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The macroeconomic impact of radical right populist parties in government☆

Montserrat Ferré[1], Carolina Manzano[*,1]

Department of Economics and ECO-SOS, Universitat Rovira i Virgili, Reus 43204, Spain

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ABSTRACT

The success of radical right populist parties in the last decades seems to rely on a combination of economically left-wing and culturally conservative attitudes. Moreover, many of these parties have established themselves as relevant actors in European democracies, entering government coalitions with more traditional conservative right-wing parties. Therefore, an interesting question emerges: what is the macroeconomic impact of this left-wing tendency on economic issues when these parties are in government? In this article we develop a Stackelberg game in a rational partisan theory model to study the macroeconomic effects of such coalitions on the expected values and the variability of inflation, output and government spending.

1. Introduction

The rise of the radical right populist parties in Europe in the last 20 years has been swift (Rodrik, 2018). For example, radical right populist (RRP) parties held 4,7% of seats at the European Parliament in 1999, and in 2019 this figure had jumped to 18,2%. Further, in the last years, many RRP parties have entered government coalitions with more traditional conservative right-wing parties in Western European democracies.[2] To name a few, RRP parties have become relevant actors in Austria, Denmark and Poland. In Austria, the centre-right Austrian People's Party (ÖVP) reached an agreement in December 2017 with the RRP Freedom Party of Austria (FPÖ) to govern in a coalition. Another coalition developed in Denmark, where the conservative Venstre party formed a minority government in 2015 with other conservative parties (the Conservative People's Party and the Liberal Alliance) and the RRP Danish People's Party. Finally, in Poland, the United Right political alliance, led by the RRP Law and Justice Party (PIS), reached power in 2015.

According to Schumacher and Kersbergen (2016) the rise of RRP parties in Western Europe can be explained as an opposition stance to the perceived establishment at the time. On the one hand, Western European democracies were seen as liberal-left, tolerant and pro-European. On the other hand, the austerity programmes that were introduced by either left or right parties in government led to welfare retrenchment and discontent among voters. Accordingly, the RRP parties would defend a monocultural society, be against European integration and favour the maintenance of a generous welfare state. For example, Bergh and Kärnä (2021) find that EU membership is associated with a larger vote share for RRP parties, and McDonnell and Werner (2019) show that RRP supporters were negative towards European integration, but were less Eurosceptic than the RRP parties themselves. Further, even

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* Corresponding author.
E-mail addresses: montserrat.ferre@urv.cat (M. Ferré), carolina.manzano@urv.cat (C. Manzano).
[1] Associate Professor.

[2] These parties are or have been part of coalitions governing in Austria, Denmark, Finland, Hungary, Italy, Latvia, Norway, Poland, Slovakia and Switzerland, among others. See the Authoritarian Populism Index at https://populismindex.com.

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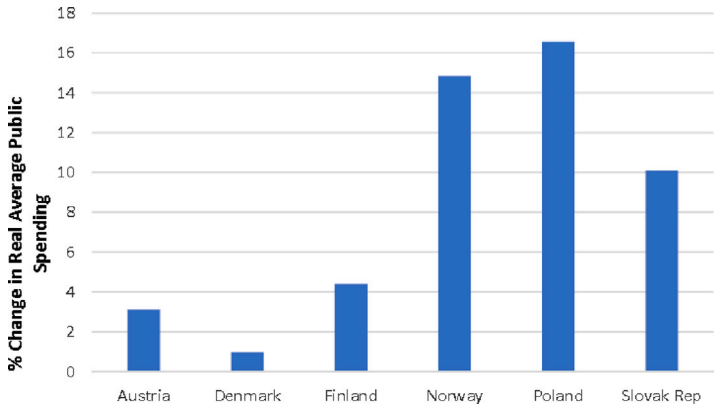

Fig. 1. Comparison of the real government spending of an RRP-conservative party coalition with that of its predecessors (2011–2019).

though these parties are characterised as "right"(radical or populist) parties, they seem to move to the left on economic issues (Afonso and Rennwald, 2018; Rathgeb and Busemeyer, 2022). For example, Eger and Valdez (2015), Ivaldi (2015) and Harteveld (2016), suggest that many RRP parties combine left-wing positions on economic issues with right-wing positions on cultural issues. Further, Pinggera (2021) and Chueri (2021) show that these parties support generous public pensions. Lately, as highlighted by Rovny and Polk (2020) there has been an increase of more explicitly left-wing proposals in the electoral manifestos of RRP parties.

Given the presence of RRP parties in government coalitions with the traditional conservative parties, it is interesting to consider whether the left-wing tendency on economic issues of RRPs does have an impact on the government policy. Önis and Kutlay (2020) argue that in many cases where RRP parties are in power, there is a process of horizontal distribution, with an expansion of social expenditures aimed at large segments of society. Further, Röth et al. (2018) argue that the reduction of the generosity of the welfare state pursued by traditional right-wing parties is clearly restrained when an RRP party is a member of a centre-right coalition. Fig. 1 seems to confirm these results. The figure shows the percentage change in real government spending by RRP-conservative parties government coalitions compared with that of the preceding governments.[3] In all 6 cases, real government spending increases when an RRP party enters a government coalition with more traditional conservative right-wing parties.

In this article we are interested in studying the expected effects of the presence of such coalitions on the main macroeconomic variables of an economy. If a government coalition of RRP and conservative parties leads to an increase in public spending, this might affect other variables. In particular, what happens to the volatility of inflation and output when an RRP party enters a coalition with a conservative party? Fig. 2 shows that the volatility of inflation and output decreased for the same period and the same 6 countries considered in Table 1[4].

In this article we will develop a theoretical model that attempts to explain the reduction in the volatility of inflation and output when there is an expectation that an RRP party will be in power. To this end, in Section 2 we will extend Alesina's (1987) rational partisan theory model, in which two parties alternate in office, to include fiscal policy. Thus, the economy will be affected by the voters' anticipation of election results: the fact that there is a possibility that the other party wins the elections will affect expected inflation and output. Given that many of the radical right populist parties have entered government coalitions with more traditional conservative right-wing parties in the European Union (Lange and S, 2012; Inglehart and Norris, 2016; Mudde, 2015), we will introduce in Section 3 the effect of an RRP party entering a coalition with the traditional right-wing party by allowing for a higher government spending objective. This attempts to reflect the empirical evidence that government spending might increase when an RRP party is in such coalition. Finally, Section 4 concludes.

2. The model

In this section, we will extend Alesina's (1987) rational partisan theory by combining features from two seminal papers by Debelle and Fischer (1994) and Alesina and Gatti (1995).[5] We will assume that there are two parties competing for office, party L

[3] The period studied runs from 2011 until 2019, as this is the period in which populist parties in Europe gained more support. It started in 2011 to avoid the data being distorted by the 2008 crisis and it ended in 2019 as the covid pandemic has generated large increases in public spending. We have selected 6 countries: Austria, Denmark, Finland, Norway, Poland and Slovakia. We have excluded Italy as a technocrat government was in place from the end of 2011 until 2013. Further, Switzerland and Hungary have also been excluded, as the populist parties SVP and Fidesz, respectively, were in power throughout the whole period studied. The data has been obtained from the Political Data Yearbook and from the IMF World Economic Outlook. More information on the parties in government for each of the 6 countries during the periods considered can be found in Table 1 in the Appendix, which shows the compositions of governments since 2011 for these countries.

[4] Of course, the sample used here is very limited in time, and further econometric studies should be undertaken. The data has been obtained from the IMF World Economic Outlook.

[5] A review of this literature can be found in Alesina and Stella (2010).

(a left-wing party) and party R (a right-wing party), with an exogenous probability P that party L wins the elections and takes office. Expected inflation embodies electoral uncertainty; as party L has a probability P to win the elections, and party R a probability $(1-P)$, expected inflation, denoted by π^e, is given by

$$\pi^e = PE(\pi_L) + (1-P)E(\pi_R), \tag{1}$$

where $E(\pi_j)$ represents expected inflation if party j is in office ($j = L, R$). Output is given by:

$$x_j = \pi_j - \pi^e - \tau_j - w^* + \varepsilon, \tag{2}$$

where π_j and π^e are the actual and expected inflation rates under party j, respectively. The tax rate levied on output is represented by τ_j, the target real wage that workers seek to achieve is denoted by w^* and finally, the productivity shock is given by ε, with $E(\varepsilon) = 0$ and $var(\varepsilon) = \sigma_\varepsilon^2$. Higher taxes and higher real wages will increase firms' costs and will reduce output. Further, if inflation is above expected inflation, agents will have negotiated wages that are now too low and firms will be able to increase output.

Following Alesina and Tabellini (1987) and Ferré and Manzano (2020), among others, if party j is in government, it faces the following budget constraint:

$$g_j = \tau_j + \pi_j, \tag{3}$$

where g_j denotes the ratio of public expenditures over output when party j is in office. According to (3), public spending will be financed by a distortionary tax and/or by money creation. We assume that the government will select the tax rate, whereas money creation will be controlled by the central bank.

The loss function for party j is given by

$$V_{Gj} = \frac{1}{2}\left(\pi_j^2 + \delta_j(x_j - x^*)^2 + \gamma(g_j - g_j^*)^2\right), \tag{4}$$

where δ_j and γ represent the relative weights assigned to output and public spending stabilisation with respect to inflation, respectively, and $\delta_j, \gamma > 0$, while x^* and g_j^* denote the output and public spending targets, respectively. According to this objective function, the party in government aims to stabilise output and inflation, as well as meeting a public spending target, which could reflect the aim of being reelected or other demands from interest groups that influence the government. Following the partisan hypothesis literature, we suppose that $\delta_L > \delta_R$. Moreover, we will assume that party L has a larger government spending target than party R: $g_L^* > g_R^*$.[6]

The objective function of the central bank is of the form

$$V_{CB} = \frac{1}{2}\left(\pi^2 + \delta_{CB}\left(x_j - x^*\right)^2\right), \tag{5}$$

where $\delta_{CB} > 0$ represents the weight given by the central bank to output stabilisation with respect to inflation stabilisation. Notice that output x_j will be affected by the party that takes office ($j = L, R$). We will assume that the central bank is independent, to reflect the institutional setup of many industrialised and developing countries (Crowe and Meade, 2007).

In this economy, the timing of events is as follows. First, agents will form expectations on π^e under electoral uncertainty, as they do not know what party will be in office.[7] Once elections take place, the shock ε is realised.[8] Afterwards, the party in office and the independent central bank will choose their policies sequentially. Beetsma and Bovenberg (1998) argue that it takes a long time to change tax rates whereas monetary policy can be adjusted rather quickly. In this setup, we will consider that, even though both policies will be discretionary, fiscal policy will be announced and fixed before monetary policy. Thus, fiscal–monetary interactions would involve a leader–follower game, in which the fiscal authority acts as the leader and the monetary authority acts as the follower.

The solution of the model (which can be found in detail in the Appendix) leads to the conclusion that, when the difference between the public spending objectives of the left and right-wing parties is relatively high, expected inflation and expected public spending will be higher under a left-wing administration, but the associated expected output growth will be lower. The following proposition summarises the results:

[6] We have assumed that the target growth for output is not different for the left and right parties, following the findings of Shelton (2012). Shelton (2012) considers the response of economic forecasts to changes in political leadership in industrialised economies and finds that in one set of countries (France, Italy, Spain, United States, United Kingdom, Canada), the left is expected to deliver higher output growth, whereas in another set of countries (Germany, Japan, the Netherlands, Norway, Sweden), the left is associated with lower output. For this reason, we have considered the output target x^* to be the same for both parties. However, following the partisan hypothesis theory, we consider that the weight on output stabilisation should be larger for L than for R.

Further, the target for public spending tends to be much more related to the political agendas of the parties, thus providing an important source of policy rift between them, with the left-wing party preferring a higher target than the right-wing party. However, as it is not clear a priory what party would place a higher weight on government expenditure stabilisation, we have assumed that γ is the same for both parties.

[7] In this model, it is crucial to notice that we are in an election year. The probabilities assigned to the party winning the elections could originate in polls taken at the beginning of the year. Once the polls have been taken, agents form their expectations knowing that there can be electoral surprises and wage contracts are signed.

[8] We studied the possibility that private-sector agents had some information about the stochastic supply-side shock prior to inflation expectations being formed. We modified the original model following Herrendorf and Lockwood (1997), allowing for the private sector to observe a signal about the supply side shock before inflation expectations are formed. The main results obtained in the paper were not altered.

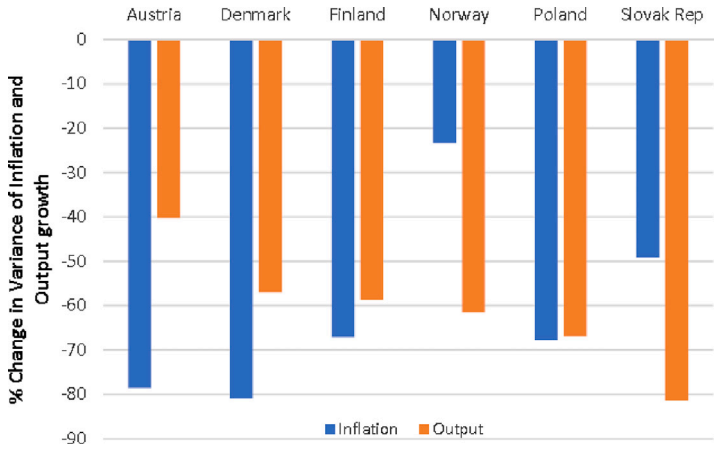

Fig. 2. Comparison of the variances of inflation and output growth of an RRP-conservative party coalition with that of its predecessors (2011–2019).

Proposition 1. *Provided that* $g_L^* - g_R^*$ *is high enough,* $E(\pi_L) > E(\pi_R)$, $E(x_L) < E(x_R)$, *and* $E(g_L) > E(g_R)$.

Notice that the traditional Rational Partisan Theory results of Alesina (1987) are altered by Proposition 1[9]: when expected inflation is higher under a particular administration, the associated expected output will be lower, provided that $g_L^* - g_R^*$ is high enough. In this case, when party L is in office, it will be more willing to increase taxes in order to finance the higher public spending target, and this will lower output. This, in turn, will force the independent central bank to inflate, and hence, $E(\pi_L) > E(\pi_R)$. Further, as expected taxes and inflation will be higher under party L administration, $E(g_L) > E(g_R)$.

3. The impact of a radical right populist party in government

We will now study the effect on these macroeconomic variables when the traditional right-wing party, party R, enters into a coalition with an RRP party. It is interesting to consider whether the probability of the left-wing party winning the elections, P, would be altered by the presence of an RRP in the coalition. In fact, it could be argued that the left-wing party could lose voters in favour of the right-wing coalition. Häusermann et al. (2021) study vote switching in Europe and conclude that social democratic parties' voter losses to RRP have been minimal, and most of these losses have predominantly been to green and left libertarian parties. Accordingly, we consider that the presence of an RRP party does not alter the probability of the left-wing party being elected. However, following the empirical literature, we will consider that the coalition now has a higher target for public spending, g_R^*. In this case, an increase in the government spending target by the right-wing coalition has the following effects:

Proposition 2. *An increase in* g_R^* *leads to higher inflation and lower output, regardless of what party is in government. An increase in* g_R^* *also leads to lower public spending if party* L *is in office, while the opposite occurs if the right-wing coalition is in office.*

An increase in the right-wing coalition's government spending target will increase inflation and lower output when either party is in office. Under a right-wing coalition government, taxes will increase to fund the higher target for public spending, and this will bring lower output and higher inflation. The increase of both the tax rate and the inflation rate implies that public spending also increases according to (3).

To see the effect of an increase in the right-wing coalition's government spending target when party L is in office, note that an increase in g_R^* increases the inflation expectations of the private sector (π^e), as the possibility of the right-wing coalition winning the election is taken into account. This increase in π^e affects output negatively and this creates more incentives for the fiscal authority to reduce the tax rate and for the central bank to increase the inflation rate.[10] This leads us to conclude that an increase in g_R^* exerts two opposite effects on public spending: (i) lower τ_L and (ii) higher π_L. Proposition 2 shows that an increase in the right-wing coalition's government spending target causes a decrease in public spending if party L is in office, indicating that the effect of the tax reduction dominates the increase in the inflation rate.

Further, the introduction of a higher public spending target for the right-wing coalition has the following implications for the variances of inflation, output and public spending:

Proposition 3. *An increase in* g_R^* *leads to lower variances of inflation, output and government spending provided that* $g_L^* - g_R^*$ *is high enough.*

[9] In Alesina's model, when the left-wing party gains office, both inflation and output are higher. Our results are driven by the interactions generated by the introduction of fiscal policy when there is an independent central bank responsible for monetary policy.

[10] This is evident from (8) and (9) in Appendix.

Table 1
Political parties in office for some European countries during the period 2011–2019. We use the following abbreviations: C: centre; CL: centre-left; CR: centre-right; LW: left wing; RW: right wing; RPP: populist right.

Country			
Austria	**Period**	2011 - 2017	12/2017 - end 2019
	Parties in office (political position)	SPÖ (CL); ÖVP (CR to RW)	ÖVP (CR to RW); FPÖ (RRP)
Denmark	**Period**	10/2011-2/2014 and 2/2014-6/2015	6/2015 – 6/2019
	Parties in office (political position)	SD (CL); RV (C to CL); SF (CL to LW) and SD (CL); RV (C to CL).	V (CR); DPP (RRP); LA (CR to RW); DKF (CR)
Finland	**Period**	6/2011-6/2014 and 6/2014-5/2015	5/2015-6/2017 and 6/2017-6/2019
	Parties in office (political position)	KOK (CR); SDP (CL); VAS (LW); SFP (C); VIHR (C to CL) ; KD (CR) and KOK (CR); SDP (CL); SFP (C); KD (CR); VIHR (C to CL)	KESK (C); PS (RRP); KOK (CR) and KESK (C); KOK (CR); PS (RRP); SIN (RRP)
Norway	**Period**	2011 – 10/2013	10/2013- end 2019
	Parties in office (political position)	DNA (CL); SV (LW); SP (C)	H (CR); FRP (RRP)
Poland	**Period**	2011 – 10/2015	11/2015 -end 2019
	Parties in office (political position)	PO (C to CR); PSL (C to CR)	PiS (RRP)
Slovakia	**Period**	2011-4/2012 and 4/2012-4/2016	4/2016 - end 2019
	Parties in office (political position)	SDKV (CL to CR); KDH (CR); Most (C to CR); SaS (CR); SD(CL to LW) and SD (CL to LW)	SD (CL to LW); SNS (RRP); Most (C to CR); Network (C to CR)

The variance of inflation will be lower after an increase in g_R^* provided that $g_L^* - g_R^*$ is high enough. To study this effect, we will follow Alesina and Gatti (1995) and decompose the variability of inflation in two components. One component will be the political volatility ($var_P(\pi)$), introduced by the uncertainty about the future course of policy as it is not known what party will be in office. Another component will be the economic volatility, induced by exogenous shocks. It is shown in the Appendix (proof of Proposition 3) that only the politically induced volatility of inflation is affected by a change in g_R^*, and it is given by

$$var_P(\pi) = P(1-P)\left(E(\pi_L) - E(\pi_R)\right)^2. \tag{6}$$

As we have seen in Proposition 2, an increase in g_R^* leads to higher expected inflation when either party is in government; however, the induced effect on $E(\pi_L)$ is smaller than the direct effect on $E(\pi_R)$. Further, given that when $g_L^* - g_R^*$ is high enough, $E(\pi_L) > E(\pi_R)$, it follows that the increase in g_R^* leads to a reduction in the difference $E(\pi_L) - E(\pi_R)$ and, according to (6), this results in a decrease in the politically induced volatility of inflation. On the other hand, when $g_L^* - g_R^*$ is low enough, as $E(\pi_L) < E(\pi_R)$, the increase in g_R^* will increase $E(\pi_R) - E(\pi_L)$ and, therefore, the politically induced volatility of inflation.

Using a similar argument as the one presented for inflation variability, when $g_L^* - g_R^*$ is high enough, the variability of output and public spending will be reduced by the presence of an RRP party in a conservative government.

Proposition 3 provides support for the empirical evidence shown in Fig. 2, as the volatility of inflation and output are expected to diminish due to the presence of an RRP party in a conservative coalition government when $g_L^* - g_R^*$ is high. According to Proposition 3, our model would support the argument that the difference between the public spending objectives of the left and right-wing parties in the 6 countries considered was relatively large.

4. Conclusion

Part of the success of radical right populist parties in the last decades seems to be linked to a combination of economically left-wing and culturally conservative attitudes. Many of these parties have managed to establish themselves as relevant actors in European democracies, entering government coalitions with more traditional conservative right-wing parties. In this article we have developed a rational partisan theory model to study the expected effects of such coalitions.

In particular, we have shown that the presence of a coalition of a radical right populist party with a conservative party can lead to higher inflation and lower output regardless of what party is in office (the left-wing party or the right-wing coalition). Further, these variables, together with government spending, have lower variance provided that the difference between the public spending targets for the left-wing party and the right-wing coalition is high enough. The results presented in this article suggest that the

political distance in terms of public spending objectives for the left and right-wing parties of the 6 countries studied here (Austria, Denmark, Finland, Norway, Poland and Slovakia) is important.

We would like to acknowledge that our key results are dependent on the limitations introduced in the model. For example, this article has considered a complete polarisation of the political parties into left and right-wing parties. There are, however, countries where the centre parties have electoral expression, and for this reason, an interesting extension would be the inclusion of a third party. The presence of the centre of the political spectrum in the rational partisan model would still impact on electoral uncertainty and thus an interesting question arises as to what would the effect on the levels and variances of inflation and output be. Further, the inclusion in our framework of other parties (centre or further left) would also allow broadening the study of voter switching and polarisation. For example, one could consider that the probability of a left-wing party governing alone would be altered by the presence of an RRP in the coalition. We have also assumed an inability of governments to borrow. The introduction of debt in the model would be an interesting extension that would also allow to study the possibility of the incumbent party increasing spending to influence the probability of being elected.

The model applied here could be used to reflect a monetary union like the European Monetary Union (EMU). By allowing the (European) central bank to target the weighted average of the countries' inflation rates, different scenarios could be considered. For instance, what effect would the rise of populism in one member country have on the EMU inflation rate? In addition, would populism in one member country generate spillover effects onto the other member countries? These effects could be studied under alternative timing of events. One could consider that the party elected to government has first-mover advantage relative to the independent central bank, or rather the opposite timing, allowing for a more rule-based state-contingent policymaking (and hence less accommodative) by the central bank.

Finally, future work could also investigate result-robustness in relation to taxes influencing the target real wage of the union. In our model, the tax rate τ is the proportion of firms' total revenue taken by the government in tax, and so it is not a tax affecting union members directly. The model presented here could be extended to assume a proportion of taxes raised through income taxes, which would affect the after-tax real wage of union members and hence their target real wage w^*. The introduction of income taxes in the model would bring about interesting avenues of research: (i) as the government would have two tax instruments, would it use each of them to achieve each of the targets for output and government spending?, (ii) would the government have an advantage over the central bank?, or (iii) would the two taxes set by the government behave as complements or substitutes? Further, the new model could also introduce unemployment subsidies (financed by part of the income tax collection), and this would, in turn, affect the trade unions' welfare function.

CRediT authorship contribution statement

Montserrat Ferré: Conception and design of study, Acquisition of data, Analysis and/or interpretation of data, Writing – original draft, Writing – review & editing. **Carolina Manzano:** Conception and design of study, Writing – original draft, Writing – review & editing.

Data availability

Data will be made available on request.

Acknowledgement

All authors approved the version of the manuscript to be published.

Appendix

Derivation of Expression (2). To simplify notation we omit subscript j in this proof. Output of a representative firm is given by $X = L^{\lambda}\exp(\varepsilon/2)$, where X denotes the real output, L represents labour, λ indicates the output elasticity and ε represents a supply shock. We assume that ε has zero mean and variance σ_{ε}^2. Distortionary taxes are levied on production. The firm maximises profit, given by: $(1-\tau)PL^{\lambda}\exp(\varepsilon/2) - WL$, where τ denotes the tax rate on total revenue of firms, P represents the price level and W is the nominal wage. Solving for the firm's labour demand, assuming it can hire the labour it demands at the given nominal wage, taking logs, we have $x = \alpha(p - w + \ln(1-\tau)) + k + \frac{\varepsilon}{2(1-\lambda)}$, where lower-case letters denote logs of nominal variables, $\alpha = \lambda/(1-\lambda)$ and $k = \lambda\ln\lambda/(1-\lambda)$. Approximating $\ln(1-\tau)$by $-\tau$,[11] $x = \alpha(p - w - \tau) + k + \frac{\varepsilon}{2(1-\lambda)}$. Finally, following Beetsma and Bovenberg (1998), for simplicity, we set $\lambda = 1/2$ so that $\alpha = 1$ and, from Alesina and Tabellini (1987), $k = 0$.[12] Hence, $x = p - \tau - w + \varepsilon$.

In addition, following Alesina and Tabellini (1987), Debelle and Fischer (1994) and Beetsma and Bovenberg (1998), among others, we assume that workers are represented by a centralised trade union which seeks to minimise deviations of the real wage rate

[11] It is important to highlight that this approximation becomes poor as τ rises above 0,25. In 2022, the corporate tax rate for the countries considered in our paper are generally below 25% (Austria: 25%, Denmark: 22%, Finland: 20%, Norway: 22%, Poland: 19% and Slovakia: 21%). For this reason, we believe this approximation should be valid in our framework.

[12] The results obtained in this article are robust for the cases where $\lambda \neq 1/2$ or $k \neq 0$. We can provide the analysis for this general case upon request.

from a particular target w^*, hence it sets the nominal wage (in logs) to achieve the target w^*. The trade union chooses the nominal wage in advance of the actions of the two policymakers, but knowing their objective functions, i.e., it minimises the objective function: $E\left((w-p-w^*)^2\right)\Big/2$. The first order condition of this optimisation problem immediately yields $w = p^e + w^*$. Therefore, $x = p - p^e - \tau - w^* + \varepsilon$. Finally, approximating $p - p^e$ by $\pi - \pi^e$, where π represents inflation rate and π^e expected inflation rate, we get the aggregate supply equation of the model. ■

Proposition A1. *In equilibrium the inflation rates, outputs and public spendings are given by*

$$\begin{aligned}
\pi_L &= \delta_{CB}\left(2\delta_{CB}+1\right)\gamma\frac{\left(\delta_R+\gamma+3\gamma\delta_{CB}+\delta_{CB}^2(2\gamma+1)\right)A_L+\delta_{CB}\gamma\left(2\delta_{CB}+1\right)A^e}{\Delta}\\
&\quad-\frac{\delta_{CB}\left(2\delta_{CB}+1\right)\gamma}{\delta_L+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\varepsilon,\\
\pi_R &= \delta_{CB}\left(2\delta_{CB}+1\right)\gamma\frac{\left(\delta_L+\gamma+3\gamma\delta_{CB}+\delta_{CB}^2(2\gamma+1)\right)A_R+\delta_{CB}\gamma\left(2\delta_{CB}+1\right)A^e}{\Delta}\\
&\quad-\frac{\delta_{CB}\left(2\delta_{CB}+1\right)\gamma}{\delta_R+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\varepsilon,\\
x_L &= x^*-\frac{1}{\delta_{CB}}\pi_L, x_R = x^*-\frac{1}{\delta_{CB}}\pi_R,\\
g_L &= g_L^*-\frac{\delta_L+\delta_{CB}^2}{\delta_{CB}\gamma\left(2\delta_{CB}+1\right)}\pi_L \text{ and } g_R = g_R^*-\frac{\delta_R+\delta_{CB}^2}{\delta_{CB}\gamma\left(2\delta_{CB}+1\right)}\pi_R,
\end{aligned}$$

where $A^e = PA_L + (1-P)A_R$, $A_j = g_j^* + w^* + x^*$, $j = L, R$, *and*

$$\begin{aligned}
\Delta &= P\left(\delta_L+\gamma+3\gamma\delta_{CB}+(2\gamma+1)\delta_{CB}^2\right)\left(\delta_R+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2\right)+\\
&+(1-P)\left(\delta_R+\gamma+3\gamma\delta_{CB}+(2\gamma+1)\delta_{CB}^2\right)\left(\delta_L+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2\right).
\end{aligned}$$

Proof of Proposition A1. We solve by backward induction. In the second step, the central bank chooses the inflation rate after observing the tax rate chosen by the government in office. Suppose that party j is in office. Then, the central bank chooses π_j in order to solve the following problem after observing τ_j:

$$\min_{\pi_j} V_{CB} = \frac{1}{2}\left(\pi_j^2+\delta_{CB}\left(x_j-x^*\right)^2\right).$$

The *f.o.c.* of this optimisation problem is given by $\frac{\partial}{\partial\pi_j}V_{CB} = \pi_j + \delta_{CB}\left(x_j - x^*\right) = 0$, which implies

$$\pi_j = \frac{\delta_{CB}}{\delta_{CB}+1}\left(w^*+x^*+\pi^e+\tau_j-\varepsilon\right). \tag{7}$$

In the first step, the fiscal authority chooses τ_j taking into account (7). Thus,

$$\begin{aligned}
&\min_{\tau_j} V_{G_j} = \tfrac{1}{2}\left(\pi_j^2+\delta_j\left(x_j-x^*\right)^2+\gamma(g_j-g_j^*)^2\right)\\
&\text{s.t. } \pi_j = \tfrac{\delta_{CB}}{\delta_{CB}+1}\left(w^*+x^*+\pi^e+\tau_j-\varepsilon\right).
\end{aligned}$$

The *f.o.c.* of this problem is given by

$$\frac{\partial}{\partial\tau_j}V_{G_j} = \pi_j\frac{\delta_{CB}}{\delta_{CB}+1}+\delta_j\left(x_j-x^*\right)\left(\frac{\delta_{CB}}{\delta_{CB}+1}-1\right)+\gamma(g_j-g_j^*)\left(1+\frac{\delta_{CB}}{\delta_{CB}+1}\right)=0.$$

Using Expressions (7), (2) and (3), it follows that

$$\tau_j = g_j^* - \frac{\delta_j+\gamma\delta_{CB}+2\gamma\delta_{CB}^2+\delta_{CB}^2}{\gamma+\delta_j+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\left(A_j+\pi^e-\varepsilon\right), \tag{8}$$

where $A_j = g_j^* + w^* + x^*$. Substituting the previous expression in (7), we get

$$\pi_j = \frac{\delta_{CB}\gamma\left(2\delta_{CB}+1\right)}{\delta_j+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\left(A_j+\pi^e-\varepsilon\right). \tag{9}$$

Using the previous formula in the expression for π^e given by (1) and solving for π^e, we get

$$\pi^e = \frac{\gamma\left(2\delta_{CB}+1\right)\delta_{CB}\left(\frac{P}{\delta_L+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}A_L+\frac{1-P}{\delta_R+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}A_R\right)}{1-\gamma\left(2\delta_{CB}+1\right)\delta_{CB}\left(\frac{P}{\delta_L+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}+\frac{1-P}{\delta_R+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\right)}. \tag{10}$$

Substituting this expression into (9), for $j = L, R$, and after some algebra we obtain the desired expressions of the inflation rates. Finally, the expressions of outputs and public spending directly follow from the *f.o.c.* of the optimisation problem of the government and the central bank. ■

Proof of Proposition 1. Taking expectations in the expressions obtained in Proposition A1, it follows that

$$E(\pi_L) = \frac{\delta_{CB}(2\delta_{CB}+1)\gamma\left(\left(\delta_R+\gamma+3\gamma\delta_{CB}+\delta_{CB}^2(2\gamma+1)\right)A_L+\delta_{CB}\gamma(2\delta_{CB}+1)A^e\right)}{\Delta},$$

$$E(\pi_R) = \frac{\delta_{CB}(2\delta_{CB}+1)\gamma\left(\left(\delta_L+\gamma+3\gamma\delta_{CB}+\delta_{CB}^2(2\gamma+1)\right)A_R+\delta_{CB}\gamma(2\delta_{CB}+1)A^e\right)}{\Delta},$$

$$E(x_L) = x^* - \frac{1}{\delta_{CB}}E(\pi_L),$$

$$E(x_R) = x^* - \frac{1}{\delta_{CB}}E(\pi_R),$$

$$E(g_L) = g_L^* - \frac{\delta_L+\delta_{CB}^2}{\delta_{CB}\gamma(2\delta_{CB}+1)}E(\pi_L) \text{ and}$$

$$E(g_R) = g_R^* - \frac{\delta_R+\delta_{CB}^2}{\delta_{CB}\gamma(2\delta_{CB}+1)}E(\pi_R).$$

Hence,

$$E(\pi_L)-E(\pi_R) = \delta_{CB}\gamma(2\delta_{CB}+1)\frac{\left(\gamma+\delta_L+3\gamma\delta_{CB}+2\gamma\delta_{CB}^2+\delta_{CB}^2\right)(A_L-A_R)-A_L(\delta_L-\delta_R)}{\Delta},$$

$$E(x_L)-E(x_R) = \frac{1}{\delta_{CB}}\left(E(\pi_R)-E(\pi_L)\right) \text{ and}$$

$$E(g_L)-E(g_R) = \frac{\gamma(2\delta_{CB}+1)^2\left(\left(\gamma+\delta_L+3\gamma\delta_{CB}+2\gamma\delta_{CB}^2+\delta_{CB}^2\right)(A_L-A_R)-A_L(\delta_L-\delta_R)\right)}{\Delta}.$$

Using these expressions, and taking into account that $A_L - A_R = g_L^* - g_R^*$, we conclude that, provided that $g_L^* - g_R^*$ is high enough, $E(\pi_L) > E(\pi_R)$, $E(x_L) < E(x_R)$, and $E(g_L) > E(g_R)$. ■

Proof of Proposition 2. Using Proposition A1, it follows that

$$\frac{\partial}{\partial g_R^*}\pi_j > 0,\ \frac{\partial}{\partial g_R^*}x_j < 0,\ j = L, R,\ \frac{\partial}{\partial g_R^*}g_L < 0, \text{ and } \frac{\partial}{\partial g_R^*}g_R > 0. \quad ■$$

Proof of Proposition 3. From Ferré and Manzano (2020), we know that if z is a random variable such that, conditional on the realisation of the shock, takes two possible values given by $z_L = E(z_L) + F_L\varepsilon$ and $z_R = E(z_R) + F_R\varepsilon$, then

$$var(z) = P(1-P)\left(E(z_L)-E(z_R)\right)^2 + \left(P(F_L)^2+(1-P)(F_R)^2\right)\sigma_\varepsilon^2.$$

Using Proposition A1, it follows that

$$var(\pi) = P(1-P)\left(\delta_{CB}\gamma(2\delta_{CB}+1)\frac{(A_L-A_R)\left(\gamma+\delta_L+3\gamma\delta_{CB}+2\gamma\delta_{CB}^2+\delta_{CB}^2\right)-A_L(\delta_L-\delta_R)}{\Delta}\right)^2 +$$
$$\left(P\left(\frac{\delta_{CB}(2\delta_{CB}+1)\gamma}{\delta_L+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\right)^2+(1-P)\left(\frac{\delta_{CB}(2\delta_{CB}+1)\gamma}{\delta_R+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\right)^2\right)\sigma_\varepsilon^2,$$

$$var(x) = \frac{E(\pi^2)}{\delta_{CB}^2}, \text{ and}$$

$$var(g) = P(1-P)\left(\gamma(2\delta_{CB}+1)^2\frac{(A_L-A_R)\left(\gamma+\delta_L+3\gamma\delta_{CB}+2\gamma\delta_{CB}^2+\delta_{CB}^2\right)-A_L(\delta_L-\delta_R)}{\Delta}\right)^2 +$$
$$\left(P\left(\frac{\delta_L+\delta_{CB}^2}{\delta_L+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\right)^2+(1-P)\left(\frac{\delta_R+\delta_{CB}^2}{\delta_R+\gamma+4\gamma\delta_{CB}+(4\gamma+1)\delta_{CB}^2}\right)^2\right)\sigma_\varepsilon^2.$$

Given that $A_L - A_R = g_L^* - g_R^*$, differentiating the previous expressions, it follows that $\frac{\partial}{\partial g_R^*}var(\pi) < 0$, $\frac{\partial}{\partial g_R^*}var(x) < 0$, and $\frac{\partial}{\partial g_R^*}var(g) < 0$ if and only if $g_L^* - g_R^* > \frac{A_L(\delta_L-\delta_R)}{\gamma+\delta_L+3\gamma\delta_{CB}+2\gamma\delta_{CB}^2+\delta_{CB}^2}$. ■

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