Public finances and inflation: the case of Spain

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PRELIMINARY DRAFT

Abstract
We empirically explore the influence of inflation on fiscal variables in the short-, medium- and long-run, for the case of the Spanish economy, in particular to draw policy lessons for the design of the pending process of rebalancing of fiscal accounts. Indeed, while Spanish public finances are in a correction path, still high government deficits and debt levels are registered by the different public administrations. In addition, the yields of a number of structural fiscal measures implemented are contingent on the future path of inflation, and the nature of inflation shocks/regimes. In this paper, we look at these issues through the lenses of: (i) the government budget constraint to assess the influence of inflation on changes in public debt; (ii) accounting decompositions of nominal revenue and expenditure items into their real and price parts; (iii) a large-scale macroeconometric model that contains a detailed fiscal policy block; (iv) a long-run accounting model on pension expenditure (along the lines of the works of the AWG).

Keywords: inflation; public finances; public debt; fiscal consolidation.

1 The opinions expressed in this paper are those of the authors and not necessarily reflect those of the Banco de España or the Eurosystem. We thank Roberto Ramos for his help with the simulations on the impact of inflation scenarios on pensions. Correspondence to: Javier J. Pérez (javierperez@bde.es), Directorate General Economics and Statistics, Banco de España, C/Alcalá 48, 28014 Madrid, Spain.

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Preliminary – please do not quote
1. Introduction

Recently, low observed inflation and the perspectives of inflation rates in the near future well-below expected by standard models dominate the policy debate. In the particular case of Spain (see Figure 1), the traditional positive inflation differential with the euro area turned negative since the inception of the economic and financial crisis, and perspectives of low inflation dominate nowadays the opinion of public and private analysts. The literature has recently signalled that low inflation or deflation can challenge the operation of fiscal policies through a number of channels, particularly in episodes of fiscal retrenchment.

We empirically explore the influence of inflation on fiscal variables, in particular government revenues, expenditure and debt, for the particular case of the Spanish economy. Our aim is to draw policy lessons from the low inflation environment for the design of the pending rebalancing process of the main fiscal aggregates. Indeed, while Spanish public finances are in a correction path since 2010, still high deficits and debt levels are registered by the different public administrations. In addition, the yields of a number of structural fiscal measures implemented are contingent on the future path of inflation (in particular, pension reforms). We will take throughout the paper the current low inflation environment as given, without entering into its possible causes.

Against this framework we assess, first, the (short-term) influence of inflation on fiscal adjustment strategies, in order to draw policy lessons for their design in a context of low inflation. In particular, we explore the implications of different inflation scenarios for public debt downsizing, the effectiveness of public spending measures (by looking at public wages’ and pensions’ reductions), and the evolution of nominal government

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2 See among others End et al. (2015) and the references quoted therein.
3 See Martí and Pérez (2015).
4 A number of explanations have been provided in the literature. Factors behind the current low inflation situation include some of a structural nature, like the deregulation of labour markets, the trends in cost-competition between countries, the influence of commodity prices worldwide, or the impact of technological progress (through increased competition by lowering barriers to entry), and others of a more conjunctural nature.
5 Trying to grasp the necessary additional fiscal effort to compensate for a low inflation environment.
revenues in the exit process from the economic crisis. To put our analysis into perspective, we compare the current environment with the one experienced by the Spanish economy at the time of the exit phase from the previous economic recession (second half of the 1990s). While now prospects are of a low inflation environment, coupled with low interest rates and moderate economic growth, the 1990s recovery took place in a moment of more elevated inflation rates, interest rates and real GDP growth.

Second, in order to complement the previous exercises, we provide a quantitative assessment of the impact of inflation “shocks” on the main fiscal aggregates through the lens of a macroeconometric model. Certainly, the impact of an “inflation shock” depends on the source of the shock, given that inflation is an endogenous variable. Understanding the latter is crucial to properly assess the public finance effects of the shocks. Accordingly, we characterize “shocks” of different nature that push prices down by the same amount (one percentage point) using the Quarterly Model of Banco de España (MTBE, see Hurtado et al. 2014): an internal inflation shock and an external inflation shock. The “internal shock” is engineered as a reduction in Spanish firms’ mark-ups, while the “external” one is modelled through a reduction of the price of oil in international markets.
Finally, in order to assess the medium-term impact on pension expenditure of a permanent low-inflation regime, we analyse the link between inflation scenarios and the effectiveness of a key piece of the most recent pension reform, namely the “revaluation index” (see Ramos, 2014). Indeed, Sánchez (2014) states that a persistently low level of inflation could be as harmful for the success of the reform (in the long term) as poor immigration and productivity.

The structure of the rest of the paper follows the description of empirical exercises outlined in the previous paragraphs. Thus, in Section 2, we look at the impact of inflation on fiscal adjustment strategies, in Section 3, we provide a quantitative assessment of the impact of inflation “shocks” on public finances thorough the lens of MTBE model, and in Section 4 we assess the linkage between pension expenditure and low-inflation. Finally, in Section 5 we provide some concluding remarks.

2. Some accounting exercises

2.1. Public debt dynamics and inflation

In this section we use the standard decomposition of public debt changes into its fundamental drivers, namely the primary budget balance, interest payments, real GDP, the GDP deflator and the deficit-debt adjustment (see e.g. Hall and Sargent, 2010) to compare the public debt consolidation experiences of two periods of “fiscal stress”, namely the most recent one, and the one of the 1990s. We carry out this exercise because the two periods present significant differences as regards average inflation. While the latter was a period of moderate/high inflation, compared to historical averages, the former is a period of low inflation. Thus, the comparison provides a natural framework to illustrate the impact of inflation on government debt adjustment processes.

Let $Y_t$ be nominal GDP at $t$ and let $D_t$ be the nominal value of government debt. The government budget constraint accounts for how a nominal interest rate $i_t$, net inflation $\pi_t$, net growth in real GDP, $g_t$, the net-of-interest deficit as a percent of $Y_t$, $p_t$, and the deficit-debt adjustment, $DDA_t$, combine to determine the evolution of the government debt-to-GDP-ratio,
\[ \frac{D_t}{Y_t} = \frac{1 + i_t}{(1 + \pi_t)(1 + g_t)} \frac{D_{t-1}}{Y_{t-1}} + p_t + \frac{DDA_t}{Y_t} \]  

(1)

were the nominal yield \(i_t\) and the stock of debt \(D_t\) are averages of pertinent objects across terms to maturity. A standard, approximated version, suitable for accounting decomposition of the fundamental determinants of debt, takes the form

\[ \frac{D_t}{Y_t} = (1 + i_t - \pi - g_t) \frac{D_{t-1}}{Y_{t-1}} + p_t + \frac{DDA_t}{Y_t} \]  

(2)

With this decomposition at hand it is possible to analyze, in particular, the sizeable impact that changes in prices may exert on the dynamics of the public debt-to-GDP ratio the determinants of changes in the debt-to-GDP ratio. In Figure 2 we assess these effects as well as the contribution of the other determinants described in equation (2). In Figure 2 we show the contribution of the determinants of the changes in debt, in cumulative terms, for two distinct periods of fiscal stress of the Spanish economy. The first 6-year period that starts in 1993 (upper panel of the figure), year in which the government deficit reached a local maxima, and the second 6-year period that starts in 2009 (lower panel), the year of maximum local public deficit of the most recent episode of financial and fiscal crises. In the former period inflation averaged 3.6% per year while in the later average inflation was substantially lower, at 1.4% per year. Both were periods of significant fiscal consolidation and overall output contraction, although of different orders of magnitude.

The illustration is quite telling regarding the issue at hand. In the upper panel, the dynamics of prices allowed a reduction of the government debt to GDP ratio of above 12 percentage points of GDP, while in the more recent, “low inflation” episode the contribution of inflation to debt reduction has been almost negligible. More important for the evaluation of forward-looking sustainability risks are the dynamics of the ratio, even more than the absolute level of public debt (as a ratio to GDP). Indeed in the 1990s episode the ratio of public debt to GDP already got stabilized at \(t+3\) in the 1990s episode, while in the most recent episode debt kept growing still over the defined \(t+6\) window.

The policy relevance of this factor cannot be minimized, given the high levels of public debt that the Spanish government currently presents. From a forward-looking point of view, to illustrate the potential impact of a prolonged period of low inflation on future debt dynamics we use the approach of Andrés et al. (2015) and run simulations on the
probability of reaching a given public debt ratio in 10 years under the baseline model and including a "lower inflation path" engineered through a negative intercept. As in the purely backward looking accounting exercise presented above, the impact of inflation in a stochastic debt sustainability framework is significant, but may be more damaging insofar as it influences agent's expectations on the stabilization and/or sustainability of public debt.

Figure 2. Determinants of the change of public debt in Spain: fiscal consolidation episodes of the 1990s and current

2.2. The effectiveness of public spending discretionary measures and inflation

The direct, ex-post budgetary savings derived from cost-cutting public spending discretionary measures with respect to a no-policy-change alternative depends on the inflation scenario, insofar as key expenditure variables like pensions and public wages have been traditionally indexed to inflation in Spain. As regards public wages, these have been traditionally revalued, as a baseline, to expected inflation as defined by the medium-term ECB target of 2%. The current year inflation outcome (November year-on-year growth rate) has been used as the reference for pensions.
We simulate the savings of the public wages per employee adjustment implemented over 2009-2014 vis-à-vis two benchmark growth alternatives, namely a 2% inflation rate (reference for public wages) and the current-year inflation rate (that averaged 1.4% over 2009-2014). As regards discretionary measures, over that period, public wages were frozen year-by-year, and in addition in 2010 there was a 5% nominal cut across the board (see Martí and Pérez, 2015). The results are presented in Figure 3. The cumulated differential savings with respect to the 2% benchmark amounts to 1.43 bn euro, which is close to 1.5% of Spanish GDP. This is almost 2.7 bn euro (0.3% of GDP) additional saving compared to a situation of 1.4% average inflation growth. This means that in the lower inflation environment, the same amount of cost-saving measures delivers less budgetary savings.

Figure 3. Impact of cost-cutting public wage measures with respect to two benchmark scenarios of inflation (2% and historical).

2.3. Public revenues and inflation

In this part, we explore the limits to tax collection that may exist in a low inflation environment despite a perceived real recovery of the economy. To do so we break down standard nominal tax bases for the different revenue items into a real and a “price” part. This approach requires, first, the identification of the appropriate nominal tax base for each revenue item (VAT; income tax; corporate tax; social security contributions), and, second, the separation of its approximate real and deflator parts. The latter may involve the use of estimation methods in the cases in which the decomposition of nominal macroeconomic variables into their real and deflator parts is not available. We follow the
standard approach in the extant literature to approximate macroeconomic bases. In their definition, though, the availability of national accounts data conditions these choices (see e.g. Morris et al., 2009, or Leal et al., 2008).

Figure 4. Government revenues and inflation: decomposition of nominal revenue macroeconomics bases between its real and price parts.

As regards VAT, we take as nominal tax base private households' consumption, household's investment, tourism revenues, and general government intermediate consumption and investment. As the average deflator of all these components we take the GDP deflator, and compute the real component as a residual on the basis of the nominal
Regarding Stamp Duties, we take as its tax base housing investment, taking its deflator as the measures of prices in this case. As to other indirect taxes, we approach the evolution of those bases by private consumption, and the decomposition follows the real-deflator decomposition of the national accounts.

With respect to direct taxation, we approximate the tax base of personal income taxes by compensation of employees, non-wage household income, including interests and dividends, minus actual social contributions paid to the general government, and adding social payments. As regards corporate income taxes, national accounts tax bases are more difficult to identify. We take, as it is standard in the literature the gross operating surplus of firms. The deflator is estimated from the income side of GDP. Finally, as an approximation of social security contributions we take compensation of employees and non-employees. As regards personal income taxes and social security contributions, the real component is estimated by the number of tax-payers, workers and social benefits' beneficiaries in the former case and workers in the latter.

In Figure 4 we present the decomposition of such tax bases into their real and deflator part. We focus on a couple of examples. First, as regards VAT out of the 4.9% growth in 1996, close to 50% was due to the real part and the other 50% to the price part, while in the first year of recovery from the latest recession the nominal growth of tax bases took place in a framework of falling prices. Second, as regards the two lower panels of the figure, wage moderation, that partly reflects low inflation, explains why tax collection on the verge of the late 2013 recovery has remained relatively subdued.

Nevertheless, the relevant object from the point of view of fiscal adjustment is the impact on the government revenue to GDP ratio, not just on the nominal value of government revenues. From the latter point of view, the final effect would depend on the net impact on the numerator (nominal public revenues) and the denominator (nominal GDP). Related to this point, one may wonder if inflation forecast errors are behind forecast errors in planned government revenue-to-GDP ratios. In particular, a relevant question is to what extent negative news on government revenues could be related to lower-than-expected inflation rates. The latter is a complex question that would deserve a deep analysis that goes well beyond the aim of the current paper. Nevertheless, as a first, extremely tentative approximation, we run the following simple regression:
\[
\begin{align*}
\left( \frac{R_t}{Y_t} - \frac{R_{t-1}}{Y_{t-1}} \right) - \left( \frac{R_t}{\hat{Y}_t} - \frac{R_{t-1}}{\hat{Y}_{t-1}} \right) &= \alpha(\pi_t - \hat{\pi}_t) + \beta(g_t - \hat{g}_t) + \epsilon_t
\end{align*}
\]  

(3)

were \( R_t \) denotes government revenue, and as described above \( Y_t \) is nominal GDP, \( \pi_t \) the inflation rate (GDP deflator) and \( g_t \) the real growth rate of GDP. A hat over a given variable denotes a forecast. Thus, we relate forecast errors in the dynamics of the ratio of the government revenue-to-GDP ratio to forecast errors in inflation and economic growth. The series of forecasts are computed by combining real-time forecasts from international organizations (European Commission, IMF and OECD) and official (government) plans. We compute monthly series that reflect in each month the latest available forecasts (for the current year and one-year-ahead), taking the perspective of the external analyst that processes incoming sources of forecast by informed agents. We run the regressions at the quarterly frequency (forecasts are averaged over the 3 months of a given quarter) over the period 1999Q1-2014Q4.

The result for one-year-ahead forecasts, provides an \( \alpha \) coefficient of -0.33, which is nonetheless not significantly different from zero in statistical terms at the usual confidence values (p-value: 0.14), while the \( \beta \) coefficient is estimated at +0.61, with a p-value of 0.0001. Thus, in net terms, according to this simplistic exercise, on average over the considered sample, and controlling for real GDP error, inflation errors do not seem to explain errors in public revenue-to-GDP ratios. This said, when the sample is constrained to the 2008Q1-2014Q4 period, the estimated real GDP error coefficient is very similar (0.59, p-value 0.0008), but the inflation error coefficient \( \alpha \) changes sign and becomes statistically significant at usual confidence values (\( \alpha =1.17, \text{p-value: 0.0185} \)). This might be a sign that during the crisis and the low-inflation period, this situation might have been a limit to revenue-based fiscal consolidation efforts.

3. Quantitative assessment of inflation shocks on public finances

In the previous Section we have illustrated the influence of inflation and "inflation shocks" on certain public finance variables, from a general point of view. But the nature of the "inflation shock" is crucial to assess the impact on public finances. We use the Quarterly Macroeconometric Model of Banco de España (MTBE, see Estrada et al., 2004., and Hurtado et al., 2014) to simulate the public finance effects of two different
shocks that push prices down by one percentage point: an internal inflation shock (Spanish firms reduce their markups) and an external inflation shock (the price of oil in international markets goes down).

The MTBE is a large-scale macro-econometric model used for medium term macroeconomic forecasting of the Spanish economy, as well as for evaluating the staff projections and, as will be the case here, for performing scenario simulations: we change some exogenous variables (markups and oil prices) and see how endogenous variables react. The model is specified as a large set of error correction mechanism equations, and, especially in the short run, is mostly demand driven. We run both shocks under alternative parameterizations, particularly as regards the degree of indexation of certain public expenditure items.

The main results of our simulations are presented in Table 1. In the simulation of an internal inflation shock, firms reduce their mark-ups, which makes HICP and the GDP deflator fall by approximately the same amount (the size of the simulation is calibrated so that HICP falls by exactly one percentage point). This has positive effects on GDP, through two channels: on one hand, with lower prices, households have a higher real disposable income, so they increase their consumption and housing investment; and on the other hand, as goods produced in Spain now have a lower price, exports grow. With higher demand, firms invest more and hire more workers, which further increases income for households and demand for firms, so second-round effects reinforce and expand the initial first-round positive effects on GDP.

But the total increase in real GDP is much less than 1%, so nominal GDP falls following this shock, and, because of this, nominal receipts of the public sector fall (the biggest impact is on direct taxes to firms, but direct taxes to households and indirect taxes also fall sharply in nominal terms). On the expenditure side, there is a moderate fall because some items are formally or informally linked to observed inflation (mainly pensions) and because the economic expansion reduces unemployment benefits.

The net effect on the public sector balance is approximately neutral (deficit is slightly higher in the first year because revenues fall faster than expenditures, but even this very small effect dies out from the second year onwards). But even with zero effect on public
deficit, since nominal GDP has fallen, the debt-to-GDP ratio worsens following this internal deflationary shock.

Table 1. Impact of lower inflation on the main macroeconomic and public sector variables

<table>
<thead>
<tr>
<th>Cumulative level differences, %</th>
<th>Internal inflation shock (mark-ups)</th>
<th>External inflation shock (oil price)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Year 1</td>
<td>Year 2</td>
</tr>
<tr>
<td><strong>PRICES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HICP</td>
<td>-1.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>GDP deflator</td>
<td>-0.9</td>
<td>-0.8</td>
</tr>
<tr>
<td><strong>REAL VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GDP</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Private consumption</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Private productive investment</td>
<td>0.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Housing investment</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Exports</td>
<td>0.2</td>
<td>0.4</td>
</tr>
<tr>
<td>Imports</td>
<td>0.3</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>NOMINAL PUBLIC SECTOR VARIABLES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total receipts</td>
<td>-0.5</td>
<td>-0.4</td>
</tr>
<tr>
<td>Direct taxes to households</td>
<td>-0.9</td>
<td>-0.8</td>
</tr>
<tr>
<td>Direct taxes to firms</td>
<td>-1.7</td>
<td>-1.2</td>
</tr>
<tr>
<td>Social contributions</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Indirect taxes</td>
<td>-0.8</td>
<td>-0.6</td>
</tr>
<tr>
<td>Total expenditures</td>
<td>-0.3</td>
<td>-0.3</td>
</tr>
<tr>
<td>Public consumption</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Public investment</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Interest payments</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Unemployment benefits</td>
<td>-0.2</td>
<td>-0.7</td>
</tr>
<tr>
<td>Other social transfers</td>
<td>-1.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>Primary balance (% of GDP, difference)</td>
<td>-0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Balance (% of GDP, difference)</td>
<td>-0.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Public debt (% of GDP, difference)</td>
<td>0.7</td>
<td>0.6</td>
</tr>
</tbody>
</table>

The simulation of an external inflation shock is also calibrated so that HICP falls by 1% in the first year (oil prices fall by 24%, from 77 to 58 euros per barrel), but in this case the effects are completely different. For a start, in this case the direct effect on the GDP deflator is approximately zero: there is no internal production of oil, so the price of goods produced at home is not hit directly by the shock. Even the second-round effects on the GDP deflator are approximately zero with the estimated coefficients of MTBE (in fact, if anything, they are positive: the deflationary effect on wages and internal prices is
estimated to be very small, and is dominated by the –also not particularly big– inflationary effect of higher demand).

The competitiveness channel through which lower inflation improved GDP after a fall in mark-ups is almost non-existent in the case of oil prices, because this is an international shock that also affects our trading partners. So now the increase in GDP is due only to the higher real disposable income of households, who increase their consumption and housing investment after the shock. Firms face higher demand, so they invest more and hire more workers, generating second-round effects that are similar to the ones described for the previous simulation.

In this case nominal GDP clearly rises (real variables grow, the GDP deflator doesn’t change), which makes nominal government receipts grow as well (mainly through direct taxes to firms, but also direct taxes to households and social contributions; indirect taxes initially fall, then restore their original level), whereas pensions and unemployment benefits drive public sector expenditures. In sum, there’s a positive effect on the budget balance, and also a sizeable fall in the debt-to-GDP ratio, both because of the lower deficit and because of higher nominal GDP.

4. The effectiveness of the most recent pension reform in a low inflation regime

In this section we explore the impact of changes in inflation assumptions in an accounting model of pension expenditure estimation along the lines of European Commission (2015), as done by Ramos (2014). A recent strand of pension reforms in Spain provide a natural framework to assess the effectiveness of reforms depending on the inflationary regime.

Spain is no exception in the gradual ageing of the population foreseen in the demographic projections available for most developed countries, with the corresponding pressure being and/or to be exerted on pension systems. Indeed, in recent decades Spain has undergone a radical demographic transformation, characterised by a sharp fall in the birth rate, higher life expectancy, and a shift in net migration, which was highly positive in the years of the

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6 This channel is actually stronger now: the positive effect on real GDP was smaller in the previous simulation because after the fall in mark-ups firms pass smaller profits on to households, which is not the case after the fall in oil prices.
economic expansion (EMU period pre-2008) but which has been negative since 2009 (see
Ramos, 2014). Furthermore, being the Spanish pension system is a pay-as-you-go system
the economic crisis has produced the accumulation of imbalances, given a sharp fall in
the number of contributors coupled with an increase in pension expenditure, the latter
being less related to the business cycle.

Table 2. Pension expenditure scenarios (accounting simulations) (a)

<table>
<thead>
<tr>
<th>REVALUATION INDEX</th>
<th>2015</th>
<th>2016-2024</th>
<th>2025-2050</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension expenditure</td>
<td>% del PIB</td>
<td>12.9</td>
<td>12.7</td>
<td>13.0</td>
</tr>
<tr>
<td>Social Security revenues</td>
<td>% del PIB</td>
<td>11.8</td>
<td>11.8</td>
<td>11.8</td>
</tr>
<tr>
<td>Social Security balance</td>
<td>% del PIB</td>
<td>-1.1</td>
<td>-0.9</td>
<td>-1.2</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>%</td>
<td>-0.4</td>
<td>1.7</td>
<td>2.0</td>
</tr>
<tr>
<td>Average revaluation of pensions</td>
<td>%</td>
<td>0.25</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Average pension / average wage</td>
<td>ratio</td>
<td>0.62</td>
<td>0.57</td>
<td>0.43</td>
</tr>
<tr>
<td>Growth of number of pensions</td>
<td>%</td>
<td>1.29</td>
<td>1.75</td>
<td>2.00</td>
</tr>
<tr>
<td>Growth of initial pension before sustainability factor</td>
<td>%</td>
<td>3.1</td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>Sustainability factor</td>
<td>factor</td>
<td>1.00</td>
<td>0.98</td>
<td>0.85</td>
</tr>
<tr>
<td>Growth of initial pension after sustainability factor</td>
<td>%</td>
<td>3.1</td>
<td>2.4</td>
<td>2.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REVALUATION 1%</th>
<th>2015</th>
<th>2016-2024</th>
<th>2025-2050</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension expenditure</td>
<td>% del PIB</td>
<td>12.9</td>
<td>13.0</td>
<td>14.3</td>
</tr>
<tr>
<td>Social Security balance</td>
<td>% del PIB</td>
<td>-1.1</td>
<td>-1.2</td>
<td>-2.5</td>
</tr>
<tr>
<td>Average revaluation of pensions</td>
<td>%</td>
<td>0.25</td>
<td>0.92</td>
<td>1.00</td>
</tr>
<tr>
<td>Average pension / average wage</td>
<td>ratio</td>
<td>0.62</td>
<td>0.59</td>
<td>0.47</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>REVALUATION 2%</th>
<th>2015</th>
<th>2016-2024</th>
<th>2025-2050</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pension expenditure</td>
<td>% del PIB</td>
<td>12.9</td>
<td>13.4</td>
<td>16.3</td>
</tr>
<tr>
<td>Social Security balance</td>
<td>% del PIB</td>
<td>-1.1</td>
<td>-1.8</td>
<td>-4.5</td>
</tr>
<tr>
<td>Average revaluation of pensions</td>
<td>%</td>
<td>0.25</td>
<td>1.81</td>
<td>2.00</td>
</tr>
<tr>
<td>Average pension / average wage</td>
<td>ratio</td>
<td>0.62</td>
<td>0.61</td>
<td>0.54</td>
</tr>
</tbody>
</table>

(a) Demographic and Social Security revenues are taken as exogenous. Projections rest mainly on 2015 Ageing Report assumptions. Pension expenditure evolves according to demographic projections and the revaluation of pensions.
(b) Including other Social Security current expenditure.
(c) Invariant assumption across scenarios.
(d) Average wage grows 3.3% on average, according to 2015 Ageing Report

4.1. The “revaluation index” of pensions

With a view to counteracting the impact of these demographic shifts, in recent years
various pension reforms have been passed in Spain. For the purposes of our paper, the
most relevant one is the reform passed at the end of 2013, in particular the establishment
of a new revaluation index. Under the later, pensions have been adjusted on a year-by-
year basis according to the performance of variables pivotal to the Social Security system,
such as revenue, expenditure and the number of pensions, replacing the former system,
in force since 1997, which linked pensions to the rate of change of the CPI. The revaluation index is obtained from the budget constraint on the pension system, that is, from equating revenue to expenditure in year $t+1$, by decomposing expenditure into three components (revaluation, number of pensions and the substitution effect) and setting moving averages to smooth the factors over the business cycle.

Specifically, the revaluation index works as follows:

$$IR_{t+1} = \bar{g}_{l,t+1} - \bar{g}_{p,t+1} - \bar{g}_{s,t+1} + \alpha \left[ \frac{l_{t+1} - G_{t+1}}{G_{t+1}} \right]$$

where $IR_{t+1}$ is the revaluation index, i.e. the amount by which pensions grow between years $t$ and $t+1$. The variables that come into play in the calculation, from left to right, are: the rate of change of the revenues of the Social Security System ($\bar{g}_{l,t+1}$), the rate of change of the number of pensions ($\bar{g}_{p,t+1}$), the substitution effect ($\bar{g}_{s,t+1}$) and a component that adjusts for imbalances that may arise between Social Security revenue ($I$) and expenditure ($G$). When the difference between revenue and expenditure is positive, this component increases the revaluation, while if it is negative, it reduces it. The imbalance between revenue and expenditure is multiplied by parameter $\alpha$, which measures the speed at which the imbalances are corrected. The extant legislation stipulates that a value of $\alpha$ equal to 0.25 is to be used, which means that in each year 25% of the imbalance between revenue and expenditure is corrected.

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7 Quite importantly, the 2013 reform also regulates the so-called sustainability factor. From 2019, starting pensions will be automatically linked to the increase in life expectancy.

8 See Ramos (2014) and De la Fuente and Domenech (2013) for additional details and references.

9 This is defined as the increase in the average pension in a year in the absence of any revaluation that year. That is to say, the increase in the average pension that comes about owing to the fact that the pensions of new pensioners are usually higher than the pensions of pensioners who abandon the system. In this way, the substitution effect depends on the number and amount of pensions of new pensioners relative to the number and amount of the pensions of pensioners exiting the system. It is estimated that the substitution effect would currently stands at around 1.0%. This component enters the formula with a negative sign, meaning that the revaluation diminishes owing to the upward pressure on expenditure due to the amount and number of new pensions.
Quite importantly, all these components of the right-hand-side of the formula are not included in as current year values, but via 11-year averages centered on t+1. This allows for smoothing of the year-to-year rates of revaluation and mitigates the effects of the business cycle.

Figure 5. Pension revaluation and sustainability factor (growth rate and percentage points)

In any case, the result of the formula just described does not yield automatically the revaluation of pensions in year t+1, as the law establishes both a floor and a ceiling. In particular, the revaluation cannot result in a pension increase which is lower than 0.25% or higher than a rate equal to inflation plus 0.5%.

4.2. Some simulations

The simulations are based on the latest Ageing Report as of 2015. Social security revenues and demographic path are given, and the pension expenditure path, in turn, is determined by the the introduction of the formula determining pension increases in 2014. Nevertheless, the model is comprehensive enough to account for the main features of the social security system, from an accounting point of view. Agents' reaction to the policy
path (reform) and the evolution of minimum pensions are not considered. The simulations are not to be considered as long-term forecasts, given dependence on exogenous assumptions and the uncertainty surrounding them, but rather as an illustration of how the revaluation formula works compared to an approach based on indexation. The main assumptions of the simulations are shown in Table 2, together with the main outcomes of the exercises. From 2014 revenues are set to the average of 2008-2013, namely 11.8% of GDP. The number of pensions gains speed as of the decade of 2020 due to the retirement of baby boomers. Pension expenditure and the average pension are obtained endogenously.

With the basic assumption outlined above, and under the revaluation index, pensions would grow in line with the floor over the whole simulation horizon (see Figure 5). This is due to the fact that at the beginning of the simulation horizon the imbalance of the Social Security system inherited from the crisis dominates the formula. But then, as of the decade of the 2020, demographic pressures hit, and the term of the formula linked to pension's growth dominates the other factors. Under this simulation, despite the fact that the inflation rate in the baseline AWG averages 1.7% over 2016-2024 and 2.0% as of 2025, pensions are set to grow at 0.25%. Given that in the model assumptions wages grow in line with productivity, the ratio average pension to average wage falls from 0.62 in 2015 to 0.34 in 2050 (see Table 2). Thus, the ratio of pension expenditure over GDP evolves from 12.9% in 2015 to 13.6% in 2050, despite the adverse demographics.

The importance of the inflation regime is clear when comparing this baseline simulation with the other two scenarios in Table 2. A revaluation of 0.25% compared to indexation to 1% amounts to almost 2 pp of GDP of lower pension expenditure as a percent of GDP, while when compared to an indexation of 2% per year the savings reach 5 percentage points of GDP. Thus, the effect of the 2013 pension reform (revaluation index part) depends crucially on the inflation regime.

In addition to the accounting simulations provided above, it is worth mentioning that some recent work by Sánchez (2014) also highlights the importance of the inflation regime on the outcomes of pension reforms. The latter author uses an overlapping generation’s model to analyse the effectiveness of recent pension reforms in Spain, and
concludes that persistently low levels of inflation could be as harmful for the success of the reform (in the long term) as poor immigration and productivity.

At the same time, though, solving the demographic problems by hinging excessively on the revaluation of pensions may lead to a different problem: the sufficiency of pensions to support pensioner's incomes. This is clear when looking at the evolution of the ratio of the average pension to the average wage. Starting from 0.62 in all three simulations, the ratio evolves, under the somewhat simplistic assumptions of the model, to 0.34, 0.39 and 0.47, respectively, in the revaluation index, the 1% and the 2% growth scenarios respectively.

5. Concluding remarks

We empirically explore the influence of inflation on fiscal variables in the short-, medium- and long-run, for the case of the Spanish economy, in particular to draw policy lessons for the design of the pending process of rebalancing of fiscal accounts. Indeed, while Spanish public finances are in a correction path, still high government deficits and debt levels are registered by the different public administrations. In addition, the yields of a number of structural fiscal measures implemented are contingent on the future path of inflation, and the nature of inflation shocks/regimes. In this paper, we look at these issues through the lenses of: (i) the government budget constraint to assess the influence of inflation on changes in public debt; (ii) accounting decompositions of nominal revenue and expenditure items into their real and price parts; (iii) a large-scale macroeconometric model that contains a detailed fiscal policy block; (iv) a long-run accounting model on pension expenditure (along the lines of the works of the AWG).

Our main findings are as follows. First, we find that during the recent episode of fiscal consolidation, discretionary fiscal policy measures yield less adjustment due to the situation of lower inflation. This applied to debt reduction strategies, both as regards government revenues and expenditures. In addition, public debt dynamics were significantly more adverse than in the higher-inflation episode of the second half of the 1990s when the stabilization of government debt was supported by favorable GDP and inflation dynamics. Second, despite the previous observations, we illustrate how the impact of low inflation on public finances depends crucially on the source of the inflation shock hitting the economy, with external shocks (oil prices) presenting even a positive
impact, while internal inflation shocks (measured through a decrease in mark-ups) having the potential of worsening public debt-to-GDP ratios. Finally, in our pension-accounting model we show how different rules of updating average pension vis-à-vis inflation and wages may contribute to the eventual success of the major pension reform of 2013, measured by the long-term dynamics of the pension expenditure-to-GDP ratio. Nevertheless, we also show how a revaluation scheme linked to persistently low inflation, in a framework in which wages grow with productivity (above inflation), can lead to a problem of sufficiency of pensions (even if the problem of the sustainability of pensions were solved).

References


