

# ZEW policybrief

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## Slow Recoveries Through Fiscal Austerity – New Insights in the Effects of Fiscal Austerity



Consequences of Fiscal Austerity for Technology Adoption, Growth and Productivity

Several European countries such as Spain, Portugal, and Greece implemented austerity programs to cope with the government-debt crisis in the aftermath of the Great Recession: They increased taxes on consumption, labour, and capital and reduced government expenditures to prevent a large increase in the debt-to-GDP ratio. Such policies impose a greater tax burden on the economy which distorts labour supply and investment. We argue that these additional tax distortions make it less attractive for firms to invest in adopting new technologies. New insights from the FRAME project show that fiscal austerity has severe negative consequences for productivity and economic growth in the medium-run and can lead to slow recoveries. Further, austerity may exacerbate existing market failures associated with investment in research and development (R&D) and technology adoption. Beyond its well-known impact on aggregate demand fiscal austerity has a negative effect on future economic growth and productivity growth and hence also on the supply side. Fiscal consolidation is desirable only if it enables a quick reduction of the cost of financing debt but this is unlikely.



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### KEY MESSAGES //

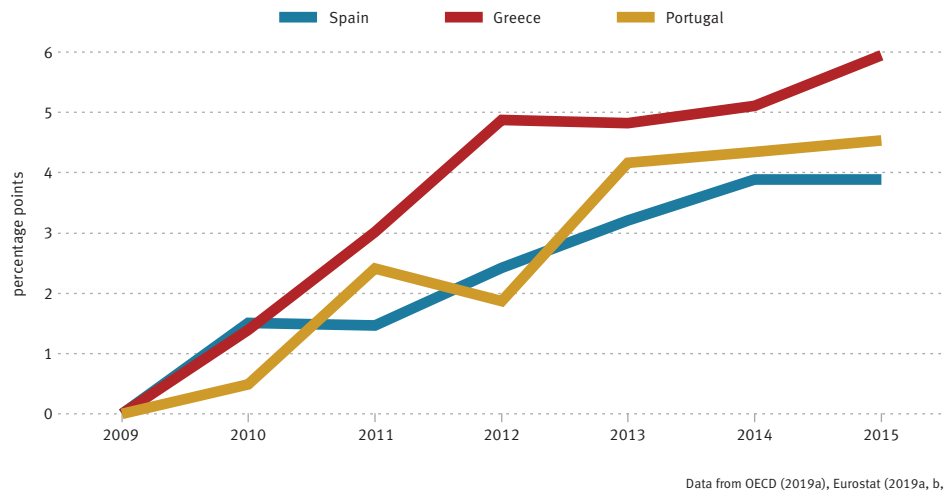
- Technology diffusion is a crucial determinant of growth. Understanding the interaction between technology diffusion and the state of the business cycle is important for macroeconomic policy-making.
- New insights from the FRAME project show that fiscal austerity slows down technology diffusion. Through its negative effect on technology diffusion, austerity has severe negative consequences for productivity and economic growth in the medium-run and can lead to slow recoveries.
- Not only technology adoption but innovation activities in general are likely below their efficient level during a recession. Austerity measures, by adding tax distortions and reducing aggregate demand, amplify inefficiencies related to innovation activities. Austerity exacerbates the problem of underinvestment in R&D and innovation in a recession.

**During the European Debt Crisis the Overall Tax Burden Increased in Several EU Countries**

**INTRODUCTION**

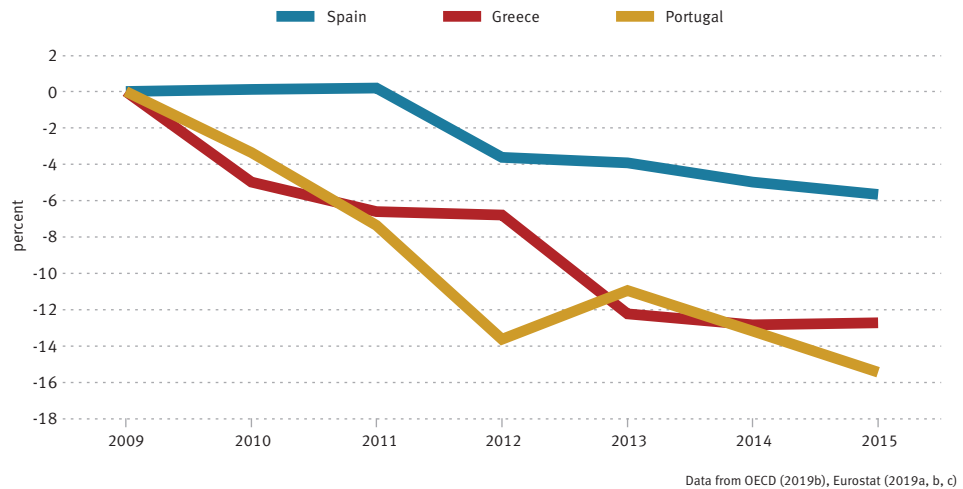
Sovereign bond yields and public debt levels skyrocketed during the Great Recession and the European Debt Crisis. Several European countries such as Spain, Portugal, and Greece implemented austerity programs to cope with the government-debt crisis in the aftermath of the Great Recession. They increased taxes on consumption, labour, and capital and reduced government expenditures. As depicted in Figure 1, the overall tax burden as a share of GDP in Spain, Portugal, and Greece increased markedly from 2009 to 2015. It was between four and six percentage points higher in 2015 than it was in 2009.

**FIGURE 1: CHANGE IN TOTAL TAX REVENUE RELATIVE TO GDP SINCE 2009 IN SELECTED EU-COUNTRIES**



Spain, for example, increased the VAT rate from 18 percent to 21 percent in 2012. The top rate on personal income was increased from 43 percent in 2010 to 52 percent in 2012 (European Commission 2012).

**FIGURE 2: CHANGE IN GOVERNMENT CONSUMPTION RELATIVE TO GDP SINCE 2009 IN SELECTED EU-COUNTRIES**



### During the Debt Crisis Government Consumption Was Cut

While tax revenues were raised, government consumption was cut. Figure 2 shows the change in government consumption relative to GDP since 2009 for Spain, Portugal, and Greece. In 2013, Spanish government consumption relative to GDP was nearly 4 percent lower than in 2009. Portuguese government consumption expenditures relative to GDP were down by more than 10 percent and Greece cut government consumption relative to GDP by as much as 12 percent. In 2011 alone, Spanish government consumption expenditures relative to GDP were reduced by close to 4 percent. These austerity measures were implemented in the midst of a severe recession. In 2013, the unemployment rate in Spain exceeded 25 percent and real GDP per capita was more than 6 percent below its 2009 level.

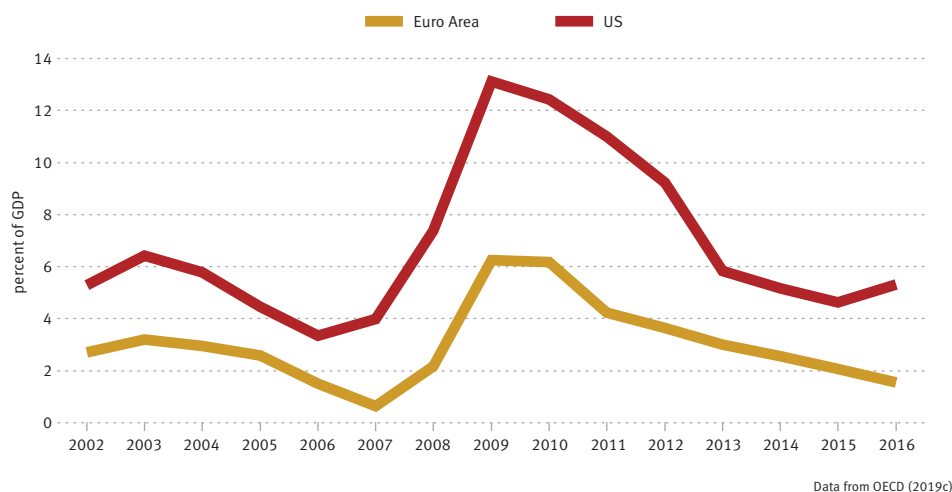
The austerity programs stood in contrast to the traditional Keynesian approach that would have called for expansionary fiscal policy to support aggregate demand during the recession. In line with this argument, aggregate time series evidence shows that government spending has strong expansionary effects in a recession. For the US, the fiscal multiplier has been estimated to be as large as 3.6 in recessionary times (Auerbach & Gordonichenko 2012). Recent quantitative models of fiscal policy find substantial expansionary effects of fiscal policy with impact multipliers ranging from 1.2 to more than 2 (Hagedorn, Manovskii & Mitman, 2018; Rendahl, 2016). Moreover, there is evidence that expansionary effects of fiscal policy are strong for a country that is member of a monetary union independently of the state of the business cycle. This effect is explained by the accommodative role played by monetary policy when expansionary fiscal policy is only conducted in some (relatively small) countries of the monetary union. (Nakamura & Steinsson, 2014).

Advocates of austerity measures argued that the recession in southern Europe was largely due to low productivity rather than deficient demand and that consequently structural reforms and fiscal consolidation were the appropriate policy response. As the argument goes, austerity measures may hurt in the short run but eventually they will pay off because they will lead to greater investment and productivity improvements and foster growth.

The two opposing views on austerity are reflected in the different fiscal policies conducted in Europe and the US in response to rising debt-to-GDP ratios during the Great Recession. While many European countries resorted to strong measures of fiscal consolidation, the US refrained from such policies. During the Great Recession, net government borrowing as a share of GDP increased much more in the US than it did in the Euro Zone. Figure 3 shows that in 2011, net borrowing of the US government amounted to 10 percent of GDP while it was only 4 percent of GDP in the Euro Area.

### Different Fiscal Policies in Europe and the US During the Great Recession

FIGURE 3: CHANGE IN NET GOVERNMENT BORROWING



To some extent, the economic literature supports the arguments in favour of austerity measures. Indeed, it is important to think beyond the short-run consequences of austerity. Business cycles and fiscal policy have strong effects on productivity and economic growth in the long- and medium-run (Barlevy, 2004; Comin & Gertler, 2006). It is less clear, however, whether austerity measures are suited to promote growth. In fact, recent research shows that fiscal austerity may hinder investment in R&D and in the adoption of new technologies. It will therefore have adverse consequences on productivity and income growth. The precise design of austerity measures and the economic environment in which they are implemented is crucial for their consequences.

## TECHNOLOGY ADOPTION: DRIVER OF PRODUCTIVITY AND GROWTH

### Speed of Technology Diffusion Plays a Crucial Role

Economic research has highlighted the role of technology adoption as an important determinant of productivity growth and economic development. New technologies do not improve productivity right away. Rather, firms must invest in the adoption of new technologies to make use of them in production. This step is important. The adoption process induces a lag between the emergence and the productive use of new technologies. On average it takes 45 years until a new technology is adopted (Comin & Mestieri 2018). The speed of technology diffusion plays a crucial role for income growth. Adoption rates account for more than a quarter of the overall variation in income per capita across countries (Comin & Hobijn, 2010; Jerzmanowski, 2007). Adopting technologies seems to be a path-dependent process, in which early adopters build a comparative advantage in adopting technologies: Countries who first adopted a given technology tend to adopt new ones faster (Comin & Hobijn, 2004). Policymakers increasingly recognize the importance of technology adoption and foster the diffusion of public research (for a discussion about Horizon Europe, see Krieger, Licht & Pellens, 2018). This is especially true for Europe where concerns have been raised that technology diffusion has slowed down and caused a decline in productivity and income growth (European Commission, 2017; European Commission, 2018; OECD 2015).

In this context, it is important to take into account that current economic conditions greatly influence the speed of technology adoption. If the economic environment is not favourable, firms will refrain from investing in the adoption of new technologies. Innovative ideas will not translate into increased productivity. For this reason, temporary economic shocks can have long lasting consequences as they slow down the diffusion of innovative ideas (Comin and Gertler, 2006). For example, sluggish technology diffusion can be seen as one explanation for reduced productivity growth in the US following the Great Recession (Anzoategui, Comin, Gertler & Martinez, forthcoming; Bianchi, Kung & Morales, 2019).

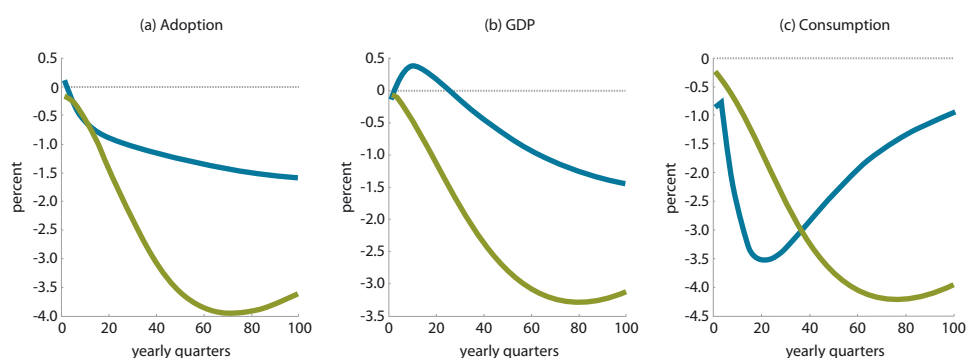
## AUSTERITY LEADS TO SLOW RECOVERIES

### The FRAME Project Investigates the Effects of Austerity Programs on Technology Adoption

Given the importance of technology diffusion for productivity and its strong dependence on the economic environment, the effects of austerity measures on technology adoption are crucial for the medium-run consequences of such policies. How do austerity measures affect technology adoption and what are the implications for productivity and income growth? These questions are at the core of the Horizon2020 research project FRAME ([www.h2020frame.eu](http://www.h2020frame.eu)). As part of FRAME, Bianchi, Comin, Kung and Jung (2019) investigate this question focussing on the case of Spain during the Great Recession. Their model endogenously accounts for the connectedness of Spain with other European economies through the trade of goods and financial assets. The study finds support for strong adverse effects of austerity programs on productivity, output, and consumption. Because tax rates are increased to consolidate the government's budget, investment decisions are distorted.

In particular, fiscal austerity deters both investment in capital and in the adoption of new technologies. This reduces the speed of technology diffusion and leads to a slower recovery. Figure 4, which is taken from Bianchi, Comin, et al. (2019), shows the responses of the technology adoption rate, GDP, and consumption after a liquidity shock under both normal fiscal policy and fiscal austerity. Normal fiscal policy continues to operate the fiscal rules estimated for the pre-recession times while under fiscal austerity, taxes are raised to limit the increase in the debt-to-GDP ratio to 10%. Fifteen years (corresponds to 60 quarters in Figure 4) after the beginning of the Spanish debt crisis, both the technology adoption rate, output, and consumption are still more than 2 percent lower when austerity measures are implemented compared to a situation without austerity measures. These findings suggest, that the austerity measures taken in the Euro Zone have contributed to the slow recoveries that were observed. They may be one explanation for the very different experiences in the US and in most of Europe after the Great Recession. Fiscal policy was much less austere in the US than in the EU (see Figure 3). In turn, the recovery was faster in the US than in many European countries: In 2017, real GDP per capita in the US was already 6.7 percent higher than ten years before while Spanish real GDP per capita had merely returned to its pre-crisis level.

FIGURE 4: SIMULATION OF LIQUIDITY SHOCK



The figure shows the responses of the technology adoption rate, GDP, and consumption after a liquidity shock under normal fiscal policy (blue) and under fiscal austerity (green). All figures show percentage deviations from the balanced growth path. Taken from (Bianchi, Kung and Morales 2019).

Fiscal consolidation can be achieved through various different policies. The exact design of austerity programs greatly affects their consequences. There is evidence that expenditure-based consolidations have much higher output costs than tax based measures (Alesina et al. 2015). Within the set of tax-based measures, Bianchi et al. (2019a) find large differences regarding the consequences for growth depending on which types of taxes are used to increase revenues. According to their simulations, the adverse effects of labour tax raises on GDP and consumption are especially strong. Raising capital taxes is the preferred means of fiscal consolidation. For the Spanish case, an austerity program that relies solely on higher capital taxes to stabilize debt leads to a trough response of output of  $-3$  percent ten years after the shock. The recession is much deeper and the recovery slower when only the labour tax is used to stabilize debt. For this scenario, the model in Bianchi, Comin, et al. (2019) predicts output to be 10 percent below trend ten years after the shock.

**Exact Design of Austerity Program is Essential to Reduce Negative Effects**

## AUSTERITY AMPLIFIES INNOVATION RELATED MARKET FAILURES

Due to innovation externalities, innovation investments are more pro-cyclical than would be socially desirable (Barlevy, 2007). The reason is that private benefits of innovation accrue in the

### Three Major Policy Implications

short-run and are small in a recession when profits are low. The public benefits of innovations, however, materialize later, after the recession, when the benefits are large. Hence, the wedge between private and public returns on innovation investments evolves countercyclical. Thus, if innovators cannot fully appropriate the public benefits of their innovation expenditures, the gap between the desirable and the actual investment in innovation widens during a recession. This dynamic inefficiency raises the costs of recessions. Austerity measures that increase taxes and weaken demand in a recession will widen the gap between private and social returns further and thereby amplify the dynamic inefficiency.

These findings have three major implications for policy. First, it is desirable to subsidize R&D and technology adoption particularly strongly during a recession to close the growing gap between private and public returns to innovation. Tax increases, by contrast, widen the gap further and lead to inefficiently low innovation activities. Second, policies that can help firms to reduce the liquidity risk of long term investments such as expansionary monetary policy are beneficial (Aghion, Fahri & Kharroubi, 2012). Lastly, fiscal stabilization has additional benefits beyond the short-run effects on employment and consumption. Stabilization policies reduce the cyclical deviation of R&D from its socially efficient level and thereby enhance growth. This conclusion is supported by empirical findings showing that a more countercyclical fiscal policy fosters growth (Aghion, Askenazy, Berman, Clette & Eymard, 2012).

### Austerity Can Bring Down Interest Rate Spreads

## WHEN AUSTERITY SUPPORTS GROWTH

An important argument in favour of austerity measures is that they reduce borrowing costs. If a high debt-to-GDP ratio serves as an indicator of a greater default probability, fiscal austerity can bring down interest rate spreads if it succeeds to reduce public debt relative to GDP. Bianchi, Comin et al. (2019) investigate the effects of austerity in response to a sudden increase in sovereign spreads. They assume that public debt directly leads to higher borrowing costs. In this situation, fiscal austerity can accelerate the recovery if the benefits stemming from reducing borrowing costs outweigh the costs of temporarily larger tax distortions. Austerity is beneficial if it can reduce the borrowing costs fast enough. Importantly, recent research shows that austerity is unable to reduce borrowing costs of financially distressed countries in the short-run (Born, Müller & Pfeiffer, 2018). Despite positive predicted effects with simulations, limited empirical evidence supports that austerity measures can act on borrowing costs, and in turn, ease economic recovery.

## CONCLUSION

Technology diffusion represents a crucial determinant of growth. Fostering the diffusion of innovative ideas constitutes a new objective of innovation policies. There is evidence that the establishment of applied research organizations, for example, contributes in an important way to the diffusion of technology and leads to significant productivity gains (Comin, Licht, Pellens & Schubert, 2018). However, little is known about the interaction between innovation policy, macroeconomic policy, and the business cycle. FRAME aims precisely at filling this gap by investigating how the speed of technology diffusion varies over the cycle and how it depends on macroeconomic policies. Work by Bianchi, Comin et al. (2019) shows that the effects of fiscal austerity on the adoption of new technologies can account for the slow recoveries after the Great Recession in Europe. Austerity measures taken in response to fiscal distress, as in Spain, Portugal, and Greece, slow down the adoption of new technologies and depress productivity growth in the medium run. Austerity is only advisable if it can reduce interest rate spreads quickly but this is unlikely for countries in severe financial distress.

If austerity measures are to be implemented nonetheless, they can be accompanied by policies that support innovation and limit the negative effects of austerity measures. In particular, it is important to alleviate frictions that prevent firms from taking advantage of the relatively low costs of expanding innovation activities during a recession. On the one hand, this includes policies aimed at alleviating credit constraints of firms (Aghion, Angeletos, et al. 2010). Expansionary monetary policy during the crisis might have been successful in this regard. On the other hand, innovation subsidies can be expanded to ensure that firms internalize the benefits of innovation even as the wedge between the private and the public return on innovation increases during the recession (Barlevy 2007).

More research is needed to advance the understanding of the role of innovation and technology diffusion for growth and its dependence on the business cycle and on macroeconomic policy. In particular, it will be important to further improve the measurement of technology adoption in order to provide policymakers with the necessary information to monitor technology adoption more closely and to evaluate the effects of macroeconomic policies on the diffusion of new ideas.

**More Research in the Role of Technology Diffusion for Growth is Needed**

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## FURTHER INFORMATION //

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