrete and sudden slowdown in TFP growth that occurred.

The change in performance in Western Europe became much starker after 1990. Figure 6

plots the GDP per capita relative to the U.S. of the same group of nations from 1990 to 2014, again from Penn World Table data (including the adjustment for German reunification). In this new figure, we see either virtually no catch-up (Germany and the U.K.) or a regression (mild in Spain, quite striking for France and Italy).

The seriousness of the situation is even more acute if we emphasize that France, Italy, and Spain were still increasing the average years of formal education of their labor force (a protracted process due to demographic lags) and improving their physical infrastructures.<sup>5</sup> In other words: there was nearly no TFP growth.<sup>6</sup>

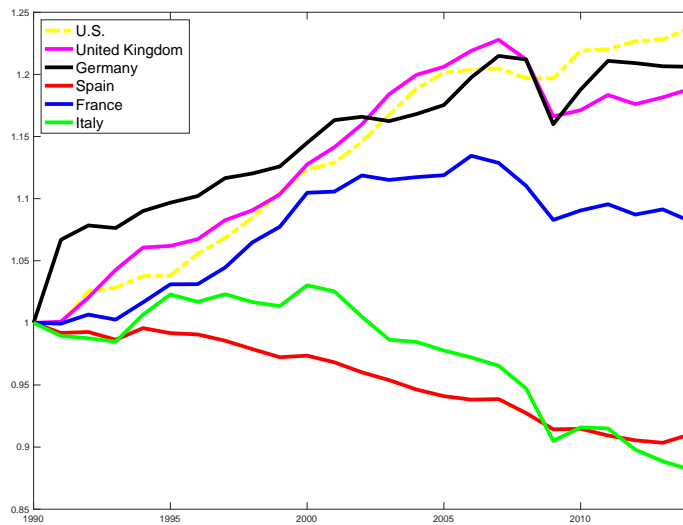


Figure 7: TFP: 1990-2014

Figure 7 illustrates this point. In it, we plot TFP normalized at 1 in 1990 for the same four countries as in Figure 5 (France, Germany, Italy, and Spain) plus, for reference, the U.S. and the U.K. TFP declined in both Italy and Spain by around 10 percent and grew in France by 8 percent (but with a fall after 2006). Germany, the U.S., and the U.K. performed much better, with the U.S. leading the pack with a 24 percent increase in TFP.

The fall in TFP in Italy and Spain is staggering, but, from a national accounting per-

<sup>5</sup>According to the data in Barro and Lee (2010) in its version 2.0 (<http://www.barrolee.com/>), France’s average years of schooling for its population over 25 went from 7.33 years in 1990 to 10.64 in 2010. In Italy, the equivalent numbers were 7.29 years in 1990 and 9.54 in 2010 and, in Spain, 6.52 years in 1990 and 10.30 in 2010. In comparison, the U.S. went from 12.32 years in 1990 to 13.42 years in 2010.

<sup>6</sup>Other factors, such as worse demographics and the permanent problems of labor markets, also played a role, but a less central one than TFP. We will come back to demographics and labor markets below.

spective, easy to understand. Italy's stagnant economy (its GDP per capita relative to the U.S. in 2014 was at the same level as in 1964, 50 years of zero convergence) coexisted, as we mentioned above, with more physical capital and higher educational achievements. Spain's GDP per capita relative to the U.S. did better before the financial crisis (reaching 67 percent in 2008), but only thanks to massive increases in hours worked due to large reductions in unemployment and immigration flows. In a shocking finding, [García-Santana, Pijoan-Mas, Moral-Benito, and Ramos \(2016\)](#) show, using administrative data, that within-industry misallocation of production factors increased substantially in *all* industries during the 1995-2007 expansion.

## 4 Why no TFP growth in Western Europe?

As we discussed above, TFP growth comes from the innovation and adoption of new technologies, business models, and managerial practices. Europe has been failing on all three fronts for the last several decades. The continent develops less economically useful technologies than other comparable economic regions, it is reluctant to allow the introduction of new business models, and it lags in the adoption of new managerial practices.

This unfortunate state of affairs is unrelated to cultural traits or idiosyncratic preferences. For centuries, Europe was at the forefront of technological innovation and adoption. Moreover—as reported in previous pages—in the decades following World War II, Europeans showed a more than considerable skill in catching up with the technological frontier, innovating in relevant fields, and working more extended hours than North Americans.

The reason, instead, for the European lack of TFP growth is the pervasive dominance of what [Parente and Prescott \(2002\)](#) have called barriers to riches. In the short space of this article, we cannot review each of them in detail, but we can highlight some of the most salient. Given the considerable heterogeneity existing within Europe (even excluding the U.K. and Switzerland, countries that have decided to follow different paths along essential aspects of their economic policies) and the multitude of industries in any modern economy, our presentation is more impressionistic than systematic, and exceptions to the mechanisms outlined below are easy to find. For instance, Scandinavian and Baltic countries suffer less from the maladies described here (also, for this article, we are excluding Russia, with all

of its peculiarities and rather different economic structure). However, the preponderance of the evidence points out that these exceptions do not outweigh the more general norm of limitations to TFP growth in the major countries of the European continent.

### 4.1 Widespread barriers to entry

Widespread barriers to entry plague sector after sector of many European economies. Some are regulatory (burdensome administrative requirements, protected activities, licensing restrictions), and some are financial (including limited access to venture capital or seed funds). Perhaps the most famous example is the difficulties that Amazon has faced in countries such as France (we will discuss some of these below when talking about the lack of competition).

But Amazon is not an isolated case. Firms such as Uber, Google, Netflix, and many others face regulatory barriers to entry in European markets.<sup>7</sup> Also, if the burden for large corporations is heavy but manageable, the cost for small startups is often overwhelming. This leads to fewer new highly successful companies being created.

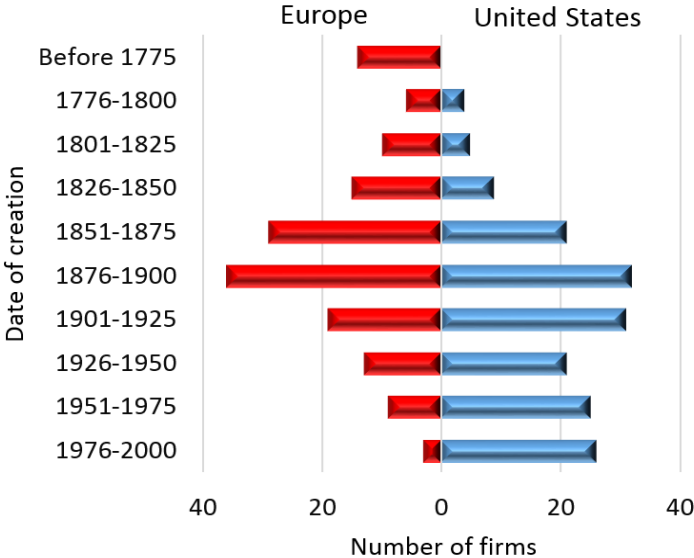


Figure 8: “Population pyramid” for largest U.S./European companies. Source: Philippon and Véron (2008)

<sup>7</sup>A recent example of a surrealistic barrier is the regional government of Valencia, Spain, threatening Susana Meseguer, who shows her small village to the rare passing tourist for a small tip, with a €600,000 fine because she lacks proper professional licensing. The fact that no licensed tourist guide will ever find profitable to set up shop in a small, remote village does not matter much. See [https://elpais.com/elpais/2018/08/23/inenglish/1535019697\\_094488.html](https://elpais.com/elpais/2018/08/23/inenglish/1535019697_094488.html)

A striking result illustrating this point is provided by Philippon and Véron (2008). These authors compile the age of creation of the firms in the FT Global 500 ranking of world companies by market cap as of September 30, 2007, and plot, in Figure 8, the “population pyramid” of the U.S. and European firms that appear in this ranking. While the U.S. has created 26 companies since 1975 that, by 2007, had entered into the FT Global 500, Europe has only created 3. Since ample evidence suggests that new firms drive much of TFP growth (Foster, Haltiwanger, and Krizan, 2001), Figure 8 is the perfect summary of Europe’s TFP growth problems.

## 4.2 Lack of competition

Related, but not equal to barriers to entry, is the lack of competition in many industries and the lax enforcement of competition law.

Since we talked before about Amazon’s travails in France, we can return to the book industry. France, like many other European countries (Germany, Spain, Italy, etc.) has a fixed book price statute. This legislation mandates that a publisher must set a price for any book it edits or imports and booksellers (either a traditional retailer or an electronic shop such as Amazon) must sell the book at that price, perhaps with the freedom to offer a small rebate (in the case of France, up to 5 percent).<sup>8</sup> Fixed price statutes limit the ability of large bookstores to discount books and take advantage of their lower operating costs. In the case of an electronic shop, such as Amazon, fixed price statutes also remove one of the main benefits of its business model: lower prices in exchange for the inconvenience of having to wait for the arrival of a book that can often be found in a local bookstore.

Amazon, not surprisingly, reacted to this statute in France by offering free shipping. The response of the French legislature was swift: prohibiting free shipping. While, in the end, this barrier did not have much bite -Amazon France currently offers shipping of books at one euro-cent<sup>9</sup>- two points are worth mentioning. First, other barriers (such as the 5 percent maximum discount on the sale price) cannot be circumvented.<sup>10</sup> Second, large firms such as

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<sup>8</sup>*Loi n<sup>o</sup> 81-766 du 10 août 1981 relative au prix du livre* (Statute 81-766, August 10, 1981, regarding book pricing), available at <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000000517179>.

<sup>9</sup>See [https://www.amazon.fr/gp/help/customer/display.html/ref=mk\\_sss\\_dp\\_1?ie=UTF8&pop-up=1&nodeId=201549020](https://www.amazon.fr/gp/help/customer/display.html/ref=mk_sss_dp_1?ie=UTF8&pop-up=1&nodeId=201549020).

<sup>10</sup>The fixed price statutes also mean that one of us, Jesús, can often buy books by Spanish authors, in

Amazon, due to their legal and financial resources, have an easier time handling regulations, giving them an unfair advantage over new, potentially highly innovative firms that lack these advantages.

An imperfect but informative measure of the consequences of the lack of competition is the rankings of “Good Markets Efficiency” of *The Global Competitiveness Index 2016-2017*.<sup>11</sup> In this ranking, Germany appears in position 23, France in 31, Spain in 54, and Italy in 67, only marginally defeating Brunei Darussalam (68) and Albania (69), but behind Morocco (64) and Sri Lanka (66).

### 4.3 High regulation

Imagine that you are the CEO of a professional soccer team in Spain. This is big business. Real Madrid, for example, is valued by Forbes at \$4.1 billion and it has annual revenue of \$735 million.<sup>12</sup> The chances are that you are an extremely sophisticated manager. Staying with Real Madrid, you are Florentino Pérez, the chairman of one the world’s largest civil engineering firms with a personal wealth of over \$2 billion.<sup>13</sup> Your team is the most successful soccer club in history, both regarding sports success (13 wins in the UEFA Champions League, the most important club trophy in the world, 6 wins ahead of your closest follower) and regarding your business model. In other words: you probably know what you are doing. Thus, you decide to hire Zinedine Zidane as the coach for your reserve team. This makes a lot of sense. Besides being one of the best soccer players ever, Zidane has been the assistant manager of the main team, a task he has performed to the applause of sports critics and fans and he has been linked with the club for over a decade. He knows the club and how it works.

However, one day, to your big surprise, you are sued for this decision. Why? It turns out that to work as a coach in a professional soccer team in Spain you need to go through a rigorous certification process whereby you attend lectures on some pathbreaking material such as “the etymological evolution of the word ‘sport’ ” (a philosophical discussion on the topic may help players focus before a challenging match) or “differences in sport practices

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Spanish, and published in Spain by a Spanish printing house 50 percent cheaper in Philadelphia than in Madrid. This observation seems hard to reconcile with the stated goal of protecting readers.

<sup>11</sup>[http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017\\_FINAL.pdf](http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf)

<sup>12</sup><https://www.forbes.com/teams/real-madrid/>

<sup>13</sup><https://www.forbes.com/profile/florentino-perez/>

between the sport in ancient times and in modern times” (perhaps to ensure the coach will know how to react in case the team travels back in time to classical Greece).<sup>14</sup> Nearly more interestingly, you need to show you can run 2k in less than 10 minutes (if you are a man) or 12 minutes (if you are a woman). The fact that the coach is not the one playing in the games has not seemed to bother the regulator much. Of course, this probably explains why the person bringing the legal case, Miguel Galán, is also the director of the Spanish National Football Coach Education Centre.

To make a long legal history short, Zidane was first fined and expelled from the Spanish league but, on appeal, the Real Madrid legal team found a loophole (due to Zidane’s French citizenship) that fixed the problem (and went on to be the first coach in history to win three consecutive UEFA Champions League titles).

Zidane’s legal adventures could be just an anecdote, but it is an example among thousands of similar cases of surrealistic regulations and pervasive unjustified licensing requirements across Europe. From the ownership of pharmacies to the opening of gas stations, from media content to the rules governing private colleges, from gym operations to funerary services, industry after industry is controlled by regulations that slow down the adoption of better practices and stifle creativity. Worse, regulations sometimes mean that entire industries, such as tight oil, never appear in Europe. Finally, these regulations are protected and effectively enforced (sometimes even beyond the letter of the law and resorting to violence) by pressure groups that have much to gain from them.

The “Doing Business Index” elaborated by the World Bank ranks 190 countries by how easy it is to conduct business in them, and it summarizes the evidence more systematically.<sup>15</sup> Among major continental European countries, Germany appears first, at position 17 in the overall ranking. While this performance is not entirely disappointing, in the subcategory of starting a business, Germany’s position collapses to 114. Indeed, European countries benefit, in the overall ranking, from their openness to trade induced by the European Single Market. The countries do much worse in all other categories than what their overall ranking would suggest. Other European countries perform even worse than Germany: France (29 overall), Spain (32 overall), and Italy (50 overall).

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<sup>14</sup>These topics are actual quotations from the certification process. See the official Spanish legislation <https://www.boe.es/buscar/doc.php?id=BOE-A-2000-5990>.

<sup>15</sup>See <http://www.doingbusiness.org/rankings>, consulted on June 12, 2017.

## 4.4 Inefficient capital markets

Innovation and adoption are costly activities. And those individuals and firms that undertake them are, often, not those with access to the funds to finance them. A young engineer fresh out of college with a brilliant business plan requires funds. A pension fund with billions of dollars to invest lacks attractive new ideas to invest in. Financial markets are supposed to fix these problems: they match agents that have funds with agents that require those resources.

European capital markets underachieve in fulfilling this task. The most discussed case is venture capital. According to the *CB Insights Venture Report 2014*, the European venture capital industry (including the U.K.) was only 18.5 percent the size of the American one in terms of total investment amount and around 30 percent in terms of the number of deals.<sup>16</sup> This difference in size is especially salient in the latest stages of firms' development, perhaps indicating that few European companies reach a size that deserves further investment.

Worse still, the response of European governments to the weakness of the venture capital industry has been, on many occasions, to create government-owned investment funds that crowd out private capitalists, introduce political considerations into the allocations of funds, and complicate the organic growth of the industry.

Briefly, other problems of European capital markets include small and fragmented stock exchanges, the high cost of IPOs, excessive regulation of publicly traded firms, an incomplete banking union, and an inordinate reliance on bank financing.

## 4.5 Education and R&D system

Innovation activity in the modern world is overwhelmingly concentrated among highly educated individuals and, often, undertaken in the context of complex R&D systems.

Concerning education, continental European countries usually do a good job regarding primary and secondary education, even if the pedagogical approaches in some countries have traditionally been more focused on memorization and drilling than on spurring creativity.<sup>17</sup>

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<sup>16</sup><https://venturebeat.com/2016/03/13/why-europe-lags-behind-the-us-in-vc-investment/>

<sup>17</sup>Educational systems create long lags in human capital accumulation and their effects are felt for decades. A 45-year-old worker in France today attended high school in the late 1980s. While educational practices in French *lycées* of 2018 might be different from those in 1988, the latter is the relevant one for TFP growth today.



The situation is more worrisome at the university level, where (or around where) many of the most creative ideas germinate. According to the *Times Higher Education World University Rankings 2016-2017*,<sup>18</sup> 17 of the top 25 world universities are in the U.S., 5 in the U.K., 1 in Canada, 1 in Switzerland, and 1 in Singapore. According to the *QS World University Rankings 2016-2017*, 13 of the top 25 world universities are in the U.S., 6 in the U.K., 2 in Switzerland, 2 in Singapore, 1 in China, and 1 in Australia.<sup>19</sup>

Ranking universities is not an exact science (how do you weight research against teaching? Or how do you value research across different disciplines?). One should read these exercises more as an indication of general trends than precise measurements. Also, some of the top research is done in national labs (such as the Max Planck Institutes in Germany). Nevertheless, the absence of universities from France, Germany, Italy, or Spain in the top positions in the rankings is telling. For example, in the *Times Higher Education* rankings, the first Spanish university appears in position 163 (Autonomous University of Barcelona) and in the *QS* rankings in position 160 (Universitat de Barcelona). And for Italy, those numbers are 137 (Scuola Normale Superiore di Pisa) and 183 (Politecnico di Milano), respectively. For two countries that pride themselves in excellence on many fiercely competitive endeavors such as sports, food, or fashion, this disappointing academic performance is puzzling (and even more so the general public indifference toward this poor performance).

With respect to R&D systems, a first proxy is spending and employment in this area. According to data from the OECD's Research and Development Statistics, among the large continental European countries, only Germany is on par with the U.S. Germany spends 2.9 percent of its GDP and employs 8.30 employees per thousand full-time employees against the 2.8 percent and 9.1 employees of the U.S. In comparison, Italy's figures are 1.33 percent and 4.93 employees and Spain's 1.22 percent and 6.61 employees.<sup>20</sup>

## 4.6 Aging of population

Incentives to innovate decrease in societies with an older population. First, older individuals are less likely to innovate: much of human capital in science and technology depreciates quickly after having been acquired, an activity concentrated in the early stages of the life

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<sup>18</sup><https://www.timeshighereducation.com/world-university-rankings>.

<sup>19</sup><https://www.topuniversities.com/university-rankings/world-university-rankings/2016>.

<sup>20</sup><http://www.oecd.org/innovation/inno/researchanddevelopmentstatisticsrds.htm>

cycle.<sup>21</sup> Second, older individuals have a lower incentive to adopt new technologies or change. The benefit of higher productivity and/or utility from it is relatively smaller with respect to the transition cost. This can occur both at an individual level (e.g., an engineer may be reluctant to learn a new programming language if she will only use it for a few years before retirement) and at an aggregate level (e.g., the political process will be less likely to embrace change and reforms as the median voter has aged).

European countries are getting older and more progressively so. Figure 9 plots the forecasted population pyramids of Germany (left column), the largest continental European country, against the U.S. (right column) in 2050.<sup>22</sup> Germany’s pyramid is considerably more top-heavy. The picture would be similar if we had used other countries (somewhat more pessimistic for Italy and Spain; more sanguine for France, which has kept fertility at much higher levels than its neighbors).

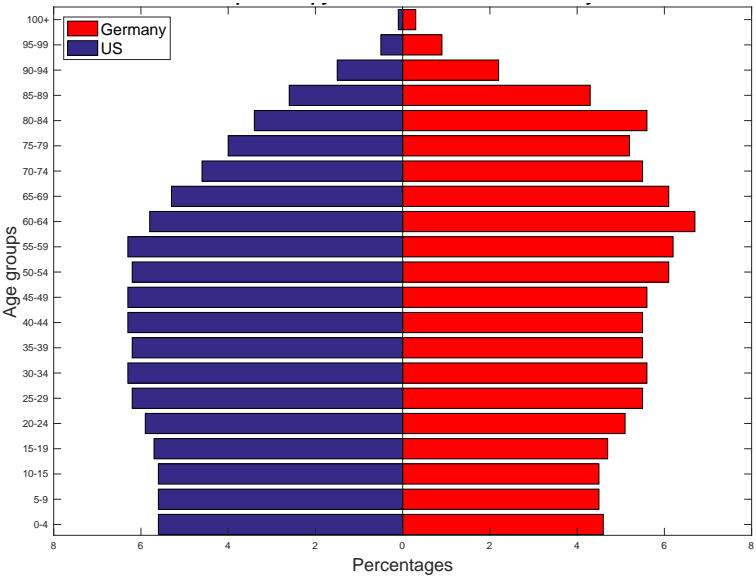


Figure 9: Population pyramids in 2050: U.S. v. Germany

The comparison is even more striking when we plot, in Figure 10, Germany (left column) against India (right column). It is hard to look at this figure without worrying about the

<sup>21</sup>This is not necessarily the case in the arts and humanities; unfortunately, these otherwise worthwhile activities are less directly linked with TFP growth.

<sup>22</sup>We use numbers from the U.S. Census Bureau as of February 11, 2017. In comparison with traditional population pyramids and to fit two countries in the same panel, we aggregate males and females (our argument does not depend on gender breakdowns) and, to ease comparison, we express population in each age group in percentages and not in absolute values.

dynamism of the German society by the middle of the century, at least in comparison with other leading economic powers.

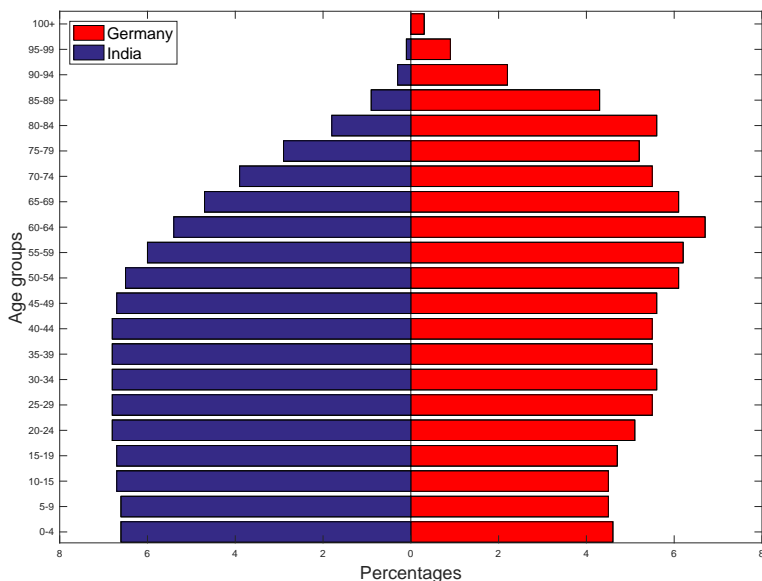


Figure 10: Population pyramids in 2050: India v. Germany

Tellingly, to a large extent, demographics in 2050 are already determined. As of June 2018, only those who would be under 32 in 2050 remain to be born. And, given that new generations are unlikely to join the labor force in large numbers until they are in their early 20s (they need to complete compulsory and most of them either a vocational or college education), the only relevant changes may be those to fertility during the next decade or so. But, given historical experience, fertility patterns are highly persistent, and the recent wave of elections in Europe suggests that the willingness of European electorates to allow for large immigration flows is more limited than previously believed.

#### 4.7 Three additional points

We would be remiss if we closed this section without briefly discussing three further points of some importance.

First, a careful reader may have noticed that we have excluded high taxes from our list of reasons behind Europe’s lackluster TFP growth performance. The reason is that their effects are, theoretically, ambiguous. A high tax on consumption or labor income may, for

example, have an effect on the total level of hours worked, but it does not need to impact TFP growth (this is what would happen, for instance, in a simple endogenous growth model without scale effects; see [Segerstrom 1998](#)). At the same time, high taxes may lower human capital accumulation and risk-taking or induce emigration of the most creative individuals. In 2017, French president Emmanuel Macron campaigned in London. With around 300,000 French citizens living in the British capital,<sup>23</sup> Macron understood that there are more French voters in London than in Nantes or Bordeaux. While we believe in the pernicious influence of high taxes for TFP growth, we can skip pressing this point.

Second, we are not convinced by the argument that innovation is less important for Europe as these countries can still achieve a high level of welfare just by copying new ideas from other countries. Although there is a kernel of truth in the argument (Italians fervently love their American-developed iPhones, and Spaniards have merrily moved their ancestral love of gossiping to Twitter), many of the new technologies require adaptation to local requirements to exploit all their advantages (or the ability to be implemented). Furthermore, many local needs may go unfulfilled if those needs are different from the ones in technologically leading countries.

Third, the creation of the euro and the consequences associated with it have not played a role in our discussion so far. While the euro might have had a negative impact on TFP (see, for example, the mechanisms in [Fernández-Villaverde, Garicano, and Santos, 2013](#)), the slowdown in TFP growth predates the creation of the euro by at least 15 years. The structural problems of the euro design might have reinforced Europe's productivity problems, but European economic problems run deeper than misguided monetary arrangements.

## 5 The political economy of slow TFP growth

How did Europe end up with institutional arrangements that slow TFP growth? And what are the political-economic consequences of this slow TFP growth?

A fruitful point of departure for the analysis is to describe the political consensus that emerged in Europe at the end of World War II (see, for more details, [Fernández-Villaverde and Santos, 2017](#)). With national-conservatives discredited by their flirtations with fascism and

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<sup>23</sup><http://www.cnn.com/2017/02/21/europe/emmanuel-macron-london-french-presidential-election/index.html>

communist parties by their association with the Soviet Union, social democrat and Christian democrat parties forged a model based on representative democracy, European integration, mixed-market economies, and quasi-corporatist welfare states that [Eichengreen \(2008\)](#) has called “coordinated capitalism.”

A combination of exogenous political factors (mainly, the Cold War and the American troops in Europe, but also the painful memories of the war experience) and endogenous forces (fast economic growth, electoral barriers to the entry of new political parties, control of large media by governments) made “coordinated capitalism” a formidable system for European reconstruction.

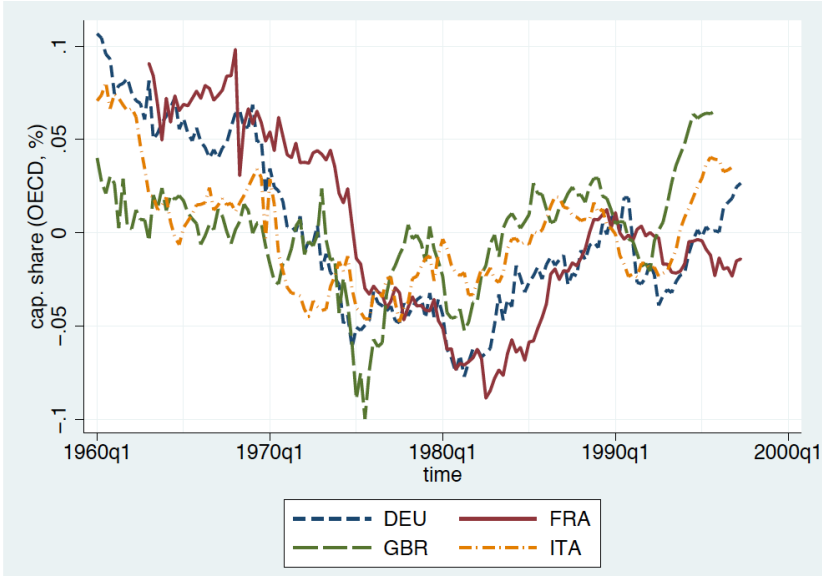


Figure 11: Capital income share in West Germany (DEU), France (FRA), U.K. (GBR), and Italy (ITA); normalized with respect to historical mean.

A series of developments after 1968, however, eroded the foundations of this system. First, the political unrest of students and workers’ strikes in 1968 led to a fast expansion of the welfare state, the introduction of restrictive labor regulations, and a strengthening of workers’ collective bargaining position. An indication of the importance of these changes appears in Figure 11, where we plot the capital income share in West Germany, France, the U.K., and Italy normalized with respect to the historical mean. Due to the policies highlighted before, capital income shares dropped in the early 1970s, lowering the rate of return on capital and forcing firms to introduce new technologies that were less dependent on labor. The new

technologies delivered an increase in the capital income share, but at the cost of permanently lower employment levels.

Second, the oil crisis of the 1970s put Europe, which mostly lacked local sources of petroleum and was heavily dependent on imports, at a severe disadvantage. This was particularly the case in economies such as France and Spain that had heavily invested in energy-intensive industries and partially accounts for the aggressiveness of the French civilian nuclear program.

Third, technological change swung against Europe's "coordinated capitalism." Traditional industries well-suited for this system, such as coal, steel, car, or aerospace, that had been at the forefront of Europe's reconstruction after World War II started being replaced by IT, financial activities, and services to firms that required a much more flexible approach to labor management and openness to fast changes.

Despite these chinks in Europe's "coordinated capitalism" armor, a winning coalition composed of older workers, retirees, civil servants, and participants in protected sectors was able to remain in power throughout the following decades for three reasons.

First, the recovery of the world economy in the 1980s and the benefits from the significant investments in education that had started in the 1960s fueled enough economic growth to avoid serious social unrest. Second, the welfare state that sustained it was financed by a relatively less distortionary tax system than it might have seemed at first sight. European countries relied heavily on the VAT and labor income taxes, but capital income tax was surprisingly low in many of them. Third, the limits to political competition (electoral systems, campaign financing regulations, limited media) were still effective.

The losing coalition of this arrangement was composed of younger workers, the unemployed, and new sectors and firms. Unfortunately, it was these new sectors and firms that would have increased TFP had they been allowed to do so.

It was only in the second half of the 2000s that the power of the winning coalitions eroded sufficiently as to put the future of Europe's economic growth at risk. Some of the forces behind this erosion were long-term. For example, the two pillars of the post-World War II political consensus faced structural challenges. Social democrat parties saw their electoral base of workers and middle-class voters dissolved by economic change. Christian democrat parties faced the consequences of secularization and the revival of a new generation of national-

conservative parties unburdened with interwar era traumas. Moreover, social media allowed new parties to emerge without the need to ingratiate themselves with traditional elites. Some of the forces were more short-term. For instance, the financial crisis moved marginal voters, such as lower middle-class workers, from the winning to the losing coalition.

The interaction between long- and short-term forces was also central. The euro crisis forced countries to consider the possibility of large transfers (present or future) within the eurozone. Corruption –quite extensive in France, Greece, Italy, and Spain– became much less tolerated when economic conditions worsened (causing, for example, the collapse of the conservative government in Spain in the spring of 2018). Moreover, the fiscal strains of the welfare state appeared more evident at the time of the 2010-2016 budget consolidations, which adverse demographics are only going to make more acute over time despite much of the electorate’s reluctance to face them.

The situation has been fertile ground for the growth of populist parties all across Europe (M5S, Podemos, Syriza, FN, etc.). In one way or another, most of these parties have forged a coalition in favor of redistribution and (at least implicitly) of default of private and public debt, and one that is deeply suspicious of market-based policies.

The presence of these populist parties complicates the introduction of reforms that may foster faster TFP growth. In its reading of the evidence, Europe has suffered from too much market, not from too little. And the mainstream parties, afraid of further electoral losses and with an increasingly more pro-status-quo electoral base, may face little incentive to remove the barriers to riches. Even the 2017 election of Emmanuel Macron is surrounded by doubts regarding its long-lasting impact and the ability of the new administration to deliver on its promises of change.

These barriers complicate the path forward for Europe. Physical and human capital accumulation cannot continue for much longer without further TFP growth. The capital-output ratio is already quite high, many public infrastructures in France and Spain are underutilized, and by 2010, most European countries’ average years of education had moved close to the U.S. level. Hours worked can grow in the short-run, especially in countries such as Spain with high unemployment, but there are inherent limits to this mechanism. In summary, without fixing TFP growth, prospects for Europe cannot be sanguine.

## 6 European lessons for the U.S.

Fast European economic growth after World War II was fostered by institutions and governance that offered incentives and opportunities to adopt U.S. technologies and managerial organization, that invested heavily in public infrastructure, that favored the accumulation of physical and human capital, and that exploited the very close economic openness of the continent. Between the end of World War II and the mid-1970s, Europe recorded, in the words of Robert Lucas, an economic growth miracle that was unrivaled among advanced countries.

But since the mid-1970s, Europe has changed course and run an unfortunate experiment that shows how institutions and policies negatively affect economic performance. The European experiment offers a number of lessons for the U.S. today. European economic weakness began once institutions and policies changed. Institutional change resulted in higher taxes, much less competition that depressed entry of new businesses, and increased regulation of capital and labor markets. The timing of changes in European TFP growth and hours worked—the two determinants of economic growth—largely coincides with the timing of changes in European institutions and governance.

These persistent declines in European economic growth of roughly two percentage points per year cumulate over time to very large level differences. This decline reflects both changes in labor input and changes in worker productivity. In terms of labor input, [Prescott \(2004\)](#) and [Ohanian, Raffo, and Rogerson \(2008\)](#) present evidence that historical changes in policies, particularly tax rates that affect the relationship between the marginal rate of substitution between consumption and leisure and the return to working, have had a large impact on hours worked.

[Ohanian, Raffo, and Rogerson \(2008\)](#) document that an average tax rate that combines consumption and VAT taxes with labor income taxes has risen considerably in much of Western and Northern Europe. This tax rate rises from about 30 percent in the 1960s to about 50 percent by the 1990s and afterward. Over this same period, hours worked per capita in Austria, Belgium, Denmark, France, Finland, Germany, Italy, and Ireland declined by about 30 percent, and hours worked in the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the U.K. declined by about 17 percent. To analyze the impact of taxes on hours worked, they constructed a standard model with log preferences over consumption and



leisure, and with government revenue used to provide households with a substitute for private consumption purchases. Their analysis shows that this increase in taxes can account for much of the decline in hours worked in these countries, which in turn represents a large component of Europe’s economic slowdown.

In contrast, quantifying the impact of institutions and policies on productivity is challenging. The best studies of this issue are careful microeconomic analyses, such as those of [Galdón-Sánchez and Schmitz \(2002\)](#) and [Schmitz \(2005\)](#). Motivated by Schmitz’s approach, we pursue a comparison between Europe and the U.S. regarding technology adoption in the energy industry that clearly has been affected by policy differences between the U.S. and Europe.

Hydraulic fracturing of shale for the production of oil and natural gas, also known as “fracking,” was adopted in the U.S. during the 1990s. The development of this technology in the U.S. was facilitated by energy deregulation as well as private, rather than public, mineral rights ([Gold, 2014](#)). Both of these factors provided strong incentives to invest in this technology. This method has revolutionized U.S. energy production. Rapid technological change has reduced production costs so much that fracking output increased between 2014 and 2016, when oil prices fell from about \$100 per barrel to \$30 per barrel. Because of fracking, U.S. oil production has roughly doubled between the 1990s and today.

Fracking has also changed the market for natural gas in the U.S. Technological change substantially reduced the production cost of shale gas, which in turn has lowered its price. The price of natural gas in the U.S. has declined by about 80 percent since 2005 as a consequence of fracking. Substantially higher natural gas production means that natural gas has reduced the use of coal in the U.S. production of electricity, which in turn has reduced greenhouse gas emissions significantly.

Fracking was initially considered to be a promising technology for Europe. European fracking also has the additional benefit of providing more energy independence to Europe at a time when Europe has been looking to reduce energy purchases from Russia and the Middle East. However, environmental concerns and political opposition has led Denmark, France, Germany, and Scotland to ban fracking, and several other European countries have had fracking moratoriums in place at one time or another.

Beyond these restrictions on fracking, institutional differences between Europe and the

U.S. also create very different incentives to invest in fracking. A major factor is property rights for mineral extraction. Mineral rights in the U.S. are largely private, while in contrast, mineral rights in Europe are largely public, which thus sharply limits profit opportunities for European producers.

Energy outcomes are remarkably different between Europe and the U.S. as a consequence of these very different policies. The U.S. is now the second largest global oil producer. The enormous increase in natural gas production has reduced U.S. greenhouse gas emissions to roughly 1990 levels. In comparison, energy and oil-intensive products such as petrochemicals and fertilizers are expensive in Europe. Compared to the U.S., the price of natural gas is more than twice as high in Europe. Consequently, coal use for electricity production is relatively higher than in the U.S., and greenhouse gas emissions are also higher than in the U.S. Europe's energy policy decisions have thus traded off one environmental issue for another, but in turn have reduced sectoral productivity and have continued European dependence on oil from Russia and the Middle East.

Up until recently, U.S. institutional quality has changed in some similar ways to Europe (see [Taylor, 2009](#), and [Ohanian, Taylor, and Wright, 2011](#), for overviews). Up through 2016, tax rates increased, and in some states, they have increased considerably for the most productive earners. Regulation also rose significantly, especially in financial markets through the Dodd-Frank legislation. This new financial regulation has raised the cost of making loans, particularly small business loans. This is because there is a significant fixed cost component in dealing with compliance and record-keeping issues that make smaller loans less profitable. This becomes even more challenging for small banks (community banks), which have a lower revenue base over which to spread the fixed costs.

The impact of financial regulation may be significant. [Mills and McCarthy \(2014\)](#) describe how credit supply is not meeting small business demand for a variety of reasons that may reflect the effect of regulations, including the consolidation of community banks and the higher costs of making loans. This may implicitly bear on the level of competition within industries, particularly for small and new businesses. [Gutiérrez and Philippon \(2018\)](#) have argued that the higher level of concentration in U.S. markets due to lax anti-trust enforcement has made European Union markets more competitive than U.S. markets. Another area that may be affected by financial and other regulations is in the field of business startups and the

ultimate success of those startups. [Decker, Haltiwanger, Jarmin, and Miranda \(2016\)](#) have documented a decline in high-growth young firms in the U.S. since 2000. [Birch and Medoff \(1994\)](#) introduced the term “gazelles” –a small subset of firm startups with unusually high growth potential. [Pugsley, Sedlacek, and Sterk \(2010\)](#) document that the fraction of gazelles in the U.S. firm startup population has declined by about a fifth. Moreover, they report that on average, gazelles grow less than they used to. More research is needed to determine how much of this worrisome decline is due to economic policies and how much is due to other factors.

On a more positive note, [Duernecker, Herrendorf, and Valentinyi \(2017\)](#) argue that the slowdown in TFP triggered by so-called Baumol’s disease (i.e., the move toward services with stagnant productivity such as education) is nearly complete and that in the future we will observe a substitution of demand toward services with higher productivity growth as their relative prices fall. Also, a large cut in the corporate tax rate is making U.S. companies more competitive with those in Europe, and a substantial decrease in business regulation, including a partial rollback of Dodd-Frank, has increased business efficiency and has reduced compliance and record-keeping costs. U.S. labor input and investment’s share of output are growing, and GDP growth has increased. In our view, the continuation of these favorable recent developments will depend on whether the U.S. continues to adopt more pro-market economic policies.

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