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Discussion

Discussion of "Can Structural Reforms Help Europe?" by Gauti Eggertsson, Andrea Ferrero, and Andrea Raffo

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1. Introduction

"W.S. Gilbert abundantly proves he is still the legitimate monarch of the Realm of Topsy-Turvydom." In such marvelous terms *The Times* of London, in 1884, reviewed the premiere of *Princess Ida*, by W.S. Gilbert and Arthur Sullivan. The critic had captured, concisely, the basic plot of many of the wonderful creations of Gilbert and Sullivan. The premise of those works was to turn around the conventional rules of society and to push the unusual arrangements to their logical consequences. With this trick, the artists created amusing pieces that the audiences of the era (and not a few of our contemporaries) adored.

Thinking about the zero lower bound (ZLB) of the nominal interest rate is similar to listening to Gilbert and Sullivan: all our intuitions about economic policy can switch and, in the process, we are entertained. Eggertsson, Ferrero, and Raffo (hereafter EFR) have presented an original and carefully crafted argument that structural reforms may be counterproductive at the ZLB, exactly opposite to their effect under normal conditions. Thus, their thought-provoking and immensely interesting article is an outstanding member of what I would like to call the economics of Gilbert and Sullivan.

Why does the ZLB cause this rumpus? For a market economy to work properly, a central piece of the machinery – the savings-investment market – must operate satisfactorily. This market, through its price (the real interest rate), ensures that the desire of households and firms to postpone consumption (savings) is equal to their desire to accumulate capital (investment). Unfortunately, the presence of cash complicates the response of the interest rate to changes in the desire to save and invest.

All modern economies have found that a convenient trading arrangement is the use of noninterest-bearing nominal notes issued by a sovereign, which we refer to as cash (or call deposits easily redeemed for cash). This is not the place to review why this is the case. Suffice it to say that these notes are the root of all evil here.

Since I started by talking about 19th century art, I fast-forward to the early 21st century. And to reflect geopolitical realities, I travel from old England to contemporary New Jersey – where I write these lines – to introduce the *Tony Soprano technology*. In a famous episode, Tony (unforgettably interpreted by the recently departed James Gandolfini) hides his

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ill-gotten money in the duck feed bins in his backyard. This *Tony Soprano technology* is available to everyone: you can store your cash in the duck feed bin or the cookie jar, or stuff it in the proverbial mattress. The storage technology imposes a lower bound on the nominal return of bonds. Since cash delivers a zero return, a traded nominal bond cannot deliver a lower return (except a few basis points for the convenience of not having Carmela – Tony's wife – steal your money). But there is no a priori reason why the real interest rate that clears the saving-investment market should be positive. But then, how do we reconcile a negative real interest rate with a (weakly) positive nominal interest rate?

As Section 2 will explain, this is not hard when we have price flexibility. Inflation induces the right real interest rate for any level of nominal interest rates. In a flexible price equilibrium, the ZLB will be associated with a price path that generates the same allocation that we would have in the absence of the bound.

The ZLB becomes a concern when nominal rigidities prevent inflation from adjusting sufficiently fast. For example, if we need inflation to lower the real interest rate when the ZLB is operative, nominal rigidities might imply that prices do not rise enough and the real interest rate would be too high. Hence, the savings-investment market can only clear with a fall in total savings triggered by lower output. The mechanism is a fall in aggregate demand (as agents, induced by the high real interest rate, consume and invest too little) that is not fully accommodated because of nominal rigidities.

"Heterodox" policies – such as generating inflation, raising taxes, or making the economy less productive – may avoid this outcome and "orthodox" policies – such as structural reforms – may exacerbate the condition. If, for instance, we liberalize the goods market, inflation will fall because of the lower markups. But lower inflation, at the ZLB, raises the real interest rate and reduces output.

Note that there is nothing special about "zero." The key is that the real interest rate cannot adjust.[1] If we had a monetary authority committed to never lowering the nominal interest rate of its policy instrument below x percent, we would have an x-lower bound. Zero is only relevant because it is outside the control of the policymaker (until we migrate to an electronic cash economy where the ZLB would disappear).

I will organize the rest of my remarks as follows. First, I will present a stylized model to explain from a complementary perspective where the result in the paper comes from and to evaluate how it could change. Then, I will offer some quick thoughts on Europe and conclude. After considerable hesitation, and in the interest of concision, I have decided to skip a thorough analysis of the multiplicity of equilibria that appear in models of the ZLB. In that way, I will stay within the equilibrium selected by the authors. Nevertheless, I am becoming convinced that a successful study of the ZLB should tackle the issue of multiplicity of equilibria. And, although I have blamed space limitations as a (true) excuse, I happily recognize that it is a most opportune one, as my own thinking about the issue is in a state of utter confusion.

2. A simple model

Let me start by considering a deterministic economy populated by a representative household, whose preferences over sequences of consumption, c_t, and labor, l_t, are

$$\sum_{t=0}^{\infty} \beta^t \left\{ \log c_t - \frac{l_t^{1+\vartheta}}{1+\vartheta} \right\}$$

where $\beta < 1$ is the discount factor and $\vartheta > 0$ is the inverse of the Frisch elasticity. Given a real wage w_t per unit of work, a nominal interest rate R_t paid on a bond, b_t, profits from the firms in the economy, F_t, and a price level p_t, we get a budget constraint

$$c_t + \frac{b_{t+1}}{p_t} = w_t l_t + R_{t-1} \frac{b_t}{p_t} + \mathsf{F}_t.$$

The first-order conditions are an Euler equation:

$$1 = \beta \frac{c_t}{c_{t+1}} \frac{R_t}{\Pi_{t+1}}$$

(where $\Pi_{t+1} = p_{t+1}/p_t$) and a consumption-labor choice $l_t^{\vartheta} c_t = w_t$.

The final good is produced by a competitive firm using a continuum of intermediate goods with the production function:

$$y_t = \left(\int_0^1 y_{it}^{(\varepsilon-1)/\varepsilon} \, di \right)^{\varepsilon/(\varepsilon-1)} \tag{1}$$

where $\varepsilon > 1$ is the elasticity of substitution. Thus, given the intermediate goods' prices p_{it} and the final goods price $p_t = (\int_0^1 p_{it}^{1-\varepsilon} \, di)^{1/(1-\varepsilon)}$, the input demand functions are

$$y_{it} = \left(\frac{p_{it}}{p_t} \right)^{-\varepsilon} y_t \quad \forall i.$$

[1] It is somewhat paradoxical that many observers who would enthusiastically concede that a lower bound in the rental market for apartments would generate inefficiencies and fewer rentals face challenges in seeing the negative consequences of the ZLB.

Each intermediate firm produces differentiated goods with a technology $y_{it} = A_t l_{it}$, where l_{it} is the labor input rented by the firm, A_t is the productivity, and $mc_t = w_t/A_t$ is the marginal cost. There is neither physical capital nor a storage technology.

The monopolistic firm faces nominal rigidities. In particular, it pays a price adjustment cost $(\phi/2)[p_{it}/p_{it-1}-1]^2$ per unit of good sold and solves

$$\max_{\{p_{it+s}\}_{s=0}^{\infty}} \sum_{s=0}^{\infty} \beta^s \frac{c_t}{c_{t+s}} \left(\frac{p_{it+s}}{p_{t+s}} - mc_{t+s} - \frac{\phi}{2}\left[\frac{p_{it+s}}{p_{it+s-1}} - 1\right]^2 \right) \left(\frac{p_{it+s}}{p_{t+s}}\right)^{-\varepsilon} y_t$$

where the pricing kernel of the economy, $\beta^s c_t/c_{t+s}$, is used to value future profits.

In a symmetric equilibrium, $p_t = p_{it}$ for all i, and after some algebra, the previous optimization problem implies an expanded Phillips curve:

$$1-\varepsilon+\varepsilon\frac{w_t}{A_t} - \phi(\Pi_t - 1)\left(\Pi_t - \frac{\varepsilon}{2}(\Pi_t - 1)\right) + \beta\phi\Pi_{t+1}(\Pi_{t+1}-1) = 0. \tag{2}$$

Also, in this symmetric equilibrium, $y_t = y_{it} = A_t l_{it}$, and because labor and good markets clear, $y_t = A_t l_t = c_t$. From the consumption-labor choice optimality condition, we derive the wage that clears the market $w_t = A_t l_t^{1+\vartheta}$.

The model is closed with a monetary authority that fixes the nominal interest rate with a Taylor rule subject to a ZLB and target inflation $\Pi = 1$:

$$R_t = \max[R\Pi_t^{\gamma}, 1]$$

with $\gamma > 1$ and where $R = 1/\beta$ is the steady-state interest rate.

Putting all these results together, and after some substitutions, the equilibrium conditions of the model are

$$\frac{R_t}{\Pi_{t+1}} = \frac{1}{\beta}\frac{A_{t+1}}{A_t}\frac{l_{t+1}}{l_t}$$

$$l_t = \left(\frac{\varepsilon-1}{\varepsilon} + \frac{\phi}{\varepsilon}(\Pi_t - 1)\left(\Pi_t - \frac{\varepsilon}{2}(\Pi_t - 1)\right) - \beta\frac{\phi}{\varepsilon}\Pi_{t+1}(\Pi_{t+1}-1)\right)^{1/(1+\vartheta)}$$

$$R_t = \max\left[\frac{1}{\beta}\Pi_t^{\gamma}, 1\right]$$

three equations in three unknowns, l_t, R_t, and Π_t. The first of these equations gives us an expression for the real interest rate, R_t/Π_{t+1}.

I can combine the equilibrium conditions into one recursion for inflation:

$$\Pi_{t+1} = \frac{A_t}{A_{t+1}}\Omega(\Pi_t, \Pi_{t+1}, \Pi_{t+3})\max\left[\Pi_t^{\gamma}, \beta\right] \tag{3}$$

where

$$\Omega(\Pi_t, \Pi_{t+1}, \Pi_{t+3}) = \left(\frac{\varepsilon - 1 + \phi(\Pi_t - 1)\left(\Pi_t - \frac{\varepsilon}{2}(\Pi_t - 1)\right) - \beta\phi\Pi_{t+1}(\Pi_{t+1}-1)}{\varepsilon - 1 + \phi(\Pi_{t+1} - 1)\left(\Pi_{t+1} - \frac{\varepsilon}{2}(\Pi_{t+1} - 1)\right) - \beta\phi\Pi_{t+2}(\Pi_{t+2}-1)}\right)^{1/(1+\vartheta)}$$

and, from its solution, obtain expressions for l_t and R_t.

Note that, first, the path for inflation $\{\Pi_t\}_{t=0}^{\infty}$ is indeterminate: there are many paths that satisfy the recursion (3). Whether those paths are convergent or divergent would depend on Π_0 and parameter values. Second, the price level is also indeterminate, since we only have a Taylor rule expressed in terms of inflation. These are well-known points that go back, at least, to Sargent and Wallace (1975). Finally, to simplify algebra, I will assume from now on that, in a baseline economy, $A_t = 1$ for all t.

2.1. The neoclassical case

The neoclassical case is when there are no nominal rigidities, $\phi = 0$. Then, labor becomes

$$l_t = \left(\frac{\varepsilon-1}{\varepsilon}\right)^{1/(1+\vartheta)}.$$

Without price rigidities, the optimal price chosen by the firm is a constant markup $((\varepsilon-1)/\varepsilon)$ over marginal cost, and the wage ensures that the labor market clears by creating a wedge between the marginal productivity of labor, A_t, and wages. Labor is constant over time because the income and the substitution effect cancel each other, and the nominal interest rate is

$$\frac{R_t}{\Pi_{t+1}} = \frac{1}{\beta}.$$

In this economy, Eq. (3) becomes $\Pi_{t+1} = \max[\Pi_t^{\gamma}, \beta]$, which has two fixed points, at β and 1.

Imagine now that, due to structural reforms, there is an alternative scenario for the economy with the same fundamentals as the baseline economy, except that productivity is now given by $\tilde{A}_0$ and $\tilde{A}_t$ for $t > 0$ (where $\tilde{x}$ denotes a variable in the alternative scenario). Three possible situations come to mind:

1. The "permanent increase in productivity": both $\tilde{A}_0$ and $\tilde{A}_t$ increase by the same amount with respect to the baseline case. Then, the real interest rate remains unchanged:

$$\frac{R_0}{\Pi_1} = \frac{\tilde{R}_0}{\tilde{\Pi}_1} = \frac{1}{\beta}.$$

2. The "temporary increase in productivity": $\tilde{A}_0$ increases but $\tilde{A}_t = 1$ does not. Then, the real interest rate at period 0 must fall to induce households to consume more today and clear markets:

$$\frac{R_0}{\Pi_1} > \frac{\tilde{R}_0}{\tilde{\Pi}_1} = \frac{1}{\beta}\frac{1}{\tilde{A}_0}.$$

3. The "future increase in productivity": $\tilde{A}_t$ increases but $\tilde{A}_0 = 1$ does not. Then, the real interest rate at period 0 must increase. The economy will produce more goods tomorrow, but not today. Since the household is richer, it desires to consume more today. The only way to clear the market is to increase the real interest rate and induce the household to wait:

$$\frac{R_0}{\Pi_1} < \frac{\tilde{R}_0}{\tilde{\Pi}_1} = \frac{1}{\beta}\tilde{A}_1.$$

To see how these changes in the real interest rate come about, Eq. (3) tells us that

$$\tilde{\Pi}_1 = \frac{\tilde{A}_0}{\tilde{A}_1}\max\left[\tilde{\Pi}_0^{\gamma}, \beta\right]$$
$$\tilde{\Pi}_2 = \max[\tilde{\Pi}_1^{\gamma}, \beta].$$

Many paths will satisfy these new conditions, but all of them will have the term $\tilde{A}_0/\tilde{A}_1$ premultiplying $\max[\tilde{\Pi}_0^{\gamma}, \beta]$.

I can select a Π_0 that ensures that the path for prices is non-explosive. For instance, to deliver price stability in the baseline scenario, I pick $\Pi_0 = 1$, while for the alternative scenario, I need

$$\tilde{\Pi}_0 = \left(\frac{\tilde{A}_1}{\tilde{A}_0}\right)^{1/\gamma}$$

(for simplicity, I assume that the changes in productivities do not drive the economy to the ZLB, i.e., $\tilde{A}_1/\tilde{A}_0 > \beta$).

If we want the ZLB to be operative, we can pick any $\Pi_0 < \beta^{1/\gamma}$, which will generate that $\Pi_t = \beta$ for $t > 0$. In the alternative case, I pick $\tilde{\Pi}_0 < \beta^{1/\gamma}$ and then

$$\tilde{\Pi}_1 = \frac{\tilde{A}_0}{\tilde{A}_1}\beta,$$

which can imply that inflation comes back to β, goes to 1, or explodes depending on the particular values of $\tilde{A}_0$ and $\tilde{A}_1$.

In summary, in the neoclassical case, the presence of the ZLB is irrelevant for allocations. Inflation will adjust to reflect the new productivities and, together with the Taylor rule, deliver the right real interest rate.

2.2. The New Keynesian case

We deal now with the New Keynesian case where $\phi > 0$ and come back to Eq. (3):

$$\Pi_{t+1} = \Omega(\Pi_t, \Pi_{t+1}, \Pi_{t+3})\max[\Pi_t^{\gamma}, \beta].$$

While it is hard to characterize the previous equation, I outline two points. First, we still have a multiplicity of paths for inflation that satisfy the recursion. Second, the first term in the right-hand side of Eq. (3) will dampen the behavior of inflation. Given the quadratic price adjustment costs, firms will change their prices more slowly over time than in the neoclassical case.

If we repeat the exercise for the scenario with changed productivities:

$$\tilde{\Pi}_{t+1} = \frac{\tilde{A}_t}{\tilde{A}_{t+1}}\Omega\left(\tilde{\Pi}_t, \tilde{\Pi}_{t+1}, \tilde{\Pi}_{t+3}\right)\max\left[\tilde{\Pi}_t^{\gamma}, \beta\right].$$

Because of the multiplicity of equilibria, I need to pick an initial value of Π_0 for the baseline scenario and a $\tilde{\Pi}_0$ for the alternative one. As I did for the neoclassical case, I pick initial inflations that rule out explosive paths for prices. Then, $\tilde{\Pi}_0$ satisfies

$$\tilde{\Pi}_1 = \frac{\tilde{A}_0}{\tilde{A}_1}\Omega(\tilde{\Pi}_0, \tilde{\Pi}_1, \tilde{\Pi}_2)\max[\tilde{\Pi}_0^{\gamma}, \beta]$$

and:

1. For the "permanent increase in productivity", inflation does not change. If Π_0 delivers a non-explosive path, so will $\tilde{\Pi}_0 = \Pi_0$. Labor is the same, but output is permanently higher because of higher productivity.
2. For the "temporary increase in productivity," $\tilde{\Pi}_0 < \Pi_0$. If we are at the ZLB (for example, $\tilde{A}_0 \gg 1$), inflation in future periods adjusts more slowly than when the ZLB is not operative and labor falls more. For some plausible calibration values, the effect is strong enough that output falls even when productivity is higher. This is the main result in EFR's paper: a temporarily higher productivity today leads to less inflation, as marginal costs fall, and hence to a higher real interest rate. Since output is demand-determined, the higher real interest rate lowers demand and hours worked.
3. For the "future increase in productivity," $\tilde{\Pi}_0 > \Pi_0$, and for opposite reasons to those in the previous case, hours increase today when we are at the ZLB (see Fernández-Villaverde et al., 2012, for an explanation of how the wealth effect triggered by a rise in future productivity may increase current output and hours).

3. How big?

Once I have explained in a simple environment the intuition of the result, we can come back to EFR's fully fledged model and ask whether the previous reasoning survives in the richer environment. Fig. 1 shows the effect on output of a 1% permanent reduction in price and wage markups in the periphery non-tradable sector caused by structural reforms when the economy is at the ZLB. The solid line is the baseline scenario where the economy has been hit by a number of shocks that has driven it to the ZLB. The dashed line is the alternative economy where, in addition to the shocks, there has been a 1% permanent reduction in markups. This exercise corresponds to the first case, "permanent increase in productivity" (where lower markups are roughly equivalent to higher productivity). Higher productivity slightly reduces output at impact. Instead of a fall of 4%, with structural reforms the fall is 4.13%. However, the economy soon recovers and the lower markups deliver a higher permanent output. That is, our intuition from Section 2 comes through nearly unchanged: when we are at the ZLB, permanent structural reforms have a small effect at impact and higher permanent output.

The result is clearer when we look, in Fig. 2, at the effects of a 10% permanent reduction in markups (where the line convention is the same as before). In this exercise, output falls 5.07% at impact (instead of 4%). But, then, we almost immediately jump to a higher output and, in the long run, the economy produces roughly 2% more. With this sizeable fall in markups, the economy suffers for a quarter but, in exchange, it achieves large long-run gains.

Figs. 1 and 2 and the short-run/long-run trade-off that they document beget questions about welfare. While EFR do not undertake a welfare analysis, with their calibrated values of the discount factor (0.99), the intertemporal elasticity of substitution (2), and the valuation of leisure in the utility function, it is most likely that undertaking structural reforms dominates not implementing them even at the ZLB (although it may not be the optimal policy; I will return to this point momentarily).

Finally, in Fig. 3 (which corresponds to the top left panel in Fig. 8 of the EFR paper), we see the evolution of output in the crisis without reforms (solid line), under a "New Deal" rule (dashed line) where markups are temporarily increased, and under the "delay" rule (dashed-dotted line). This figure captures the two additional cases in Section 2: a temporary change in productivity – in this case, a quasi-reduction caused by higher markups – and a future change in productivity. The best of the two alternative scenarios is the future increase in productivity: the crisis is smaller today and we have a positive long-run effect. I will discuss this policy in the next section in more detail. The scenario of a temporary increase in the markups pushes output higher for several quarters and, since it is reversed, it does not bring negative long-run consequences. This line is the one that should worry us. A temporary increase in productivity caused by structural reforms will lower output in the short-run with respect to the baseline scenario (see Fig. 7 in the paper) and the political backlash will reverse them shortly after they are introduced, losing any long-run gains.

While EFR link a temporary increase in markups in Fig. 3 to the New Deal, I prefer to interpret it as a temporary surcharge in the VAT (or the income tax). This interpretation hints at a simple strategy to get around the negative effects of structural reforms: exploiting fiscal policy to replicate the incentives that the nominal interest rate cannot create when the ZLB is operative (Farhi et al., 2013).

This is a good moment to recall that many of the economists who defend structural reforms in Europe (myself included!) do not deny the effectiveness of monetary and fiscal policy as instruments to manage a recession at the ZLB. Indeed, they stress that the optimal policy is a coordinated strategy of unconventional monetary policy, middle-run fiscal consolidations, and vigorous structural reforms. We might decry the fact that politicians hijack the "structural reforms" mantra and use it as a fig leaf to cover other goals. But such behavior should not affect our evaluation of the structural reforms.

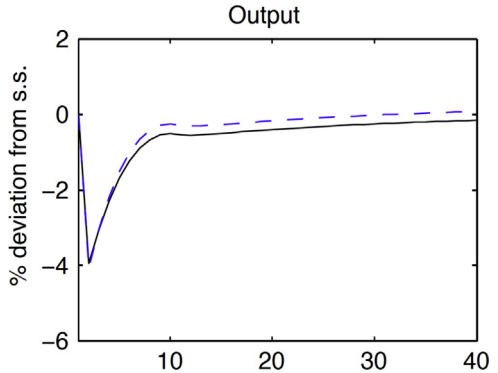

Fig. 1. Permanent reduction of markups by 1%.

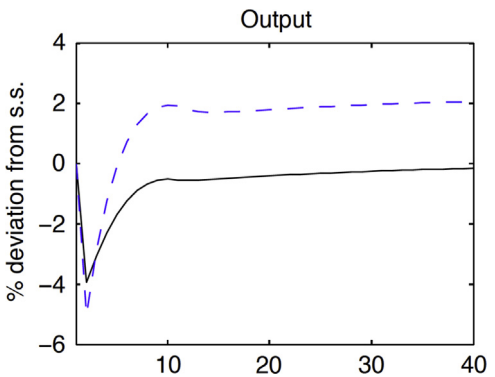

Fig. 2. Permanent reduction of markups by 10%.

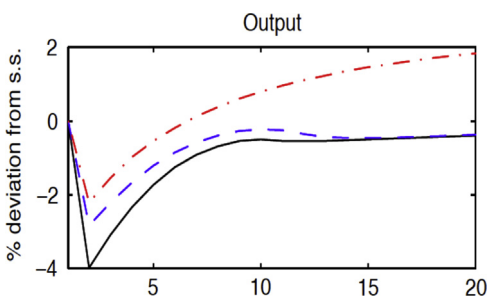

Fig. 3. Two alternative experiments.

In summary, as the paper argues, structural reforms can have a contractionary effect on impact. However, unless the reforms are quickly reverted, the negative effects on output are relatively small and short-lived and the welfare effects are most likely positive (although not optimal). Furthermore, there is a simple way to get around the negative effects: the judicious application of VAT increases.

4. Can we get around EFR's result?

In this section, I outline several possibilities that could potentially change the paper's result. First, I analyze the timing of productivity changes. Second, I assess the consequences of the absence of capital. Third, I talk about structural reforms and solvency constraints.

4.1. When will productivity change?

Fernández-Villaverde et al. (2012) have proposed that a promising policy when we are at the ZLB is to increase future productivity (the third scenario in Section 2). The wealth effect triggered by higher future productivity pushes up aggregate

demand today. In the normal case outside the ZLB, the real interest rate increases to induce households to defer consumption until the time when the economy is more productive. At the ZLB, in contrast, higher aggregate demand today translates into higher output.

This opens the floor to discussing which of the three scenarios is most plausible: a temporary increase in productivity, a permanent increase in productivity, or a future increase in productivity? I favor the last possibility. Why?

The structural reforms proposed in Europe include labor market reforms (making hiring and firing easier, modernizing work rules and collective bargaining), improving the educational system, allowing for competition in products' markets, and creating less distortionary tax systems. These reforms are unlikely to improve productivity for some time. For example, flexible work rules require firms to reorganize their procedures and establishments, which may even temporarily lower productivity. Similarly, there is a long lag before any improvement in education has a noticeable impact on the human capital stock. Strengthened competition in the goods' markets often requires that new firms enter the liberalized markets, a relatively slow process. A less distortionary tax system must go through the legislative process, enactment delays, and behavioral responses. For instance, if the income from a second earner in a household starts to be better treated under the income tax code, non-working spouses would have to search for a new job, accumulate firm-specific human capital, and so on. In modern European economies, it is hard to think about regulations that are so obviously wrong that removing them would have an immediate effect on productivity.[2]

EFR focus much of their attention on the possible reversion of structural reforms and how this is the worst possible scenario: we get all the negatives from higher productivity today and none of the long-run benefits. There is certainly the chance of a political backlash, but even observers who were skeptical about the euro's survival, like Paul Krugman, have expressed their surprise at the "incredible willingness of southern European countries to suffer mass unemployment, year after year, rather than break ranks."[3] I read this remark as suggesting that a backlash is not a sure thing.

Thus, an intriguing experiment presents itself: we can take the model in the paper and add a probability λ that the markups would revert to their original value in each quarter.[4] Since agents in the model have rational expectations, they will integrate over the possible events. How high does λ need to be to make structural reforms a bad idea (for example, in welfare terms)? My suspicion is that λ would probably need to be quite high. The reader could then judge if her prior about λ is higher or lower than this cutoff.

4.2. *What about capital?*

Often, we write models without capital in the production function because the negative consequences for the analysis of its absence are smaller than the enhanced clarity and simplicity. I am not convinced that an evaluation of structural reforms under the ZLB is one of those situations. In this subsection, I will discuss the effects of omitting capital in the short-run dynamics of the model and in the next subsection on its long-run dynamics.

In models without capital, a temporary *increase* in productivity *decreases* the real interest rate. Since the economy cannot move the extra output due to the higher productivity, market clearing requires a drop in the interest rate to induce higher consumption in the current period. Thus, if the temporary increase in productivity occurs at the ZLB, where the real interest rate is already too high, the situation worsens.

In comparison, with capital, a temporary *increase* in productivity *increases* the real interest rate as long as the shock has a small persistence (for example, in a standard real business cycle with a conventional calibration, for autoregressive coefficients as extremely low as 0.09). The mechanism comes from the rental rate of capital and non-arbitrage. Higher productivity today forecasts higher productivity tomorrow and, therefore, a higher rental rate of capital. By non-arbitrage, households will invest more than the additional amount of saving generated by their desire to smooth consumption. The savings-investment market clears with an increase in the real interest rate, which reduces the severity of the ZLB.

This mechanism is, furthermore, relevant in Europe, as structural reforms are explicitly aimed at fostering investment. Part of the reason why countries such as Spain or Ireland experienced a housing boom after the creation of the euro is that other possible investments were not attractive due to barriers to entry, lack of competition, or poor human capital. After the collapse of the housing boom, aggregate demand in the peripheral countries has been depressed due to the low levels of investment. Structural reforms, by making those investments more profitable in the future, may increase aggregate demand today, reverse the negative short-run effects of the reforms, and avoid the political backlash.

4.3. *Solvency*

Structural reforms in Europe are also explicitly designed to achieving persistent growth effects. This channel is significant because the peripheral countries have suffered from doubts about their ability to repay their debts and a *slow stop* in foreign financial flows. These doubts have fed back into the economy by lowering consumption and investment, increasing the risk premia in lending to firms, and worsening public finances. This feedback translates into a vicious cycle of even deeper

[2] Changes in tax rates may have fast effects, but those are more about conventional fiscal policy than about distortions.

[3] http://krugman.blogs.nytimes.com/2013/10/07/credibility-all-the-way-down/

[4] And, indeed, papers such as EFR's may make it less likely, since they help us to understand that the cost of structural reforms at the ZLB are both to be expected and short-lived.

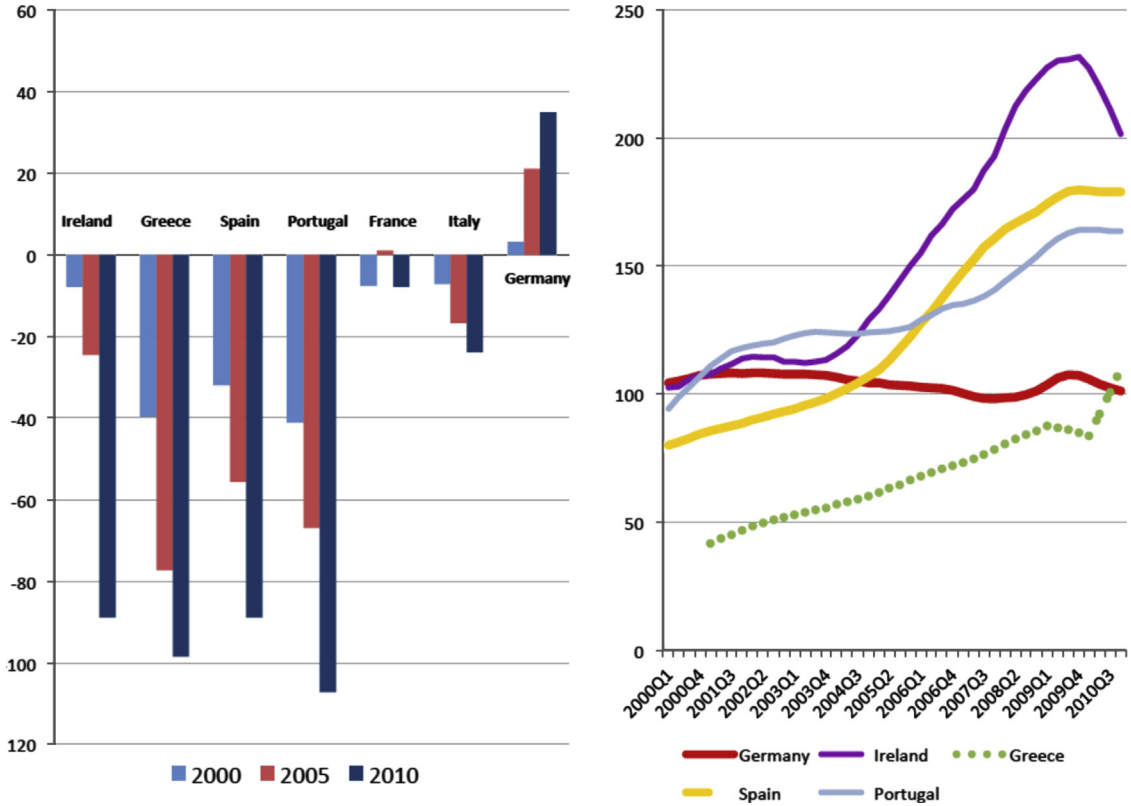

Fig. 4. External indebtedness and private credit.

doubts about their solvency. An increase in output triggered by structural reforms alleviates the solvency constraint by lowering the denominator in the debt to output ratio and transforming the vicious cycle into a virtuous loop of higher aggregate demand, lower premia, and healthier public finances.

It is not entirely clear to me that the model used by EFR is the right framework for thinking about these growth effects. First, as pointed out in the previous subsection, because EFR do not have capital. The reduction in markups that the authors consider has an effect only on labor supply, not on capital. But we know from the literature on optimal taxation that the effects on capital accumulation of distortions (such as markups) are much larger than the effects on hours worked (this is a way to think about the Chamley–Judd result of zero capital income tax). For example, in a real business cycle model with monopolistic competition and a conventional calibration, reducing markups from 10% to 5% increases hours worked, in the steady state, by 3% but raises capital by 10.4%. Second, structural reforms may allow peripheral European countries to get closer to the world technology frontier.[5] Not only are these growth effects crucial for welfare analysis, but also they create wealth effects that, as I explained before, increase current aggregate demand. All the possible channels of technological innovations so fundamental to modern endogenous growth theory are completely absent in the paper. Finally, structural reforms may be interpreted as a signal of political resolve of the peripheral countries to service their debts, thus lowering risk premia.

5. A slightly different history for Europe

As I have defended elsewhere (Fernández-Villaverde et al., 2013), the problem of the peripheral European countries was not, to a first degree, an issue of competitiveness of their exports or a weak aggregate demand. To the contrary, the poor competitiveness of their exports and the depressed aggregate demand are symptoms of a more serious illness.

Fig. 4, left panel, plots the net international investment position of several European countries. The right panel shows the loans to other residents granted by monetary financial institutions.[6] These two panels illustrate a history of fast credit growth and debt increase in the peripheral countries and the acquisition of net international investments by Germany. Peripheral European countries used the low interest rates brought about by the euro to fuel large increases in private debt

[5] The apparently good performance of these countries in terms of labor productivity is largely an artifact of low hours and a selection effect (unemployment accumulates among the least productive workers).

[6] Both panels are in percentages of output. Loans are expressed as a percentage of (annualized) GDP and smoothed with an MA-4. Source: Eurostat.

(Spain and Ireland) or public debt (Portugal and Greece). The debt led to acute institutional deterioration: reforms stopped, corruption extended, and large, unsustainable fiscal commitments were undertaken. Moreover, when the crisis hit, sclerotic policy-making institutions and poorly selected politicians were unable to cope with the challenges and postponed the painful decisions required to fix the situation.

Some observers have argued, for example, that the budget surplus that Spain posted in 2007, right before the end of the housing boom, is proof that Spain was not profligate and that, therefore, the insistence of the European Union in putting the fiscal house in order was a case of self-defeating contractionary policy. Nothing could be further from the truth. First, the Spanish budget surplus was a mirage caused by the extraordinary revenues raised by a tax system heavily dependent on real estate transactions. Fernández-Villaverde and Rubio-Ramírez (2009) computed that even a conservative adjustment of revenues to compensate for the housing boom would suggest that Spain still had a large structural budget deficit in 2007. Second, the boom era witnessed the start or expansion of large spending programs (including health, education, infrastructures, and long-term care for the elderly and handicapped) that, while small in the short-run as they were rolled out, were scheduled to grow quickly. Third, the Spanish government was implicitly loading on its books the debts of the Cajas (savings banks with a quasi-public ownership) that were recklessly expanding their balance sheets.

Structural reforms are essential to, first, reverse the institutional deterioration that prevents effective decision making; second, to regain competitiveness in the international market in economies with downward nominal wage rigidities and fixed-exchange rates (the euro); and third, to spark the growth that will pay down the large accumulated debt. Postponing them because of the potential negative short-run effects risks only delaying the inevitable.

6. The economics of Richard Wagner

I started my discussion with the economics of Gilbert and Sullivan. A few years before the premiere of *Princess Ida*, another composer, Richard Wagner, attended the first performance of his own comedy, *Die Meistersinger von Nürnberg*. Radically distinct in style and ambition, the opera includes a line sung by the main hero, Hans Sachs:

Drum sag ich Euch: ehrt Eure deutschen Meister! Dann bannt Ihr gute Geister;

which we could translate as:

Thus I say to you: honor your German Masters, then you will conjure up good spirits!

This line summarizes my views: while it is true that the ZLB should make us cautious about structural reforms, the case for them, as emphasized by Germany, is still compelling. Gilbert and Sullivan are a lot of fun, but I will stick with my Wagner.

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