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Fiscal multipliers in Emerging Market Economies: Can we learn something from Advanced Economies? ☆

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ABSTRACT

It is a well-established fact that Emerging Market Economies (EMEs) have smaller fiscal multipliers than Advanced Economies (AEs). We confirm this difference for our sample using Panel VAR and Interactive Panel VAR (Saborowski and Weber, 2013) models. Then we analyze the impact of some macroeconomic factors on multiplier effects for EMEs and AEs separately. We argue that the development degree can modify the effect of the traditional determinants of fiscal multipliers. A Panel Conditionally Homogeneous VAR (Georgiadis, 2012) is used to test this statement. First of all, we find that the tested determinants (imports, public debt, savings, unemployment and financial development) act in the same way both in EMEs and in AEs. Secondly, public spending efficiency is relatively more sensitive to each tested determinant in EMEs than in AEs. Thirdly, the most important factor for improving fiscal policy efficiency in EMEs (public debt), differs from the one in AEs (openness to trade). Last but not least, we show that improving the tested determinants individually is not sufficient to achieve the same public spending efficiency in EMEs.

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1. Introduction

Following the global financial and economic crisis, large fiscal stimulus packages were set up in Advanced Economies (AEs) leading to a surge of interest for fiscal multipliers in these countries. Since 2009, many papers are interested in fiscal multipliers focusing on their size and determinants.

Regarding the value of fiscal multipliers, estimates range from zero to more than 2 (IMF, 2011) according to the methodology used and the country or period considered.

Since the particular context of the crisis, the determinants of multiplier effects are broadly studied, especially the state of the business cycle and the monetary policy interest rate, but also the state of public finances and the exchange rate regime for example.[1] These studies aim to explain the spread between fiscal multipliers over time and countries. Highlighting the main determinants of fiscal multipliers, these articles show when and why fiscal policy is the most efficient.

Although these empirical studies mainly focus on AEs, there are some articles about Emerging Market Economies (EMEs). The macroeconomic effects of public spending in EMEs are also an important issue since public spending can provide a boost to the development process. The few studies about multipliers in EMEs find smaller values than in AEs whatever the method used (Ilzetzki et al., 2013; Kraay, 2014). Why is this spread so large?

This difference is theoretically explained by structural characteristics that differentiate EMEs from AEs: EMEs face to a lesser supply-side flexibility, a faster growth over the last decades and a weaker management of public spending. However, there is no empirical explanation about this. Indeed, the determinants of multiplier effects in EMEs are poorly investigated. To the best of our knowledge, only Ilzetzki et al. (2013) deal with fiscal multipliers' determinants in EMEs but they are assumed to be the same as in AEs since the computed impact is homogeneous whatever the development degree. EMEs and AEs are studied together while the particularities of EMEs ask for a specific analysis of the multiplier mechanisms (Combes and Mustea, 2014). Since there is no empirical study about the determinants of multiplier effects considering EMEs specificities, can we really extend the conclusions about them from AEs to EMEs?

The contribution of this paper is twofold. Using a panel of 48 countries (EMEs and AEs) over the period 1990–2013, we first use PVAR and Interactive PVAR (Saborowski and Weber, 2013) models to (re)-estimate multiplier effects in AEs and EMEs to confirm previous results in the literature over our sample. Secondly, we select the main determinants of multiplier effects according to the literature and data availability (openness, public debt, savings, unemployment, and financial development). We use a Panel Conditionally Homogeneous VAR (Georgiadis, 2012) to allow multiplier effects to vary across the level of development and these chosen determinants. In this way, we can check that the development degree modifies the determinants and/or the extent in which the determinants act. To the best of our knowledge, this paper is the first to estimate the impact of fiscal multipliers' determinants conditionally to the development degree. More generally, it is the first to use the PCH-VAR model for studying the effects of fiscal policy both in EMEs and AEs.

As a result, we confirm that multiplier effects are smaller in EMEs than in AEs and we show that the tested determinants act in the same way in both groups. Nevertheless, since multiplier effects are weak in EMEs, they are relatively more sensitive to an improvement in the considered macroeconomic factors. However, none of these factors allow public spending efficiency in EMEs to become as efficient as in AEs.

This paper proceeds as follow. Section 2 surveys the main empirical methods used to estimate fiscal multipliers. Section 3 presents the estimation of multiplier effects in EMEs and AEs by using PVAR and Interactive PVAR models. Section 4 discusses the theoretical intuitions and justifications for differentiating the effects of some macroeconomic factors according to the development degree. Section 5 briefly introduces the PCH-VAR model and outlines the empirical results about the conditional effects of the considered determinants. Section 6 concludes.

[1] See Table 2 in appendix.

2. How to empirically measure multiplier effects?

Measuring fiscal multiplier applies for identifying exogenous shocks in public spending. Indeed, estimating the impact of public spending on GDP leads to an issue of reversal causality: government spending could affect GDP, but GDP could also affect government spending. Two main empirical approaches are currently used in the literature[2]: the narrative approach and the Structural Vector Autoregressive (SVAR) approach.

First, with the narrative approach, or "natural experiment" (Ramey and Shapiro, 1998), exogenous variations in public spending are identified by using military spending. The theoretical argument behind this is that "significant changes in overall government spending are directed to a few sub-categories of spending", and military spending variations could be considered as exogenous to the economic context. The authors study the case of United States and affirm that government spending on durable goods increased in time of military build-ups. As all wars in which the USA have recently been involved have not been on the US territory, local infrastructures had not been affected. Hence an increase in public spending on durable goods is not due to the economic context. In this way, many economists use military spending to identify exogenous changes in public spending,[3] but they only are interested in the US case. If fact, this narrative approach cannot be applied to any countries because of two main factors:

- Government spending can be due to the war itself: countries can experiment war on their territory, so an increase in public spending is necessary to rebuild and repair damages, making the observed variation in public spending endogenous.
- War can be due to economic conditions and not only driven by exogenous political factor, especially in developing countries; this also makes government spending endogenous to prevailing macroeconomic factors.

This identification strategy is therefore invalidated in many countries, the narrative approach cannot be applied. Thus, a second method was developed by Blanchard and Perotti (2002) who employed a Structural Vector Autoregressive (SVAR) model. Using VAR models, dynamic relationships between variables can be represented, and the Structural form enables the identification of (structural) shocks. With theoretical assumptions, this approach allows to identify fiscal shocks considering the structural form of SVAR's residuals. Blanchard and Perotti (2002) suppose that public spending does not respond to economic context in the same quarter. The discretionary (exogenous) part of fiscal policy can be isolated by using quarterly data if we order the effect of current GDP on current spending is zero.

An increase in public spending can be due to three events:

- An automatic and immediate response to GDP and macroeconomics variations, commonly named "automatic stabilizers".
- A discretionary change in fiscal policy in response to the economic context.
- An exogenous change in public spending without relation with the economic context.

We are interested in the last case.

The effects of automatic stabilizers are controlled by assuming that current GDP has no effect on current spending. Even if automatic stabilizers act immediately, we consider that their effects on public spending are very small, the assumption therefore remains realistic.

Regarding discretionary changes in public spending according to the economic context, if we consider that public spending cannot be changed further to a GDP shock in only one-quarter, we artificially suppress endogenous changes in fiscal policy by the structural assumption of Blanchard

[2] Note that marginal methodologies exist; they mainly try to use some macroeconomic variables to identify fiscal shocks. Clemens and Miran (2011) use fiscal rules, Kraay (2014) uses lending from official creditors, Estevão and Samake (2013) use a Structural Vector Error-Correction Model (SVECM) and use annual data.

[3] See for example Ramey and Shapiro (1998); Edelberg et al. (1999); Eichenbaum and Fisher (2005); Ramey (2011); Barro and Redlick (2011); Fisher and Peters (2010); Nakamura and Steinsson (2014).

and Perotti (2002). Actually, by assuming that GDP has no contemporaneous effect on public spending, we ensure that the only source of public spending variations is exogenous. Thus, we artificially remove automatic response of public spending to GDP, and we isolate exogenous fiscal shocks. Quarterly data are needed because using annual data would imply that a government does not change its fiscal policy during an entire year, which seems unrealistic.

This paper uses the Blanchard and Perotti (2002) assumption in order to estimate multiplier effects in EMEs and AEs. We want to underline differences in the dynamic between public spending and GDP according to the country group, but we consider that a common dynamic exists within each group. Panel methodologies are therefore more suitable and allow to take into account the unobserved heterogeneity at the country level. Panel Vector Autoregressive (PVAR) models are therefore used.

3. Estimating multiplier effects in EMEs and AEs

In this section, fiscal multipliers in AEs and EMEs are estimated using two methodologies: a Panel VAR (PVAR) model, and an alternative specification of PVAR with interaction terms (IP-VAR).

Note that the PVAR model is used by Ilzetzki et al. (2013) in order to estimate fiscal multipliers in EMEs and AEs, but our sample differs from their own. Regarding the IP-VAR model, to the best of our knowledge, this model has never been used for fiscal multiplier estimations according to the development degree.

3.1. Methodology

Following Blanchard and Perotti (2002), we estimate a PVAR model which is described below:

$$X_{n,t} = \sum_{j=1}^{p} A_j X_{n,t-j} + C_n + \varepsilon_{n,t} \tag{1}$$

where

- t denotes time and n denotes country;
- $X_{n,t} \equiv [G_{n,t}, Y_{n,t}]$, with G being the growth rate of quarterly government spending (consumption) and Y the quarterly growth rate of GDP, both in real terms;
- A is a polynomial matrix, j lags;
- C_n is a vector of country fixed effects which controls for individual heterogeneity;
- $\varepsilon_{n,t}$ is a vector of errors terms that can be interpreted as i.i.d. shocks to government spending and GDP growth under their structural form.

Note that only G and Y are introduced in the VAR specification with the aim of limiting restrictions and maximizing the number of observations.[4] This means that we compute spending multipliers and not fiscal ones.

The model is estimated for two groups of countries: EMEs and AEs. Since the fixed effects are correlated with the regressors because of the lagged dependent variable, the coefficients in the PVAR could be estimated by GMM. However, given that time dimension (96 quarters) is relatively large compared to cross-sectional dimension (48 countries), fixed effect approach is more appropriate since the Nickell bias is close to zero. The PVAR is therefore estimated by OLS.

We then focus on Orthogonalized Impulse Response Functions (OIRFs) that show the response of GDP to an orthogonal shock in public spending. The orthogonalization is obtained by ordering the variables in the PVAR following Blanchard and Perotti's assumption. This means that we use a Cholesky decomposition: the first variable (public spending) is supposed to be “more exogenous” than the second (GDP). The validity of this assumption is based on the use of quarterly data.

[4] We also performed PVAR estimations with three additional variables, as in Ilzetzki et al. (2013) (current account of the trade balance, real effective exchange rate and monetary policy interest rate), and results are not presented because no significant difference was found. However, public revenue is not introduced in the VAR because data are not available.

From the OIRFs, and following the previous definition of fiscal multipliers, we compute impact spending multipliers from a public spending shock at time $t=T$ as follows[5]:

$$k_t = \frac{\Delta y_{t=T}}{\Delta g_{t=T}} = \frac{y_T}{g_T}\frac{\mathrm{irf}_{t=T}}{\sigma_G} = \frac{\mathrm{irf}_{t=T}}{b.\sigma_G} \tag{2}$$

and the spending multiplier through horizon N is:

$$k_N = \frac{\Delta y_{t+N}}{\Delta g_{t=T}} = \frac{y_T}{g_T}\frac{\mathrm{irf}_{t=N}}{\sigma_G} = \frac{\mathrm{irf}_{t=N}}{b.\sigma_G} \tag{3}$$

where

- y_T is the GDP at time T;
- g_T is the government spending at time T;
- $\mathrm{irf}_{t=T}$ is the coefficient read on the response function of GDP growth rate to a public spending growth rate shock at time T;
- σ_G is the initial shock of public spending growth rate;
- $b = g_T/y_T$ is the public spending to GDP ratio, on average over countries.

3.2. The data

We build an unbalanced panel dataset composed of 48 EMEs and AEs over the period 1990–2013. The list of countries is shown in appendix, Tables 3 and 4 present the data sources. All the endogenous variables in the PVAR are collected at a quarterly frequency, and the main descriptive statistics are presented in appendix, Table 5.

Before running the estimation, we first use an X-11 process to remove and correct data seasonality.

We use the first difference of the log of each variable, in order to solve the non-stationarity problem. The test from Im et al. (2003) and the Fisher test set by Choi (2001) are presented in appendix, Table 6 presents unit root test on variables in log-level. Given that the series are non-stationary, their growth rates are used.[6] Note that taking variables in first difference can lead to a loss of information, especially when the series are co-integrated. The co-integration tests from Persyn and Westerlund (2008) were therefore performed.[7] They lead us to reject the existence of co-integration relation between our series. GDP and public spending can be introduced in growth rates in the VAR, which makes the IRF analysis possible.

EMEs and AEs are differentiated by using the World Bank Classification based on Gross National Income (GNI). All countries that are not in high income category are considered as EMEs.[8]

3.3. Results

Before estimating PVAR, the optimal lag length (p) is chosen by using the Moment Model Selection Criteria (MMSC) developed by Andrews and Lu (2001): we compute MMSC-BIC, MMSC-AIC and MMSC-QIC for one to six lags. We must choose the model which minimizes the criterion. Table 9 in appendix presents the MMSC-AIC[9] for AEs and EMEs. For the both sub-samples, the optimal lag is one lag.

A PVAR is estimated for AEs and EMEs separately. In both cases, we test the PVAR stability by checking the eigenvalue condition. Graphs presenting eigenvalues are available in appendix, Fig. 11.

[5] OIRFs do not directly give spending multipliers since we use the growth rates of GDP and public spending. See the demonstration in Appendix A.

[6] Stationarity tests for variables in growth rates are presented in Table 7.

[7] Results are presented in appendix, Table 8.

[8] Countries can change category over the period.

[9] MMSC-BIC, MMSC-AIS and MMSC-QIC are equal when the system is just identified.

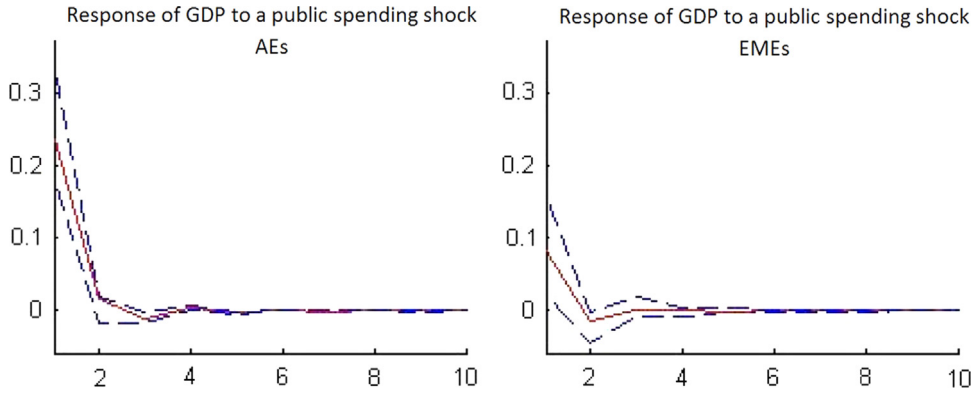

Fig. 1. GDP responses to a one standard deviation shock in public spending in AEs (left) and EMEs (right) – PVAR model.

Fig. 1 shows the Orthogonal Impulse Response Functions (OIRFs) of real GDP growth to a one unit shock in public spending in AEs and in EMEs. Each IRF is computed with a 90% confidence band based on Monte Carlo simulations (2000).

From the OIRFs coefficients, and according to Eq. (2), spending multipliers are computed for both types of countries. We find a smaller multiplier in EMEs (0.41 in impact, 0 at horizon $N=2$) than in AEs (1.33 in impact, 0.04 in horizon $N=2$).[10] In EMEs, the effect disappears from the first quarter after the shock, but in AEs, the effect continues one-quarter after. Globally, and cumulatively, the effect remains positive (see appendix, Fig. 12, for cumulative IRFs).

To confirm these results, a PVAR with an interaction term (IP-VAR) is estimated. This method was implemented by Saborowski and Weber (2013) and, to the best of our knowledge this IP-VAR has not been used to estimate fiscal multipliers. The IP-VAR allows the relation between the endogenous variables to vary according to an interaction term value. As interaction variable, we use a dummy variable which takes the value 1 if the country is an AE, 0 otherwise.

The model is given by:

$$X_{n,t} = \sum_{j=1}^{p} A_j X_{n,t-j} + C_n + C_n Z_{n,t} + \sum_{j=1}^{p} B_j Z_{n,t} X_{n,t} + \varepsilon_{n,t} \tag{4}$$

with:

- $X_{n,t} \equiv [G_{n,t}, Y_{n,t}]$, where G is the growth rate of quarterly government spending (consumption) and Y the quarterly growth rate of GDP, both in real terms;
- A a polynomial matrix, j lags;
- C_n a vector of country-specific intercepts;
- $Z_{n,t}$ a matrix of interaction terms that can influence both the dynamic relationship and the level of the variables;
- B_j is a polynomial matrix that contains the conditional coefficients;
- $\varepsilon_{n,t}$ is a vector of errors terms that can be interpreted as i.i.d. shocks to public spending and GDP growth under its structural form.

The IP-VAR is estimated by OLS since residuals are uncorrelated across equations by construction (Towbin and Weber, 2013). Moreover, when time dimension is relatively large compared to individual dimension, OLS are consistent.

Fig. 2 presents the response of real GDP growth rate following a one unit shock in public spending in AEs and EMEs, and cumulative IRFs for both groups are presented in appendix, Fig. 13.

[10] See appendix, Table 10 for details about computation.

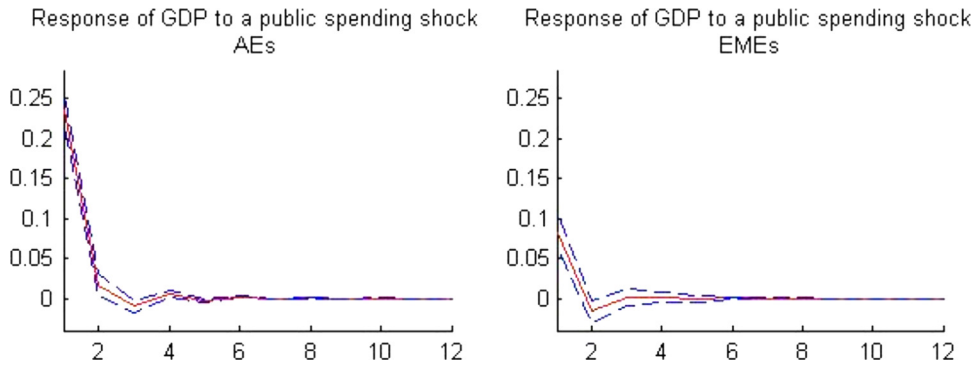

Fig. 2. GDP responses to a one unit shock in public spending in AEs and EMEs – IP-VAR model.

Spending multipliers in impact are computed from these IRFs. Once again, we find a smaller multiplier in EMEs than in AEs: 0.39 in EMEs and 1.44 in AEs.[11] These results are very close to the ones found with the baseline PVAR model, and the effects also disappear after the first period.

Concerning AEs, estimated fiscal multipliers range from 0.4 to 2.1 (IMF, 2012), our results are therefore in line with existing literature.

Concerning EMEs, only few articles are interested in a panel of EMEs, but our results are in accordance with most of them. Ilzetzki et al. (2013) find that spending multipliers in EMEs are insignificant, but they show that spending multipliers are smaller in EMEs than in AEs. Moreover, Kraay (2014) finds spending multipliers around 0.4. Estevão and Samake (2013) estimate spending multipliers following a spending cut and find spending multipliers from 0.01 to 0.5.

Showing that fiscal multipliers are smaller in EMEs than in AEs leads to wonder about the reasons of such a difference.

In our opinion, the difference of fiscal multipliers in EMEs and AEs is due to contextual differences between the two types of countries. EMEs have a poorer institutional context that reduces economic performances (North, 1990) and increases the decision and implementation lags of fiscal policy (Hemming et al., 2002). In addition to the institutional issue, the economic context in EMEs is also very different. The supply-side is less flexible in EMEs than in AEs and instability and uncertainty are larger there.

It is difficult to empirically test for the influence of these contextual factors on the spread between EMEs and AEs multipliers. However, we argue that the particular institutional and economic contexts in EMEs lead to a different impact of macroeconomic factors on multipliers values. To the best of our knowledge, none of the studies interested in EMEs provide an empirical analysis about this point.

Actually, Kraay (2014) and Estevão and Samake (2013) implement new methods to compute fiscal multipliers in EMEs and Less Developed Countries (LDC) using annual data. However, they are not interested in the difference between EMEs and AEs.

Concerning Batini et al. (2014), they present the main determinants of fiscal multipliers. The degree of development is considered as a determinant: EMEs would have smaller multipliers than AEs, but no empirical explanation is provided. Moreover, they consider that other determinants of fiscal multipliers are the same in EMEs and AEs,[12] and their impact is supposed to be the same.

As in Batini et al. (2014), Ilzetzki et al. (2013) analyze the determinants of fiscal multipliers, but they do not provide explanations about the difference between multipliers in EMEs and AEs. They use a PVAR model to estimate spending multipliers according to several criterion, but they estimate a global effect by mixing EMEs and AEs. Thus, all countries in a same sub-sample have the same fiscal

[11] See appendix, Table 11 for details about computation.

[12] They consider that each determinant acts in the same way and extent except for public debt: they envisage a lower threshold at which public debt becomes bad for public spending efficiency in EMEs than in AEs.

multiplier, whatever the development degree. Macroeconomic factors are supposed to have an homogeneous effect.

Another point has to be addressed. Ilzetzki et al. (2013) do not seem to envisage a strong correlation between the degree of development and the level of other macroeconomic variables. The difference of multipliers can be fully due to the criterion that separates the sample only if there is no other difference between the two groups. For example, Ilzetzki et al. (2013) show that EMEs have smaller multipliers than AEs. Then they mix both EMEs and AEs, and they separate the sample according to the level of public debt; they show that a high public debt-to-GDP ratio causes a smaller multiplier. However, maybe most of the countries with high debt are also the less developed, so the effect of public debt cannot be isolated from the effect of development and vice versa.

In short, some studies analyze the key determinants of fiscal multipliers (see Table 2 in appendix), but they do not account for the differences between EMEs and AEs. In the remainder of this paper, the impact of several macroeconomic factors on spending multipliers is investigated by allowing for the heterogeneity of their impact according to the level of development.

4. On the potential sources of differences between EMEs and AEs

In this section, the expected effects of each determinant are presented, and we explain why these determinants could act in a different way and extent in EMEs and AEs.

Table 2 in appendix presents the main articles about the determinants of fiscal multipliers. From this literature, five key determinants are retained: the degree of trade openness, the state of public finances, the savings rate, the capacities utilization rate and the financial development.[13]

4.1. Trade openness

Trade openness should have a negative impact on the fiscal multiplier: the higher the propensity to import is, the higher the leakage of demand is when public spending increases.

Imports could further affect fiscal stimulus efficiency in EMEs than in AEs because of two main characteristics.

First, in EMEs with large openness to trade, government could be encouraged to strongly rely on trade taxes as a broad source of revenue.[14] Easterly and Rebelo (1993) show that poor countries rely heavily on international trade taxes as revenue source. However, trades are too volatile to constitute a healthy basis for public revenue and then for fiscal policy. Thus, a country that relies on volatile revenue to implement fiscal policy is more likely to be inefficient because unpredictable (sizable) changes in public resources are more likely to occur.

Second, AEs in our sample are mainly members of the European Union. Therefore, a coordination of fiscal policies between countries is more likely to be implemented than in the EMEs considered. The leakage of demand by imports would be smaller in these AEs because imports of the main commercial partners would also increase – and exports too.

As multiplier effects depend on the propensity to import, we use the imports-to-GDP ratio to measure this impact.

[13] We do not address either the question of the exchange rate regime or the role of monetary policy rate. We are aware of the importance of these factors but the methodology used does not allow to test for them. Testing the impact of exchange rate regime applies for using a discontinuous classification, and the monetary policy rate is not a structural factor, so we cannot integrate it as a conditioning variable (see Section 5). However, we tested these factors using IP-VAR model, and results are consistent with existing literature.

[14] For example, in Philippines over the period 1990–2013, taxes on international trades represent on average more than 20% of total public revenue (World Bank, World Development Indicators, 2014).

4.2. The state of public finances

Regarding public debt, Keynesian mechanisms suppose that consumption is related to current income, so whatever the debt level, multiplier effects could not be affected. However, when consumers are forward-looking, they anticipate that an increase in public spending by increasing public debt today is equivalent to an increase in tax levels later. They therefore increase their savings to protect themselves against the rise of tax levels: consumption does not increase after a fiscal stimulus (Barro, 1974). To hold, this Ricardian equivalence requests agents to be altruistic. In this way, a high public debt reduces spending multiplier when agents are altruistic.

Sutherland (1997) shows that for high levels of public debt, fiscal stimulus can have anti-Keynesian effects even if consumers are not altruistic. When public debt is high, agents anticipate that they will have to pay more taxes soon: the debt burden will not be only supported by next generations. Consumers therefore increase their savings without being altruistic, and without the need to have some possibilities to transfer wealth across generations.

This argument seems to be true in AEs as in EMES, but we argue that it could be more important in EMEs because the institutional context reduces both the quality of spending and revenue management, and the confidence in government. Implications could be twofold: the threshold from which public debt produces anti-Keynesian effects might be lower in EMEs than in AEs (Batini et al., 2014), and the effects of a high public debt could be worse in EMEs than in AEs.

Moreover, a fiscal expansion with fiscal sustainability concerns can reduce the availability of external credit for the private sector. This issue can be more important in EMEs because of weaker internal possibilities of financing. If external credit decreases further to a fiscal expansion, public consumption crowds out private demand.

In order to measure the impact of the state of public finances, the debt-to-GDP ratio is used.

4.3. The savings rate

The savings rate should have a negative impact on fiscal multipliers since savings is a leakage of demand. A high savings rate reduces the increase of consumption following a public spending positive shock.

The savings rate depends on two main factors also involving a negative effect of savings on public spending efficiency.

First, a high savings rate may be representative of developed financial markets. Financial development makes easier consumption smoothing over time (and thus Ricardian equivalence). In this way, the savings rate reduces multiplier effects.[15]

Second, the savings rate depends on uncertainty and expectations: in an uncertainty environment, agents increase their demand for precautionary savings (Leland, 1968). In this way, a high savings rate may be representative of high uncertainty and pessimistic expectations, which should also reduce multiplier effects.

The impact of savings on fiscal multipliers should be negative both in EMEs and AEs, whatever the prevailing determinant of savings. However, this effect can be worse in EMEs than in AEs.

On one hand, governments in EMEs face to a lower confidence, mainly because of a poorer governance that leads to more uncertainty and more pessimistic expectations. This unfavorable context makes fiscal expansions less efficient.

On the other hand, in EMEs, the financial sector could make a less efficient use of savings, increasing the negative impact of savings in EMEs.

However, in EMEs, the savings-to-GDP ratio may not reflect real savings. Indeed, a weak financial development could lead agents to keep precautionary savings out of the official banking system.

[15] We address this point at the end of the section by considering the credit-to-GDP ratio.

Small savings rate is therefore not representative of low uncertainty, and spending multipliers in EMEs with low savings-to-GDP ratios could not be very high. Thus, the gap between multipliers in EMEs with low savings rates and EMEs with high savings rates could be smaller than the one in AEs.

4.4. The capacities utilization rate

Keynesian mechanisms are based on some hypotheses. One of them concerns the production capacities utilization rate: Keynesian mechanisms are effective in economies with excess production capacities. Indeed, when public spending increases, global demand rises and supply-side responds by increasing production. If production capacities are fully used, supply cannot quickly increase, and this reduces the spending multiplier. This argument explains why fiscal multipliers are larger in bad times (when production capacities are partially used) than in good times (when production capacities are fully used) (Baum and Koester, 2011; Baum et al., 2012).

To measure the capacities utilization rate, we use the unemployment rate, which measures the quantity of unemployed workers related to the quantity of workers. In countries with many available workers, the adaptability of the supply-side is larger – enterprises can quickly engage new workers. The unemployment rate is expected to have a positive impact on spending multiplier, because a high unemployment rate reflects a recessionary context.

Unemployment could have a different impact in EMEs and AEs. Actually, supply-side is often considered as less flexible in EMEs than in AEs, even if unemployment could be higher in EMEs. A possible explanation involves the informal sector. Many agents are considered as unemployed while they work in informal sector. These workers could not want to be engaged by formal enterprises and the adaptability of the supply-side would be limited. In this way, the effect of unemployment would be smaller in EMEs than in AEs.

4.5. Financial development

Credit-to-GDP ratio is often used as an indicator of financial development.

On one hand, financial development would have some negative impacts on multiplier effects.

First, a weak credit-to-GDP ratio can mean that economic agents are credit-constrained. According to previous results in the literature, a smaller ratio implies that Ricardian equivalency proposition is invalidated (Khalid, 1996). An interpretation is that people are less forward-looking because they cannot smooth their consumption over the time. Hence, countries with smaller credit-to-GDP ratio might have larger fiscal multipliers.

Second, savings possibilities are few when financial development is weak, agents have only few possibilities to smooth their consumption. If they cannot shift their consumption, public consumption is less likely to crowd-out private consumption even if interest rates are increased.

Finally, financial development could generate more instability in EMEs than in AEs (Aghion et al., 2004). In this way, a larger financial development would reduce spending multiplier by creating instability, and this effect would be more important in EMEs than in AEs.

On the other hand, we argue that financial development can have a positive impact on spending multipliers. To increase their consumption (investments), consumers (investors) need some financing sources. A more developed financial sector increases the availability of financing sources, and also the kind of financing. The credit rationing could be less important, and agents can easily increase their consumption (investments). In EMEs, investment is less sensible to interest rates because it is constrained by rationing from banking.

The positive effect of financial development could be more important in EMEs than in AEs by increasing the available financings.

In sum, we argue that the particular context of EMEs makes public spending efficiency in EMEs less sensible to the unemployment rate, but more sensible to the degree trade openness, the level of public debt, the degree of uncertainty, and the financial development.

5. On the impact of key determinants on spending multipliers in EMEs and AEs

5.1. Methodological issue

From a theoretical point of view, the key determinants of multipliers in EMEs and AEs can act in a different way. This statement has to be empirically tested with an appropriate methodology.

In Section 3, PVAR and IP-VAR specifications are used to compute spending multipliers in EMEs and AEs. However, using these both methodologies can be insufficient.

Running the PVAR model, the dynamic between endogenous variables is supposed to be homogeneous across cross-sectional units. When we are interested in countries, this assumption is not realistic, especially when there are EMEs and AEs in the same sample.

Moreover, estimating a PVAR model necessitates dividing the sample into sub-samples according to one criterion. Testing the impact of several characteristics implies that the number of sub-samples quickly increases,[16] and the number of observations by sub-sample quickly decreases.

The last limit of PVAR specification is the potential correlation between the criterion at the origin of the sub-samples, and another one. Indeed, if such a correlation exists, the results that are attributed to the criterion can be due to the other one.

With the IP-VAR specification, two characteristics can be controlled for at the same time. However, the two interaction variables have to be fixed at arbitrary levels, so the threshold from which the dynamic can change is exogenous.

In order to address these problems, we use a Panel Conditionally Homogeneous VAR model (PCH-VAR) implemented by Georgiadis (2012). The PCH-VAR model makes observable structural characteristics explanatory and representative for heterogeneities between cross-sectional units. Actually, the PCH-VAR allows for the dynamic between endogenous variables to vary across the cross-sectional units according to another variable (named the conditioning variable, or the interaction variable). Contrary to the IP-VAR model, the interaction variable is not fixed at arbitrary levels: the dynamic between the endogenous variables can be different at many levels (up to 300) of the conditioning variable. We can therefore observe the smooth evolution of the dynamic relationship between GDP and public spending according to the level of another variable – the degree of development.

Considering all the previous motivations, we use the PCH-VAR model. The reduced form of the model is[17]:

$$X_{n,t} = \sum_{j=1}^{p} A_j(z_{n,t}) X_{n,t-j} + C_n + H_q w_{t-q} + \varepsilon_{n,t} \tag{5}$$

where

- $X_{(n,t)} \equiv [G_{(n,t)}; Y_{(n,t)}]$ is the vector of endogenous variables as previously defined;
- $z_{(n,t)}$ is the matrix of conditioning variables (here development and an other one);
- C_n is the vector of deterministic terms (country fixed effects and country specific time trends);
- w_t is the vector of exogenous variables that are supposed to have a homogeneous effect across countries;
- E and H are matrices of parameters.

This PCH-VAR is estimated by OLS; following Georgiadis (2012) the model can be estimated as a standard multiple equations model. The PCH-VAR can also be estimated by using the Pesaran (2006) technique to address the cross-sectional dependence issue.

As in the simple PVAR case, PCH-VAR estimation gives us OIRFs, but here the coefficients matrix depends on the conditioning variables making the OIRFs to be conditional to these conditioning variables.

[16] Estimating the impact of N characteristics needs to have 2^N sub-samples.
[17] See Georgiadis (2012) for a more complete explanation.

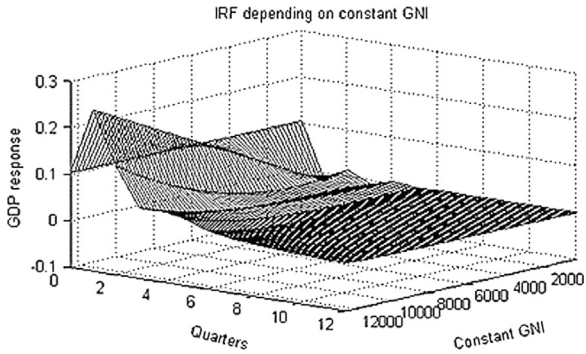

Fig. 3. GDP response to a one unit shock in public spending according to the level of constant GNI.

With two conditioning variables, six graphs in three dimensions are obtained. As an example, considering A and B two conditioning variables, we have:

- Three graphs for a given level of A (10, 50, 90% percentile of the sample), in which the IRF can vary according to the B variable;
- Three graphs for a given level of B (10, 50, 90% percentile of the sample), in which the IRF can vary according to the A variable.

Typically, we investigate whether the impact of public spending on GDP is conditional to a set of macroeconomic characteristics. Therefore we are interested in the figures that present the IRF according to some variables at low and high levels of development. By means of these IRFs, we know the reaction of GDP growth rate following a one unit shock in public spending growth rate. Actually, as with the PVAR model, these coefficients do not directly give fiscal multipliers. However, by using PCH-VAR model we only obtain an approximation of spending multipliers, and this is the main limit of this model. Nevertheless, pointing out the differences in the reaction of GDP growth to public spending variations according to the level of development is necessary to confirm that we have to take into account this kind of (structural) characteristics in fiscal multipliers estimations.

5.2. Results

Before estimating the impact of the considered factors, the PCH-VAR model is used in order to confirm previous results about the impact of development degree.

5.2.1. The degree of development

The following figures show the response of GDP to a one unit shock in public spending, after one-quarter, according to the level of constant GNI (Fig. 3), GNI per capita (Fig. 4) and HDI (Fig. 5).

In each case, we calculate an approximation of fiscal multiplier by collecting OIRFs coefficients and calculating the average of the spending-to-GDP ratio; then, the ratio of the first to the second is used. First, values are computed belonging the first and the last quartiles of the distribution of the conditioning variable. Second, multipliers are computed for the 10% percentile (90% percentile) of lower (higher) values of the conditioning variable; mulipliers values for the quartiles are presented in Table 10 and the ones for the percentiles are presented in appendix, Table 12.

The three indicators of development give a close to zero spending multiplier for the less developed countries in the sample (-0.04), and a close to one spending multiplier (1.01) in the more developed ones.[18] These values computed for EMEs are lower than those estimated using PVAR and IP-VAR, probably because of the countries that are in the first quartile of the GNI distribution: their

[18] Note that HDI gives a smaller multiplier for the more developed countries.

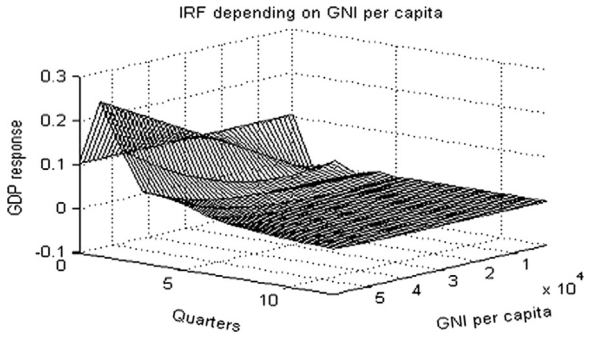

Fig. 4. GDP response to a one unit shock in public spending according to the level of GNI per capita.

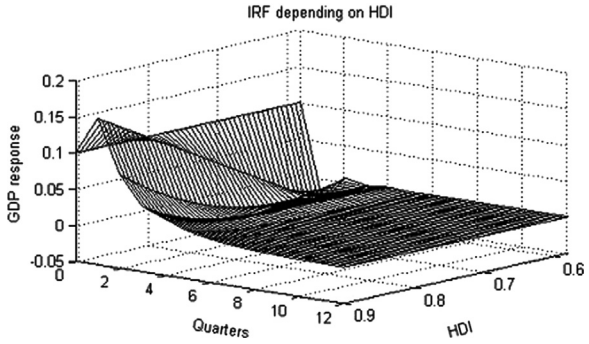

Fig. 5. GDP response to a one unit shock in public spending according to the Human Development Index.

Table 1
Spending multiplier at time $t=1$ according to the degree of development.

	Spending multiplier (average)
Value of constant GNI	
First quartile	−0.04
Last quartile	1.01
Value of GNI per capita	
First quartile	−0.04
Last quartile	1.01
Value of HDI	
First quartile	0.04
Last quartile	0.78

development level is less than the average level of all the EMEs considered in PVAR and IP-VAR models (Table 1).

In all the following cases, IRFs coefficients at low and high levels of the conditioning variables[19] are collected for two levels of development: at low level (fixed at 10% percentile of the development variable) and at high level (fixed at 90% percentile of the development variable). Each group of countries, considered as EMEs and AEs, has two multipliers and the gap between these two values is interpreted as the impact of the conditioning variable. Note that the relative rate of change is used to measure the gap between the two multipliers, thus we measure the sensitivity of multiplier to a change in the conditioning variable.

[19] The chosen levels are presented in appendix, Table 14.

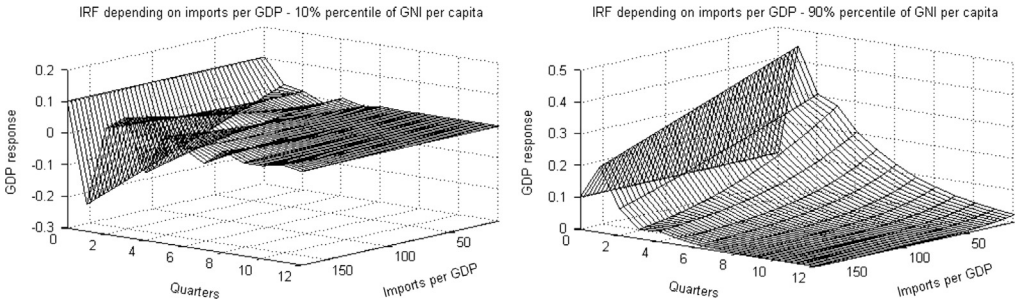

Fig. 6. GDP response to a one unit shock in public spending according to import-to-GDP ratio at low and high levels of development – PCH-VAR model.

Figures are presented by group of countries (EMEs and AEs), conditional IRFs for all countries together are presented in appendix, Fig. 14.

5.2.2. Trade openness

Trade openness may have a negative impact on fiscal multiplier: the higher the propensity to import is, the higher the leakage of demand is when public spending increase. Studying separately EMEs and AEs (Fig. 6) confirms the negative impact of imports on the GDP response to a fiscal expansion,[20] and the effect is more important in EMEs than in AEs. Note that the spending multiplier becomes negative[21] in EMEs when openness is high. In EMEs, the decrease of GDP due to an increase in public spending by one unit is around 90% larger when the imports-to-GDP ratio exceeds 100% of GDP. In AEs, the rise of GDP induced by an increase in public spending is 60% smaller when the ratio exceeds 100% of GDP. This conclusion confirms our expectations (Section 4).

5.2.3. The state of public finances

Globally, our results are in accordance with our expectations: multiplier effects are smaller, and even negative in EMEs, when public debt is high. A negative fiscal multiplier is possible especially if the confidence of consumers and investors is diminished, which is more likely to occur when the public debt-to-GDP ratio is increased by the fiscal expansion (Spilimbergo et al., 2009). In EMEs, multiplier is around 0.06 when public debt is lower than 40% of GDP, but when public debt becomes higher than 100% of GDP, spending multiplier becomes negative, around -0.12. This means that in the less developed countries in our sample, the increase of GDP due to an increase in public spending is around 150% higher when public debt represents less than 40% of GDP (Fig. 7).

Note that the negative impact of fiscal stimulus in case of high debt can reflect more than anti-Keynesian effects. Actually, anti-Keynesian effects lead to no effects of expansionary policy, but not necessarily to a negative one. Another explanation is the negative influence of high debt on interest rate premia (Hemming et al., 2002): when public debt is high, risk premia is important and interest rates increase. The link between risk premia and interest rates is stronger when government credibility is weak (Alesina and Perotti, 1994). Since governance is often considered as poor in EMEs, credibility of government in the management of public debt might be smaller, leading to a negative spending multiplier.

In AEs, spending multiplier is around 1.15 when public debt is lower than 40% of GDP, and it decreases up to 0.8 when public debt exceed 100% of GDP. In AEs, an increase by one unit of public spending leads to an increase of GDP by 43% higher when public debt is smaller than 40% of GDP.

Thus, the effect of high public debt is worse in EMEs than in AEs.

[20] We also estimate the model taking into account exports and we obtain the same results.

[21] Tervala (2009) presents a micro-based macro model in which fiscal multipliers can be negative under certain assumptions as a high substitution rate between private and public consumption and a strong complementarity between public consumption and leisure.

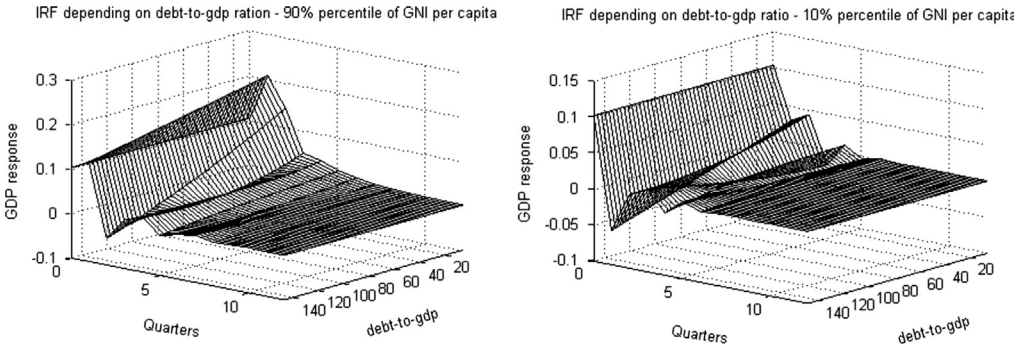

Fig. 7. GDP response to a one unit shock in public spending according to debt-to-GDP ratio for low and high levels of development – PCH-VAR model.

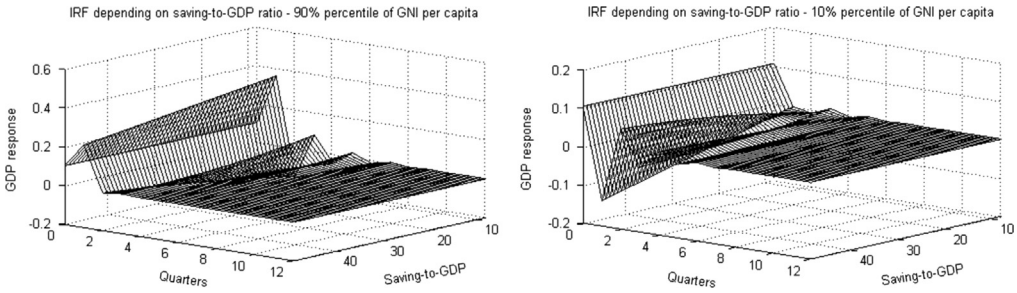

Fig. 8. GDP response to a one unit shock in public spending according to savings-to-GDP ratio at low and high levels of development – PCH-VAR model.

5.2.4. The savings rate

As explained in Section 4, we expect that savings reduce spending multiplier, firstly because savings are a leakage of demand, secondly because savings can be related to uncertainty. Fig. 8 confirms this assumption, both in EMEs and AEs. However, the scale of the effect is different between AEs and EMEs. In EMEs, the reduction of GDP after an increase in public spending is around 80% larger when the savings rate is high; in AEs, the rise of GDP due to a fiscal stimulus is 33% smaller when savings exceed 30% of GDP. Thus, EMEs are more sensitive to the savings rate than AEs.

5.2.5. The capacities utilization rate

Fig. 9 shows that the higher the unemployment rate is, the higher the spending multipliers are in AEs as in EMEs. However, we find a larger sensitivity of spending multipliers in EMEs than in AEs. We have no strong explanation about that.

5.2.6. Financial development

Fig. 10 shows that a higher development of financial system increases public spending efficiency. As explained in Section 4, the impact of financial development can be negative (by enabling the Ricardian equivalency, by increasing savings possibilities and by increasing instability) or positive (by increasing financing possibilities). Results from the PCH-VAR estimations are consistent with the positive effects of a reduction in credit rationing. As expected, this impact is weaker in AEs than in EMEs.

In sum, using a PCH-VAR model, we show that public spending efficiency is more sensitive to the macroeconomic factors considered in EMEs than in AEs. This statement can explain the inferiority of spending multipliers in EMEs because each factor has a worse effect on the multiplier in EMEs than the one in AEs. However, according to the average characteristics of our sample (see Table 15), this

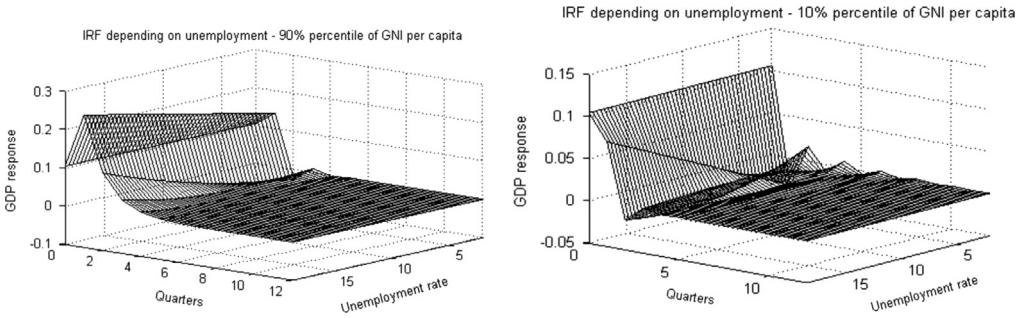

Fig. 9. GDP response to a one unit shock in public spending according to unemployment rate at low and high levels of development – PCH-VAR model.

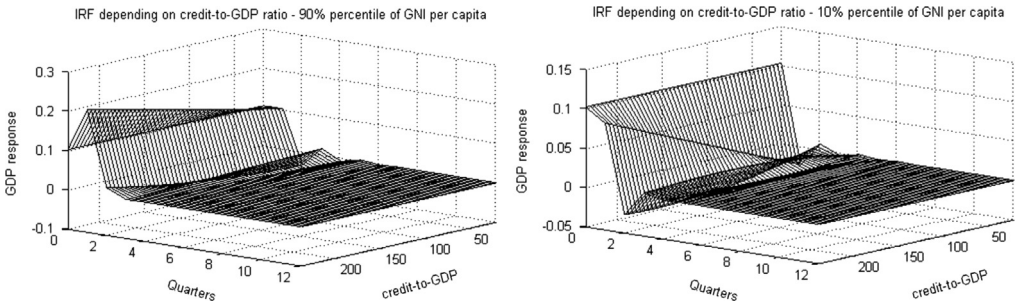

Fig. 10. GDP response to a one unit shock in public spending according to credit-to-GDP ratio at low and high levels of development – PCH-VAR model.

analysis shows that an improvement of the considered factors is not sufficient to make public spending in EMEs as efficient as in AEs despite a larger sensitivity.

6. Concluding remarks

Globally, our results are in line with previous results in the literature: we find a very small multiplier for EMEs (around zero) and close to one for AEs.

We show that imports, public debt and savings reduce spending multipliers both in EMEs and AEs, while unemployment and financial development increase spending multipliers. Regarding the scale of the impact of each determinant, public debt has the greatest influence in EMEs while this is trade openness in AEs. Moreover, all the determinants have a relative impact that is larger in EMEs than in AEs. In spite of this larger sensitivity in EMEs, each determinant is individually insufficient to make public spending in EMEs as efficient as in AEs. This result argues for differentiating the policy recommendations according to the development degree. Indeed, in EMEs, action is needed on several factors at the same time to ensure an efficient fiscal policy. Moreover, since multiplier effects are very low in EMEs, acting on the traditional determinants of fiscal multipliers could be ineffective. EMEs' governments could have to act on other factors as institutional quality.

To clearly address the issue of this paper, conclusions about fiscal multipliers in AEs cannot be fully extended to the case of EMEs. The effects of the tested factors broadly vary according to the development degree. For example, reducing public debt in EMEs is not sufficient to ensure a positive (and large) impact of public spending on GDP while AEs with low public debt have spending multipliers upper than one.

Nevertheless, our analysis presents two main limits because of the methodologies used.

First, analyzing the effect of several determinants at the same time would be interesting and may be better than analyzing them separately. However, the methodology used does not allow for adding more than two conditioning variables mainly because some interaction spaces are likely to be sparsely populated. Second, we have not enough data to control for public revenue. The computed multipliers are spending multipliers, considering no change in revenue structure and level.

In spite of these limitations, this paper empirically shows that the development degree has to be considered when fiscal multipliers are analyzed in a panel of EMEs and AEs. This work also opens perspectives for future research.

On one hand, we argue that institutions – notably revenue and spending management – could be responsible for the differences between fiscal policy efficiency in AEs and EMEs. Such an effect is not tested in the model because of the lack of variability in institutional measurements. However, the institutional context is likely to be responsible for the underlined gap.

On the other hand, an in-depth analysis and comparison of consumption behaviors after a fiscal stimulus according to the level of development can be interesting. Maybe such an analysis can support our conclusions and better explain the weakness of multiplier effects in EMEs.

Finally, this paper shows that recommendations made in order to improve fiscal policy efficiency in EMEs differ from those for AEs. To be more efficient, EMEs have to act on other factors than the traditional determinants of fiscal multipliers, otherwise the effect of public spending is likely to remain weak.

Acknowledgments

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Appendix A

Demonstration for spending multiplier computation from growth rates:
Note:

- y_t is the GDP at time t;
- g_t is the government spending at time t;
- irf_t is the impulse response function of GDP growth rate to a public spending growth rate shock at time t;
- σ_{g_t} is the initial shock of public spending growth rate;
- $b = g_T/y_T$ is the public spending on GDP ratio, on average over countries.

According to Spilimbergo et al. (2009), the impact multiplier is the variation of GDP at time t following a public spending shock at time t. Impact multiplier is computed as follows:

$$k_t = \frac{\Delta y_t}{\Delta g_t} = \frac{y_t - y_{t-1}}{g_t - g_{t-1}} \tag{6}$$

Since variables in the VAR are in growth rate, the coefficient read on IRF is:

$$\mathrm{irf}_t = \frac{y_t - y_{t-1}}{y_{t-1}} \tag{7}$$

And the shock is:

$$\sigma_{g_t} = \frac{g_t - g_{t-1}}{g_{t-1}} \tag{8}$$

The impact multiplier directly computed from IRFs with variables in growth rate, $\tilde{k_t}$, is therefore:

$$\tilde{k_t} = \frac{\mathrm{irf}_t}{\sigma_{g_t}} = \frac{\frac{y_t - y_{t-1}}{y_{t-1}}}{\frac{g_t - g_{t-1}}{g_{t-1}}} = \frac{y_t - y_{t-1}}{g_t - g_{t-1}} * \frac{g_{t-1}}{y_{t-1}} \tag{9}$$

which is equivalent to:

$$\tilde{k_t} = k_t * \frac{y_{t-1}}{g_{t-1}} \tag{10}$$

Therefore:

$$k_t = \tilde{k_t} * \frac{g_{t-1}}{y_{t-1}} \tag{11}$$

And finally:

$$k_t = \frac{irf_t}{\sigma_{g_t} * b} \tag{12}$$

with $b = g_{t-1}/y_{t-1}$.

Appendix B

See Figs. 11–14 and Tables 2–15.

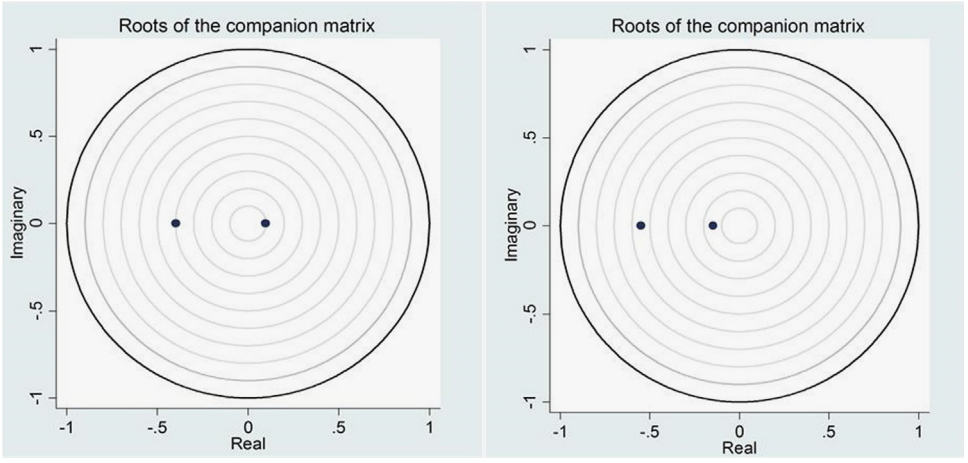

Fig. 11. Eigenvalues of the companion matrix for AEs (left) and EMEs (right).

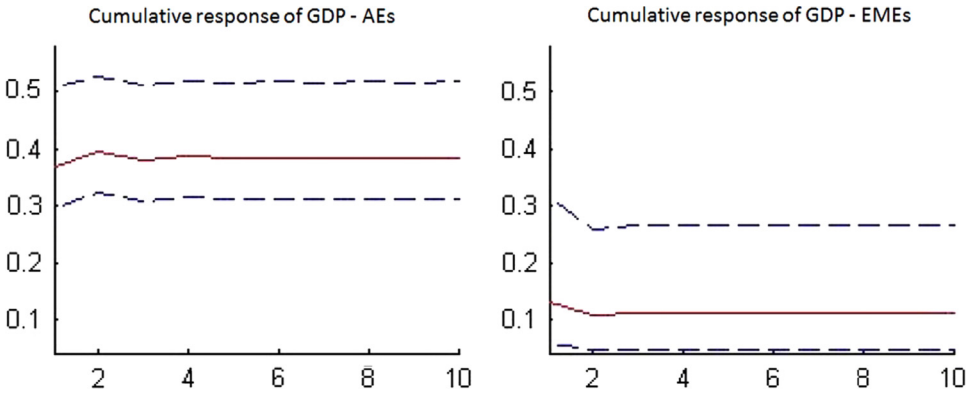

Fig. 12. Cumulative IRFs depending on development – PVAR model.

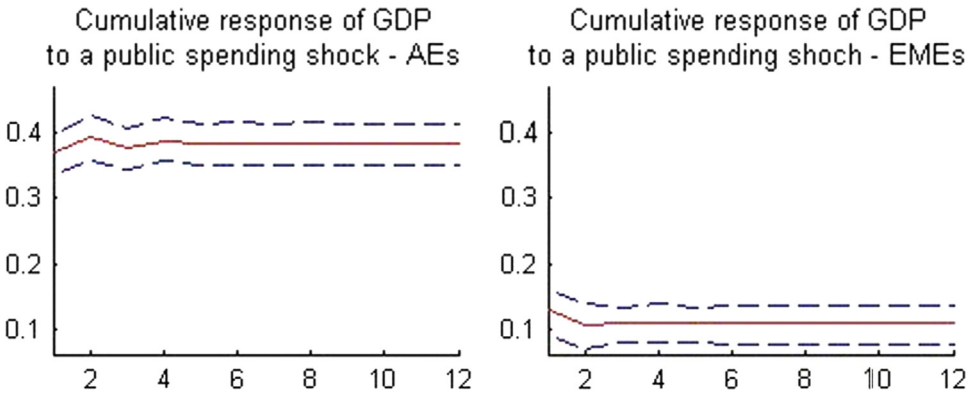

Fig. 13. Cumulative IRFs depending on development – IP-VAR model.

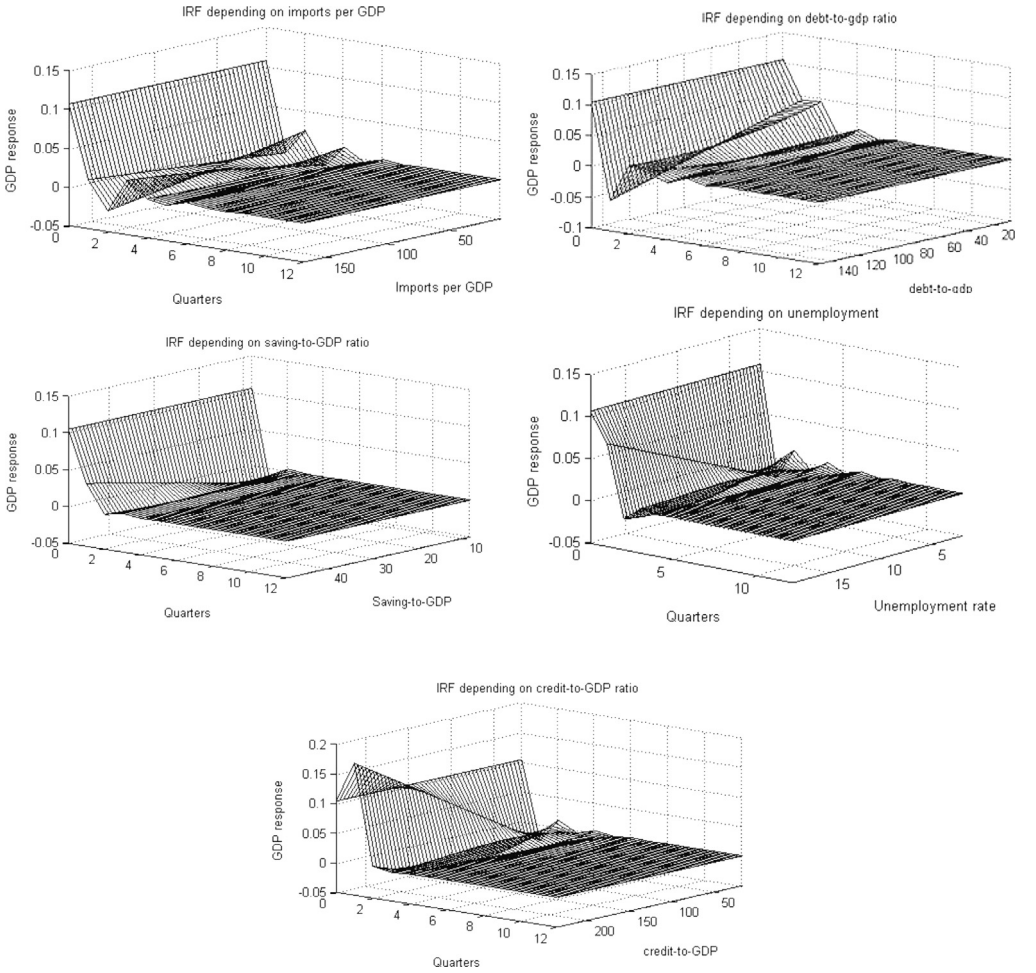

Fig. 14. GDP response to a one unit shock in public spending conditionally to the factors considered – PCH-VAR model, all countries.

Table 2
Fiscal multipliers determinants in the literature.

Factors	Authors	Country	Methodology	Results
Trade openness	Ilzetzki et al. (2013)	AEs & EMEs	Panel VAR	Trade openness increases Fiscal Multipliers (FM)
Exchange rate regime	Born et al. (2013)	OECD	Panel VAR	FM are larger in fixed exchange rate regimes
	Ilzetzki et al. (2013)	AEs & EMEs	Panel VAR	
	Corsetti et al. (2011)		New Keynesian Model	
	Corsetti et al. (2012)	OECD	Two-stages estimation	
Debt Level	Ilzetzki et al. (2013)	AEs & EMEs	PVAR	A higher government debt-to-GDP ratio decreases FM
	Cimadomo et al. (2010)	Euro Area	Time-varying structural VAR	
	Deák and Lenarcic (2012)	USA	Regime-switching VAR	
Labor market rigidity	Cole and Ohanian (2004)	USA	DSGE	Rigidities increase FM (if imply wage rigidities)
	Gorodnichenko et al. (2012)	Finland	DSGE	
Quality of public expenditure and revenue management	Cimadomo et al. (2010)	Euro Area	Time-varying SVAR	A smaller share of government investment reduces FM A larger share of public wages decreases FM
State of the business cycle	Mittnik and Semmler (2012)	USA	Regime-dependent VAR	FM are larger in time of low economic activity (or downturns)
	Baum et al. (2012)	G7	Threshold VAR	
	Auerbach and Gorodnichenko (2012b)	OECD	Regime-switching SVAR	
	Auerbach and Gorodnichenko (2012a)	USA	Regime-switching SVAR	
	Auerbach and Gorodnichenko (2013)	Japan	Regime-switching SVAR	
	Baum and Koester (2011)	Germany	Threshold SVAR	
	Corsetti et al. (2012)	OECD	Two-stages estimation	
	Perotti (1999)	OECD	Theoretical	
Degree of monetary accommodation to fiscal shocks	Nakamura and Steinsson (2014)	USA	Narrative approach	FM could be higher when the interest rate is lower
	Woodford (2011)		New Keynesian Model	
Composition and implementation of fiscal policy	Barro and Redlick (2011)	USA	Narrative approach	Increasing tax has a negative impact on GDP
	Alesina and Ardagna (2010)	OECD	Stat. analysis & simple regression (FM is not estimated)	Fiscal stimuli based on tax reductions have more positive effects (than spending increases)
	Mountford and Uhlig (2009)	USA	VAR	
Financial development	Corsetti et al. (2012)	OECD	Two-stages estimation	The higher the credit to GDP ratio is, the higher FM are
	Cimadomo et al. (2010)	Euro Area	Time-varying SVAR	
Development	Ilzetzki et al. (2013)	AEs & EMEs	PVAR	Fiscal multipliers are smaller in EMEs
	Kraay (2014)			
	Estevão and Samake (2013)			

Table 3
List of countries.

Country	Code	Country	Code
Argentina	ARG	Iceland	ISL
Austria	AUT	Italy	ITA
Belgium	BEL	Japan	JPN
Bulgaria	BGR	Korea	KOR
Bolivia	BOL	Lithuania	LTU
Brazil	BRA	Luxembourg	LUX
Switzerland	CHE	Latvia	LVA
Costa Rica	CRI	Malta	MLT
Cyprus	CYP	Malaysia	MYS
Czech Republic	CZE	Nicaragua	NIC
Germany	DEU	Netherlands	NLD
Denmark	DNK	Norway	NOR
Dominican Republic	DOM	Peru	PER
Spain	ESP	Philippines	PHL
Estonia	EST	Poland	POL
Finland	FIN	Portugal	PRT
France	FRA	Romania	ROM
United Kingdom	GBR	Singapore	SGP
Greece	GRC	Slovakia	SVK
Hong Kong	HKG	Slovenia	SVN
Croatia	HRV	Sweden	SWE
Hungary	HUN	Thailand	THA
Indonesia	IDN	Turkey	TUR
Ireland	IRL	Uruguay	URY

Table 4
Data sources.

Variable	Measurement	Source
d.ps	Final consumption of government at constant prices – US dollars – Log-difference	Eurostat – CEPALstat – Asian Bank of Development, financial and economic database
d.gdp	GDP at constant prices – US dollars – Log-difference	Eurostat – CEPALstat – Asian Bank of Development, financial and economic database
Public spending-to-GDP	Final consumption of government per GDP	Eurostat – CEPALstat – Asian Bank of Development, financial and economic database
Import-to-GDP	Imports of goods and services (% GDP)	World Bank – World Development Indicators Database
Debt-to-GDP	Gross government debt-to-GDP ratio	Abbas et al. (2010) – IMF – A Historical Public Debt Database
Savings-to-GDP	National Gross savings (% GDP)	World Bank – World Development Indicators Database
Unemployment rate	Total unemployment (% of total labor force)	International Labor Organization
Credit-to-GDP	Domestic credit to private sector (% GDP) provided by commercial banks and financial institutions	World Bank – World Development Indicators Database

Table 5
Descriptive statistics.

Variable	Observations	Mean	Std. Dev.	Min	Max
d.ps	3448	0.01	0.06	−2.19	2.17
d.gdp	3448	0.01	0.02	−0.24	0.36
Public spending-to-GDP	3496	0.18	0.08	0.01	0.77
Import-to-GDP	3448	50.33	33.91	7.01	228.74
Debt-to-GDP	3448	54.89	29.72	3.69	186.44
Saving-to-GDP	4424	22.81	8.89	1.99	54.29
Unemployment rate	4224	7.76	4.27	0.70	25.20
Credit-to-GDP	3448	99.14	60.90	11.10	347.34

Table 6
Stationarity tests for real GDP in log-level (GDP) and real public spending in log-level (PS).

	No time trend		Time trend	
Series	Im–Pesaran–Shin	Fisher	Im–Pesaran–Shin	Fisher
GDP	1.24 (0.89)	110.43 (0.42)	0.84 (0.80)	130.53 (0.10)
PS	1.67 (0.95)	92.70 (0.58)	4.45 (1.00)	63.27 (0.99)

Table 7
Stationarity tests for real GDP growth rate (d.gdp) and real public spending growth rate (d.ps).

	No time trend		Time trend	
Series	Im–Pesaran–Shin	Fisher	Im–Pesaran–Shin	Fisher
d.gdp	−36.33 (0.00)	−49.67 (0.00)	−49.29 (0.00)	−48.14 (0.00)
d.ps	−46.33 (0.00)	−50.81 (0.00)	−47.40 (0.00)	−50.07 (0.00)

Table 8
Westerlund error-correction-based panel cointegration tests – H0: series are non-co-integrated.

HA	Value	*P*-value	Bootstrapped *p*-value*
Co-integration of at least one of the cross-sectional units G_t	−1.06	0.28	0.12
Co-integration of at least one of the cross-sectional units G_a	−4.54	0.13	0.06
Co-integration for the panel as a whole P_t	−1.68	0.94	0.81
Co-integration for the panel as a whole P_a	−0.234	0.97	0.90

* Bootstrapped *p*-values are reported for 200 replications.

Table 9
Optimal lag length selection for AEs and EMEs.

Lag	AEs MMSC-AIC	EMEs MMSC-AIC
1	**1.91E−31**	**7.44E−32**
2	4.61E−31	9.66E−31
3	7.27E−31	4.43E−31
4	8.29E−31	1.43E−30
5	1.00E−30	1.53E−30
6	1.10E−30	8.42E−31

Table 10
Spending multipliers in AEs and EMEs using PVAR model.

Countries	IRF coefficients	Initial shock	ps/gdp	**Fiscal multiplier**
AEs	0.24	1	0.18	**1.33**
EMEs	0.09	1	0.22	**0.41**

Table 11
Spending multiplier in AEs and EMEs using IP-VAR model.

Countries	IRF coefficients	Initial shock	ps/gdp	**Fiscal multiplier**
AEs	0.26	1	0.18	**1.44**
EMEs	0.08	1	0.22	**0.39**

Table 12
Spending multipliers in AEs and EMEs according to development model using PCH-VAR model.

Conditioning variable (CD)	Value of CD	IRF coefficient (average)	Public spending to GDP ratio (average)	**Spending multiplier**
Constant GNI	10% percentile	−0.02	0.32	−**0.05**
	First quartile	−0.01	0.24	−**0.04**
	Last quartile	0.18	0.18	**1.01**
	90% percentile	0.18	0.17	**1.11**
GNI per capita	10% percentile	−0.02	0.32	−**0.05**
	First quartile	−0.01	0.24	−**0.04**
	Last quartile	0.18	0.18	**1.01**
	90% percentile	0.22	0.17	**1.28**
DHI	10% percentile	0.005	0.32	**0.02**
	First quartile	0.01	0.24	**0.04**
	Last quartile	0.14	0.18	**0.8**
	90% percentile	0.15	0.17	**0.86**

Table 13
Spending multipliers at low and high degree of development according to the traditional determinants.

Conditioning Variables	At 10% percentile of GNI per capita	At 90% percentile of GNI per capita
Low import multiplier	−0.02	2.44
High import multiplier	−0.51	1.51
Relative difference	0.96	0.61
Low debt multiplier	0.06	1.15
High debt multiplier	−0.12	0.80
Relative difference	1.50	0.44
Low saving multiplier	−0.06	1.99
High saving multiplier	−0.33	1.50
Relative difference	0.82	0.33
Low unemployment multiplier	−0.06	0.89
High unemployment multiplier	0.19	1.36
Relative difference	1.31	0.34
Low credit multiplier	−0.05	0.65
High credit multiplier	0.20	1.11
Relative difference	1.25	0.41

Table 14
Thresholds for low and high levels of the conditioning variables.

Variable	Low level (%)	High level (%)
Import-to-GDP	0–50	100–150
Public debt-to-GDP	0–40	100–140
Savings-to-GDP	0–20	30–50
Unemployment rate	2–6	14–18
Credit-to-GDP	0–50	150–200

Table 15
Means of main determinants in AEs and EMEs.

Variable	EMEs	AEs	*T*-test (*p*-value)
Imports per GDP	43.31	55.23	10.32 (0.00)
Public debt to GDP	49.07	62.05	10.25 (0.00)
Savings rate	20.11	25.87	22.06 (0.00)
Unemployment rate	8.48	7.09	10.7 (0.00)
Credit to GDP	55.31	129.8	44.26 (0.00)

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