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The Stabilizing Effects of Economic Policies in Spain in Times of COVID-19

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The Stabilizing Effects of Economic Policies in Spain in Times of COVID-19[1]

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Abstract

In this article we analyse the stabilizing role of economic policies during the COVID-19 crisis in Spain. First, we estimate the contribution of the structural shocks that explain the behaviour of the main macroeconomic aggregates during 2020, using a DSGE model estimated for the Spanish economy. Our results highlight the importance of supply and demand shocks in explaining the COVID-19 crisis. Second, we have simulated a counterfactual scenario for GDP in absence of the COVID-19 economic policy measures. According to our results, the annual fall in GDP moderates at least by 7.6 points in the most intense period of the crisis, thanks to these stabilizing policies. Finally, we have estimated the potential effects of Next Generation EU in the Spanish economy. Assuming that Spain may receive from the EU between 1.5 and 2.25 percentage points of GDP in grants and loans from 2021 to 2024, to finance mainly public investment, GDP could increase between 2 and 3 pp in 2024. All these results show the usefulness of a DSGE model like EREMS, as a practical tool for the applied economic analysis and understanding of the Spanish economy.

Keywords: business cycle, shocks, growth, historical decomposition, COVID-19.

JEL classification: E30, E32, E43, E51, E52, E62

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1. Introduction

Only two weeks after the start of the COVID-19 lockdown in Spain, we carried out simulations based on a DSGE model, offering the first quantifications of the potential macroeconomic impact of the COVID-19 pandemic on the Spanish economy and the effects of the stabilizing economic policies announced at that time (see Boscá et al, 2020a and 2020b). These simulations were updated in May (Boscá et al, 2020c), when the lockdown de-escalation process began, producing economic scenarios for 2020 similar to those projected by the Bank of Spain (2020). Subsequently (Boscá et al, 2020d), we estimated a historical decomposition of the GDP growth rate into structural shocks of different nature, using the available information at that time and forecast for the remaining quarters of 2020.

All these simulations and historical decomposition exercises have been computed using the latest version of the dynamic and stochastic general equilibrium model EREMS (see Boscá et al, 2020e). This model is similar to those used by different international institutions such as, for example, the European Commission (see Kollmann et al, 2016, or Albonico et al, 2017), and is based on an earlier version (see Boscá et al, 2011), which was extended introducing a banking sector and a wide set of structural shocks. Using the theoretical constraints of the model, it is possible to estimate the structural shocks and their contributions to the behaviour of the main macroeconomic aggregates over time. Specifically, in this article we extended the model to include three stochastic implicit tax rates on consumption, and labour and capital incomes, and use 21 observed variables to identify the 21 shocks consistent with these theoretical restrictions.[2] To simplify the analysis and presentation, the 21 estimated factors have been grouped into supply shocks (for example, total factor productivity or efficiency in the use of residential capital), demand shocks (such as changes in preferences of private consumption or changes in public consumption) and credit (disturbances that alter the credit stock of companies and households).

These characteristics make this model a useful complement to the modelling and analysis tools already available, while improving our understanding of the Spanish economy from a macroeconomic perspective. Additionally, its use during the COVID-19 pandemic is analogous to other recent research (for example, Eichenbaum et al., 2020, Faria and Castro, 2020, or Guerrieri et al, 2020) that have begun to evaluate the effects of this crisis with similar models, although ours is richer and more detailed in terms of economic agents, sectors, variables and empirical observables.

Conditional on the information available until the third quarter of 2020, in this paper we estimate the historical decomposition of the main economic variables, in terms of the contributions of structural shocks, and we extend this decomposition until the end of 2021, using the latest available economic forecasts from BBVA Research (2020). These forecasts are exogenous to the model. Additionally, we update the simulations of the effects of the

[2] Quarterly implicit tax rates for the Spanish economy have been computed using the same methodology proposed by the European Commission (2020a) and information from OECD, INE, IGAE and AEAT.

economic policies implemented in 2020, and offer a preliminary assessment of the effects of Next Generation EU for 2021 (see, European Commission, 2020b), conditional on the scarce information available so far.

According to our findings, negative total factor productivity (TFP) and demand shocks explain most of the fall of GDP in the second quarter of 2020. Nevertheless, their negative contribution, unparalleled in history, has been partially offset by public consumption, transfers to the private sector and the credit impulse, especially for firms. Looking forward, NGEU can accelerate the recovery of the Spanish economy in 2021 and the following years. Our results show the usefulness of EREMS as a complementary tool for the analysis of the economic cycle and to understand its causes, and as a preliminary step for the design and evaluation of economic policies, such as those deployed during the crisis.

The structure of this article is as follows. The second section provides a brief description of the theoretical model, its calibration and estimation. The third section presents the results of the historical decomposition of GDP growth in terms of the structural shocks estimated. In section four, we update the simulated effects of the economic policies implemented so far. The fifth section simulates the potential effects of NGEU on the Spanish economy from 2021 to 2024. The last section offers the main conclusions of this article.

2. The model

2.1 Agents and markets

A new version of the dynamic stochastic general equilibrium EREMS model has been used to estimate and simulate the effects of stabilizing economic policies and structural shocks during the COVID-19 crisis. This model is determined by a well-founded system of equations at the microeconomic level and by macroeconomic constraints at the aggregate level. EREMS is a model for a small open economy like Spain, of an intermediate size within a monetary union, which takes the rest of the world as given and incorporates the interaction between financial and real variables. A complete description of the details of the objective functions of the different agents, their first order conditions, and the equilibrium equations are beyond the objectives of this paper and can be found in Boscá et al. (2020e). The only difference with that version is that in the one used in this paper we assume that social security contributions and the implicit tax rates on consumption, and on labor and capital incomes are now endogenous. This change allows us to compute the effects of shocks in these taxes during the COVID-19 crisis.

Compared to the REMS model (Boscá et al, 2011), EREMS basically includes two types of extensions. The first is the inclusion of a banking sector, which allows evaluating to what extent credit to households and firms is affected by changes in interest rate margins, by variations in bank capital regulations or by restrictions in the values of the assets used as collateral. The second extension is its stochastic dimension, which allows the estimation of the shocks that explain the dynamics of the main macroeconomic aggregates through their historical decomposition. In addition, EREMS includes some additional markets and variables as, for example, housing supply and demand.

The starting point of the model is the one proposed by Gerali et al. (2010) for a closed economy without a public sector, but with a banking sector. We extend this model to a small open economy within a monetary union, with a very detailed public sector, both in terms of the different components of expenditure and income, as shown in Figure 1.

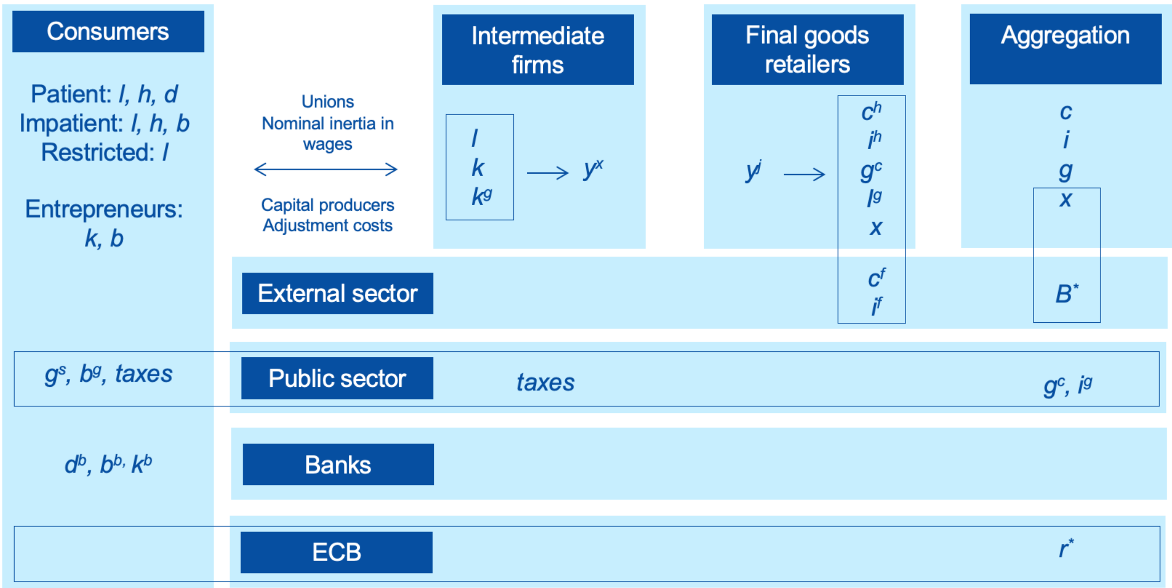

Figure 1: *Model structure in EREMS. Source: own elaboration based on Boscá et al (2020)*

There are four types of households: patient, impatient, households restricted in financial markets, and entrepreneurs. Patient consumers consume, save, supply labour, and accumulate their wealth in houses and deposits. Impatient consumers consume, supply labour, and borrow from banks to purchase their houses. Its indebtedness is subject to the restriction that the debt may not exceed the loan-to-value ratio times the market value of the house. Restricted households consume all their current income (they do not save) and supply labour, but they do not have access to the financial market to borrow against their future income. These three types of consumers delegate wage bargaining to unions, which operate in the labor market under conditions of monopolistic competition. Finally, entrepreneurs, in addition to consuming, buy productive capital and rent it to producers of intermediate goods. This productive capital is financed by loans taken from the banking sector. The model assumes that consumers are exposed to shocks in consumer preferences and in the demand for housing. These shocks also reflect their confidence in business cycle conditions. In a situation of uncertainty, consumers tend to reduce their private consumption, especially durable goods and housing, and increase their level of savings.

Firms in intermediate goods markets hire workers and capital from entrepreneurs to produce goods and services that they sell to firms in domestic and foreign final goods markets. Intermediate firms operate under monopolistic competition. In addition to consumption (domestic and foreign), the production of goods can be used for three types of investment: productive capital, public investment and real estate. Therefore, one additional difference with Gerali et al (2010) and Boscá et al (2011) is that the model incorporates an endogenous supply of houses.

The banking sector is characterised by the wholesale units and retail branches of banks. Branches offer deposits to savers (patient consumers) and loans to impatient households and entrepreneurs. In these retail markets, the deposits and loans offered by each bank are imperfect substitutes, so the banking sector also operates under monopolistic competition. The deposits and loans substitution elasticities are subject to shocks that alter the market power of banks in setting interest rates for their clients. Interest rates on retail deposits are determined with a (negative) spread with respect to the European Central Bank interest rate. Retail banks also lend to the government by purchasing part of the public debt. The interest rates on retail loans include a spread with respect to the interest rate at which banks obtain funds in the wholesale market. Both deposit and retail loan spreads depend on the market power of banks.

On the other hand, interest rates paid by branches to wholesale units are determined by a spread with respect to the interest rate of the external debt, which includes a country risk premium. This spread depends on the deviations of the bank capital ratio with respect to its regulatory level requirements. When banks are forced to increase this ratio, banks' branch funding becomes more expensive. Banks are exposed to shocks in their capital in order to satisfy the restriction imposed by the regulators on the ratio of capital to bank assets.

The model assumes that the Spanish economy trades consumer and investment goods, and bonds (public and foreign debt) with the rest of the world. To ensure the uniqueness and stability of the equilibrium, the Spanish risk premium increases with the net external debt against the rest of the world. This risk premium also incorporates a shock that captures variations that are not directly explained by the current level foreign debt.

The public sector provides public consumer goods and transfers, invests in public capital that is accumulated in infrastructures, borrows, and sets distorting taxes on consumption, labor and capital income, as well as social contributions. The model incorporates a fiscal rule that guarantees the sustainability of public finances in the long run, such that lump-sum transfers react to deviations in the ratio of public debt to GDP with respect to its steady-state level.

In this version of the model, together with public consumption (C^g) and public investment (I^g), we consider that the implicit tax rates on consumption (τ^c) and capital (τ^k) and labor income (τ^L) are also stochastic variables, subject to shocks (ξ^i) that can be estimated by including additional observables in the empirical specification of the model. In particular, defining T^c as the revenues of indirect taxes on private consumption (C^p), T^l the revenues of taxes (including social security contributions) on labour income (W), and T^k the revenues of taxes on capital income (rk), we assume that

$$T_t^c = \overline{\tau^c} \xi_t^{\tau c} C_t^p \tag{1}$$
$$T_t^l = \overline{\tau^l} \xi_t^{\tau l} W_t \tag{2}$$
$$T_t^k = \overline{\tau^k} \xi_t^{\tau k} \left(r_t^k k_{t-1} \right) \tag{3}$$
$$C_t^g = \overline{\psi^{cg}} \xi_t^{cg} \tag{4}$$
$$I_t^g = \overline{\psi^{ig}} \xi_t^{ig} \tag{5}$$

where the bar over variables denotes steady state values, shocks follow an AR(1) process

$$\ln \xi_t^i = \rho_i \ln \xi_{t-1}^i + \epsilon_t^i \tag{6}$$

and the innovations are normally distributed and are nots cross-correlated

$$\epsilon_t^i \sim N\left(0, \sigma_i^2\right) \tag{7}$$

Notice that these variables determine the main components of the government budget balance with the exception of transfers. As neither transfers nor the budget balance are used as observable in the empirical model, shocks to transfers are not identified, although they can be estimated as residuals given the rest of shocks and their contribution to the theoretical budget balance obtained from the model, as we show at the end of the next section.

Finally, the ECB sets the interest rate using a Taylor rule for inflation and output for the euro area as a whole. As in Galí and Monacelli (2005), we take the part of the inflation rate and output growth that depends on the rest of the union as exogenous to the model. Additionally, we consider the effects of quantitative easing by including a shadow interest rate that measures the overall stance of monetary policy when the lower bound is not necessarily binding (see De Rezende and Ristiniemi, 2020).

2.2 Calibration and estimation

The structural parameters of the model are calibrated to reproduce the main steady-state ratios of the Spanish economy in the sample period 1992-2019 (see Boscá et al, 2020d, for further details). These ratios are the share of different aggregate demand components, deposits and credit on GDP, the shares of public debt held by domestic agents and banks, and the bank capital to assets ratio. On the other hand, we estimate the autocorrelation coefficient and the variance of the innovation for each of the 21 shocks of the model, which have a clear theoretical interpretation. We also estimate eight parameters that capture the inertia and the degree of indexation of prices and wages in the economy. These parameters are estimated by Bayesian methods using the Metropolis Hastings algorithm implemented in Dynare 4.4.3.

To estimate the 21 shocks of the model, 21 observables are used[3]. This set of variables include, among others, GDP, private consumption, private investment, exports, imports, employment, a wide set of interest rates and fiscal variables, housing prices, levels of credit, deposits and bank capital, and tax revenues, distinguishing between taxes on income from labor and capital, and indirect taxes. Except for prices and interest rates, the remaining macroeconomic aggregates are deflated and expressed in terms of the working-age population and deviations from their sample mean year-on-year growth rates. The model is estimated from the fourth quarter of 1992 to the fourth quarter of 2019. However, the historical decomposition of GDP and other observables in terms of shocks contributions extends until the end of 2021, using the latest BBVA Research forecasts, published in October 2020. This exercise therefore provides a novel assessment of the effects of COVID-19 during the crisis and the ongoing recovery, conditional on these forecasts, which can subsequently be evaluated and updated as new information becomes available. As we will see in the next section, the results show the usefulness of this type of model as a complementary tool to analyse and understand the factors that characterize the economic crisis caused by COVID-19.

3. Historical decomposition in times of COVID-19

Figure 2 represents GDP per working-age population (WAP) in real terms and the estimated linear trend from the first quarter of 1990 to the fourth of 2020. The COVID-19 crisis truncated the recovery after the 2007-2009 Great Recession and the 2011-2012 sovereign debt crisis. At the end of 2019, GDP per WAP was 3.2% above the maximum reached in the previous expansionary cycle. Assuming that the linear trend would adequately approximate the long-term equilibrium path, during 2019 the Spanish economy would have been slightly above (1.2 pp) its trend growth

[3] See the Appendix for a description of the 21 shocks and their distribution into supply, demand and credit.

path and, therefore, with an almost neutral cyclical position. The fall in GDP per WAP in the first half of 2020 is unparalleled in history. Between the last quarter of 2019 and the second of 2020, its contraction was 25.3%, reaching levels not seen since the second half of 1997. Despite the recovery in the second half of the year, GDP per WAP will still be 8.7% below that of the end of 2019, a level equivalent to that of 2015.

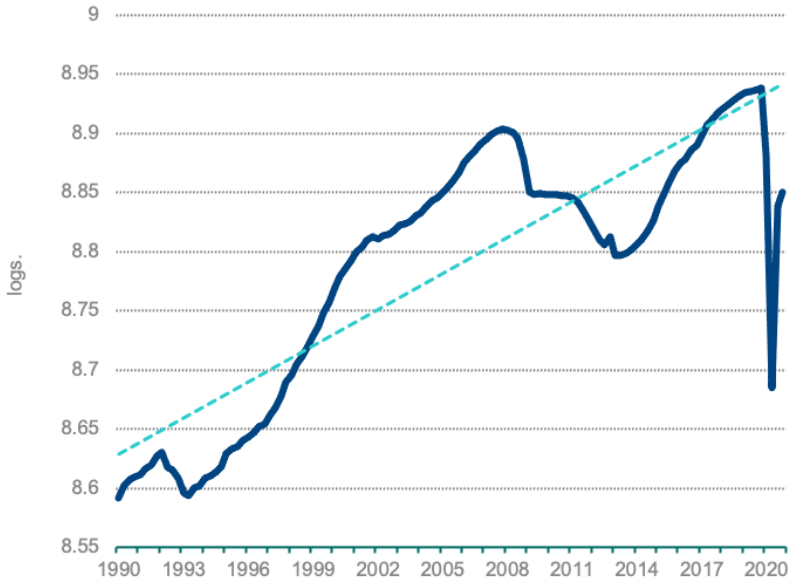

Figure 2: *GDP per working-age population, 1Q1990-4Q2020.*
Source: own elaboration based on INE and BBVA Research forecasts.

Figure 3 represents the deviation since 2008 of the interannual growth rate of GDP per WAP with respect to its sample mean. This is the transformation used as observable in the estimation of the model. According to this evidence, the Spanish economy has been slowing down since 2016 and at the end of 2019 GDP per WAP growth was already on its temporary average. The falls in the first half of 2020 were unprecedented: four times those observed in the previous international financial crisis, showing the exceptional nature of the COVID-19 crisis.

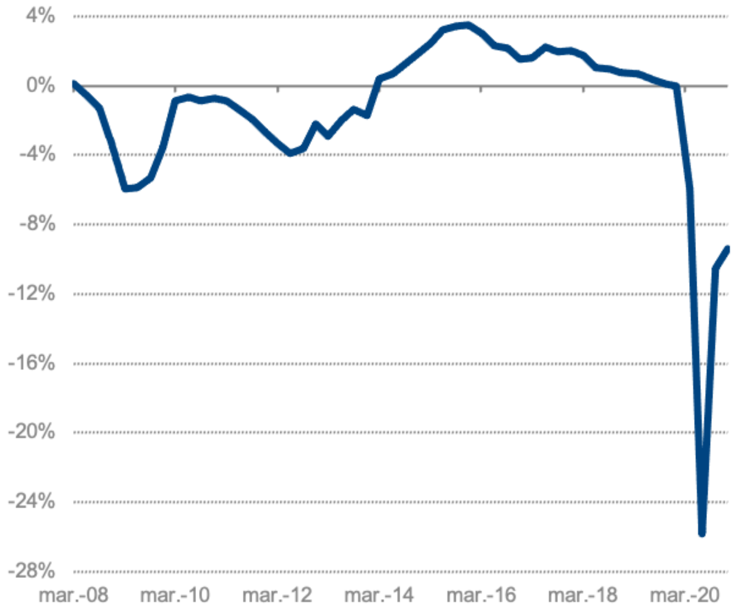

Figure 3: *Annual growth rate of GDP per working-age population, 2008-2020 (%).*
Source: own elaboration based on INE and BBVA Research forecasts.
Deviations from the sample average

Behind the evolution over time of this GDP per WAP growth rate are supply and demand shocks, whose contribution can be estimated with the model described in the previous section. Figure 4 presents the contribution since 2008 of aggregate supply, aggregate demand and credit shocks to the growth rate of GDP per WAP, obtained from the estimation of the model with observations up to the third quarter of 2020, and extending the sample period with exogenous forecasts to the model until the fourth quarter of 2020 (see BBVA Research, 2020). The bars above the horizontal axis indicate positive contributions to the cycle, while those below correspond to negative contributions. By construction, the sum of all contributions is equal to the deviation from their long-term average of the annual growth rate of GDP per WAP, which is represented by a solid line.

As seen in Figure 4, the contribution of supply, demand and credit factors during the COVID-19 crisis is very different from that of the previous crisis. Except for the increase in wage mark-ups in the first quarters (in line with the results of Doménech, García and Ulloa, 2018), the Great Recession was mainly a crisis caused by unsustainable growth in demand. In fact, during the sovereign debt crisis and a good part of the recovery, supply factors have had a crucial positive contribution and led to a sharp improvement in productivity. The estimates show that supply factors, which supported the economic recovery, gradually lost weight after their maximum contribution reached in 2016. In the last quarter of 2018 supply shocks started to have a negative contribution in GDP per WAP growth.

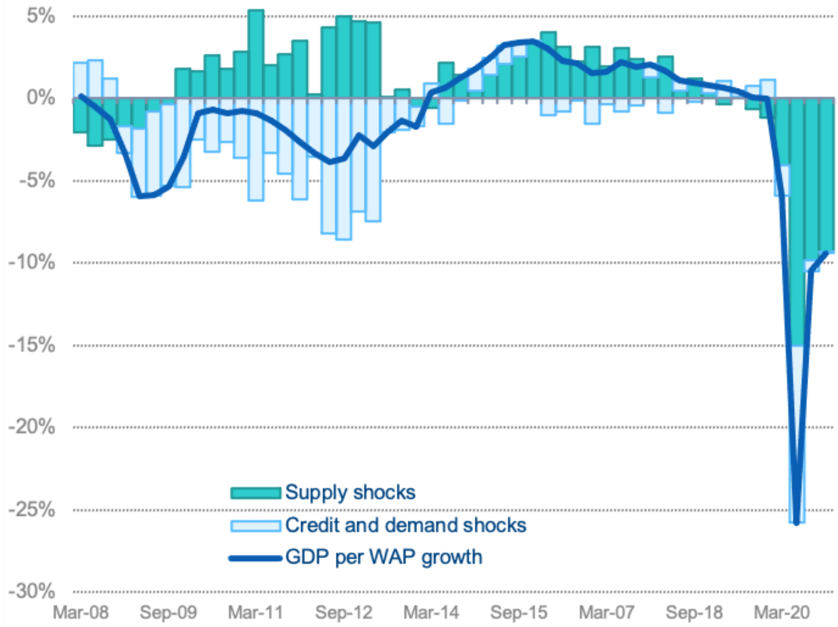

Figure 4: *Annual growth rate of GDP per WAP and contributions of supply, demand and credit shocks, 2008-2020. Source: own elaboration. Deviations from the sample average.*

During the COVID-19 crisis, supply and demand factors have been very relevant. During the recession caused by the lockdown, supply shocks represented 58% of the fall of GDP per WAP and demand and credit represented the remaining 42%. With the recovery started in the third quarter of 2020, demand is recovering and most of the year-on-year decline at the end of the year is explained by supply factors.

However, this does not mean that some demand shocks do not continue to contribute negatively to the decline in GDP per WAP, but that other demand or credit factors offset the negative contribution of some demand shocks with their positive contribution. This is precisely what Figure 5 shows, in which some demand factors, such as the credit impulse and aggregate demand by the public sector (public consumption and investment, and indirect taxes), have partially offset the negative contribution of consumption and private investment demand, as well as foreign demand. It should be noted that public sector transfers to households and firms are not used as an observable, and are not explicitly identified in the model. Therefore, unemployment benefits, tax deferrals, job furlough or retention schemes and self-employed aids for temporary cessation of activity implicitly reduce the fall of aggregate demand from the private sector. As we will see in the next section, these discretionary measures of the public sector have been very relevant to avoid a greater contraction in activity.

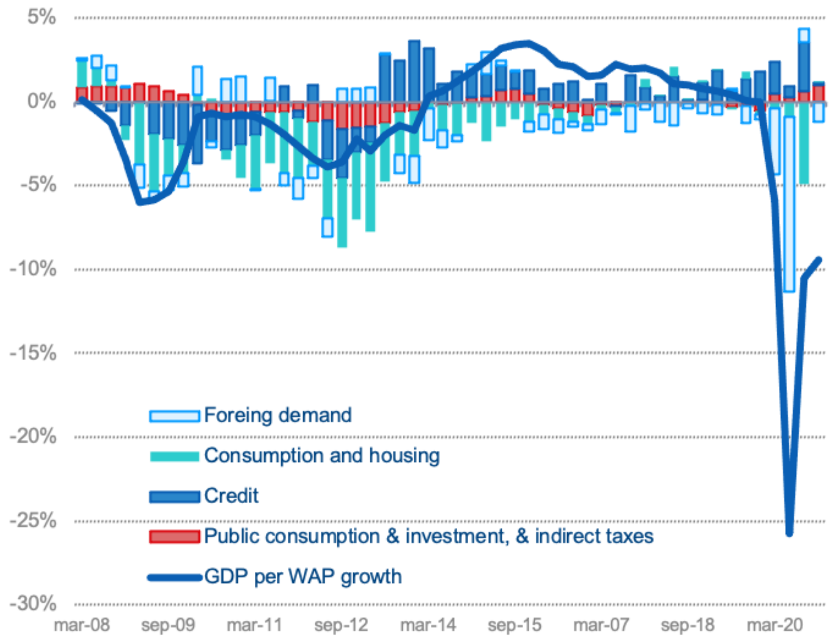

Figure 5: *Annual growth rate of GDP per WAP and contributions from shocks in foreign demand, private consumption and demand for housing, credit, public consumption and investment and indirect taxes, 2008-2020. Source: own elaboration. Deviations from the sample average.*

It is important to highlight the significant contribution of the credit impulse, which reaches almost three points of year-on-year growth of GDP per WAP in the third quarter of 2020, partly as a consequence of the public guarantee programs that, together with a more capitalized and active banking sector, made it possible to face the enormous increase in liquidity demand and the financing needs of firms during the crisis. Regarding the public components of aggregate demand, their contribution has been positive and slightly above one percentage point of GDP at the end of 2020. Lower implicit indirect taxes contribute almost 6 tenths to growth, public consumption almost 3 tenths and public investment 2 tenths throughout 2020.

As with demand factors, not all supply shocks have contributed equally during the COVID-19 crisis. Figure 6 shows that, within supply shocks, the factor that has contributed the most to the fall in GDP per WAP has been TFP, as might be expected, due to the lockdown and closure of economic activities. In the second quarter its contribution is approximately half of all the observed decrease in the level of activity. Conditional on the forecasts used for the last part of 2020, TFP gradually recovers, although its negative contribution does not disappear, while mark-ups also contribute negatively, with a fall of almost 5 percentage points to year-on-year growth at the end of 2020. This result indicates that, again, prices and wages flexibility should be key to accelerate the recovery of the Spanish economy after COVID-19.

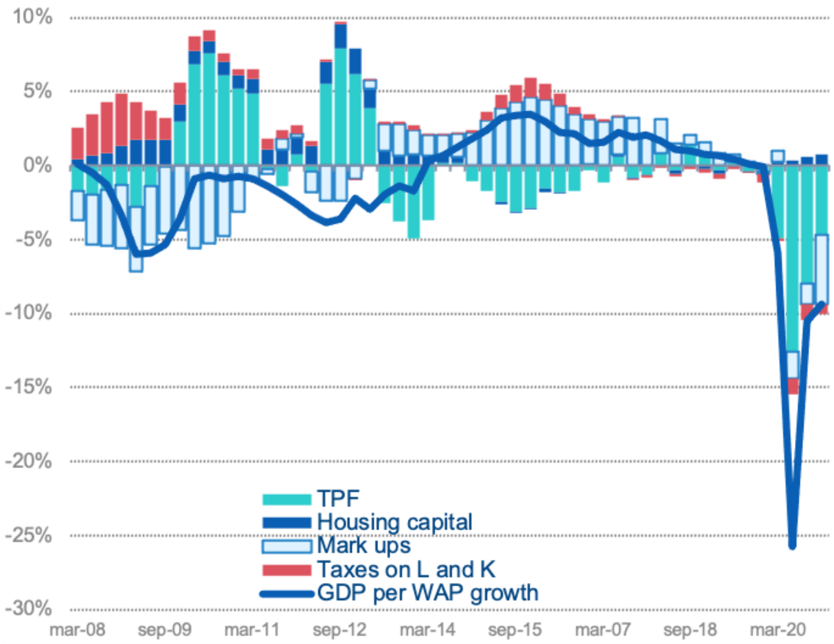

Figure 6: *Annual growth rate of GDP per WAP and contributions of supply shocks: TFP, mark-ups, residential capital, and tax on labor and capital, 2008-2020.*
Source: own elaboration. Deviations from the sample average.

Figure 6 also draws attention to the procyclicality of the implicit tax rates on labor and capital incomes, which in the second and third quarters of 2020 have subtracted one percentage point of year-on-year GDP per WAP growth. This means that the tax exemptions and deferrals adopted during the COVID-19 crisis, mainly through decreases in social contributions, have probably been insufficient, given the characteristics and magnitude of the crisis, since have only partially compensated the fall of the tax bases and have not prevented the increase in the tax burden on labour and, to a lesser extent, on capital incomes.

In Figure 7 we represent the year-on-year growth of government budget balance. The results confirm that public consumption and investment, and implicit tax rates shocks have not been the main determinant of the deterioration of the general government primary budget balance during the crisis. In fact, in the second quarter of 2020 the contribution of these shocks was even positive. The main determinants of the increase in the fiscal deficit (equal to 16.5 pp of GDP in 2Q2020 with respect to the same quarter of 2019) have been other (non-fiscal) shocks estimated by the model, and more importantly, fiscal variables, such as transfers. These transfers fall in the category of residuals, because they are not used as observables in the model and for which we do not estimate shocks.

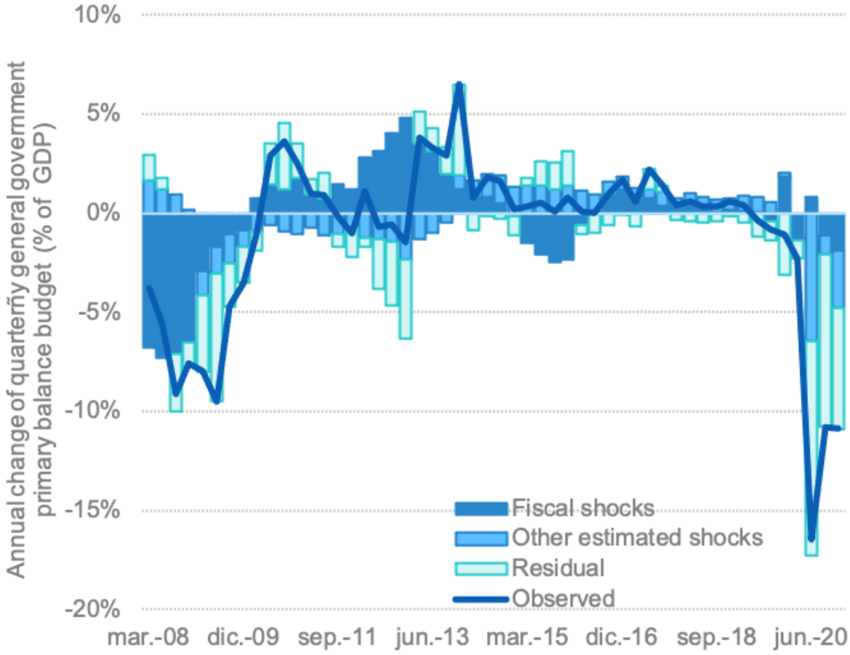

Figure 7: *Annual change of the quarterly general government primary balance budget (% of GDP), 2008-2020. Source: own elaboration.*

4. The stabilizing effects of economic policies

The objective of this section is to evaluate the effect of the countercyclical economic policies adopted in order to stabilize the economy and partially cushion the effects of lockdown, activity restrictions, uncertainty and other consequences of the COVID-19 crisis. More specifically, to counteract the sharp drop in activity, the Spanish Government approved an important package of economic measures that, with the information available in the 2021 Budget Plan, is estimated to have been mobilizing public resources in 2020 for about €164.1 billion, distributed between discretionary spending measures (€55,588 million), discretionary income measures (€922 million) and public guarantees and guarantees for loans (€107.6 billion). These measures include increases in health spending, subsidies to protect income for workers, self-employed and firms, as well as public guarantees for loans, or exemptions and extensions in the payment of taxes.

As Table 1 details, all these measures are introduced in EREMS altering some exogenous variables in the model, mainly in the second and third quarters of 2020, with the objective of simulating a counterfactual scenario of the economy without all these implemented temporary measures. It should be noted, however, that our simulations do not assess discretionary policies implemented by regional governments or municipalities.

In addition to the previous discretionary policies, we also take into account the temporary activation of the general escape clause of the Stability and Growth Pact, adopted on March 23 by ECOFIN. In the model, this implies that the fiscal rule is temporarily halted until mid-2022. We do not simulate the effects of measures approved by the Eurogroup through the additional resources available at the ESM, the European Investment Bank or the European unemployment fund SURE.

Measures	Amount (millions)	Timing	Model assumption
Monetary measures taken by the ECB	1.350.000	T1 a T4	Avoid effects on risk premium
Temporary activation of the general escape clause of SGP	---	T1 a T4	Fiscal rule temporally halted
Public credit guarantees	107,600	T1 a T4	Lower NPL
Job furlough schemes, self-employed aids and others	25,055	T2 y T3	Transfers to households
Social Security contributions exemptions	9,699	T2 y T3	Lower social contributions
Health expenditures and other similar measures	21,000	T2 y T3	Public consumption
Public investment measures	110	T2 y T3	Public investment
Exemptions of taxes	318	T2 y T3	Lower taxes

Table 1: *COVID-19 economic policy measures taken into account in the simulation of counterfactual scenarios for 2020. Source: own elaboration based on the 2020 Stability Programme of Spain and ECB.*

The extraordinary measures adopted by the ECB, such as the Pandemic Emergency Purchase Program (PEPP) of €1,350 billion, the expansion of the Asset Purchase Program (APP), new liquidity instruments as TLTRO III and PELTRO or the forward guidance (see Borgioli et al, 2020), have the objective of providing all the necessary liquidity and avoiding any type of tensions in financial markets such as, for example, an increase in risk premia of countries with smaller fiscal margins and high levels of public debt.

Figure 8 presents the GDP baseline and the simulated counterfactual scenario in absence of the COVID-19 economic policy measures detailed in Table 1, under the assumption that they are reverted in 2021. The results show that the set of policies implemented has a significant impact on mitigating the decline in economic activity. According to our results, the annual fall in GDP moderates by 5 percentage points (pp). The difference in the second quarter is even greater: economic policies limited the accumulated fall since 4Q19 in 7.6 pp.

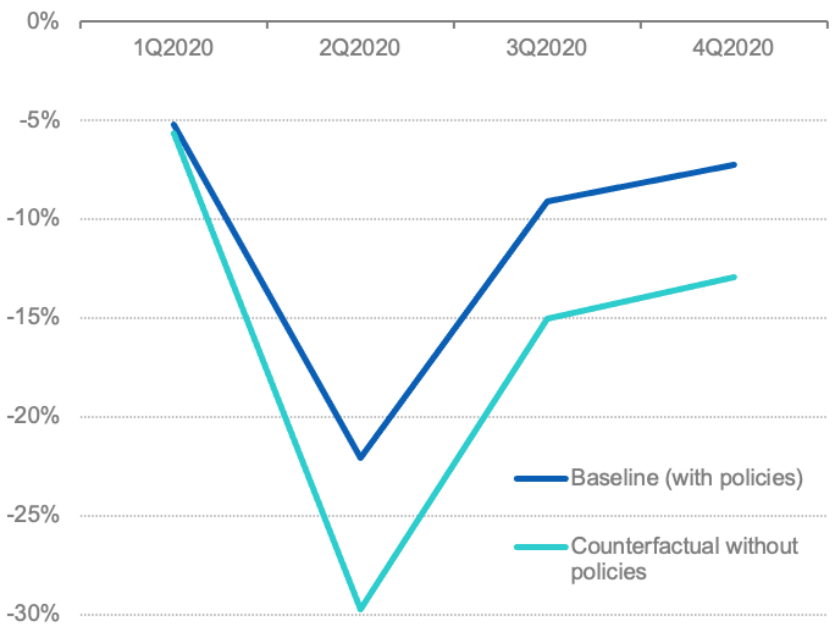

Figure 8: *GDP effects of COVID-19 economic policies in 2020. Percentage deviations from 4Q2019. Source: own elaboration.*

It is important to note that in this simulation the public credit guarantees only limit the increase in non-performing loans, incentivizing banks to meet the demand of liquidity, mainly of firms, during the pandemic. The simulation does not consider a gloomier scenario in which a credit restriction by the full amount of the public credit guarantee (9.7% of GDP in 2020) could have implied an additional fall of GDP or, even worse, hysteresis effects with the disappearance of many firms. Alternative simulation strategies that reduce the flow of credit to firms by the amount of these public credit guarantees increase the fall of GDP in line with an elasticity close to one. However, casual information indicates that not all credit has been used by firms to avoid a greater fall in GDP, but to store liquidity in the event that it is needed throughout a crisis with uncertain duration. In any case, according to these results, it cannot be ruled out that the economic policy measures have prevented an additional contraction in GDP of close to 10 percentage points in the worst phase of the COVID-19 crisis.

5. The potential effects of NGEU

In addition to the measures adopted by the ECB, the ESM, the EIB and SURE, Europe has launched a European recovery plan, better known as Next Generation EU (NGEU). This plan will be a very important and timely step in supporting the recovery in Europe. With a fiscal stimulus of 5.4% of the GDP for the EU, according to the simulations of the European Commission (EC) it could raise the GDP of some countries by more than 4% in 2024. This recovery plan is strongly redistributive since countries with a higher level of per capita income, and that have suffered the least during the COVID-19 crisis, contribute around 2% of their annual GDP. This temporary fund will be financed by a long-term European bond, a decision that can be interpreted as a step towards a future fiscal union. All these elements of NGEU reinforce the European project and make its response to the crisis an opportunity to advance the process of integration, transformation and modernization of the EU.

According to current estimates, Spain can receive around €140 billions between grants and loans for four years, which is equivalent to 12.0% of GDP and just over €3,000 per capita. Grants can reach €72 billion (6.4 pp of GDP forecasted for 2020) in the period 2021-2023. The Recovery and Resilience Facility would allow Spain to obtain more than €59 billion in grants, and REACT-EU (Recovery Assistance for Cohesion and the Territories of Europe), €12 billion.

The European Commission (2020) has carried out some simulations with the QUEST III model (see Ratto, Roeger and Veld, 2009) of the effects of NGEU on European economies that, like Spain, have a per capita income below the average and a public debt to GDP ratio above average. To carry out these simulations, the EC assumes that 93.5% of NGEU is used for public investment (with a higher fiscal multiplier, as found by Gechert, 2015) and the rest for public consumption, that 25% is disbursed each year between 2021 and 2024, and that between 50% and 100% of the grants, and 50% of the loans would be used.

Under the preceding assumptions and in countries with GDP per capita below EU average and high levels of public debt, the EC estimates that the NGEU effects on GDP level range from 4,2% in 2024 to 1.5% in 2030 for fiscal impulses ranging between 1,5% and 2,3% of GDP in four years. In the short term the estimated fiscal multiplier is equal to 1.37 and the cumulative fiscal multiplier until 2024 is equal to 1.71, decreasing significantly after that year.

In a similar vein, in Figure 9 we have simulated the effects of NGEU with EREMS for the low (50% grants and 50% loans) and high scenarios (100% grants and 50% loans). We make the same assumptions as the EC for comparability with their results. The only difference is that we use a DSGE model that has been calibrated and estimated for the Spanish economy. In particular, we obtain slightly minor effects than the European Commission and the Spanish Government (see Ministerio de Hacienda, 2020). In the high scenario, GDP increases by 3 pp in 2024 (4 pp in the simulation of the EC), with a peak fiscal multiplier equal to 1.33 (1.83 for the EC). The cumulative fiscal multiplier from 2021 to 2024 is 1.08 (1.65 for the EC).

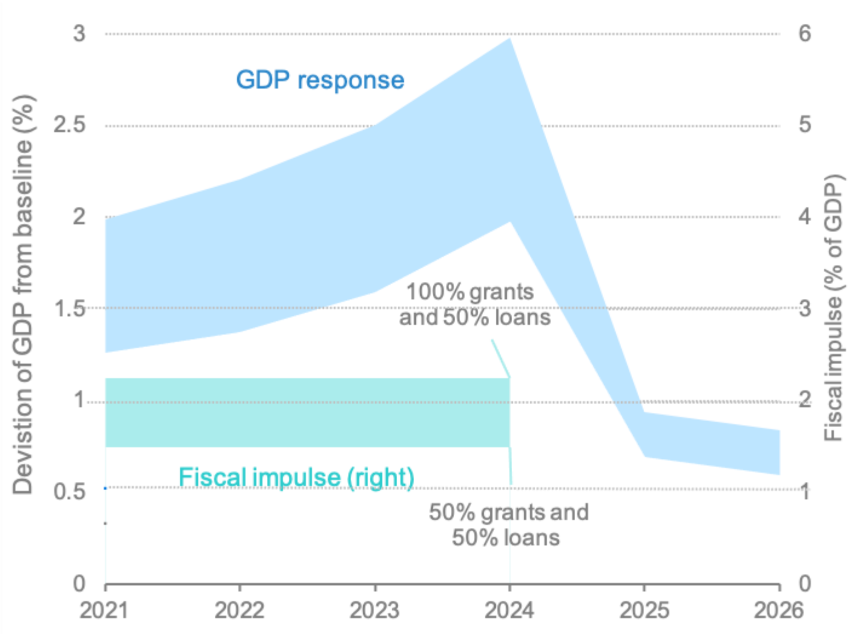

Figure 9: *GDP effects of NGEU. Percentage deviations from baseline. Source: own elaboration based on EREMS.*

It is important to take these simulation results with some caution. The effects of NGEU on the Spanish economy will depend on so many factors that can hardly be fully taken into account in a quantitative analysis like ours. The first factor is the absorption and execution capacities of these European funds by the Spanish public administration. With NGEU Spain will have available an aid that more than doubles the structural funds of the last multiannual financial framework of the EU, to execute it in approximately half the time. Second, many characteristics of the current economic conditions favour high fiscal multipliers (see Blanchard and Leigh, 2013, and Andrés and Doménech, 2013), such as, the low-capacity utilization of many inputs, the expansionary monetary policy in a low or even negative interest rate environment (see Christiano et al, 2011), the ability of the ECB to dampen any sovereign risk (Corsetti, Kuester, Meier and Müller, 2013), or a higher share of financial restricted economic agents. Nevertheless, high uncertainty may increase precautionary saving and reduce the effects of government spending as in Alloza (2017). Third, the focus of NGEU funds on transformation projects that increase potential growth also increase the likelihood of higher fiscal multipliers. Fourth, as a large part of funds are grants, Ricardian equivalence is less likely. For example, we have checked that if Spain receives 2.25% of GDP in EU grants, the cumulative fiscal multiplier from 2021 to 2024 is 30% higher than in the case the same amount is financed only by EU loans.

At the end of the day, the main factors will be the effectiveness and the speed of the projects financed by these European funds (with positive ex ante public policy evaluations), its design, selection, governance, execution and ability to increase potential growth. The last point is extremely important. To the extent that NGEU may increase potential growth, this should reinforce confidence, reduce precautionary saving and increase certainty about the ability of the government to sustain or even reduce the public debt to GDP ratio, avoiding a trade-off between fiscal expansion and the risk of unsustainable debt dynamics, as pointed out by Blanchard (2019). Structural reforms, in line with the European Commission's Specific Recommendations to Spain, would also significantly increase the effects of NGEU in the long term, facilitating digitization and transition to an emissions-neutral economy, increasing potential growth and productivity, and reducing structural unemployment (see European Commission, 2019).

6. Conclusions

In this article we have analysed the stabilizing role of economic policies during the COVID-19 crisis in Spain. First, we have estimated the contribution of the structural shocks that explain the behaviour of the main macroeconomic aggregates, using a DSGE model. Our results highlight the importance of supply and demand shocks in explaining the COVID-19 crisis. During the recession caused by the lockdown, supply shocks represented 58% of the fall of GDP per WAP and demand and credit represented the remaining 42%. With the recovery started in the third quarter of 2020, demand has been recovering and most of the annual decline at the end of the year is explained by supply factors. Within them, the factor that has contributed the most to the fall in GDP per WAP has been TFP, due to the lockdown and closure of economic activities. In the second quarter its contribution is approximately half of all the observed decrease in the level of activity. Conditional on the forecasts used for the last part of 2020, TFP gradually recovers, although its negative contribution does not disappear, while mark-ups also contribute negatively, with a fall of almost 5 percentage points to year-on-year growth at the end of 2020. Regarding the public components of aggregate demand, their contribution has been positive and slightly above one percentage point of GDP at the end of 2020. On the contrary, implicit tax rates on labor and capital incomes have been procyclical and in the second and third quarters of 2020 have subtracted one percentage point of year-on-year GDP per WAP growth. Therefore, tax exemptions and deferrals have only partially compensated the fall of the tax bases and have not prevented the increase in the tax burden on labour and, to a lesser extent, on capital incomes. The results confirm that unemployment benefits, job furlough schemes and self-employed aids for temporary cessation of activity have been the main fiscal instruments to avoid a larger fall of aggregate demand and the main determinants of the deterioration of the general government primary budget balance during the crisis.

In a second exercise, we have simulated a counterfactual scenario for GDP in absence of the COVID-19 economic policy measures. We show that the set of policies implemented had a significant impact on mitigating the decline in economic activity. In particular, according to our results, the annual fall in GDP moderates at least by 5 percentage points thanks to these stabilizing policies, with a larger effect in the second quarter when discretionary fiscal policies limited the fall of GDP by 7.6 pp.

Finally, we have estimated the potential effects of Next Generation EU in the Spanish economy. Assuming that Spain may receive between 1.5 and 2.25 percentage points of GDP between EU grants and loans from 2021 to 2024, to finance mainly public investment, GDP could increase between 2 and 3 pp in 2024, with a peak fiscal multiplier equal to 1.33 and a cumulative fiscal multiplier of 1.08 in these four years. These effects would be larger if Spain implements structural reforms in line with the Country Specific Recommendations made by the European Commission.

All these results show the usefulness of a DSGE model like EREMS, as a practical tool for the applied economic analysis and understanding of the Spanish economy, complementing other helpful empirical methodologies already available.

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Appendix. Distribution of shocks into supply, demand and credit.

Supply shocks

1. Technological or TFP shock.
2. Wage mark-up shock affecting workers' market power.
3. Price mark-up shock affecting producers' market power.
4. Shock on bank mark-ups when fixing interest rates on loans to firms.
5. Shock on bank mark-ups when fixing interest rates on loans to households.
6. Shock on bank mark-ups when fixing interest rates on households' deposits.
7. Shock on housing investment.
8. Shock on bank capital (in the process of converting profits into financial capital in the banking sector).
9. Shock on the effective tax rate on labour.
10. Shock on the effective tax rate on capital.

Demand shocks

11. Shock on house prices (originated in housing demand).
12. Shock on the demand for goods.
13. Shock on public expenditure.
14. Shock on public investment.
15. Shock on the rate of intervention (monetary shock).
16. Shock on imports.
17. Shock on exports.
18. Shock on risk premium.
19. Shock on the effective tax rate on consumption.

Credit shocks

20. Shock to the loan-to-value for firms.
21. Shock to the loan-to-value for households.

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