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The circular relationship between productivity growth and real interest rates

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In most advanced economies, both real long-term interest rates and productivity growth have decreased since the early 1990s. The column demonstrates how a circular relationship links these two indicators. Until there is a technology shock, the relationship will converge to an equilibrium in which growth and interest rates are both low.

It is essential to understand whether there is a circular relationship between total factor productivity (TFP) growth and real interest rates. If so, this would help explain their joint decline over the last ten years in developed countries. It would also help us discover whether we are risking a secular stagnation scenario as described by Gordon (2010), and if so to help create the conditions to escape for it.

The circular relationship and the understanding of the slowdown in productivity

Economic growth in all advanced countries has slowed consistently since the 1970s, and has fallen to a historical low since the Great Recession (e.g. Bergeaud et al. 2016, 2017). This secular slowdown is mainly the result of weaker growth in TFP, but the widespread stagnation is difficult to interpret in a standard growth framework. This is even more puzzling when we consider the diversity of productivity levels, of degrees of new technology diffusion, and of average human capital and of openness to trade across all advanced countries, which are all affected by a slowdown. A shared TFP trend in the context of this structural heterogeneity suggests that a common global factor could be at play.

In a recent paper (Bergeaud et al. 2019), we investigate one possible explanation: the slowdown could be related to a decline in long-term real interest rates which has been happening since the early 1990s in all developed countries. Specifically, we discuss and test the existence of a circular relationship between interest rates and productivity growth. It is well-known that productivity is a long-term determinant of return on capital and thereby of interest rates, which explains why there is a positive correlation between these two indicators (Marx et al. 2017 show this empirically, for example). We argue that this is only one side of the coin. Interest rates are also a determinant of the minimum expected return from investment projects, and therefore of the productivity level required for such investments. The decline in long-term real interest rates, notably due to negative demographic pressures, may have led to a slowdown in productivity by allowing an increasing number of weakly-productive companies and projects to be profitable (we refer to this mechanism as the 'cleansing effect'). Empirically, this relationship has been confirmed by many papers (e.g. Aghion et al. 2012, 2019)

More recently, the cleansing effect appears to dominate the negative impact of tougher financial constraints on innovation financing (e.g. Reis, 2013, Gopinath et al. 2017, Gorton and Ordonez 2016, Cette et al. 2016). A negative permanent shock on interest rates, for example due to population ageing, would then lead to a secular fall in productivity growth. This fall would in turn lead to a decline in interest rates and create a circular relationship between these two indicators that ultimately would converge to a

steady state characterised by low growth and low interest rates. When real interest rates are low (as has been the case for several decades), it is likely that the second channel would dominate the first one. In this case, only a technology shock could disrupt the downward spiral.

Empirical estimates confirm the existence of the circular relationship

To test this mechanism, and in particular the existence of a circular relationship between real interest rates and TFP growth, we take a long-run view. We rely on the Long Term Productivity database built by Bergeaud et al. (2016), which provides comparable cross-country TFP estimates from the end of the 19th century onwards. We also use Jorda et al. (2019).

We estimate this circular relationship by cross-country panel regressions using annual data on a sample of 17 advanced countries from 1950 to 2017. We jointly estimate the two relationships (from real interest rates to productivity growth, and from productivity growth to real interest rates) using different methods, and use the point estimates to look at the past and the future. For worldwide technological progress, we use the relative price of investment in the US (the ratio of the price of investment over the price of GDP), and we model its diffusion using the relative distance to the TFP level of the US.

Our results hint at the existence of a circular relationship that would lead to a secular stagnation equilibrium: a situation in which productivity grows slowly, and real interest rates are low. Between the two sub-periods of 1984-1995 and 2005-2016, TFP annual growth declined by about 0.66 percentage points in the US and 1.51 percentage points in the euro area, and the contribution of real interest rates that we estimate fell by 0.6 percentage points and 0.56 percentage points respectively. While other factors are influential during this period, in particular a slowdown in human capital stock, such contributions suggest that real interest rates could account for a significant share of the productivity slowdown.

Simulation of the impact of a technology shock

One escape from this circular relationship would be a new technological revolution linked to the digital economy, or, in countries where there is still room for convergence, by using structural reforms to improve the diffusion of new technologies. Using our estimate results, we propose some simulations to test the impact of a negative shock in the US relative investment price, considered as the result of a technology shock. This negative shock is calibrated in order to have the same magnitude and duration as the one corresponding to the ICT shock in the US between 1985 and 2007. This is a small shock in terms of amplitude, as it had a limited impact on TFP growth compared to other shocks in the 20th century. This shock could stem from a second wave linked to ICT, which could be due to the contribution of AI or robots to production processes.

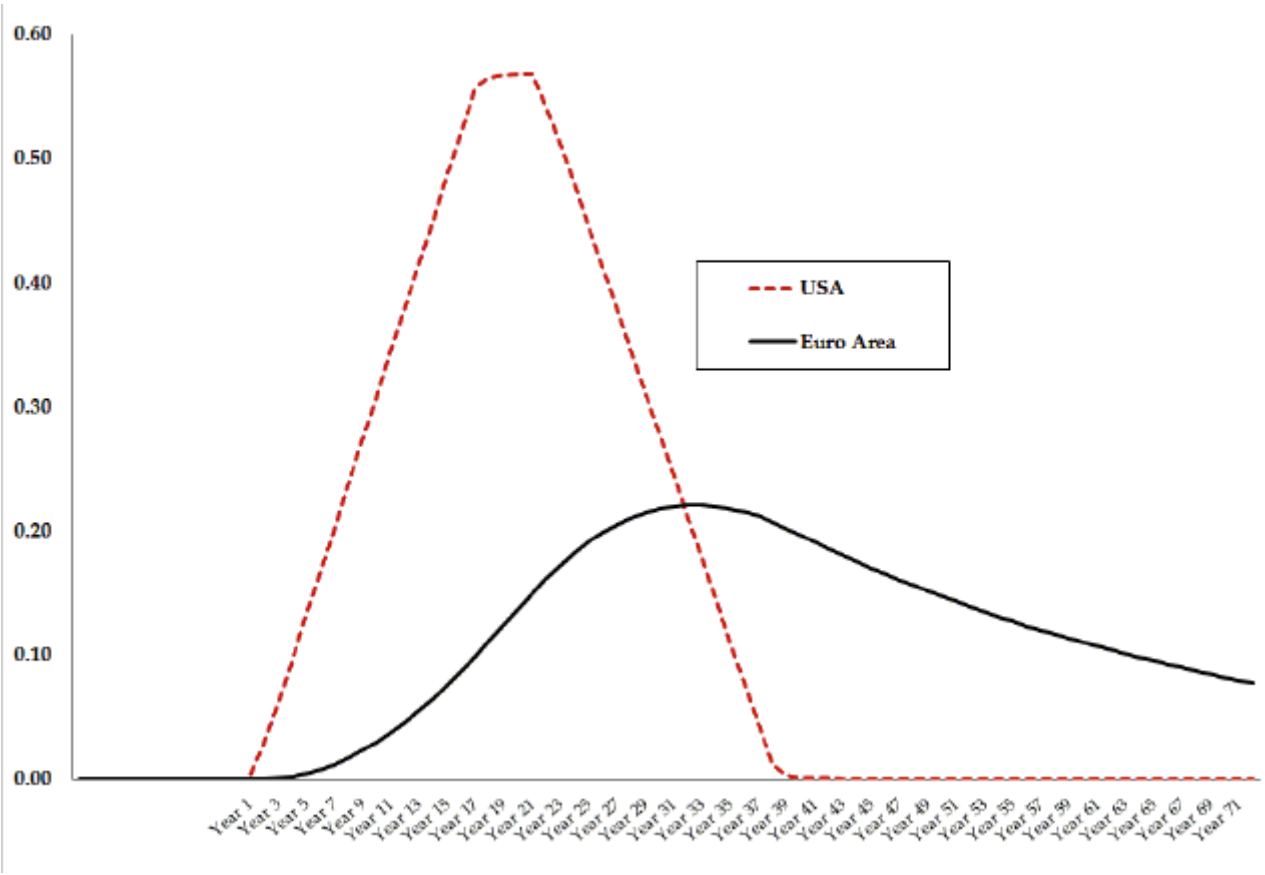
The shock in relative investment prices directly impacts the TFP growth rate in the US, and therefore the contemporaneous level of real interest rates, which in turn impacts the TFP growth rate in the next period, and so on. For other countries, the impact of the shock depends on their relative TFP level compared to the US: countries that are close to or above the TFP level of the US also directly benefit from the shock, while other countries are only indirectly affected through the catching-up process. This is the case for the euro area which, as a whole, is too far below the US TFP level at the time of the shock to be directly impacted.

The results from these simulations confirm the intuition (Figures 1 and 2). The shock would be enough to escape the secular stagnation trap, with TFP growth higher than the

baseline rate by 0.6 percentage points at the peak. This technology shock in the US would spread to other countries through the catching-up process, and lead to a slow but lasting acceleration in TFP, as its level converges to that of the US. In the US and euro area, TFP growth relative to the baseline reaches a peak of 0.6 percentage points and 0.2 percentage points, respectively, about ten years after the US peak in the euro area.

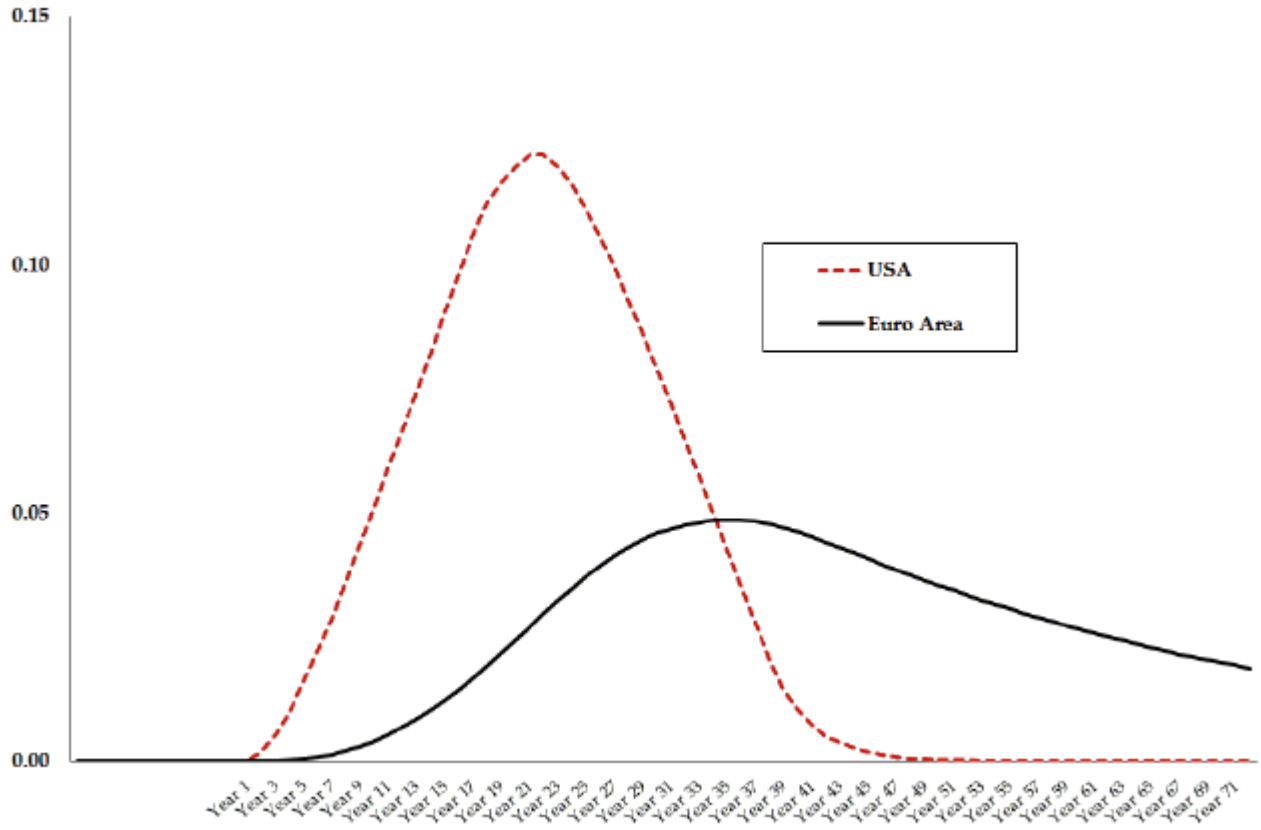
All other things being equal, the gain in terms of TFP level is, at the end of the process, about 25% in the two economic areas. In GDP terms the gain would be larger, because of the capital deepening driven by the investment price decrease.

Figure 1 Simulation of response of the growth rate of TFP in the euro area and US after a shock of relative investment prices in the US (percentage point difference from baseline)



Source: Bergeaud et al. (2019).

Figure 2 Simulation of response of the real interest rate in the euro area and US after a shock of relative investment prices in the US (percentage point difference from baseline)



Source: Bergeaud et al. (2019).

Implications for the debate on secular stagnation risk

The circular relationship between TFP growth and real interest rates contributes to our understanding of the slowdown in productivity since the 1980s. It also contributes to the current secular stagnation debate, and provides an alternative secular stagnation explanation from Hansen, and more recently for instance from Summers (2014, 2015), which are mainly based on demand dynamics.

A combined low interest rate and low productivity growth environment can be explained by a weak cleansing mechanism, in which low interest rates support the survival of weakly profitable firms and investment projects. And so the decrease in real interest rates since the early 1990s can help to explain the slowdown in productivity over that period.

The global economy will face headwinds in the foreseeable future (Gordon 2010). In particular, significant productivity growth would be required to finance the energy transition towards more sustainable growth, to lead to an ordered decrease in the high debt levels inherited from the Global Crisis, and to face the consequences of an ageing population.

This technology shock, the impact of which would be maximised in the low interest rate environment, would be necessary to face these headwinds with confidence, and not to suffer from low growth for long with possible economic, social and political troubles. The debate among economists over whether this technology shock will emerge is controversial, but as the after-effects of the crisis on productivity growth vanish, a clearer view of what we can expect in the coming years is warranted.

References

Aghion, P, A Bergeaud, G Cette, R Lecat and H Maghin (2019), "The Inverted-U Relationship Between Credit Access and Productivity Growth", *Economica* 86(341): 1–31.

Aghion, P, P Askenazy, N Berman, G Cette, and L Eymard (2012), "Credit constraints and the cyclicality of R&D investment: Evidence from France", *Journal of the European Economic Association* 10(5): 1001–1024.

Bergeaud, A, G Cette and R Lecat (2016), "Productivity trends in advanced countries between 1890 and 2012", *Review of Income and Wealth* 62(3): 420–444.

Bergeaud, A, G Cette and R Lecat (2017), "Total factor productivity in advanced countries: A long-term perspective", *International Productivity Monitor* (32)6: 6-24.

Bergeaud, A, G Cette and R Lecat (2019), "The Circular Relationship Between Productivity Growth and Real Interest Rates", Banque de France working paper 734.

Cette, G, J Fernald and B Mojon (2016), "The pre-Great Recession slowdown in productivity", *European Economic Review* 88(C): 3–20.

Gopinath, G, *¸S Kalemli-Özcan, L Karabarbounis and C Villegas-Sanchez (2017), "Capital allocation and productivity in South Europe",* The Quarterly Journal of Economics 132(4): 1915–1967.

Gordon, R J (2010), "Revisiting US Productivity Growth over the Past Century with a View of the Future", NBER working paper 15834.

Jordà, Ò, K Knoll, D Kuvshinov, M Schularick, and A M Taylor (2019), "The Rate of Return on Everything, 1870-2015", *The Quarterly Journal of Economics* 134(3): 1225–1298.

Marx, M, B Mojon and F R Velde (2017), "Why Have Interest Rates Fallen Far Below the Return on Capital", Banque de France working paper 617.

Reis, R (2013), "The Portugese Slump and Crash and the Euro Crisis", *Brookings Papers on Economic Activity* 44(1): 143–210.

Summers, L H (2014), "US economic prospects: Secular stagnation, hysteresis, and the zero lower bound", *Business Economics* 49(2): 65–73.

Summers, L H (2015), "Demand side secular stagnation", *American Economic Review: Papers and Proceedings* 105(5): 60–65.