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Fiscal Spillovers of Dutch Policy in the Eurozone:

VAR and Local Projections Approach

Master's Thesis

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Abstract

Recent discussion about fiscal policy coordination in the eurozone has led to renewed academic interest in the size and significance of fiscal spillovers in the European Monetary Union (EMU). Continuous macroeconomic imbalances between EMU member countries have encouraged conversations about the role of member countries with ample fiscal space in mitigating these imbalances with respect to member countries with insufficient fiscal space. Coordinated national fiscal policies could substitute the common interest rate mechanism, which is constrained by the effective lower bound. To assess the usefulness of such joint fiscal policies at the EMU level, this thesis builds on previous empirical research that analyses fiscal spillovers between the largest eurozone economies, extending this work by including the Netherlands. The results show that increased government spending of the Netherlands by one euro leads to a substantial boost in foreign economic activity via output and export effects over time. Dutch output is negatively affected to a large extent by a simultaneous government spending shock of one euro in the other countries. In the long run, Dutch exports are positively affected by this aggregate spending shock.

Keywords:

Macroeconomic imbalances, fiscal policy, fiscal spillovers, the Netherlands, eurozone, vector autoregressions, local projections.

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1. Introduction

When considering the development over time of national government budgets, public debt levels, current accounts and competitiveness levels, the member countries of the European Monetary Union (EMU) can be divided into two groups. First, many northern member countries have overall competitive economies with regards to the rest of the currency union. These countries, like the Netherlands and Germany, see stable productivity levels, as well as a combination of budgetary surpluses, current account surpluses and relatively low government debt levels, and thus room for fiscal expansion. Southern Europe, on the other hand, features less competitive economies with low productivity, (large) budget deficits, current account deficits and more substantial public debt levels. Countries included in the latter group, which implicitly have more limited fiscal space, are Italy, Spain, and France.

Heterogeneous fiscal positions of euro area countries coexist with the absence of an area-wide fiscal authority or central fiscal capacity. This has linked the desire of the European Commission (EC) to mitigate the contemporaneous macroeconomic imbalances across member countries to recent discussions about an "aggregate fiscal stance" in the EMU. Consecutively, the EC has formulated proposals to coordinate national fiscal policies in the euro area to enhance area-wide macroeconomic stability.[1] Following this current discussion, questions about the size of fiscal spillovers in the eurozone have surfaced. More specifically, increased area-wide focus lies on fine-tuning national fiscal policies of countries with ample fiscal space. As the common EMU monetary policy is increasingly limited by the effective lower bound while many member countries face high government debt burdens, alternative measures are sought by the EC to improve macroeconomic balance across the euro area. Increased government spending in member countries with fiscal space could stimulate economic activity and hence compensate for potential budgetary consolidation and current account deficits in member countries with limited fiscal space. Countries with fiscal space could hence contribute in mitigating the macroeconomic imbalances in the EMU through fiscal expansions, filling the gap of lacking macroeconomic stabilization tools in the targeted countries.[2] The usefulness of such joint fiscal policies can be assessed when the effects of fiscal policy changes implemented by one EMU country on other member economies are known.

Previous literature has found non-negligible estimates of cross-border fiscal spillovers in the eurozone. Beetsma et al. (2006) conduct a panel vector autoregression (PVAR) model on

[1] See European Commission (2016), EPSC (2016) and Bańkowski & Ferdinandusse (2017).
[2] See Georgiadis & Hollmayr (2016).

eleven EU countries over the period of 1965-2004 and find substantially positive international output spillovers from an individual fiscal expansion. The findings of Beetsma and Giuliodori (2011), who have also executed a PVAR model but for a different sample of fourteen EU countries over the period 1970-2004, are similar to those of Beetsma et al. (2006). Moreover, both papers use yearly data and suggest that these spillovers mainly emerge via trade. One caveat of this suggestive statement, however, is that the authors have relied on a 'partial' approach in which they have ignored the spillover channel of the common monetary policy interest rate (Beetsma et al., 2006). Dabla-Norris et al. (2017), on the other hand, investigate a more complete set of fiscal spillover channels. Based on a PVAR model on ten euro area countries using quarterly data over 1999-2016, the authors find significant and positive cross-border spillovers from fiscal expansions. Their results further highlight the important role of trade and the current account in the transmission of these fiscal spillovers (Dabla-Norris et al., 2017).

The trade channel, as well as the interest rate channel, are further investigated by Alloza et al. (2019) in addition to their benchmark analysis on fiscal spillovers. Over the period 1980Q1-2016Q4, the authors have executed a combination of a structural VAR (SVAR) model and a local projections method as developed by Jordà (2005). The SVAR model is used to identify government expenditure shocks in Germany, France, Italy, and Spain. The local projections model then quantifies the spillover effects of these shocks on each other's economic activity. The local projections approach used by Alloza et al. (2019) has two advantages compared to the VAR model. First, the local projections method is rather simple to implement and it is more resilient to misspecifications. Second, the local projections approach allows for a convenient and transparent computation of the spillovers in terms of cumulative multipliers. An explanation of these multipliers follows later in this thesis. The construction of the cumulative multipliers is not dependent on the use of sample averages and hence does not have the potential of being misleading when the sample means of output and government spending substantially differ over time (Alloza et al., 2019; Ramey, 2016; Ramey & Zubairy, 2018; Fieldhouse et al., 2018). Alloza et al. (2019) find significant and overall non-negligible fiscal spillovers between the four largest euro area economies.

Based on this empirical approach of Alloza et al. (2019), I quantify the spillover effects of Dutch fiscal policy on other EMU member countries, as well as the impact of foreign fiscal policies on Dutch economic activity. Specifically, this paper aims at answering the question: What is the size of the spillover effects of fiscal expansions implemented by the Netherlands, an EMU member country with ample fiscal space, on other EMU members with more limited

fiscal space?[3] In this respect, the study of Alloza et al. (2019) is partly replicated and expanded by including the Netherlands in the empirical analysis. Fiscal expansions are measured by government spending increases and economic activity is mainly determined by real gross domestic product (GDP). Aside from the bilateral cross-border spillovers, the analysis also provides a byproduct in the form of estimated domestic fiscal multipliers, which encompass the dynamic effects of national fiscal policy shocks on the undertaking country itself. Furthermore, two types of aggregate fiscal spillovers are estimated: spillovers by destination and spillovers by origin. The first spillover type reports the effect of simultaneous government expenditure increases implemented by the observed EMU member countries on a certain receiving member country. Spillovers by origin determine the extent to which an individual country can impact economic activity of the other countries through an exogenous government spending shock. The empirical analysis further expands the benchmark analysis on the output effects by estimating the spillover effects of an expenditure shock via trade, i.e. the shock's impact on real imports and exports.

The first main finding is that the bilateral spillovers from a government spending shock of one standard deviation both originating from and received by the Netherlands are economically small and not statistically significant. The lacking statistical significance applies to all discussed results, which implies that interpreting the results by means of economic intuition is of no real added value in this paper. This could be linked to the missing data for the Netherlands over 1980Q1-1998Q4, which could not be constructed within the time scope of this thesis. Future research could improve the preciseness of the discussed results by appropriately constructing this Dutch historical data. The second main finding concerns the positive aggregate output spillovers from government spending of the Netherlands. For example, three years after a one-euro government spending increase in the Netherlands, aggregate GDP of the other euro area countries rises by 1.52 euros. Moreover, the spillovers via from a Dutch fiscal expansion on foreign economic activity are positive as well. Three years after the initial one-euro expenditure increase in the Netherlands, the aggregate exports of remaining EMU countries have substantially increased with 1.42 euros.

In addition, the impact of foreign expenditure shocks in Dutch economic activity are assessed. Spillovers from a simultaneous one-euro shock in the other euro area countries received by the Netherlands are estimated to be negative. Lastly, the estimated trade spillovers suggest that a simultaneous one-euro government spending shock occurring in the other

[3] The resulting views formulated in this thesis belong to the author and do not necessarily reflect those of the Ministry of Finance of The Netherlands, hence they should not be reported as such.

countries positively affects Dutch exports by up to 0.79 euros. These non-negligible spillover effects via export levels highlight the importance of the trade channel in determining the size and sign of cross-border fiscal policy effects.

The remaining part of this thesis is structured as follows. Section 2 provides a literature review on fiscal spillovers in the euro area and their main transmission channels. Section 3 discusses the collected data, for which this thesis has relied on the quarterly historical fiscal dataset created and shared by Alloza et al. (2019). Next, section 4 explains the methodologies used to identify the government spending shocks and to estimate the spillover effects of these shocks on output and via trade. Section 5 replicates the pair-wise cumulative multipliers reported by Alloza et al. (2019) and discusses the spillover results of the Netherlands, while section 6 concludes. Accompanying figures and tables are included in the Appendix.

2. Literature review

This thesis is focuses on output spillovers generated by government spending shocks, along the lines of Alloza et al. (2019). Such fiscal spillovers can emerge via four key channels: the trade channel, the interest rate channel, the real effective exchange rate or relative price channel and the channel of the fiscal theory of the price level. The size, sign, and overall importance of the first channel is empirically assessed in section 5.2. Because of time constraints, empirical investigation based on Alloza et al. (2019) of the interest rate channel of spillovers for the Netherlands is open for future research. In addition, the other spillover channels could not be empirically considered within the scope of this thesis. However, a broad overview of the transmission mechanisms of fiscal spillovers is key for understanding the dynamics of these spillovers in order to interpret the results and to improve the presented research in the future.

A first note should be placed on the fiscal multiplier, which measures the impact of increased government expenditures in country j on output in country i. When a government decides to spend more on collective or public goods, households' wages can increase because of increased demand for and production of these collective products. Hence households' disposable income rises, which means they have increased consumption opportunities, leading to rising domestic output levels and prices. In case (part of) the publicly purchased goods and services are produced abroad, resulting rising imports will directly boost foreign economic activity. Similarly, if (part of) the increased household consumption is targeted at imported products, foreign economic activity will experience a boost due to the domestic public expenditure shock that causes rising production, output, investment, and consumption levels in

the receiving country. This output effect hence spills over across borders when the consumption of domestic households and/or public purchases are (partly) oriented towards imported foreign goods and services (Bénassy-Quéré, 2006; Clancy et al., 2016).

This trade channel through which the economic effects of a fiscal expansion can spill over to non-implementing countries depends on the import content of the increased domestic consumption, i.e. on the home bias of consumption. Suppose the increased consumption resulting from a fiscal expansion would be solely focused on domestically produced goods and services, i.e. if domestic consumption would have a strong home bias. The spillover effect via trade on foreign production, output and consumption will then be much smaller, because the expansionary effects are not significantly felt by the other country due to a low degree of trade openness in the implementing country. (Cook & Devereux, 2018). Significant home bias can coincide with inelastic trade prices: when domestic prices rise after increased government expenditures, consumers will not easily shift away from domestic to foreign goods and services. International spillovers from a domestic fiscal expansion are hence weaker if the trade price elasticity is low (Corsetti & Müller, 2013).

The positive fiscal spillovers via the trade channel can be outweighed by the negative spillovers via the interest rate channel. Rising government expenditures are mostly financed with a higher level of public debt. This debt rise leads to an increased interest rate on government bonds. Increased public debt levels demand higher levels of debt financing via loans taken on by the government, which is translated to higher bond prices. Increased bond prices lead to larger borrowing costs for private agents, crowding out private investments (Clancy et al., 2016). Empirical estimation of this interest rate channel is conducted by Alloza et al. (2019), the study on which this paper is based, by taking the euro-area-wide short-term interest rate as dependent variable in the analysis, which is described in section 4. Their results suggest that a government spending shock in the observed countries significantly affects the area-wide interest rate in a positive way, except for France where these effects are not significant from zero. For example, two years after the German implementation of the expenditure increase by one percent of GDP, the area-wide interest rate is estimated to increase by approximately 0.25 percentage points (Alloza et al., 2019).

In addition, negative spillovers can emerge via the real effective exchange rate or relative price channel, as a counterweight to the trade spillovers. According to Bénassy-Quéré (2006), differences in relative prices between member countries in a currency union have an ambiguous effect on the output response to a fiscal shock. Rising relative prices in country j due to increased government expenditures could lead to a shrinking domestic competitiveness position

regarding international trade. Hence this fiscal shock in country j could positively affect the economic activity and trade position of country i. This situation can be associated with a high level of the previously discussed trade price elasticity. Households in country j relatively easily substitute their consumption away from domestic to foreign products as the latter are cheaper. On the other hand, if prices increase more in country j compared to country i, then the real interest rate in country j is relatively lower. This is because in a monetary union, the nominal interest rates in both countries are the same. A lower real interest rate in country j leads to increased attractiveness of the private investment and consumption climate in this country due to lower borrowing costs. Consequently, investments in country i are potentially crowded out, assuming that initially the borrowing costs in this country remain unchanged (Bénassy-Quéré, 2006).

In the broader context of the monetary union, a final fiscal spillover channel of importance is the fiscal theory of the price level. According to Bergin (2000), this fiscal theory implies that the common price level in a currency union is set by the urge to transform nominal household wealth into real values in a manner consistent with equilibrium. In a monetary union, like the euro area, multiple conditions that pin down the equilibrium price level are present, i.e. multiple household budget constraints need to be satisfied to reach this price level. On top of this, there is no direct coherence between the government and household budget constraints in each member country of the union. Nevertheless, the national government budget constraints can still jointly determine the equilibrium price level. Because of this, an individual rise in debt-financed government expenditures, without future backing or compensation by higher public taxes, is found to generate increase the common price level of the entire currency union (Bergin, 2000). An individual public expenditure increase can then result in a worsened competitiveness position of the whole euro area vis-à-vis the global market, depending on price developments in countries outside of the euro area.

3. Data description

Before describing the dataset of Alloza et al. (2019) used in this analysis, some background is provided on the construction of this database by the authors. First of all, Alloza et al. (2019) argue that an appropriate identification of the government spending shocks is grounded on time variation that is only featured in fiscal datasets of long time duration.[4] Furthermore, the analysis

[4] See also Cimadomo & Bénassy-Quéré (2012), who have found evidence for time variation in the government spending multipliers of the United Kingdom, the United States and Germany.

should account for the impact of potential heterogeneity between the country causing the fiscal shock and the country facing the shock on the fiscal spillover transmission (Alloza et al., 2019). The quarterly dataset of fiscal variables constructed by Alloza et al. (2019) controls for these two essential aspects. Firstly because of the detailed character of the data, allowing for the usage of an identification approach grounded on a specific definition of tax revenues and public expenditures.[5] The second reason is its consistency with official European statistics, which allows for comparisons across EMU member countries (Alloza et al., 2019).

The most recent version of their dataset, which is used throughout the analysis, contains fiscal variables for Germany, France, Spain, and Italy over the period 1980Q1-2018Q4. Alloza et al. (2019) have structured the fiscal variables in their dataset as described in Table 1 and they have formulated the following definitions these variables. Total revenue (TOR) encompasses the total earnings or proceeds of the general government. Direct taxes (DTX) are defined as the receivable current taxes on wealth and income, amongst others. Social security contributions (SCT) are the net social contributions, receivable. Indirect taxes (TIN) are the receivable taxes on production and import. Total expenditure (TOE) is defined as the total general government expenditure. Social payments (THN) are measured as the payable social benefits aside from transfers in kind. Compensation of employees (COE) is the payable compensation of employees. Subsidies (SIN) are defined as the payable subsidies. Government investment (GIN) is defined as the sum of gross capital formation and the acquisitions minus disposals of non-financial non-produced assets. Lastly, the interest payments (INP) are measured by the payable interest (Alloza et al., 2019).

This thesis uses the definitions of public expenditures and tax revenues as formulated by Alloza et al. (2019): government spending is determined by government investment (GIN) plus government consumption (GCN). Net tax revenues are measured by the total revenues (TOR) less total transfers. The total transfers, in turn, are calculated as the sum of subsidies (SIN) and social payments (THN). Other expenditure and revenues are defined as the residual of the total revenues and expenditure after subtraction of the specified revenue and expenditure components (Alloza et al., 2019).

The main data source used by Alloza et al. (2019) is the quarterly non-financial accounts for general government, which is part of the ESA2010 database of Eurostat. When available, this data is extended backwards by the growth rates of the variables as reported in the quarterly non-financial accounts for general government of the ESA1995 database. In case this data is

[5] See Blanchard & Perotti (2002).

not available, Alloza et al. (2019) have constructed indicators based on the unobserved components model (UCM) methodology formulated by Paredes et al. (2014). To create these indicators, Alloza et al. (2019) have relied on various data sources like the OECD, the Bank of International Settlements (BIS) and national statistical accounts. Appendix A of Alloza et al. (2019) contains detailed lists of data sources used to collect all variables for each country and to construct the dataset of Alloza et al. (2019) used in this thesis.

Because of time constraints, this analysis does not implement the methodology of Paredes et al. (2014) to extend the Dutch data backwards until 1980Q1. Hence this thesis is grounded on Dutch data over the period 1999Q1-2018Q4, while remaining the original data sample for the other four euro area countries over 1980Q1-2018Q4. Construction of the Dutch historical dataset is of significant added value for future research on fiscal spillovers in the euro area involving the Netherlands, because for this country the analysis cannot rely (yet) on the time variation of long fiscal time series.

Fiscal variables for the Netherlands over 1999Q1-2018Q4 are collected and added to the dataset based on the existing structure of the variables as reported in Table 1 of Alloza et al. (2019), as well as on their variable definitions. Statistics Netherlands (2020a; 2020b) has gathered and stored data on all mentioned fiscal variables from 1999Q1 onwards based on the ESA2010 specifications of the mentioned fiscal variables, which are identical to the definitions of Alloza et al. (2019).

Additional non-fiscal variables involved in this research are output, exports, imports, the output deflator and the 10-year interest rate. The first three variables are denoted in real terms (Alloza et al., 2019). For the original set of countries, this research uses the dataset of these other variables over 1980Q1-2015Q4 as constructed by Alloza et al. (2019). The authors have mainly relied on OECD and Eurostat data to collect information on these additional variables. Appendix A in Alloza et al. (2019) provides more detailed information on the specific data sources of all non-fiscal variables for the original set of countries. To update the set of other variables for these countries, data on all these variables are collected from Eurostat (2020a). For the Netherlands, nominal GDP and the output deflator are obtained via Statistics Netherlands (2020c). Data for real and nominal GDP are available from 1999Q1 onwards and the output deflator was calculated based on this data.[6] Nominal imports and exports over 1999Q1-2018Q4 are retrieved from Statistics Netherlands (2017) and converted into real values

[6] Note that, despite recent developments in shifting the base year of price indices from 2010 to 2015, the base year of the GDP deflator is kept at 2010 for the purpose of replicating Alloza et al. (2019) and considering the shared dataset by dr. Alloza observing the other countries.

using the output deflator. The 10-year interest rate on Dutch government bonds over the same period is obtained via Eurostat (2020b). Nominal variables are turned into real variables by means of the GDP deflator. In line with Alloza et al., (2019), all observations except the long-term interest rate are seasonally adjusted.

4. Methodology

In this section, the vector autoregressive methodology used to identify government spending shocks is explained first. The local projections approach developed by Jordà (2005) and used by Alloza et al. (2019) to estimate the impact of these expenditure shocks on the economic activity of other eurozone countries is described next. Special attention in measuring the spillovers as described in section 4.1 is devoted to estimating the bilateral and aggregate fiscal spillovers originating from and received by the Netherlands. Moreover, the benchmark analysis is extended by focusing on fiscal spillover effects via the trade channel in section 4.2.

4.1 Identification of government spending shocks

To obtain the government spending shocks, a structural vector autoregression (SVAR) model is used. For each observed country, the following VAR is separately estimated:

$$x_t = B_L(L)x_{t-1} + e_t \tag{1}$$

where $x_t = [tr_t, g_t, y_t, p_t, r_t]'$ is a vector encompassing the natural logarithms of real net tax revenues (tr_t), government expenditures (g_t), gross domestic product (y_t), the output deflator (p_t) and the level of 10-year rate on government bonds (r_t). $B(L) = (I - B_1L - B_2L^2 \dots B_pL^p)$ is a lag polynomial of order p = 4. Inclusion of four lags is essentially done because this research relies on quarterly data. Eq. (1) further includes a quadratic trend and a constant, which are disregarded here for clarity purposes. The vector of residuals e_t is assumed to contain a linear combination of structural residuals or shocks:

$$A_0 e_t = C\varepsilon_t \tag{2}$$

where A_0 and C are coexisting and concurrent impact matrices that outline the residuals of the VAR(4) model in reduced form into structural errors or shocks ε_t (Alloza et al., 2019).

To obtain the structural government spending shocks, certain assumptions and restrictions are required. For an understanding of these assumptions, consider the second equation of the system in Eq. (2):

$$e_t^G = \alpha_{g,y}e_t^Y + \alpha_{g,p}e_t^P + \alpha_{g,r}e_t^R + \beta_{g,t}\varepsilon_t^T + \varepsilon_t^G \tag{3}$$

In line with Blanchard and Perotti (2002) and following Alloza et al. (2019), the key identifying assumption is that fiscal policy implementation in response to economic development does not occur within the same quarter. The utilization of quarterly data thus eradicates the prospect of contemporaneous ad hoc responses and the α coefficients in Eq. (3) only illustrate the automatic reaction of public expenditures to the other indicators (Alloza et al., 2019). In line with Alloza et al. (2019) and following Perotti (2005), the output elasticity of government spending ($\alpha_{g,y}$) is restricted to 0, the price elasticity of government spending ($\alpha_{g,p}$) is assumed to be –0.5 and the interest rate elasticity of government spending ($\alpha_{g,r}$) is assumed to be 0 (Perotti, 2005; Alloza et al., 2019). Alloza et al. (2019) further mention that Cléaud et al. (2014) report France as an exception where the price elasticity of government spending ($\alpha_{g,p}$) is assumed to be 0 rather than –0.5 (Cléaud et al., 2014; Alloza et al., 2019).

Following Blanchard and Perotti (2002), the cyclically adjusted government expenditure shocks can be constructed as follows:

$$e_t^{G,CA} = e_t^G - \left(\alpha_{g,y} e_t^Y + \alpha_{g,p} e_t^P + \alpha_{g,r} e_t^R\right) = \beta_{g,t} \varepsilon_t^T + \varepsilon_t^G \quad (4)$$

The restriction of $\beta_{g,t} = 0$ is finally imposed to distinguish government spending shocks from net tax revenues shocks (Alloza et al., 2019; Blanchard & Perotti, 2002).

As Alloza et al. (2019) point out, this set of restrictions allows for the identification and estimation of the individual structural shocks to government expenditures, ε_t^G, for the Netherlands, Germany, Italy, France, and Spain. Alloza et al. (2019) further note that the benchmark impulse responses to the structural expenditure shocks calculated in section 5 are not grounded on the VAR model as formulated in Eq. (1). Instead, these responses are computed by means of a local projections model. Hence, it is not necessary to estimate more coefficients of the contemporaneous-response matrix A in Eq. (2). In case of computing the impulse responses based on the moving average specification of Eq. (1), Alloza et al. (2019) argue that the key elements in matrix A could be obtained by instrumentalizing ε_t^T and ε_t^G for e_t^T and e_t^G in the other formulas in Eq. (2).[7] As this thesis focuses on the local projections approach as explained by section 4.2, this paper will not delve into obtaining the matrix elements through the described VAR model.

Finally, Alloza et al. (2019) importantly mention that variables from other countries are not explicitly involved in the identification of a structural shock ε_t^G. This approach is implicitly based on assuming that Eq. (1) encompasses ample details on a country's economic

[7] See Blanchard & Perotti (2002) and Perotti (2005) for more details on this instrumentalization.

environment to determine the structural shocks in Eq. (2). When estimating the spillover effect of a fiscal shock in country i, this assumption is relaxed by taking fiscal shocks in countries j ≠ i into account (Alloza et al., 2019). Moreover, the covariance matrix of the country-specific government spending shocks ε_t^G is close to diagonal, thus the obtained shocks are uncorrelated and hence Eqs. (1)-(3) formulate a decent way to identify the structural government spending shocks. In the covariance matrix, which combines the structural shocks ε_t^G obtained via the country-specific VAR models, all non-diagonal values approach zero and hence the bilateral correlations are not significant.

4.2 Estimation of fiscal spillovers

This subsection discusses the method used to estimate the cross-border output effects of the identified structural government spending shocks, which are referred to as fiscal spillovers. As a byproduct, this method further estimates the effects of such spending shocks on the domestic economy, which will be referred to as the domestic government spending multipliers. In addition, two statistics are proposed that are able to quantify the size of aggregate fiscal spillover effects in the eurozone by country of destination and by origin.

To estimate the economic effects of public expenditure shocks, impulse response functions are computed in line with Alloza et al. (2019) based on the local projections method of Jordà (2005). Compared to the impulse response functions resulting from the moving average representation in Eq. (1), Alloza et al. (2019) report some key advantages of the local projections approach. First, this method is rather simple to implement and it is more resilient to misspecifications. The latter is because the local projection method addresses the problem of horizon-specific VAR specification errors in case the moving average representation does not appropriately capture the data-generating process (Alloza et al., 2019; Ramey, 2016). Second, the local projections approach allows for a convenient and transparent computation of the spillovers in terms of cumulative multipliers, an explanation of which follows later in this subsection. The construction of the cumulative multipliers is not dependent on the use of sample averages and hence does not have the potential of being misleading when the sample means of output and government spending substantially differ over time (Alloza et al., 2019; Ramey & Zubairy, 2018; Fieldhouse et al., 2018). Aside from the discussed advantages, however, Alloza et al. (2019) also mentions a downside of the local projections method. This approach results in a relatively inefficient estimate of the impulse responses, compared to the responses generated by an inversed moving-average VAR representation (Alloza et al., 2019).

The degree to which the considered EMU member countries (the Netherlands, Germany, France, Italy, and Spain) economically profit from a change in fiscal policy implemented by each one of the other countries is estimated first. Specifically, this part of the analysis replicates Alloza et al. (2019) by formulating a system of country-specific equations based Owyang et al. (2013) and Ramey and Zubairy (2018). The effect of increased government spending in country j on the real GDP in country i is generated by executing these equations over the horizon h for all country combinations (i, j) separately:

$$\frac{y_{i,t+h} - y_{i,t-1}}{y_{i,t-1}} = \alpha_{i,h} + \beta_{i,j,h} \frac{shock_{j,t}}{y_{i,t-1}} + \delta_{i,h}(L)x_{i,t-1} + \xi_{i,t+h} \quad (5)$$

$$\frac{g_{j,t+h} - g_{j,t-1}}{y_{i,t-1}} = \lambda_{i,h} + \gamma_{i,j,h} \frac{shock_{j,t}}{y_{i,t-1}} + \rho_{i,h}(L)x_{j,t-1} + \zeta_{i,t+h} \quad (6)$$

where y and g are variables of real output and real government expenditures and $shock_{j,t}$ is defined by the structural government spending shock ε_t^G, as obtained in Eq. (4) for country j (Alloza et al., 2019). Scaling by real lagged output is done in both equations to ensure that all variables are measured in the same units. In addition, the independent shock variables are standardized such that these resulting variables have a standard deviation equal to one:

$$\left(\frac{shock_{j,t}}{y_{i,t-1}}\right)^{new} = \frac{\left(\frac{shock_{j,t}}{y_{i,t-1}}\right)^{old}}{st.dev.\left(\frac{shock_{j,t}}{y_{i,t-1}}\right)^{old}} \quad (7)$$

where the denominator measures the standard deviation of the initial shock variable. In addition, the shock variables as a whole are numerically scaled down by 100 (i.e. they are divided by 100) in order to approach sensible scaling of the cumulative multipliers as specified below in Eq. (8). The variable $x_{i,t-1}$ further encompasses country-specific controls for i which also include structural government spending shocks at time t originating from the other countries i ≠ j. Involved in the control variable x_{t-1} are the level of the debt-to-GDP ratio and the interest rate, and the natural logarithms of real government spending, net tax revenues and output. Alloza et al. (2019) note that in Eq. (6), by definition, the inclusion of additional controls for country j is not of key importance, because the variable $shock_{j,t}$ already covers the control information. However, these control variables for country j are still included because of the possibility that the coefficient $\rho_{i,h}$ is not exactly equal to zero due to the presence of the $y_{i,t-1}$ term on the left-hand side of Eq. (6) (Alloza et al., 2019). Both this coefficient $\rho_{i,h}(L)$ and the term $\delta_{i,h}(L)$ in Eq. (5) are polynomials in the lag operator of order four, because the analysis uses quarterly data. The standard errors are Newey-West (HAC) corrected given that the

residuals $\xi_{i,t}$ of the local projections model are serially correlated, due to the iterative nature of this method.

To estimate the spillover effects of an initial government expenditure increase of one euro by country j on the GDP of country i, international cumulative multipliers are calculated. Current standard practices regarding this statistic, as introduced by Mountford and Uhlig (2009), are advantageous since the cumulative multiplier approach accounts for successive government spending increases after the original one-euro expenditure shock. A second note should be placed on the calculation of this multiplier, for which the impulse responses need not be rescaled by the sample average of the government expenditure to GDP ratio. Eqs. (5) and (6) already effectively rescale these responses for every period t (Alloza et al., 2019).[8] Concretely, and following Alloza et al. (2019), the multiplier of an increase in public spending in country j on country i's output h quarters after the policy implementation ($M_{i,j,h}$) is calculated as the cumulated output coefficients from Eq. (5) divided by the cumulative sum of the government spending coefficients from Eq. (6):

$$M_{i,j,h} = \frac{\sum_{r=0}^{h} \beta_{i,j,r}}{\sum_{r=0}^{h} \gamma_{i,j,r}} \tag{8}$$

For the estimation of aggregate fiscal spillovers in the EMU, two additional methods are used based on the resulting information from Eqs. (5) and (6). First, spillovers by destination (or $spillover_{i,h}^{D}$) are estimated to measure a country's economic benefits from concurrent public expenditure increases implemented by the other eurozone countries. Second, the size of the fiscal spillovers that each country is capable of generating through an individual rise in government spending is estimated by referring to the spillovers by origin (or $spillover_{j,h}^{O}$).

The degree to which real GDP of country i is affected by a simultaneous government spending shock originating from the other countries j ≠ i is measured by the spillover effect by destination. This aggregate fiscal spillover effect is computed as the summed total of the coefficients of the output equation divided by the summed total of the government equation coefficients:

$$spillover_{i,h}^{D} = \frac{\sum_{j \neq i} \sum_{r=0}^{h} \beta_{i,j,r}}{\sum_{j \neq i} \sum_{r=0}^{h} \gamma_{i,j,r}} = \sum_{j \neq i} M_{i,j,h} \frac{\Gamma_{i,j,h}}{\sum_{j \neq i} \Gamma_{i,j,h}} \tag{9}$$

where $M_{i,j,h}$ is the previously defined cumulative fiscal multiplier in Eq. (8) and $\Gamma_{i,j,h} = \sum_{r=0}^{h} \gamma_{i,j,r}$. These cross-country multipliers are weighted in Eq. (9) by the share of the size of the government spending increase in country j in the total government spending increases from

[8] See Owyang et al. (2013) for more details.

countries j ≠ i. The results from Eq. (9) likely present an upper bound, because $spillover^{D}_{i,h}$ is the response of country i to an initial concurrent one-euro spending increase in the rest of the observed countries. According to Alloza et al. (2019), the advantage of this spillover-by-destination approach, compared to previous empirical research, is that the abovementioned key equations only rely on some key identification restrictions when obtaining the fiscal shocks, rather than on elaborate assumptions.

The spillovers by origin, $spillover^{O}_{j,h}$, indicate the effects of an exogenous public expenditure shock from country j on the GDP of the other countries i ≠ j. In this case, the fiscal spillovers are averaged by output weights. This calculation is grounded on the output and government spending coefficients in Eqs. (5) and (6) as follows:

$$spillover^{O}_{j,h} = \sum_{i \neq j} \frac{\sum_{r=0}^{h} \beta_{i,j,r}}{\sum_{r=0}^{h} \gamma_{i,j,r}} w_j = \sum_{i \neq j} M_{i,j,h}\, w_j \qquad (10)$$

where $w_j = \frac{y_j}{\sum_{i \neq j} y_i}$ reports the output weights. Intuitively, $spillover^{O}_{j,h}$ reports an average effect of the expenditure shock originating from country j on the rest of the countries i ≠ j, and the effect weights are measured by the relative size of the receiving economy (Alloza et al., 2019).

5. Results

First, this section attempts to replicate Table 3 of Alloza et al. (2019), which contains the pair-wise cumulative multipliers of country i's output response in euros two years or eight quarters after a one-euro increase in government spending implemented by country j. Next, this section covers the Dutch results on the estimated bilateral spillovers of an individual government spending shock and on the aggregate fiscal spillovers by destination and by origin. Further focus is placed on the estimated aggregate spillovers via trade for the Netherlands. Highlighting the results for the Netherlands is in line with the main academic contribution of this thesis as described earlier.

Note that future research is needed to improve the statistical preciseness of the presented results, because the estimates following Eqs. (8)-(10) are not based on regressions that contain coefficients of which significance levels are accessible. Further research is also needed to finalize the replication of Alloza et al. (2019) by estimating the output spillovers of government investment and consumption increases separately. Moreover, the interest rate channel of spillovers is yet to be quantified for the Netherlands by looking at the effect of government spending increases on the euro-area-wide interest rate.

5.1 Replication of Alloza et al. (2019)

For each pair of countries (i, j), cumulated government spending multipliers at eight quarters after the fiscal policy implementation are calculated by means of summarizing the output and expenditure coefficients of Eqs. (5) and (6) into Eq. (8). Alloza et al. (2019) have done this for Germany, Italy, France and Spain, and Table 2 merges these countries with the Netherlands. The diagonal values represent the domestic cumulative multipliers of government spending, while the off-diagonal multipliers report the bilateral fiscal spillovers. For replication purposes, this subsection discusses the results for Germany, France, Italy, and Spain, which are compared to earlier findings as formulated in Table 3 of Alloza et al. (2019).

In this context, discussion is needed about the definition of the independent shock variable in both Eq. (5) and (6). To scale the cumulated multipliers, the shock variable is initially specified by dividing this variable as reported in Eq. (7) by 100 in both Eqs. (5) and (6). Aside from this first specification, two additional definitions are considered for optimal scaling of the pair-wise cumulative spending multipliers. The second approach keeps the original specification of the shock variable in Eq. (6), while Eq. (5) is grounded on the unscaled shock variable, i.e. the variable is neither divided nor multiplied by 100. A third alternative is to scale up or multiply the shock variable in Eq. (5) by 100, while maintaining the initial shock variable definition for Eq. (6). The notes attached to Table 2 provide more details on the specification used for each pair-wise cumulative multiplier. Note that comparing the results in Table 2 with the findings of Alloza et al. (2019) reported in their Table 1 is only possible for the sign and size of the multipliers, since replication of the Newey-West corrected significance levels needs more time and attention beyond the scope of this thesis. Hence no vast conclusions can be derived from the resulting replication study.

Compared to the cumulative multipliers of Alloza et al. (2019), the German multipliers are found to be smaller. Only the replicated domestic cumulative multiplier of German government spending, i.e. the effect of a one-euro increase in German public expenditures on their own output, appears to be somewhat larger. The replicated German multipliers further suggest a downward revision, compared to Alloza et al. (2019), of the government expenditure effects originating from Germany on the economic activity of France and Spain. The impact on Italian output is only slightly more negative compared to Alloza et al. (2019): a German government spending increase of one euro results in a decrease of 0.06 euros of Italian output (instead of 0.04 euros) two years after the policy implementation.

French government spending shocks of one euro have a similar impact on German output after eight quarters, while the effects on economic activity of Italy and Spain are estimated to be lower. The replicated results even suggest that these expenditure shocks decrease Italian and Spanish output. The domestic cumulative multiplier of France also differs substantially, as a one-euro expenditure increase is estimated to decrease French output by 2.6 euros two years after the spending shock. As noted earlier, however, no clear insight can be given on the significance of these multipliers currently.

In case of Italy, all cumulative spending multipliers originating from this country are estimated to be lower compared to Alloza et al. (2019). Whereas the authors estimated that an Italian expenditure shock positively affects the economic activity of every other country after two years, the replicated results show that, for example, a one-euro rise in Italian government expenditures leads to a decrease in French output by 0.07 euros eight quarters after implementing the fiscal policy. The Italian domestic cumulative expenditure multiplier is found to be negative and far from unity in absolute terms, which does not correspond to the findings of Alloza et al. (2019).

Increasing Spanish public spending is found to have a nearly similar impact on Italian GDP compared to Table 3 of Alloza et al. (2019). The other cumulative multipliers originating from Spain are lower, as well as the Spanish domestic multiplier. For example, this analysis suggests that a one-euro spending increase in Spain leads to falling French output by 0.26 euros two years after the shock, while Alloza et al. (2019) estimated this effect to be positive and equal to 0.12 euros.

In sum, the replication of Table 3 as in Alloza et al. (2019) can be improved on two areas. First, the statistical significance of the estimated pair-wise cumulative multipliers could not be tested in this analysis because of time constraints. A second and final note should be placed on the size differences of the estimated multipliers compared to those reported by Alloza et al. (2019), which is likely associated with the uncertainty about the results' significance.

5.2 Fiscal spillovers in the euro area

Because the main contribution of this thesis is the inclusion of the Netherlands in the sketched research framework, this country is also included in Table 2. Two years after implementing an increase in Dutch public spending, the foreign output effects are overall found to be positive but economically small. A government expenditure shock in the Netherlands leads to an increase of 0.10 euros in German output after eight quarters. This same shock further leads to increased Dutch output by 1.37 euros, two years after occurrence. Dutch output is found

to receive larger and more various individual foreign spending spillovers compared to the bilateral output effects that a Dutch spending increase generates. An expenditure increase implemented by Spain is found to positively impact Dutch GDP by 0.36 euros, while a German spending shock of one euro appears to cause falling Dutch output by 0.35 euros.

Based on Eqs. (5) and (6), Fig. 1a-d report the local projections impulse responses of output in country i to a government spending shock in country j, where either one of these countries is the Netherlands. The left panel of each figure shows the percentage responses of either output in country i or Dutch government spending following a government spending increase of one standard deviation implemented by the Netherlands. The right panel illustrates the effects of an expenditure shock by one standard deviation in country i on both its own government spending and on Dutch output. Following section 4.2, all 68% and 95% confidence bands are calculated based on Newey-West corrected standard errors (Alloza et al., 2019).

Fig. 1a looks at the dynamics between government expenditure increases in the Netherlands and German output, and vice versa. The upper left graph shows that the impulse responses of German GDP to a Dutch fiscal expansion are positive, yet economically small. The lower left figure reports positive effects of the same shock to Dutch government spending over time. This effect increases over the short run and at four quarters after the spending rise, this expenditure effect peaks at 0.1 percent. Over the longer run, the spending responses remain positive but with some fluctuations; at three years after the shock, the expenditure response is approximately equal to 0.03 percent. German government spending shocks have small but slightly increasing positive effects on Dutch economic activity over the longer run, with the peak output effect occurring three years after the shock of one standard deviation equal to 0.004 percent.

The upper left panel of Fig. 1b reveals that over time a Dutch government spending shock negatively affects French output to a small extent: twelve quarters after the implementation of this expenditure increase, French output falls by 0.002 percent. Reversely, a government spending shock in France has the largest, yet still economically small, negative impact on Dutch GDP after seven quarters, when this shock of one standard deviation decreases output of the Netherlands by approximately 0.004 percent. The impulse responses of Dutch government expenditure to a domestic spending shock follow a similar pattern over the horizons compared to the lower left graph of Fig. 1a, but the peak positive response is slightly larger in Fig. 1b.

Fig. 1c illustrates fluctuating impulse responses of both Dutch and Italian output to foreign government expenditure rise, as well as varying sizes of these bilateral fiscal spillovers. The upper left panel shows that increased Dutch public expenditures negatively impact Italian GDP in the short and long run (three years after the policy implementation), while this output effect

is positive between four and ten quarters after the shock. Both the positive and negative peak responses to a spending shock of one standard deviation are limited to 0.002 percent. Italian government spending shocks are further found to impact Dutch output to a larger extent, with a peak positive impulse response at twelve quarters after the shock of one standard deviation amounting to approximately 0.25 percent. Dutch GDP is positively impacted by an Italian government spending increase at the first and sixth quarter after the policy implementation in Italy. At the third, ninth and tenth quarter after the shock, the output effect for the Netherlands is found to be (somewhat) negative. Dutch government spending features impulse responses that develop similarly over time compared to the previously discussed Figs., yet the peak positive spending spillover effect appears to be slightly larger.

In Fig. 1d, the dynamics between Spanish and Dutch fiscal policies and output are observed. The percentage response of Spanish GDP to a Dutch public expenditure shock of one standard deviation remains close to zero until seven quarters after the policy implementation. At nine quarters after the shock, Spanish output positively peaks at approximately 0.15 percent. At three years after the implementation, the impulse response drops to -0.05 percent. Output in the Netherlands is found to be increasingly positively affected over the short and medium term by a Spanish government spending shock. This output effect peaks at 0.3 percent and it does not remarkably change from six quarters after the shock onwards. Government spending impulse responses in the Netherlands to a domestic expenditure shock of one standard deviation again follow a similar pattern as in Fig. 1a-c, but now the positive spending response peaks at approximately 0.25 percent.

The government spending multipliers of the Netherlands on domestic output over the first three years are reported in Fig. 2. The output response on impact is substantially negative, while at three quarters after the domestic spending shock of one standard deviation the positive output effect peaks at over five euros approximately. Over the longer run, this multiplier remains positive at a value surrounding unity, which is in line with the Dutch cumulative multiplier after two years as reported in Table 2. Note that, unlike the previously discussed figures, the confidence bands of Fig. 2 are calculated in absence of the Newey-West correction. This has not been possible, because the domestic spending multipliers were calculated manually without regressions, implying that at the time of writing the Newey-West correction needs more time to be implemented separately.

Table 3 reports the government spending spillovers by destination and by origin of all observed euro area countries. The size of both spillover types is heterogeneous across countries, which confirms the findings of Alloza et al. (2019). The fiscal spillover multiplier by destination

is rather small for the Netherlands and over time this spending multiplier is negative. Two years after a simultaneous one-euro government spending increase in the other countries, Dutch output is found to fall by 1.37 euros. The Dutch fiscal spillover by origin is negative but close to zero on impact and is positive over the other considered horizons. After three years, the simultaneous foreign spending shock leads to an output increase in the Netherlands by 1.52 euros. As the multipliers could not be tested for significance, detailed explanation of these results is not appropriate here. In general, negative destination spillovers could indicate that one-euro expenditure increases implemented by other EMU countries lead to falling output in the receiving country. Positive spillovers by origin potentially suggest that one country is able to generate positive spillovers through an individual government spending shock on the economic activity of the other observed member countries.

Impulse responses of the fiscal spillovers by destination and by origin for the Netherlands are reported in the upper and lower panel of Fig. 3, respectively. Dutch output does not significantly respond to a simultaneous public spending shock of one standard deviation in the other EMU countries until three quarters after the implementation of the foreign fiscal policy. One year after the spending shock, output in the Netherlands falls by approximately 0.35 percent. Hereafter, the impulse responses increase and become positive, with the peak output effect occurring at two years after the foreign shock and amounting to 0.75 percent. Dutch output increases due to this foreign spending shock after three years by approximately 0.15 percent. Fiscal spillovers originating from a Dutch government spending shock on aggregate foreign output in the EMU are much smaller when looking at the impulse responses in the lower panel of Fig. 3. Three quarters after this expenditure shock of one standard deviation, foreign GDP rises by 0.04 percent, after which this positive effect falls back to 0.005 percent. Similar to Fig. 2 and for the same reasons as explained above, the confidence bands of Fig. 3 are not calculated by means of Newey-West corrected standard errors.

5.3 Exploring the spillover mechanism of trade

As discussed in section 2, the trade channel is one of the main mechanisms through which international fiscal spillovers occur. To provide insight on the size of these spillovers via trade, three estimations are computed. First, the effect of domestic expenditure shocks on a country's own level of imports is assessed by embedding the real imports of each country as dependent variable into Eqs. (5) and (6). Hence the set of the domestic import equations is formulated as follows:

$$\frac{imp_{j,t+h} - imp_{j,t-1}}{imp_{j,t-1}} = \alpha_{i,h} + \beta_{i,j,h}\frac{shock_{j,t}}{imp_{j,t-1}} + \delta_{i,h}(L)x_{j,t-1} + \xi_{i,t+h} \quad (11)$$

$$\frac{g_{j,t+h} - g_{j,t-1}}{imp_{j,t-1}} = \lambda_{i,h} + \gamma_{i,j,h}\frac{shock_{j,t}}{imp_{j,t-1}} + \rho_{i,h}(L)x_{j,t-1} + \zeta_{i,t+h} \quad (12)$$

The second method quantifies the spillovers by destination of government spending on real exports, practically implying that the dependent variable of Eq. (5) becomes country-specific real exports. The novel coefficients are then summarized through Eq. (9). Thirdly, the spillovers by origin impacting real exports are estimated by means of Eq. (10), in combination with taking the sum of real exports in countries i ≠ j as the dependent variable in Eq. (5). For these two methods, the following system of export equations is used:

$$\frac{exp_{i,t+h} - exp_{i,t-1}}{exp_{i,t-1}} = \alpha_{i,h} + \beta_{i,j,h}\frac{shock_{j,t}}{exp_{i,t-1}} + \delta_{i,h}(L)x_{i,t-1} + \xi_{i,t+h} \quad (13)$$

$$\frac{g_{j,t+h} - g_{j,t-1}}{exp_{i,t-1}} = \lambda_{i,h} + \gamma_{i,j,h}\frac{shock_{j,t}}{exp_{i,t-1}} + \rho_{i,h}(L)x_{j,t-1} + \zeta_{i,t+h} \quad (14)$$

The cumulative multipliers resulting from these three methods, as calculated by Eq. (8), are summarized in panels A-C of Table 4. Similar to Alloza et al. (2019), the resulting spending multipliers on foreign real exports are heterogeneous across countries. The size of the spillovers on domestic imports, however, features a roughly similar range for all countries but Italy. For the Netherlands, the domestic imports spillover is small over time, which could imply that increased Dutch expenditures do not remarkably flow towards imported goods and services. Over time, government spending shocks from other countries are found to positively affect Dutch exports, as is observed in panel B of Table 4. Three years after the simultaneous foreign government spending shock of one euro, Dutch exports have increased by 0.79 euros. Panel C further shows that a one-euro government expenditure increase originating from the Netherlands has a positive impact on the export levels of the other observed euro area countries. Foreign exports rise by 1.42 euros three years after the Dutch fiscal policy implementation.

Fig. 3 finally displays the impulse responses of Dutch imports to a government spending rise of one standard deviation implemented by the Netherlands. Overall, Dutch imports are found to be positively affected by a domestic government spending shock, although these positive percentage responses are small of size. The peak occurs at seven quarters after the government spending increase was implemented: during this quarter Dutch imports increase by approximately 0.015 percent following the shock. This percentage value is in line with the reported import multipliers in Table 4.

6. Conclusion

In light of examining the essence and effectiveness of joint fiscal policies in the euro area, this thesis has attempted to answer the question: What is the size of the spillover effects of fiscal expansions implemented by the Netherlands, an EMU member country with ample fiscal space, on other EMU members with more limited fiscal space? An extension of the empirical research by Alloza et al. (2019) on fiscal spillovers in the euro area has been executed by focusing on the Netherlands. The country-specific government expenditure shocks of the Netherlands, Germany, France, Italy, and Spain are identified by means of individual SVAR(4) models. As a follow-up, the local projections approach is aimed at analyzing bilateral fiscal spillovers as well as the aggregate fiscal spillovers by destination and by origin. Moreover, this approach is used to assess the trade channel through which fiscal spillovers can occur by looking at import and export effects of a structural government spending shock.

The replication of Table 3 of Alloza et al. (2019) leads to concluding that more time and attention is needed to improve the preciseness of the estimated cumulative multipliers reported in Table 2. If these multipliers would be statistically significant, economic intuition would be in place to explain them, however this does not apply for this thesis. This is also the case for the extended analysis that focuses on the Netherlands because of overall uncertainty about the statistical significance of the presented results. Nevertheless, some findings considering the Netherlands are worth highlighting. First, Dutch government spending increases amounting to one euro are found to have positive effects on aggregate output and exports of the other observed euro area countries, so the Dutch fiscal and trade spillovers by origin are positive. Furthermore, output of the Netherlands is found to decrease over time following a simultaneous one-euro expenditure shock originating from the rest of the countries, i.e. the aggregate fiscal spillovers with the Netherlands as destination appear to be negative. Lastly, a similar shock positively impacts Dutch exports, in other words the trade spillovers received by the Netherlands are positive.

An important final note should be placed on the development of this research over the limited time span. As already mentioned, there is scope for future research with regards to improving the statistical significance of the results, partly because they were calculated manually without regression analyses. The long data sample over 1980Q1-2018Q4 of the quarterly historical dataset of Alloza et al. (2019) was shortened for the Netherlands following issues with appropriately constructing Dutch historical quarterly data before 1999Q1. When the data for the Netherlands would be extended backwards to 1980Q1 in future research following

the methodology of Paredes et al. (2014), the preciseness of the results will likely improve, hence economic theory could be used to interpret the results. Moreover, at the time of writing the replication of the analyses executed by Alloza et al. (2019) is not fully finalized. Fiscal spillovers from public consumption and investment shocks separately and from increases in government expenditures via the area-wide interest rate are yet to be quantified for the Netherlands. Hence, the empirical results of this paper aim to give a more elaborate insight on the dynamics of Dutch fiscal policy in the context of the euro area, but it is essential to mention that the presented findings are not definitive or finite. Future research is needed to create an appropriate historical quarterly fiscal database for the Netherlands, as well as to deepen and properly finalize the empirical research of this paper based on replicating Alloza et al. (2019). Therefore, this thesis functions as a tool for future scholars to elaborate on this topic that specifically includes the Netherlands as a small but economically strong and stable country.

7. Appendix: Figures and tables

Table 1

Structure of the database and its components.

Total Revenues (TOR)	Total Expenditure (TOE)
Direct Taxes (DTX)	Government Consumption (GCN)
Indirect Taxes (TIN)	Compensation of Employees (COE)
Social Security Contributions (SCT)	Government Investment (GIN)
Other revenues	Social Payments (THN)
	Subsidies (SIN)
	Interest Payments (INP)
	Other expenditures

Source: Alloza et al. (2019)

Table 2

Pair-wise cumulative government expenditure multipliers after two years.

		Destination									
		DE		FR		IT		ES		NL	
Origin	DE	1.52	(*)	0.22	(**)	-0.06	(**)	0.13	(**)	-0.35	(*)
	FR	0.07	(***)	-2.60	(*)	-0.04	(**)	-0.04	(**)	0.16	(**)
	IT	-0.06	(**)	-0.07	(**)	-0.25	(**)	-0.04	(**)	0.27	(*)
	ES	0.16	(*)	-0.26	(*)	0.02	(**)	1.10	(*)	0.36	(*)
	NL	0.10	(**)	0.00	(**)	0.01	(**)	0.02	(*)	1.37	(*)

Notes: (*) denotes usage of equations set (i.e. Eq. 5 and 6) based on the shock var. divided by 100; (**) implies Eq. 6 is based on (shock var. / 100), while Eq. 5 uses the original independent var.; (***) marks the use of (shock var. * 100) in Eq. 5, while Eq. 6 is based on (shock var. / 100).

Table 3

Pair-wise cumulative multipliers after two years.

		Destination			
		DE	FR	IT	ES
Origin	DE	1.42**	0.39**	-0.02	0.24*
	FR	0.09	1.61*	0.14	0.12*
	IT	0.68*	0.20*	1.12**	0.25*
	ES	0.96*	0.12	0.04	1.23**

Note: One and two stars denote significance at 68% and 95% levels respectively (computed using Newey–West standard errors).

Source: Alloza et al. (2019)

Fig. 1a

Fiscal spillovers on GDP and government spending between the Netherlands and Germany.
Note: 68% and 95% confidence bands calculated by means of Newey-West standard errors.

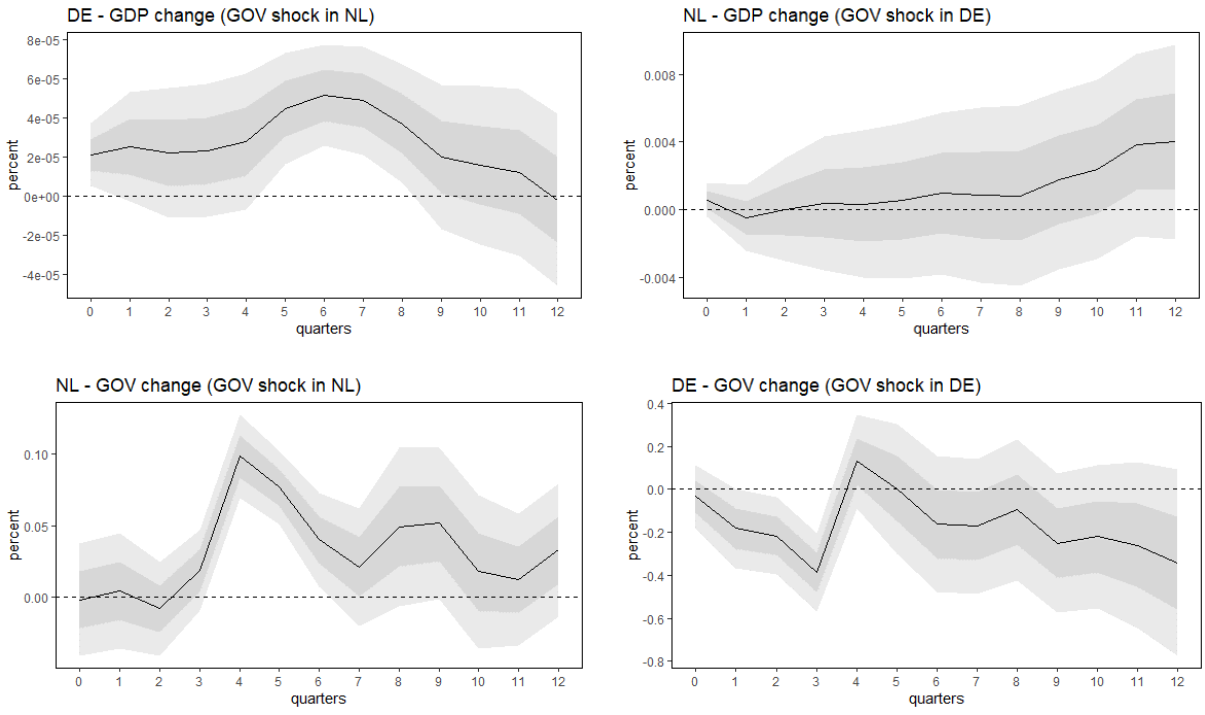


Fig. 1b

Fiscal spillovers on GDP and government spending between the Netherlands and France.

Note: 68% and 95% confidence bands calculated by means of Newey-West standard errors.

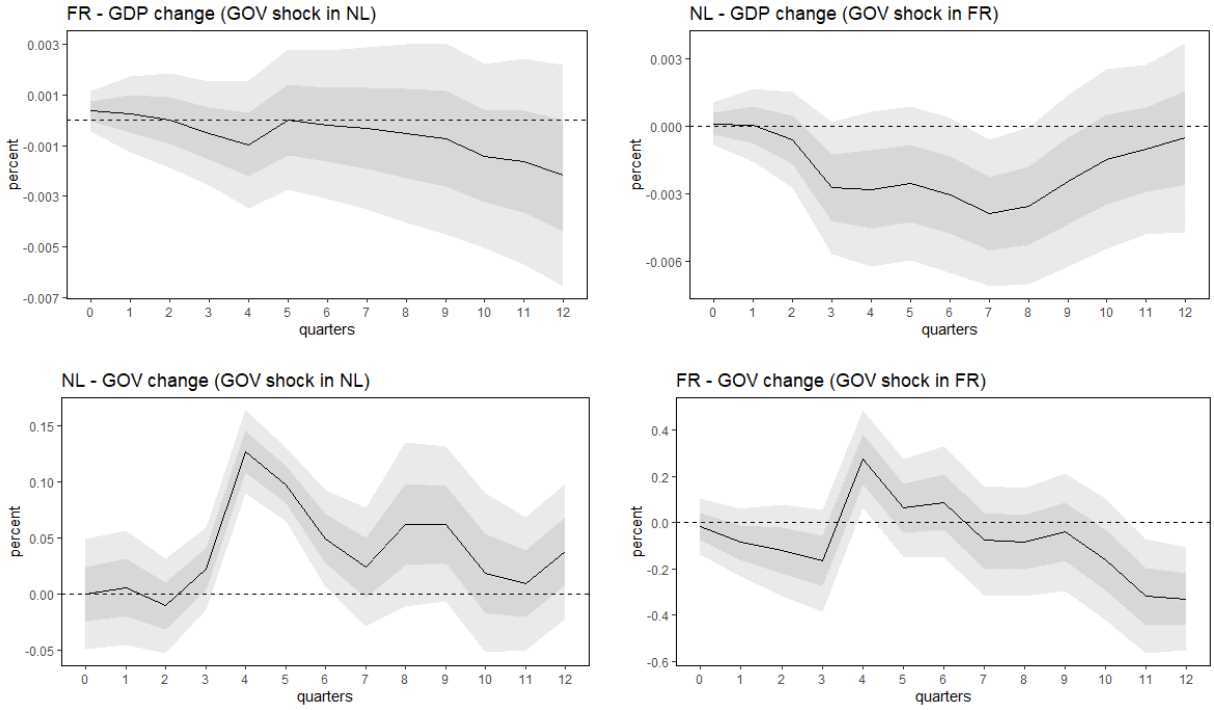


Fig. 1c

Fiscal spillovers on GDP and government spending between the Netherlands and Italy.

Note: 68% and 95% confidence bands calculated by means of Newey-West standard errors.

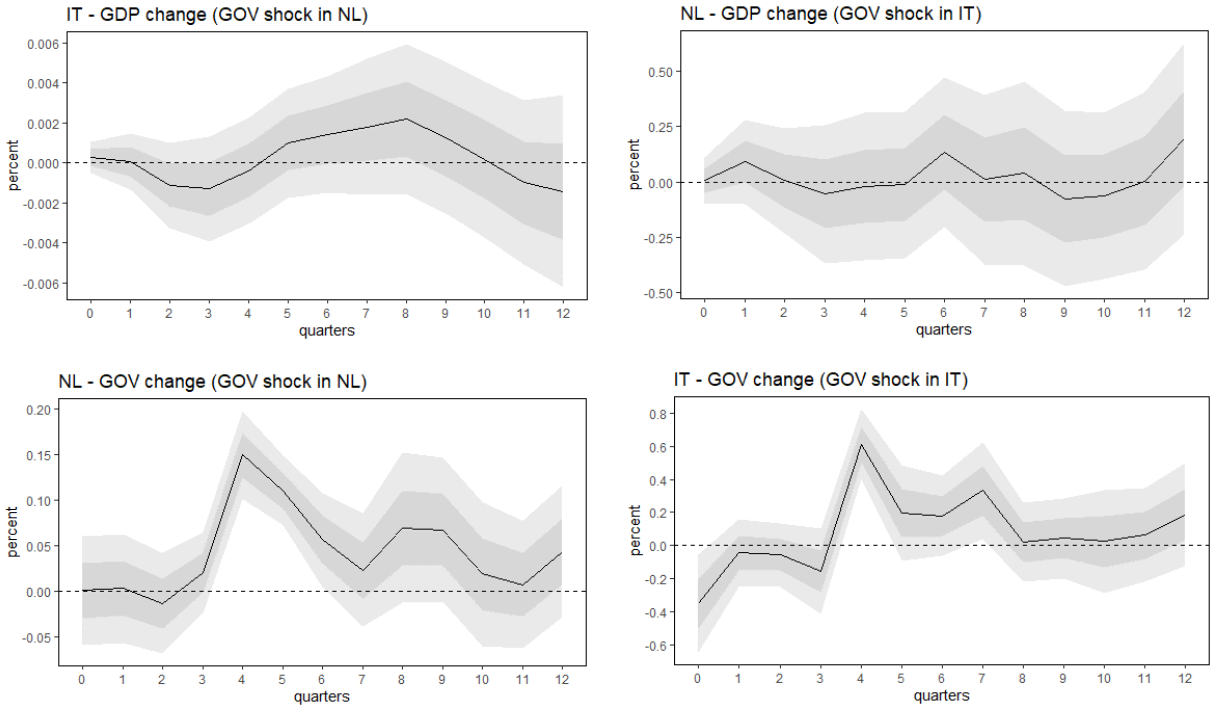


Fig. 1d

Fiscal spillovers on GDP and government spending between the Netherlands and Spain.

Note: 68% and 95% confidence bands calculated by means of Newey-West standard errors.

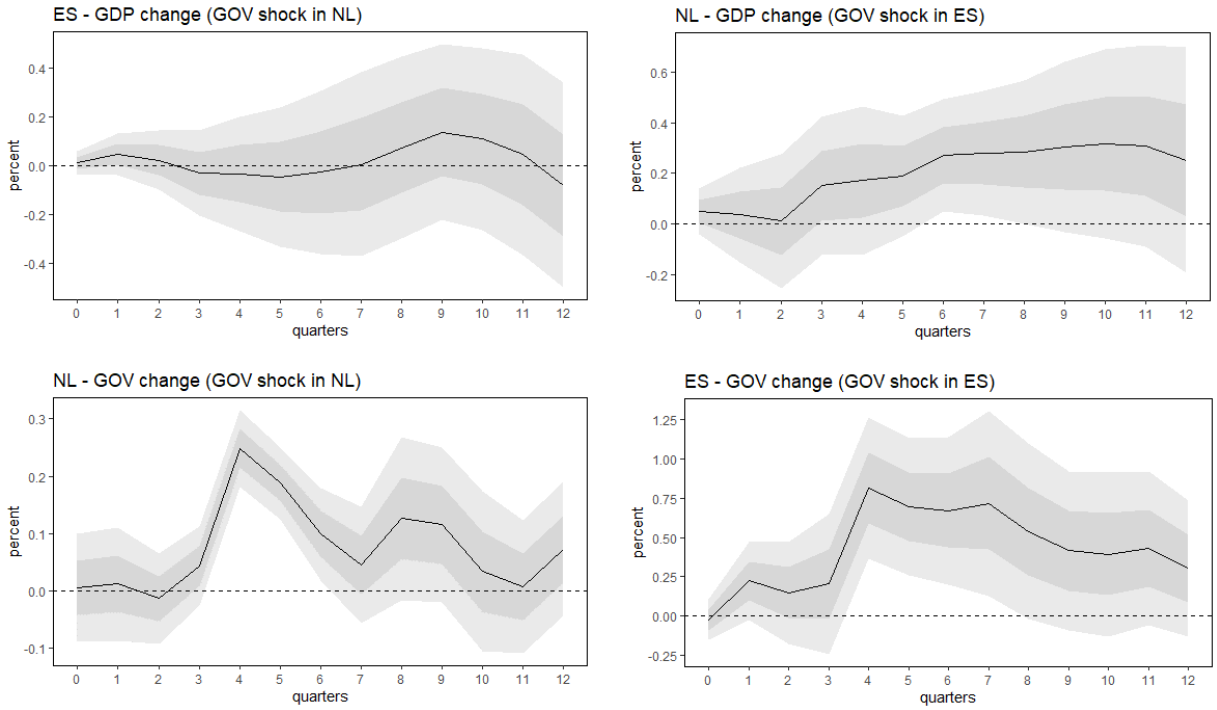


Fig. 2

Government spending shock cumulative multiplier of the Netherlands.

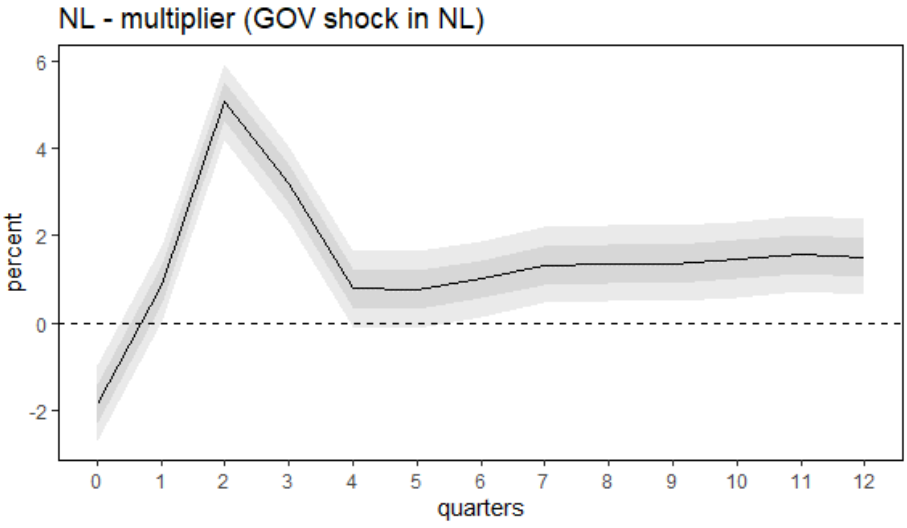


Table 3
Output spillovers from increased government expenditures.

	DE	FR	ES	IT	NL
a. By destination					
Impact	-0.01	-0.01	0.00	-0.05	-0.02
1 year	-0.40	-0.65	-0.09	-0.13	-0.25
2 years	-0.70	-0.92	-0.24	0.35	-1.37
3 years	-1.56	-1.85	-0.56	1.31	-3.68
b. By origin					
Impact	-0.04	-0.25	-0.01	-0.02	-0.01
1 year	-0.05	-0.23	-0.08	-0.09	0.77
2 years	0.46	-0.34	0.00	-0.80	1.16
3 years	-0.04	0.46	0.10	-2.90	1.52

Fig. 3
Fiscal spillovers by destination (upper graph) and by origin (lower graph) of the Netherlands.

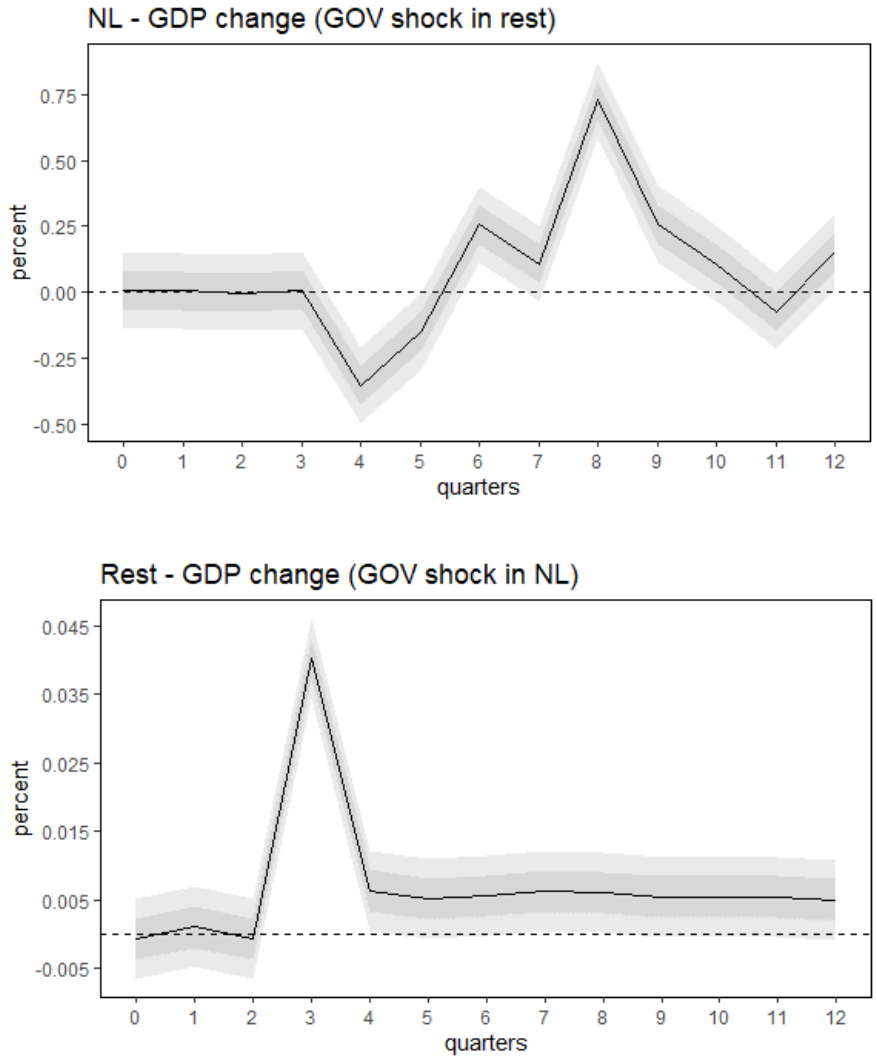
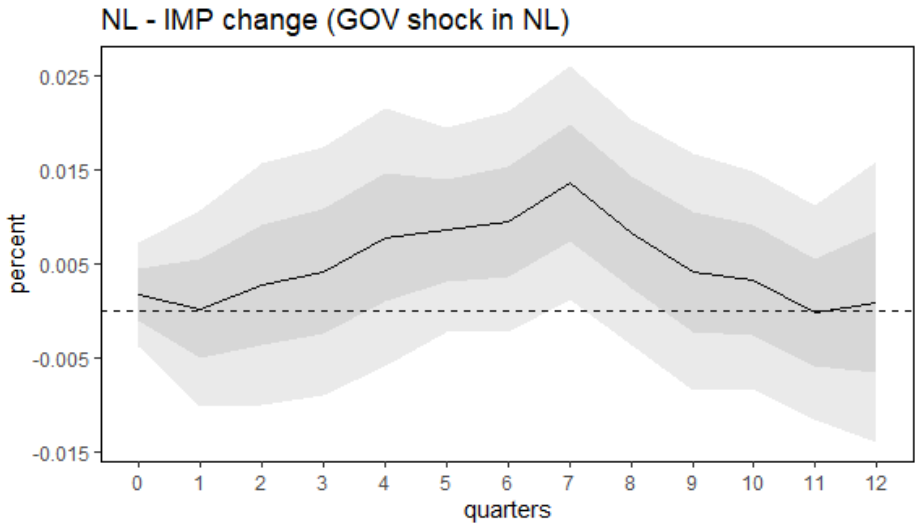


Table 4
Spillovers on imports and exports from increased government expenditures.

	DE	FR	ES	IT	NL
a. Domestic imports					
Impact	-0.12	0.03	-0.01	0.25	0.01
1 year	0.01	-0.01	0.03	-0.60	0.01
2 years	0.01	-0.01	0.01	0.22	0.01
3 years	0.01	0.01	0.02	0.64	0.01
b. By destination (exports)					
Impact	0.32	-0.60	0.05	0.18	0.24
1 year	-0.89	-0.23	0.14	1.59	0.21
2 years	-0.79	-0.56	0.64	1.14	0.00
3 years	-0.90	-1.61	1.09	-0.80	0.79
c. By origin (exports)					
Impact	0.29	-0.07	0.07	-0.06	-0.04
1 year	0.67	-0.15	-0.39	-0.28	0.98
2 years	0.58	-0.77	-0.21	-0.39	1.21
3 years	-0.89	-1.64	0.04	-0.35	1.42

Fig. 4
Response of Dutch imports to a domestic government spending shock.



8. References

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