SPILLOVERS

Research in Economics at Banco de Portugal • Biannual • Year VII • July 2019

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Overview

In the ongoing race between economic ideas and events, research remains our best tool to cut through uncertainty and lighten the unknown. Economists and policy makers are still struggling to understand the anatomy of the current expansion. The identification of economic shocks is hard; the transmission mechanisms and the impact of policies are unclear. The debate on the optimal suite and sequence of policies remains unfinished. These issues apply globally and Portugal is no exception.

Research can provide a solid foundation for these debates. Research is a guidepost on what policy should be; and, like a lighthouse over a cliff, it also warns us on what to avoid. Given the prevailing uncertainty, the latter is probably the most important today. Independent research grounded on a well-defined agenda is a treasure trove for a central bank. Research at Banco de Portugal over the years is testimony to this fact; this new edition of Spillovers is a nice reflection of that.

Our research is based on several pillars. There is an agenda anchoring research activities at the Bank, which is approved by the Board, communicated externally, and evaluated on a regular basis. This ensures that our scientific inquiry is oriented towards conceptual and empirical foundations for policy-making, including the interaction among policies and instruments. Research is also conducted with independence and its quality is continuously assessed by academic peers. External interaction, be it with the academy, the Eurosystem, national central banks, or other domestic and international institutions, is intense. In this process, research at Banco de Portugal works as a catalyst for deepening knowledge about the Portuguese economy and the euro area. BPLIM, Banco de Portugal's microdata research laboratory, is also pivotal in this process by making very rich micro-datasets on the Portuguese economy available to international researchers.

Research in a central bank aims at promoting economic well-being. This implies providing evidence-based analysis to policy makers, with interpretations based on advanced tools and policy advice grounded on independent arguments using the latest theoretical advances. The knowledge frontier and the relevant questions we are called to address change continuously, sometimes in surprising ways. With so many interesting and important issues still unanswered, I am sure that we will continue to pursue Banco de Portugal's research agenda, a never-ending but ultimately irresistible quest.

Nuno Alves
Head of the Economics
and Research Department (DEE)

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Interview

Martín Uribe is a professor of Economics at Columbia University and a Research Associate of the National Bureau of Economic Research (NBER). Before joining Columbia, Uribe taught at Duke University and the University of Pennsylvania, and was a Staff Economist in the Division of International Finance of the Board of Governors of the Federal Reserve System. Uribe obtained a Ph.D. in economics from the University of Chicago, a Master degree from CEMA (Buenos Aires, Argentina) and a BA degree from Universidad Nacional de Córdoba (Córdoba, Argentina). He has made scientific contributions in the areas of International Economics, Monetary Economics, and Public Finance. His research focuses on understanding the sources and propagation of macroeconomic shocks within and across countries and on the design of monetary, fiscal, and exchange-rate-based stabilization policies. His work has been published in academic journals, including the American Economic Review, the Journal of Political Economy, and Econometrica, and has received financial support from the National Science Foundation. Uribe co-authored the books "Open Economy Macroeconomics" (Princeton University Press) and "International Macroeconomics" (under contract, Princeton University Press). He has held visiting research positions at the Federal Reserve Bank of Philadelphia, the European Central Bank, Goethe University (Germany), University of Bonn, and Princeton University and has consulted for the World Bank. Uribe is a Co-editor of the Journal of International Economics, an Associate editor of the Journal of Money, Credit and Banking, and an editorial advisor of the Canadian Journal of Economics.

You stressed recently the importance of distinguishing between permanent and temporary monetary policy shocks; the current low inflation environment, along with reduced slack and robust recoveries could be understood in light of the stimulus measures adopted by major central banks, in the sense that nominal interest rates so low for so long (changing the average rate for some years, likewise a permanent monetary policy shock) could indeed be associated with low inflation outcomes. Are the euro area and Japan (perhaps soon the U.S.?) in a policy trap, something you suggested could happen almost 20 years ago ["The Perils of Taylor Rules", JET, 2001, with Jess Benhabib and Stephanie Schmitt-Grohé]?

I think the three cases are a bit different. Japan seems to be stuck in a liquidity trap. The nominal interest rate is low because the BOJ is trying to boost inflation, and inflation is low because people expect the interest rate to be low in the indefinite future. By contrast, in late 2015, the U.S. Fed stated that the crisis was over and announced a process of normalization of the nominal interest rate, which consisted in raising rates gradually from technically zero to 3.5 percent. Notably, the Fed made this announcement when the inflation rate was still 1 percentage point below the official target. In the few years since the normalization process began, inflation has risen to its intended target. The situation in Europe is in between those of Japan and the United States. If the ECB continues to convey the idea that zero rates are here to stay, inflationary expectations might begin to solidify at a below-target range. At that point the eurozone will have fallen in a Japan-style liquidity trap. On the other hand, if in the near future the ECB declares the great contraction over and begins to normalize rates, I think the path of prices and quantities will begin to look more like in the post 2015 United States. The monetary policy in the eurozone is at a critical bifurcation point. It will be interesting to see which direction policymakers will choose.

It seems that during the 1970's monetary policy was actively trying to stimulate the economy, achieving high inflation and high unemployment... Currently, given low inflation outcomes, monetary policy seems to want to avoid any sort of tightening, leading policy rates towards the Friedman rule, perhaps preventing inflation from rising. Markets currently expect the Fed to cut interest rates before the end of the year, amidst an economy that remains fairly strong (though slowing). Are we, in some sense, on the good side of monetary policy miscalculations?

I think that the Fed has been doing a good job at conveying the idea that monetary policy is in the process of normalizing. This process is perfectly compatible with pausing and even easing if called for by business conditions. I think this is precisely what we are seeing now. A cut in rates in the near future will most likely be understood as a temporary move, which is precisely what the Fed would like if the cut is to achieve its goal of providing stimulus.

You suggested ["Downward Nominal Wage Rigidity, Currency Pegs, and Involuntary Unemployment", JPE 2016] using fiscal policy and, perhaps more feasible, "prudential" capital controls to fight (or avoid) deep recessions such as the ones characterizing the eurozone periphery some years ago, given the externality that downward nominal wage rigidities impose within a monetary union. Looking at the particular case of the euro area, do you think a true Banking Union (seen as a true European banking system, in particular with all the risks stemming from the banking sector fully mutualized) and a true Capital markets union mitigate the need for such controls? In the sense that financial shocks are absorbed at a euro area level? Or is a fiscal union still a necessary step to avoid the kind of crisis we witnessed?

I think a fiscal union is an essential element of a monetary union. When Kentucky enters in recession, a number of automatic stabilizers kick in (unemployment insurance, food stamps, medical services for the needy, etc.). These programs are to a large extent (directly or indirectly) funded by the Federal government. This means that tax payers in New Jersey are helping Kentucky weather the recession. A critic might argue that Germany did help Greece during the GFC in spite of the fact that no fiscal union was in place. This is true. However, the key difference is that Kentucky does not have to ask New Jersey for help. No need for lengthy negotiations. Moreover, Kentuckians don't realized that they are being helped and New Jerseyites don't realize that they are helping Kentucky. This puts out of the way a lot of the negative political factors and stigma we saw during the Eurozone crisis (the rich helping the poor, or the orderly helping the basket case sort of rhetoric). I think that a banking union can also help in this regard, but I don't think it is a replacement for some sort of fiscal union.

What do you think are the most important lessons from the financial crisis and the sovereign debt crisis [in Europe]? Which critical aspects have been missed before the crisis and which aspects deserve further attention from macroeconomists?

I think that one of the most important lessons we learned from the euro crisis is the need to demand sound fiscal policies from all country members before the crisis occurs, as opposed to calling for fiscal austerity in the midst of the crisis. In this regard, I think that the role of the European Commission must be rethought. The economic principles at play are simple and well understood since the work of Keynes and Hicks: fiscal policy must be tight during booms and loose during recessions. Many countries in the periphery of Europe have done exactly the opposite. This was not that bad before 1999, because countries still had monetary policy to play with. The crisis taught us that misguided fiscal policy can have disastrous consequences when monetary policy is out of the control of the local governments.

In your opinion, over the next years, what are the most promising and challenging topics of research with relevance for policymakers, especially central bankers?

One area of research in monetary economics that in my opinion deserves much more attention than it has received thus far is what I would call "the theory of monetary normalization." The United States has embarked in such a process since 2015, while Japan and the Eurozone are still keeping rates at zero. What do we know about the process of policy normalization? At the heart of this question I think is the need to understand the differences between the effect of temporary and persistent changes in monetary policy. I have the impression that central banks around the world conduct policy under the understanding that a movement in the interest rate always has the same effect, regardless of whether it is interpreted by the public to be temporary or persistent. They seem to believe that monetary policy shocks come in just one flavor: A cut in interest rates always causes the inflation rate to increase, and, similarly, a tightening always causes inflation to fall. In my opinion, this kind of logic has had deleterious consequences for inflation outcomes around the world. For example, in Japan the nominal rate has been zero for the past quarter century and inflation has been significantly below target. Yet, the BOJ continues to hope that keeping the interest rate at zero indefinitely will help boost inflationary expectations. The polar case is Argentina. Its central bank has been keeping rates above 40 percent for the past decade, hoping that this will bring inflation down. I think that at the root of this problem is a lack of understanding of the fact that transitory and permanent movements in the nominal interest rate can have different effects. Of particular importance is the need to better understand the short-run effect of permanent (or persistent) movements in monetary policy. To go back to the example of the BOJ: What do theory and evidence tell us about the short-run effect of a hypothetical policy change in which the BOJ announces a gradual normalization of its policy rate to its pre-1995 historical average of about 5 percent? What empirical and theoretical tools do we have to gauge the short-run and long-run consequences of such a change in policy regime? Under the one-flavor view, this policy would create more deflation and recession. But incipient empirical and theoretical work has begun to challenge this view. I think that much more work is needed until we can confidently say that we understand the process of monetary policy normalization.

By João Valle e Azevedo

In every issue, we ask experts to briefly present and discuss two papers written by staff members. In this issue, the guest is Prof. Rui Castro.

Rui Castro (Ph.D. University of Rochester) is a Professor at the Department of Economics of McGill University. Prior to joining McGill in 2017, he was Professor at the Department of Economics of Western University, and prior to that at the Université de Montréal. He is a Research Fellow at CIREQ, and has held visiting positions at McGill University, Nova School of Business and Economics, New York University's Stern School of Business, and Banco de Portugal. Professor Castro's research has been in Macroeconomics, with connections to several other areas such as Economic Development, Labor Economics, International Economics, Political Economy, and Finance. This research has been funded mostly by FQRSC and SSRCH, and published in leading academic journals such as the *Quarterly Journal of Economics, the Review of Economic Studies, the Journal of Monetary Economics, the American Economic Journal: Macroeconomics, the Review of Economic Dynamics, the International Economic Review, and Journal of Industrial Economics*.

Featured published paper

Mata, José and Paulo Guimarães. 2019. "Temporary investment incentives and divestment by foreign Firms", *Oxford Economic Papers*, Volume 71, Issue 1, Pages 166-186 (JEL CODE: F23, L53, M16, O25, R11, R58)

Governments often rely on transitory tax incentives in order to attract investment by foreign firms, with the hope that these firms remain in the country once the incentives are phased out. An empirical assessment of whether such policy measures are successful for firm retention has remained elusive, due to data limitations. Mata and Guimarães provide a first careful analysis, focusing on a unique data set on Puerto Rico's long-standing tax incentive program targeting multinational firms interested in establishing new businesses there. Under the incentive program, foreign multinationals enjoy a large tax exemption on the profits generated in the years shortly after entry into Puerto Rico, with the exemption gradually lowered over time and eventually eliminated.

The analysis has two main goals. First, to assess by how much the phasing out of the tax incentives increases the probability that multinationals leave Puerto Rico. Second, to identify the firm characteristics which increase how sensitive the exit decision is.

Multinational firms are found to respond very significantly to the reduction in tax incentives.

According the preferred specification, whenever the tax exemption is reduced, the overall probability of exiting from Puerto Rico in the same year or the year after increases by 2.5 percentage points - from a baseline exit probability of 6.6%.

Three factors are found to significantly increase this exit response. First, whether the firms are tightly connected to Puerto Rico, as proxied by being headquartered in either the US or Spain, or in US states with a high share of Puerto Rican immigrants. This higher sensitivity is consistent with an asymmetric information story: connected firms have superior information about Puerto Rico, a lower cost-efficiency cutoff for entering in the first place, and therefore tax considerations receive a larger weight on their cost calculations, and exit decision.

Second, whether firms run low-skill operations in Puerto Rico, as proxied by the average wage per worker. The higher exit sensitivity of these firms is consistent with the notion that low-skill operations involve smaller setup costs, either related to hiring skilled labor, or to complementary capital expenditures. Firms running low-skill operations face less of these irreversible investments, which contributes to a relatively larger value upon exit.

Third, whether firms invest in Puerto Rican locations in which agglomeration economies around industry clusters are less likely to develop. The main proxy for agglomeration economies is the employment change in the firm's industry cluster around the time of the firm's establishment in Puerto Rico. Firms which are less associated with these industry clusters enjoy lower levels of knowledge spillovers, and are therefore more likely to exit as taxes increase.

These results suggest the transitory tax incentive policies are associated with relatively low firm retention rates. To assess whether such policies are ultimately desirable, one needs to also factor in the firm entry effects, and the production outcomes, namely spillover effects on domestic firms.

Featured article from *Banco de Portugal Economic Studies*

Pimenta, Ana Catarina and Manuel Coutinho Pereira. 2019. "Aggregate educational mismatches in the Portuguese labour market". *Banco de Portugal Economic Studies* (JEL CODE: I21, J21, J24)

A long-held perception is that the Portuguese workforce is under-qualified. That is, workers have lower schooling levels than what is required by their occupations. However, the qualifications of Portuguese workers have increased dramatically in the recent past, with each new generation attaining higher formal schooling compared to the previous ones. At the same time, the Portuguese economy has also undergone a significant structural transformation, shifting towards occupations requiring higher levels of education. What has been the extent of undereducation in the Portuguese workforce in the recent past? Did the expansion in schooling achievement reduce the extent of undereducation, in spite of the occupational upgrading? Or, as some suggest, was the schooling expansion excessively large, actually leading to an over-educated workforce?

This article provides answers to these questions. It measures the extent of mismatch between worker and occupation skills, and describes its evolution over the past two decades. The key step in the analysis is the measurement of the worker-occupation skill mismatch. The preferred approach relies on asking job analysts what they consider to be the appropriate formal education requirements of each occupation. Such an assessment is provided by the International Labour Organization. An important advantage of this sort of information is that it allows for the construction of internationally comparable measures of skill mismatch, in addition to being able to capture skill improvements taking place over time. The authors are therefore also able to contrast the findings for the Portuguese economy with those for the rest of the European Union.

According to the preferred approach, the Portuguese workforce is indeed fairly under-qualified. About 2/3 of the workers in 1995 did not have the formal education required by their occupations. This has steadily improved over time, and by 2013 only 1/3 of the workers were under-qualified. Over-qualification is not a very significant problem, increasing from 1% of the workers in 1995 to 5% in 2013. By 2013, 60% of the workers were therefore well-matched. The skill mismatches tend to be particularly severe among older workers, and across all occupations requiring some level of skill, especially intermediate-level ones such as skilled manual occupations (like machine and transport operators) and technicians. By 2013, with younger generations progressively more educated and performing relatively more skilled work, most of the under-qualified were older workers in these two occupations.

Portugal does stand out compared to the rest of the EU, including the Eastern European countries. It had the most under-qualified workforce in 2007, and still in 2016 in spite of no- table progress during this time period. Also compared to other countries, the main deficiency is with older workers lacking the education to perform intermediate-skilled occupations.

The results confirm the perception of an under-qualified workforce in Portugal, but show also a significant improvement and convergence to the rest of the EU, which is likely to continue as older workers exit the workforce.

Recently published

Our economists publish in a wide range of economic and finance journals and scholarly books.

Mathematical and Quantitative Methods

- Iskrev, Nikolay, 2019. "What to expect when you're calibrating: Measuring the effect of calibration on the estimation of macroeconomic models". *Journal of Economic Dynamics and Control*, Elsevier, vol. 99(C): 54-81. (JEL CODE: C32).

Forthcoming

- Castro, Tomás del Barrio, Paulo M. M. Rodrigues and A. M. Robert Taylo. 2019. "Temporal Aggregation of Seasonally Near-integrated Processes". *Journal of Time Series Analysis*. (JEL CODE: C12; C22).

Macroeconomics and Monetary Economics

- Basto, Rita, Sandra Gomes and Diana Lima. 2018. "Exploring the Implications of Different Loan-To-Value Macroprudential Policy Designs". *Journal of Policy Modeling* Vol 41, issue 1 66-83 (JEL CODE E58, E61, F42).

Forthcoming

- Gil, Pedro Mazeda, and Gustavo Iglésias. 2019. "Endogenous Growth and Real Effects of Monetary Policy: R&D and Physical Capital Complementarities in a Cash-in-Advance Economy". *Journal of Money, Credit and Banking*. (JEL CODE: O41, O31, E41).

Financial Economics

- Bonfim, D. and M. Kim, 2019. "Liquidity Risk and Collective Moral Hazard". *International Journal of Central Banking*, 15(2), 101-150. (JEL CODE: G21, G28).
- Valle e Azevedo, J. and D. Bonfim. 2019. "Deposit Insurance and Cross-Border Banks," *ifo DICE Report*, 17(1): 14-20. (JEL CODE: G20).

Forthcoming

- Farinha, Luísa, Marina-Eliza Spaliara and Serafeim Tsoukas. 2019. "Bank Shocks and Firm Performance: New evidence from the Sovereign Debt Crisis." *Journal of Financial Intermediation*. (JEL CODE: F32, F34, G15, G21, E44).

Multinational Firms; International Business

- Mata, José and Paulo Guimarães. 2019. "Temporary investment incentives and divestment by foreign firms". *Oxford Economic Papers*. Volume 71, Issue 1, Pages 166–186. (JEL CODE: F23, L53, M16, O25, R11, R58).

Labour and Demographic Economics

- Babecký, Jan, Clémence Berson,Ludmila Fadejeva, Ana Lamo, Petra Marotzke, Fernando Martins, and Pawel Strzelecki. 2019. "Non-base wage components as a source of wage adaptability to shocks: evidence from European firms, 2010–2013." *IZA Journal of Labor Policy*, vol. 8(1), pages 1-18, December. (JEL Code: J30 J32 C81 P5).

Economic Development, Innovation, Technological Change, and Growth

Forthcoming

- Santos, Cezar, Mariana Weiss, and Guilherme Zimmermann. 2019. "Heterogeneity and the Energy Consumption of Brazilian Households: A Structural Analysis." *Brazilian Review of Econometrics*.

Health, Education and Welfare

Forthcoming

- Greenwood, Jeremy, Philipp Kircher, Cezar Santos, and Michele Tertilt. 2019. "An Equilibrium Model of the African HIV/AIDS Epidemic." *Econometrica*. (JEL CODE: I18, J12, O11, O55).

New titles in the *Working Papers* series

Technical working papers intended for publication in leading finance and economic journals. Find here the complete list of working papers.

A reexamination of inflation persistence dynamics in OECD countries: A new approach • 2019 • João Nicolau, Paulo M.M. Rodrigues, Gabriel Zsurkis

This paper introduces a simple and easy to implement procedure to test for changes in persistence. The time-varying parameter that characterizes persistence changes under the alternative hypothesis is approximated by a parsimonious cosine function. The new test procedure is the minimum of a t-statistic, computed from a test regression that considers a set of reasonable values for a frequency term that is used to evaluate the time varying properties of persistence. The asymptotic distributions of the new tests are derived and critical values are provided. An indepth Monte Carlo analysis shows that the new procedure has important power gains when compared to the local GLS de-trended Dickey-Fuller (DF GLS) type tests introduced by Elliott *et al.* (1996) under various data generating processes with persistence changes. Moreover, an empirical application to OECD countries' inflation series shows that for most countries analysed persistence was high in the first half of the sample and subsequently decreased. These results are compatible with modern macroeconomic theories that point to changes in inflation behavior in the early 1980s and also with recent empirical evidence against the I(1)-I(0) dichotomy.

Into the heterogeneities in the Portuguese labour market: an empirical assessment • 2019 • Fernando Martins, Domingos Seward

This paper provides a comprehensive study of the heterogeneity in the Portuguese labour market. We use Labour Force Survey microdata covering a complete business cycle, from 1998:1 to 2018:1, to evaluate the labour market attachment of several labour states and assess the most suitable allocation of individuals across statuses. We also evaluate the adequacy of the conventional unemployment criteria. Following the relevant strand of literature on this topic, we apply an evidence-based categorisation of labour market status by exploiting the information on the results of the behaviour of non-employed. To that end, we use multinomial and binary logit models of the determinants of transitions of workers across labour market states to test for the equivalence between non-employed groups. We conclude that heterogeneity is an evident feature of the Portuguese labour market, both between and within the conventional non-employment states. In particular, we find that the status comprising those inactive workers which want work constitutes a distinct state in the labour market and displays a transition behaviour closer to unemployment than to the group of inactive workers which do not want work. Moreover, the classification as inactive workers of individuals which report "waiting" as a reason for not having searched for a job, those individuals who have searched for a job but are still considered to be out-of-the-labour-force, as well as those individuals which are due to start work in more than three months might not be reasonable, since they show considerable attachment to the labour market and we reject the pooling of such states with their counterparts.

The new ESCB methodology for the calculation of cyclically adjusted budget balances: an application to the Portuguese case • 2019 • Cláudia Braz, Maria Manuel Campos, Sharmin Sazedj

The analysis of public finance developments relies, amongst other indicators, on estimates of cyclically adjusted budget balances (CABs), which correct headline government balances for business cycle fluctuations. The European System of Central Banks (ESCB) endorsed in late 2018 a new aggregate methodology for the calculation of CABs, developed by Bouabdallah *et al.*, 2019. This paper presents the application of this new cyclical adjustment methodology to the Portuguese case, providing details on the calculation of the underlying fiscal-to-base and base-to-output elasticities. Additionally, it describes the output gap estimations used to assess the cyclical position of the economy. The paper also presents the analytical tool developed by Bouabdallah *et al.*, 2019 to disentangle the drivers of structural fiscal developments, providing details on its application to Portugal.

Testing for Episodic Predictability in Stock Returns • **2019** • Matei Demetrescu, Iliyan Georgiev, Paulo M.M. Rodrigues, A. M. Robert Taylor

Standard tests based on predictive regressions estimated over the full available sample data have tended to find little evidence of predictability in stock returns. Recent approaches based on the analysis of subsamples of the data have been considered, suggesting that predictability where it occurs might exist only within so-called "pockets of predictability" rather than across the entire sample. However, these methods are prone to the criticism that the sub-sample dates are endogenously determined such that the use of standard critical values appropriate for full sample tests will result in incorrectly sized tests leading to spurious findings of stock returns predictability. To avoid the problem of endogenously determined sample splits, we propose new tests derived from sequences of predictability statistics systematically calculated over sub-samples of the data. Specifically, we will base tests on the maximum of such statistics from sequences of forward and backward recursive, rolling, and double-recursive predictive sub-sample regressions. We develop our approach using the over-identified instrumental variable-based predictability test statistics of Breitung and Demetrescu (2015). This approach is based on partial-sum asymptotics and so, unlike many other popular approaches including, for example, those based on Bonferroni corrections, can be readily adapted to implementation over sequences of subsamples. We show that the limiting distributions of our proposed tests are robust to both the degree of persistence and endogeneity of the regressors in the predictive regression, but not to any heteroskedasticity present even if the sub-sample statistics are based on heteroskedasticity-robust standard errors. We therefore develop fixed regressor wild bootstrap implementations of the tests which we demonstrate to be first-order asymptotically valid. Finite sample behaviour against a variety of temporarily predictable processes is considered. An empirical application to US stock returns illustrates the usefulness of the new predictability testing methods we propose.

Modelling the Demand for Euro Banknotes • **2019** • António Rua

Liquidity management is a key mission of a central bank. In particular, the adequate provision of banknotes requires the understanding of what drives currency demand in a continuously changing environment. The challenge is even bigger in the case of the European monetary union where the euro continues to develop into a well-established currency outside borders. The focus is on modelling euro banknotes demand namely by considering its denominational breakdown. Such an analysis allows to unveil the heterogeneous role played by the several drivers while providing a more in depth modelling of currency demand. The econometric approach pursued allows to take on board the interconnections across denominations both in the long- and short-run dynamics.

What is the Impact of Increased Business Competition? • **2019** • Sónia Félix, Chiara Maggi

This paper studies the impact of a structural reform that reduces entry costs for firms. We provide novel empirical evidence on the response of firms' entry, employment, and exit behavior. To do so, we use as a natural experiment a reform in Portugal that significantly reduced entry time and costs. We find that the reform had an expansionary impact: firm entry and employment increased by 25% and 4% per year, respectively. Moreover, around 60% of the increase in employment came from incumbent firms expanding their size, with most of the rise occurring among the firms that were the most productive before the reform. Standard models of entry, exit, and firm dynamics, which assume a constant elasticity of substitution, are inconsistent with our findings about the heterogeneous response of incumbents to the reform. We show that a model with heterogeneous firms and variable markups accounts for our evidence. In this framework, the most productive firms face a lower demand elasticity and increase their employment in response to the entry of new firms.

Vocational high school graduate wage gap: the role of cognitive skills and firms • **2019** • Joop Hartog, Pedro Raposo, Hugo Reis

Comparing cohorts born between 1951 and 1994, we document and interpret changes in the age differential among graduates from secondary education with a vocational and a general curriculum. The wage gap initially increased and then decreased. We find that these changes cannot be attributed to simple compositional shifts in the economy, but instead relate to important changes in worker allocation to firms that are heterogeneous in wage policies: the demise of assortative matching between workers and firms that worked out favourably for vocational graduates. Our results suggest that reforms of vocational education initiated in the late 1980's have been a successful policy intervention.

How Responsive are Wages to Demand within the Firm? Evidence from Idiosyncratic Export Demand Shocks • **2019** • Andrew Garin, Filipe Silvério

How much do employees' wages directly reflect their employer's labor demand, rather than competition from other employers in the labor market? We test the wage incidence of product demand shocks by studying a quasi-experiment that idiosyncratically shocked individual firms' export demand without systematically affecting similar firms' product or labor demand. Our shocks measure how much Portuguese exporters' sales were impacted by where—but not what—they had been selling before the recession of 2008. These shocks predict changes in output, payroll, and hiring at affected firms, but not at rival employers in the same labor market segment. An idiosyncratic shock that changes output by 10 percent in the medium-run causes wages of pre-2008 employees to change proportionally by 1.5 percent, relative to trend. Consistent with a simple framework, we find that these pass-through effects are larger in industries with lower employee turnover rates and in firms with higher pay premiums. These findings offer evidence that heterogeneous firm dynamics can plausibly generate substantial cross-sectional wage dispersion, but only in less-fluid labor markets.

The transmission of unconventional monetary policy to bank credit supply: evidence from the TLTRO • **2019** • António Afonso, Joana Sousa-Leite

We assess the transmission of the Targeted Longer-Term Refinancing Operations (TLTRO) to the bank credit supply for the Euro area (2014:05-2018:01) and for Portugal (2011:01-2018:01), using a panel data setup. For the Euro area, we find a positive relationship between the TLTRO and the amount of credit granted to the real economy. For the vulnerable countries, the effects of the TLTRO on the stock of credit increased from 2016 to 2017. Among the group of small banks, the effects are stronger in less vulnerable countries. We also find that competition has no statistically significant impact on the transmission of the TLTRO to the bank credit supply for the Euro area. For Portugal, using a difference-in-differences model, we find no statistically significant impact of the TLTRO on credit granted by banks. Finally, bidding banks set lower interest rates than non-bidding banks and the difference seems to be larger in 2017. In Portugal, the effects of the TLTRO on loan interest rates also increased from 2016 to 2017 and are stronger for small banks.

From the *Banco de Portugal Economic Studies*

Banco de Portugal Economic Studies aims to publish theoretical and applied studies prepared by economists at Banco de Portugal, often co-authored with external researchers. All articles are signed and are of the sole responsibility of their respective authors. The articles aim to contribute to an informed and high-quality debate on the Portuguese economy. The journal intends to be a reference publication in that debate, and is directed to a relatively specialized public on economic issues.

January 2019

Sectoral concentration risk in Portuguese banks' loan exposures to non-financial firms • António R. dos Santos, Nuno Silva.

Cyclically-adjusted current account: balances in Portugal • João Amador, João Falcão Silva.

Aggregate educational mismatches in the Portuguese labour market • Ana Catarina Pimenta, Manuel Coutinho Pereira.

Economics synopsis
Why is price stability a key goal of central banks? • Bernardino Adão.

April 2019

Potential output: How does Portugal compare with the euro area over the last 40 years? • Cláudia Duarte, José R. Maria, Sharmin Sazedj.

The new ESCB methodology for the calculation of cyclically adjusted budget balances: an application to the Portuguese case • Cláudia Braz, Maria Manuel Campos, Sharmin Sazedj.

Inflation expectations in the Survey of Professional Forecasters: An exploratory analysis • Joana Garcia, Nikolay Iskrev.

Economics synopsis
Credit and the economy: lessons from a decade of research at Banco de Portugal • Diana Bonfim, Luísa Farinha, Sónia Félix.

Seminars

DEE regularly invites experts in various fields of economics to present their latest research. Banco de Portugal staff, as well as researchers from other central banks, Portuguese and foreign universities are invited to attend. The following is a list of the seminars that were organized during the last six months. See the seminars' webpage for a list of past and next seminars.

2019

Jan. 11 **Trading Up and the Skill Premium** • Sérgio Rebelo • Northwestern University

Fev. 13 **Quantitative Easing** • Vincent Sterk • University College London

22 **Commitment and Competition** • Ramon Marimon • European University Institute

27 **Labor Reallocation and Wage Growth: Evidence from East Germany** • Sang Yoon (Tim) Lee • Queen Mary University of London

Mar. 13 **Employment Protection, Investment in Job-Specific Skills, and Inequality Trends in the United States and Europe** • Matthias Doepke • Northwestern University

20 **Understanding the Credit Multiplier: The Working Capital Channel** • Heitor Almeida • University of Illinois at Urbana-Champaign

26 **Industrial Revolution in Services** • Chang-Tai Hsieh • The University of Chicago Booth School of Business

27 **Investment Demand and Structural Change** • Manuel García-Santana • Universitat Pompeu Fabra

Apr. 3 **Quantity Measurement, Balanced Growth, and Welfare in Multi-Sector Growth Models** • Georg Duernecker • University of Munich

5 **Public Employment in a Task Based Theory of Underemployment** • Pedro Maia Gomes • Birkbeck, University of London

24 **Can productivity still grow in service-based economies? Literature overview and preliminary evidence from OECD countries** • Luiz de Mello • OECD

24 **A Theory of Falling Growth and Rising Rents** • Timo Boppart • IIES - Stockholm University

May 6 **Assessing the Gains from E-Commerce** • Pete Klenow • Stanford University

10 **Interest rates and foreign spillovers** • Roberto De Santis • European Central Bank

15 **Herding Cycles** • Edouard Schaal • Universitat Pompeu Fabra

20 **Trade and Informality in the Presence of Labor Market Frictions and Regulations** • Rafael Dix Carneiro • Duke University

21 **Estimating a Dynamic Game of Electoral Competition with Moral Hazard and Imperfect Monitoring** • Holger Sieg • University of Pennsylvania

29 **Patents to Products: Innovation, Product Creation, and Firm Growth** • Salomé Baslandze • Einaudi Institute for Economics and Finance

31 **Self-Fulfilling Debt Crises, Revisited: The Art of the Desperate Deal** • Harold Cole • University of Pennsylvania

Jun. 17 **Risk Externalities in Corporate Investment** • Felipe Iachan • Fundação Getúlio Vargas

Courses

2019

Jun. 3 - 7 **Nonlinear Panels with an Emphasis on Dynamic Quantile Models** • Manuel Arellano • CEMFI

From the 3rd to the 7th of June, Professor Manuel Arellano (CEMFI) taught the course Nonlinear Panel Data Lectures at the Economics and Research Department. The course focused on nonlinear panel methods to deal with the problem of unobserved heterogeneity, that is, the existence of characteristics that vary among individuals and affect the dependent variable and other observed regressors but are unobserved. This is a problem, as it makes it hard to control for these characteristics and claim that the estimates in a model have a causal interpretation. Several examples were given to illustrate that nonlinear panel data models with individual effects are common in economics.

The methods described in the course were the fixed-effects and random-effects approaches and Bayesian inference. One problem that all these methods are exposed to is the incidental parameter problem, which is the case in which the estimator fails to be consistent for a fixed value of time periods. In this case, fixed effects fixed-T estimators or bias-reduction methods should be used. Dynamic discrete models were also covered, mentioning further the initial conditions problem.

The course dealt with these methods in the estimation of the conditional mean of the dependent variable, but also, and with special emphasis, in the estimation of quantiles.

Quantile regression allows the researcher to get a sense not only of the mean of the conditional distribution of the dependent variable, but of its entire distribution. After a brief historical overview of the use of quantile regression, the lecturer introduced linear quantile regression and explained how quantile techniques can be applied to nonlinear models with unobserved heterogeneity – specifically nonlinear models with fixed effects in large samples, covering the incidental parameter problem, and nonlinear models with random effects in short panels. Dynamic models were also covered (including models with time-varying unobservables).

Finally, a review was given on some recent work on methods to identify and estimate nonlinear dynamic systems on micro data, where the aim is to estimate flexible nonlinear reduced-form models, which allow, on the one hand, to document new empirical facts possibly with latent variables and, on the other, to extract relevant policy quantities without the need for a specific structural model. In this context, the lecturer presented his own quantile-based estimator for continuous outcomes (Arellano and Bonhomme 2016), which could be used, for example, to allow for time-invariant unobserved heterogeneity in households' preferences in a life-cycle model of consumption and saving.

The course ended with an empirical illustration of the use of an estimated nonlinear dynamic reduced-form system, through the reproduction of some of the results in Arellano, Blundell and Bonhomme 2017's work E*arnings and Consumption Dynamics: A Nonlinear Panel Data Framework*, which studies nonlinear persistence in income and nonlinear transmission of income shocks to consumption, obtained on recent data of the PSID (Panel Study of Income Dynamics).

By Leonor Queiró

Jun. 24 - 28 **Macroeconomic forecasting course**

This course was offered by the Research Department to economists from central banks of Portuguese-speaking countries and from the statistical institutes of Madeira and Azores, in the context of the cooperation plan of Banco de Portugal. The objective of the course was to equip participants with the necessary tools for the development or improvement of short- and medium-term macroeconomic forecasting models. The course was lectured by Paulo Júlio, Nuno Lourenço and António Rua, lasted a week and included the following modules:

1. Inflation projection models: Auto-regressive models, Unit root tests and cointegration, Error correction models
2. Short-term forecasting models of economic activity: Bridge Models and ARIMA Models
3. Factor models
4. Coincident indicators

By Cristina Manteu

Conferences

2019

Jun. 10-11 **10th Conference on Monetary Economics**

The 10th Banco de Portugal Conference on Monetary Economics took place in Lisbon, June 10 -11 featuring eight papers.

On June 10 the first paper, *State Dependent Effects of Monetary Policy: the Refinancing Channel*, presented by Sérgio Rebelo (joint work with Martin Eichenbaum and Arlene Wong), highlighted the varying efficacy of monetary policy depending on the potential savings from refinancing mortgages. If mortgage rates are fixed and interest rates had risen in the past, interest rate cuts will not be as stimulative, as the benefits of refinancing, exploiting the new lower rates, are smaller. All else equal, as refinancing costs decline monetary policy becomes more powerful. The empirical and theoretical analysis is thus useful to design and assess the effects of monetary policy depending on its history.

Mussa Puzzle Redux, presented by Dmitry Mukhin (joint work with Oleg Itskhoki) provides an explanation for the high volatility of nominal and real exchange rate after the end of the Bretton Woods system of pegged exchange rates. The mechanism is not based on sticky-prices (as typically suggested) and relies instead on financial market segmentation whereby nominal exchange rate risk is borne by a small subset of agents.

Exchange Rates and Uncovered Interest Differentials: The Role of Permanent Monetary Shocks, presented by Stephanie Schmitt-Grohé (joint work with Martín Uribe) is an analysis of the effects of temporary and permanent monetary shocks on exchange rates. While temporary increases in interest rates may cause a currency appreciation, as typically admitted, the effects of permanent changes are the opposite, leading to a depreciation of the currency. This distinction is also relevant for monetary policy insofar as permanent increases in interest rates may lead to a permanent rise in inflation [see interview with Martín Uribe in this newsletter]. This paper adds to that debate by reducing the fears associated with exchange rate movements after a monetary policy "normalization". If the normalization is perceived to be credible then one should expect a depreciation of the currency (also contributing to higher domestic inflation), contrary to the usual logic.

The Short Rate Disconnect in a Monetary Economy, presented by Monika Piazzesi (joint work with Moritz Lenel and Martin Schneider), studies the differences between monetary policy rates and bank deposit interest rates due to the backing of deposits with short maturity bonds. Whenever these bonds become scarce spreads widen, banks reduce leverage and increase portfolio risk. Since the transmission of monetary policy is typically assumed to occur more or less directly via several maturities and instruments, the analysis highlights that such mechanism is complicated by the demand (and supply) of safe bonds across the business cycle along with the associated choices of leverage and risk by banks.

On June 11, the first paper, *Optimal Inflation and the Identification of the Phillips curve*, presented by Silvana Tenreyro (joint work with Michael McLeay) argues that the flatness of the Phillips curve (negative relation between inflation and economic slack/unemployment) can be the result of monetary policy aimed at stabilizing inflation and output. The relation can be a feature of the data but difficult to identify given the way monetary policy operates. In some settings, whenever there is slack monetary policy tries to reduce it by raising inflation, thus contributing to a positive relation between slack and inflation, i.e. hiding the negative relation that operates in the background.

Technological Innovation and Labor Income Risk, presented by Dimitris Papanikolaou (joint work with Leonid Kogan, Lawrence D. W. Schmidt and Jae Song) investigates using US data how the distribution of wage growth changes after major technological advances by the firm, or its competitors. Own firm innovation is found to be associated with a small increase in workers' wages, while innovation by competing firms is associated with lower future wages.

However, these effects are particularly strong for the highest-paid workers. Increased disparity in innovation across firms can thus account for a significant part of the recent rise in income inequality, consistent with the idea that innovation leads to substantial variation in inequality through creative destruction in the product market and human capital reallocation.

The Macroeconomics of the Greek Depression, presented by Loukas Karabarbounis (joint work with Gabriel Chodorow-Reich and Rohan Kekre) digs into the explanatory factors behind the recent Greek depression using a large general equilibrium model, concluding that contractionary fiscal policies and lower external demand contributed most to the depression, together with a decline in total factor productivity. The authors also argue that a nominal devaluation would have had short lived effects while fiscal adjustment through spending (instead of taxes), and away from capital taxes towards other taxes, would have been a better alternative.

Asset Prices and Unemployment Fluctuations presented by Patrick Kehoe (joint work with Pierlauro Lopez, Virgiliu Midrigan and Elena Pastorino) is an important contribution to understand labour market dynamics, in particular the volatility of unemployment. It hinges on the idea that job relations are long term relations and so job creation depends critically on the discount factor (or associated risk premium) firms use to evaluate the match, much like in the case of other longer term investments. The large variations observed in risk premia, together with human capital accumulation, amplify the changes in the value of job creation and hence in unemployment.

By João Valle e Azevedo

Mar. 25 Joint Banco de Portugal and IMF conference on "Portugal: Reform and Growth Within the Euro Area"

Banco de Portugal and the International Monetary Fund jointly organized the conference "Portugal: Reform and Growth Within the Euro Area", held in Lisbon on 25 March 2019.

The Conference aimed at drawing lessons, including for Europe, from Portugal's crisis responses and to discuss policy options for a sustained and inclusive economic path going forward. Broader issues of institutional reform in the euro area were also high on the agenda.

The conference included speeches by Carlos Costa (Governor of Banco de Portugal), David Lipton (First Deputy Managing Director of the IMF) and Mário Centeno (Eurogroup President).

The first session of the conference was on "Institutional reform in the euro area". Wolfgang Munchau (Associate Editor of the Financial Times) moderated the session and the panelists were Agnès Bénassy-Quéré (Paris School of Economics), Benoît Coeuré (Member of the Executive Board of the ECB) and Poul Thomsen (Director of the European Department of the IMF). The second session focused on the Portuguese economy and its main challenges. Pedro Santos Guerreiro (journalist) moderated the session and the panelists were Alfredo Cuevas (Mission Chief for Portugal, IMF), Ricardo Reis (AW Phillips Professor of Economics in the London School of Economics) and Teodora Cardoso (President of the Portuguese Public Finance Council, from February 2012 to February 2019). The third session discussed labour and product market challenges for Portugal, in a European context, and was moderated by Helena Garrido (journalist), with the following panelists: Fátima Barros (Associate Professor of Católica Lisbon School of Business and Economics), Mário Jorge Machado (CEO of Têxteis Adalberto) and Stéphane Carcillo (Head of the Jobs and Income Division at the OECD). The final session was on the "Financial sector: recovery and challenges". Clara Raposo (Dean, Lisbon School of Economics & Management) moderated the panel, composed of Fernando Faria de Oliveira (President of the Portuguese Banking Association), Peter Grasmann (Head of Unit at the Directorate-General for Financial Stability, Financial Services and Capital Markets Union, European Commission) and Mahmood Pradhan (Deputy Director of the European Department at the IMF).

The discussions were extremely rich and sowed the seeds for many ensuing debates. We invite all to watch the full webcast of the conference, available at https://www.bportugal.pt/en/evento/joint-banco-de-portugal-and-imf-conference-portugal-reform-and-growth-within-euro-area.

Meet our researchers

In this issue we present two members of our research staff.

Carla Soares is an economist in the Monetary Policy Division at the Economics and Research Department. Before starting this position in 2007, she worked at the Markets and Reserve Management of Banco de Portugal. She holds a BA in economics from ISCTE, a masters in monetary and financial economics from ISEG and has just finished her Ph.D. in economics from NOVASBE. Her work has been published in the *Journal of Money, Credit and Banking* and in the *Manchester School*.

Please, tell us about the research you are carrying on at DEE

My research interests comprise primarily monetary policy, with an applied focus, aiming at contributing to a better informed policy advice. More particularly, I have been interested in the role of the banking and financial systems in policy transmission and its relevance for the policy implementation framework. I believe that the crisis and central banks response to it has provided many questions to be answered along these lines of research.

On transmission, I have studied the risk taking channel of monetary policy, with an application to Portugal. I have been also looking at monetary policy response under sudden stop scenarios as those observed during the sovereign debt crisis. The results show the importance of the central banks to act as lender of last resort, in order to contain potentially disruptive consequences on the economy, but also to surpass frictions in money markets that may cause serious market stress. I have been still studying the potential welfare benefits from financial integration with fundamental heterogeneity between economies that can help explain markets disruptions following a large negative shock.

More recently, I have been interested in the effects of negative interest rate policy, with a focus on transmission via banks. Does transmission differ from the positive rate environment and if so, in what ways? Finally, and looking forward, policy implementation with a large central bank balance sheet, interactions with regulatory measures and related issues as the demand for safe assets, are also on my research agenda.

Sónia Félix has been working at the Financial Intermediation Division of the Economics and Research Department of Banco de Portugal since 2015. She holds a Ph.D. in Economics from Nova School of Business and Economics, where she has been working as an invited teaching assistant since 2010. Her general areas of research are applied microeconometrics, market power, and firm dynamics.

Please, tell us about the research you are carrying on at DEE

My recent research has focused mainly on how market frictions affect firm dynamics. I have been exploring the very rich micro data sets at the firm and worker level of Banco de Portugal. In particular, I am interested in understanding how market power in the labour market affects the wage setting policy of a firm and whether it helps to explain the wage gender gap.

A different line of research focuses on the product market. My primary interest is on the micro drivers of aggregate price setting and how competition affects the firm's price setting decisions.

I have also been studying the linkages between the real and financial sectors, with an emphasis on how credit market conditions affect firm dynamics, namely the survival probability and the investment decisions of a firm.

In a recent joint project I study how a reduction in entry costs in the market affects firm creation, employment, and exit.

Visiting Researchers

Banco de Portugal offers cash grants to support research projects in the field of Economics, with a view to promoting inter-change between the scientific and academic communities and the Bank, and to contributing towards the improvement of theoretical and applied research in Portugal.

Applicants wishing to develop research projects in the Economics and Research Department must hold a Doctorate degree or be about to finalise their Doctorate degree. Preferred topics include monetary and labour economics, financial intermediation, banking, and studies on the Portuguese economy.

Application instructions are available. Applications are invited from all interested parties.

Further information may be obtained via email: conferences@bportugal.pt.

Ioan-Sebastian Buhai • Stockholm University

Tatsuro Senga • Queen Mary University of London

Farzad Saidi • Stockholm School of Economics

Felipe Iachan • Fundação Getulio Vargas

Visitors

Sotirios Kokas • University of Glasgow

Luis Martins • ISCTE-IUL

Alexandro Ruiz • CEMFI

Serafeim Tsoukas • Serafeim Tsoukas

John Addison • Durham University

Consultants

Miguel Portela • University of Minho

Upcoming events and announcements

Seminars 2019

Sep. 20 David Weiss • Tel Aviv University

25 Liliana Varela • London School of Economics

Oct. 10 Mikhail Golosov • The University of Chicago

16 Saki Bigio • University of California, Los Angeles

23 Vasso Ioannidou • Lancaster University

Nov. 27 Adrien Auclert • Stanford University

Dec. 4 Johanna Wallenius • Stockholm School of Economics

Courses 2019

Sep. 30- Oct. 2 **HANK - Heterogeneous Agent New Keynesian Models** • Matthew Rognlie • Northwestern University

Nov. 7-8 **Competitive Search and Labor Sorting** • Philipp Kircher • European University Institute

Dec. 9-13 **Introduction to Macroeconomic and Macrofinancial Modeling in the IRIS Toolbox** • Jaromir Benes • OGResearch

Conferences 2019

Aug. 21 **European System of Central Banks' Day-Ahead Conference**

Correspondence to the editor

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This newsletter, as well as other online information about Economic Research at Banco de Portugal is available here.

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