THE DECLINE IN PUBLIC INVESTMENT: "SOCIAL DOMINANCE" OR TOO-RIGID FISCAL RULES?

2020

BANCO DE ESPAÑA
Eurosistema

Documentos de Trabajo
N.º 2025

Mar Delgado-Téllez, Esther Gordo, Iván Kataryniuk and Javier J. Pérez

THE DECLINE IN PUBLIC INVESTMENT: "SOCIAL DOMINANCE" OR TOO-RIGID FISCAL RULES?

THE DECLINE IN PUBLIC INVESTMENT: "SOCIAL DOMINANCE" OR TOO-RIGID FISCAL RULES? (*)

Mar Delgado-Téllez, Iván Kataryniuk and Javier J. Pérez

BANCO DE ESPAÑA

Esther Gordo

AIREF

(*) The views expressed in this paper are the authors' and do not necessarily reflect those of the Banco de España, the Eurosystem or the AIReF. We thank Víctor Mora, Silvia Albrizio and Mónica Correa for their help. We also thank Vitor Gaspar, Ludger Schuknecht, Gilles Mourre and participants of IMF Fiscal Affairs Department Seminar. Correspondence to: Mar Delgado-Téllez (mar.delgado@bde.es), Esther Gordo (esther.gordo@airef.es), Iván Kataryniuk (ivan.kataryniuk@bde.es) and Javier J. Pérez (javierperez@bde.es) (Directorate General of Economics, Statistics and Research, Banco de España, c/ Alcalá, 48, 28014 Madrid, Spain).

Documentos de Trabajo. N.º 2025

2020

ISSN: 1579-8666 (on line)

Abstract

Public investment in advanced economies is at historical lows, and shows a declining trend since at least the 1980s. Two main hypotheses have been posed to rationalize this fact. On the one hand, the "social dominance hypothesis" claims that this is related to structural factors, given the upward social expenditure trends related to ageing populations and social preferences, and the operation of the government budget constraint (limits to further increase significantly tax revenues and public debt, in a context of secular stagnation). On the other hand, another branch of the literature indicates that too-rigid fiscal rule frameworks cause fiscal retrenchment episodes to hinge heavily on public capital expenditure, which does not recover enough in the subsequent expansion, creating a sort of downward hysteresis behaviour in this budgetary item. In this paper we look jointly at both sets of duelling explanatory factors, and show that both are key to understanding public investment dynamics in advanced economies over the past decades.

Keywords: social dominance, fiscal rules, public investment.

JEL classification: H6, E62, C53.

Resumen

El nivel de inversión pública de las economías avanzadas se encuentra en mínimos históricos y muestra una tendencia decreciente al menos desde la década de los ochenta. Hay dos hipótesis principales en la literatura que tratan de explicar este hecho. La hipótesis de la «prevalencia del gasto social» *(social dominance)* argumenta que se debe a que existen factores estructurales que empujan el gasto social al alza, en particular debido al envejecimiento de la población y las preferencias sociales asociadas, de manera que, puesto que los Gobiernos tienen recursos limitados (y márgenes decrecientes, dadas la situación de estancamiento secular y la acumulación de niveles muy elevados de deuda pública), la inversión pública estaría siendo desplazada de los presupuestos públicos. Una segunda hipótesis señala que la causa de este fenómeno es la existencia de marcos rígidos de reglas fiscales, que en períodos de consolidación fiscal llevan a los decisores públicos a ajustar los gastos de capital, menos rígidos a la baja, pero que en períodos de expansión no generan los incentivos adecuados para que se recuperen unos niveles más elevados de inversión, haciendo permanente una parte importante de la pérdida de los períodos bajistas. En este documento analizamos de manera conjunta la capacidad explicativa de estas dos teorías, y encontramos que ambas son relevantes para entender la dinámica de la inversión pública de las economías avanzadas en las últimas décadas.

Palabras clave: tendencias del gasto social, reglas fiscales, inversión pública.

Códigos JEL: H6, E62, C53.

1 Introduction

The situation of low interest rates "for long" and low economic growth (against the background of the "secular stagnation" discussion) has spurred a debate on the need to revisit the role of fiscal policies (see e.g. Blanchard, 2019). Advocates of a more active role of fiscal policy tend to focus on the need to revitalize government spending items that spur long-term growth, particularly, public investment. Moreover, the drastic economic downturn linked to COVID-19 and the substantial fiscal reaction has reinforced this point forcefully (see IMF, 2020). Government investment programs could be particularly effective at the current juncture, as monetary authorities are less likely to react by tightening policies when policy rates are at or close to the effective lower bound. At the same time, the expectation that low interest rates will be sustained for a long period anticipates persistent low borrowing costs for governments. Beyond fiscal stabilization arguments, the emergence of new investment needs such as those derived from digitalization or climate change would reinforce the call for an enhanced investor role of the government. One example of how this discussion is pervading to the policy debate is European Union's "Next Generation EU" fiscal package, that comprises many of these elements in a medium-term perspective (see European Council, 2020).

Thus, there is a stark contrast between the fact that public investment in many advanced economies is at historical lows, while the consensus of the literature finds beneficial economic effects of effective government investment from a broad perspective, i.e. including infrastructure spending and R&D expenditure, on economic efficiency, productive capacity and long-term growth. Indeed, government investment has been constantly declining as a fraction of output in most advanced economies over the past decades and stands currently at five-decade lows. This feature is shared with a broad set of emerging market economies despite their much lower public capital stocks.

A possible hypothesis for the decline in government investment is that the traditional functions of public investment might be increasingly undertaken outside of the broad general government category, using, for example, Public-Private Partnerships (PPP) or public corporations outside of the general government definitions. While, for the former, some authors (Engel et al., 2019) argue that the use of PPP's is recent and represents a small proportion of global infrastructure, the data for the latter is scarce. Therefore, we cannot fully account in this paper for this particular trend.

Two recent strands of the literature put forward consistent explanations for the reasons behind the permanent downward trend in government investment. First, one branch of the literature stresses the role that some secular factors (like ageing populations), linked to current expenditure trends, may be playing (see Schuknecht and Zemanek, 2018). In particular, contrary to public investment, social expenditures in advanced economies have shown an unabated upward trend in the past four decades, tripling its weight in output, and crowding out other outlays from the budget in a period in which both tax revenues and public debt have tended to increase as a ratio to GDP. A second strand of the literature, in turn, focuses more on the role of too-rigid fiscal rule frameworks in reducing policy-maker choices, in particular at times of fiscal stress, when public investment tends to be overburdened compared to other budgetary items that are more difficult to adjust for political, economic or social motives (see Ardanáz et al., 2020, and the references quoted therein).

In this paper, we look jointly at both sets of explanatory factors, and show that, when taken in conjunction, both stories are key to understanding public investment dynamics in advanced economies over the past five decades. Our results show that social expenditure growth has been strongly correlated with future negative growth in public investment. In the case of fiscal rules, we find that, although they restrict both expenditure components directly, the effect is stronger in the case of social expenditure, and, as a consequence they can indirectly relax the pressure of social expenditure on public investment. This conclusion seems robust to the degree of flexibility of the fiscal rule.

The rest of the paper is organized as follows: in the next section we review the two main branches of the literature on the determinants of public investment evolution. In Section 3 we show companion stylized facts on the two dominant trends needed to understand the evolution of investment, namely those driving social expenditures and those on the generalization of fiscal rules. Next, we move to Section 4 where we pose an empirical model that allows us to dig into the determinants of social spending, public investment dynamics, and the role of fiscal rules. Finally, we present our conclusions.

2 Literature review

2.1 Social dominance

The literature has emphasized several factors that contribute to explain the secular decline in public investment in advanced economies (see Haan and Sikken, 1996; Oxley and Martin,

1991). Firstly, the supply of public capital and, particularly, public infrastructure depends on the level of development of countries, being lower at higher levels of development. Once countries have built a quality infrastructure, less public investment is needed. However, in more recent times new needs requiring more public investment have appeared, such as those related to intangible capital, the digitalization of the economy and the need to mitigate risks associated with climate change.

Secondly, some authors suggest that the decline in public investment may be reflecting the shrinking importance of the public sector in advanced economies, as a consequence of the privatization of companies in the telecommunications and energy sectors, as well as of railways and airports. Nevertheless, Mehrotra and Välilä (2006) find that privatizations are unlikely to account for the continuous fall in investment. Another possibility, closely related to the previous one, is that public investment might be undertaken through Public Private Partneships (PPP). However, the literature argues that the emergence of PPP's is a rather recent phenomenon and represents a small proportion of global infrastructure investment that offers only very limited explanatory power for the decline of public investment (Engel et al., 2019). According to the IMF Investment and Capital Stock Dataset (IMF, 2019), the stock of PPP's amounts to less than 5% of GDP in almost all advanced economies, and, for these economies, investment using PPP's is lower than 0.1% of GDP. However, it could be the case that public investment is implemented through public or quasi-public corporations outside of the standard definition of general government. Given that data for this type of investment is scarce, we cannot reject that it has increased during the period that public investment decreased.

More recently, the literature has coined the term "social dominance" (see Schuknecht and Zemanek, 2018) to explain the existence of a permanently negative relationship between social expenditure and public investment. With social expenditure showing a secular increase in terms of GDP as a result of demographic pressures, public investment should decline if new revenues or more debt are not available. Indeed, over the past decades, the progressive construction of the welfare system in developed countries combined with a process of population ageing have boosted social expenditure, crowding out other budgetary items. This development is mainly a reflection of social preferences in a context of progressively ageing populations that exert increasing pressure on pension and health outlays. Against this framework, as there are some limits to taxation, a trade-off emerges between social expenditure and public investment and education expenditure, while more sticky items such as public

order and security spending, which are necessary for a stable institutional environment, are more resilient. This is the "social dominance" phenomenon. This can also be rationalized from a political economy perspective as the outcome of a growing number of more aged voters who tend to discount future payoffs more heavily than working-age individuals so that long-term growth is relatively less important (see Jäger and Schmidt, 2016).

2.2 The role of fiscal rules

Another area of study focuses on the role fiscal rules may exert on public investment and other expenditure items. According to the literature and from a more general point of view, the introduction of fiscal rules has been successful in bringing healthier public finances by lowering fiscal deficits (Debrun et al., 2008). This result holds even after taking into account the endogeneity of the adoption of a fiscal rule (Caselli and Reynaud, 2018), as countries with a longer tradition of fiscal discipline might be prone to introduce fiscal rules.

The success of fiscal rules to cope with the traditional pro-cyclical bias of fiscal policy is mixed, though. Several authors emphasize the procyclical behavior of public investment and the fact that it tends to fall the most at times of fiscal consolidations (Lane, 2003; Gavin and Perotti, 1997; Gali and Perotti, 2003; Breunig and Busemeyer, 2012). According to this line of research, fiscal consolidation episodes tend to be accompanied by large public investment cuts, contributing to the well-documented pro-cyclical bias in public capital expenditures. This relation seems to be also present in emerging economies (Serven et al., 2007). In addition, for a sample of 53 emerging and developed countries during 1980-2011, Bamba et al. (2019) find that this relationship seems to be more intense when debt is high, in spending-based fiscal consolidations episodes, in the low phase of the economic cycle, and after debt and stock market crises. The reasons behind this relate to the fact that cuts in public investment are politically more acceptable than cuts in social expenditure (see Ardanaz and Izquierdo, 2017).

Moreover, a more recent strand of the literature suggests the design of fiscal rules is important. In countries with flexible fiscal rule frameworks, fiscal adjustment tends to hinge on public investment to a lower extent than in countries with rigid fiscal rules or no rules. Ardanáz et al. (2020) find that the bias is less pronounced in countries with flexible fiscal rules frameworks (i.e. those that include mechanisms to accommodate unexpected or cyclical shocks, like cyclically-adjusted fiscal targets) compared to those with "rigid" fiscal rules (i.e. those establishing numerical limits on fiscal targets without taking into account flexible

features) or no rules. Other papers emphasize the relevance of the design of the fiscal rule (expenditure rules versus balanced budget rules, simpler versus more complex), both in the case of advanced economies (Blanchard and Giavazzi, 2004; Debrun et al., 2008; Ayuso-i Casals et al., 2009) and developing economies (Bova et al., 2014; Guerguil et al., 2017; Alberola et al., 2018).

There is no consensus in the literature in terms of the effect of fiscal rules in the composition of public finances. The empirical results about how fiscal rules affect social expenditure and public investment are not conclusive. In terms of the effect on social expenditure, Dahan and Strawczynski (2013) find that the introduction of fiscal rules reduces the ratio of social transfers to government consumption. For public investment, Mehrotra and Välilä (2006) do not find any systematic impact, while Ardanáz et al. (2020), using a panel of advanced and emerging economies, find that flexible fiscal rules can influence the composition of government expenditure protecting investment expenditures in periods of fiscal consolidation. European Commission (2017) analyze fiscal rules in European economies and conclude that stronger fiscal rules might mitigate the negative effect of high public debt on public investment.

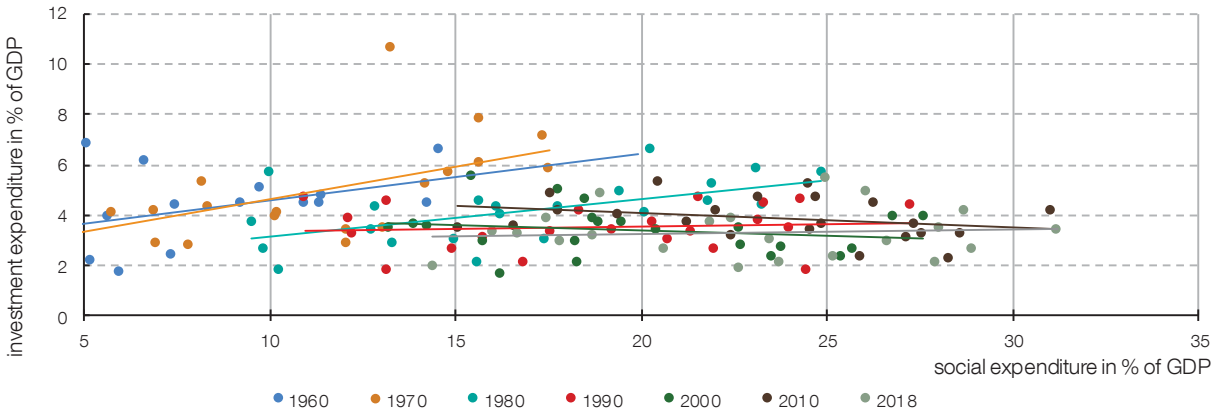
3 Two relevant trends

3.1 The upward trend in social spending

A preliminary look at the data seems to reflect the existence of a trade-off between social public expenditure and public investment across countries during the 60s, 70s and 80s. More recently, the persistent increase in social expenditure has continued while public investment seems to have reached a floor between 2%-4% of GDP in most of the countries considered. Figure 1 illustrates how the simple correlation between public investment and social expenditure may have switched from positive to seemingly negative.

While total public expenditures as a share of GDP have increased drastically in industrialized economies since 1960, the weight of investment has dropped. Indeed, the rise in expenditure has been concentrated on social expenditures, whose share in terms of GDP has tripled in the period (see upper panel of Figure 2) fuelled by the expansion of the social welfare state together with increasing costs of services and an ageing population, which demanded higher-quality health services and a more generous pension system (see Figure 3). The increase in public spending came hand-in-hand with an expansion of the tax burden

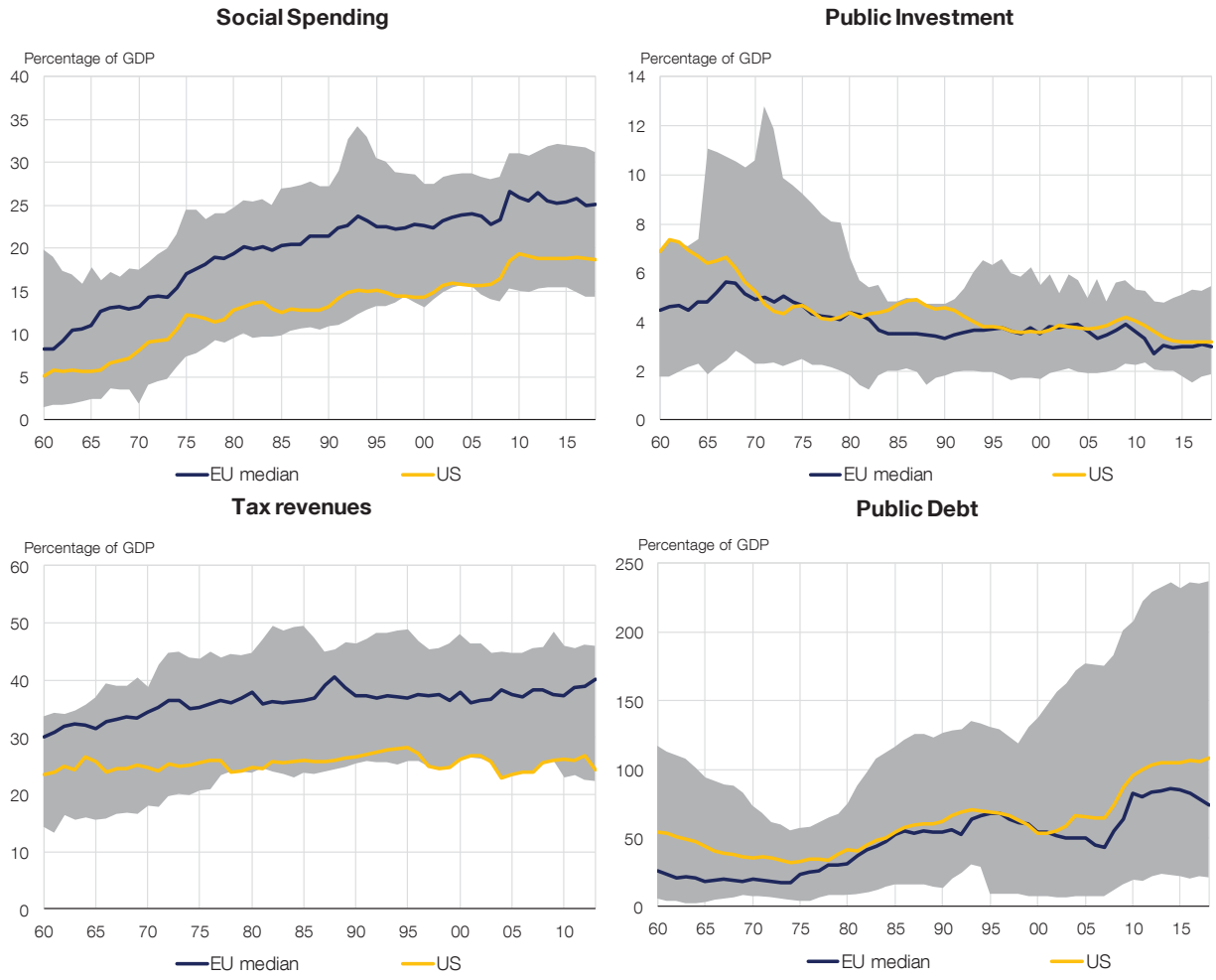
Figure 1: Social Expenditure and Public Investment Evolution by year†



SOURCES: OECD, AMECO, IMF.

† Year 2018 not available for all countries, the figure represents the nearest in time available.

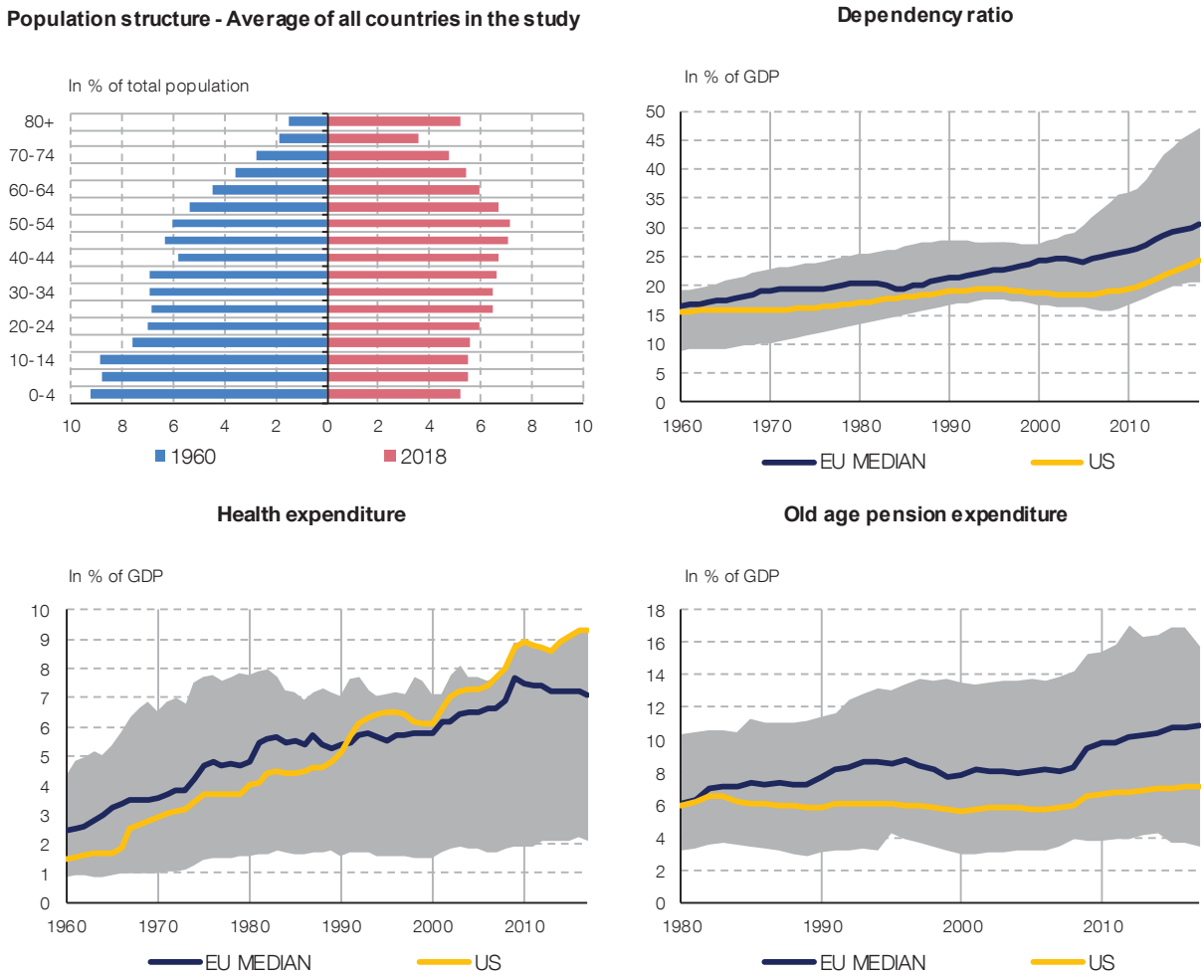
Figure 2: Public finance trends in the EU (only countries of study) and the US.



SOURCES: OECD, AMECO, IMF.

Grey area represents the maximum and minimum in the country sample.

Figure 3: Impact of ageing on public expenditure



SOURCES: OECD, Schuknecht and Zemanek (2018).

Grey area represents the maximum and minimum in the country sample.

needed to finance it. Nonetheless, the increase in government revenues was not enough over the whole period to cater for the increased expenditures, leading to a significant build-up of government debt (see lower panels of Figure 2). The latter put pressure on governments, in particular at times of economic distress, making it more likely for the government budget constraint to bite during crisis times.

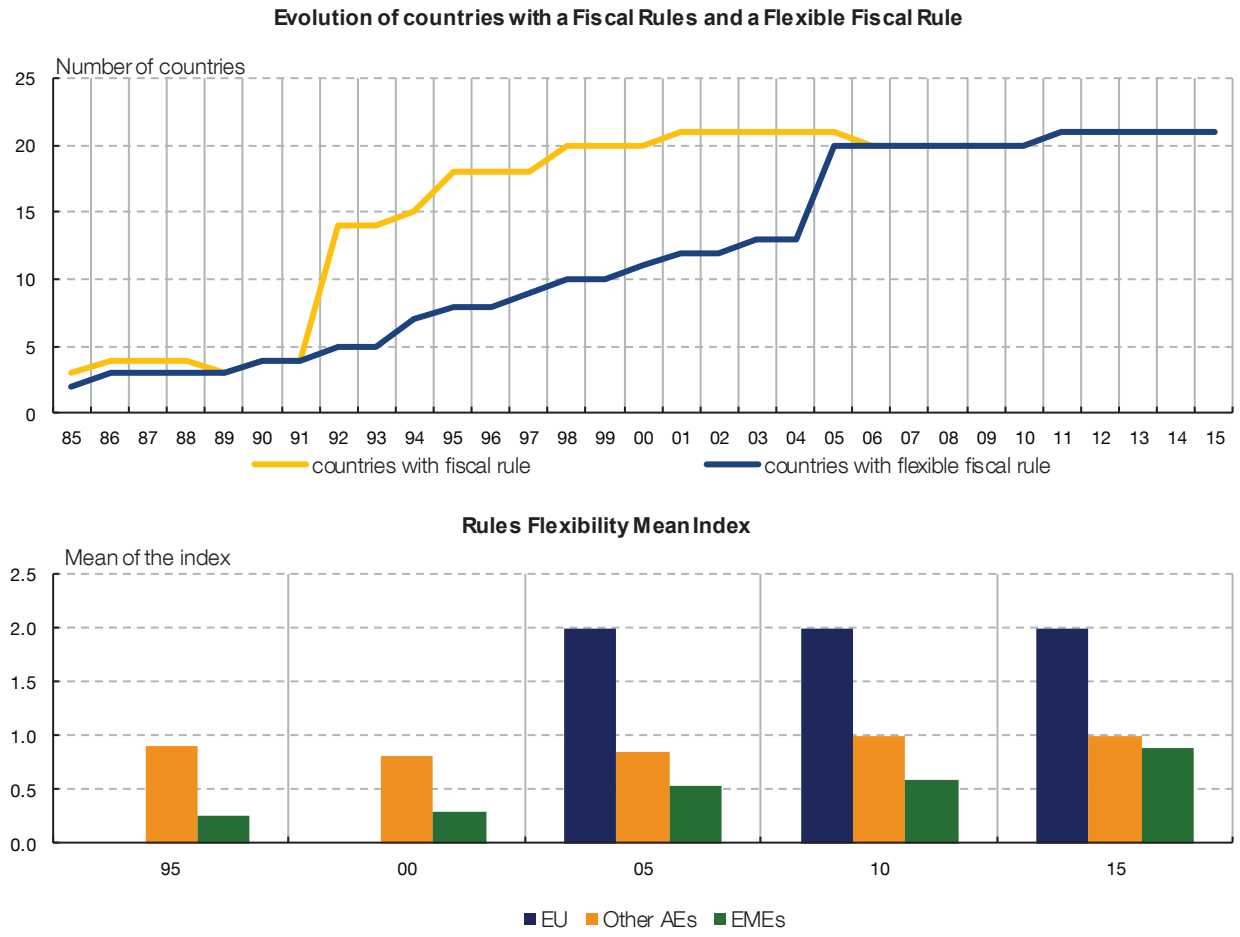
At the same time, public investment has suffered a long run decline, which goes back to the 1960s and is present not only in the advanced economies but also in some emerging economies. In the case of the EU, public investment recorded a significant fall during the 1970s and the 1980s before stabilizing in the 1990s. After increasing slightly in the pre-financial-crisis years, reflecting a gradual increase in Greece, Ireland, Spain, Portugal and in the countries that joined the EU between 2004 and 2007, public investment reached a ratio

of 3% of GDP, below the pre-crisis median. In the case of the US, the public investment ratio has followed a similar pattern. As a result, it stands now at an historical low of 3% of GDP.

3.2 Trends in fiscal rules frameworks

Governments have tried to discipline public finances through the implementation of fiscal rules. While in the 60's and 70's only a handful of advanced economies had fiscal rules in place,[1] its prevalence increased markedly in the early 1990's (see Figures 4 and A.3), in particular in Europe, as a consequence of the adoption of the Maastricht Treaty.

Figure 4: Fiscal rules evolution



SOURCE: IMF.

[1]Detailed data about fiscal rules design was obtained from the IMF dataset (IMF, 2017). We extend the data backwards with the information about fiscal rules in the previous years available in that dataset. We use two types of variables originated from this dataset. First, a dummy variable taking value of 1 if some fiscal rule exists in the dataset in a particular year. Second, a dummy variable taking value of 1 if a country has a flexible feature in its fiscal rule, such as a cyclically-adjusted target, a clause protecting investment expenditure (or "golden rule") or a well-defined escape clause, following Ardanáz et al. (2020).

In addition, past reforms have tried to find the right balance between enforcing fiscal discipline while preserving flexibility. The so-called "second-generation" fiscal rules have expanded the flexibility provisions putting the cyclically adjusted budget balance at the center of fiscal frameworks (to correct for the consequences of the cycle on public finances), introducing new escape clauses or with the design of "golden rules" i.e., fiscal rules that provide flexibility to spend in public investment by not accounting for it in the calculation of total expenditures (see Figure 4).

Figure 4 shows that flexible rules have become more common around the world. In the particular case of the EU, flexible rules were adopted in 2005 after the Stability and Growth Pact reform with the consideration of the cyclical adjusted balance and the introduction of escape clauses in case of severe shocks. Furthermore, specific provisions related to public investment were added in 2013 (Barbiero and Darvas, 2014).[2]

4 Empirical approach

4.1 Dataset

We build up a long panel database for the period 1960-2018 for twenty-two OECD developed countries, fourteen from the European Union (Austria, Belgium, Germany, Spain, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Denmark, Sweden) and eight non-EU (Australia, Canada, Switzerland, Japan, United States, New Zealand, the United Kingdom and Norway) (see table A.1 for additional details).

Two key variables in this study are social expenditure and public investment. Social expenditure comprises all public expenditures related to health, pensions, unemployment and family support (for a detailed description see OECD, 2019). Social expenditure data is obtained from the OECD social expenditure database and from several documents that contain historical data (OECD, 1985; Espuelas, 2013; Carolo and Pereirinha, 2010). Public investment is extracted from AMECO and IMF databases.[3] For the sake of robustness, we assess the dynamics of these variables via two alternative definitions: changes of GDP percentages and real terms growth rates.

[2]There are strong arguments about how these rules should be financed: as future generations will benefit from current investment expenditure given its impact on long term growth, it should be financed with debt and not by taxes paid by current generations (Blanchard and Giavazzi, 2004; Balassone and Franco, 2000)

[3]We specifically use an IMF public investment database (IMF, 2019) for historical data interpolation.

Other relevant variables for this analysis are the ones related to fiscal rules. We compute a fiscal rules dummy and fiscal rules flexibility dummy that are extracted from IMF (2017). Although the dataset covers only the period 1985-2015, it contains information on the existence of fiscal rules prior to 1985, enabling us to construct the fiscal rules dummy variable for the whole period. The only two countries having fiscal rules before 1985 are Germany and Japan whose fiscal rules date back to the 1960s.

We use a set of control variables representing demographic, political and economic performance topics. We include the dependency ratio of the population, defined as the percentage of people older than 64 years old over the population between 24-65 years old (working age population). We interact this variable with an old-age population variable considering those citizens older than 84 over the working age population.

For political ideology we use the Armingeon et al. (2019) database. We calculate an index that takes value 1 when the government is right-wing, 2 if center and 3 if left-wing, considering the combinations of different political parties in the government formation. As economic variables we use GDP per capita, the stock of public debt in percentage of GDP, the output gap obtained by a Hodrick-Prescott filter, and the public budgetary balance in percentage of GDP. Finally, we include a fiscal consolidation dummy following Alesina and Ardagna (2013), where a fiscal consolidation occurs if the cyclically adjusted primary balance/GDP ratio improves in two consecutive years and the cumulative improvement is at least two percentage points of GDP.

4.2 Econometric model

In the analysis, we explore two topics: first, the determinants of social expenditure and the effect of fiscal rules; second, the determinants of public investment and the existence of "social dominance" versus the impact of fiscal rules.

For the first question, we estimate the following equation:

$$\Delta soexp_{it} = \alpha + \beta_{db} Debt_{i\,t-1} + \beta_{dep} \Delta dep_{it} + \beta_{gc} \Delta lGDPc_{it} + \beta_x X_{it} + \mu_i + \epsilon_{it} \qquad (1)$$

where $soexp_{it}$ stands for social expenditure in percentage of GDP, subscript i and subscript t refer to the country and year respectively. According to equation 1 the variation of social expenditure is explained by the stock of public debt in percentage of GDP ($Debt_{i\,t-1}$), the variation of the dependency ratio (Δdep_{it}), and the increase in the log of GDP per capita ($\Delta lGDPc_{it}$). X_{it} represents a vector of variables that includes: fiscal rules variables (dummy

of fiscal rule, flexibility of fiscal rule, fiscal consolidation and the interaction fiscal consolidation with the flexibility dummy), political ideology and the lagged budgetary balance. Finally, the country fixed effect is represented by μ_i.

For the second question, dealing with the determinants of investment and the potential existence of crowding out from social spending on public investment, we estimate the following equation:

$$\Delta inv_{it} = \alpha + \beta_{fr} Fiscalrule_{it} + \sum_{s=1}^{3} \beta_{soexp,s} \Delta soexp_{it-s} + \beta_x X_{it} + \mu_i + \epsilon_{it} \qquad (2)$$

where, subscript i and subscript t refer to the country and year, respectively, Δinv_{it} stands for the change in public investment over GDP, $Fiscalrule_{it}$ for the fiscal rules variables (dummy of fiscal rule, flexibility of fiscal rule, fiscal consolidation and the interaction fiscal consolidation with the flexibility dummy), and $\Delta soexp_{it}$ stands, as before, as the growth of social expenditure. In this case, the vector of controls X_{it}, include the traditional determinants of public investment, such as the stock of public debt in percentage of GDP, the increase in the log of GDP per capita, the stock of public capital, GDP growth per capita, political ideology and the lagged budgetary balance. We do not include time dummies, as the main cyclical variation would be captured by the variation of GDP.

The model is estimated in differences, as the non-stationary nature of the data might lead to spurious results[4]. We replicate the same specifications but considering the variables in real terms growth, deflating both investment and social expenditure with the GDP deflator. Main results hold.

Our estimation strategy is based on a fixed effects panel data model. We estimate a fixed effect data model instead of other possible strategies, such as Generalized method of moments (GMM), due to the structure of our panel. Indeed, Judson and Owen (1999) found that for a panel with a small N and a time span (T) of 30 periods or more, the most suitable estimation strategy is the Least Squared Dummy Variable method (LSDV).

Moreover, one of the main concerns in the construction of this kind of models is the appearance of the Nickell bias that may arise when the number of groups is small and the lag of the dependent variable is included. Nevertheless, in Nickell (1981) the possible bias

[4] Another empirical method to capture the determinants of investment would be to find whether the social expenditure and investment are cointegrated and then estimate a panel error-correction model. However, it would make more difficult the comparison with the effect of fiscal rules, and, in any case, an exploration of the country-by-country trends (see Figure A.2) shows that countries have followed very dissimilar trajectories.

affecting an OLS estimation of a panel data model with individual fixed effects is significantly reduced when considering a large time dimension of the panel. Thus, for our panel of 58 time observations the bias is expected to be extremely small. We actually estimate the model both including and excluding the lag of the dependent variable, obtaining very similar results, and therefore we decided to include as our main specification the one excluding the lag.

In addition, we use the Driscoll and Kraay (1998) as our main specification. Relying on large T asymptotics, they demonstrate that the standard non-parametric time series covariance matrix estimator can be modified such that it is robust to very general forms of cross-sectional as well as temporal dependence. Besides, for the sake of robustness, we estimate the main specification under the biased-corrected Least Square Dummy Variable (LSDVC) developed by Bruno (2005a,b), obtaining similar results.

We do not control for the potential endogeneity of the variables capturing the incidence of fiscal rules, for several reasons. First, in our case, as there is a majority of European countries, outside pressure to implement fiscal rules might be dominant, easing off the endogeneity concerns. Second, the more common and state-of-the-art ways to control for endogeneity cannot be applied to our set of countries. Caselli and Reynaud (2018) construct an instrumental variable strategy to account for the endogeneity of the fiscal rules, using geographical proximity. However, the set of countries they have is wider and includes emerging market economies. Given that we use only OECD economies, the proximity variable would be less useful, as in European economies, implementation dates are correlated. Similarly, Alberola et al. (2018) use, in the context of Latin American economies, an external instrument defined as the number of years the current political regime has been in place. However, that strategy seems only suitable for economies with low stability in political regimes.

In order to complete our analysis and account for the dynamic response of both social expenditure and public investment, we explore the dynamic response of a fiscal rule implementation, following Ardanáz et al. (2020). In particular, we estimate Jordà (2005)'s local projections' method. We also consider the dynamic impact of social expenditures' dynamics on investment using this method. Hence, equation 2 becomes:

$$\Delta inv_{i,t+h} = \alpha_{i,h} + \beta_{fr,h} Fiscalrule_{it} + \beta_{soexp,h} \Delta soexp_{it-1} + \beta_{x,h} X_{it} + \mu_{i,h} + \epsilon_{it+h} \qquad (3)$$

where we include in the vector of covariates X_{it} all the previous controls and the subindex h= [0, 7] represent the coefficients taken from this regression h periods ahead. We estimate

one regression for each value of h, therefore $\beta_{soexp,h}$ measures the effect of social expenditure on investment after h periods and $\beta_{fr,h}$ the effect of the presence of a fiscal rule. In order to avoid possible endogeneity problems, we use lags of social expenditures as shocks.

The local projection method is a more flexible alternative to VAR specifications since it does not impose the model restrictions proper of structural VARs. It delivers non-linear estimates of the explanatory variables across horizons, also allowing to control for other possible determinants, as in the previous specifications. Finally, we also use this methodology to analyze the differential dynamic impact of the presence of fiscal rules during consolidations, following Ardanáz et al. (2020).

5 Results

As stated in the previous section, we perform a set of regressions to test the determinants of social expenditure and public investment dynamics. If the social dominance hypothesis holds, increases in social expenditure should precede falls in public investment. As some preliminary evidence on the social dominance hypothesis, in Table 1 we present a battery of Granger-causality tests performed in a country-by-country basis, in order to test if increases in social expenditure can help forecast investment expenditure (and viceversa). For each country we estimate the following equations:

$$Y_t = \alpha + \beta Y_{t-1} + \gamma X_{t-1} + \epsilon_t \tag{4}$$

in which X_t and Y_t can both represent social expenditure and public investment.

Table 1: Granger Causality by country: Social expenditure and Investment

Dependent variable	AT	BE	DE	ES	FI	FR	GR	IE
Social expenditure	0.00	0.15	-0.09	0.08	0.12	-0.15	0.18	0.64***
Investment	-0.08***	-0.01*	-0.07***	0.00	0.01	-0.02***	0.01	-0.05***

	IT	LU	NL	PT	DK	GB	SE
Social expenditure	0.24	0.06	0.26**	0.14	-0.05	0.01	-0.01
Investment	-0.02**	-0.00	-0.03***	-0.01	-0.01	-0.02	-0.02***

	AU	CA	CH	JP	US	NZ	NO
Social expenditure	-0.36	-0.17	0.21	0.01	0.13	0.17*	0.25
Investment	0.00	-0.00	-0.02***	-0.03***	-0.02*	-0.03	0.00

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

The first column of the table shows that in none of the countries in the sample an increase in public investment is significantly related to a decrease in social expenditures. On the contrary, social expenditure growth helps to forecast public investment in the majority of countries showing a sort of crowding out effect, in line with findings by Schuknecht and Zemanek (2018). As a result, it reinforces the decision of including, in the benchmark model, social expenditure as a determinant of investment expenditure, but not the opposite. This is only suggestive evidence, as no controls are used. Now we move to the main body of our empirical results.

Social expenditure determinants

Table 2 show the determinants of social expenditure. Firstly, in line with the existent literature, social expenditure grows with age-related fundamentals (dependency ratio). This direct relationship is based on the evolution of pensions and health expenditure, the two main components of social expenditure when population ages. Related to the former, a rise in life expectancy increases both the number of pensioners and the duration of pension reception. As regards the latter, Bech et al. (2011), for instance, estimate that ageing in the short run, and the increase in life expectancy in the long run, have a boosting effect on health expenditure due to the longer time spent in bad health and the higher incidence of chronic diseases with a high medical treatment cost.

In addition, coming back to the table, social expenditure is negatively correlated to the debt to GDP ratio, a result in line with the existence of some self-correcting fiscal discipline when public debt is high. Therefore, when debt levels are significant, governments tend to freeze pensions or cut health expenditure and social benefits. Moreover, social spending contributes in fiscal consolidation episodes to the re-equilibrium of the government budget. Dividing the sample in two periods, 1960-1985 and 1985-2015, we can see that these trends are stronger in the second part of the sample, when the expansion of the welfare state was already in place in most of the countries, in particular, in Northern Europe (see Figure A.2).

Social expenditure also shows a distinct counter-cyclical behaviour, as this expenditure item is negatively correlated with the output gap, consistently with Lane (2003). Neither GDP per capita nor ideology seem to have an impact on social expenditure evolution, with one exception, countries governed by left-hand parties tend to have higher social expenditure in the shorter period of 1985-2015. This is probably related to the generalization of the welfare system during the first two decades of the longer sample period, independently of the political party in power.

Table 2: Δ Social Expenditure / GDP determinants

	1960-2015					1960-1985		1985-2015	
Debt_{t-1}	-0.006***	-0.007***	-0.005***	-0.005***	-0.006***	-0.008	-0.008	-0.010***	-0.010***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.006)	(0.002)	(0.002)
GDPpc growth_t	-0.012	-0.006	0.002	-0.012	-0.006	0.002	0.002	-0.069*	-0.073*
	(0.012)	(0.011)	(0.010)	(0.011)	(0.010)	(0.009)	(0.009)	(0.035)	(0.037)
dependency ratio	0.028***	0.026**	0.015	0.028***	0.027**	0.018	0.018	0.038**	0.034**
	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)	(0.024)	(0.024)	(0.014)	(0.014)
Cycle	-0.227***	-0.233***	-0.244***	-0.230***	-0.236***	-0.171***	-0.171***	-0.208***	-0.202***
	(0.022)	(0.024)	(0.023)	(0.021)	(0.023)	(0.021)	(0.021)	(0.032)	(0.037)
Ideology_{t-1}	0.021	0.011	0.022	0.026	0.016	-0.041	-0.041	0.062*	0.053
	(0.045)	(0.045)	(0.045)	(0.044)	(0.044)	(0.132)	(0.132)	(0.033)	(0.035)
Rules dummy	-0.323***			-0.319***		0.105		-0.307***	
	(0.061)			(0.063)		(0.550)		(0.105)	
Flexibility dummy		-0.214***			-0.230***		0.105		-0.200**
		(0.080)			(0.083)		(0.550)		(0.089)
Fiscal Cons. Alesina			-0.331***	-0.308**	-0.339***	-0.066	-0.066	-0.295*	-0.260***
			(0.078)	(0.152)	(0.111)	(0.283)	(0.283)	(0.160)	(0.091)
Fiscal Cons. Al.× Rules dummy				-0.012		-0.336		0.049	
				(0.170)		(0.457)		(0.187)	
Fiscal Cons. Al.× Flexibility					0.012		-0.336		-0.036
					(0.133)		(0.457)		(0.110)
# Observations	1,127	1,127	1,109	1,109	1,109	439	439	649	649
Countries	22	22	22	22	22	21	21	22	22
R-squared	0.307	0.297	0.307	0.322	0.314	0.146	0.146	0.527	0.518

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

Finally, fiscal rules exert a moderating pressure on social spending, including when the degree of flexibility of the rules is taken into account. Most countries did not have any fiscal rules prior to 1985 (see Figure A.3). Therefore, it is not surprising that their effectiveness is only significant in the second sub-period, when they where more generalized and gained strength. The interaction of fiscal rules and flexible fiscal rules with the fiscal consolidation episodes does not give any conclusive result, indicating that the effectiveness of fiscal rules (whether flexible or not) in controlling increases in social expenditure is not particularly higher in consolidation times.

Investment expenditure determinants

Concerning the analysis of public investment determinants, we find evidence of a crowding-out of public investment by social spending, a phenomenon which is also stronger in the second part of the sample (see Tables 3 and 4). This finding lends support to the "social dominance hypothesis" and is in line with the results obtained using Granger causalities. An increase of one percentage point in social expenditure leads to a decrease of around 0.1 percentage points in investment expenditure, summing up the effects of the different lags.

With respect to the cyclical determinants of public investment, we do not find a strong procyclical behaviour of investment expenditure when this variable is expressed as changes in the ratio to GDP, as measured by the significance of the output gap in the regression (Tables 3), but it is positive and strongly significant when measuring investment in growth rates, confirming the findings in Lane (2003).

Along the structural determinants of public investment, we find that countries with lower GDP per capita growth and lower capital stock tend to increase their investment more, specially in the first part of the period, indicating a catching-up process of the less developed countries. Meanwhile, political ideology does not seem to have a significant impact on investment evolution. However, contrary to the social expenditure case, the stock of debt has no significant impact on the evolution of investment. In the case of fiscal consolidation episodes, they hinge particularly heavily on this spending item, specifically between 1985 and 2015. With respect to the variable measuring the profitability of the new investment, the difference between real interest rates and growth rates, we find a negative but not significant effect on public investment. As a consequence, an environment with low interest rates might increase public investment, but in our regression this effect is not distinguishable from zero (see table A.2).

Table 3: Δ Investment Expenditure / GDP determinants

	1960-2015					1960-1985		1985-2015	
Debt_{t-1}	-0.001	-0.001*	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.001)	(0.001)
GDPpc growth_t	-0.007*	-0.007*	-0.004	-0.007	-0.007*	-0.013**	-0.013**	-0.003	-0.011
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.006)	(0.017)	(0.016)
$\text{Capital Stock}_{t-1}$	-0.006***	-0.006***	-0.005***	-0.006***	-0.006***	-0.018***	-0.018***	-0.006**	-0.007**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.004)	(0.004)	(0.002)	(0.003)
Cycle	-0.007	-0.007	-0.010	-0.008	-0.007	-0.012	-0.012	-0.001	0.009
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.015)	(0.015)	(0.017)	(0.018)
Ideology_{t-1}	-0.009	-0.012	-0.010	-0.009	-0.011	-0.055	-0.055	-0.002	-0.006
	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	(0.046)	(0.046)	(0.016)	(0.016)
Δ Social expenditure_{t-1}	-0.014	-0.014	-0.020*	-0.023**	-0.023**	-0.003	-0.003	-0.031	-0.034
	(0.012)	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	(0.021)	(0.021)
Δ Social expenditure_{t-2}	-0.043**	-0.042**	-0.045**	-0.047**	-0.046**	-0.013	-0.013	-0.056**	-0.058**
	(0.018)	(0.017)	(0.018)	(0.018)	(0.018)	(0.020)	(0.020)	(0.027)	(0.027)
Δ Social expenditure_{t-3}	-0.037**	-0.035**	-0.035***	-0.036***	-0.035***	-0.001	-0.001	-0.055***	-0.055***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)	(0.017)	(0.016)
Rules dummy	-0.057*			-0.049		0.026		-0.044	
	(0.030)			(0.030)		(0.202)		(0.026)	
Flexibility dummy		-0.072*			-0.072**		0.026		-0.072*
		(0.037)			(0.034)		(0.202)		(0.037)
Fiscal Cons. Alesina			-0.099**	-0.064	-0.088	0.063	0.063	-0.215***	-0.178***
			(0.042)	(0.078)	(0.060)	(0.159)	(0.159)	(0.060)	(0.030)
Fiscal Cons. Al.× Rules dummy				-0.064		-0.169		0.081	
				(0.083)		(0.131)		(0.068)	
Fiscal Cons. Al.× Flexibility					-0.044		-0.169		0.042
					(0.076)		(0.131)		(0.043)
# Observations	1,075	1,075	1,074	1,074	1,074	404	404	586	586
Countries	22	22	22	22	22	21	21	22	22
R-squared	0.0723	0.0738	0.0766	0.0799	0.0816	0.0782	0.0782	0.115	0.117

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

Table 4: Investment Expenditure growth determinants

	1960-2015					1960-1985		1985-2015	
Debt_{t-1}	-0.054***	-0.052***	-0.049***	-0.047***	-0.044***	-0.074	-0.074	-0.041*	-0.038*
	(0.015)	(0.015)	(0.016)	(0.016)	(0.016)	(0.091)	(0.091)	(0.021)	(0.021)
GDPpc growth_t	-0.024	-0.059	0.016	-0.004	-0.042	-0.289*	-0.289*	1.085**	0.882**
	(0.149)	(0.135)	(0.157)	(0.156)	(0.141)	(0.154)	(0.154)	(0.456)	(0.394)
Capital Stock_{t-1}	-0.145***	-0.157***	-0.142***	-0.149***	-0.163***	-0.442***	-0.442***	-0.199***	-0.216***
	(0.029)	(0.032)	(0.031)	(0.028)	(0.032)	(0.089)	(0.089)	(0.044)	(0.050)
Cycle	0.666***	0.700***	0.646***	0.668***	0.701***	0.614	0.614	-0.459	-0.216
	(0.246)	(0.248)	(0.241)	(0.248)	(0.246)	(0.468)	(0.468)	(0.530)	(0.497)
Ideology_{t-1}	0.081	0.030	0.076	0.087	0.043	-0.977	-0.977	0.236	0.168
	(0.499)	(0.504)	(0.494)	(0.496)	(0.501)	(0.910)	(0.910)	(0.506)	(0.524)
Social exp. Growth_{t-1}	0.016	0.011	0.008	0.006	-0.001	0.018	0.018	-0.049	-0.069
	(0.043)	(0.042)	(0.039)	(0.039)	(0.039)	(0.036)	(0.036)	(0.118)	(0.112)
Social exp. Growth_{t-2}	-0.017	-0.022	-0.020	-0.022	-0.028	0.036	0.036	-0.154	-0.167
	(0.038)	(0.039)	(0.039)	(0.039)	(0.040)	(0.032)	(0.032)	(0.180)	(0.183)
Social exp. Growth_{t-3}	-0.051	-0.054	-0.053	-0.053	-0.056	0.026	0.026	-0.612***	-0.621***
	(0.056)	(0.057)	(0.056)	(0.056)	(0.056)	(0.038)	(0.038)	(0.126)	(0.121)
Rules dummy	-0.573			-0.447		-3.477		0.140	
	(1.010)			(0.999)		(4.211)		(0.691)	
Flexibility dummy		-1.852			-1.824		-3.477		-1.286
		(1.247)			(1.177)		(4.211)		(0.975)
Fiscal Cons. Alesina			-2.267*	-1.753	-1.922	-0.086	-0.086	-4.035**	-3.818***
			(1.157)	(2.130)	(1.611)	(4.451)	(4.451)	(1.542)	(0.704)
Fiscal Cons. Al.× Rules dummy				-0.906		-5.423		0.573	
				(2.411)		(4.375)		(1.985)	
Fiscal Cons. Al.× Flexibility					-1.255		-5.423		0.264
					(2.242)		(4.375)		(1.508)
# Observations	1,068	1,068	1,067	1,067	1,067	397	397	607	607
Countries	22	22	22	22	22	21	21	22	22
R-squared	0.0625	0.0655	0.0682	0.0687	0.0725	0.0604	0.0604	0.158	0.159

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

Table 5: Interactions between fiscal rules and social expenditure evolution.

	Dependent variable: Δ investment expenditure / GDP					
	Rules dummy			Rules flexibility dummy		
$Debt_{t-1}$	-0.001*	-0.001*	-0.001*	-0.001*	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPpc $growth_t$	-0.004	-0.002	-0.002	-0.008	-0.007	-0.006
	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)
Capital $Stock_{t-1}$	-0.006***	-0.006***	-0.006***	-0.006**	-0.006**	-0.006**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Cycle	-0.001	-0.004	-0.005	0.003	0.001	0.000
	(0.020)	(0.021)	(0.021)	(0.023)	(0.022)	(0.022)
$Ideology_{t-1}$	-0.002	-0.001	-0.002	-0.003	-0.001	-0.004
	(0.014)	(0.015)	(0.014)	(0.015)	(0.016)	(0.015)
Δ Social $expenditure_{t-1}$	0.035	-0.014	-0.012	0.008	-0.017	-0.013
	(0.027)	(0.020)	(0.020)	(0.023)	(0.019)	(0.019)
Δ Social $expenditure_{t-2}$	-0.048*	-0.027	-0.046*	-0.047*	0.006	-0.047*
	(0.026)	(0.047)	(0.025)	(0.026)	(0.035)	(0.025)
Δ Social $expenditure_{t-3}$	-0.063***	-0.064***	-0.043	-0.063***	-0.067***	-0.043
	(0.020)	(0.019)	(0.051)	(0.019)	(0.018)	(0.032)
Rules dummy	-0.016	-0.026	-0.024			
	(0.026)	(0.028)	(0.029)			
Flexibility dummy				-0.037	-0.024	-0.036
				(0.035)	(0.041)	(0.039)
Δ Social $expenditure_{t-1}$	-0.063*			-0.034		
× Rule indicator	(0.033)			(0.030)		
Δ Social $expenditure_{t-2}$		-0.023			-0.079*	
× Rule indicator		(0.050)			(0.042)	
Δ Social $expenditure_{t-3}$			-0.024			-0.030
× Rule indicator			(0.051)			(0.037)
# Observations	608	608	608	608	608	608
Countries	22	22	22	22	22	22
R-squared	0.101	0.0974	0.0974	0.0993	0.106	0.0991

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

Fiscal rules also play a role in disciplining government investment dynamics, but to a lesser extent than in the case of social expenditure. In most of the specifications, the coefficient is negative, but small and not significant. Curiously, the interaction of fiscal consolidation episodes and the fiscal rules dummys is very significant in the first sub-period, but this only reflects two episodes of fiscal consolidation (one for Germany and the other for Japan), as they are the only ones with fiscal rules in that period. Hence, one cannot confirm that the flexibility of fiscal rules has had the expected impact on investment, possibly

signalling the need for an improvement in their design and their effective implementation, contrary to the findings in Ardanáz et al. (2020). Given that their sample include emerging economies and the time period is shorter, we cannot discard that this is a product of the different sample selection. We should take into account, in any case, that the effect of fiscal rules on investment might be present indirectly through the negative and sizeable impact of fiscal rules on social expenditure. This results hold under an alternative definition of fiscal rules based on a numeric index of the strength and flexibility, that is further developed in Annex 6.

Table 5 show the interactions between fiscal rules and social expenditure in determining public investment. In principle, fiscal rules might exert more pressure on social expenditure (Bergman et al., 2013), mitigating the negative effect of social expenditure on investment. However, we do not find evidence of this mitigation effect. The interaction coefficients are negative and mostly insignificant, irrespective of the presence of flexibility clauses.

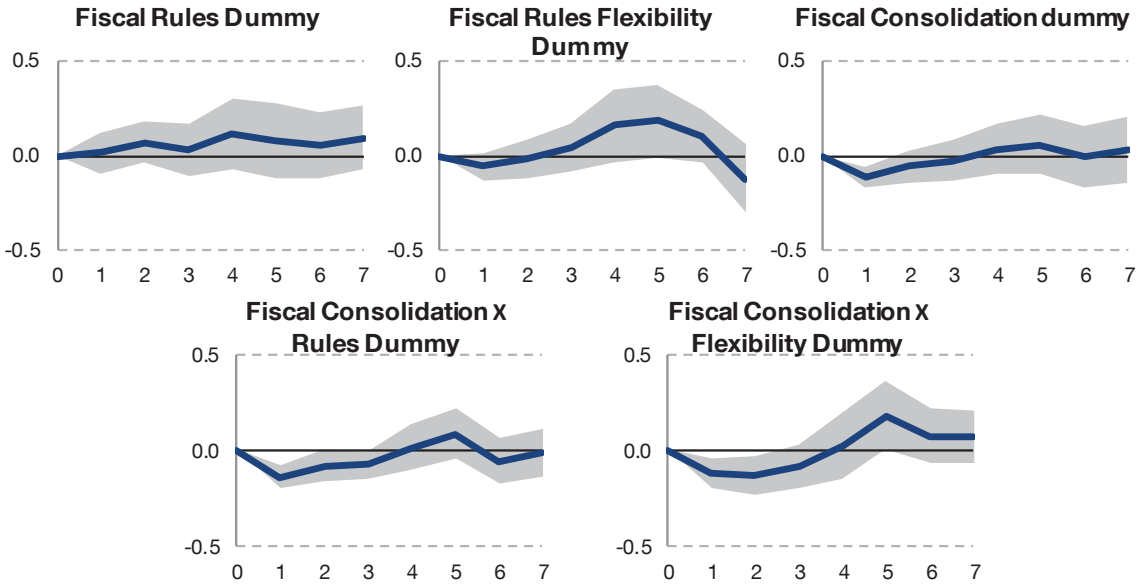
The dynamic effects of fiscal rules

Finally, Figure 5 presents the effects of the presence of fiscal rules during fiscal consolidations in a dynamic framework, using equation 3. In particular, in the first two panels, we plot the values of $\beta_{fr,h}$ for the fiscal consolidation dummies, the fiscal rules dummies and the interactions. In the panel that appears below, we plot the values of $\beta_{soexp,h}$. We find that both the presence of rules and flexible rules make the fiscal consolidation less harmful for public investment (right-hand panels of Figure 5a). This effect is not present in the case of social expenditure, in which the impulse responses are very similar regardless of the presence of fiscal rules (whether flexible or not), which complements the results found in Ardanáz et al. (2020).

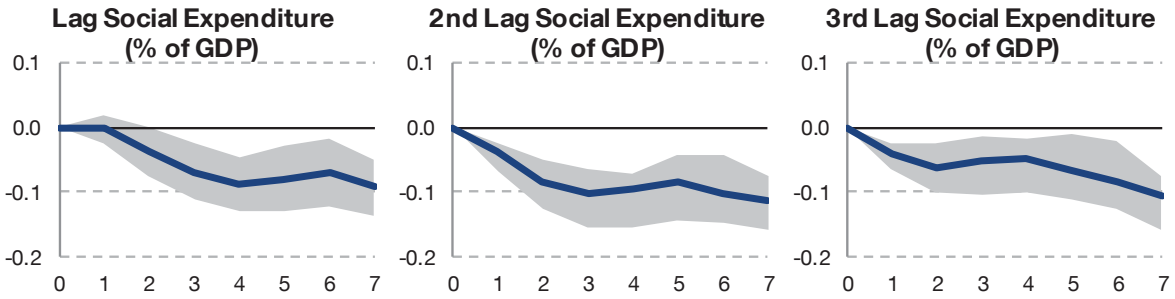
With respect to the effect of social expenditure in public investment, we also find that, following a lagged shock in social expenditure, public investment shows a declining path (see Figure 5b), thus reinforcing the results about the causal effect of social expenditure on investment.

Figure 5: Local projections impact (horizon 6 years)

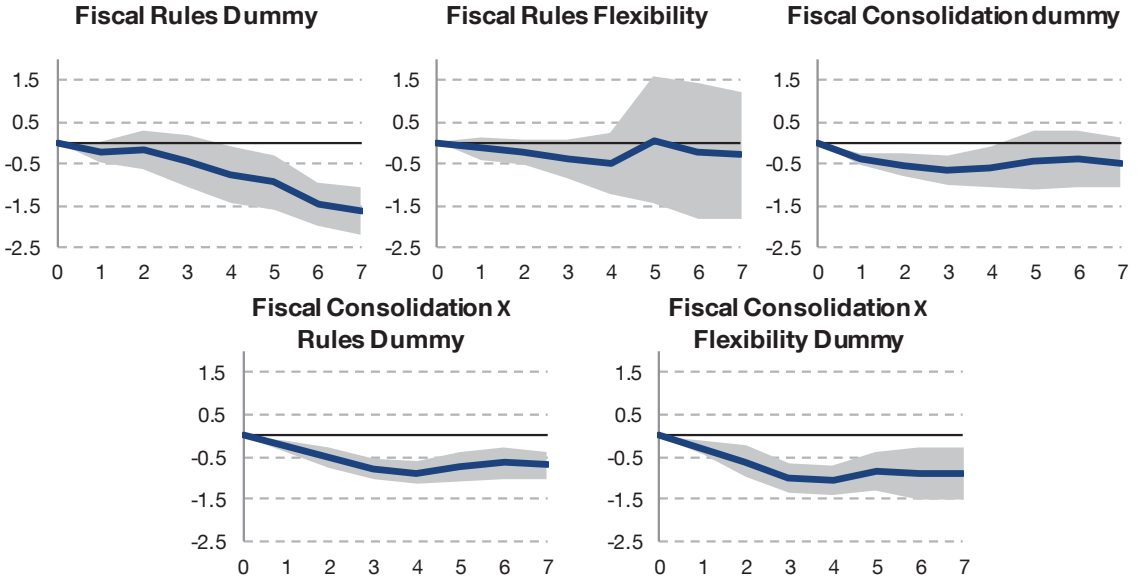
(a) Dependent variable: Public investment (in GDP terms)



(b) Dependent variable: Public investment (in GDP terms)



(c) Dependent variable: Social expenditure (in GDP terms)



Grey area correspond to the confidence band at 90%.

6 Conclusions

In this paper we analyze the determinants of social and public investment expenditure dynamics in a broad set of advanced economies, and the interrelation between them. The main objective is to ascertain the reasons for the long-standing decline in public investment expenditure as a fraction of output and total expenditure. This is a long-standing empirical issue in economics. The novelty of our paper lies in the integrated approach we take. We test jointly the two main hypotheses that have been posed in the literature, and show that both are relevant to understand the phenomenon at hand. The "social dominance hypothesis" claims that the secular decline in public capital expenditure is a structural feature, due to upward social expenditure trends (linked to ageing populations and social preferences), while another branch of the literature indicates that too-rigid fiscal rules' frameworks cause fiscal retrenchment episodes to hinge heavily on public capital expenditure, inducing cyclical elements to create a sort of downward hysteresis in this budgetary item.

Our results show strong support for the "social dominance hypothesis", in the sense that social expenditure growth is a strong determinant of future negative growth in public investment. In the case of fiscal rules, we find that they exert discipline over both spending items, but more so in the case of social expenditure, therefore relaxing the pressure it makes on public investment. These results are robust over different specifications and estimation methods. In particular, the flexibility of the fiscal rules does not seem to have played a significant role, once other first-order determinants are taken on board.

It is worth mentioning that as regards rules, we have analysed the role of "de iure" fiscal rules. But in practice fiscal rules have displayed a pro-cyclical bias as regards their implementation, i.e. they have been applied more strongly in "bad times", being their implementation record relatively muted in "good times" (see Figure 5). In practice, as regards our empirical strategy, this implies that an endogeneity bias might be present in our estimations. To us, this is a promising avenue for further research.

References

Alberola, E., Kataryniuk, I., Melguizo, n., and Orozco, R. (2018). Fiscal policy and the cycle in latin america: the role of financing conditions and fiscal rules. *Ensayos sobre Política Económica*, 36(85):101–116.

Alesina, A. and Ardagna, S. (2013). The design of fiscal adjustments. In *Tax policy and the economy*, volume 27, pages 19–68. University of Chicago Press, Chicago, Illinois.

Ardanaz, M. and Izquierdo, A. (2017). Current expenditure upswings in good times and capital expenditure downswings in bad times?: New evidence from developing countries. *IDB Working Paper No. IDB-WP-838*.

Ardanáz, M., Cavallo, E., Izquierdo, A., and Puig, J. (2020). Growth friendly fiscal rules? safeguarding public investment from budget cuts through fiscal rule design. *Inter-American Development Bank, IDB Working Paper No. IDB-WP-1083*.

Armingeon, K., Wenger, V., Wiedemeier, F., Isler, C., Knöpfel, L., Weisstanner, D., and Engler, S. (2019). Comparative political data set 1960-2017. *Institute of Political Science, University of Berne*.

Ayuso-i Casals, J., Hernandez, D. G., Moulin, L., and Turrini, A. (2009). Beyond the sgp: Features and effects of eu national-level fiscal rules. In *Policy instruments for sound fiscal policies*, pages 204–240. Springer.

Balassone, F. and Franco, D. (2000). Public investment, the stability pact and the 'golden rule'. *Fiscal studies*, 21(2):207–229.

Bamba, M., Combes, J.-L., and Minea, A. (2019). The effects of fiscal consolidations on the composition of government spending. *Applied Economics*, pages 1–16.

Barbiero, F. and Darvas, Z. (2014). In sickness and in health: protecting and supporting public investment in europe. Technical report, Bruegel Policy Contribution.

Bech, M., Christiansen, T., Khoman, E., Lauridsen, J., and Weale, M. (2011). Ageing and health care expenditure in eu-15. *The European Journal of Health Economics*, 12(5):469–478.

Bergman, M., Hutchison, M. M., Jensen, S. E. H., et al. (2013). *Do sound public finances require fiscal rules or is market pressure enough?* Citeseer.

Blanchard, O. (2019). Public debt and low interest rates. *American Economic Review*, 109(4):1197–1229.

Blanchard, O. J. and Giavazzi, F. (2004). Improving the sgp through a proper accounting of public investment. *CEPR discussion paper*.

Bova, M. E., Carcenac, N., and Guerguil, M. M. (2014). *Fiscal rules and the procyclicality of fiscal policy in the developing world*, volume 14-122. International Monetary Fund.

Breunig, C. and Busemeyer, M. R. (2012). Fiscal austerity and the trade-off between public investment and social spending. *Journal of European Public Policy*, 19(6):921–938.

Bruno, G. S. (2005a). Approximating the bias of the LSDV estimator for dynamic unbalanced panel data models. *Economics letters*, 87(3):361–366.

Bruno, G. S. (2005b). Estimation and inference in dynamic unbalanced panel-data models with a small number of individuals. *The Stata Journal*, 5(4):473–500.

Carolo, D. F. and Pereirinha, J. A. (2010). The development of the welfare state in Portugal: trends in social expenditure between 1938 and 2003. *Journal of lberian and Latin American Economic History*, 28(63):469–501.

Caselli, F. and Reynaud, J. (2018). Do fiscal rules improve the fiscal balance? a new instrumental variable strategy. *background paper to IMF staff discussion note*, 18(04).

Dahan, M. and Strawczynski, M. (2013). Fiscal rules and the composition of government expenditures in oecd countries. *Journal of Policy Analysis and Management*, 32(3):484–504.

Debrun, X., Moulin, L., Turrini, A., Ayuso-i Casals, J., and Kumar, M. S. (2008). Tied to the mast? national fiscal rules in the european union. *Economic Policy*, 23(54):298–362.

Driscoll, J. C. and Kraay, A. C. (1998). Consistent covariance matrix estimation with spatially dependent panel data. *Review of economics and statistics*, 80(4):549–560.

Engel, E., Fischer, R. D., and Galetovic, A. (2019). International experience with public-private partnerships in infrastructure. In *Economics of Infrastructure Investment*. University of Chicago Press.

Espuelas, S. (2013). La evolución del gasto social público en españa, 1850-2005. *Banco de España, Estudios de Historia Económica*, 63.

European Commission (2017). Government investment in the EU: the role of institutional factors, Report on Public Finances in EMU 2017.

European Commission (2019). Fiscal rules database. Available from European Commission Web site: `https://ec.europa.eu/info/publications/fiscal-rules-database_en`.

European Council (2020). European council conclusions, 17-21 july 2020, press release. Available from European Council of the European Union Web site: `https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf`.

Gali, J. and Perotti, R. (2003). fiscal policy and monetary integration. *NBER working paper*, 9773.

Gavin, M. and Perotti, R. (1997). Fiscal policy in latin america. *NBER macroeconomics annual*, 12:11–61.

Guerguil, M., Mandon, P., and Tapsoba, R. (2017). Flexible fiscal rules and countercyclical fiscal policy. *Journal of Macroeconomics*, 52:189–220.

Haan, J. de, J. S. and Sikken, B. (1996). Government capital formation: Explaining the decline. *Review of World Economics*, 132:55–74.

IMF (2017). Fiscal rules dataset: 1985-2015. Available from International Monetary Fund Web site: `https://www.imf.org/external/datamapper/fiscalrules/map/map.htm`.

IMF (2019). Investment and capital stock dataset, 1960-2017. Available from International Monetary Fund Web site: `https://www.imf.org/external/np/fad/publicinvestment/`.

IMF (2020). World economic outlook update, june 2020. International Monetary Fund.

Jäger, P. and Schmidt, T. (2016). The political economy of public investment when population is aging: a panel cointegration analysis. *European Journal of Political Economy*, 43:145–158.

Jordà, s. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182.

Judson, R. A. and Owen, A. L. (1999). Estimating dynamic panel data models: a guide for macroeconomists. *Economics letters*, 65(1):9–15.

Lane, P. R. (2003). The cyclical behaviour of fiscal policy: evidence from the oecd. *Journal of Public economics*, 87(12):2661–2675.

Mehrotra, A. and Välilä, T. (2006). Public investment in Europe: evolution and determinants in perspective. *Fiscal Studies*, 27(4):443–471.

Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica: Journal of the Econometric Society*, pages 1417–1426.

OECD (1985). Social expenditure 1960-1990. problems of growth and control. *OECD Social Policies Studies*.

OECD (2019). The oecd socx manual 2019 edition. a guide to the oecd social expenditure database. *Organisation for Economic Co-operation and Development*.

Oxley, H. and Martin, J. (1991). Controlling government spending and deficits: trends in the 1980s and prospects for the 1990s. *OECD Economic Studies*, 17:145–189.

Schaechter, A., Kinda, T., Budina, N. T., and Weber, A. (2012). Fiscal rules in response to the crisis-toward the'next-generation'rules: A new dataset. *IMF Working paper*, 187.

Schuknecht, L. and Zemanek, H. (2018). Social dominance. *CESifo Working Paper Series*, 6894.

Serven, L., Perry, G. E., and Suescun, R. (2007). *Fiscal policy, stabilization, and growth: prudence or abstinence?* The World Bank.

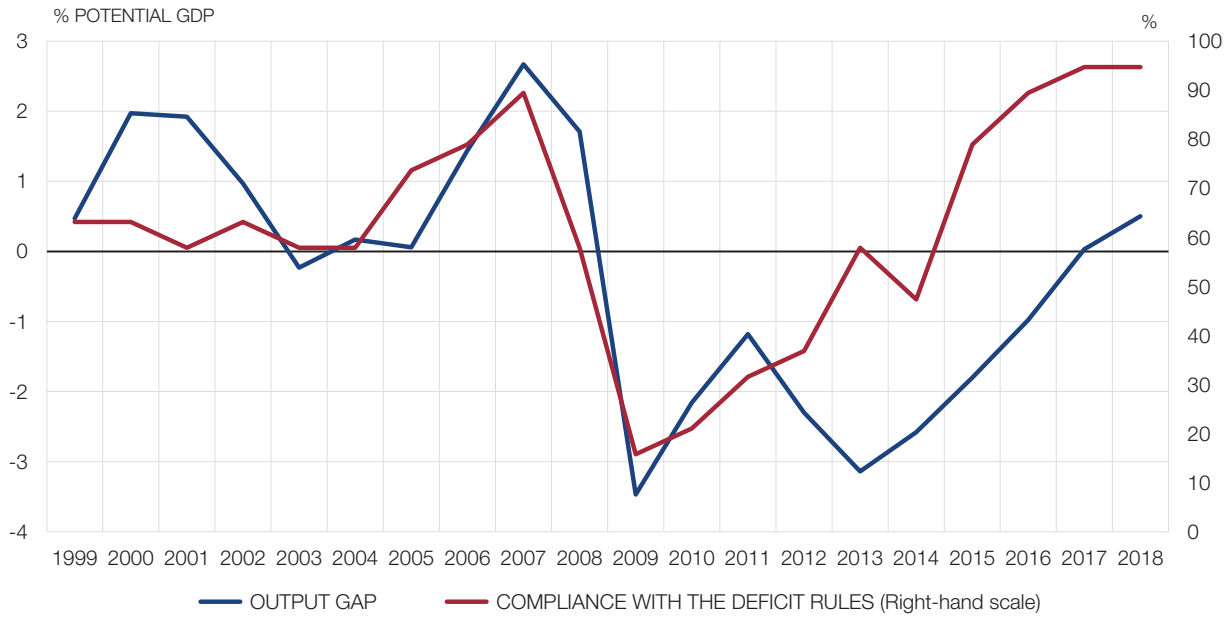
Annex I: Additional material and Robustness checks

Table A.1: Database

Data	Sources	Availability
Social Expenditure (in % of GDP)	OECD Database, OECD (1985), Espuelas (2013), Carolo and Pereirinha (2010)	**1960-2018**: AT BE DE ES FI FR GR IE IT NL PT DK GB SE AU[1] CA[1] CH JP[1] US NZ NO **1980-2018**: LU
Public investment (in % of GDP)	AMECO, IMF, IMF (2019)	**1960-2018**: AT BE DE ES FI FR GR IE IT NL PT DK[2] GB SE AU CA[2] CH JP US NZ[2] NO **1980-2018**: LU
Real GDP growth	IMF, OECD	**1960s-2018**:AT BE DE ES FI FR GR IE IT NL PT DK GB SE AU CA CH JP US NZ NO **1980-2018**:LU
GDP per capita	AMECO, IMF	**1960-2018**:AT BE ES FI FR GR IE IT LU NL PT DK GB SE AU CA CH JP US NO **1970-2018**: DE **1980-2018**: NZ
Demographic variables	OECD	**1960-2018**: ALL COUNTRIES
Averaged cabinet composition ideology (1= right, 2= center, 3=left)	Armingeon et al. (2019)	**1960-2017**: AT BE DE FI FR GR IE IT LU NL DK GB SE AU CA CH JP US NZ NO **year[3]-2017**: PT ES
Fiscal Rules Dummy	IMF (2017)	**1960-2015**:ALL COUNTRIES
Fiscal Rules Flexibility	IMF (2017)	**1985-2015**:ALL COUNTRIES

[1] Availability: AU (1960-2016); CA(1960-2017); JP (1960-2015).
[2] Availability: DK (1965-2018); AU CA (1960-2017); NZ (1960-2016).
[3] Availability: PT (1975); ES (1977).

Figure A.1: EU: Output gap and compliance with the deficit rules†



SOURCE: European Commission

† Percentage of countries with public deficit higher than 3% of GDP.

Figure A.2: Social Expenditure and Investment by country (in GDP percentage)

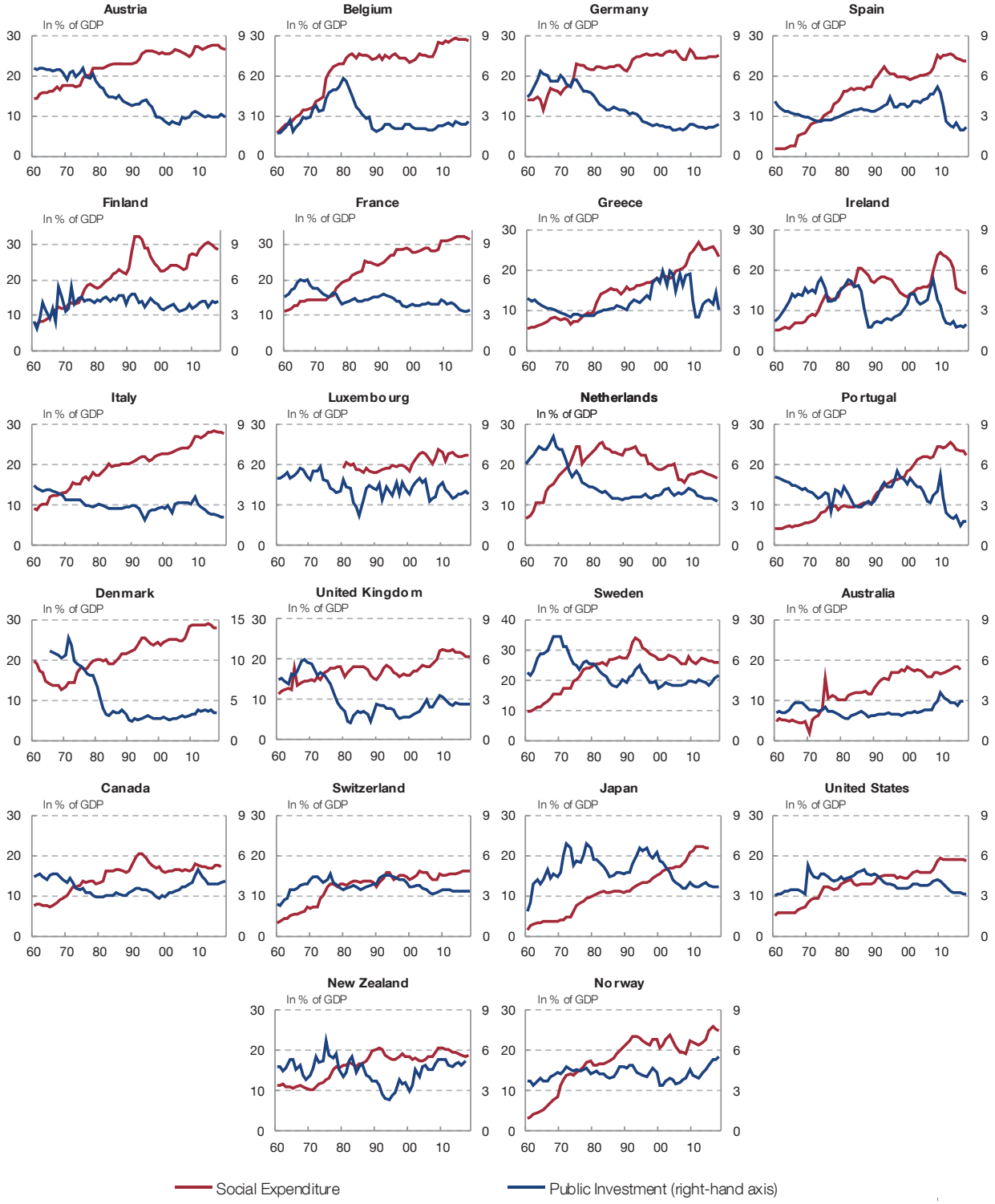


Figure A.3: Fiscal rules and flexible fiscal rules in place by country

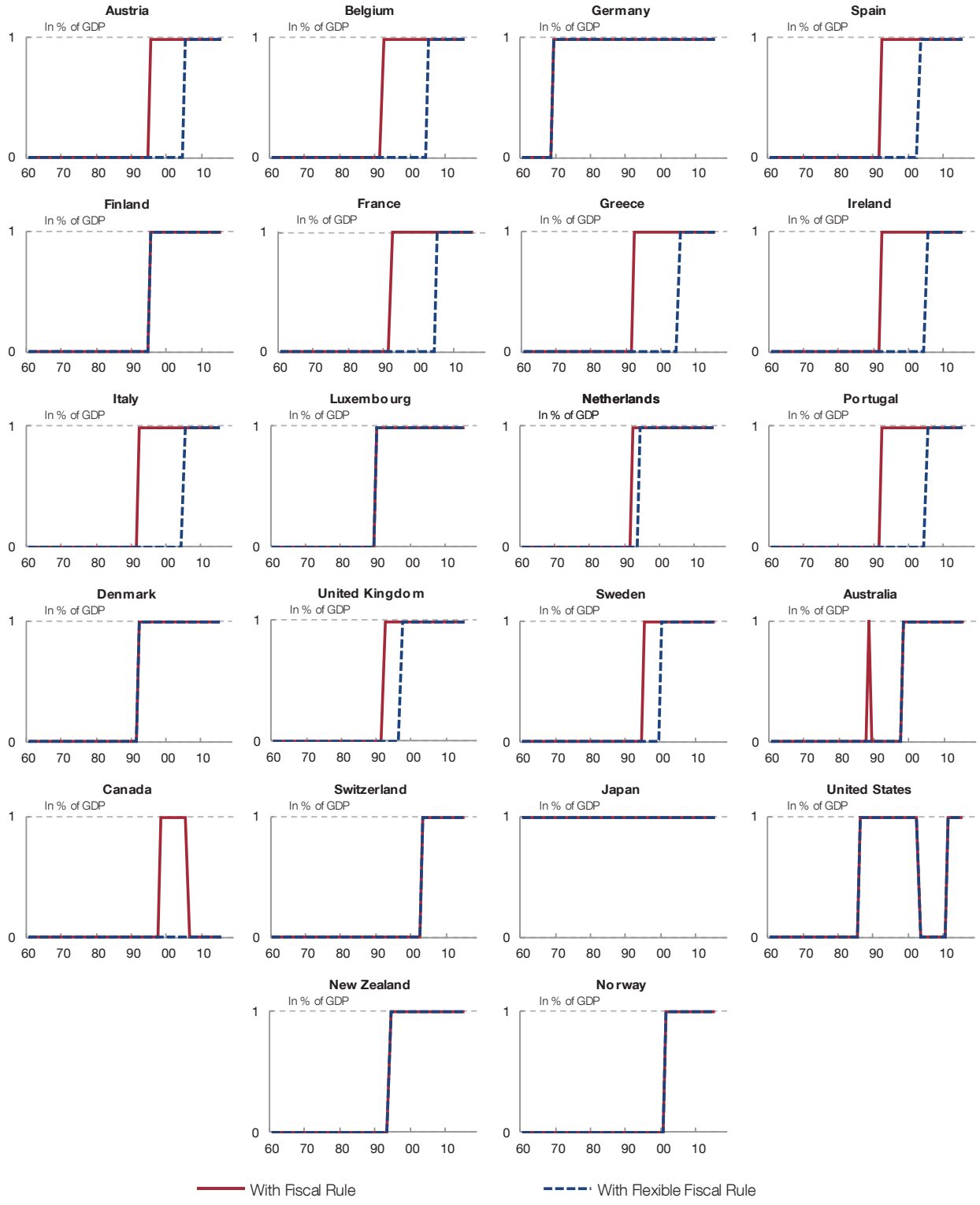


Figure A.4: Fiscal Consolidation according to Alesina: improvement of cyclically adjusted primary balance/GDP ratio two consecutive years and cumulative improvement of at least two percentage points of GDP.

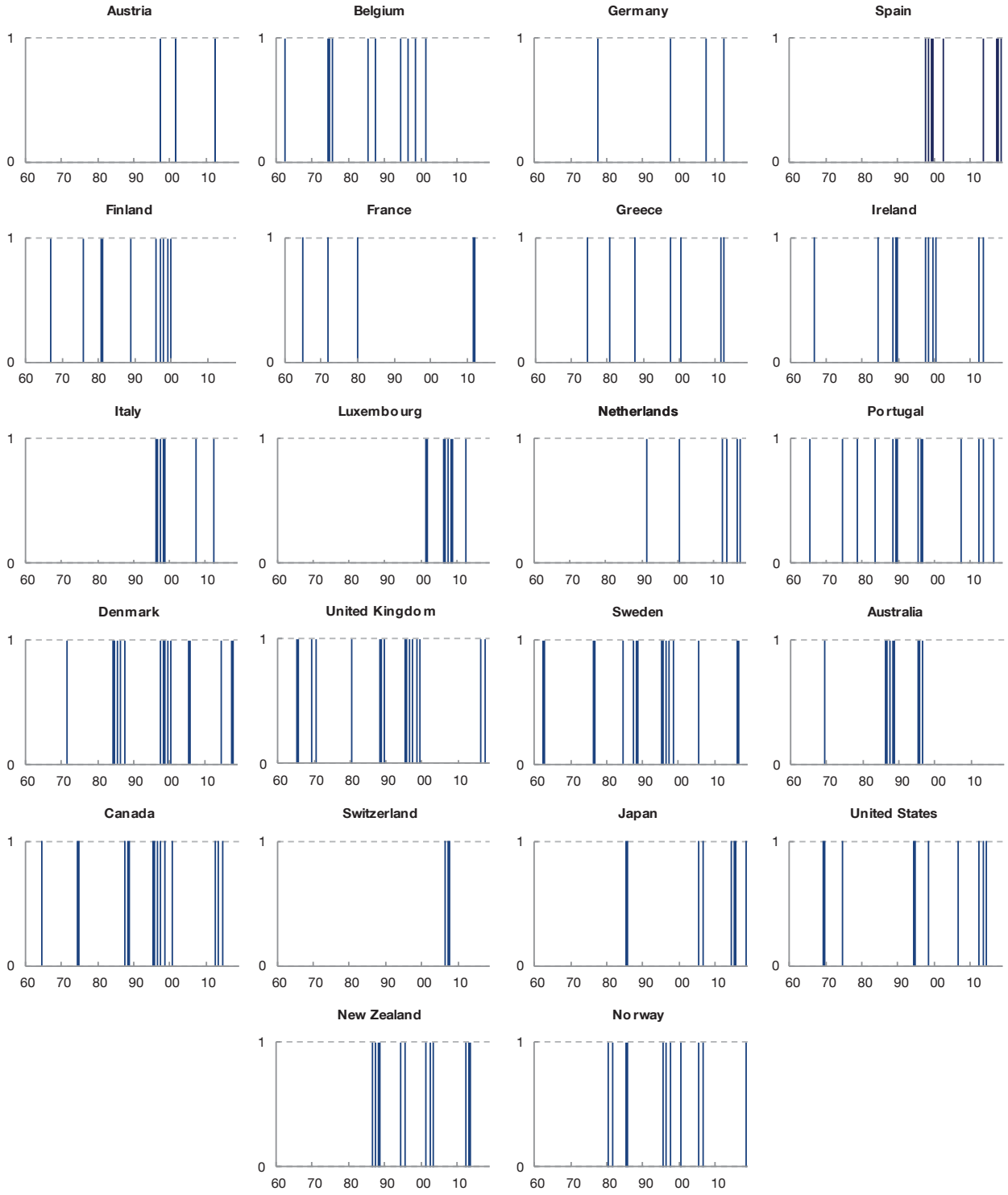
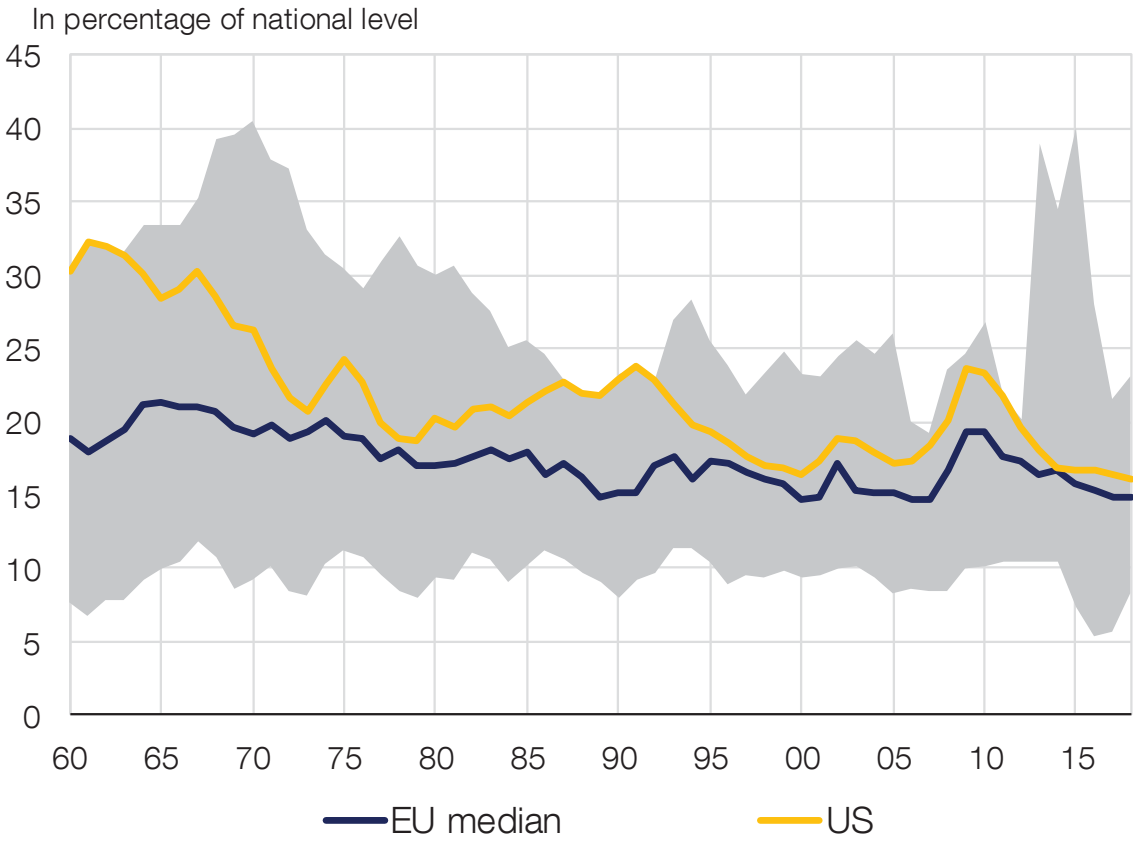


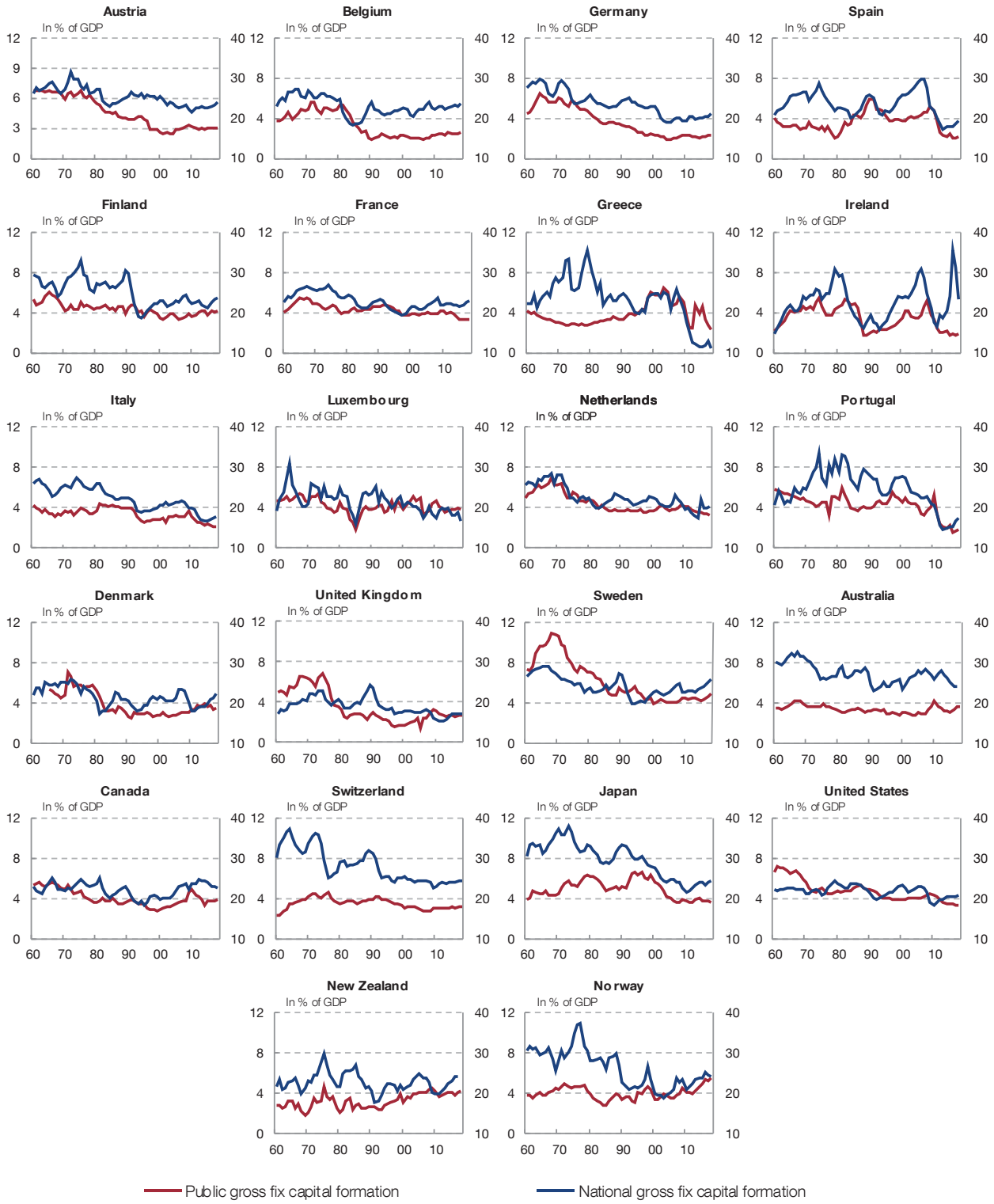
Figure A.5: Public gross fix capital formation / national gross fix capital formation



SOURCE: European Commission and IMF

Grey area represents the maximum and minimum gross fix capital formation in the sample.

Figure A.6: Public and national gross fix capital formation



SOURCE: European Commission and IMF

Table A.2: Role of profitability in Δ Investment Expenditure / GDP

	Dependent variable: Δ public investment / GDP				
$Debt_{t-1}$	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$GDPpc\ growth_t$	-0.010***	-0.008**	-0.007*	-0.010***	-0.008**
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)
$Capital\ Stock_{t-1}$	-0.005***	-0.004***	-0.004***	-0.005***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Profitability	-0.020	-0.016	-0.022	-0.022	-0.017
	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)
Δ $Social\ expenditure_{t-1}$	-0.015	-0.013	-0.018	-0.022*	-0.020
	(0.014)	(0.014)	(0.013)	(0.013)	(0.013)
Δ $Social\ expenditure_{t-2}$	-0.051***	-0.050***	-0.052***	-0.054***	-0.053***
	(0.016)	(0.017)	(0.017)	(0.017)	(0.017)
Δ $Social\ expenditure_{t-3}$	-0.032**	-0.031**	-0.030**	-0.032**	-0.030**
	(0.013)	(0.013)	(0.012)	(0.012)	(0.012)
Cycle	-0.023	-0.020	-0.028	-0.024	-0.020
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
$Ideology_{t-1}$	-0.022	-0.024	-0.023	-0.022	-0.023
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
Rules dummy	-0.080***			-0.074**	
	(0.026)			(0.029)	
Flexibility dummy		-0.051			-0.049
		(0.031)			(0.030)
Fiscal Cons. Alesina			-0.085**	-0.062	-0.070
			(0.036)	(0.069)	(0.051)
Fiscal Cons. Al.× Rules dummy				-0.041	
				(0.074)	
Fiscal Cons. Al.× Flexibility					-0.045
					(0.062)
# Observations	1,018	1,018	1,017	1,017	1,017
Countries	22	22	22	22	22

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

Table A.3: Robustness: biased-corrected Least Squared Dummy Variable

	Dependent variable: Δ public investment / GDP				
Δ Investment/GDP$_{t-1}$	-0.045	-0.047	-0.051*	-0.054*	-0.058*
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Debt$_{t-1}$	-0.001***	-0.001***	-0.001***	-0.001*	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPpc growth$_t$	-0.009***	-0.009***	-0.006*	-0.008***	-0.008***
	(0.004)	(0.004)	(0.003)	(0.004)	(0.004)
Capital Stock$_{t-1}$	-0.006***	-0.006***	-0.006***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Cycle	-0.011	-0.011	-0.013**	-0.011	-0.011
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Ideology$_{t-1}$	-0.004	-0.006	-0.003	-0.001	-0.003
	(0.019)	(0.019)	(0.019)	(0.019)	(0.019)
Δ Social expenditure$_{t-1}$	-0.009	-0.008	-0.015	-0.018	-0.017
	(0.013)	(0.013)	(0.013)	(0.014)	(0.013)
Δ Social expenditure$_{t-2}$	-0.041***	-0.041***	-0.044***	-0.046***	-0.045***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Δ Social expenditure$_{t-3}$	-0.036***	-0.035***	-0.036***	-0.036***	-0.035***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Rules dummy	-0.060*			-0.052	-0.074***
	(0.034)			(0.036)	(0.036)
Flexibility dummy		-0.074***			-0.093***
		(0.034)			(0.045)
Fiscal Cons. Alesina			-0.105***	-0.071	
			(0.036)	(0.053)	
Fiscal Cons. Al.× Rules dummy				-0.065	
				(0.069)	
Fiscal Cons. Al.× Flexibility					-0.051
					(0.071)
# Observations	1,077	1,077	1,075	1,075	1,075
Countries	22	22	22	22	22

Estimation strategy following Bruno (2005a,b).
***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

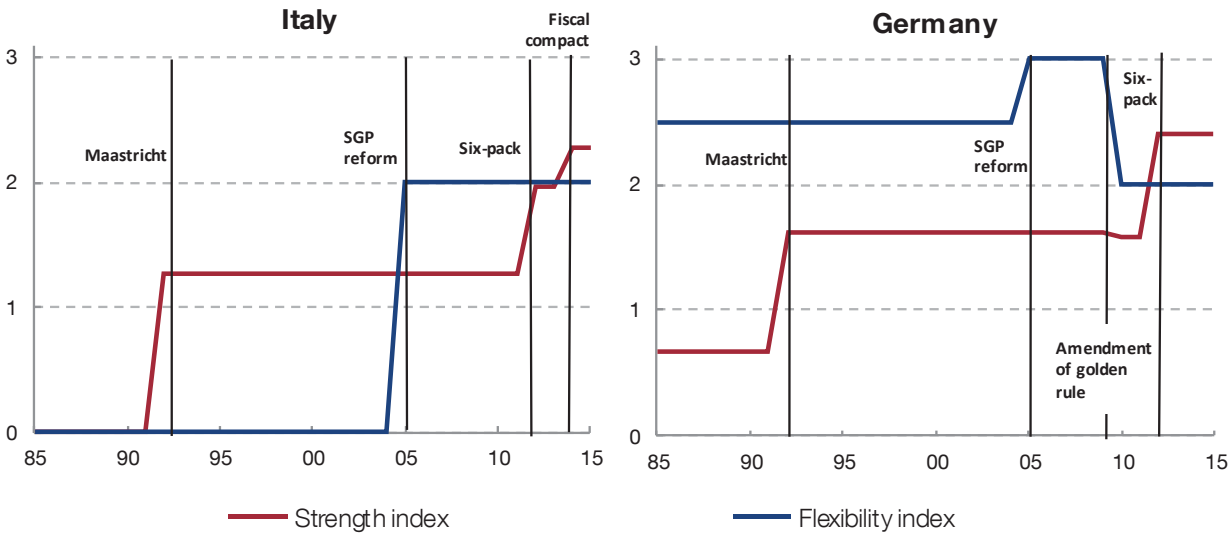
Annex II: fiscal rules index

In this section, we explain the construction of a fiscal rules strength index, in the spirit of the European Commission index (European Commission, 2019). Strength is defined by four criteria: sectoral coverage (general, central or regional government), existence of enforcement mechanisms, legal basis and the existence of supporting procedures. All the variables are originated with the IMF Fiscal Rules Dataset (IMF, 2017; Schaechter et al., 2012). The scores of these four criteria are first standardised to range between 0 and 1. National and supranational rules are weighted equally and only the strongest one is taken into account. Moreover, if a country has different types of rules (revenue or expenditure rules, debt rules, or budget balance rules) they are added to the overall index to reflect a more complete fiscal rules framework. As a result, the composite Fiscal Rules Strength index varies between 0 and 4 (e.g. the maximum value could be reached by a country with these 4 types of rules, each of them scoring 1 in the 4 criteria considered). Finally, we have calculated also a composite index of flexibility of these rules taking into account if each rule has a flexible feature in its fiscal rule, such as a cyclically-adjusted target, a clause protecting investment expenditure (or "golden rule") or a well-defined escape clause.

As an example, the supranational legislation from the Maastricht Treaty (the basic fiscal rule for countries in the EU without national rules), scores 1.275 in the Strength index. It included a budget balance rule with general coverage (1 point), enforcement mechanisms (1 point), a statutory legal basis (0.8 points) and no supporting procedures (0 points), and a debt rule with the same characteristics, but lower score in the enforcement mechanisms (0.5 points), as it did not have a formal enforcement procedure. As a result, the scores sum up to 5.3. This is divided by 4, resulting in a score of 1.275.

Figure A.7 shows the scores for Italy and Germany. In Italy, the score is basically the supranational one until the "Fiscal Compact" reform in 2014. In Germany, we take the maximum between the national and supranational scores. The figure shows that, while in the case of the supranational EU legislation the path is always increasing, as in the case of Italy, the national legislation in Germany registers a drop in the flexibility index in 2009, when the Budget Balance Rule was amended to equal the treatment of investment, removing the so-called "golden-rule".

Figure A.7: Fiscal Rules: Strength and Flexibility index



Source: IMF fiscal rules dataset, own calculations

Table A.4: Alternative measures for the rule based on index

	Dependent variable: Δ investment expenditure / GDP				
Debt_{t-1}	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPpc growth_t	-0.009	-0.015	-0.000	-0.010	-0.016
	(0.020)	(0.018)	(0.016)	(0.018)	(0.016)
$\text{Capital Stock}_{t-1}$	-0.007**	-0.007**	-0.006**	-0.007**	-0.007**
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Cycle	0.004	0.012	-0.005	0.005	0.012
	(0.020)	(0.021)	(0.016)	(0.018)	(0.020)
Ideology_{t-1}	-0.002	-0.003	-0.002	-0.002	-0.002
	(0.016)	(0.017)	(0.016)	(0.016)	(0.016)
Δ $\text{Social expenditure}_{t-1}$	-0.017	-0.017	-0.030	-0.029	-0.026
	(0.023)	(0.022)	(0.021)	(0.022)	(0.022)
Δ $\text{Social expenditure}_{t-2}$	-0.048*	-0.047*	-0.056*	-0.054*	-0.051*
	(0.027)	(0.025)	(0.027)	(0.028)	(0.027)
Δ $\text{Social expenditure}_{t-3}$	-0.057***	-0.056***	-0.054***	-0.053***	-0.052***
	(0.018)	(0.019)	(0.017)	(0.016)	(0.017)
Fiscal Strength	-0.044*			-0.035	
	(0.024)			(0.023)	
Fiscal Flexibility index		-0.039*			-0.029
		(0.021)			(0.020)
Fiscal Cons. Alesina			-0.149***		
			(0.029)		
Fiscal Cons. Al.× Rules strength				-0.069***	
				(0.017)	
Fiscal Cons. Al.× Rules flexibility					-0.079***
					(0.017)
# Observations	587	587	586	586	586
Countries	22	22	22	22	22
R-squared	0.0941	0.0953	0.113	0.107	0.107

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

Table A.5: Interactions between fiscal rules and social expenditure evolution.

	Dependent variable: Δ investment expenditure / GDP					
	Rules strength index			Rules flexibility index		
Debt_{t-1}	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDPpc growth_t	-0.008	-0.008	-0.008	-0.014	-0.013	-0.012
	(0.018)	(0.019)	(0.019)	(0.018)	(0.018)	(0.018)
$\text{Capital Stock}_{t-1}$	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***	-0.007***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
cycle	0.003	0.002	0.002	0.010	0.008	0.007
	(0.020)	(0.021)	(0.021)	(0.022)	(0.023)	(0.022)
Ideology_{t-1}	-0.003	-0.003	-0.002	-0.003	-0.002	-0.004
	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
Δ $\text{Social expenditure}_{t-1}$	0.007	-0.015	-0.015	0.006	-0.018	-0.014
	(0.022)	(0.021)	(0.020)	(0.023)	(0.020)	(0.020)
Δ $\text{Social expenditure}_{t-2}$	-0.048*	-0.047	-0.045	-0.047*	-0.007	-0.047*
	(0.026)	(0.038)	(0.027)	(0.026)	(0.028)	(0.024)
Δ $\text{Social expenditure}_{t-3}$	-0.062***	-0.062***	-0.075**	-0.061***	-0.065***	-0.043
	(0.018)	(0.018)	(0.031)	(0.018)	(0.019)	(0.030)
Rules strength index	-0.041*	-0.043*	-0.046**			
	(0.023)	(0.022)	(0.022)			
Rules flexibility index				-0.033*	-0.028	-0.032*
				(0.018)	(0.018)	(0.018)
Δ $\text{Social expenditure}_{t-1}$	-0.018*			-0.017		
$\times$ Rule indicator	(0.010)			(0.013)		
Δ $\text{Social expenditure}_{t-2}$		0.001			-0.032*	
$\times$ Rule indicator		(0.018)			(0.017)	
Δ $\text{Social expenditure}_{t-3}$			0.009			-0.015
$\times$ Rule indicator			(0.014)			(0.016)
# Observations	608	608	608	608	608	608
Countries	22	22	22	22	22	22
R-squared	0.101	0.0998	0.100	0.102	0.106	0.102

***, **, *: significance at the 1 percent, 5 percent and 10 percent levels.

BANCO DE ESPAÑA PUBLICATIONS

WORKING PAPERS

1920 LUIS J. ÁLVAREZ, MARÍA DOLORES GADEA and ANA GÓMEZ-LOSCOS: Inflation interdependence in advanced economies.

1921 DIEGO BODAS, JUAN R. GARCÍA LÓPEZ, JUAN MURILLO ARIAS, MATÍAS J. PACCE, TOMASA RODRIGO LÓPEZ, JUAN DE DIOS ROMERO PALOP, PEP RUIZ DE AGUIRRE, CAMILO A. ULLOA and HERIBERT VALERO LAPAZ: Measuring retail trade using card transactional data.

1922 MARIO ALLOZA and CARLOS SANZ: Jobs multipliers: evidence from a large fiscal stimulus in Spain.

1923 KATARZYNA BUDNIK, MASSIMILIANO AFFINITO, GAIA BARBIC, SAIFFEDINE BEN HADJ, ÉDOUARD CHRÉTIEN, HANS DEWACHTER, CLARA ISABEL GONZÁLEZ, JENNY HU, LAURI JANTUNEN, RAMONA JIMBOREAN, OTSO MANNINEN, RICARDO MARTINHO, JAVIER MENCÍA, ELENA MOUSARRI, LAURYNAS NARUŠEVIČIUS, GIULIO NICOLETTI, MICHAEL O'GRADY, SELCUK OZSAHIN, ANA REGINA PEREIRA, JAIRO RIVERA-ROZO, CONSTANTINOS TRIKOUPIS, FABRIZIO VENDITTI and SOFÍA VELASCO: The benefits and costs of adjusting bank capitalisation: evidence from Euro Area countries.

1924 MIGUEL ALMUNIA and DAVID LÓPEZ-RODRÍGUEZ: The elasticity of taxable income in Spain: 1999-2014.

1925 DANILO LEIVA-LEON and LORENZO DUCTOR: Fluctuations in global macro volatility.

1926 JEF BOECKX, MAARTEN DOSSCHE, ALESSANDRO GALESI, BORIS HOFMANN and GERT PEERSMAN: Do SVARs with sign restrictions not identify unconventional monetary policy shocks?

1927 DANIEL DEJUÁN and JUAN S. MORA-SANGUINETTI: Quality of enforcement and investment decisions. Firm-level evidence from Spain.

1928 MARIO IZQUIERDO, ENRIQUE MORAL-BENITO and ELVIRA PRADES: Propagation of sector-specific shocks within Spain and other countries.

1929 MIGUEL CASARES, LUCA DEIDDA and JOSÉ E. GALDÓN-SÁNCHEZ: On financial frictions and firm market power.

1930 MICHAEL FUNKE, DANILO LEIVA-LEON and ANDREW TSANG: Mapping China's time-varying house price landscape.

1931 JORGE E. GALÁN and MATÍAS LAMAS: Beyond the LTV ratio: new macroprudential lessons from Spain.

1932 JACOPO TIMINI: Staying dry on Spanish wine: the rejection of the 1905 Spanish-Italian trade agreement.

1933 TERESA SASTRE and LAURA HERAS RECUERO: Domestic and foreign investment in advanced economies. The role of industry integration.

1934 DANILO LEIVA-LEON, JAIME MARTÍNEZ-MARTÍN and EVA ORTEGA: Exchange rate shocks and inflation comovement in the euro area.

1935 FEDERICO TAGLIATI: Child labor under cash and in-kind transfers: evidence from rural Mexico.

1936 ALBERTO FUERTES: External adjustment with a common currency: the case of the euro area.

1937 LAURA HERAS RECUERO and ROBERTO PASCUAL GONZÁLEZ: Economic growth, institutional quality and financial development in middle-income countries.

1938 SILVIA ALBRIZIO, SANGYUP CHOI, DAVIDE FURCERI and CHANSIK YOON: International Bank Lending Channel of Monetary Policy.

1939 MAR DELGADO-TÉLLEZ, ENRIQUE MORAL-BENITO and JAVIER J. PÉREZ: Outsourcing and public expenditure: an aggregate perspective with regional data.

1940 MYROSLAV PIDKUYKO: Heterogeneous spillovers of housing credit policy.

1941 LAURA ÁLVAREZ ROMÁN and MIGUEL GARCÍA-POSADA GÓMEZ: Modelling regional housing prices in Spain.

1942 STÉPHANE DÉES and ALESSANDRO GALESI: The Global Financial Cycle and US monetary policy in an interconnected world.

1943 ANDRÉS EROSA and BEATRIZ GONZÁLEZ: Taxation and the life cycle of firms.

1944 MARIO ALLOZA, JESÚS GONZALO and CARLOS SANZ: Dynamic effects of persistent shocks.

1945 PABLO DE ANDRÉS, RICARDO GIMENO and RUTH MATEOS DE CABO: The gender gap in bank credit access.

1946 IRMA ALONSO and LUIS MOLINA: The SHERLOC: an EWS-based index of vulnerability for emerging economies.

1947 GERGELY GANICS, BARBARA ROSSI and TATEVIK SEKHPOSYAN: From Fixed-event to Fixed-horizon Density Forecasts: Obtaining Measures of Multi-horizon Uncertainty from Survey Density Forecasts.

1948 GERGELY GANICS and FLORENS ODENDAHL: Bayesian VAR Forecasts, Survey Information and Structural Change in the Euro Area.

2001 JAVIER ANDRÉS, PABLO BURRIEL and WENYI SHEN: Debt sustainability and fiscal space in a heterogeneous Monetary Union: normal times vs the zero lower bound.

2002 JUAN S. MORA-SANGUINETTI and RICARDO PÉREZ-VALLS: ¿Cómo afecta la complejidad de la regulación a la demografía empresarial? Evidencia para España.

2003 ALEJANDRO BUESA, FRANCISCO JAVIER POBLACIÓN GARCÍA and JAVIER TARANCÓN: Measuring the procyclicality of impairment accounting regimes: a comparison between IFRS 9 and US GAAP.

2004 HENRIQUE S. BASSO and JUAN F. JIMENO: From secular stagnation to robocalypse? Implications of demographic and technological changes.

2005 LEONARDO GAMBACORTA, SERGIO MAYORDOMO and JOSÉ MARÍA SERENA: Dollar borrowing, firm-characteristics, and FX-hedged funding opportunities.

2006 IRMA ALONSO ÁLVAREZ, VIRGINIA DI NINO and FABRIZIO VENDITTI: Strategic interactions and price dynamics in the global oil market.

2007 JORGE E. GALÁN: The benefits are at the tail: uncovering the impact of macroprudential policy on growth-at-risk.

2008 SVEN BLANK, MATHIAS HOFFMANN and MORITZ A. ROTH: Foreign direct investment and the equity home bias puzzle.

2009 AYMAN EL DAHRAWY SÁNCHEZ-ALBORNOZ and JACOPO TIMINI: Trade agreements and Latin American trade (creation and diversion) and welfare.

2010 ALFREDO GARCÍA-HIERNAUX, MARÍA T. GONZÁLEZ-PÉREZ and DAVID E. GUERRERO: Eurozone prices: a tale of convergence and divergence.

2011 ÁNGEL IVÁN MORENO BERNAL and CARLOS GONZÁLEZ PEDRAZ: Sentiment analysis of the Spanish Financial Stability Report. (There is a Spanish version of this edition with the same number).

2012 MARIAM CAMARERO, MARÍA DOLORES GADEA-RIVAS, ANA GÓMEZ-LOSCOS and CECILIO TAMARIT: External imbalances and recoveries.

2013 JESÚS FERNÁNDEZ-VILLAVERDE, SAMUEL HURTADO and GALO NUÑO: Financial frictions and the wealth distribution.

2014 RODRIGO BARBONE GONZALEZ, DMITRY KHAMETSHIN, JOSÉ-LUIS PEYDRÓ and ANDREA POLO: Hedger of last resort: evidence from Brazilian FX interventions, local credit, and global financial cycles.

2015 DANILO LEIVA-LEON, GABRIEL PEREZ-QUIROS and EYNO ROTS: Real-time weakness of the global economy: a first assessment of the coronavirus crisis.

2016 JAVIER ANDRÉS, ÓSCAR ARCE, JESÚS FERNÁNDEZ-VILLAVERDE and SAMUEL HURTADO: Deciphering the macroeconomic effects of internal devaluations in a monetary union.

2017 FERNANDO LÓPEZ-VICENTE, JACOPO TIMINI and NICOLA CORTINOVIS: Do trade agreements with labor provisions matter for emerging and developing economies' exports?

2018 EDDIE GERBA and DANILO LEIVA-LEON: Macro-financial interactions in a changing world.

2019 JAIME MARTÍNEZ-MARTÍN and ELENA RUSTICELLI: Keeping track of global trade in real time.

2020 VICTORIA IVASHINA, LUC LAEVEN and ENRIQUE MORAL-BENITO: Loan types and the bank lending channel.

2021 SERGIO MAYORDOMO, NICOLA PAVANINI and EMANUELE TARANTINO: The impact of alternative forms of bank consolidation on credit supply and financial stability.

2022 ALEX ARMAND, PEDRO CARNEIRO, FEDERICO TAGLIATI and YIMING XIA: Can subsidized employment tackle long-term unemployment? Experimental evidence from North Macedonia.

2023 JACOPO TIMINI and FRANCESCA VIANI: A highway across the Atlantic? Trade and welfare effects of the EU-Mercosur agreement.

2024 CORINNA GHIRELLI, JAVIER J. PÉREZ and ALBERTO URTASUN: Economic policy uncertainty in Latin America: measurement using Spanish newspapers and economic spillovers.

2025 MAR DELGADO-TÉLLEZ, ESTHER GORDO, IVÁN KATARYNIUK and JAVIER J. PÉREZ: The decline in public investment: "social dominance" or too-rigid fiscal rules?

BANCO DE **ESPAÑA**
Eurosistema

Unidad de Servicios Generales I
Alcalá, 48 - 28014 Madrid
E-mail: publicaciones@bde.es
www.bde.es