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SPILLOVERS

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EUROSYSTEM

Research in Economics at Banco de Portugal • Biannual • Year X • February 2022

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Foreword

For many decades has the economics profession relied on observations and assumptions about the long-term trend of important drivers. Technological progress and the demography come to mind. More recently, climate joined that select group. We can now witness an explosion of research directed at understanding the effects of climate change on all sorts of economic outcomes, including output, growth, migrations, capital reallocation, inequality, credit, and more.

The topic is challenging because it involves mapping climatological variables to economic outcomes, and vice versa. The work carried out by economists since the late 1970s has laid the foundations for today's febrile activity on climate change at universities and other research institutions, including central banks. This effort started half a decade ago at Banco de Portugal, but only recently has it produced visible output. One such example is the working paper by Adão and co-authors, which argues that Pigou taxes on carbon emissions can significantly reduce the long-term rise in global temperatures, more so than incentives to the adoption of new technology in the renewable energy sector. Another project, by Santos and co-authors, explores the energy mix and worker specialisation patterns of different economic blocs to conclude that carbon taxation will cause significant factor reallocation and heterogeneous effects on households. Our researchers are currently active on several other cutting-edge projects on climate change.

One of the requirements to carry out research on climate change is access to climatological data. There are several high quality, publicly available sources. The integration of such data with the microdata sets used in finance and economics research, with their lack of precise geo-referencing data, is difficult. We think this is a task for the coming years, and we hope to contribute to that effort through BPLIM, our microdata research laboratory. In dealing with datasets from very different sources, a concern of the academic community is whether published research can be replicated. That was precisely the theme of a workshop organised by BPLIM, which included an address by Lars Vilhuber, a top specialist on research replicability. The reader may want to read an interview with him in this Spillovers edition.

Research on climate change allows us to blend theoretical modelling and climate data into policy contributions. That was on display in a policy-oriented special issue published in the *October 2021 Economic Bulletin*, as well as the *ECB occasional paper* on climate change and monetary policy, and the *Banco de Portugal occasional paper* on bank exposures to firms vulnerable to climate change.

More work is on the way. Stay tuned.

António Antunes
Deputy Head of the Economics and Research Department

Interview

Lars Vilhuber • Department of Economics, Cornell University.

You are the Data Editor of the American Economic Association since 2018. What do you make of your experience so far?

A few tenative impressions stand out so far. First, the Data Editor's activity that is most apparent to researchers are the reproducibility and data provenance checks we conduct for articles prior to their acceptance. It is work I do with undergraduates, 25 of them at most times, under the supervision of myself, an assistant (pre-doc), and a graduate student. We have done over 1,000 articles so far! Thus, I am amazed and satisfied that we can do this task with undergraduates, trained for the job, but who walk away, I hope, with the satisfacton of a job well done, and well contributed to improving science.

Second, I am satisfied with the packages that researchers submit. They are not perfect, but they are good. We are, in a true sense, editors, making the replication packages better, but not detectives or policemen, rooting out the bad guys! I do believe that we have made the replication packages ever more accessible, to a broader audience.

Finally, I am amazed at the diversity of experiences and skill sets that I get to see. I'm a labor economist by training, but we get to see packages from all sorts of articles that the AEA journals publish. There is enough similarity that we can tackle nearly all of them computationally, but huge diversity. But I also see through that diversity a continuing need for economists to learn better and new techniques - a need for continuous improvement, and for better graduate training. That's less about reproducibility than the efficiency of the research process - some of the packages are quite inefficiently programmed, taking our replicators a lot of time just to do the tasks the authors described, and which must have taken the authors even longer to do!

There is a growing recognition of the need for improved data transparency and reproducibility and several journals now require that data and code be made available. AEA journals go a step further and require that materials be deposited in a data archive and ensure reproducibility of the results. Do you expect this trend to generalize to the discipline? What main obstacles do you foresee?

Every scientific article needs to be transparent in its approach and methods. That includes the computational implementation of the methods, and the source of its data. Depositing data (and code) in proper archives is a first step - it makes them more easily findable, and persistent. That part is easy, and should really be done by all journals, since it carries little cost, and much upside, for journals.

What is more challenging is to do it right. It is not sufficient to dump a ZIP file into an archive. While we might gain from persistence, we gain little in terms of transparency. Proper deposits are clearly structured, visible to others. That is not something most economists were trained to do – as a profession, we actually trained them over the past two decades to think in terms of "zip files sent by email" as the "right" way to do it. We're past that, but it's taking time to disseminate the new habits in the profession. And it takes data editors to vet those deposits, even before attempting to assess computational reproducibility

The hardest part is assessing computational reproducibility. This is true when data are confidential, as you are well placed to know, but it also can be challenging more generally. When all data are available and the code is well-structured, this should be easy - doable by machines. In practice, it is not, for lack of structure, but also for lack of conventions how to structure.

But ultimately, we do not really care about narrow reproducibility. What we care about is on one hand evidence that the provided materials are complete, and produced the results in the paper, and on the other hand, the ability to easily generalize to other contexts. Computational reproducibility is one way to increase confidence that both of those goals are plausible and achievable. But it is not the only way. If I am assured, through some evidence or proof other than the author's words, that the code actually ran, then I may not need to run the code again - very useful when the data are hard to access, or the code runs for three months on a high-performance computing cluster. Thus, I think we will start to see tools and standards that support such "trusted party" certifications more often. We already have some such certifications conducted by humans, but we should also start to see more software solutions.

Many empirical economists where never trained to properly conduct reproducible research. Should we revisit the academic curricula and, if so, what changes should be introduced? Do you have any specific advice for young researchers that are now initiating their careers?

For young researchers, I can only argue in the strongest words: learn quickly how to do research reproducibly. While it may be a small hurdle at the start (yet one more thing to learn), it saves time, and makes future projects, papers, and revisions to that job market paper after the umpteenth referee report that is standing between you and tenure so much easier.

More generally, I do believe that the same way economists learn correct econometrics, and biologists learn proper pipetting and how to keep a lab notebook, and photographers learn proper composition techniques, empirical social scientists need to learn reproducible techniques as part of the foundational techniques in their discipline. I do not think it is an option - the transparency that reproducibility engenders is key to the credibility of our science.

And that does not start in graduate school. It starts much earlier - definitely during a bachelors, possibly in high school. I don't think you should learn R or Python or Stata or Matlab without simultaneously learning how to run R or Python or Stata or Matlab reproducibly.

Restricted-access data pose particular challenges for reproducibility. In your view, how can we ensure transparency and reproducibility when dealing with these data and what role can Research Data Centers play in promoting reproducibility?

Restricted-access data are challenging, but only because it takes time and possibly money to get access to them. I think the largest challenge to overcome are private data - data that only a single researcher can access. In economics, that tends to be the data of private companies that a researcher has a special connection to. This is where tools to certify the computational traces may come in handy, because that really has no other solutions.

Restricted-access data in research data centers – like BPLIM – is only a challenge because access procedures are often long, or require physical presence in certain geographic areas. But you and others have made great strides in allowing for remote access, greatly broadening access - where it used to be a few dozen researchers locked into a windowless room (really, that's how you want to spend your summer in Lisbon?), now it can be hundreds of researchers spread across an entire continent. There are currently nearly 1,000 projects using the French restricted-access system CASD (www.casd.eu), spread across multiple European countries and even North America!

More importantly, research centers, and the legal framework authorizing them, provide objectivity to the data access. When access is not controlled by a specific gatekeeper, but by an impartial access procedure, we have taken one potential bias out of the research process. This is not always feasible when the data are commercial, proprietary, because access may be premised on topic-selection (no topic that might embarass the data owner) or output selection (vetoing results because they might shed an unfavorable light on the data owner). While useful research can still be conducted, as long as these biases are made clear, research centers can alleviate them.

Finally, research centers can provide services that most individual data providers do not offer. For instance, providing archiving of older versions of datasets, or the publication of metadata with persistent identifiers (f.i., digital object identifiers, DOI) – as you at BPLIM, but also the IAB in Germany and CASD in France, have done – improves the transparency of the research process. And facilitates broader re-use of these data, for new studies that may or may not disprove the results from earlier research.

You were one of the members of the panel promoted by the National Academies of Sciences, Engineering and Medicine that produced the recent report "Transparency in Statistical Information for the National Center for Science and Engineering Statistics and All Federal Statistical Agencies". Is this a sign that the call for transparency and reproducibility is extending beyond academia? What are your expectations in this regard?

The U.N. fundamental principles of offical statistics, originally adopted in 1994, clearly articulate that statistics should be "impartial", should "retain trust" by basing decisions on "scientific principles and professional ethics, on the methods and procedures for the collection, processing, storage and presentation of statistical data." I'll call that transparency.

What has changed over time is our interpretation of what those ethics are, and how to interpret and implement them. When transparency still meant "send me a postage-pre-paid envelope so that I can send you a hard-copy of the Cobol code", assessing reproducibility is a much harder endeavor. It has now become cheap to do so, and so our expectations of what constitutes transparency and reproducibility has changed. Think of the analogy to preservation and storage. Many computer centers still use magnetic tape for some backup and archival purposes. LTO tapes were introduced in 2000 with 100GB. Twenty years later, the same physical size can hold 18,000 GB, for, I believe, the same cost. That affects decisions on what to store. What we used to discard, because we thought of lesser importance, to reduce cost, we can now keep and preserve. The digital traces of our research activity have become ever cheaper to keep, and thus the reasons not to keep them, have evaporated. Thus, it has become ever easier to require transparency. That affects how statistical agencies are adapting to the new environment. Though sometimes, they need a little nudge.

Central banks do a lot of policy work often using highly confidential data. What steps might be involved to improve reproducibility of policy work at central banks? How would you define data reproducibility in this context?

Reproducibility and fast-paced analysis work that is often required are not contradictions. As I've mentioned before, reproducible code is by definition more robust, and it is a small step from there to adaptable code. The use of confidential data only means that the data, and sometimes the conclusions drawn from the analysis of such data, cannot be broadly shared. It does not mean that the code cannot be shared - unless you have to intentionally obfuscate the methods, for some policy reason, though that should be the exception. I see an analogy to the world of cryptography here. The best cryptographic methods are generally accepted to be those where the algorithm is public, and where even part of the key might be public. Only one key number is kept secret. Can flaws be detected in such code? Absolutely, and that does happen. But such code can then also be quickly fixed, and improved. Shouldn't we aim to improve our policy in the same way?

So I do believe that a high level of transparency can be achieved even when the data are confidential.

How do you ascertain reproducibility is slightly more complicated, but really not that difficult. I'm not an expert on what goes on inside central banks, so this may already be going on there. Think of some of the techniques used in academia or the commercial world to ensure reliability. We peer-review articles. Six or eight pairs of eyes (referees) are generally better than two (the editor's) to identify flaws, but of course, they are not perfect. Some research institutes already do internal code reviews - one team reimplements from scratch the methods as described by another team. That takes time. Faster methods include "buddy programming", where two programmers work on the same problem, side-by-side. Or continuous-integration tools, where every change of the code leads to a computer re-executing the entire jobflow again, every time, automatically. All of these are meant to enhance the reliability and robustness of the results. Computational reproducibility is along for the ride, as an indicator.

Finally, data reproducibility relies on data curation practices. Are you keeping archives of the data that was used for last quarter's policy report? Can you, or was it streaming data that is (still) too expensive to preserve? Sometimes, data reproducibility is not feasible, but the fact that it may not be feasible is itself of importance, and part of the transparency of the process.

Thank you for inviting me to contribute!

By Paulo Guimarães

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

João Madeira is Associate Professor at the University of York. He is a macroeconomist whose research focuses on the sources of business cycle fluctuations and in particular the role played by labour market rigidities. He currently works on understanding better inflation expectations and how disagreement in monetary policy committees arises and impacts the economy.

Featured published paper

Portugal, Pedro and José Varejão. 2021. "Why Do Firms Use Fixed-Term Contracts?", *Portuguese Economic Journal*.

Fixed-term contracts account for a significant share of total employment in many labor markets. This has conventionally been interpreted within a labor adjustment cost framework (firms use temporary employment to save on potential future firing costs). In the last two decades the literature has also considered other motives for the use of fixed-term contracts, namely cost saving reasons (especially savings on fringe benefits), temporary replacement, and screening for permanent positions. However, assessing how fixed-term contracts play in employers' hiring policies is a difficult task (limited data makes disentangling the impact on transitions to permanent contracts hard: lower firing costs could encourage firms to do more on-the-job screening leading to more frequent transitions to permanent positions but could also reduce pre-hiring screening reducing the rate of successful matches making transitions to permanent positions less frequent).

In this article Pedro Portugal and José Varejão provide more clear answers on the role of fixed-term contracts in staffing policies by using a longitudinal matched employer-employee dataset (whereas previous studies used employee data obtained from domestic labor force surveys). The data is for Portugal where fixed-term contracts represent about 18% on average in the period studied, this is larger than in most of Europe, making it a case of special interest (also because it has strict overall employment protection legislation but mild regulation of temporary forms of employment, this is unusual since strict overall employment protection is accompanied by strict temporary employment regulation).

The authors' results provide several valuable insights. Firms with a larger share of workers with high human capital are less likely to use temporary contracts and convert temporary matches sooner to permanent. Moreover, high human capital firms promote temporary workers to permanent positions more often. This can be explained because firing skilled workers means losing a higher proportion of job-specific human capital (in support of this, the authors find that firms which invest more in training also use fewer fixed-term contracts and are more likely to convert them to permanent positions). It is further observed that when permanent workers leave (for natural causes or voluntarily) the number of temporary contracts also rises. The article also shows that the likelihood of promotion to permanent position declines after age 40 and for less educated individuals. The regression estimates also show firms are more likely to offer open-ended contracts to those workers that they hire with fixed-term contracts.

The findings overall support that firms use fixed-term contracts as mechanisms for screening workers for permanent positions. The use of fixed-term contracts for churning (worker turnover in excess of job turnover) seems for the most part limited to low-skilled jobs and firms.

Featured article from *Banco de Portugal Economic Studies*

Cardoso, Fátima and António Rua. 2021. "Unveiling the real contribution of final demand to GDP growth", *Banco de Portugal Economic Studies*.

Traditionally, components of final demand to real GDP are not adjusted for the contribution of imports (which are typically taken as an aggregate deducted from the total sum of the remaining components of final demand: private consumption, investment, government spending and exports). A justification for this is the lack of information on a regular basis on the import content of the components of final demand. However, this can then result in an overstatement of the real contribution of the different components of final demand to the evolution of GDP. Therefore, how to measure the contribution of imports to each component of final demand in GDP accounting is an important question in GDP accounting in need of analysis.

To answer the aforementioned question Fátima Cardoso and António Rua study several methodologies to remove the contribution of imports from each component of final demand. These methodologies are implemented using data for Portugal for the period since the adoption of the euro. The available import contents are based on the input-output symmetric matrices which have data on intermediate expenditures and final uses by product coming from both imports and domestic production. From this disaggregated information it is possible to calculate the import content by product and for each component of final demand.

The first methodology studied is to use the import contents (calculated at current prices) for the most recent year available. The import contents are thus taken as fixed over time for the entire period under analysis. The second methodology studied is to use all the information available over time, from annual national accounts and from input-output matrices and respective import contents to obtain an annual series of import contents calculated at current prices (linear interpolation was used in years when the input-output symmetric matrices were not available). The third methodology estimates annual import contents at constant prices (the input-output matrices used when calculating import contents at current prices are previously deflated and converted to constant prices of the reference year).

The analysis in the article shows that there has been an increase in the import content (except private consumption) which is particularly marked in the estimates at constant prices. The authors then estimate for each methodology a proxy for imports (multiplying the import contents for each component of final demand by the respective expenditure level of each component) and compare with the actual observed imports. The estimation of annual import contents at constant prices is shown to be the most informative, since it has the smaller discrepancies for both the level of observed imports (about 1% discrepancy on average whereas for the other methods the discrepancy exceeds 10% on average) and the observed level of GDP growth (0% discrepancy on average).

Recently published

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

Mathematical and Quantitative Methods

- Balboa, Marina, Paulo M. M. Rodrigues, Antonio Rubia and A. M. Robert Taylor. 2021. "Multivariate fractional integration tests allowing for conditional heteroskedasticity with an application to return volatility and trading volume". *Journal Of Applied Econometrics*, 36 (5), 544 - 565. JEL Codes: C12, C22.
- Cruz, João, João Nicolau and Paulo M. M. Rodrigues. 2021. "Structural changes in the duration of bull markets and business cycle dynamics." *Asia-Pacific Financial Markets*, 28 (3), 333-352. JEL Codes: C12, C22.
- Martins, Luis F. and Paulo M. M. Rodrigues. 2021. "Tests for segmented cointegration: an application to US governments budgets". *Empirical Economics*. JEL Codes: C12, C22, H60.
- Vandyck, T., M. Weitzel, K. Wojtowicz, L. R. Los Santos, A. Maftei, and Sara Riscado. 2021. "Climate policy design, competitiveness and income distribution: A macro-micro assessment for 11 EU countries". *Energy Economics*, Vol 103, 105538. JEL Codes: C68, H23, Q43, Q52, Q54.
- Zsurkis, Gabriel, João Nicolau and Paulo M. M. Rodrigues. 2021. "A re-examination of inflation persistence dynamics in OECD countries: a new approach*". *Oxford Bulletin of Economics and Statistics*, 83 (4), 935-959. JEL Codes: C12, C22.

Macroeconomics

- Antunes, António, and Valerio Ercolani. 2021. "Health and Earnings: a General Equilibrium Evaluation." Research in Economics 75(3): 203-214. JEL Codes: D91, E21, I14, I15.

International Economics

- Caliendo, Lorenzo, Fernando Parro, Luca David Opromolla, and Alessandro Sforza. 2021. "Goods and Factor Market Integration: A Quantitative Assessment of the EU Enlargement." *Journal of Political Economy*. 129:12, 3491-3545. JEL Codes: F1, F2.

Labor and Demographic Economics

Forthcoming

- Addison, John T., Pedro Portugal, and Hugo Vilares. 2021. "Union Membership Density and Wages: The Role of Worker, Firm, and Job-Title Heterogeneity." *Journal of Econometrics*. JEL Codes: J31.
- Carneiro, Anabela, Pedro Portugal, Pedro Raposo, and Paulo M. M. Rodrigues. 2021. "The Persistence of Wages." *Journal of Econometrics*. JEL Codes: J31.
- Cavalcanti, Tiago, Georgi Kocharkov and Cézar Santos. 2021. "A Note on Contraception, Social Norms and Growth". *Macroeconomic Dynamics*. JEL Codes: J13, O11.
- Portugal, Pedro and José Varejão. 2021. "Why Do Firms Use Fixed-Term Contracts?" *Portuguese Economic Journal*. JEL Codes: J23.

Occasional Paper Series – ECB Strategy Review

Work developed in the context of the ECB's monetary policy strategy review, published in the *Occasional Paper Series* of the ECB, and co-authored by economists from Banco de Portugal.

- Baumann, Ursel, et al. 2021. "Inflation expectations and their role in Eurosystem forecasting". *Occasional Paper Series* 264, European Central Bank. (Work stream on inflation expectations).
- Cecioni, Martina, et al. 2021. "The ECB's price stability framework: past experience, and current and future challenges", *Occasional Paper Series* 269, European Central Bank. (Work stream on the price stability objective).
- Cappiello, Lorenzo, et al. 2021. "Non-bank financial intermediation in the euro area: implications for monetary policy transmission and key vulnerabilities". *Occasional Paper Series* 270, European Central Bank. (Work stream on non-bank financial intermediation).
- Drudi, Francesco, et al. 2021. "Climate change and monetary policy in the euro area". *Occasional Paper Series* 271, European Central Bank. (Work stream on climate change).
- Albertazzi, Ugo, et al. 2021. "The role of financial stability considerations in monetary policy and the interaction with macroprudential policy in the euro area.", *Occasional Paper Series* 272, European Central Bank. (Work stream on macroprudential policy, monetary policy and financial stability).
- Debrun, Xavier, et al. "Monetary-fiscal policy interactions in the euro area", *Occasional Paper Series* 273, European Central Bank. (Work stream on monetary-fiscal policy interactions).
- Assenmacher, Katrin, et al. 2021. "Clear, consistent and engaging: ECB monetary policy communication in a changing world.", *Occasional Paper Series* 274, European Central Bank. (Work stream on monetary policy communications).
- Brand, Claus, et al. 2021. "Employment and the conduct of monetary policy in the euro area", *Occasional Paper Series* 275, European Central Bank. (Work stream on employment).

New titles in the *Occasional Papers* series

Assessment of the exposure of the Portuguese banking system to non-financial corporations sensitive to climate transition risks • Ricardo Marques and Ana Margarida Carvalho

Climate change is a source of risk to financial stability. This article presents a quantification of the exposure of the Portuguese banking system to non-financial corporations (NFCs) sensitive to the risks arising from the transition to a low-carbon economy. The results suggest that about 60% of banks' exposures to NFCs are in climate-policy-relevant sectors (CPRS), chiefly in the sectors dedicated to construction, transaction and use of buildings and, to a lesser extent, in sectors associated with the production and use of means of transportation and in energy-intensive industries. This article also presents a methodology for estimating direct greenhouse gas (GHG) emissions, by sector of activity, from resident NFCs with bank financing. The calculation of carbon intensity on the basis of these estimates shows that around 60% of banks' exposures to NFCs is below the median of this indicator. This result is consistent with the higher concentration of exposures in climate-policy-relevant sectors with lower direct GHG emissions.

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.

Markups and Financial Shocks • Ana Cristina Soares and Philipp Meinen

This paper analyses the impact of financial frictions on markup adjustments at the firm level. We use a rich panel data set that matches information on banking relationships with firm-level data. By relying on insights from recent contributions in the literature, we obtain exogenous credit supply shifters and markups that are both firm specific and time varying. We uncover new findings at this level. In particular, firms more exposed to liquidity risks tend to raise markups in response to negative bank-loan supply shocks, while less exposed firms generally reduce them. Further empirical analyses suggest that our findings are mostly consistent with models featuring a sticky customer base, where financially constrained firms have an incentive to raise markups in order to sustain liquidity. Our results have important economic implications regarding the cyclicality of the aggregate markup.

Coworker Networks and the Labor Market Outcomes of Displaced Workers: Evidence from Portugal • Marta Silva and José Garcia-Louzão

The use of social contacts in the labor market is widespread. This paper investigates the impact of personal connections on hiring probabilities and re-employment outcomes of displaced workers in Portugal. We rely on rich matched employer-employee data to define personal connections that arise from interactions at the workplace. Our empirical strategy exploits firm closures to select workers who are exogenously forced to search for a new job and leverages variation across displaced workers with direct connections to prospective employers. The hiring analysis indicates that displaced workers with a direct link to a firm through a former coworker are roughly three times more likely to be hired compared to workers displaced from the same closing event who lack such a tie. However, we find that the effect varies according to the type of connection as well as firms' similarity. Finally, we show that successful displaced workers with a connection in the hiring firm have higher entry-level wages and enjoy greater job security although these advantages disappear over time.

Not All Shocks Are Created Equal: Assessing Heterogeneity in the Bank Lending Channel • Luísa Farinha, Gil Nogueira and Laura Blattner

We provide evidence that the strength of the bank lending channel varies considerably across three major positive events in the European sovereign debt crisis – the Greek debt restructuring (PSI), outright monetary transactions (OMT), and quantitative easing (QE). We study how lending responds to each event combining credit registry data with security-level bank balance sheet data from Portugal, a country that was directly exposed to all three events. Even though the price of sovereign debt increased by substantially more after the PSI and OMT announcements, only QE had statistically and economically significant effects on lending to firms and households. We find that banks only realized trading gains after QE but not the other two events. These results suggest that banks' incentives to sell bonds are an important determinant of the transmission of sovereign debt interventions to the real economy.

Trade, Misallocation, and Capital Market Integration • László Tetenyi

Developing countries typically integrate into the world economy by first opening up to trade and then later, if at all, by integrating their capital markets. I study the effects of postponing the opening of capital markets in a standard trade model with financial frictions and firm dynamics. As trade barriers fall, the model predicts that capital misallocation declines in the aggregate, but increases among exporters. Allowing capital inflows helps all firms but it also magnifies the losses from misallocation. In the quantitative experiment calibrated to the Hungarian integration episode of the 90s, the benefit of cheaper capital dominates the adverse effect of growing capital misallocation on productivity, leading to higher output, consumption, and welfare than under closed capital markets. Moreover, Hungary could have gained an extra 1% in welfare, on top of the overall gain of 7%, by immediately allowing capital inflows after the reduction in trade barriers.

On the Cleansing Effect of Recessions and Government Policy: Evidence from Covid-19 • Pedro Dias Moreira, Cezar Santos and Nicholas Kozeniauskas

Recessions can have a cleansing effect by encouraging the reallocation of resources from low-productivity firms towards higher-productivity ones. Whether this effect actually occurs is still debated. We contribute to answering this question by providing new evidence. Using a survey of firms matched with administrative data, we trace out the Covid-19 recession's effects across the productivity distribution. Higher-productivity firms are found to have been more successful at maintaining employment, but there was not a rise in exit amongst lower-productivity firms. In line with the theory that support policies offset the cleansing effect of recessions, high-productivity firms are also found to have been less likely to take up government support.

Permanent and temporary monetary policy shocks and the dynamics of exchange rates • Alexandre Carvalho, João Valle e Azevedo and Pedro Pires Ribeiro

Over the short run contractionary monetary policy shocks tend to be associated with domestic currency appreciations, which goes against standard interest rate parity conditions. How can this be reconciled with the fact that these conditions tend to be restored over the long run? We show the distinction between permanent and temporary monetary policy shocks is helpful to understand the impacts of monetary policy on exchange rates in the short as well as over the long run. Drawing on monthly data for the United States, Germany, France, Great Britain, Japan, Australia, Switzerland and the euro area from 1971 to 2019, and resorting to a simple structural vector error correction (SVEC) model and mild identifying restrictions, we find that a shock leading to a temporary increase in U.S. nominal interest rates leads to a temporary appreciation of the USD against the other currencies, in line with the literature on the exchange rate effects of monetary shocks and that on the forward premium puzzle. In turn, a monetary policy shock leading to a permanent rise in nominal interest rates - e.g. one associated with a normalisation of monetary policy after a long period at the zero lower bound - has the opposite impact, i.e., in line with interest parity conditions, in the short as well as over the long run. The ensuing depreciation may also contribute to higher (not lower) inflation, also in the short run. We thus confirm, in a simpler setting and for more economies, the results of Schmitt-Grohé and Uribe (2021). This highlights the relevance of differentiating between temporary and permanent monetary policy shocks in interpreting short-run exchange rate movements.

The impact of a macroprudential borrower based measure on households' leverage and housing choices • Sónia Félix, Fátima Silva, Vítor Oliveira and Daniel Abreu

Banco de Portugal implemented new limits to the loan-to-value (LTV) ratio in July 2018. This paper investigates the impact of these new lending limits on households' leverage and housing choices. Using credit register data that covers the universe of loans granted to households, which allows us to account for loan and households' characteristics and bank heterogeneity, we document a decline in the LTV ratio after the implementation of the macroprudential measure. Importantly, using a difference-in-differences estimation strategy we estimate the impact of the policy change on households that were more likely to exceed the new LTV limits in the absence of the policy change. Our results show that the policy change was effective in reducing households' leverage as constrained households take out smaller loans and have lower loan-to-income ratios. These households pay higher interest rate spreads and have higher loan-service-to-income ratios than the control group. This paper also shows that the policy change affected households' housing choices as constrained households bought cheaper houses. Overall, our results highlight the improvement of the risk profile of households following the introduction of the LTV limits.

The sensitivity of SME's investment and employment to the cost of debt financing • Diana Bonfim, Clara Raposo and Cláudia Custódio

We use variation in the access to a government credit certification program in Portugal to estimate the sensitivity of SMEs´ investment and employment to the cost of debt financing. Targeted firms have access to a credit certification and loan guarantees. We use a multidimensional regression discontinuity design to estimate real effects. Eligible firms increase borrowing and obtain bank loans at lower rates than non-eligible firms, allowing them to increase investment and employment during crises. Eligible firms also exhibit increased return on assets and default less. Industry-level analysis shows reduced heterogeneity in access to credit in more exposed industries.

COVID-19, Lockdowns and International Trade: Evidence from Firm-Level Data • Ana Catarina Pimenta, Carlos Melo Gouveia and João Amador

The COVID-19 pandemics and the lockdowns imposed to mitigate the rise of infections beyond manageable levels strongly affected international trade in the early months of 2020. Although the health crisis and the mobility restrictions associated to lockdowns are closely related, their impacts on international trade have a different nature. This paper uses monthly firm-level trade data for Portuguese firms to measure the impact of lockdowns on nominal export and import flows during 2020 and the first half of 2021, while also assessing the impact of the health crisis. The high time frequency and granularity of the data contribute to the identification of the impact of these obstacles on trade. We conclude that the detrimental impact of lockdowns is sizeable and broadly similar in exports and imports, and the impact of the health conditions is slightly stronger in exports. There is evidence of a lower impact of lockdowns as of June 2020, hinting at a progressive adaptation of international traders to the prevailing circumstances. Notwithstanding this adaptation, the impact of lockdowns partly remerged in the third wave of the pandemics, notably on imports flows. There is also evidence that the impact of lockdowns was stronger for larger firms and for those more integrated in global value chains.

Serial Entrepreneurs, the Macroeconomy and Top Income Inequality • Sónia Félix, Petr Sedláček and Sudipto Karmakar

Are serial entrepreneurs – owners of multiple firms – important for understanding the sources and aggregate consequences of business dynamism? Using unique administrative data, we show that – compared to other businesses – firms of serial entrepreneurs are larger, more productive, grow faster, exit less often and disproportionately contribute to aggregate job creation and productivity growth. Moreover, even the very first firms of serial entrepreneurs feature these "premia", suggesting an important role of innate abilities, rather than luck or learning. Finally, we show theoretically and quantitatively that serial entrepreneurship is also important for understanding and modelling of top income inequality.

The persistence of wages • Paulo M. M. Rodrigues, Pedro Portugal, Pedro Raposo and Anabela Carneiro

This paper provides comprehensive and detailed empirical regression analyses of the sources of wage persistence. Exploring a rich matched employer-employee data set and the estimation of a dynamic panel wage equation with high-dimensional fixed effects, our empirical results show that permanent unobserved heterogeneity plays a key role in driving wage dynamics. The decomposition of the omitted variable bias indicates that the most important source of bias is the persistence of worker characteristics, followed by the heterogeneity of firms' wage policy and last by the job-match quality. We highlight the importance of the incidental parameter problem, which induces a severe downward bias in the autoregressive parameter estimate, through both an in-depth Monte Carlo study and an empirical analysis. Using three alternative bias correction methods (the split-panel Jackknife (Dhaene and Jochmans, 2015), an analytical expression (Hahn and Kuersteiner, 2002), and a residual based bootstrap approach (Everaert and Pozzi, 2007, Gonçalves and Kaffo, 2015)), we observe that up to one-third of the reduction of the autoregressive parameter estimates induced by the control of permanent heterogeneity (high dimensional fixed effects) may not be justified.

Scrapping, Renewable Technology Adoption, and Growth • Bernardino Adão, Ted Temzelides and Borghan Narajabad

We develop a dynamic general equilibrium integrated assessment model that incorporates scrapping costs due to new technology adoption in renewable energy as well as externalities associated with carbon emissions and renewable technology spillovers. We use world economy data to calibrate our model and investigate the effects of the scrapping channel on renewable energy adoption and on the optimal energy transition. Our calibrated model implies several interesting connections between scrapping costs, the two externalities, policy, and welfare. We investigate the relative effectiveness of two policy instruments-Pigouvian carbon taxes and policies that internalize spillover effects-in isolation as well as in tandem. Our findings suggest that scrapping costs are of quantitative importance for technology adoption and the energy transition. The two policy instruments are better thought of as complements rather than substitutes.

Sovereign-Bank Diabolic Loop: The Government Procurement Channel • Diana Bonfim, Sujiao Zhao, Francisco Queiró and Miguel A. Ferreira

We show that banks' lending exposure to firms with government procurement contracts can amplify the diabolic loop between sovereigns and banks. Using the fiscal austerity measures implemented during the 2010-2011 European sovereign debt crisis as a shock to government procurement, we find that banks with higher exposure to these firms reduced lending significantly more than banks with lower exposure, controlling for firm-specific credit demand. The reduction in credit supply is economically as important as the effect of banks' sovereign debt holdings, and affected both firms with and without government contracts. Firms with lending relationships with affected banks experienced lower sales growth, assets growth, employment growth, and investment. This decrease in real economic activity is likely to reduce tax revenue, further amplifying the diabolic loop.

Assessing the effectiveness of the Portuguese borrower-based measure in the Covid-19 context • Ângelo Ramos, Vítor Oliveira and Katja Neugebauer

Based on the macroeconomic projections from Banco de Portugal and using an integrated micro-macro model developed by Gross and Población (2017), this paper makes a first attempt at gauging the impact of the Covid-19 pandemic on Portuguese households and banks. To this end, we examine how the borrower-based measure, which has been put into place in 2018, might have been successful in dampening the negative economic effects of the pandemic on households' debt-servicing capacities and thereby onto the banking system. We find that the borrower-based measure, defined as an LTV ratio cap of 90%, a shocked DSTI ratio cap of 50%, and a maturity cap for mortgage loans of 40 years, leads to (i) a reduction in households' loss rate (LR), caused by both a decrease in households' probability of default (PD) and loss given default (LGD), and (ii) an increase in the capital ratio of the banking system, compared with a scenario where these limits are not in place. We also find positive effects of introducing a shocked DSTI ratio cap, calculated according to the Portuguese borrower-based measure, as it further (i) decreases the risk parameters of the borrowers and (ii) increases the capital ratio of 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 editor is Pedro Duarte Neves. 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.

July 2021

Challenges in measuring fiscal effects • Cláudia Braz, Maria Manuel Campos.

Unveiling the real contribution of final demand to GDP growth • Fátima Cardoso, António Rua.

Heterogeneity in loan pricing: the role of bank capital • Diana Bonfim, Luísa Farinha, Leonor Queiró

Economic synopsis | Simple guidelines for the taxation of housing • Pedro Teles

October 2021

Euro area inflation expectations during the COVID-19 pandemic • Sandra Gomes, Nikolay Iskrev, Pedro Pires Ribeiro

Consumption expenditure during the COVID-19 pandemic: an analysis based on Portuguese card transaction data • Sónia Cabral, Cristina Manteu, Sara Serra, Cátia Silva

Household wealth in Portugal and the euro area • Sónia Costa, Luísa Farinha, Luís Martins, Renata Mesquita

Revisiting Portuguese banks' efficiency and Productivity • Nuno Ribeiro, Inês Tavares

Seminars

2021

Sep. 8 **The Financial Channel of Wage Rigidity** • Benjamin Schoefer • Berkeley, University of California.

15 **The Big Three and Board Gender Diversity: The Effectiveness of Shareholder Voice** • David Matsa • Kellogg School of Management, Northwestern University.

20 **The Economic Geography of Global Warming** • Esteban Rossi-Hansberg • University of Chicago.

22 **Worker Beliefs About Rents and Outside Options** • Simon Jäger • MIT Economics.

29 **Occupations, Life Cycle Wage Growth and Occupations** • Richard Rogerson • Princeton University.

Oct. 6 **Estimating a Life-Cycle Generalized Roy Model of Pay and Task Assignment: Compensating Differentials, Discrimination and Racial Gaps** • Limor Golan • Washington University in St. Louis.

13 **Skill Prices, Occupations, and Changes in the Wage Structure for Low Skilled Men** • Christopher Taber • University of Wisconsin-Madison.

18 **Redrawing the Map of Global Capital Flows: The Role of Cross-Border Financing and Tax Havens** • Matteo Maggiori • Stanford University.

27 **Micro Risks and Pareto Improving Policies** • Manuel Amador • Minnesota and Minneapolis Fed.

Nov. 8 **Firms, Informality and the Spatial Effects of Labor Market Shocks: Evidence from the Syrian Refugees in Turkey** • Gabriel Ulyssea • University College London.

10 **Regulating Conglomerates: Evidence from an Energy Conservation Program in China** • Daniel Xu • Duke University.

17 **Beware the Side Effects: Capital Controls, Misallocation and Welfare** • Enrique Mendoza • University of Pennsylvania.

24 **Household Labor Search, Spousal Insurance, and Health Care Reform** • Andrew Shephard • University of Pennsylvania.

29 **Global Reallocations in the US-China Trade War** • Pablo Fajgelbaum • Princeton University.

Dec. 6 **Does Political Partisanship Cross Borders? Evidence from International Capital Flows** • Margarita Tsoutsoura • Cornell University.

13 **Imperfect Risk Sharing and the Business Cycle** • Alessandro Dovis • University of Pennsylvania.

14 **Prep school for poor kids: The long-run impacts of head start on human capital and economic self-sufficiency** • Martha Bailey • UCLA Economics.

Courses

2021

Oct. 20/22 Machine Learning in Finance • Ansgar Walther • Imperial College

Prof. Ansgar Walther from Imperial College London (UK) taught a course on *Machine Learning in Credit Markets* from October 20 to 22, 2021. The course had two sections. In the first section, some popular machine learning models in the Finance literature were reviewed, covering simple regression and classification problems, tree-based models, neural networks, and the role of interpretability in machine learning.

The second part of the course was structured as a seminar. Recent academic papers in Finance related to the machine learning literature were discussed. Prof. Walther organized this literature around three topics: machine learning as a tool to predict credit default, the relationship between machine learning and causal inference, new topics on Fintech and credit markets. At the end of the course, some participants exposed their own research to Prof. Walther and to the rest of the class, receiving feedback on how to use modelling approaches from machine learning.

By Gil Nogueira

Nov. 8/12 Topics in macro-finance and continuous-time modeling • Jaroslav Borovička • New York University

The course *Topics in macro-finance and continuous-time modeling* was taught by Jaroslav Borovicka from New York University. He first covered foundations of continuous-time calculus used in macro-finance. He introduced some elementary asset pricing examples and interesting models of preferences. He analysed asset pricing implications of learning and heterogeneity in agents' beliefs and preferences.

Asset prices contain valuable information about investors' beliefs, risk attitudes, and physical probabilities. Disentangling these features of the economy is, however, challenging. He covered conceptual ideas and recent research in this area.

Modern asset pricing models introduce complex nonlinear dynamics that have different implications for cash flows that mature at different horizons. He introduced a set of tools for studying this term structure of risk.

Finally, financial constraints constitute a quantitatively important amplification mechanism in macroeconomic dynamics. Models of financial constraints that were presented crucially depend on the appropriate modelling of asset prices because these prices enter financial constraints and generate a feedback effect.

By Pedro Teles

Conferences and Other Events

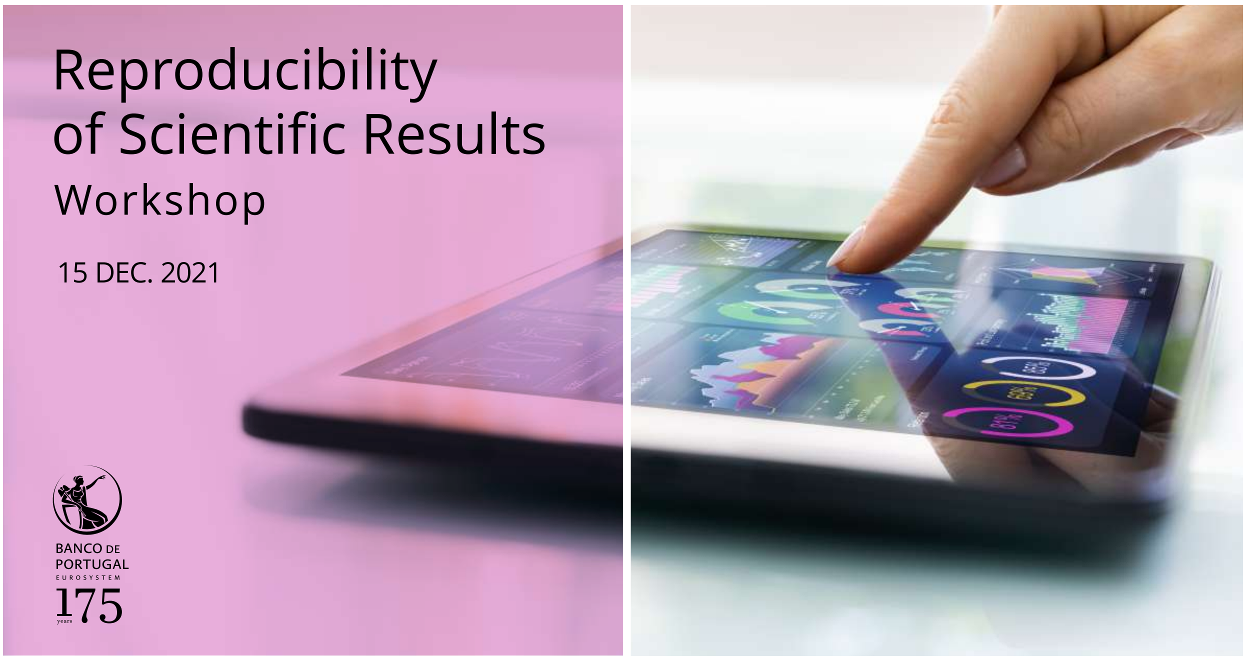
2021

Dec. 15 **Workshop "Reproducibility of Scientific Results"**

On December 15, 2021 the Microdata Laboratory of Banco de Portugal (BPLIM) organized an online Workshop on the topic of Reproducibility of Scientific Results. The workshop consisted of six presentations by recognized experts in the area. The initial presentation was by Sylverie Herbert, with a presentation titled "Implementing Reproducibility and Transparency in Central Banks". Sylverie, who is a research economist at the Banque de France, reviewed good practices of replicability for research and policy work and discussed their applicability in the central banks. The second presentation was by Luíza Andrade from the World Bank, who works with the DIME Analytics team within the World Bank, which aims to promote research transparency and reproducibility practices through trainings and code review. Luíza's presentation was about "Frequent reproducibility mistakes in Stata and how to avoid them". The next presentation was from Thibaut Lamadon, an assistant professor from the University of Chicago. Thibaut is co-author of several papers, which set new standards for reproducibility and serve as great examples for the research community. His presentation was about "Reproducibility in economics with administrative data: Making the most of existing techniques". Julia Schulte-Cloos followed with a presentation on "A tool-kit for reproducible report generation with RMarkdown, Pandoc, and Lua". Julia is a Marie-Curie funded Research Fellow at the University of Munich (LMU), and is an expert on research ethics in the age of Big Data, open science practices, and reproducibility. She has been promoting open science practices by offering advanced training programs and developing tools for generating reproducible research workflows. The following presentation was by Marianne Saam from the ZBW Leibniz Centre for Economics. Marianne's presentation, "Dawning of a new age? Replications Practices and Journal Data Policies", discussed incentives for practices of replication and possible solutions as well as the results of a survey of journal practices and presented the IREE, the International Journal for Re-Views in Empirical Economics. The final presentation was that of Lars Vilhuber. Lars is Executive Director of Cornell University's Labor Dynamics Institute and the Data Editor of the American Economic Association (AEA). He is also the Managing Editor of the Journal of Privacy and Confidentiality, and sits on advisory boards of restricted-access data centers in France, Canada, and the United States. In his presentation, Lars covered several aspects not discussed in the other previous presentations, such as data provenance and reproducibility in secure remote data access systems. He also discussed the AEA Data and Code availability policy and the current efforts to improve the reproducibility process.

Overall, there were 157 participants, of which 116 were national. The majority of the participants (82) where from universities, 52 were from central banks and the remaining 23 were from other public and private institutions. For more information on the workshop, including the presentations and videos see:

https://github.com/BPLIM/Workshops/tree/master/BPLIM2021.



Meet our researchers

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

Cláudia Braz joined the Economics and Research Department of Banco de Portugal in 1999, and currently heads the Public Finances and Structural Studies Division. Since 2015, she chairs the Working Group on Public Finance (WGPF) of the European System of Central Banks, a sub-committee of the Monetary Policy Committee, accumulating this position with her duties at Banco de Portugal. She earned her M.Sc. in Economics from Nova School of Business and Economics, where she was a Teaching Assistant and Invited Professor for over a 10 year-period. Her work has featured prominently in Banco de Portugal publications.

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

Since I joined the Bank, my main interest has been public finances.

The long experience at the Bank has allowed me to develop a thorough analytical and policy-oriented background in the public finances' domain, by being entrusted with the analysis of budgetary developments, the elaboration of fiscal projections, the development of relevant tools and fiscal policy assessments. Beyond public finances, I have become familiar with a broad range of macroeconomic, financial, and European topics. In this respect, I benefited considerably from the close cooperation with colleagues in the Department.

My duties at the Bank have also favoured the development of other skills. In the context of fiscal briefings, I have contributed extensively to rigorous counsel to the Board. In terms of external outreach, I have been an important contributor to the Bank's regular publications and authored studies, particularly on fiscal issues. Also, I have maintained an advantageous consistent interaction with both national and international institutions. The coordination responsibilities have created opportunities for the training of young economists and the leveraging of my resource management and work organisation abilities.

Finally, my responsibilities as WGPF chair deepened considerably my knowledge of EU and international fiscal-related themes as well as aspects of national fiscal frameworks outside Portugal. In terms of organisational and institutional skills, I learnt considerably from the conduct of meetings involving public finance experts from all Member States and the ECB. In particular, reaching consensus on sensitive issues has proven to be a stimulating challenge. I was also highly motivated by the presentation of the work from the group in the Monetary Policy Committee.

Although I have been at the Bank for more than 20 years now, coming to work every day remains a pleasure. I feel very fortunate for having the possibility to work in the Economics and Research Department's inspiring environment and benefit on a daily basis from a rich interaction with peers.

Bruno Freitas is an economist in the Monetary Policy division at the Economics and Research Department of Banco de Portugal since 2019. He holds a M.Sc. in Economics from Nova School of Business and Economics, where he was an invited Teaching Assistant. His general areas of research are macroeconomics and monetary policy.

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

Over the past years, my research focus has been primarily directed towards monetary policy, namely assessing the latest macroeconomic developments and outlook for the euro area in furtherance of informed policy advice. Some of my policy-oriented research comprised the impact of the COVID-19 pandemic on economic activity in the euro area, its labour market and price levels, as well as the drivers behind the subsequent and present-day recovery.

More recently, I have sought to shed a new light on the role of inflation in public debt dynamics by characterizing the common features of debt reduction episodes in which inflation played a major role. I believe that a correct characterization of these periods is necessary to a well-grounded discussion of monetary-fiscal policy interactions.

I am very grateful for the opportunity to regularly take part in friendly, engaging and thought-provoking discussions of challenging economic issues with my colleagues, with whom I have learned invaluable insights.

Visiting fellows 2022

Banco de Portugal offers cash grants to support research projects in the field of Economics, with a view to promoting interchange 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. Due to the pandemic situation, Banco de Portugal will not be considering applications until current travel and workplace restrictions are lifted. All interested parties are invited to check Banco de Portugal's website for updates.
Further information may be obtained via email: conferences@bportugal.pt.

Consultants

Miguel Portela • University of Minho

Upcoming events and announcements

Seminars 2022

Feb. 16 Fabrice Tourre • Copenhagen Business School
Mar. 2 Paulo Bastos • World Bank
9 Liyan Shi • Einaudi Institute for Economics and Finance (EIEF))
23 David Thesmar • MIT Sloan School of Management
30 David Hémous • University of Zurich
Apr. 1 Robert Shimer • Kenneth C. Griffin Department of Economics - University of Chicago
8 Kyle Herkenhoff • Federal Reserve Bank of Minneapolis
20 Costas Meghir • Yale University
27 Fatih Guvenen • University of Minnesota
May 11 Isabelle Mejean • Sciences Po
25 Kim Ruhl • University of Wisconsin
Jun. 1 Antoinette Schoar • MIT Sloan School of Management
15 Kuntara Pukthuanthong • University of Missouri

Conferences 2022

Jun. 20-21 **Workshop on Labour Economics**
Jul. 4-6 **11th MoFIR Workshop on Banking**

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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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