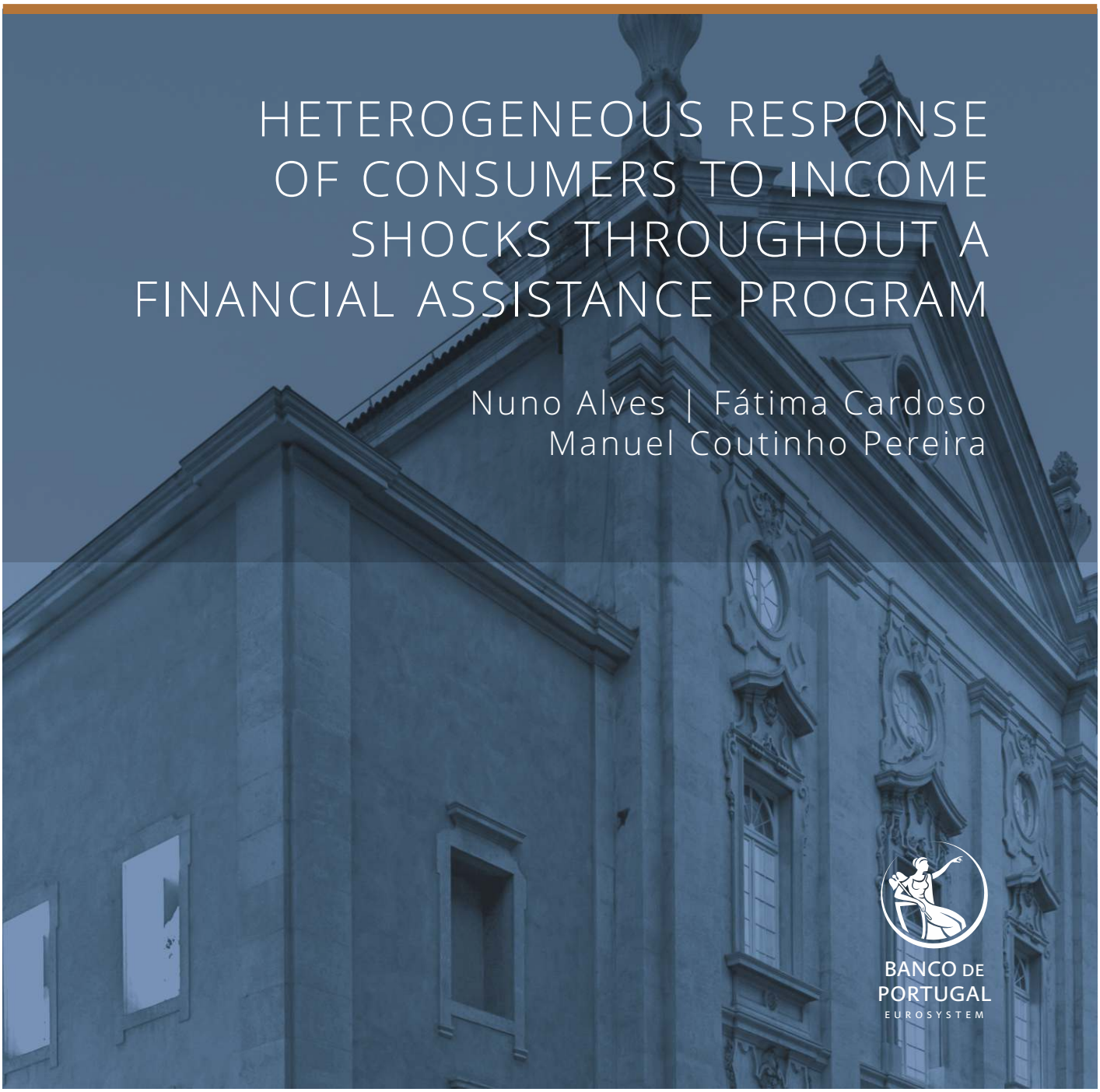
18

WORKING PAPERS 2020

HETEROGENEOUS RESPONSE OF CONSUMERS TO INCOME SHOCKS THROUGHOUT A FINANCIAL ASSISTANCE PROGRAM

Nuno Alves | Fátima Cardoso
Manuel Coutinho Pereira



BANCO DE PORTUGAL
EUROSYSTEM

18

WORKING PAPERS 2020

HETEROGENEOUS RESPONSE OF CONSUMERS TO INCOME SHOCKS THROUGHOUT A FINANCIAL ASSISTANCE PROGRAM

Nuno Alves | Fátima Cardoso
Manuel Coutinho Pereira

NOVEMBER 2020

Please address correspondence to
Banco de Portugal, Economics and Research Department
Av. Almirante Reis, 71, 1150-012 Lisboa, Portugal
Tel.: +351 213 130 000, email: estudos@bportugal.pt

BANCO DE PORTUGAL
EUROSYSTEM

Lisboa, 2020 • www.bportugal.pt

Working Papers | Lisboa 2020 • Banco de Portugal Av. Almirante Reis, 71 | 1150-012 Lisboa • www.bportugal.pt •
Edition Economics and Research Department • ISBN (online) 978-989-678-754-7 • ISSN (online) 2182-0422

Heterogeneous response of consumers to income shocks throughout a financial assistance program

Nuno Alves
Banco de Portugal

Fátima Cardoso
Banco de Portugal

Manuel Coutinho Pereira
Banco de Portugal

This version: November 2020

Abstract
This paper studies the impact on consumption of the exogenous changes in public wages in Portugal arising in the context of the economic and financial assistance program (2011-2014), by exploiting the variability in the size of such changes across municipalities. The initial wage cuts triggered a marked reduction of private consumption, while the reinstatements in the later years gave rise to an increase, albeit of a smaller magnitude. The consumption response was larger for employees with relatively lower wages. Households smoothed the impact on consumption of negative income shocks by drawing down their deposits. Consumer credit did not play such a role, as households deleveraged as a response to those negative shocks.

JEL: E21, E62, E65

Keywords: wage shocks, positive and negative shocks, household consumption response, MPC heterogeneity.

Acknowledgements: We would like to thank João Amador, António Antunes, Lara Wemans and participants in an internal seminar for valuable comments. The views expressed are those of the authors and do not necessarily coincide with those of Banco de Portugal or the Eurosystem. All errors are ours.

E-mail: njalves@bportugal.pt; fcardoso@bportugal.pt; mpereira@bportugal.pt

1. Introduction

Understanding the transmission of income shocks to consumption decisions is critical to anchor the modelling of households' decisions and to assess the impact of public policies. Uncovering reliable estimates of the marginal propensity to consume (MPC) out of income shocks has been the subject of an extensive literature for several decades (see Jappelli and Pistaferri (2010, 2017) for comprehensive reviews). These studies have found that the MPC depends on the size, sign and persistence of income shocks, on households' characteristics and on the degree of credit market frictions. Such work comprises, among others, Gross and Souleles (2002), Souleles *et al.* (2006), Agarwal *et al.* (2007), Parker *et al.* (2013), Mian *et al.* (2013), Misra and Surico (2014), Jappelli and Pistaferri (2014), Agarwal and Qian (2014), Sahm *et al.* (2015), Bunn *et al.* (2018), Dupor *et al.* (2018) and Christelis *et al.* (2019). Despite the richness of the literature, a convincing identification of the response of consumption to income shocks is still work in progress. In particular, isolating truly exogenous income shocks has proven a daunting task.

We contribute to this work by analysing a quasi-experimental framework arising in Portugal in the context of the sovereign debt crisis. In this period, there were very sizeable public wage changes (cuts and reinstatements) decided at a national level. These had a heterogeneous profile across municipalities, given the progressive nature of these wage changes, and the differences in the size of the public sector and in the characteristics of civil servants at such regional level. In this context, we are able to uncover the household consumption response to income shocks, taking advantage of a rich dataset by municipality comprising full card withdrawals and payments, which approximate private consumption[1], as well as household financial data.

The use of regional data to estimate MPCs and identify potential layers of heterogeneity adds to a rapidly growing literature employing regional settings to address macroeconomic issues (Chodorow-Reich 2019). Three features add particular interest to our contribution. Firstly, we are able to track the full cycle of public wage cuts and subsequent reinstatements over about half a decade. Indeed, at the beginning of the sovereign debt crisis, around 2011-2012, there were very strong and largely unanticipated cuts to public wages. These were afterwards unwound, but the reversal was gradual and on occasion there were temporary setbacks, with public wages rising and falling within the same year. This process was only completed by 2016-17. We can therefore disentangle the effects of positive and negative shocks under a common setting.

Secondly, we are in a position to assess heterogeneity of the MPC on the basis of the characteristics of agents, because we compute the shocks from microdata,

1. Card transactions approximate well consumption of non-durables and durables excluding cars (cars make up about half of purchases of durables). This is the actual aggregate we are studying throughout the paper, but for simplicity we refer to private consumption without this qualification.

at the worker level. While this is standard in the literature assessing MPCs on the basis of households' replies to survey questions, it is less common in the quasi-experimental literature based on regional shocks. Thirdly, we combine datasets with monthly data for both consumption and household deposits and consumer credit at the municipality level, making it possible to study also the response of these financial variables to income shocks. This allows us to shed some light on the financial channels mediating the transmission of income shocks to consumption decisions, which are typically postulated but rarely inferred from the data in the literature.

Our key findings are as follows. First, the MPC is highly dependent on the nature and characteristics of the income shock. There was a strong consumption response to the large and negative public wage shocks at the beginning of the sovereign debt crisis in the first years of our sample. These shocks were arguably unexpected and perceived at the time as very persistent. Afterwards, following in particular a Constitutional Court decision partly overturning some of the initial wage cuts, expectations that all cuts would eventually be reverted became prevalent. From 2013 onwards, we estimate smaller and less persistent impacts following positive income shocks vis-a-vis those of negative shocks in the initial years, which may be explained by anticipation of shocks. In turn, the negative shocks that occurred during this later period are estimated to have had no impact on consumption, in line with agents' having largely perceived them as transitory.

We also find heterogeneity in the MPC both as a function of income and age. As regards income, in general, the response of consumption is larger the lower the wages of those experiencing the shock. This is particularly clear following the large negative income shocks at the beginning of the sample. As regards age, the estimates suggest a decreasing pattern of MPCs as households get older.

Finally, the financial counterpart to the consumption decisions has to be interpreted on the backdrop of the financial constraints prevailing in the context of the financial and sovereign debt crises. This implied that the response of consumption was mediated to a large extent by changes in deposits and not through the recourse to the credit market. In fact, for 2011-2012 we estimate a significant fall in deposits as a response to negative income shocks, in line with some degree of smoothing of consumption. Looking at heterogeneity, such an effect was less pronounced among the higher-income workers, which is a surprising result to a certain extent. In turn, consumer credit responded negatively, probably relating to the deterioration in households' net worth in the wake of negative income shocks, implying more binding credit constraints. The estimates for the second part of the sample are not so clear-cut. Nevertheless, in the case of the negative shocks, which were transitory, there is evidence of a decline in deposits, again in line with the smoothing of consumption by households. As regards credit market decisions, we estimate a fall in consumer credit after positive wage shocks, indicating that households decided to deleverage more.

The remainder of the article is organized as follows. Section 2 describes the sequence of cuts and reinstatements of public sector wages in Portugal and

discusses their nature. Section 3 deals with the wage data and the computation of the shocks, also presenting an overview of the heterogeneity of shocks across municipalities. Section 4 presents the corresponding data on consumption, deposits and consumer credit. Section 5 outlines the econometric methodology. Section 6 reports the estimated aggregate MPC over the period under analysis and Section 7 describes the heterogeneity of MPCs by income and age of the workers affected by the shocks. Section 8 focuses on the households' financial response to income shocks. Concluding remarks are made in Section 9.

2. Cuts and reinstatements of public wages in Portugal over the period 2011-2016

The shocks analysed in this paper are based on the sequence of cuts and reinstatements of public wages implemented around the Portuguese Economic and Financial Assistance Program (May 2011 - June 2014), agreed between the Portuguese authorities, the European Union and the International Monetary Fund.[2] In this section, we describe the legislative measures underlying such wage changes and provide a brief account of the context and rationale behind them. In an Appendix, we present a chronology of the sequence of measures and respective shocks.

In order to help understand what follows, we note that civil servants in Portugal earn a monthly salary, comprising a base wage plus, for some workers, extra allowances. In addition there are two annual bonuses («holiday» and «Christmas») equal to one monthly base wage each. Prior to the economic and financial crisis these bonuses used to be paid in June and November. Some of the changes in salaries we consider were enacted through special legislation, but most of them were passed through the annual State Budgets. In normal circumstances, in Portugal the State Budget is presented by government to the Parliament by mid-October and the general approval takes place around early November. This was always the case in the years from 2011 to 2014, in time for the Budget to come into force on January 1, after the final approval of Parliament and enactment by the President of the Republic.

The sequence of legislated changes starts with the cut of the monthly full wage (i.e. base wage plus allowances) set out in the 2011 Budget and in force from the beginning of the year, some months before the start of the Assistance Programme. This pay-cut had a progressive nature, ranging from 0 to 10 percent, depending on the wage earned. The 2011 Budget was not explicit about the possibility of a reversal of the wage cut. This is likely to have been perceived as very persistent, given the difficult circumstances of the Portuguese economy at the time. The

2. In the framework of the program, there were important tax shocks as well. This is not an issue for our results, as long as there is no significant correlation on a monthly frequency (used in the estimations) with the wage shocks being studied, which is plausible.

Constitutional Court was called to evaluate this wage cut in September 2011 and decided to uphold it, considering that the measure would last while «fiscal emergency» lasted.

The difficult situation of public finances led the new government (which took office in June 2011) to pass a second wage cut in the 2012 Budget, suspending or reducing the payment of the Holiday and Christmas bonuses for most workers while the Assistance Programme lasted. This second cut was also progressive, but the number of affected workers was larger. The Constitutional Court was called to rule on the lawfulness of this measure and, in July 2012, decided that it was unconstitutional, but the ruling would only take effect from the beginning of 2013. This outcome came largely as a surprise at the time.

In order to cope with the Court's last decision, government reinstated the payment of one of the bonuses in full in the 2013 Budget, ruling further that this was to be paid in 12-monthly instalments. The fact that government did not incorporate fully the Court's decision into the Budget raised controversy during its discussion, and prompted the President of the Republic to request an assessment by the Constitutional Court of the relevant provisions immediately after the budget came into force.[3] The response came in April 2013 when the Court decided that Government would have to reinstate the full amount of the second bonus as well. Government implemented this last decision through legislation coming into force in June 2013, by which the payment of the part of the bonus concerned by the decision would take place in November (the part that had not been cut would be paid in June as previously scheduled).

Following the Court's decision of April 2013, the government prepared legislation to enlarge the initial 2011 pay-cut (which was still in force), in order to make up for the reinstatement of the bonuses to some extent. Such a legislation was passed in the 2014 Budget, setting out more extensive cuts of the monthly full wage. These were also progressive and ranged from 0 to 12 percent, taking as a reference the initial 2010 wage (prior to the implementation of the 2011 cut). Such cuts were in place from January to May 2014, date at which the Constitutional Court announced its decision to overturn them (a decision possibly anticipated by agents to a large extent). A short period followed in which wages went back to the pre-2011 level, until government ruled the reintroduction of the original 2011 cut by a law passed in September 2014. The first bonus that had been paid in 12-monthly instalments was paid without any cut during this interim period, and the second bonus was similarly paid without any reduction in June.

Against the background of the end of the Assistance Programme (June 2014), government prepared in July 2014 legislation foreseeing the phasing out of the 2011 cut, which had been suspended and was to be re-introduced soon. According to this legislation, 20 percent of the cut would be reversed from 1 January 2015 on,

3. In the two previous instances, the assessment by the Constitutional Court had been requested by Members of Parliament of the opposition parties.

while the reversal of the remaining part should occur over a period of up to four years (i.e. up to 2018). The President of the Republic sought an assessment of the Constitutional Court before it come into force. In August 2014 the Court ruled that the full reversal should occur up to 2016, given the conclusion of the Assistance Programme. The law, passed in September 2014, established the reversal of 1/5 of the 2011 cut from 1 January 2015 on, but left open the way how further reversals would occur. The 2015 State Budget did not include any further provisions in this respect. Government suggested it would pay back only a further 1/5 of the cut during 2016, if it won the coming elections.

A new government coming out of the October 2015 elections, supported by different political forces, took office in November. At the end of December, legislation was approved setting out the calendar for the full reinstatement of the 2011 cut, in the course of 2016. This was to occur cumulatively over the year, by an extra 1/5 at the beginning of each quarter.

Two distinct periods stand out in this narrative. The first one starts with the presentation of the 2011 Budget and extends approximately over the following two years. It is dominated by the severity of the economic and financial crisis. The two key negative wage shocks enacted in this context (the 2011 cut and the suspension of bonuses in 2012) are likely to have been regarded as very persistent by agents. The subsequent years saw a gradual improvement in the macroeconomic conditions and in the prospects that Portugal would complete successfully the adjustment programme by mid-2014. This allowed the reversal of the wage cuts, in a process sped up by the decisions of the Constitutional Court. The negative shocks enacted in these later years essentially replaced measures previously overturned by the Court and as such agents most likely regarded them as temporary.

3. Wage data and computation of shocks

3.1. Wage data

Shocks were computed by simulating the successive legislated changes in salaries with microdata from the 2005 Public Administration Census (*Recenseamento Geral da Administração Pública*), for Central Government and Regional Government of Madeira.[4] In the case of Local Government, data from the 1999 Census were used, as the 2005 Census had an incomplete coverage. The Censuses encompass detailed information at the level of the worker including the base wage and extra allowances.

The salary of each worker was firstly projected to 2010 - to proxy the level when the first cut was enacted - on the basis of the annual updates of the wage scale. The procedure employed to compute the wage level in 2010 and, more generally,

4. Data for Azores Regional Government were not available and, for this reason, the municipalities in Azores were altogether excluded from the exercise.

the use of the wage distribution in 2010 to simulate the shocks throughout the full period under consideration is reasonable given the freezing of career progression (the other source of changes in wages) for most of the time from 2005 until the years after the economic and financial crisis.[5] Naturally there were also changes in the composition of the public workforce, driven by retirement and hiring of employees (dismissal of civil servants is only allowed in very special circumstances in Portugal), but it is reasonable to assume that the distribution of public wages within each municipality did not change substantially.

The data on private consumption and financial variables (see Section 4) are available at the municipality level and therefore we must aggregate the individual shocks to that level, prior to assessing impacts. We consider 289 municipalities, given the exclusion of those of Azores. We scale shocks so that these represent the change in total income of the municipality, as we are considering the impacts on the respective total consumption. We take the private sector wage bill by municipality from *Quadros de Pessoal*, also a worker level database. We do not have data with the corresponding level of disaggregation for pensions and other sources of income. We used the weights of household income components,[6] to scale further the shock to represent the change in total income of the municipality after a change in public wages.

Although impacts are estimated by regressions at the municipality level, the fact that shocks are calculated from microdata enables us to study heterogeneity of impacts along the distribution of wages. We know the position occupied by the affected workers in the wage distribution in the private and public sectors, and we can assess the way such position interacts with the effects of the shocks. We also investigate the existence of such an interaction with workers' ages, another variable available in our micro datasets.

3.2. Two approaches for the computation of shocks

On the basis of the narrative presented in Section 2, it is possible to derive more than one shock series, depending on the assumptions made about the moment agents reacted to the shocks, and the change in income they perceived the shock to entail. The most straightforward approach is to assume that households only reacted when wages actually changed, and by the respective change. Event studies on the effect of taxes (Romer and Romer 2010; Cloyne 2013) follow this type of approach as a benchmark. This is consistent with the empirical literature (in particular, associated with natural tax experiments) which documents that

5. Career progression was suspended in August 2005 until new legislation was approved in the course of 2008. However, due to delays in the coming into force of this new legislation, and the rules themselves governing workers' progression, relatively few employees managed to get advancements until the freezing was re-introduced from January 2011 on and kept throughout the crisis.

6. Taken from the Household Expenditure Survey (*Inquérito às despesas das famílias*) 2010-2011, at the NUT2 level. This is an aggregated geographical classification, with only 7 regions in total.

households react to changes in disposable income, even in the case of richer households, for whom liquidity constraints should be less binding. This *payment approach* is the first followed in this paper. In the case of changes in the base wage, the shock is just the change in the monthly wage received, recorded in the month it took effect. The shocks at the worker level are then aggregated to the municipality level. We have nevertheless a difficulty in the case of changes affecting the Christmas and holiday bonuses, which are intermittent payments occurring in two specific months of the year.[7] A strict application of the payment approach is unfeasible in this case, as it would require to record a shock in the month the bonus was paid and to cancel it out in the following month, and proceed with such a recording in the subsequent years (given the non-transitory nature of the shock). We assume, as an alternative, some degree of smoothing, i.e. that employees received this income uniformly over the twelve-month period starting in the month the bonus was paid. The shock is $1/12$ of the change in the yearly bonus, recorded in the month the measure took effect, namely the month the bonus was paid. Furthermore this procedure is consistent with the seasonal adjustment of the consumption data we use.

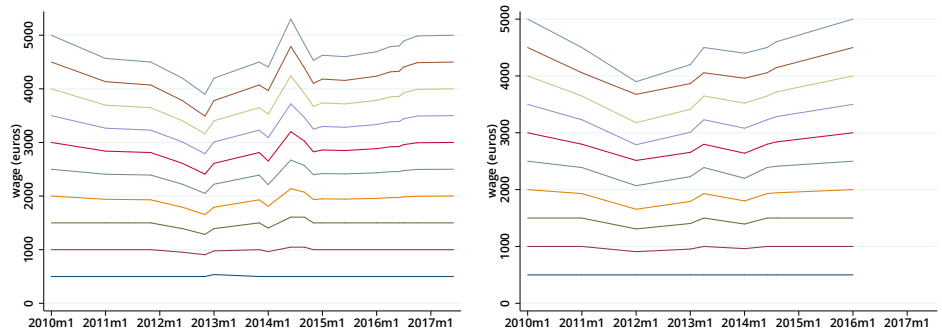
We compute an alternative shock series following an *announcement approach*. Agents without liquidity constraints may have modified their behaviour once they learned about the coming changes in wages, even before these impacted actual payments. If this was the case, it is also likely that agents took into account the full impact of the measure on the salary (considering the base wage and bonuses), and disregarded the precise timing of implementation of the measure, and their short-term impacts. A practical difficulty arising in this approach is to ascertain the time of the «credible announcement» of the legislated measure. We chose to date the shocks to the time of approval of the respective legislation,[8] except - as explained below - where anticipation to a prior date was possible on the basis of Constitutional Court decisions. For example, the partial suspension of the Christmas and holiday bonuses is assigned for the full amount to January 2012, the date of approval, instead of June and November in the payment approach. The December 2015 measure reinstating the pre-2011 wages is recorded taking as a reference the final amount, while in the payment approach the recording follows the gradual pace of the reinstatement.

As said, in the announcement approach we allow anticipation of the measures prompted by previous decisions of the Constitutional Court which implied a reasonably clear course of action by government. In this instance, the shocks are dated to the moment of the decision. This is the case of the obligation to re-instate the second bonus, in April 2013, and of the overturn of the 2014 wage cut, in May of that year. In contrast, we do not allow anticipation of government measures

7. As described above, this characteristic changed to a certain extent as part of the legislated changes we are studying.

8. Approximated by the publication date; when publication occurs until the mid of the month, the shock is allocated to that month, otherwise it is allocated to the following one.

preceded by Constitutional Court decisions for which there was uncertainty about how and when government would implement them. Examples of the latter are the Court decisions, respectively, of July 2012 overturning the cut in Christmas and holiday bonuses, and of August 2014 recommending the reinstatement of the pre-2011 wage level.



(a) Payment approach (b) Announcement approach

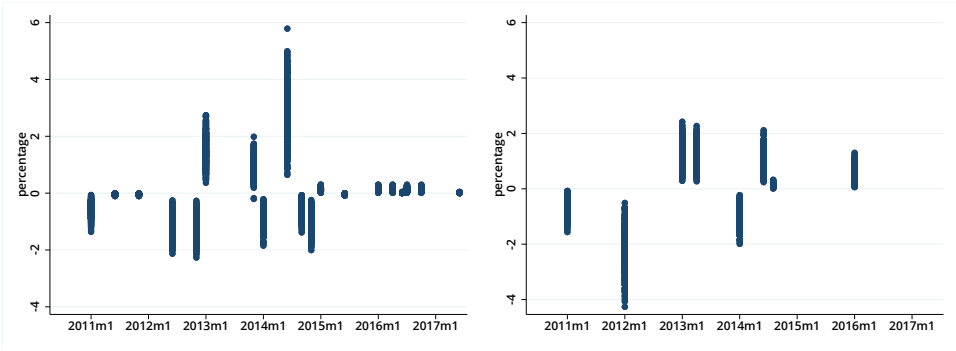
Figure 1: Evolution of monthly individual wages, as driven by shocks in each approach

Note: Wages in the payment approach refer to the amounts actually paid, the bonuses being allocated by 1/12th over the twelve-month period starting in the month of payment. Wages in the announcement approach refer to the «mensualised» yearly wage (including bonuses) that each measure entailed.

We end this section by presenting the evolution of wages as driven by the shocks in the two approaches (Figure 1). The progressive nature of the wage cuts is evident: wages below 1000 euros were hardly affected, while wages around 5000 euros had cuts reaching 20% at their maximum extent. Besides the precise timing of the shocks, the profile of wages as driven by the shocks in each approach also differs. In particular, the temporary return of wages to the pre-2011 level, after the Constitutional Court rejected the 2014 wage cut, does not give rise to shocks under the announcement approach. Moreover, in the latter approach, the full reversal of the initial cut was concluded in just one step in January 2016, while in the payment approach this reversal extended further in time, reflecting its gradual nature.

3.3. The shock series

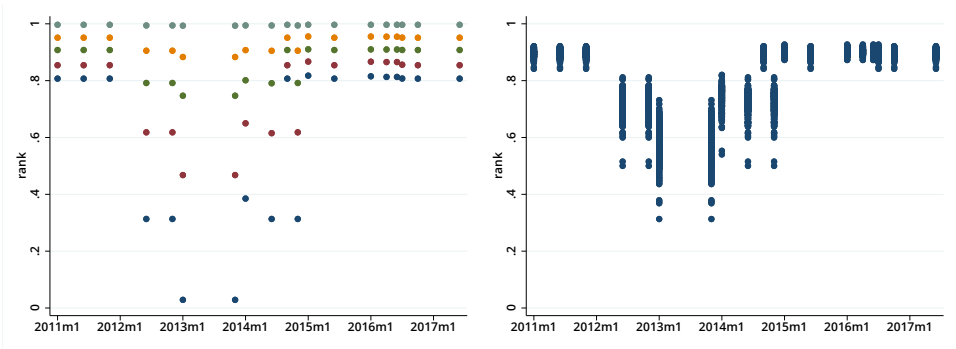
Figure 2 presents the shocks after aggregation to the municipality level. In an Appendix, we provide details about the timing and amount of each shock in the two approaches. There is considerable heterogeneity across municipalities. Several shocks range from close to zero to up to two percent of the overall municipality income, and the largest ones reach a maximum over four percent. Such a sectional variability in the size of shocks across municipalities is important, because it is the basis to estimate their effects.



(a) Payment approach (b) Announcement approach

Figure 2: Shocks across municipalities (as a percentage of municipality income)

As described above, all wage cuts enacted in the period were progressive, affecting disproportionally civil servants across their wage distribution. Considering the distribution of private and public salaries, the cuts become even more progressive as public employees tend to earn more than their private sector counterparts (chiefly reflecting higher educational attainment). For instance, in 2010, the median salary in public administration was 77 percent above that in the private sector.



(a) Rank, percentiles 1 25 50 75 and 99 (b) Rank, mean across municipalities

Figure 3: Wage rank of the workers affected by the shocks, payment approach

Note: The wage rank is computed taking as a reference all workers in the public and private sectors, and normalized to the interval (0,1).

Figure 3 intends to illustrate the progressivity of shocks, which affected only average-to-high income workers. For instance, only the workers in the upper quintile of the private-public wage distribution had their wage reduced by the 2011 cut, while the partial suspension of the Christmas and holiday bonus in 2012 affected

the workers in the three upper quintiles (Panel (a)). There is nevertheless some variation across municipalities in the position of the concerned workers in wage distribution, as Panel (b) illustrates for the mean. We take advantage of such a variation to study the interaction between the wage level and the impact of the shocks.

4. Data on consumption and financial variables

Household consumption is approximated by cash withdrawals at automated teller machines (ATM) and payments at point of sale terminals (POS) by municipality, on a monthly basis (source: *SIBS - Sociedade Interbancária de Serviços*).[9] Such withdrawals and payments capture around 60 percent of purchases of non-durable goods plus durables excluding cars (cars are typically paid in a different way).

The series of card withdrawals and payments enters the regressions in first differences of logarithms, approximating percentage changes. In terms of percentage changes, the national total of card transactions has a correlation with private consumption in quarterly National Accounts over 90 percent for year-on-year rates, and close to 70 per cent for chain rates (this holds both for total and non-durable consumption). Figure 4 shows the evolution of the quarterly year-on-year rates of change.

Besides analysing the effects on consumption we study the impact of the wage shocks on household financial variables, namely deposits and consumer credit (source: *Banco de Portugal*). These data are also available by municipality, on a monthly basis. All data - non-financial and financial - were adjusted for seasonality and working day effects using the X13-ARIMA procedure, and deflated using the Harmonised Index of Consumer Prices.

5. Econometric methodology

A key issue one needs to address is the exogeneity of the shocks. Changes in public wages responded to the situation of public finances, which were themselves impacted by the overall macroeconomic situation of the country. Such an indirect link to macroeconomic developments can be primarily controlled for by the inclusion of time fixed-effects. The precise shape (e.g. size) of the shock in each municipality is, however, also mediated by the characteristics of the municipality. For example, progressive shocks tend to be larger for richer municipalities whose consumption may also have behaved differently in comparison to poorer ones during the crisis. Municipality fixed-effects control for the respective characteristics that may impact

9. Only transactions made with domestic cards were considered, given that it is intended to estimate the response of consumption of residents. The payments made through online banking were not included, because their breakdown by municipality is not available.

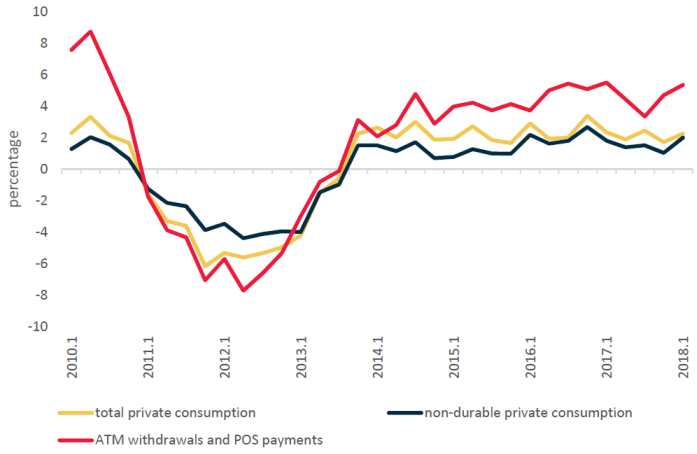


Figure 4: Private consumption and card withdrawals and payments (year-on-year changes in volume)

consumption and be correlated with the shocks, at the same time. In addition, we control for the local trajectory of consumption through the inclusion of lags of card withdrawals and payments, in order to hold fixed any factors varying across time and space which affect consumption and may be correlated with the shocks at the municipality level. Finally we control for the lags of the shock itself and the change in the number of ATM and POS by municipality.

Our econometric specification is an application to a dynamic panel setting of the specifications used by previous authors to assess the impact on consumption of income changes, such as Souleles *et al.* (2006) and Misra and Surico (2014). In this specification, changes in consumption are modelled as a function of the shock and additional controls, including time and individual effects. Moreover, we follow a local projection-type specification (Óscar Jordà 2005), which has been used in many recent works for the computation of impulse-responses.[10]

The responses of private consumption to changes in income, as a result of changes in public wages, are thus estimated by a series of regressions, for horizons (i.e. months ahead) $h = 0, 1, ..., H$

$$\ln c_{i,t+h} - \ln c_{i,t-1} = \alpha_i^h + \gamma_t^h + \beta^h \Delta W_{i,t} + \varphi^h(L) Ctrl_{i,t-1} + e_{i,t+h},$$

where i indexes municipalities, t indexes time, $\varphi^h(L)$ is a polynomial in the lag operator of order 11. $\ln c$ is the log of card withdrawals and payments, which proxy consumption, and ΔW are the wage shocks. $Ctrl$ is a vector including $\Delta \ln c_{i,t-1}$, $\Delta W_{i,t-1}$ and the first lag of the change in the number of ATM and POS by municipality.

10. See Auerbach and Gorodnichenko (2013), Leduc and Wilson. (2013), Romer and Romer (2017), Ramey and Zubairy (2018) and Fieldhouse *et al.* (2017), to mention just a few.

Given that our shock is arguably exogenous conditional on the controls included, we are in a position to use a standard fixed-effects estimator. Standard errors are computed by the Driscoll and Kraay (1998) method, which is robust to the presence of broad patterns of correlation in the residual variables, notably across time and municipalities. The regressions are weighted by the weight of the municipality public and private wage bill in the national total.

The regressions above yield the percentage response of consumption h months ahead to a 1 percent change in income, driven by a change in the public wage bill. We report the ratio of the cumulative percentage response of consumption to the cumulative income response, up to a given horizon, computed as $\frac{1}{H+1}\sum_{h=0}^{H}\hat{\beta}^h$, with $H = 0, 3, 6, 12, 18$ (note that income increases by 1% on impact and remains constant throughout the full horizon). This may also be viewed as average cumulative change in the path of consumption. The analysis of average cumulative responses is convenient for the presentation of marginal propensities to consume (MPCs)[11] at which we will be looking, and has also the advantage that it smooths out the noise in the responses stemming from the high - monthly - frequency of the data used.

We compute the impact of income shocks on the changes in household deposits and consumer debt on the basis of regressions similar to the ones above, but now considering as the dependent variable the change in the log of the respective stocks between $t-1$ and $t+h$. For these financial variables, as we are interested in the average cumulative responses of the first differences (not of the levels),[12] the coefficients of the shock taken from the regressions need not be cumulated. The figures reported in the tables are these coefficients, $\hat{\beta}^h$, divided by $h+1$ to normalize by the response of income, as before.

We also study the impact of negative and positive shocks, and modify the specification above accordingly, including in the same regression the contemporaneous values and lags of both kinds of shocks. Moreover, we study the interaction of the shock with variables such as the means by municipality of the position in the overall wage distribution and of the age of the affected workers. This is done on the basis of specifications (in the case of consumption) of the type

$$\ln c_{i,t+h} - \ln c_{i,t-1} = \alpha_i^h + \gamma_t^h + \beta^h \Delta W_{i,t} + \delta^h Z_{i,t} + \theta^h \Delta W_{i,t} Z_{i,t} + \varphi^h(L) Ctrl_{i,t-1} + e_{i,t+h},$$

where Z is each one of the interaction variables, and controls now include the lags of the interactions of the shock, in addition to the other variables. In this instance, the estimates reported in the tables refer to the overall marginal effect of the shock, including the interaction term.

11. In the analogous context of the presentation of fiscal multipliers, several authors such as Ramey (2016), have argued for the presentation of impulse-response functions as the ratio between the cumulative changes in the response-variable and the shock-variable.

12. Given the accounting identity between consumption, income and changes in household assets and liabilities.

6. Response of private consumption

6.1. Payment approach

In the payment approach, shocks span between January 2011 and June 2017.[13] The data used in the local projection regressions start in 2010:1 (but the first year is lost in first-differencing) and end in 2018:12, given that we compute impulse-responses for up to 18 months ahead. Furthermore, we split the sample into the period up to 2012 and the subsequent years, in line with the two main periods that emerge from the narrative presented in Section 2.

		Full sample		Sample 2011-12		Sample 2013-17	
Months	**All**	**Neg.**	**Pos.**	**Neg.**	**Pos.**	**Neg.**	**Pos.**
0	0.18*	0.16	0.17	0.83***		0.12	0.18***
	0.10	*0.23*	*0.10*	*0.19*		*0.31*	*0.07*
3	0.24***	0.26	0.24***	0.71***		0.15	0.26***
	0.06	*0.20*	*0.07*	*0.13*		*0.23*	*0.05*
6	0.18***	0.24	0.17***	0.57***		0.35	0.18***
	0.07	*0.22*	*0.05*	*0.16*		*0.24*	*0.05*
12	0.14**	0.23	0.1	0.52***		0.39	0.06
	0.07	*0.14*	*0.07*	*0.17*		*0.26*	*0.07*
18	0.12*	0.26**	0.04	0.38**		0.36	-0.06
	0.06	*0.13*	*0.06*	*0.18*		*0.24*	*0.07*

Table 1. Average cumulative response of consumption to a shock to public wages, payment approach

Note: Ratio of percentage cumulative consumption response to cumulative income change, up to the given month, following a shock to public wages equal to one percent of household income.

Table 1 presents the impact of wage shocks - equal to one percent of household income - on consumption for the payment approach, also considering separately negative and positive shocks. The estimated impacts - where statistically significant - have the conventional positive sign: negative wage shocks decrease consumption, while positive shocks increase it. It is also apparent that the impacts for the full sample, and considering the shocks as a whole, reflect quite different estimates for the two subsamples considered and separating positive and negative shocks.

In order to compute MPCs, we scale the figures in the table by the ratio - equal to 0.83 - of average consumption to average income of Portuguese households in

13. The phasing out of the 2011 cut was completed in October 2016, but this impacted the second bonus to be paid in the following year only in June, corresponding to the final shock in this approach.

euro.[14] In the period 2011-2012 there are negative shocks only. The responses to them are clearly significant, with the average cumulative MPC estimates standing at 69 cents on impact, 47 cents after six months and 31 cents after eighteen months. In contrast, negative shocks in the years 2013-2017 produce no impact. Positive wage changes trigger an increase in consumption in this latter subsample, but such an increase is significant only up to six months and of a smaller magnitude, the average response remaining around 15 to 20 cents, per euro of change in income. In order to put these figures into perspective, simulations of a life cycle model with constant risk aversion came out with MPCs out of permanent shocks of 0.77 and 0.93, respectively, depending on whether agents could borrow or not. The corresponding figures for transitory shocks were 0.05 and 0.18 (Jappelli and Pistaferri 2010).

The absence of a response to the wage cuts in 2013-2017 suggests that the affected households (mostly belonging to the upper brackets of the wage distribution) may have regarded them as transitory and smoothed them out. Specifically, agents could be expecting from the start the Constitutional Court to overturn the 2014 wage cut. Similarly the lifting of the original 2011 wage cut in the months following that same Court decision was known in advance to be temporary and could have been disregarded by agents, along with the negative shock associated with the ensuing reintroduction. This contrasts with the cuts in the initial years that agents are likely to have regarded as long-lasting.

A second piece of evidence following from Table 1 is the more pronounced impact of negative shocks in the period 2011-2012 vis-a-vis that of positive shocks in the subsequent years. This is in line with previous work separating out the impacts of income declines and increases which has often found a stronger impact of the former. For instance, Bunn *et al.* (2018), on the basis of questions included in a household survey for the UK, reported MPCs of 64 and 14 pence per pound of change in income, over an annual horizon, respectively, for negative and positive shocks. In the same vein, Sahm *et al.* (2015) found that a sizeable segment of households in the US used the 2011 payroll tax cut mostly to rebuild their balance sheets (rather than spend more) and then, when the payroll tax cut expired in 2013, reacted by spending less (rather than drawing down their balance sheets).

In our context such an evidence could square with agents' becoming gradually to expect the wage reinstatements that occurred in the post 2013 period,[15] which could have diluted in time their reaction. An explanation not backed by the data

14. Figures taken from the Household Expenditure Survey (*Inquérito às despesas das famílias*) 2010-2011. We considered all consumption classes, except car purchases and imputed rents, to approximate the type of purchases normally made with cards (see Section 4), and took all households. We could have as well taken only the households in the upper income brackets, say, in the three upper quintiles, to which affected workers mostly belong. As it turns out, the ratio of averages for the households in these quintiles is almost identical to the overall ratio.

15. Given the improvement in the macroeconomic situation and the stance taken by the Constitutional Court, from the time it decided to overturn the cut in the bonuses.

is the payment approach failing to capture adequately the reinstatement of the 2011 cut from January 2016 on - the main shock in the second subsample - to the extent this is recorded as a sequence of smaller shocks. Indeed, the asymmetry continues to hold for the announcement approach (see the next section), in which this reinstatement is lumped in one large shock.

6.2. Announcement approach

We now analyse the impact on consumption for the announcement approach, in which shocks are dated according to the time of approval of legislation and evaluated for the full change in wages entailed by the measure. In this approach shocks span between January 2011 and January 2016.

		Full sample		Sample 2011:1 - 2012:12		Sample 2013:1-2017:6	
Months	**All**	**Neg.**	**Pos.**	**Neg.**	**Pos.**	**Neg.**	**Pos.**
0	0.26***	0.24**	0.29	0.93***		0.17	0.51**
	0.07	*0.11*	*0.20*	*0.24*		*0.45*	*0.24*
3	0.16**	0.02	0.48**	0.92***		-0.09	0.62**
	0.07	*0.10*	*0.20*	*0.24*		*0.32*	*0.28*
6	0.13**	0.05	0.39**	0.87***		-0.01	0.38
	0.06	*0.10*	*0.19*	*0.27*		*0.28*	*0.26*
12	0.16**	0.11	0.33*	0.73***		0.41	0.28
	0.07	*0.09*	*0.18*	*0.21*		*0.29*	*0.23*
18	0.16**	0.15	0.22	0.61**		0.73**	-0.06
	0.07	*0.10*	*0.17*	*0.27*		*0.29*	*0.22*

Table 2. Average cumulative response of consumption to a shock to public wages, announcement approach

Note: Ratio of percentage cumulative consumption response to cumulative income change, up to the given month, following a shock to public wages equal to one percent of household income.

The results for the announcement approach (Table 2) are generally much in line with those in the preceding section. Responses to negative shocks in the first subsample are statistically significant throughout the full horizon. The point estimates are slightly stronger and the response more persistent than in the payment approach. The average cumulative MPC estimates now stands at 77 cents on impact, 61 cents after six months and 51 cents after eighteen months. Nevertheless, the point estimates in both approaches, for a given horizon, are in statistical terms not different. Therefore, the evidence points to the existence of a response at the time of announcement, although this does not preclude a reaction at the time of

payment, as estimated in the previous section.[16] Indeed, there might have been some differentiation in the behaviour of agents in this respect. Below we show evidence that workers at the upper wage cohorts reacted essentially at the time of announcement, while workers at the lower cohorts reacted at both dates.

In the period 2013-2017 responses are non-significant for negative shocks, as in the payment approach. It is worth noting that there is now just one such shock (see Figure 2b), the 2014 wage cut which, as argued above, agents may have disregarded as temporary. As far as positive shocks are concerned, responses are slightly stronger but shorter-lived than in the payment approach. These are significant on impact and up to three months only (the average cumulative MPC standing, respectively, at 42 and 51 cents). The asymmetry between a stronger impact of negative shocks in 2011-2012 vis-a-vis that of positive shocks in the subsequent years continues to hold. Among positive shocks, only the ones reinstating the pre-2011 level had a permanent nature. In contrast, the reversion of the 2014 cut, which was in place only for a few months, may have been regarded as temporary from the beginning by households. Nevertheless, after that exclusion of the latter shock, the strength of the response remained approximately unchanged, suggesting that the asymmetry is not driven by the permanent vs. transitory nature of shocks.

7. Heterogeneity in the response of consumption

7.1. Heterogeneity across the wage distribution

Table 3 shows the impacts of wage shocks on consumption in the payment approach, for the model interacting the shocks with the mean rank in the wage distribution of the concerned workers, by municipality.[17] As shown in Figure 3b, the mean rank - normalized to the interval (0,1) - lies above 0.6 for most shocks. We present results for interaction with the values 0.7, 0.8 and 0.9, which comprise most of the distribution of that mean rank across shocks (percentiles 15 to 90). The estimates shown are the overall marginal effect of the shocks when the interaction variable takes on the indicated values.

In the period 2011-2012, the average cumulative impacts (where statistically significant) go down, in absolute terms, as affected workers move up the wage distribution. Such a pattern becomes even more evident, converting the percentage responses in the table into euro-for-euro impacts on the basis of differentiated

16. A way to investigate this issue is to include both shocks in the same regression, but the evidence is not clear-cut. Considering the full sample and the overall shock, to have more degrees of freedom given that the two series partly overlap, only the time of payment shocks appear significant; if we confine the estimation to the years 2011-2012, then only the shocks in the announcement approach appear significant.

17. One could as well have considered the interaction with the *median* almost without changing the results, because the correlation between mean and median is around 0.95.

Mt.	Sample 2011-12 Negative shocks			Sample 2013-17 Negative shocks			Sample 2013-17 Positive shocks		
Rk.	**0.7**	**0.8**	**0.9**	**0.7**	**0.8**	**0.9**	**0.7**	**0.8**	**0.9**
0	1.06***	0.95***	0.84*	0.17	-0.06	-0.29	0.29***	0.01	-0.27
	0.27	*0.25*	*0.45*	*0.56*	*0.37*	*0.73*	*0.10*	*0.27*	*0.53*
3	0.97***	0.66***	0.35	0.09	-0.12	-0.33	0.23***	0.18	0.14
	0.20	*0.12*	*0.21*	*0.43*	*0.22*	*0.52*	*0.06*	*0.13*	*0.27*
6	0.94***	0.44***	-0.07	0.63*	0.15	-0.32	0.17***	0.12	0.07
	0.21	*0.14*	*0.25*	*0.36*	*0.22*	*0.51*	*0.05*	*0.13*	*0.26*
12	0.89***	0.4**	-0.09	0.48	0.11	-0.25	0.06	-0.07	-0.21
	0.08	*0.16*	*0.33*	*0.34*	*0.25*	*0.57*	*0.08*	*0.14*	*0.30*
18	0.84***	0.25	-0.33	0.45	0.1	-0.26	-0.02	-0.14	-0.26
	0.08	*0.16*	*0.32*	*0.38*	*0.25*	*0.63*	*0.08*	*0.15*	*0.32*

Table 3. Average cumulative response of consumption to a shock to public wages, by the rank of workers in the wage distribution (payment approach)

Note: Ratio of percentage cumulative consumption response to cumulative income change, up to the given month, following a shock to public wages equal to one percent of household income. Responses are calculated at the given values of the mean by municipality of ranks in the wage distribution of workers affected by shocks. The rank is calculated by reference to the overall public and private wage distribution in Portugal in 2010.

ratios of average consumption to average income, which tend to be lower at the upper income brackets.[18] Negative shocks in 2011-2012 trigger a decrease in consumption of 94 cents per euro of change in income, on impact, when the mean rank is 0.7. Over time, the average effect weakens somewhat, to 78 cents after one year and further to 73 cents half a year later, but it remains statistically significant throughout. When the mean rank is 0.8, the MPC is 73 cents on impact and it remains statistically significant up to one year (31 cents, on average) only. Evaluating the mean rank at 0.9, the response of consumption becomes just barely significant on impact (56 cents).

Table 4 shows heterogeneity in consumption responses for the announcement approach. The average impacts of the large negative shocks in the years 2011-2012 are statistically significant across all the interaction values of the mean rank of the affected workers by municipality - albeit at the 10 percent level only for shorter horizons, when the mean rank is 0.9. In this case, the MPCs range between 37 cents, on impact, to 69 cents, eighteen months out, on average (a decreasing trend being absent over the horizon considered). The fact that there is now a significant response, in contrast to the payment approach, indicates that a reaction at time of

18. Specifically, we now consider the average propensities to consume within percentiles 60 to 80, 70 to 90 and 80 to 100 of the income distribution, respectively equal to 0.88, 0.77 and 0.66 (figures computed on the basis of the Household Expenditure Survey).

announcement was more prevalent among the higher-income workers. It is however noteworthy that responses are likewise significant and quite sizeable for the lower-income workers. The MPCs stand at around 2.5 euros, on impact, remaining at 1 euro and 20 cents, on average, after one year and half. These point estimates are very large in absolute terms and much larger than those for the payment approach, but should be seen with caution given that values of the mean rank lower than 0.80 are not represented in the sample for all shocks (in particular, not for the 2011 cut). Moreover, the uncertainty surrounding the estimates is large as well, so that the two standard-errors interval around the point estimates intersect in both approaches. Nevertheless, such results could also hint at the possibility that the relatively less well-off households felt the large initial negative shocks in a particularly strong manner.

Mt.	**Sample 2011-12**			**Sample 2013 - 17**					
	Negative shocks			**Negative shocks**			**Positive shocks**		
Rk.	**0.7**	**0.8**	**0.9**	**0.7**	**0.8**	**0.9**	**0.7**	**0.8**	**0.9**
0	2.86***	1.71***	0.55*	-0.2	0.85*	1.9	0.95	0.63*	0.31
	0.71	*0.40*	*0.28*	*0.66*	*0.50*	*1.30*	*0.64*	*0.35*	*0.22*
3	1.68***	1.15***	0.62*	-0.13	-0.17	-0.22	1.44***	0.82***	0.19
	0.27	*0.24*	*0.32*	*0.43*	*0.36*	*0.91*	*0.36*	*0.23*	*0.18*
6	1.53***	1.13***	0.73***	0.3	-0.44	-1.18*	0.96***	0.47**	-0.03
	0.31	*0.18*	*0.26*	*0.38*	*0.30*	*0.63*	*0.37*	*0.23*	*0.26*
12	1.41**	1.14***	0.86***	0.69*	-0.17	-1.03	0.74*	0.31	-0.11
	0.56	*0.21*	*0.24*	*0.40*	*0.32*	*0.69*	*0.41*	*0.24*	*0.34*
18	1.4***	1.23***	1.05***	1.16***	0.52*	-0.12	0.06	-0.19	-0.44
	0.51	*0.19*	*0.26*	*0.43*	*0.31*	*0.70*	*0.41*	*0.24*	*0.42*

Table 4. Average cumulative response of consumption to a shock to public wages, by the rank of workers in the wage distribution (announcement approach)

Note: Ratio of percentage cumulative consumption response to cumulative income change, up to the given month, following a shock to public wages equal to one percent of household income. Responses are calculated at the given values of the mean by municipality of ranks in the wage distribution of workers affected by shocks. The rank is calculated by reference to the overall public and private wage distribution in Portugal in 2010.

A decreasing profile of MPCs as one moves up the wage distribution is the one to expect on the assumption that workers in the upper income brackets should be more able to smooth out consumption. Several previous contributions came to analogous profiles of MPCs across income or wealth levels. For instance, Souleles *et al.* (2006) show that low-income or low-liquid-wealth households consumed a larger proportion of the 2001 tax rebate in the US, and Jappelli and Pistaferri (2014) document a negative correlation between MPC out of an income windfall and cash-on-hand[19] for

19. Defined as the sum of disposable income and financial wealth net of consumer debt.

Italian households. This literature has often ascribed such an evidence to variation in liquidity constraints and/or in financial wealth. The liquidity constraints hypothesis is less appealing in our case, as all groups of household were able to smooth out the negative shocks in the second subsample (see below). Nevertheless, other factors such as differentiated income risk perceptions or precautionary behaviour could have been at play.

In the years 2013-2017, negative shocks have no impact on consumption, paralleling the results in last section. The absence of an impact holds even for relatively lower-income workers, playing down the importance of liquidity constraints even for this group (presumably shocks would have to have an impact further down the wage distribution to produce a response of consumption).[20]

The impact of positive shocks in the later years is suggestive of a negative relationship between the MPCs and the rank in the income distribution, as for negative shocks in 2011-2012. However, even for the announcement approach, responses are significant only for the mean ranks of 0.7 and 0.8 and up to the six-month horizon (the average MPCs being, respectively, 85 and 36 cents). The fact that impacts are non-significant further up the wage distribution could indicate a stronger anticipation of wage reinstatements there.

7.2. Heterogeneity across age of workers

We now turn to the impacts on consumption when shocks are interacted with the mean age of the workers affected by the shock. Table 5 presents the interactions with mean age equal to 41, 43 and 45, values which range approximately from percentile 10 to 90 of the variable.

In spite of the limited variability of mean age of the affected workers across municipalities, point estimates indicate a decreasing pattern of MPCs with age, both for negative shocks in 2011-2012 and for positive ones in 2013-2017. In the second subsample, this profile is more marked for the announcement approach. An issue that may be raised is to what extent the positive correlation between income and age of workers accounts for this result, given the similar pattern of decrease in the MPCs as income goes up, documented in the previous section. Correlation between income and age across shocks is indeed positive but not large - around 30 percent. Nevertheless, in order to control for it, we also estimated a model interacting the shocks with *both* variables, income and age, and the decreasing profile of MPC with age still mostly holds.[21]

A stability of the MPC by age is to be expected when agents are still far from retirement (Christelis *et al.* 2019). In this vein, Souleles *et al.* (2006) report that MPCs out of the 2011 tax rebates in the US remain essentially unchanged

20. The MPC evaluated at a mean rank of 0.6 (not shown), a value already at the bottom of the distribution in our data, still indicates no effect.

21. The exception being for the payment approach in the second subsample, where the estimates are not statistically significant any more.

Mt.	Sample 2011-12 Negative shocks			Sample 2013 - 17 Negative shocks			Sample 2013 - 17 Positive shocks		
Age	**41**	**43**	**45**	**41**	**43**	**45**	**41**	**43**	**45**
				Payment approach					
0	1.26***	0.98***	0.7***	-0.28	0.04	0.35	0.14	0.18***	0.23*
	0.18	*0.16*	*0.18*	*0.70*	*0.38*	*0.26*	*0.12*	*0.06*	*0.12*
3	0.95***	0.76***	0.57***	0.11	0.14	0.16	0.21*	0.25***	0.29***
	0.15	*0.13*	*0.13*	*0.49*	*0.28*	*0.19*	*0.12*	*0.05*	*0.08*
6	0.92***	0.66***	0.4**	0.65	0.42*	0.19	0.15	0.17***	0.18**
	0.16	*0.16*	*0.18*	*0.43*	*0.25*	*0.18*	*0.11*	*0.05*	*0.08*
12	0.6**	0.51**	0.42*	0.7**	0.43**	0.16	0.06	0.05	0.04
	0.25	*0.20*	*0.22*	*0.36*	*0.22*	*0.19*	*0.16*	*0.07*	*0.08*
18	0.38*	0.35*	0.33	0.86***	0.48**	0.09	-0.04	-0.07	-0.09
	0.23	*0.20*	*0.24*	*0.33*	*0.20*	*0.20*	*0.17*	*0.08*	*0.10*
				Announcement approach					
0	1.69***	1.19***	0.68***	-0.9	-0.1	0.7	1.29**	0.86**	0.44
	0.22	*0.17*	*0.16*	*0.63*	*0.39*	*0.49*	*0.59*	*0.35*	*0.29*
3	1.1***	0.83***	0.55***	-0.63***	-0.26	0.11	1.01***	0.74**	0.46
	0.17	*0.17*	*0.19*	*0.23*	*0.21*	*0.36*	*0.36*	*0.30*	*0.32*
6	1.06***	0.75***	0.44**	-0.27	-0.18	-0.08	1.02***	0.59**	0.16
	0.16	*0.16*	*0.19*	*0.25*	*0.21*	*0.28*	*0.27*	*0.24*	*0.29*
12	1.2***	0.78***	0.35**	0	0.18	0.36	1.22***	0.61***	0
	0.20	*0.16*	*0.18*	*0.38*	*0.26*	*0.26*	*0.21*	*0.20*	*0.28*
18	1.05***	0.66***	0.26	0.14	0.46*	0.78**	1.19***	0.4**	-0.4
	0.19	*0.15*	*0.19*	*0.42*	*0.27*	*0.36*	*0.26*	*0.20*	*0.30*

Table 5. Average cumulative response of consumption to a shock to public wages, by mean age of workers

Note: Ratio of percentage cumulative consumption response to cumulative income change, up to the given month, following a shock to public wages equal to one percent of household income. Responses are calculated at the given values of mean age of the affected workers by municipality.

across ages. Jappelli and Pistaferri (2014) documented a decreasing pattern of MPC out an income windfall with age, but mainly for persons at retirement. Our results, however, suggest a greater ability to smooth out consumption for elderly households in their active years. This could be due, for instance, to larger holdings of wealth (after controlling for income).

8. Responses of financial variables

Table 6 shows the average cumulative responses of the change in deposits and in consumer debt, in percentage points in the payment approach. These responses

may be transformed into euro-for-euro impacts, similarly to the calculations of MPCs, by scaling them by the ratio of each financial variable (stock) to income.[22]

Mt.	Sample 2011-12 Negative shocks			Sample 2013-17 Negative shocks			Sample 2013-17 Positive shocks		
Rk.	**0.7**	**0.8**	**0.9**	**0.7**	**0.8**	**0.9**	**0.7**	**0.8**	**0.9**
				Change in deposits					
0	0.67***	0.73***	0.79***	0.7	0.73	0.76	-0.02	-0.49***	-0.96***
	0.12	*0.13*	*0.17*	*0.59*	*0.51*	*0.87*	*0.09*	*0.15*	*0.25*
3	0.22***	0.12	0.02	0.9***	0.57***	0.24	0.07	-0.1	-0.27*
	0.07	*0.08*	*0.11*	*0.29*	*0.12*	*0.26*	*0.05*	*0.07*	*0.16*
6	0.15**	-0.01	-0.16	0.63**	0.16*	-0.31	-0.02	-0.16***	-0.3**
	0.06	*0.06*	*0.10*	*0.25*	*0.08*	*0.23*	*0.05*	*0.05*	*0.15*
12	0.11**	0.02	-0.08	0.54***	0.02	-0.5***	0	-0.08	-0.15
	0.05	*0.07*	*0.12*	*0.15*	*0.09*	*0.15*	*0.05*	*0.05*	*0.14*
18	0.11***	0.01	-0.08	0.39***	0.06	-0.27***	0.01	-0.02	-0.05
	0.04	*0.05*	*0.08*	*0.12*	*0.07*	*0.10*	*0.03*	*0.05*	*0.11*
				Change in consumer debt					
0	0.1	0.32***	0.54***	-0.44	0	0.44	-0.01	-0.26***	-0.52**
	0.13	*0.06*	*0.11*	*0.28*	*0.24*	*0.41*	*0.04*	*0.10*	*0.20*
3	0.2***	0.2***	0.2***	-0.17	-0.18*	-0.18	-0.03	-0.08*	-0.14*
	0.06	*0.03*	*0.07*	*0.19*	*0.09*	*0.24*	*0.03*	*0.04*	*0.08*
6	0.05	0.08***	0.11***	0.15	0.1	0.05	0.02	-0.04	-0.09
	0.04	*0.01*	*0.04*	*0.11*	*0.09*	*0.20*	*0.03*	*0.04*	*0.08*
12	0.05**	0.02*	-0.01	0.1	-0.07	-0.24	-0.03	-0.02	-0.01
	0.03	*0.01*	*0.02*	*0.10*	*0.08*	*0.16*	*0.02*	*0.03*	*0.06*
18	0.03**	0.02**	0.02	0.13	-0.03	-0.19	-0.03	-0.03	-0.02
	0.01	*0.01*	*0.02*	*0.09*	*0.08*	*0.13*	*0.02*	*0.02*	*0.04*

Table 6. Average cumulative response of financial variables to a shock to public wages, by the rank of workers in the wage distribution (payment approach)

Note: Ratio of cumulative response of the change in deposits or consumer debt in percentage points to percentage cumulative income change, up to the given month, following a shock to public wages equal to one percent of household income. Responses are calculated at the given values of the mean by municipality of ranks in the wage distribution of workers affected by shocks. The rank is calculated by reference to the overall public and private wage distribution in Portugal in 2010.

In the period 2011-2012, when the median rank is 0.7, the change in deposits decreases by 47 cents per euro of reduction in income, on impact, by 15 cents three

22. This is done on the basis of information from the Household Finance and Consumption Survey 2013. Specifically, we consider the ratio of the mean stock to mean income within percentiles 60 to 80, 70 to 90 and 80 to 100 of the income distribution. Such ratios are, respectively, equal to 0.70, 0.63 and 0.58, in the case of deposits, and 0.11, 0.08 and 0.06, in the case of consumer debt.

months out and by 8 cents eighteen months out, on average. This indicates that the relatively less well-off households smoothed out consumption to some extent by drawing deposits down.[23]

The responses for the workers further up the wage distribution are statistically significant on impact only (smaller variation of deposits by 46 cents, per euro of decrease in income). This does not fully match the hypothesis of an increased use of deposits to finance consumption as one moves up the wage distribution, in the wake of the initial negative income shocks, which one would expect from the results above. However, we are not looking at the full balance sheet. It could be that households in upper income cohorts were rather de-cumulating other types of financial assets, more risky than deposits, as a response to the added uncertainty of the period.

It is worth noting that irrespective of a reaction at the time of announcement or at the time of payment, a smaller net accumulation of assets is always to be expected when income actually falls, if there is consumption smoothing to some extent. However, when the reaction occurs at the time of announcement, households will cut consumption already when they learn about the future income reduction, and assets will go up temporarily, while income remains unchanged. At the time income actually falls, such an increase is more than fully reversed.[24]

In the period 2013-2017, a negative response of deposits to negative shocks is consistently significant for the lower-income workers (smaller variation by 27 cents eighteen months out, on average, per euro of decrease in income). This squares - as in the years 2010-2011 - with some extent of consumption financing through a reduction in deposits for this cohort. Again no similar result is observed for their higher-income counterparts.

In the wake of positive shocks, deposits do not go up. Actually when the mean rank is 0.8 and 0.9, the opposite occurs, albeit over a relative short horizon (change in deposits decreasing, respectively, by 10 and 17 cents after six months, on average). This suggests that positive income shocks may trigger a recomposition of financial assets portfolio, away from deposits and towards more risky assets.

Consumer debt goes down after the shocks in 2011-2012, indicating that this variable did not accommodate the income reduction, nor helped sustain consumption, to any extent. This holds across the different segments of the wage distribution that are being interacted with the shock, although the persistence of responses differs a bit across them. Negative shocks appear to have triggered debt repayment instead, possibly reflecting the enhanced restrictiveness

23. Note that such households are still relatively high in the overall wage distribution of the country.

24. The response of deposits for the announcement approach in the period 2011-2012 - not shown in order not to overburden the text, but available upon request - does not indicate, however, a pattern of sign reversion. When the mean rank is 0.7, there is a larger change in deposits on impact, as one would expect, but the responses for the remaining horizons are not significant. For the higher-income workers, the responses are similar to the ones in the payment approach.

of credit conditions during this period. Converting into euro-for-euro the respective magnitudes are, however, rather small: for example, change in debt falls on average by 2 cents or less after three months. The responses of consumer debt are generally not significant in the post-2012 period, but there is evidence of a decrease after positive shocks for shorter horizons, which continues to suggest debt repayment.

9. Conclusions

This paper focuses on the transmission of shocks to public wages to consumption decisions in Portugal, taking advantage of the regional heterogeneity in the changes in public wages in the context of the sovereign debt crisis. The MPC depends on the nature and characteristics of the income shock. Our estimates point to a strong and persistent consumption response to the large, unanticipated and negative public wage shocks in 2011-2012. We estimate in this period MPCs of 0.7-0.8 on impact and 0.5-0.7 after one year. These results suggest that such negative shocks, besides unanticipated, have been perceived as rather persistent. Nevertheless, households smoothed to some extent their impact on consumption, through a reduction of deposits. The financial constraints predominant in that period, in the context of the financial and sovereign debt crisis, hampered the smoothing of consumption through the credit mechanism. Indeed, these negative shocks triggered a deleveraging by households.

From 2013 onwards, the consumption responses to wage shocks were less strong, suggesting a more important role for consumption smoothing than in the first period. In the case of negative changes in wages in this period, they appear to have had no impact on consumption, giving rise instead to a decrease in deposits. This suggest that agents perceived these changes as temporary, as they replaced measures previously overturned by the Constitutional Court, and fully smoothed their impact on consumption. The positive shocks in this later period include particularly the wage increases corresponding to the gradual reversion of previous wage cuts. Our estimates suggest that these shocks had a significant and positive effect on consumption, but the magnitude and persistence is smaller compared to the responses to negative shocks in the first period. This result may relate to the anticipation of these measures as, at the time they were decided by government, agents had already the expectation that all wage cuts would be reversed.

Interacting the effects with age and income (position in the wage distribution) allows to explore the role of agents' characteristics in MPC heterogeneity. In what concerns income, in general the response of consumption is larger, the lower the wages of those experiencing the shock. However, looking at the financial side, the negative response of deposits is much more evident for the relatively less-off households, which is surprising. The interpretation of the effects on financial variables requires some caution, though, as their evolution - in particular that of deposits - reflects not only income and consumption changes but also decisions about the financial asset portfolio.

Our approach is novel in the empirical analysis for Portugal. The results are encouraging, suggesting that this framework based on regional heterogeneity can be useful to shed some light on other macroecomic issues, as also shown by a growing related literature for other countries.

10. Appendix: Sequence of measures and respective shocks

Legal text	Date	Payment approach				Announcement approach			
		timing	amount			timing	amount		
			P25	P50	P75		P25	P50	P75
		2011 wage cut							
Lei 55-A/10	31-Dec	Jan 11	-0.71	-0.54	-0.41	Jan 11	-0.82	-0.63	-0.47
(2011 Budget)		Jun 11*	-0.06	-0.04	-0.03				
		Nov 11*	-0.06	-0.04	-0.03				
		Holiday and Christmas bonuses cut							
Lei 64-B/11	30-Dec	Jun 12	-1.34	-1.07	-0.80	Jan 12	-2.67	-2.14	-1.60
(2012 Budget)		Nov 12	-1.42	-1.14	-0.85				
		Overturn of holiday and Christmas bonuses cut							
Ac. TC 353/12	05-Jul	no shock							
		Reintroduction of full Christmas bonus and its payment in 12 installments							
Lei 66-B/12	31-Dec	Jan 13	1.10	1.48	1.91	Jan 13	0.91	1.22	1.52
(2013 Budget)									
		Obligation to reintroduce the full holiday bonus							
Ac. TC 187/13	05-Apr					Apr 13	0.85	1.14	1.42
		Reintroduction of full holiday bonus from November on							
		(End of 2012 Christmas bonus' spreading over 12 months)							
Lei 39/13	21-Jun	Nov 13	0.65	0.84	1.11				
		2014 wage cut							
Lei 83-C/13	31-Dec	Jan 14	-1.12	-0.91	-0.66	Jan 14	-1.21	-0.98	-0.71
(2014 Budget)									
		Overturn of 2014 wage cut and temporary return of wages to 2010 level							
Ac. TC 413/14	30-May	Jun 14	2.07	2.74	3.46	Jun 14	0.75	1.02	1.28
		Phasing out of 2011 wage cut: 1/5 by January 2015 and the remainder until 2018 (proposal)							
Dec. AR 264/XII	25-Jul					Aug 14	0.10	0.13	0.17
		Obligation to complete the phasing out of 2011 wage cut until 2016							
Ac. TC 574/14	14-Aug	(no shock)							
		Reintroduction of 2011 wage cut							
Lei 75/14	12-Sep	Sep 14	-0.72	-0.55	-0.42				
		(End of 2013 Christmas bonus' spreading over 12 months)							
		Nov 14	-1.26	-1.01	-0.76				
		Reversal of 1/5 of 2011 wage cut (from January 2015 on)							
Lei 75/14	12-Sep	Jan 15	0.09	0.12	0.16				
		Jun 15+	-0.05	-0.04	-0.03				
		Phasing out of the remainder of the 2011 wage cut							
Lei 159-A/15	30-Dec	Jan 16	0.09	0.12	0.16	Jan 16	0.39	0.52	0.68
		Apr 16	0.09	0.12	0.16				
		Jun 16*	0.01	0.02	0.02				
		Jul 16	0.09	0.12	0.16				
		Oct 16	0.09	0.12	0.16				
		Jun 17*	0.01	0.02	0.02				

Table 7. Measures and shocks (measured as a percentage of municipality income)

Notes: Amounts are given at the percentiles 25, 50 and 75 across municipalities. *These shocks refer to the impact on the bonuses. +This shock, referring to the impact on the second bonus, is negative because in the previous year this bonus had been paid by reference to the wage without any cut.

References

Agarwal, Sumit, Chunlin Liu, and Nicholas S. Souleles (2007). "The Reaction of Consumer Spending and Debt to Tax Rebates—Evidence from Consumer Credit Data." *Journal of Political Economy*, 115(6), 986–1019.

Agarwal, Sumit and Wenlan Qian (2014). "Consumption and Debt Response to Unanticipated Income Shocks: Evidence from a Natural Experiment in Singapore." *American Economic Review*, 104(12), 4205–30.

Auerbach, Alan J. and Yuriy Gorodnichenko (2013). "Output Spillovers from Fiscal Policy." *American Economic Review: Papers and Proceedings*, 103(3), 141–146.

Bunn, Philip, Jeanne Le Roux, Kate Reinold, and Paolo Surico (2018). "The consumption response to positive and negative income shocks." *Journal of Monetary Economics*, 96(C), 1–15.

Chodorow-Reich, Gabriel (2019). "Geographic Cross-Sectional Fiscal Spending Multipliers: What Have We Learned?" *American Economic Journal: Economic Policy*, 11(3), 1–34.

Christelis, Dimitris, Dimitris Georgarakos, Tullio Jappelli, Luigi Pistaferri, and Maarten van Rooij (2019). "Asymmetric consumprion effects of transitory income shocks." *The Economic Journal*, 129(622), 2322–2341.

Cloyne, James (2013). "Discretionary Tax Changes and the Macroeconomy: New Narrative Evidence from the United Kingdom." *American Economic Review*, 103(4), 1507–1528.

Driscoll, John C. and Aart C. Kraay (1998). "Consistent Covariance Matrix Estimation with Spatially Dependent Panel Data." *Review of Economics and Statistics*, 80(4), 549–560.

Dupor, Bill, Marios Karabarbaounis, Marianna Kudlyak, and M. Saif Mehkari (2018). "Regional Consumption Responses and the Aggregate Fiscal Multiplier." Working Paper 18-04, Federal Reserve Bank of San Francisco.

Fieldhouse, Andrew, Karel Mertens, and Morten O. Ravn (2017). "The Macroeconomic Effects of Government Asset Purchases: Evidence from Postwar US Housing Credit Policy." *American Economic Review*, 133(3), 1503–1560.

Gross, David B. and Nicholas S. Souleles (2002). "Do Liquidity Constraints and Interest Rates Matter for Consumer Behavior? Evidence from Credit Card Data." *Quarterly Journal of Economics*, 7(1), 149–185.

Jappelli, Tullio and Luigi Pistaferri (2010). "Fiscal Policy and MPC Heterogeneity." *Annual Review of Economics*, 2(1), 479–506.

Jappelli, Tullio and Luigi Pistaferri (2014). "Fiscal Policy and MPC Heterogeneity." *American Economic Journal: Macroeconomics*, 6(4), 107–136.

Jappelli, Tullio and Luigi Pistaferri (2017). *The Economics of Consumption: Theory and Evidence*. Oxford University Press.

Leduc, Sylvain and Daniel Wilson. (2013). "Roads to Prosperity or Bridges to Nowhere? Theory and Evidence on the Impact of Public Infrastructure Investment." In *NBER Macroeconomics Annual*, vol. 27, edited by Daron Acemoglu, Jonathan Parker, and Michael Woodford, pp. 89–142. University of

Chicago Press.

Mian, Atif, Kamalesh Rao, and Amir Sufi (2013). "Household Balance Sheets, Consumption, and the Economic Slump." *Quarterly Journal of Economics*, 128(4), 1687–1726.

Misra, Kanishka and Paolo Surico (2014). "Consumption, Income Changes, and Heterogeneity: Evidence from Two Fiscal Stimulus Programs." *American Economic Journal: Macroeconomics*, 6(4), 84–106.

Parker, Jonathan A., Nicholas S. Souleles, David S. Johnson, and Robert McClelland (2013). "Consumer Spending and the Economic Stimulus Payments of 2008." *American Economic Review*, 103(6), 2530–53.

Ramey, Valerie A. (2016). "Macroeconomic Shocks and Their Propagation." Working Paper 21978, National Bureau of Economic Researchl.

Ramey, Valerie A. and Sarah Zubairy (2018). "Government Spending Multipliers in Good Times and in Bad: Evidence from US Historical Data." *Journal of Political Economy*, 126(2), 850–901.

Romer, Christina and David Romer (2010). "The Macroeconomic Effects of Tax Changes: Estimates Based on a New Measure of Fiscal Shocks." *American Economic Review*, 100(3), 763–801.

Romer, Christina and David Romer (2017). "New Evidence on the Aftermath of Financial Crises in Advanced Countries." *American Economic Review*, 107(10), 3072–3118.

Sahm, Claudia R., Matthew D. Shapiro, and Joel B. Slemrod (2015). "Balance-Sheet Households and Fiscal Stimulus: Lessons from the Payroll Tax Cut and Its Expiration." Working Paper 21220, National Bureau of Economic Research.

Óscar Jordà (2005). "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review*, 95(1), 161–182.

Souleles, Nicholas S., Jonathan A. Parker, and David S. Johnson (2006). "Household Expenditure and the Income Tax Rebates of 2001." *American Economic Review*, 96(5), 1589–1610.

Working Papers

2017

1|17 The diffusion of knowledge via managers' mobility
Giordano Mion | Luca David Opromolla | Alessandro Sforza

2|17 Upward nominal wage rigidity
Paulo Guimarães | Fernando Martins | Pedro Portugal

3|17 Zooming the ins and outs of the U.S. unemployment
Pedro Portugal | António Rua

4|17 Labor market imperfections and the firm's wage setting policy
Sónia Félix | Pedro Portugal

5|17 International banking and cross-border effects of regulation: lessons from Portugal
Diana Bonfim | Sónia Costa

6|17 Disentangling the channels from birthdate to educational attainment
Luís Martins | Manuel Coutinho Pereira

7|17 Who's who in global value chains? A weighted network approach
João Amador | Sónia Cabral | Rossana Mastrandrea | Franco Ruzzenenti

8|17 Lending relationships and the real economy: evidence in the context of the euro area sovereign debt crisis
Luciana Barbosa

9|17 Impact of uncertainty measures on the Portuguese economy
Cristina Manteu | Sara Serra

10|17 Modelling currency demand in a small open economy within a monetary union
António Rua

11|17 Boom, slump, sudden stops, recovery, and policy options. Portugal and the Euro
Olivier Blanchard | Pedro Portugal

12|17 Inefficiency distribution of the European Banking System
João Oliveira

13|17 Banks' liquidity management and systemic risk
Luca G. Deidda | Ettore Panetti

14|17 Entrepreneurial risk and diversification through trade
Federico Esposito

15|17 The portuguese post-2008 period: a narrative from an estimated DSGE model
Paulo Júlio | José R. Maria

16|17 A theory of government bailouts in a heterogeneous banking system
Filomena Garcia | Ettore Panetti

17|17 Goods and factor market integration: a quantitative assessment of the EU enlargement
FLorenzo Caliendo | Luca David Opromolla | Fernando Parro | Alessandro Sforza

2018

1|18 Calibration and the estimation of macro-economic models
Nikolay Iskrev

2|18 Are asset price data informative about news shocks? A DSGE perspective
Nikolay Iskrev

3|18 Sub-optimality of the friedman rule with distorting taxes
Bernardino Adão | André C. Silva

4|18 The effect of firm cash holdings on monetary policy
Bernardino Adão | André C. Silva

5|18 The returns to schooling unveiled
Ana Rute Cardoso | Paulo Guimarães | Pedro Portugal | Hugo Reis

6|18 Real effects of financial distress: the role of heterogeneity
Francisco Buera | Sudipto Karmakar

7|18 Did recent reforms facilitate EU labour market adjustment? Firm level evidence
Mario Izquierdo | Theodora Kosma | Ana Lamo | Fernando Martins | Simon Savsek

8|18 Flexible wage components as a source of wage adaptability to shocks: evidence from European firms, 2010–2013
Jan Babecký | Clémence Berson | Ludmila Fadejeva | Ana Lamo | Petra Marotzke | Fernando Martins | Pawel Strzelecki

9|18 The effects of official and unofficial information on tax compliance
Filomena Garcia | Luca David Opromolla Andrea Vezulli | Rafael Marques

10|18 International trade in services: evidence for portuguese firms
João Amador | Sónia Cabral | Birgitte Ringstad

11|18 Fear the walking dead: zombie firms, spillovers and exit barriers
Ana Fontoura Gouveia | Christian Osterhold

12|18 Collateral Damage? Labour Market Effects of Competing with China – at Home and Abroad
Sónia Cabral | Pedro S. Martins | João Pereira dos Santos | Mariana Tavares

13|18 An integrated financial amplifier: The role of defaulted loans and occasionally binding constraints in output fluctuations
Paulo Júlio | José R. Maria

14|18 Structural Changes in the Duration of Bull Markets and Business Cycle Dynamics
João Cruz | João Nicolau | Paulo M.M. Rodrigues

15|18 Cross-border spillovers of monetary policy: what changes during a financial crisis?
Luciana Barbosa | Diana Bonfim | Sónia Costa | Mary Everett

16|18 When losses turn into loans: the cost of undercapitalized banks
Laura Blattner | Luísa Farinha | Francisca Rebelo

17|18 Testing the fractionally integrated hypothesis using M estimation: With an application to stock market volatility
Matei Demetrescu | Paulo M. M. Rodrigues | Antonio Rubia

18|18 Every cloud has a silver lining: Micro-level evidence on the cleansing effects of the Portuguese financial crisis
Daniel A. Dias | Carlos Robalo Marques

19|18 To ask or not to ask? Collateral versus screening in lending relationships
Hans Degryse | Artashes Karapetyan | Sudipto Karmakar

20|18 Thirty years of economic growth in Africa
João Amador | António R. dos Santos

21|18 CEO performance in severe crises: the role of newcomers
Sharmin Sazedj | João Amador | José Tavares

22|18 A general equilibrium theory of occupational choice under optimistic beliefs about entrepreneurial ability
Michele Dell'Era | Luca David Opromolla | Luís Santos-Pinto

23|18 Exploring the implications of different loan-to-value macroprudential policy designs
Rita Basto | Sandra Gomes | Diana Lima

24|18 Bank shocks and firm performance: new evidence from the sovereign debt crisis
Luísa Farinha | Marina-Eliza Spaliara | Serafem Tsoukas

25|18 Bank credit allocation and productivity: stylised facts for Portugal
Nuno Azevedo | Márcio Mateus | Álvaro Pina

26|18 Does domestic demand matter for firms' exports?
Paulo Soares Esteves | Miguel Portela | António Rua

27|18 Credit Subsidies
Isabel Correia | Fiorella De Fiore | Pedro Teles | Oreste Tristani

2019

1|19 The transmission of unconventional monetary policy to bank credit supply: evidence from the TLTRO
António Afonso | Joana Sousa-Leite

2|19 How responsive are wages to demand within the firm? Evidence from idiosyncratic export demand shocks
Andrew Garin | Filipe Silvério

3|19 Vocational high school graduate wage gap: the role of cognitive skills and firms
Joop Hartog | Pedro Raposo | Hugo Reis

4|19 What is the Impact of Increased Business Competition?
Sónia Félix | Chiara Maggi

5|19 Modelling the Demand for Euro Banknotes
António Rua

6|19 Testing for Episodic Predictability in Stock Returns
Matei Demetrescu | Iliyan Georgiev
Paulo M. M. Rodrigues | A. M. Robert Taylor

7|19 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

8|19 Into the heterogeneities in the Portuguese labour market: an empirical assessment
Fernando Martins | Domingos Seward

9|19 A reexamination of inflation persistence dynamics in OECD countries: A new approach
Gabriel Zsurkis | João Nicolau | Paulo M. M. Rodrigues

10|19 Euro area fiscal policy changes: stylised features of the past two decades
Cláudia Braz | Nicolas Carnots

11|19 The Neutrality of Nominal Rates: How Long is the Long Run?
João Valle e Azevedo | João Ritto | Pedro Teles

12|19 Testing for breaks in the cointegrating relationship: on the stability of government bond markets' equilibrium
Paulo M. M. Rodrigues | Philipp Sibbertsen Michelle Voges

13|19 Monthly Forecasting of GDP with Mixed Frequency MultivariateSingular Spectrum Analysis
Hossein Hassani | António Rua | Emmanuel Sirimal Silva | Dimitrios Thomakos

14|19 ECB, BoE and Fed Monetary-Policy announcements: price and volume effects on European securities markets
Eurico Ferreira | Ana Paula Serra

15|19 The financial channels of labor rigidities: evidence from Portugal
Edoardo M. Acabbi | Ettore Panetti | Alessandro Sforza

16|19 Sovereign exposures in the Portuguese banking system: determinants and dynamics
Maria Manuel Campos | Ana Rita Mateus | Álvaro Pina

17|19 Time vs. Risk Preferences, Bank Liquidity Provision and Financial Fragility
Ettore Panetti

18|19 Trends and cycles under changing economic conditions
Cláudia Duarte | José R. Maria | Sharmin Sazedj

19|19 Bank funding and the survival of start-ups
Luísa Farinha | Sónia Félix | João A. C. Santos

20|19 From micro to macro: a note on the analysis of aggregate productivity dynamics using firm-level data
Daniel A. Dias | Carlos Robalo Marques

21|19 Tighter credit and consumer bankruptcy insurance
António Antunes | Tiago Cavalcanti | Caterina Mendicino | Marcel Peruffo | Anne Villamil

2020

1|20 On-site inspecting zombie lending
Diana Bonfim | Geraldo Cerqueiro | Hans Degryse | Steven Ongena

2|20 Labor earnings dynamics in a developing economy with a large informal sector
Diego B. P. Gomes | Felipe S. Iachan | Cezar Santos

3|20 Endogenous growth and monetary policy: how do interest-rate feedback rules shape nominal and real transitional dynamics?
Pedro Mazeda Gil | Gustavo Iglésias

4|20 Types of International Traders and the Network of Capital Participations
João Amador | Sónia Cabral | Birgitte Ringstad

5|20 Forecasting tourism with targeted predictors in a data-rich environment
Nuno Lourenço | Carlos Melo Gouveia | António Rua

6|20 The expected time to cross a threshold and its determinants: A simple and flexible framework
Gabriel Zsurkis | João Nicolau | Paulo M. M. Rodrigues

7|20 A non-hierarchical dynamic factor model for three-way data
Francisco Dias | Maximiano Pinheiro | António Rua

8|20 Measuring wage inequality under right censoring
João Nicolau | Pedro Raposo | Paulo M. M. Rodrigues

9|20 Intergenerational wealth inequality: the role of demographics
António Antunes | Valerio Ercolani

10|20 Banks' complexity and risk: agency problems and diversification benefits
Diana Bonfim | Sónia Felix

11|20 The importance of deposit insurance credibility
Diana Bonfim | João A. C. Santos

12|20 Dream jobs
Giordano Mion | Luca David Opromolla | Gianmarco I.P. Ottaviano

13|20 The DEI: tracking economic activity daily during the lockdown
Nuno Lourenço | António Rua

14|20 An economic model of the Covid-19 pandemic with young and old agents: Behavior, testing and policies
Luiz Brotherhood | Philipp Kircher | Cezar Santos | Michèle Tertilt

15|20 Slums and Pandemics
Luiz Brotherhood | Tiago Cavalcanti | Daniel Da Mata | Cezar Santos

16|20 Assessing the Scoreboard of the EU Macroeconomic Imbalances Procedure: (Machine) Learning from Decisions
Tiago Alves | João Amador | Francisco Gonçalves

17|20 Climate Change Mitigation Policies: Aggregate and Distributional Effects
Tiago Cavalcanti | Zeina Hasna | Cezar Santos

18|20 Heterogeneous response of consumers to income shocks throughout a financial assistance program
Nuno Alves | Fátima Cardoso | Manuel Coutinho Pereira