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Essais sur la Politique Budgétaire
Multiplicateurs et Interactions Budgétaires

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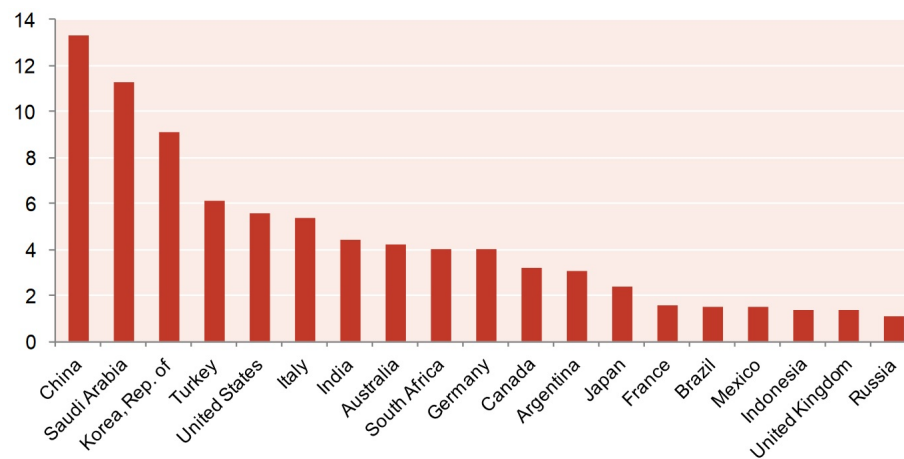
Première partie

Introduction Générale

Si au début des années 2000 la tendance était plutôt à la réduction de l'interventionnisme et de la taille du secteur public, la crise économique et financière de 2008 a suscité un regain d'intérêt pour l'utilisation de l'instrument budgétaire.

D'une part, la violence et la persistance de la crise ont imposé aux gouvernements la mobilisation de tous les instruments disponibles afin d'en contenir les effets. Les pays du G20 se sont donc lancés dans des programmes de relance sans précédent : en 2009, plus de 2% du PIB des 19 plus grandes économies mondiales (G20) ont été investis dans l'économie avec l'objectif d'enrayer la baisse de la demande globale. La Figure 1 montre ainsi l'importance de ces politiques de relance pour ces pays du G20. Les pays sont rangés selon l'importance des mesures de relance en proportion du PIB. A titre d'exemple, le gouvernement français a investi près de 2% de son PIB dans l'économie, ce qui représentait, en 2009, un montant de plus de 30 milliards d'euros.

FIGURE 1 – Montants en pourcentage du PIB des mesures de relance budgétaire dans les pays du G20 en 2008-2009 - Graphique tiré de ILS (2011)



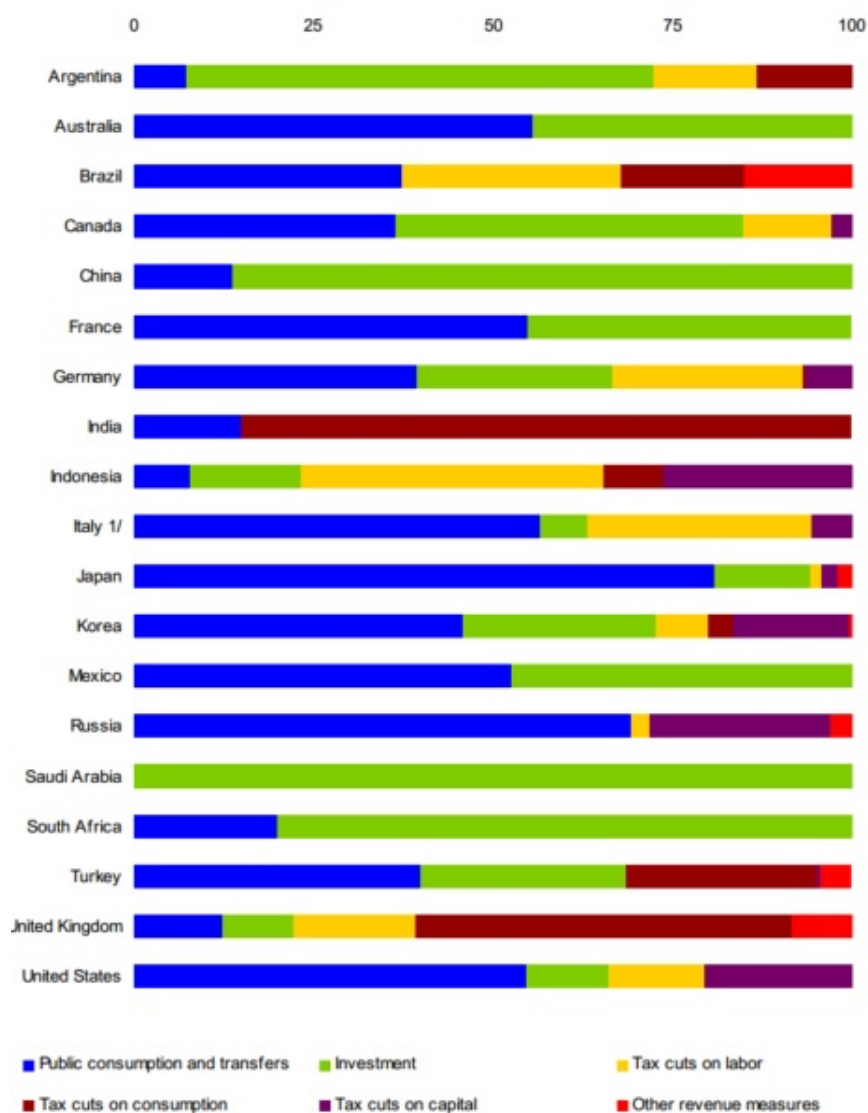
D'autre part, l'utilisation de l'instrument budgétaire est d'autant plus justifiée que la politique monétaire conventionnelle a très vite atteint ses limites. La paralysie du système interbancaire a en effet poussé les banques centrales à pratiquer des taux d'intérêt très bas de manière à ré-alimenter le circuit bancaire (*Zero Lower Bound*). Or, l'efficacité de la po-

litique budgétaire est reconnue comme étant plus importante lorsque les taux d'intérêt sont faibles.

Enfin, si les effets de la politique budgétaire semblaient relativement limités jusqu'alors, Blanchard et Leigh (2013) ont montré qu'ils étaient en fait largement sous-estimés. Ce résultat confirme d'ailleurs les travaux du Fonds Monétaire International, qui, dès 2008, publiait une étude sur les effets de la politique budgétaire en cas de crise systémique (Laeven et Valencia, 2008; 2010). Les spécificités de ces crises rendraient les politiques de relance budgétaire efficaces, puisqu'elles permettraient, a minima, de réduire la durée de la récession à la condition qu'elles soient mises en place à temps, de manière temporaire et ciblée. De même, pour relancer l'activité économique, il semble qu'une hausse des dépenses publiques soit plus efficace qu'une réduction des taxes. Cette affirmation a d'ailleurs pu guider les gouvernements dans le choix de la composition de leurs programmes de relance. La Figure 2 montre l'importance relative des mesures de relance en pourcentage de la relance totale. On observe en effet que les pays du G20 ont majoritairement préféré augmenter leurs dépenses de consommation et/ou d'investissement plutôt que de réduire leurs recettes fiscales. Les hausses de consommation publique sont représentées en bleu, et les hausses d'investissement en vert. Nous pouvons ainsi noter que les politiques budgétaires expansionnistes sont constituées d'une hausse des dépenses à plus de 50% hormis pour quatre pays (Brésil, Inde, Indonésie, Royaume-Uni). Ces augmentations de dépenses constituent même jusqu'à 100% des mesures de relances budgétaires pour l'Australie, la Chine, la France, le Mexique ou encore l'Arabie Saoudite.

L'analyse de l'efficacité de la politique budgétaire, et en particulier des dépenses publiques, reprend donc tout son sens tant le contexte actuel a dissous le relatif consensus existant jusqu'alors. Ce regain d'intérêt pour la politique budgétaire appelle en effet à une ré-évaluation de certaines problématiques relatives à son utilisation. D'abord, quels sont les facteurs déterminant l'efficacité de la politique budgétaire ? Comment leur importance peut-elle varier selon les pays et leurs structures économiques ? Ensuite, il apparaît que la coor-

FIGURE 2 – Composition des mesures de relance budgétaire en 2009 dans les pays du G20 - Graphique tiré de IMF (2009)



1/ Includes expansionary stimulus measures only.

dination des politiques budgétaires soit un critère d'efficacité. Se pose donc la question de l'effectivité d'une telle coordination au niveau international. C'est à ces problématiques que cette thèse ambitionne de répondre.

En premier lieu, les déterminants de l'efficacité de la politique budgétaire semblent être multiples. À titre d'exemple, il est assez largement admis que la politique budgétaire est

plus efficace durant les périodes de ralentissement économique (e.g. Corsetti et al., 2012; Baum et al., 2012). Les capacités de production sous-utilisées rendent l'ajustement de l'offre à l'augmentation de la demande plus rapide et moins coûteux. L'efficacité de la politique budgétaire s'en trouve alors améliorée. Néanmoins, l'effet d'autres facteurs, tel que le développement financier par exemple, sont plus controversés. Ainsi, de nombreuses questions subsistent. D'abord, les pays font face à des situations économiques très hétérogènes. Cette hétérogénéité pourrait entraîner, d'une part, une pluralité des déterminants de l'efficacité de la politique budgétaire, et d'autre part, une hiérarchisation différente de ces déterminants selon les pays. Nous tâcherons ainsi d'analyser les effets de facteurs d'efficacité identifiés par la littérature tout en prenant en compte l'hétérogénéité des structures économiques. Ensuite, si de nombreux déterminants de l'efficacité de la politique budgétaire ont déjà été envisagés dans la littérature, il nous semble possible que certains aient été oubliés. Notre intérêt se portera donc aussi sur des facteurs d'efficacité non considérés jusqu'alors.

En second lieu, il a été montré qu'une politique budgétaire expansionniste était d'autant plus génératrice de croissance qu'elle était conduite de manière coordonnée entre plusieurs pays (Hebous et Zimmermann, 2013). Pour davantage d'efficacité, les gouvernements devraient donc coordonner leurs efforts budgétaires. Néanmoins, certaines théories d'économie politique affirment que les États interagissent entre eux de manière stratégique, voire se concurrencent. Il est vrai qu'à l'échelle d'un gouvernement, l'existence, par exemple, de cycles politico-budgétaires et politico-économiques a été soulignée (e.g. Nordhaus, 1975; Rogoff et Sibert, 1988), conduisant notamment à observer des politiques budgétaires expansionnistes en périodes électorales. L'existence d'un objectif électoral pourrait alors réduire l'intérêt des gouvernements à la coopération ainsi que l'efficacité des politiques budgétaires mises en place. Nous chercherons donc à déterminer si une coordination des politiques budgétaires s'opère réellement entre les gouvernements.

La thèse s'articule donc autour de ces deux points : facteurs d'efficacité et interactions

budgétaires. L'étude des déterminants de l'efficacité de la politique budgétaire fait l'objet de la seconde partie de la thèse, et l'analyse des interactions fait l'objet de la troisième partie. Ces deux parties sont chacune scindées en deux chapitres et font l'objet d'un développement introductif ci-après.

Mesurer l'efficacité de la politique budgétaire : le multiplicateur keynésien

De manière générale, l'efficacité peut être définie comme l'obtention d'un résultat maximal par l'utilisation de moyens et ressources limités. Les critères à analyser pour juger de l'efficacité d'une politique vont donc dépendre de l'objectif de la dite politique. Si l'on suit la typologie des fonctions de l'État proposée par Musgrave en 1959, la politique budgétaire a trois fonctions principales : une fonction d'affectation des ressources de manière à financer les biens collectifs, un objectif redistributif, et enfin une fonction de régulation conjoncturelle qui consiste à lisser le cycle économique. Chacun de ces objectifs va induire une mesure de l'efficacité de la politique budgétaire très différente. Compte tenu du contexte actuel précédemment évoqué, et de l'utilisation évidente de la politique budgétaire en tant que régulateur conjoncturel, notre intérêt se porte naturellement sur la fonction de régulation conjoncturelle.

De ce point de vue, le gouvernement va utiliser la politique budgétaire pour agir sur l'activité économique qui peut être mesurée par le revenu total de l'économie, autrement dit par le Produit Intérieur Brut (PIB). C'est donc dans cette perspective que la première partie de cette thèse cherchera à analyser l'efficacité de la politique budgétaire en mesurant son effet sur le PIB. A cet égard, le concept de multiplicateur budgétaire, ou multiplicateur keynésien, est mobilisé.

L'effet multiplicateur des dépenses publiques est défini par J.M. Keynes en 1936, dans

son ouvrage *Théorie générale de l'emploi, de l'intérêt et de la monnaie*, comme étant la variation de l'output engendrée par une hausse des dépenses publiques. Au delà de la simple formalisation du mécanisme, J.M. Keynes démontrera aussi que ce multiplicateur budgétaire est supérieur à l'unité. Cependant, depuis Keynes, le multiplicateur a focalisé l'attention de nombreux chercheurs sans qu'aucun consensus n'ait semblé apparaître quant à sa valeur. D'après Creel et al. (2011), empiriquement, des valeurs du multiplicateur peuvent être trouvées sur un intervalle allant de -2,2 à plus de 3.

Les valeurs estimées du multiplicateur dépendent notamment des pays considérés. À titre d'exemple, Biau et Girard (2005) estiment un multiplicateur d'une valeur de 1.5 en France, Blanchard et Perotti (2002) estiment que le multiplicateur est compris entre 0.9 et 1.3 aux Etats-Unis, Giordano et al. (2007) montrent qu'il est de 1.7 en Italie, et De Castro et Hernandez De Cos (2008) l'estiment à 1.3 en Espagne. Ainsi, une multitude d'études existent sur une multitude de pays. Certains pays ont constitué l'objet d'étude de grand nombre d'auteurs, d'autres, au contraire, n'ont été que très peu analysés. C'est notamment le cas des pays émergents. Si, au lendemain de la crise économique et financière, les ressources investies par les pays émergents et en développement n'atteignent pas les montants investis par les pays industrialisés (Khatiwada, 2009), il n'est pas moins important de s'intéresser à leur efficacité.¹ Les pays émergents font face à des contraintes en termes de ressources bien plus strictes que les pays industrialisés, l'impératif d'efficacité y est donc d'autant plus prégnant. Ainsi, analyser et mesurer l'effet multiplicateur de la politique budgétaire dans les pays émergents semble indispensable puisque l'originalité de leur contexte structurel pourrait modifier les mécanismes traditionnellement mis en avant par la littérature sur les économies avancées.

1. Sur un panel de 32 pays industrialisés, émergents et en développement, l'IILS (2009) estime le montant total des relances budgétaires de 2009 à 1194,41 milliards de dollars pour les pays industrialisés, contre 795,57 milliards pour les pays émergents et en développement (voir Tableau 5 en Annexe pour les montants par pays).

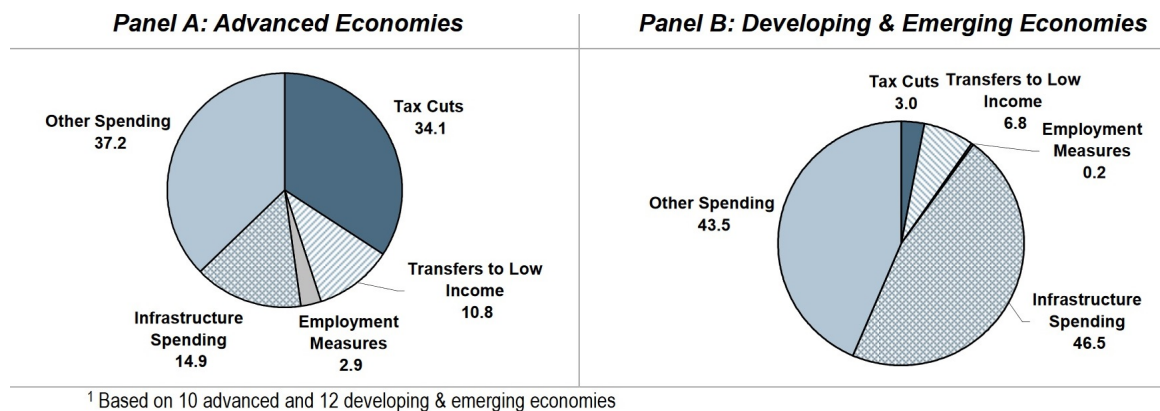
Les déterminants du multiplicateur budgétaire dans les pays émergents : quelles différences avec les pays industrialisés ?

Le contexte conjoncturel prévalant depuis dix ans a fait renaitre l'intérêt pour les multiplicateurs budgétaires et leurs déterminants. De nombreux articles ont cherché à analyser l'impact du contexte économique (e.g. phase du cycle économique, taux d'intérêt, régime de change) sur la valeur du multiplicateur, mais très peu se concentrent sur les pays émergents. Les quelques articles qui estiment des multiplicateurs budgétaires pour des pays émergents (Kraay, 2014; Ilzetzki et al., 2013) montrent que leur valeur est beaucoup plus faible que dans les pays industrialisés. Ceci peut s'expliquer par un contexte économique très différent : les pays émergents font face à une flexibilité moindre de l'offre, à une croissance relativement plus importante que les pays industrialisés cette dernière décennie, mais aussi à une gestion moins performante des dépenses publiques. Ces spécificités vont modifier les mécanismes économiques à l'œuvre, et par là même, les déterminants du multiplicateur. C'est d'ailleurs l'argument du premier chapitre de cette thèse qui estime l'impact des déterminants traditionnels du multiplicateur dans les pays émergents pour ensuite comparer ces résultats au cas des pays industrialisés.

En s'appuyant sur un panel de quarante-huit pays émergents et industrialisés, la première partie du chapitre cherche à ré-estimer la valeur des multiplicateurs budgétaires dans les pays émergents et dans les pays industrialisés. Notre intérêt se porte ici sur les dépenses plutôt que sur les recettes publiques pour deux raisons principales. D'une part, les données sur les recettes fiscales des pays émergents sont très peu disponibles, et d'autre part, les politiques budgétaires sont davantage basées sur une hausse des dépenses publiques que sur une réduction des prélèvements fiscaux. Ce dernier constat est d'ailleurs d'autant plus vrai pour les pays émergents, comme le montre la Figure 3. En effet, sur l'échantillon utilisé par Khatiwada (2009), en 2009, les hausses de dépenses publiques représentaient 52.1% des mesures de relance budgétaire dans les économies avancées contre 90% dans les économies émer-

gentes. L'organisation moindre du secteur public dans les pays émergents peut conduire à une collecte moins efficace des impôts et taxes. Agir sur l'activité économique par le biais de la taxation est dès lors plus complexe. Analyser l'efficacité de la politique budgétaire en se concentrant sur l'effet des dépenses publiques paraît alors pertinent.

FIGURE 3 – Composition des mesures de relance budgétaire de 2009 - Comparaison économies avancées (AEs) et économies émergentes (EMEs) - Graphique tiré de Khatiwada (2009)



Après avoir confirmé que les multiplicateurs budgétaires sont plus faibles dans les pays émergents que dans les pays industrialisés, nous cherchons à expliquer pourquoi. Notre intérêt se porte ainsi sur les déterminants du multiplicateur budgétaire dans ces deux groupes de pays.

Parmi les déterminants traditionnels du multiplicateur budgétaire, nous considérons ici :

- l'ouverture commerciale qui crée une plus forte fuite de la demande lors d'une hausse des dépenses publiques, et, de fait, aura tendance à réduire l'effet multiplicateur ;
- le niveau de dette publique qui, s'il est trop élevé, modifie les anticipations des agents qui augmenteront leur épargne plutôt que leur consommation à la suite d'un choc positif de dépenses publiques ;
- le taux d'épargne qui constitue une fuite de la demande et donc réduirait l'efficacité d'une hausse des dépenses publiques ;

-
- le taux d'utilisation des capacités de production qui augmente la flexibilité de l'offre lorsqu'il est faible et, par là même, augmente l'efficacité potentielle d'une relance budgétaire ;
 - le développement financier qui, lorsqu'il est faible, met à mal le principe d'équivalence Ricardienne en contraignant les agents à prendre leurs décisions selon leur revenu courant et non pas permanent ; lorsqu'il est important, en revanche, le développement financier peut augmenter les possibilités de financement et ainsi accroître la probabilité d'une hausse du PIB suite à une politique de relance.

En utilisant un modèle VAR (Vecteur Auto-Régressif) qui sera conditionnel à la fois au niveau de développement et à la valeur des facteurs sus-mentionnés, le multiplicateur peut être affecté différemment par chaque déterminant selon le niveau de développement des pays considérés. Ainsi, et à titre d'exemple, la méthode employée permet de mesurer l'impact d'un niveau élevé de dette publique sur la valeur du multiplicateur conditionnellement au niveau de développement économique.

Ce travail permet de montrer que les facteurs considérés influencent le multiplicateur budgétaire dans le même sens que ce soit dans les économies avancées ou dans les pays émergents. Toutefois, ces derniers y sont plus sensibles. Ainsi, nous montrons qu'une forte ouverture commerciale, un niveau élevé de dette publique ainsi qu'un fort taux d'épargne réduisent l'effet multiplicateur des dépenses publiques de façon plus importante dans les pays émergents que dans les économies avancées. A l'inverse, un fort taux de chômage et un développement financier important vont davantage améliorer l'effet d'une politique de relance dans les pays émergents. Concernant l'importance relative de ces facteurs, nous montrons que l'ouverture commerciale constitue le facteur le plus influent pour les économies avancées, alors qu'il s'agit de la dette publique pour les économies émergentes.

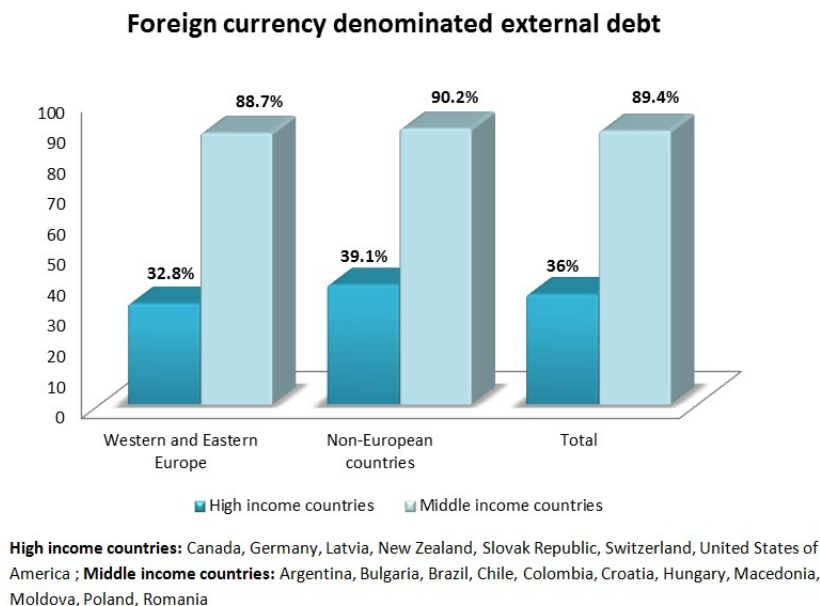
Ces résultats confirment que les économies émergentes présentent des spécificités par

rapport aux économies avancées : si les déterminants de l'efficacité de la politique budgétaire y sont similaires, leur impact et leur hiérarchisation y sont différents.

À ce stade, plusieurs facteurs d'efficacité de la politique budgétaire ont été étudiés. Néanmoins, il nous est apparu que les économies émergentes présentaient une spécificité qui n'avait pas encore été considérée comme déterminante pour l'efficacité de la politique budgétaire : leur taux d'endettement en monnaie étrangère.

D'une part, comme le soulignent Combes et Mustea (2014), les pays émergents ont vu l'importance de leur dette extérieure s'accroître considérablement, et d'autre part, les pays émergents sont très largement endettés en monnaie étrangère. Comme le montre la Figure 4, la part de la dette libellée en monnaie étrangère atteint près de 90% de la dette extérieure totale dans les pays émergents (*middle income countries* selon la classification 2017 de la Banque Mondiale), alors qu'elle n'est que de 36% dans les pays à haut revenu.

FIGURE 4 – Endettement extérieur moyen en monnaie étrangère en pourcentage de l'endettement extérieur total - 2016 - Graphique construit à l'aide de données issues de la Banque Mondiale (WB, 2015)



Si la littérature s'est intéressée à l'importance de la monnaie dans laquelle la dette publique est libellée, aucune étude, à notre connaissance, ne s'interroge sur le rôle de la monnaie d'endettement des agents privés dans la détermination de l'effet multiplicateur des dépenses publiques.

Dans le second chapitre de cette thèse, nous cherchons donc à compléter la littérature existante en analysant l'effet de l'endettement privé sur le multiplicateur budgétaire. Plus particulièrement, notre intérêt se porte sur la monnaie d'endettement des entreprises. Les entreprises sont en effet au cœur du mécanisme multiplicateur puisque leurs décisions en termes d'investissement vont (directement) influencer l'activité économique.

Endettement en monnaie étrangère : quelles implications pour le multiplicateur budgétaire ?

Les pays émergents sont très majoritairement endettés en monnaie étrangère (voir Figure 4). Or, l'endettement en monnaie étrangère peut s'avérer problématique du fait de l'exposition des agents aux variations de taux de change (Elekdağ et Tchakarov, 2007). Lorsque les agents sont endettés en monnaie étrangère, la valeur réelle de leur dette est directement affectée par les variations du taux de change : une appréciation de la monnaie locale va réduire la valeur réelle de leur endettement, tandis qu'une dépréciation engendrera une hausse de la valeur réelle de cette même dette. Si l'effet richesse positif en cas d'appréciation peut stimuler l'activité économique des agents, l'effet richesse négatif dû à une dépréciation risque en revanche de l'altérer.

En conséquence, tout facteur, y compris la politique budgétaire, qui influence le taux de change peut affecter l'activité économique via l'endettement en monnaie étrangère.

De nombreuses études, tant empiriques que théoriques (citons par exemple Kim, 2015, ou Bouakez et Eyquem, 2015), montrent qu'à l'inverse des prédictions traditionnelles du mo-

dèle Mundell-Fleming-Dornbush, une hausse des dépenses publiques n'est pas suivie d'une appréciation, mais d'une dépréciation de la monnaie locale. Dans ce cadre, une hausse des dépenses publiques augmenterait alors la charge de la dette des agents endettés en monnaie étrangère, créant un effet richesse négatif. L'effet potentiellement positif d'une relance budgétaire en serait amoindri.

C'est ce mécanisme qui est au cœur du deuxième chapitre de cette thèse, dont l'objet est de modéliser l'effet multiplicateur des dépenses publiques conditionnellement à la part de la dette des entreprises libellée en monnaie étrangère.

Ainsi, après avoir montré empiriquement que le multiplicateur budgétaire décroît avec la part de la dette libellée en monnaie étrangère, ce chapitre présente un cadre théorique permettant d'analyser l'efficacité de la politique budgétaire selon la part de la dette des entreprises libellée en monnaie étrangère. Pour ce faire, nous construisons un modèle à deux pays en équilibre général dynamique stochastique (DSGE). Ce modèle intègre des rigidités nominales (Calvo, 1983), un marché des capitaux imparfait et incomplet (Schmitt-Grohé et Uribe, 2003) et un mécanisme d'accélérateur financier à la Bernanke et al. (1999).

Le mécanisme d'accélérateur financier est central dans notre analyse, puisqu'il permet de modéliser la vulnérabilité des entreprises à leur structure de bilan, y compris à leur endettement en monnaie étrangère. A cet égard, une variation du taux de change modifie le poids de l'endettement des firmes et, par là même, leur richesse nette. En outre, pour accéder à un financement, les firmes doivent s'acquitter d'une prime de financement externe qui augmente avec le poids de leur endettement relativement à leur niveau de richesse. Cette prime de financement est en fait une prime d'agence due à un traitement contractuel de l'asymétrie d'information entre prêteur et emprunteur. Ainsi, la structure de financement des entreprises n'est plus neutre, puisque tout changement dans cette structure engendrera une variation de leur prime de financement externe. Une hausse de la valeur réelle de l'endettement d'une entreprise, ou une diminution de sa richesse nette, aura pour effet d'augmenter la prime et donc le coût de financement de la firme. Ses dépenses d'investissement en seront alors réduites, et

l'activité économique avec.

Dans ce cadre théorique, nous montrons qu'une hausse des dépenses publiques a un effet différent sur l'activité économique selon la monnaie dans laquelle est libellée la dette des entreprises. Suite à un choc positif des dépenses publiques, le taux de change réel se déprécie, amplifiant l'effet multiplicateur lorsque les entreprises sont endettées en monnaie locale, l'amoindrissant lorsque les firmes sont endettées en monnaie étrangère. En somme, ce résultat confirme l'observation empirique quant à l'effet négatif de l'endettement en monnaie étrangère sur le multiplicateur budgétaire. Ce chapitre nous permet donc d'affirmer qu'il est primordial pour les gouvernements d'inciter les agents économiques et, plus globalement le système bancaire, à privilégier la monnaie locale comme monnaie d'endettement s'ils souhaitent recouvrer l'efficacité de la politique budgétaire. Ce résultat apporte d'ailleurs une justification supplémentaire aux mesures de plus en plus nombreuses visant à limiter les prêts en monnaie étrangère dans les pays émergents.

En résumé, au sein de la première partie de cette thèse, nous montrons dans un premier temps que la sensibilité du multiplicateur à ses déterminants dépend du niveau de développement économique. Nous analysons ensuite l'importance d'un facteur ignoré jusqu'alors par la littérature : l'endettement en monnaie étrangère des entreprises. Nous montrons que la valeur du multiplicateur décroît avec l'importance de la dette libellée en monnaie étrangère.

Par ailleurs, la littérature a montré que la politique budgétaire est plus efficace lorsqu'elle est conduite de manière coordonnée entre plusieurs pays. Nous consacrons donc la seconde partie de la thèse à l'analyse des interdépendances des décisions publiques, de manière à déterminer la mesure dans laquelle la coordination budgétaire est plausible.

Les interactions budgétaires en Europe

L'aspect de la politique budgétaire abordé dans cette partie est relatif à l'interdépendance des économies, et, de fait, à l'interdépendance des décisions publiques. En Europe, la question d'une union fiscale est débattue depuis longtemps. Quelque peu laissé de côté, le débat a resurgi au lendemain de la crise financière et économique de 2008, lorsqu'il est apparu nécessaire de regrouper les forces européennes pour améliorer l'efficacité des gouvernements dans leur lutte contre la crise.

Les rôles d'institutions et de conseils ont été redéfinis² pour favoriser la coopération entre les différents gouvernements, et tant les économistes que les hauts responsables européens cherchent à fédérer les décisions budgétaires. S'il semble plutôt consensuel d'affirmer qu'associer ses efforts budgétaires et coopérer est plus efficace que d'agir de façon isolée, il semble bien moins évident que la coopération soit réellement une raison d'agir pour les gouvernements.

En effet, les gouvernements peuvent utiliser la politique budgétaire de manière stratégique et n'ont, individuellement, que peu d'incitations à mutualiser leurs efforts budgétaires.

D'une part, les gouvernements sont en concurrence les uns par rapport aux autres pour attirer des facteurs productifs mobiles. Ils vont alors utiliser l'instrument budgétaire pour se démarquer et tenter d'être plus attractifs que les autres. On parle alors de concurrence fiscale (Wilson, 1986; Zodrow et Mieszkowski, 1986).

D'autre part, les citoyens disposent de peu de moyens pour juger de l'efficacité absolue de l'action budgétaire. Ils peuvent donc être amenés à comparer les mesures prises par leur gouvernement à celles prises dans d'autres pays. Si un pays semble mettre en place une politique opposée jugée efficace, le gouvernement peut en pâtir en n'étant pas ré-élu lors des élections suivantes. Une concurrence par comparaison va alors s'opérer, incitant les gouvernements à

2. À titre d'exemple, en 2009, le Traité de Lisbonne fait du Conseil Européen une institution à part entière et définit officiellement le rôle de l'Eurogroupe.

se copier mutuellement pour ne pas s'exposer à de telles sanctions (Besley et Case, 1992).

Enfin, la mise en œuvre d'une politique budgétaire expansionniste génère des externalités positives. En effet, une hausse de la demande globale dans un pays entraîne une augmentation des importations, et donc des exportations des partenaires commerciaux. Dès lors, il peut être intéressant d'adopter un comportement de passager clandestin afin de bénéficier de davantage de croissance sans avoir à augmenter soi-même ses dépenses publiques. Ce comportement est avantageux tant pour l'État que pour le citoyen-contribuable.

La concurrence fiscale, la concurrence par comparaison et l'existence d'externalités positives sont autant de raisons pour lesquelles les gouvernements peuvent interagir entre eux, et ce sans coopérer. Néanmoins, selon la raison pour laquelle des interactions se produisent, les implications normatives seront très différentes. Si les gouvernements se concurrencent ou privilégient des objectifs électoraux, leur intérêt pour la coordination pourrait être limité et l'efficacité de la politique budgétaire réduite. La question de l'identification des raisons poussant les gouvernements à interagir est donc essentielle.

Identification de la nature des interactions budgétaires en Europe

Il a été montré, dans le cas de la zone Euro, qu'une politique budgétaire expansionniste coordonnée entre plusieurs pays est plus efficace qu'une relance de même ampleur mise en place par un gouvernement seul (Hebous et Zimmermann, 2013). Toutefois, et comme expliqué plus haut, les gouvernements sont peu enclins à coopérer.

Ainsi, ce troisième chapitre, après avoir testé l'existence d'interactions en termes d'orientation budgétaire en Europe, s'attache à déterminer la nature de ces interactions. Pour ce faire, nous avons recours à l'économétrie spatiale qui permet de modéliser les liens potentiels entre les pays, et de tester empiriquement l'existence de ces liens.

En particulier, l'utilisation d'un modèle spatial dynamique sur données de panel (SDPD) nous permet de tester l'existence d'interactions décalées dans le temps. Jusqu'alors, seules

des interactions budgétaires simultanées ont été estimées dans la littérature. Or, la politique budgétaire est soumise à un délai de mise en œuvre impliquant qu'elle ne répond aux changements conjoncturels qu'avec un retard, et non instantanément. Ainsi, il était fait abstraction du délai de réaction nécessaire aux gouvernements pour s'adapter aux changements réalisés par d'autres gouvernements. L'utilisation d'un modèle dynamique à la fois temporellement et spatialement nous permet donc de dépasser cette limite de la littérature.

Ce choix de modélisation nous permet de mettre en évidence l'existence d'interactions positives décalées dans le temps. Ces interactions témoignent notamment d'un phénomène de *meneur-suiveur* dans les prises de décisions budgétaires en Europe. Chaque pays imite l'action réalisée par ses voisins à la période précédente.

L'originalité de notre approche tient aussi à la méthode d'identification de la nature des interactions. Dans la littérature, très peu d'articles parviennent à déterminer la nature des interactions qu'ils observent. Bien souvent, les liens entre gouvernements sont modélisés par la distance géographique, ce qui ne donne aucune information. En effet, la proximité entre plusieurs pays peut impliquer de la concurrence fiscale, de la concurrence par comparaison ou même des externalités liées à de forts échanges commerciaux (Brueckner, 2003). Il apparaît donc nécessaire d'utiliser une modélisation des liens entre gouvernements qui révèle la cause de l'interaction. Ainsi, nous identifions la nature des interactions en associant à chaque motif théorique un canal de transmission spécifique.

Concernant la coopération, nous supposons que deux pays seront plus enclins à coopérer s'ils sont politiquement proches. Il est vrai que deux gouvernements n'étant pas du même bord peuvent coopérer en matière budgétaire, mais, en moyenne, si la coopération est bien la cause des interactions budgétaires, les interactions observées devraient être d'autant plus fortes que les gouvernements sont politiquement proches.

Suivant l'hypothèse de concurrence fiscale,³ les pays se concurrencent pour attirer des

3. Par concurrence fiscale, nous entendons ici une concurrence qui peut s'exercer tant en termes de taxation,

bases taxables mobiles, constituées principalement de capitaux. Selon la littérature existante, les institutions au sens large, ainsi que le niveau des taxes et investissements publics sont des facteurs importants pouvant déterminer l'attractivité d'un pays. Nous supposons que les pays similaires en termes d'institutions vont davantage utiliser l'instrument budgétaire pour se différencier, et donc se concurrencer. En cas de concurrence fiscale, les interactions observées devraient donc être plus importantes entre pays partageant des institutions similaires.

Pour traduire ces hypothèses, des matrices d'interactions ont été construites pour refléter la proximité politique d'une part, et la proximité en termes de contexte institutionnel d'autre part. L'absence d'interactions suivant ces schémas nous amène à rejeter l'existence de coopération et de concurrence fiscale.⁴ Nous en déduisons donc que les interactions décalées dans le temps observées sont dues à de la concurrence par comparaison. Nous confirmons par la suite cette conclusion en nous basant sur l'argument de Allers et Elhorst (2005) selon lequel la fragmentation politique d'un gouvernement réduit son intérêt à agir stratégiquement et donc à imiter son voisin. En effet, plus un gouvernement est divisé politiquement, plus le groupe politique à l'origine d'une mesure est difficile à identifier pour les citoyens, il est même envisageable que la mesure adoptée soit attribuée à d'autres partis. L'intérêt d'instaurer des mesures dans l'objectif d'être ré-élu devient alors très limité. Nous montrons que, dans le cas de l'Europe, la fragmentation politique des gouvernements réduit l'intensité des interactions, confirmant ainsi l'existence de concurrence par comparaison.

En somme, ce chapitre met en avant l'existence d'interactions positives décalées dans le temps dues à de la concurrence par comparaison. Cette étude, qui se veut d'abord positive, souligne la nécessité de renforcer les institutions européennes visant à favoriser la coopération budgétaire. Réduire les comportements stratégiques des gouvernements devrait en effet permettre d'accroître l'efficacité de la politique budgétaire.

affectant ainsi les revenus publics, qu'en termes d'investissement, affectant ainsi les dépenses.

4. La présence d'interactions dues à l'existence d'externalités positives a été écartée par le signe positif des interactions estimées.

Par ailleurs, les résultats de ce chapitre concernant le timing des interactions identifiées sont compatibles avec l'existence d'un phénomène de *leader-follower* parmi les pays européens. En d'autres termes, il est possible qu'un ou plusieurs pays soient suivis par d'autres dans leurs décisions budgétaires.

Compte tenu de l'actualité, et d'une croyance relativement répandue, l'Allemagne pouvait être vue comme occupant ce rôle de meneur. Le quatrième chapitre de cette thèse cherche donc à tester cette hypothèse.

Existe-t-il un leadership allemand en matière budgétaire en Europe ?

Dès les prémices de la construction européenne, l'Allemagne, et la France, ont joué un rôle clef dans la définition des règles organisant l'Union Européenne. Récemment, de nombreux articles tant journalistiques qu'économiques ou politiques traitent d'un potentiel leadership politique allemand (Schild, 2013). L'Allemagne est même utilisée par Schoeller (2015) comme illustration de sa théorie relative à l'émergence d'un leader politique.

Aussi, si un phénomène de *leader-follower* en matière budgétaire est observable en Europe, il est possible que l'Allemagne en soit le leader. Pour le vérifier, une spécification empirique similaire à celle utilisée dans le chapitre 3 est utilisée. Néanmoins, pour tester l'existence d'un leadership allemand, l'Allemagne n'est plus considérée comme interagissant avec les autres pays européens "d'égal à égal". Nous considérons que l'Allemagne agit d'abord, et nous estimons les réactions des autres pays aux changements de la politique allemande.

Cette analyse est relativement proche de celle réalisée par Altshuler et Goodspeed (2015) qui montrent la présence d'un leadership américain au sein des pays de l'OCDE en termes de politique fiscale. La technique d'estimation est toutefois plus complète ici dans la mesure où les estimations sont réalisées en prenant en compte les dynamiques à la fois temporelle et spatiale.

Les résultats obtenus dans ce chapitre montrent que l'Allemagne est bien suivie par les

pays européens. Les fonctions de réactions des différents pays suite à un changement budgétaire montrent que ce sont les pays d'Europe centrale, comme l'Autriche et la Slovaquie, qui sont les plus influencés par l'Allemagne.

En résumé, au sein de la seconde partie de cette thèse, nous montrons dans un premier temps que les choix budgétaires des gouvernements européens sont interdépendants. Néanmoins, nous montrons que la coopération n'est pas la raison de ces interactions qui se veulent avant tout stratégiques et politiques. Dans un second temps, nous mettons en avant le rôle de leader européen de l'Allemagne dans la mise en œuvre des politiques budgétaires nationales. Ce leadership pourrait d'ailleurs contribuer à la coordination des politiques budgétaires européennes, dans la mesure où, sous une impulsion allemande, les différents gouvernements pourraient être amenés à suivre la même voie.

Annexe

FIGURE 5 – Montants des mesures de relance budgétaire de 2009 par pays - Tableau tiré de Khatiwada (2009)

Table 4: Fiscal Rescue Packages ¹				
	Total Fiscal Package (USD billions)	Total Fiscal Package as a Percentage of GDP in 2009	Likely Spending in 2009 (in USD billions)	Spending in 2009 as a Percentage of GDP
Argentina	13.2	3.9	13.20	3.9
Australia	26.5	2.5	11.66	1.1
Belgium	2.52	0.5	2.52	0.5
Brazil	3.6	0.2	3.60	0.2
Canada	31.06	2.0	15.53	1.0
Chile	4	2.3	4.00	2.2
China	586	13.0	257.84	6.1
France	32.75	1.1	33.00	1.1
Germany	103.3	2.8	44.42	1.2
Hungary	6.5	3.8	6.50	4.0
India	4	0.3	4.00	0.3
Indonesia	6.15	1.2	6.15	1.2
Italy	6.3	0.3	6.30	0.3
Japan	110	2.3	70.40	1.5
Korea	25	2.7	12.50	1.3
Malaysia	18.2	7.9	9.10	4.2
Mexico	54	4.7	22.14	1.9
Netherlands	7.56	0.8	7.56	0.8
New Zealand	5	3.8	5.00	3.7
Norway	2.9	0.6	2.90	0.6
Philippines	6.84	3.7	3.42	1.3
Portugal	2.77	1.1	2.77	1.1
Russia	20	1.1	20.00	1.1
Saudi Arabia	60	11.3	21.00	4.0
South Africa	3.76	1.2	3.76	1.3
Spain	14.05	0.8	14.05	0.8
Switzerland	1.34	0.3	1.34	0.3
Thailand	8.32	2.8	3.16	1.2
Turkey	0	0.0	0.00	0.0
United Kingdom	36.36	1.3	33.81	1.2
United States	787	5.6	251.84	1.8
Vietnam	1	0.9	1.00	1.1
Total (\$ billions)	1989.98		894.48	
Advanced Economies	1194.41		515.60	
Developing & Emerging Economies	795.57		378.87	

¹ 2009 GDP based on IMF's growth forecasts for 2009

Source: ILS based on national sources

Deuxième partie

Les multiplicateurs budgétaires

Chapitre 1

Fiscal multipliers in Emerging Market Economies: Can we learn something from Advanced Economies? ⁵

1.1 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 -2.2 to more than 3 (Creel et al., 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.⁶ These studies

5. Chapitre publié sous la référence suivante : Hory M. P. (2016). Fiscal multipliers in Emerging Market Economies: Can we learn something from Advanced Economies? *International Economics*, 146, 59–84.

6. See Table 1.2 in Appendix for a review of the main articles that deal with fiscal multiplier determinants.

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 (Ilzetzi 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 Ilzetzi 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 Panel Vector Autoregressive (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 (trade openness, public debt, savings, unemployment, financial development). We use a Panel Con-

ditionally Homogenous VAR (Georgiadis, 2012) to allow multiplier effects to vary across the level of development and the chosen determinants. In this way, we can check whether the development degree modifies the determinants of the fiscal multiplier 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 follows. Section 1.2 surveys the main empirical methods used to estimate fiscal multipliers. Section 1.3 presents the estimation of multiplier effects in EMEs and AEs using PVAR and Interactive PVAR models. Section 1.4 discusses the theoretical intuitions and justifications for differentiating the effects of some macroeconomic factors according to the development degree. Section 1.5 briefly introduces the PCH-VAR model and outlines the empirical results about the conditional effects of the considered determinants. Section 1.6 concludes.

1.2 How to empirically measure multiplier effects?

Measuring fiscal multipliers 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:⁷ the narrative approach and the Structural Vector Autoregressive approach (SVAR).

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 subcategories of spending”, and military spending variations could be considered as exogenous to the economic context. The authors study the case of the United States and affirm that government spending on durable goods increased in time of military build-ups. As all wars in which the US has 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 spending⁸, but they only are interested in the US case. In 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, and the narrative approach cannot be applied. Thus, a second method was developed by Blanchard and Perotti (2002) who employ a Structural Vector Autoregressive (SVAR) model. Using a VAR model,

7. 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.

8. (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).

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 the economic context in the same quarter. The discretionary (exogenous) part of fiscal policy can be isolated by using quarterly data if we enforce the effect of current GDP on current spending to be zero.

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

- an automatic and immediate response to GDP and macroeconomic variations, commonly named “automatic stabilizers”;
- a discretionary change in fiscal policy in response to the economic context;
- a discretionary and 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 the current GDP has no effect on current spending. Even if automatic stabilizers act immediately, their effects on public spending are very small, the assumption therefore remains realistic.

Regarding discretionary changes in public spending according to the economic context, considering that public spending cannot be changed further to a GDP shock in only one quarter artificially suppresses endogenous changes in fiscal policy (Blanchard and Perotti, 2002). Actually, assuming that GDP has no contemporaneous effect on public spending ensures 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 aim 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.

1.3 Estimating multiplier effects in EMEs and AEs

In this section, fiscal multipliers in AEs and EMEs are estimated using two methodologies: a PVAR model, and an alternative specification of a PVAR with an interaction term (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 theirs. Regarding the IP-VAR model, to the best of our knowledge, this model has never been used for fiscal multiplier estimations, especially according to the development degree.

1.3.1 Methodology

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

$$X_{n,t} = \sum_{j=1}^p A_j X_{n,t-j} + C_n + \epsilon_{n,t} \quad (1.1)$$

Where:

- t denotes time and n denotes country;
- $X_{n,t} \equiv [G_{n,t}, Y_{n,t}]$, with G 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 error 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.⁹ 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 the Generalized Method of Moments (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 the Ordinary Least Squares (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 the 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, as explained in Section 1.2.

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:¹⁰

$$\Lambda_t = \frac{\Delta y_{t=T}}{\Delta g_{t=T}} = \frac{y_T}{g_T} \frac{\text{irf}_{t=T}}{\sigma_G} = \frac{\text{irf}_{t=T}}{b \cdot \sigma_G} \quad (1.2)$$

9. 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). Results are not presented because no significant difference has been found. However, public revenue is not introduced in the VAR because data are not available.

10. OIRFs do not directly give spending multipliers since GDP and public spending are introduced in growth rates. See the demonstration in Appendix.

And the spending multiplier through horizon N is:

$$\Lambda_N = \frac{\Delta y_{t+N}}{\Delta g_{t=T}} = \frac{y_T}{g_T} \frac{\text{irf}_{t=N}}{\sigma_G} = \frac{\text{irf}_{t=N}}{b \cdot \sigma_G} \quad (1.3)$$

Where:

- y_T is GDP at time T ;
- g_T is government spending at time T ;
- $\text{irf}_{t=T}$ 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;
- $b = g_T/y_T$ is the public spending to GDP ratio, in average over countries.

1.3.2 The data

We build an unbalanced panel dataset composed by 48 EMEs and AEs over the period 1990-2013. The list of countries is shown in Appendix, Table 1.3, and Table 1.4 presents 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 1.5.

Before running the estimation, an X-11 process is used to remove and correct data seasonality.

The first difference of the log of each variable is used, 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 1.6 shows unit root tests on variables in log-level. Given that the series are non-stationary, their growth rates are used.¹¹ 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.¹² They lead to reject the existence of co-integration relation between the series. GDP and public spending can be

11. Stationarity tests for variables in growth rates are presented in Table 1.7.

12. Results are presented in Appendix, Table 1.8.

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 the high income category are considered as EMEs¹³.

1.3.3 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. The optimal lag length is the one that minimizes the criterion. Table 1.9 in Appendix presents the MMSC-AIC¹⁴ 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, the PVAR stability is tested by checking the eigenvalue condition. Graphs presenting eigenvalues are available in Appendix, Figure 1.11.

Figure 1.1 shows the Orthogonal Impulse Response Functions (OIRFs) of real GDP growth rate to a one unit shock in public spending in AEs and in EMEs. Each IRF is computed with a 90% confidence band based on 2000 Monte Carlo replications.

From the OIRF coefficients, and according to Equation 1.2, 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 $N=2$).¹⁵ 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, Figure 1.12, for cumulative IRFs).

13. Countries can change category over the period.

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

15. See Appendix, Table 1.10 for details about computation.

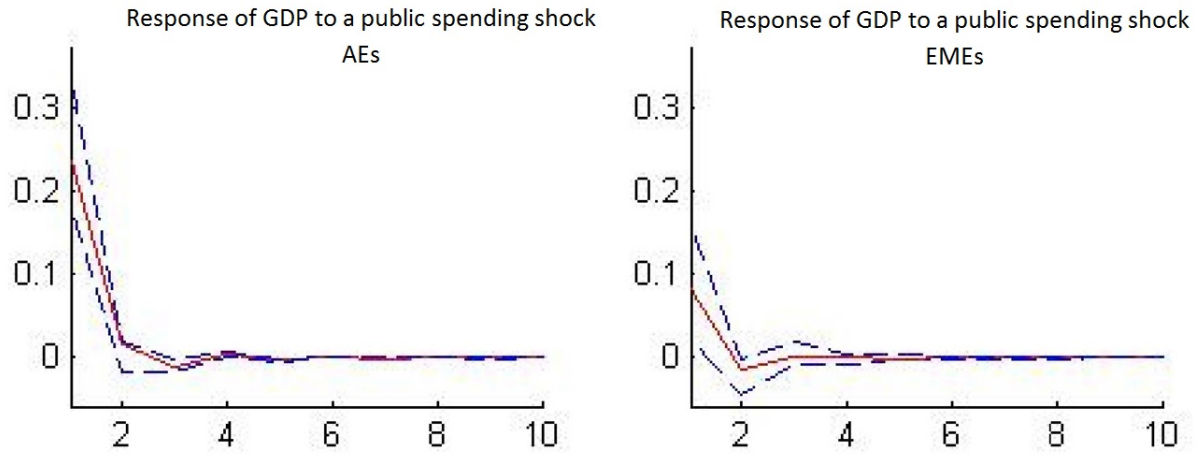


FIGURE 1.1: GDP responses to a one standard deviation shock in public spending in AEs (left) and EMEs (right) - PVAR model

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 an 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:

$$X_{n,t} = \sum_{j=1}^p A_j X_{n,t-j} + C_n + C_n Z_{n,t} + \sum_{j=1}^p B_j Z_{n,t} X_{n,t-j} + \varepsilon_{n,t} \quad (1.4)$$

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

Figure 1.2 presents the response of real GDP growth rate following a one unit shock in public spending respectively in AEs and EMEs. Cumulative IRFs for both groups are presented in Appendix, Figure 1.13.

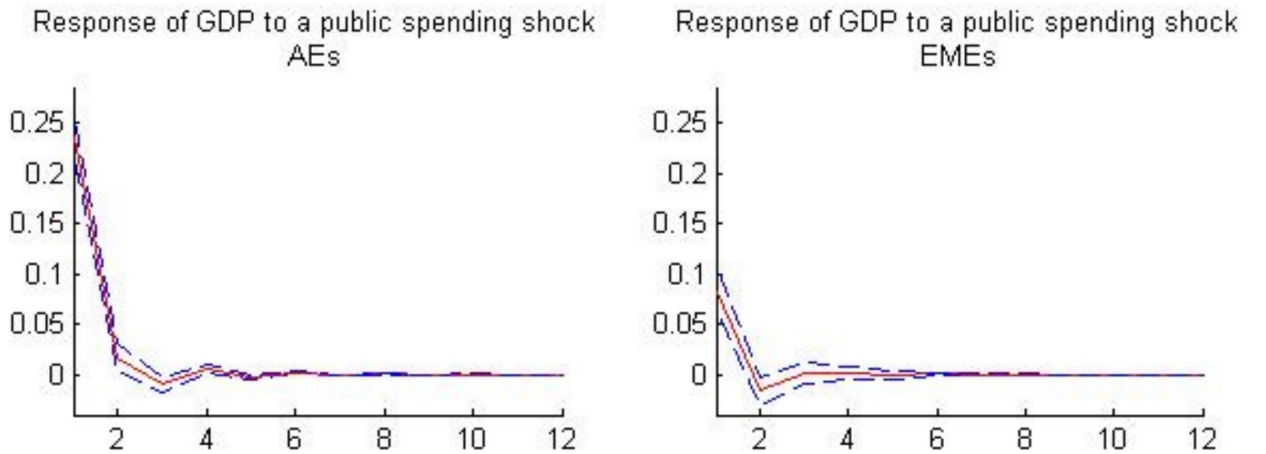


FIGURE 1.2: GDP responses to a one unit shock in public spending in AEs and EMEs – IP-VAR model

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, 1.44 in AEs.¹⁶ These results are very close to the ones found with the baseline PVAR model, and the effects also disappear

16. See Appendix, Table 1.11 for details about computation.

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 the 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, hence 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 multiplier 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.

Regarding 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 the other determinants of fiscal multipliers are the same in EMEs and AEs¹⁷, 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 also use a PVAR model to estimate spending multipliers according to other criterion, but they estimate a global effect by mixing EMEs and AEs. Thus, all countries in a same sub-sample have the same fiscal 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 for example according to the level of public debt; they show that a high public debt-to-GDP ratio leads to 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 1.2 in Appendix), but they do not account for the differences between EMEs and AEs. In the remainder of this article, 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.

17. 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 weakens public spending efficiency in EMEs than in AEs.

1.4 On the potential sources of differences between EMEs and AEs

This section presents the expected effects of the considered determinants of the fiscal multiplier. We also explain why these determinants could act in a different way and extent in EMEs than in AEs.

Table 1.2 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 capacity utilization rate and the financial development.¹⁸

1.4.1 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 more affect fiscal stimulus efficiency in EMEs than in AEs because of two main features.

First, in EMEs with large openness to trade, government could be encouraged to strongly rely on trade taxes as a broad source of revenue.¹⁹ 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

18. We do not address neither the question of the exchange rate regime or the role of monetary policy interest 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 the existing literature.

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

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.

Hence, trade openness may have a negative impact on the fiscal multiplier, and this impact could be larger in EMEs than in AEs.

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

1.4.2 The state of public finances

Regarding the public debt, Keynesian mechanisms assume that consumption is related to the 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). In its original version, this Ricardian equivalence asks for, among others, altruistic agents. Hence, a high public debt reduces spending multipliers 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 they will have to pay more taxes soon: the debt burden will not be supported only by future 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 leads to 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.

To sum up, a negative effect of public debt on the fiscal multiplier is expected, and this effect could be worse for EMEs than for AEs.

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

1.4.3 The savings rate

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

The savings rate depends on two main factors also involving a negative effect 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.²⁰

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.

20. This point is addressed at the end of the section by considering the credit-to-GDP ratio.

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. 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.

Therefore, a high savings rate could deteriorates multiplier effects both in AEs and EMEs. This effect could be larger in EMEs than in AEs if a high savings rate reflects uncertainty or if the financial sector makes a less efficient use of savings.

1.4.4 The capacity utilization rate

Keynesian mechanisms are based on some hypothesis. One of them is about the production capacity utilization rate: Keynesian mechanisms are effective in economies with excess production capacities. Indeed, when public spending increases, global demand rises and the 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 capacity utilization rate, we use the unemployment rate, which measures the quantity of unemployed workers related to the total 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 therefore expected to have a positive impact on the spending multiplier.

Unemployment could have a different impact on the fiscal multiplier in EMEs than in 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.

1.4.5 Financial development

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

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

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 equivalence proposition is invalidated (Khalid, 1996). An interpretation is that people are less forward-looking because they cannot smooth their consumption over time. Hence, countries with smaller credit-to-GDP ratio might have larger fiscal multipliers.

Furthermore, 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 could 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). Furthermore, 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 financing possibilities.

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 of trade openness, the level of public debt, the degree of uncertainty, and the financial development.

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

1.5.1 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 1.3, PVAR and IP-VAR specifications are used to compute spending multipliers in EMEs and AEs. However, using these both methodologies can be inadequate here.

With the PVAR model, the dynamic between the endogenous variables is supposed to be homogeneous across cross-sectional units. When we are interested in countries, this assump-

tion 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 increases²¹, and the number of observations by sub-sample quickly decreases.

The last limit of the 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 simultaneously controlled for. 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 heterogeneity between cross-sectional units. Actually, the PCH-VAR allows for the dynamic between the endogenous variables to vary across the cross-sectional units according to another variable (named the conditioning variable, or the interaction variable); and several conditioning variables can be introduced. 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

21. Estimating the impact of N characteristics needs to have 2^N sub-samples.

of the model is:²²

$$X_{n,t} = \sum_{j=1}^p A_j(z_{n,t})X_{n,t-j} + C_n + H_q w_{t-q} + \varepsilon_{n,t} \quad (1.5)$$

where

- $X_{n,t} \equiv [G_{n,t}; Y_{n,t}]$ 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 a vector of country fixed effects;
- w_t is the vector of exogenous variables that are supposed to have an homogeneous effect across countries;²³
- A and H are matrices of parameters.

This PCH-VAR is estimated by the 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 conditional to these conditioning variables.

With two conditioning variables, six graphs in three dimensions are obtained. As an example, considering that A and B are 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 variable B;
- Three graphs for a given level of B (10, 50, 90 % percentile of the sample), in which the IRF can vary according to the variable A.

In what follows, 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 show 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 pub-

22. See Georgiadis (2012) for more explanations.

23. Here, the equation is estimated without common exogenous variable.

lic spending growth rate. 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.²⁴ Nevertheless, pointing out the differences in the reaction of GDP 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 multiplier estimations.

1.5.2 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 the development degree .

The degree of development

The following figures respectively show the response of GDP to a one unit shock in public spending, after one quarter, according to the level of the constant GNI (Figure 1.3), the GNI per capita (Figure 1.4) and the HDI (Figure 1.5).

In each case, an approximation of the fiscal multiplier is computed by collecting OIRF 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 (i.e. the degree of development). Second, multipliers are computed for the 10% percentile (90% percentile) of lower (higher) values of the conditioning variable; multiplier values for the quartiles are presented in Table 1.1 and the ones for the percentiles are presented in Appendix, Table 1.12.

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 ones²⁵. These values computed for EMEs are lower than those estimated

24. An average fiscal multiplier is computed for low and high levels of the tested determinants.

25. Note that HDI gives a smaller multiplier for the more developed countries.

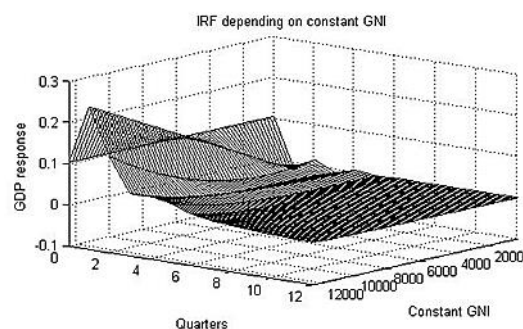


FIGURE 1.3: GDP response to a one unit shock in public spending according to the level of constant GNI

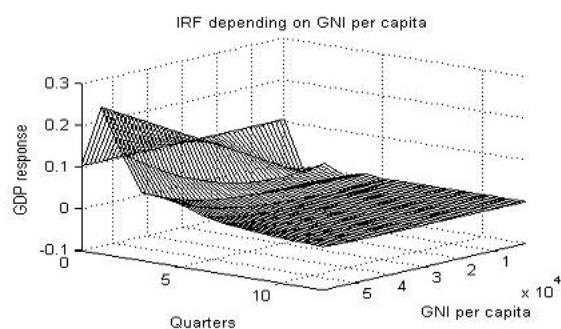


FIGURE 1.4: GDP response to a one unit shock in public spending according to the level of GNI per capita

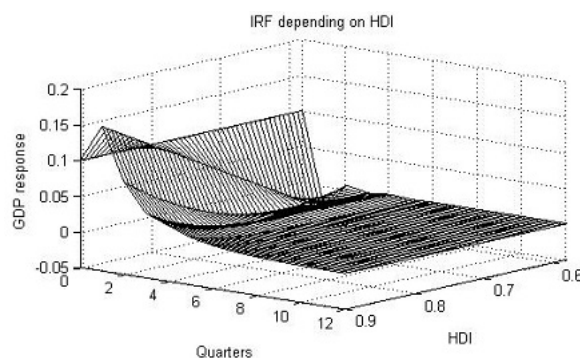


FIGURE 1.5: GDP response to a one unit shock in public spending according to the Human Development Index

using PVAR and IP-VAR, probably because of the countries that are in the first quartile of the GNI distribution: their development level is less than the average level of all the EMEs

TABLE 1.1: Spending multipliers 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

considered in PVAR and IP-VAR models.

In all the following cases, IRFs coefficients at low and high levels of the conditioning variables²⁶ 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, respectively 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.

Figures are presented by group of countries (EMEs and AEs), conditional IRFs for all countries together are presented in Appendix, Figure 1.14. In what follows, results for AEs are shown in the left graph, and results for EMEs are in the right graph.

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 (Figure 1.6) confirms the negative impact of imports on the GDP

26. The chosen levels are presented in Appendix, Table 1.14.

response to a fiscal expansion²⁷, and the effect is more important in EMEs than in AEs. Note that the spending multiplier becomes negative²⁸ 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 1.4).

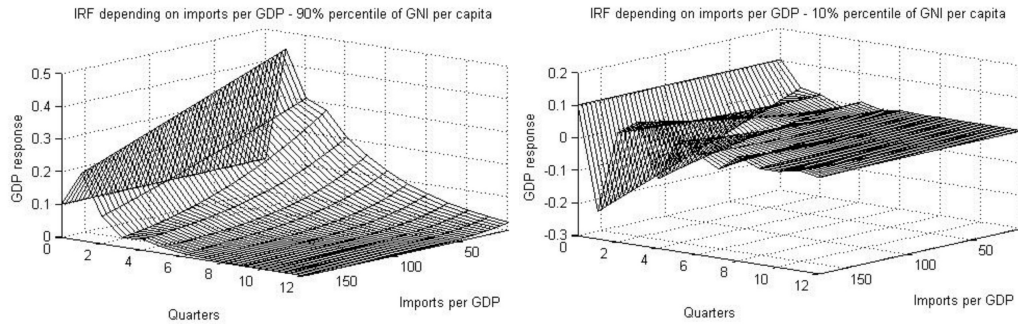


FIGURE 1.6: GDP response to a one unit shock in public spending according to import-to-GDP ratio at low and high levels of development – PCH-VAR model

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 even more 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

27. We also estimate the model taking into account exports and the same results are obtained.

28. 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.

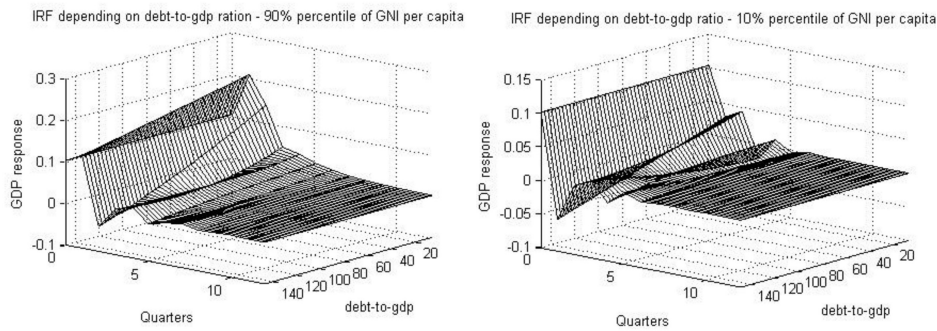


FIGURE 1.7: GDP response to a one unit shock in public spending according to debt-to-GDP ratio for low and high levels of development – PCH-VAR model

public debt represents less than 40% of GDP.

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, when public debt is smaller than 40% of GDP, the rise in GDP due to a change in public spending is 43% higher than in the case public debt exceed 100% of GDP.

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

The savings rate

As explained in Section 1.4, we expect that savings reduce the spending multiplier, firstly because savings are a leakage of demand, secondly because savings can reflect uncertainty.

Figure 1.8 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. Hence, EMEs are more sensitive to the savings rate than AEs.

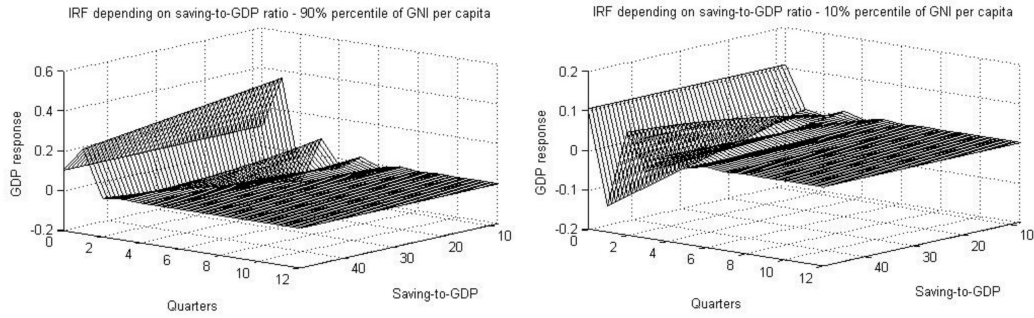


FIGURE 1.8: GDP response to a one unit shock in public spending according to savings-to-GDP ratio at low and high levels of development – PCH-VAR model

The capacity utilization rate

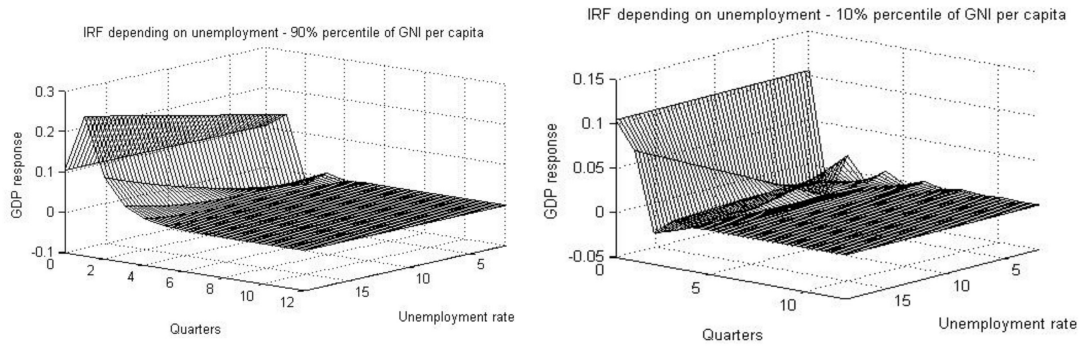


FIGURE 1.9: GDP response to a one unit shock in public spending according to unemployment rate at low and high levels of development – PCH-VAR model

Figure 1.9 shows that the higher the unemployment rate is, the higher spending multipliers are in AEs as in EMEs. Contrary to our expectations, the impact of unemployment on the fiscal multiplier is larger in EMEs than in AEs.

Financial development

Figure 1.10 shows that a higher development of the financial system increases public spending efficiency. As explained in section 4, the impact of financial development can be negative (by enabling the Ricardian equivalence, by increasing savings possibilities and by increasing instability) or positive (by increasing financing possibilities). Results from the PCH-VAR estimates are consistent with the positive effects of a reduction in credit rationing. As expected, this impact is weaker in AEs than in EMEs.

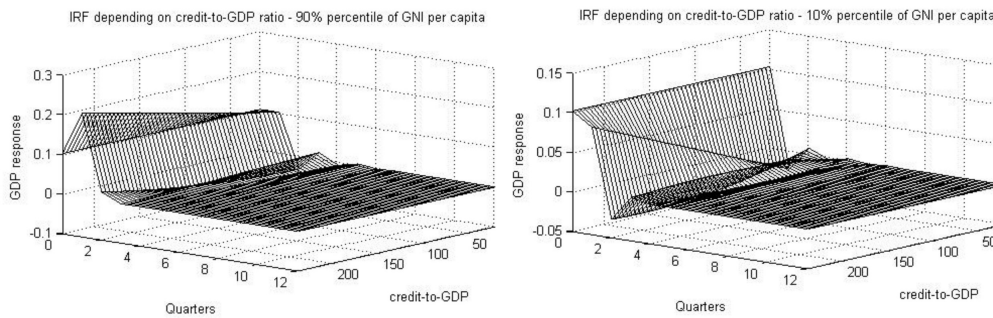


FIGURE 1.10: GDP response to a one unit shock in public spending according to credit-to-GDP ratio at low and high levels of development – PCH-VAR model

In sum, using a PCH-VAR model, we show that public spending efficiency is more sensitive to the considered macroeconomic factors 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 in AEs. However, the average characteristics of the sample (see Appendix, Table 1.15) show 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. In fact, smaller multipliers in EMEs remain even if some worsening factors takes smaller values there than in AEs.

1.6 Concluding remarks

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

We show that imports, public debt and savings reduce spending multipliers both in EMEs and AEs, while the spending multiplier is higher when unemployment and financial development are large. 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 seems individually insufficient to make public spending in EMEs as efficient as in AEs. This result argues for differentiate 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 the 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 effects of several determinants at the same time would be interesting and may be better than analyzing them separately. However, the method 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.

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. Moreover, the weak institutional context could reduce the confidence of economic actors. After an increase in public spending, if they are pessimistic, households are likely to increase their savings and firms could reduce investment leading to smaller public spending effects. Since the number of confidence surveys increases, it could be interesting to estimate fiscal multipliers conditionally to the results of these surveys. It can allow to measure the effect of confidence on the multiplier.

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.

Appendix

Demonstration for spending multiplier computation from growth rates:

Note:

- y_t is GDP at time t ;
- g_t is 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, in average over countries.

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

$$\Lambda_t = \frac{\Delta y_t}{\Delta g_t} = \frac{y_t - y_{t-1}}{g_t - g_{t-1}} \quad (1.6)$$

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

$$\text{irf}_t = \frac{y_t - y_{t-1}}{y_{t-1}} \quad (1.7)$$

And the shock is:

$$\sigma_{g_t} = \frac{g_t - g_{t-1}}{g_{t-1}} \quad (1.8)$$

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

$$\tilde{\Lambda}_t = \frac{\text{irf}_t}{\sigma_{g_t}} = \frac{\frac{y_t - y_{t-1}}{y_{t-1}}}{\frac{g_t - g_{t-1}}{g_{t-1}}} = \frac{y_t - y_{t-1}}{g_t - g_{t-1}} * \frac{g_{t-1}}{y_{t-1}} \quad (1.9)$$

Wich is equivalent to:

$$\tilde{\Lambda}_t = \Lambda_t * \frac{y_{t-1}}{g_{t-1}} \quad (1.10)$$

Therefore:

$$\Lambda_t = \tilde{\Lambda}_t * \frac{g_{t-1}}{y_{t-1}} \quad (1.11)$$

And finally:

$$\Lambda_t = \frac{irf_t}{\sigma_{g_t} * b} \quad (1.12)$$

With $b = \frac{g_{t-1}}{y_{t-1}}$

TABLE 1.2: Fiscal multipliers determinants in the literature

Factors	Authors	Country	Methodology	Results
Exchange rate regime	Born et al. 2013	OECD	Panel VAR	FM are larger in fixed exchange rate regimes
	Ilizetzi et al. 2013	AEs & EMEs	Panel VAR	
	Corsetti et al. 2011		New Keynesian Model	
	Corsetti et al. 2012	OECD	Two-stages estimation	
Public debt level	Ilizetzi 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	
	Stanova 2015	Eastern European countries	SVAR-X	
	Chian Koh 2017	AEs and EMEs	PVAR and sign restrictions	
	Nickel and Tudyka 2014	European countries	IP-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 spending 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
	Shen et al. 2015	LICs	New Keynesian model	Less efficiency of public investment reduces FM

Fiscal multipliers determinants in the literature (continuation)

Factors	Authors	Country	Methodology	Results
State of the business cycle	Mittnik and Semmler 2012	USA	Regime-dependent VAR	
	Baum et al. 2012	G7	Threshold VAR	
	Auerbach and Gorodnichenko 2012b	OECD	Regime-switching SVAR	FM are larger in time of low economic activity (or downturns)
	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	FM are larger in times of financial crisis and low economic activity or downturns
	Chian Koh 2017	AEs and EMEs	PVAR & Sign restrictions	FM are larger during recession than expansion only for Slovak Rep. and Czech Rep. – For Hungary, FM are high all over the business cycle
	Mirdala and Kameník 2017	Slovak Rep. – Czech Rep. – Hungary	TVAR	FM are larger in booms than in recession and lower in uncertainty times
	Alloza 2016	USA	SVAR and Narrative approach	

Fiscal multipliers determinants in the literature (continuation)

Factors	Authors	Country	Methodology	Results
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)	Tax reductions have larger positive effects than spending rises
	Mountford and Uhlig 2009	USA	VAR	Increasing public spending gives higher FM than tax cuts
	Bouakez et al. 2014	USA	Modified SVAR	FM are negatively correlated with the size of government spending
	Kitsios et al. 2016	AEs and EMEs	Correlated random coefficient model – Quantile regressions	The crowding out effect of public spending is reduced by external financing leading to higher FM
Trade openness	Shen et al. 2015	LICs	New Keynesian model	Increasing public spending gives higher FM than tax cuts
	Mirdala and Kameník 2017	Slovak Rep. – Czech Rep. – Hungary	TVAR	
	Ilzetzki et al. 2013	AEs & EMEs	Panel VAR	Trade openness increases Fiscal Multipliers (FM)
	Shen et al. 2015	LICs	New Keynesian model	High imports reduce FM

Fiscal multipliers determinants in the literature (continuation)

Factors	Authors	Country	Methodology	Results
Development	Ilzetzi et al. 2013	AEs & EMEs	PVAR	Fiscal multipliers are smaller in EMEs
	Kraay 2014			
	Estevão and Samake 2013			
	Chian Koh 2017		PVAR & Sign restrictions	
Degree of monetary accommodation to fiscal shocks	Brinca et al. 2016	OECD	OLG	FM is higher in case of high wealth inequality
	Nakamura and Steinsson 2014	USA	Narrative approach	FM could be higher when the interest rate is lower
	Woodford 2011		New Keynesian Model	
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	
	Sin 2016		DSGE	FM are higher in case of financial frictions
	Brinca et al. 2016		OLG	FM are higher in case of credit constrained agents
	Chian Koh 2017	AEs and EMEs	PVAR & Sign restrictions	FM increase with financial development

TABLE 1.3: 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 1.4: 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 and others (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 1.5: 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 1.6: 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 1.7: 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 1.8: 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 1.9: Optimal lag length selection for AEs and EMEs

	AEs	EMEs
Lag	MMSC-AIC	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 1.10: 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 1.11: 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

FIGURE 1.11: Eigenvalues of the companion matrix for AEs (left) and EMEs (right)

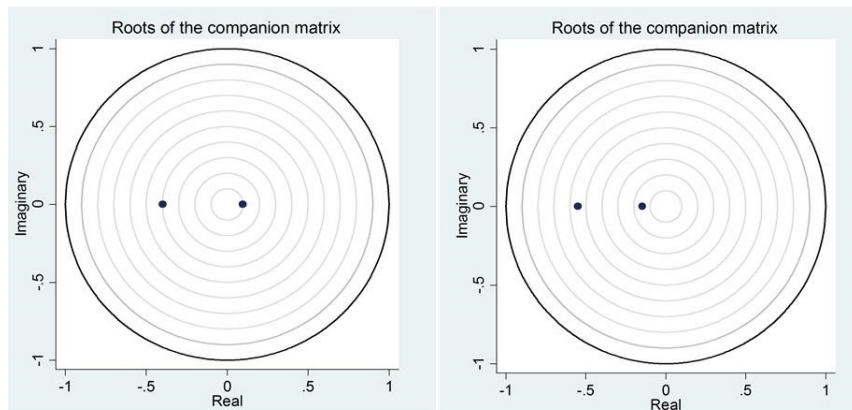


FIGURE 1.12: Cumulative IRFs depending on development - PVAR model

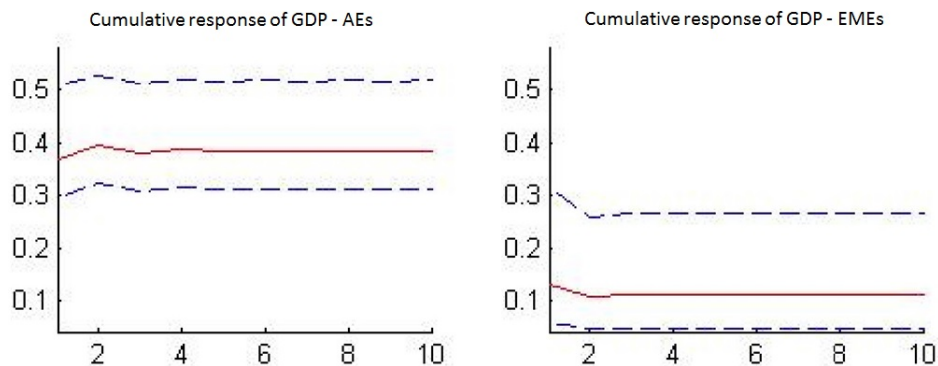


FIGURE 1.13: Cumulative IRFs depending on development - IP-VAR model

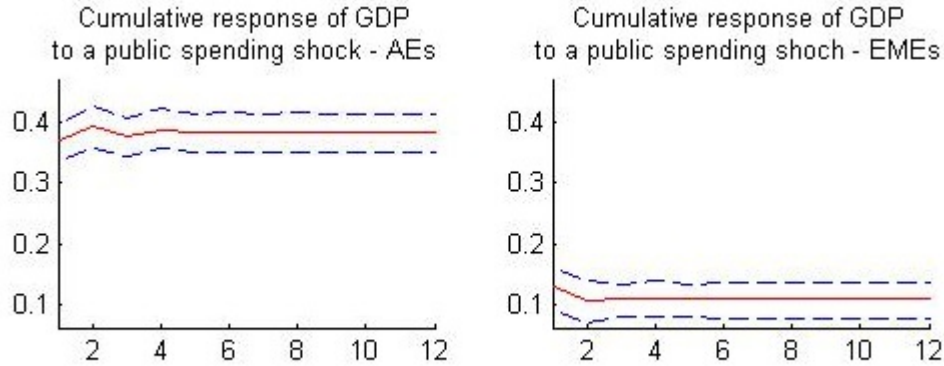


TABLE 1.12: Spending multipliers in AEs and EMEs according to the development level using PCH-VAR model

Conditioning variable	Value of the conditioning variable	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

FIGURE 1.14: GDP response to a one unit shock in public spending conditionally to the factors considered – PCH-VAR model, all countries

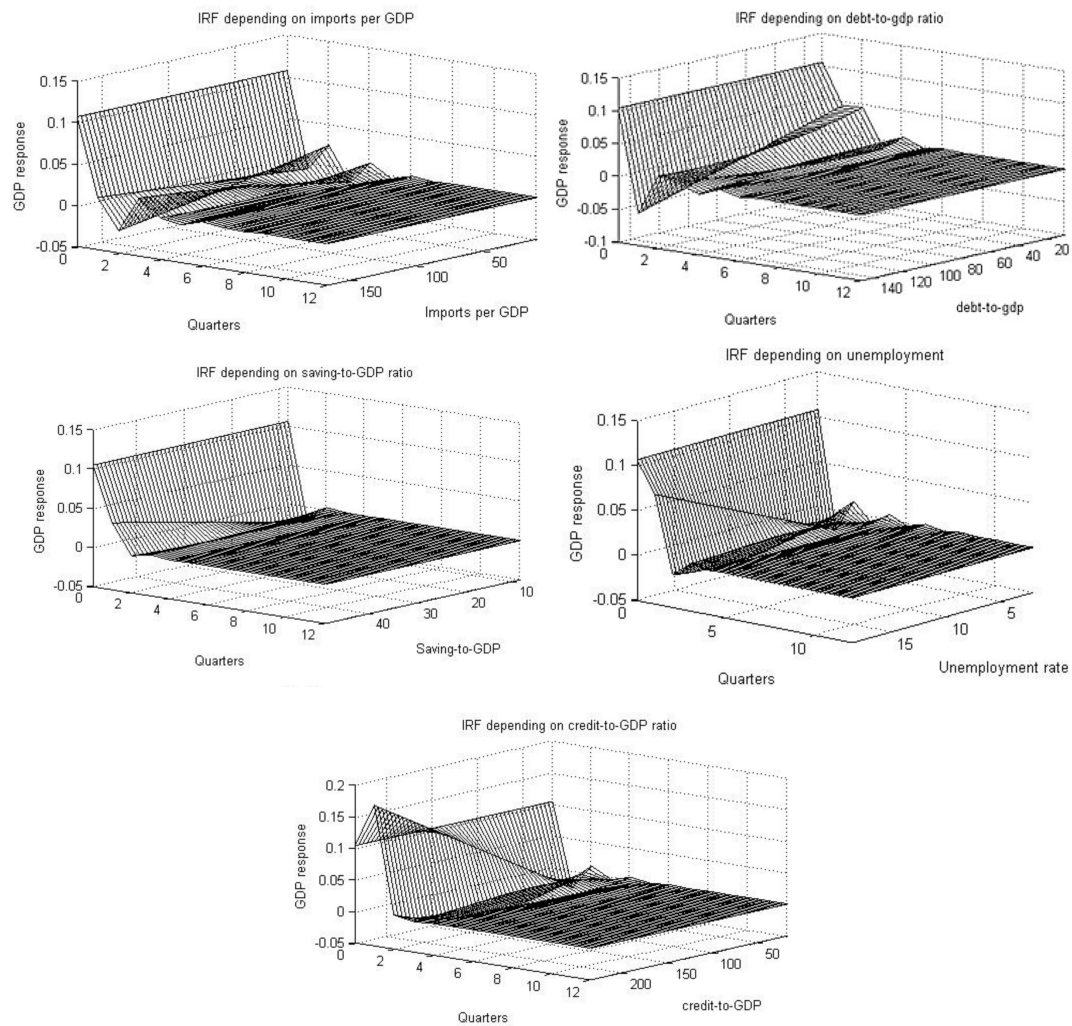


TABLE 1.13: Spending multipliers at low and high degree of development according to the traditional determinants

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 savings multiplier	-0.06	1.99
High savings 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 1.14: 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 1.15: 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)

Chapitre 2

Foreign currency denominated debt and the fiscal multiplier²⁹

2.1 Introduction

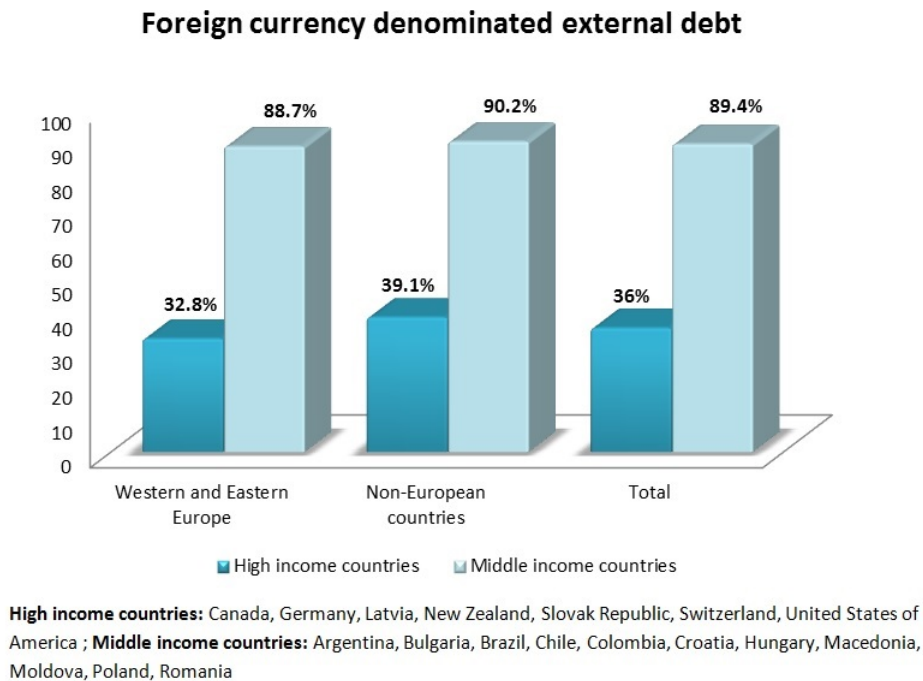
The empirical evidence shows that fiscal multipliers are smaller in Emerging Market Economies (EMEs) than in Advanced Economies (AEs) (Chian Koh, 2017; Ilzetzki et al., 2013; Hory, 2016). While fiscal multipliers are often found larger than one in AEs, they remain close to zero in EMEs; and this gap seems due to some specificities that differentiate EMEs from AEs.

Among the determinants of the fiscal multiplier, the existing literature shows that, among others, fiscal multipliers are higher when public debt is low (Deák and Lenarcic, 2012; Cimadomo et al., 2010), during business cycle downturns (Baum et al., 2012; Corsetti et al., 2012) and/or when interest rates are relatively low (Nakamura and Steinsson, 2014; Woodford, 2011). However, this literature often considers the level of development as a determinant per se, without fully explaining why fiscal multipliers are so small in EMEs. Regarding the

29. Chapitre co-écrit avec Grégory Leveigne (Université d'Orléans et Banque de France) et Daria Onori (Université d'Orléans).

argument of public debt, for example, emerging countries often experiment lower public debt to GDP ratios than AEs, that should lead to higher fiscal multipliers.³⁰ Moreover, some features of EMEs are not analyzed in the existing literature. This is the case of the currency denomination of external debt. In fact, there is a large difference between AEs and EMEs: while the former are mainly indebted in local currency, the latter are largely indebted in foreign currency. As shown in Figure 2.1, the share of foreign currency denominated external debt is close to three times higher in EMEs than in AEs.

FIGURE 2.1: Share of foreign currency denominated external debt



The impact of this feature on the efficiency of public spending has not been addressed in the literature, and this is what this paper aims to do. Especially, the goal of this paper is to analyze the effect of public spending, through the computation of fiscal multipliers, conditionally to the currency denomination of private debt, with a particular attention to firms'

30. Considering a panel of 41 countries from Europe and Central Asia between 2000 and 2013, the average debt-to-GDP ratio is 54% for high income countries, and 34% for middle income countries (Historical Public Debt Database, International Monetary Fund).

indebtedness. To this end, after presenting an empirical evidence of the negative impact of foreign currency denominated debt on the fiscal multiplier, we develop a theoretical framework that allows the impact of public spending to vary according to the currency denomination of external debt. We build a two-country Dynamic Stochastic General Equilibrium (DSGE) model that incorporates sticky prices, imperfect and incomplete international financial markets, a not-too-aggressive monetary policy and a financial accelerator mechanism à la Bernanke et al. (1999). Such an approach could provide an explanation, at least partial, of the small values of fiscal multipliers observed in EMEs.

On the one hand, being indebted in foreign currency makes firms vulnerable to exchange rate fluctuations. While an appreciation of the local currency leads to a decrease in the real value of their debt, a depreciation leads to an increase.

On the other hand, a change in fiscal policy generates exchange rate fluctuations. According to the traditional Mundell-Fleming-Dornbush model, the exchange rate is supposed to appreciate following an increase in public spending. However, many papers show the opposite: the exchange rate depreciates following an increase in public spending (Kim and Roubini, 2008; Betts and Devereux, 2000; Ravn et al., 2007; Kollmann, 2010; Corsetti et al., 2012; Bouakez and Eyquem, 2015).

The depreciation of the exchange rate following a positive public spending shock is due to the variation of the interest rate differential between two countries that, in case of imperfect financial markets, determines the real exchange rate variations. If the long run interest rate differential decreases, the real exchange rate decreases. According to Bouakez and Eyquem (2015), this occurs when the long term real interest rate increases less than the country premium. This condition necessitates to have a monetary policy not-too-aggressive, that is a feature consistent with actual worldwide trends in monetary policy.

This paper considers a theoretical framework similar to Bouakez and Eyquem (2015). In addition, we consider a two-country model, coupled by the presence of a financial acceler-

ator mechanism à la Bernanke et al. (1999), in order to account for the (large) vulnerability of firms to exchange rate fluctuations when they are indebted in foreign currency. The presence of the financial accelerator seems to better fit the data (Christensen and Dib, 2008) and especially accentuates the impact of the financing structure of firms on economic fluctuations.

In fact, firms finance their activity by accessing external financing both in local and foreign currency. More than the interest rate, they have to pay an external finance premium, due to informational imperfections, that increases with their capital to net worth ratio. Introducing a financial accelerator makes the financing structure of firms non-neutral: a variation in the indebtedness level of firms and/or a variation of their net worth lead to a change in the external finance premium that modifies financing costs and therefore affects investment, leading to economic fluctuations.

Especially, if an increase in public spending leads to a depreciation of the exchange rate, the firms that are indebted in foreign currency face an increase in the real value of their debt. The increase of the external finance premium leads to a decrease in investment, and therefore economic growth worsens. In such a case, the efficiency of an increase in public spending could therefore be reduced.

To sum up, the contributions of this paper are twofold. Firstly, the paper provides an empirical evidence of the negative impact of foreign currency denominated external debt on the fiscal multiplier by using a Panel Conditionally Homogeneous VAR (Georgiadis, 2012). Secondly, the negative impact of foreign currency denominated debt is emphasized in a two-country DSGE model with sticky prices, imperfect and incomplete financial markets, a not-too-aggressive monetary policy and a financial accelerator mechanism.

The paper is organized as follows. Section 2.2 presents an empirical evidence of the negative impact of foreign currency denominated external debt on the multiplier. Sections 2.3, 2.4 and 2.5 respectively show the theoretical model, the calibration used and the results

we obtain. Section 2.6 discusses alternative calibrations of the model. Finally Section 2.7 concludes.

2.2 Empirical evidence

In the literature, the impact of some determinants of the fiscal multiplier has been estimated, as for example the degree of openness or the level of public debt but, to the best of our knowledge, nothing is said about the importance of the currency denomination of private debt. This section therefore presents estimates of the impact of foreign currency denominated debt on the fiscal multiplier.

2.2.1 Empirical Specification

How does foreign currency denomination of indebtedness affect the impact of public spending on GDP? To address this question, fiscal multipliers have to be estimated conditionally to the currency denomination of debt. Nevertheless, this involves some technical difficulties.

First, some assumptions are necessary to identify exogenous shocks in public spending since measuring the impact of public spending on GDP leads to reverse causality issues.

Following Blanchard and Perotti (2002), we assume that the economic context can contemporaneously respond to government spending, but government spending are not contemporaneously affected by the economic context. Especially, it is assumed that a government takes at least one quarter to change its fiscal policy regarding economic context variations. This assumption reflects, among others, the decision and implementation lags of fiscal policy. Therefore, we use a Panel Vector Autoregressive (PVAR) model with a Cholesky decomposition that allows to generate Orthogonalized Impulse Response Functions (OIRF), meaning that the shocks generated are identified.

Second, estimates have to be conditional to the currency denomination of indebtedness. Georgiadis (2012) provides a method which allows to estimate a dynamic, within a VAR, that can vary according to the level of a conditional variable. Using his Panel Conditionally Homogeneous VAR (PCH-VAR), the dynamic between public spending and GDP can be estimated conditionally to the currency denomination of external debt.

The following equation is estimated:³¹

$$X_{n,t} = \sum_{s=1}^p A_s(z_{n,t}) X_{n,t-s} + C_n + \varepsilon_{n,t} \quad (2.1)$$

with:

- $X_{n,t} = [G_{n,t}; Y_{n,t}]$, where G is the quarterly growth rate of public consumption, and Y is the quarterly growth rate of GDP;
- $z_{n,t}$ is a vector containing the conditioning variable: the share of external debt denominated in foreign currency;
- $C_{n,t}$ is a vector of country fixed effects;
- $\varepsilon_{n,t}$ is a vector of reduced form residuals with $var(\varepsilon_{n,t}) = \hat{\sigma}$.

2.2.2 Data

Data about currency denomination of private debt are not broadly available. This constrains to use data on currency denomination of total external debt, including both private and public debt; this is the first limitation of our estimates.

A sample of 7 countries³² is considered, including both emerging and advanced economies, over the period 2005Q1-2013Q4, implying a total of 364 observations. Countries, as well as the time period, have been chosen conditionally to data availability.

31. See Georgiadis (2012) for detailed explanations about the methodology, and Chapter 1 for an application of the PCH-VAR to the estimation of the fiscal multipliers.

32. Bulgaria, Croatia, Germany, Hungary, Slovak Republic, Switzerland and Turkey.

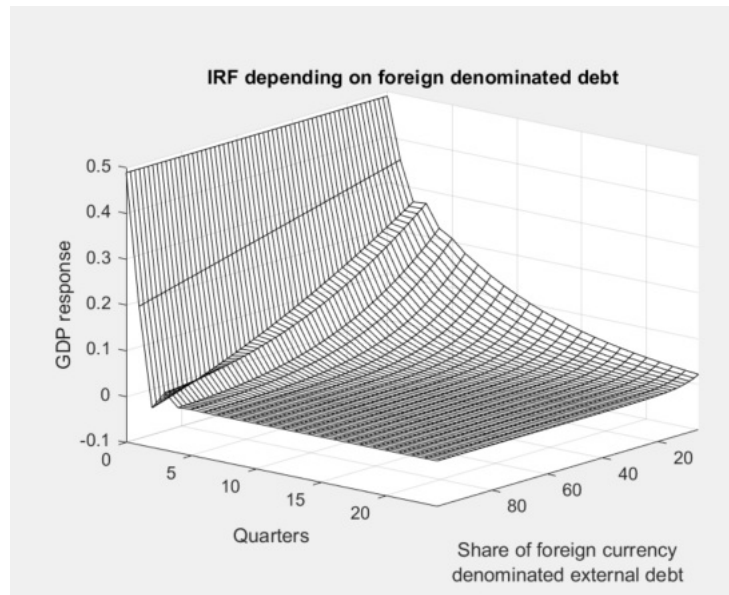
Public consumption and GDP are taken from Eurostat, and the share of external debt denominated in foreign currency comes from the Quarterly External Debt Statistics database from the World Bank.

Public consumption and GDP are corrected for seasonality by using an X-11 process. They are introduced in growth rate in the regression because the series are non-stationary (the results of unit root tests are shown in Appendix, Table 2.2).

2.2.3 Empirical Results

Our results are presented in Figure 2.2 which shows the response of GDP to a one unit shock in public spending according to the share of external debt denominated in foreign currency.³³ The higher the share of external debt denominated in foreign currency, the smaller the response of GDP to a public spending shock. This result confirms that the currency denomination of external debt modifies the impact of public spending on GDP.

FIGURE 2.2: GDP response to a one unit shock in public spending according to the share of external debt that is denominated in foreign currency



33. The optimal lag-length is selected by minimizing the AIC criteria, which leads to introduce 2 lags, see Appendix, Table 2.3.

Generally, to measure the efficiency of fiscal policy, the fiscal multiplier is computed, that is the ratio of a change in output (ΔY) to a change in public spending (ΔG) (Spilimbergo et al., 2009). Here, the multiplier cannot be directly read on the IRF because the IRF in Figure 2.2 show the response of the GDP growth rate to a change in public spending growth rate, that is not the proper definition of the fiscal multiplier.

Hence, the fiscal multiplier at time t is computed as follows:³⁴

$$\Lambda_t = \frac{\Delta Y_t}{\Delta G_t} = \frac{y_T}{g_T} irf_t \quad (2.2)$$

Where $\frac{y_T}{g_T}$ is the average ratio of public spending to GDP, and irf_t is the coefficient read on the IRF.

When the share of external debt denominated in foreign currency is less than 10%, the average fiscal multiplier is 1.75. However, it decreases when external debt increases. For share of external debt in foreign currency exceeding 90%, the average fiscal multiplier is about 1. Moreover, the fiscal multiplier becomes zero at the second period for countries highly indebted in foreign currency, rather than it remains positive during more than 10 periods for countries mainly indebted in local currency.

This result shows that the currency denomination of external debt is an important determinant of public spending efficiency since it affects the value of the fiscal multiplier. Especially, a large share of external debt denominated in foreign currency reduces the fiscal multiplier.

As no formalization has been found in the existing literature, the next Section of the paper develops a theoretical framework which allows the impact of public spending to vary according to the currency denomination of external debt.

34. A demonstration is presented in the Appendix of Chapter 1.

2.3 The Model

In this section, a two-country DSGE model is developed. Two countries of equal size are considered: the Home bloc (H), and the Foreign one (F) that are populated by a continuum of identical households normalized to one. These households consume a composite good (C_t) including home ($C_{H,t}$) and foreign goods ($C_{F,t}$), and they also can buy home and foreign bonds ($B_{H,t}$ and $B_{F,t}$).

In each bloc, there are two types of firms: the wholesales and the retails.

The wholesale firms buy retail goods to turn it into capital, and they use capital to produce an homogeneous wholesale good. To finance their activity, they can borrow, both in local and foreign currencies, but they have to pay an external finance premium. This premium affects firms' solvency, thus modifying investment decisions and, in this way, producing economic fluctuations.

The retail sector is monopolistically competitive: retail firms purchase the wholesale goods, they differentiate them without any cost and then the retail goods are sold to the households.

2.3.1 Households

We consider an infinite horizon discrete time economy populated by a constant mass of agents whose size is normalized to one in each country. The representative household in the home country is characterized by the following preferences:

$$E_t \sum_{t=0}^{\infty} \beta^t U(C_t, L_t) \quad (2.3)$$

Where E_t indicates expectations at time t , $\beta \in (0, 1)$ is the discount factor, C_t is the per capita consumption index, and L_t is the number of worked hours.

We assume that the utility function takes the following form:

$$U(C_t, L_t) = \frac{C_t^{1-\sigma_c}}{1-\sigma_c} - \frac{L_t^{1+\sigma_l}}{1+\sigma_l} \quad (2.4)$$

where $\sigma_c > 0$ is the inverse of the inter-temporal elasticity of substitution of consumption, and $\sigma_l > 0$ is the inter-temporal elasticity of substitution of labor.

The household faces the following budget constraint:

$$P_t C_t + B_{H,t} + S_t B_{F,t} + T_t = P_t W_t L_t + R_{n,t-1} B_{H,t-1} + \phi_{t-1}(d_{t-1}) S_t R_{n,t-1}^* B_{F,t-1} + \Gamma_t \quad (2.5)$$

where W_t is the wage rate in real terms, Γ_t are dividends received by the owners of firms, S_t is the nominal exchange rate expressed as domestic currency units needed to have one unit of foreign currency, $B_{H,t}$ and $B_{F,t}$ are risk-free one-period nominal bonds from the home and the foreign countries, T_t is a lump-sum tax levied on households, P_t is the Consumer Price Index (CPI), $R_{n,t} = 1 + r_{n,t}$ and $R_{n,t}^* = 1 + r_{n,t}^*$ with $r_{n,t}$ and $r_{n,t}^*$ the domestic and foreign nominal interest rates.

The factor ϕ_t is a country premium received by the household who buys foreign bonds. It is an increasing function of the aggregate level of foreign debt d_t and it is defined as follows:

$$\phi_t(d_t) = \exp\left(-\phi_d \frac{S_t B_{F,t}}{Y P_t}\right) \quad (2.6)$$

where $d_t = \frac{S_t B_{F,t}}{Y P_t}$ with $B_{F,t}$ being the total debt of country F, $\phi_d > 0$ is the country premium elasticity. Finally, $\phi'(\cdot) < 0$, namely it increases with the aggregate level of foreign debt $-B_{F,t}$ and at the steady state, when the net foreign asset position is zero, $\phi(0) = 1$.

This function ensures the stationarity of the model (Schmitt-Grohé and Uribe, 2003), and the existence of a country risk premium reflects frictions in international capital markets, as the price to pay to access markets, agency costs or even the possibility of default. For analytical convenience, and without loss of generality, home households can hold foreign bonds,

but foreign households cannot hold home bonds (Benigno and Thoenissen, 2008).

The representative household chooses C_t , L_t , $B_{H,t}$ and $B_{F,t}$ to maximize her utility subject to the budget constraint, leading to the following first order conditions:

1. Consumption and leisure are chosen in order to equalize the marginal rate of substitution between consumption and leisure to the real wage:

$$L_t^{\sigma_l} = W_t C_t^{-\sigma_c} \quad (2.7)$$

2. The Euler equation, representing household's taste for consumption smoothing:

$$R_{n,t} = \frac{1}{\beta} E_t \left[\frac{C_t^{-\sigma_c}}{C_{t+1}^{-\sigma_c}} \pi_{t+1} \right] \quad (2.8)$$

where $\pi_t = P_t/P_{t-1}$ is the inflation factor.

3. The arbitrage equation between national and foreign bonds:

$$E_t \left[\left(R_{n,t} - \phi_t \frac{rer_{t+1}}{rer_t} \frac{\pi_{t+1}}{\pi_{t+1}^*} R_{n,t}^* \right) \right] = 0 \quad (2.9)$$

where $\pi_{t+1}^* = P_{t+1}^*/P_t^*$ is the foreign inflation factor and $rer_t = \frac{S_t P_t^*}{P_t}$ is the real exchange rate.

Finally, the standard transversality conditions must hold.

The per capita index of consumption, C_t , is an aggregate of consumption goods produced in the home country ($C_{H,t}$) and consumption goods produced in the foreign country ($C_{F,t}$). It is defined as follows:

$$C_t = \left[w^{1/\mu} C_{H,t}^{(\mu-1)/\mu} + (1-w)^{1/\mu} C_{F,t}^{(\mu-1)/\mu} \right]^{\mu/(\mu-1)} \quad (2.10)$$

where $\mu > 0$ is the elasticity of substitution between home and foreign goods, and $w \in (0, 1)$ captures the degree of home bias in the home bloc, $(1-w)$ can therefore be viewed as the

trade openness degree.

Consumption in each bloc is defined by:

$$C_{H,t} = \left[\int_0^1 C_{H,t}(v)^{(\zeta-1)/\zeta} dv \right]^{\zeta/(\zeta-1)} ; C_{F,t} = \left[\int_0^1 C_{F,t}(v)^{(\zeta-1)/\zeta} dv \right]^{\zeta/(\zeta-1)} \quad (2.11)$$

where $\zeta > 0$ is the elasticity of substitution between the varieties v produced into each bloc.

The optimal intra-temporal allocations of consumption are:

$$C_{H,t}(v) = \left(\frac{P_{H,t}(v)}{P_{H,t}} \right)^{-\zeta} C_{H,t} ; C_{F,t}(v) = \left(\frac{P_{F,t}(v)}{P_{F,t}} \right)^{-\zeta} C_{F,t} \quad (2.12)$$

$$C_{H,t} = w \left(\frac{P_{H,t}}{P_t} \right)^{-\mu} C_t ; C_{F,t} = (1-w) \left(\frac{P_{F,t}}{P_t} \right)^{-\mu} C_t \quad (2.13)$$

The CPI associated with the index of consumption (Equation 2.10) is given by:

$$P_t = [w(P_{H,t})^{1-\mu} + (1-w)(P_{F,t})^{1-\mu}]^{1/(1-\mu)} \quad (2.14)$$

where the price sub-indexes associated with $C_{H,t}$ and $C_{F,t}$ are:

$$P_{H,t} = \left[\int_0^1 P_{H,t}(v)^{1-\zeta} dv \right]^{1/(1-\zeta)} ; P_{F,t} = \left[\int_0^1 P_{F,t}(v)^{1-\zeta} dv \right]^{1/(1-\zeta)} \quad (2.15)$$

2.3.2 The Exchange Rate

Since the Law of One Price (LOP) applies to differentiated goods:

$$\frac{S_t P_{F,t}^*}{P_{F,t}} = \frac{S_t P_{H,t}^*}{P_{H,t}} = 1, \quad (2.16)$$

it is possible to rewrite the real exchange rate at time t as:

$$rer_t = \frac{S_t P_t^*}{P_t} = \frac{\left[w^* + (1 - w^*) \tau_t^{\mu^* - 1} \right]^{1/(1 - \mu^*)}}{\left[1 - w + w \tau_t^{\mu - 1} \right]^{1/(1 - \mu)}} \quad (2.17)$$

where $\tau = P_{F,t}/P_{H,t}$ represents the terms of trade (the domestic currency relative price of imports to exports).

Finally, using the household's first order condition (Equation 2.9), the (modified) Uncovered Interest rate Parity (UIP) condition is obtained:

$$E_t \frac{R_{n,t}}{\pi_{t+1}} = \phi_t E_t \frac{R_{n,t}^*}{\pi_{t+1}^*} \frac{rer_{t+1}}{rer_t} \quad (2.18)$$

It is different from the standard UIP because of the presence of the interest rate premium ϕ_t .

2.3.3 Firms

Both countries are populated by wholesale firms which buy the final good, both from H and from F, to convert it into new capital. Then they use capital to produce the wholesale good which is acquired and differentiated by monopolistically competitive firms, the retailers.

Wholesale Firms

Wholesale firms produce and sell an homogeneous good on a competitive market by using labor and capital. The production technology has constant returns to scale and is represented by a Cobb-Douglas function where technical progress is exogenous and captured by the factor A_t :

$$Y_t^W = A_t K_t^\alpha L_t^{1-\alpha} \quad (2.19)$$

where Y_t^W is the quantity of wholesale goods produced by a firm, K_t is the capital stock

at the beginning of the period t , L_t is the labor demand function of the firm, and $0 < \alpha < 1$ measures the capital intensity.

To obtain capital, wholesale firms invest (I_t) by buying the final good sold by retailers and they use the existing capital to transform it into new capital (K_t). Wholesale firms have to support an internal adjustment cost of capital which is increasing and convex in I_t/K_t :

$$\Psi(I_t, K_t) = \frac{\Phi}{2} \left(\frac{I_t}{K_t} - \delta \right)^2 K_t \quad (2.20)$$

where $\delta \in (0, 1)$ is the depreciation rate of capital, Φ is a positive parameter and I_t is a composite good from home and foreign retail firms constructed as follows:

$$I_t = \left[w_I^{1/\mu_I} I_{H,t}^{\frac{(\mu_I-1)}{\mu_I}} + (1-w_I)^{1/\mu_I} I_{F,t}^{\frac{(\mu_I-1)}{\mu_I}} \right]^{\frac{\mu_I}{(\mu_I-1)}} \quad (2.21)$$

where $w_I \in (0, 1)$ measures the home bias of capital producers, and $\mu_I > 0$ the elasticity of substitution between home and foreign retail goods for capital producers. It is assumed that firms and households have the same preferences, meaning that $w = w_I$ and $\mu = \mu_I$. The price of I_t therefore corresponds to the CPI:

$$P_t = [w(P_{H,t})^{1-\mu} + (1-w)(P_{F,t})^{1-\mu}]^{1/(1-\mu)} \quad (2.22)$$

The optimal intra-temporal demands for domestic and foreign inputs are:

$$I_{H,t} = w \left(\frac{P_{H,t}}{P_t} \right)^{-\mu} I_t; \quad I_{F,t} = (1-w) \left(\frac{P_{F,t}}{P_t} \right)^{-\mu} I_t \quad (2.23)$$

Finally, the stock of capital evolves according to the following law:

$$K_{t+1} = I_t + (1 - \delta)K_t \quad (2.24)$$

Wholesale firms choose the level of investment, the quantity of labor and capital that maximize their profits. Let $P_{H,t}^W$ be the price of the wholesale good at home, and $mc_t = \frac{P_{H,t}^W}{P_{H,t}}$ the marginal costs. The profit and the corresponding constraint of the representative wholesale firm can be written as follows:

$$\Pi_t^W = E_t \Sigma_{T=0}^{\infty} \beta_W^T \left[mc_{t+T} \frac{P_{H,t+T}}{P_{t+T}} A_{t+T} K_{t+T}^{\alpha} L_{t+T}^{1-\alpha} - W_{t+T} L_{t+T} - \frac{P_{t+T}}{P_{t+T}} I_{t+T} - \Psi(I_{t+T}, K_{t+T}) \right] \quad (2.25)$$

$$SC. K_{t+T+1} = I_{t+T} + (1 - \delta) K_{t+T} \quad (2.26)$$

By solving this problem we obtain the value of the average real wage in the home economy:

$$W_t = mc_t \frac{P_{H,t}}{P_t} (1 - \alpha) \frac{Y_t}{L_t} \quad (2.27)$$

the real price of capital, q_t :

$$q_t = 1 + \frac{\partial \Psi(I_t, K_t)}{\partial I_t} = 1 + \Phi \left(\frac{I_t}{K_t} - \delta \right) \quad (2.28)$$

and, finally, the real return on capital over the period t , R_t^k :

$$R_t^k = \left[\frac{\alpha mc_t \frac{P_{H,t}}{P_t} \frac{Y_t}{K_t} - \frac{\Phi}{2} \left[\delta^2 - \left(\frac{I_t}{K_t} \right)^2 \right] + (1 - \delta) q_t}{q_{t-1}} \right] \quad (2.29)$$

where $R_t^k = 1 + r_t^k$, with r_t^k the real rate of return of capital.

The first part of (2.29) is the marginal productivity of capital $\left(mpc_t = \alpha mc_t \frac{P_{H,t}}{P_t} \frac{Y_t}{K_t} \right)$. Equation (2.29) means that each additional unit of capital yields $mc_t \frac{P_{H,t}}{P_t} \frac{Y_t}{K_t}$ to the firm, minus the cost due to the adjustment of capital. The equation also takes into account the fact that capital can also be resold at its depreciated value $(1 - \delta) q_t$.

To finance their activity, wholesale firms borrow in local and foreign currency, and they

have to support an external finance premium (Θ_t) defined by:

$$\Theta_t = \Theta \left(\frac{q_{t-1}K_t}{N_t} \right) \quad (2.30)$$

with $\Theta'(\cdot) > 0$, $\Theta(1) = 1$ and $\Theta(\infty) = \infty$; N_t is the net worth of a wholesale firm, which will be defined below.

Wholesale firms borrow in home currency with proportion κ , and in foreign currency with proportion $(1 - \kappa)$, with $\kappa \in [0, 1]$. Therefore, home and foreign interest rates are combined to obtain the expected marginal cost of borrowing:

$$\begin{aligned} E_t \left(R_{t+1}^k \right) &= \Theta_{t+1} \left[\kappa E_t \left(\frac{R_{n,t}}{\pi_{t+1}} \right) + (1 - \kappa) \phi_t(d_t) E_t \left(\frac{R_{n,t}^*}{\pi_{t+1}^*} \frac{rer_{t+1}}{rer_t} \right) \right] \\ &= \Theta_{t+1} \left[\kappa E_t(R_t) + (1 - \kappa) \phi_t(d_t) E_t \left(R_t^* \frac{rer_{t+1}}{rer_t} \right) \right] \end{aligned} \quad (2.31)$$

with R_t and R_t^* the nominal exchange rates in the home and foreign economies. Equation (2.31) means that the real return of capital must be equal to the cost to acquire this capital. This cost is determined by the external finance premium, by the home interest rate in proportion κ , and by the foreign interest rate in proportion $1 - \kappa$.

Wholesalers accumulate net worth according to the following dynamics:

$$N_{t+1} = \xi_e \left[R_t^k q_{t-1} K_t - \Theta_t \left[\kappa \frac{R_{n,t-1}}{\pi_t} + (1 - \kappa) \phi_{t-1} \frac{R_{n,t-1}^*}{\pi_t^*} \frac{rer_t}{rer_{t-1}} \right] (q_{t-1} K_t - N_t) \right] \quad (2.32)$$

where $1 - \xi_e$ is the probability for a firm to exit the market. The net worth is equal to the real return on capital held by the firm minus the financing cost of the acquired capital.

Equation (2.32) shows that firms are exposed to exchange rate fluctuations when they are indebted in foreign currency. For small values of κ , a decrease in the RER (an appreciation) inflates the firms net worth, and an increase in the RER (a depreciation) deflates their net

worth.

Entrepreneurs that exit consume their remaining resources:

$$C_t^e = \frac{(1 - \xi_e)}{\xi_e} N_t \quad (2.33)$$

As for households, the optimal consumption of exiting entrepreneurs is:

$$C_{H,t}^e = w \left(\frac{P_{H,t}}{P_t} \right)^{-\mu} C_t^e ; C_{F,t}^e = (1 - w) \left(\frac{P_{F,t}}{P_t} \right)^{-\mu} C_t^e \quad (2.34)$$

Retail Firms

Each retail firm uses the wholesale good Y^W to produce a differentiated good $Y(v)$. The output of each firm is:

$$Y_t(v) = Y_t^W(v) \quad (2.35)$$

Each retailer maximizes his profit facing the following demand function:

$$Y_t(v) = \left(\frac{P_{H,t}(v)}{P_{H,t}} \right)^{-\zeta} Y_t \quad (2.36)$$

Home retailers set the price of their goods as an optimal price $\hat{P}_{H,t}(v)$ with a probability $1 - \rho_H$. If firms do not optimize the price at the period t , $P_{H,t}(v) = P_{H,t-1}(v)$. This assumption allows to introduce sticky prices following Calvo (1983).

The inter-temporal profit of a retail firm can be written as follows:

$$E_t \sum_{k=0}^{\infty} \rho_H^k \frac{\lambda_{t+k}}{\lambda_t} \left[\hat{P}_{H,t}(v) Y_{t+k}(v) - P_{H,t+k} mc_{t+k} Y_{t+k}(v) \right] \quad (2.37)$$

where $mc_{t+k} = \frac{P_{H,t+k}^W}{P_{H,t+k}}$ represents marginal costs, $\frac{\lambda_{t+k}}{\lambda_t} = \beta^k \frac{U_{C_{t+k}}}{U_{C_t}}$ is the discount factor for future (real) profits.

The first order condition related to the maximization of inter-temporal profit implies:

$$\widehat{P}_{H,t}(v) = \frac{\zeta}{\zeta - 1} \frac{\sum_{k=0}^{\infty} (\rho_H \beta)^k mc_{t+k} P_{H,t+k}^{\zeta+1} Y_{t+k}}{\sum_{k=0}^{\infty} (\rho_H \beta)^k P_{H,t+k}^{\zeta} Y_{t+k}} \quad (2.38)$$

The price index is therefore given by the combination of revised (and optimally set) prices and non-revised prices:

$$P_{H,t} = \left[(1 - \rho_H) (\widehat{P}_{H,t})^{1-\zeta} + \rho_H (P_{H,t-1})^{1-\zeta} \right]^{\frac{1}{1-\zeta}} \quad (2.39)$$

Combining the log-linearization of Equations (2.38) and (2.39) leads to the following inflation dynamics, also called New-Keynesian Phillips curve:

$$\widehat{\pi}_{H,t} = \beta E_t \widehat{\pi}_{H,t+1} + \frac{(1 - \rho_H)(1 - \beta \rho_H)}{\rho_H} \widehat{mc}_t \quad (2.40)$$

2.3.4 Fiscal Policy

Following, among others, Bouakez and Eyquem (2015), public spending is financed through lump-sum taxes:

$$P_t G_t = T_t \quad (2.41)$$

where G_t is the total amount of public spending. Note that public spending is aggregated as private demand.³⁵

Public spending follows an autoregressive process of the type:

$$\widehat{G}_t = \rho_g \widehat{G}_{t-1} + \varepsilon_{g_t} \quad (2.42)$$

where $\widehat{G}_t = \frac{G_t - G}{G}$ is the log-deviation of G_t around its steady state value G , $\rho_g \in (0, 1)$, and

35. As for I and C^e , this assumption means that government has the same preferences than households. It ensures that the reactions of firms, households and the government act in the same way without affecting the results.

ε_t^g is a white noise.

2.3.5 Monetary Policy

The monetary authority sets the nominal interest rate according to the following Taylor rule with output growth Y_t and consumer price index inflation (π_{t+1}) targets:

$$\hat{R}_{n,t} = \rho \hat{R}_{n,t-1} + (1 - \rho) \left(\gamma_\pi E_t \hat{\pi}_{t+1} + \gamma_y \hat{Y}_t \right) \quad (2.43)$$

ρ is the coefficient of autocorrelation of nominal interest rate, γ_π is the weight given to inflation, and γ_y the weight for output.

2.3.6 Market Clearing

The aggregated demand for the home economy is:

$$Y_t = w \left(\frac{P_{H,t}}{P_t} \right)^{-\mu} (C_t + C_t^e + I_t + G_t) + (1 - w) \left(\frac{P_{H,t}^*}{P_t^*} \right)^{-\mu} (C_t^* + I_t^* + G_t^*) \quad (2.44)$$

The equilibrium between the current account and the financial account allows to define the trade balance (TB) as follows:

$$TB_t = P_{H,t} Y_t - P_t C_t - P_t C_t^e - P_t I_t - P_t G_t - P_t \Psi(I_t, K_t) \quad (2.45)$$

The home economy accumulates net foreign assets according to the following dynamics:

$$d_t = \phi_{t-1} d_{t-1} \frac{RER_t}{RER_{t-1}} \frac{R_{n,t-1}^*}{\pi_t^*} + \frac{P_{H,t}}{P_t} \frac{Y_t}{Y} - \frac{C_t}{Y} - \frac{C_t^e}{Y} - \frac{G_t}{Y} - \frac{I_t}{Y} - \Psi(I_t, K_t) \quad (2.46)$$

The Walras' Law implies that the bond market equilibrium is reached when all the other markets are balanced.

2.4 Calibration

This section presents the calibration of the parameters of model and the steady state ratios. They are shown in the Appendix, Table 2.4. The values are selected from the existing literature, and alternative calibrations are tested, as presented in Section 2.6. Note that the parameters of the two countries are calibrated in the same way, excepted for monetary policy, fiscal policy, and the financial accelerator mechanism which is only introduced in the home economy in order to concentrate on the relevant mechanisms, without loss of generality.

2.4.1 Households

Following Bonam and Lukkezen (2014) or Elekdağ and Tchakarov (2007), the inverse of the inter-temporal elasticity of substitution (σ_c) is fixed at 2, and the inverse of the Frisch elasticity of labor supply (σ_l) at 1. As in most of the literature, the discount factor β is set at 0.99. The elasticity of substitution between varieties locally produced ζ is equal to 6, following Bouakez and Eyquem (2015) or Kitano et al. (2015). An alternative value of ζ is considered in Section 2.6.

Regarding the elasticity of substitution between home and foreign goods, μ , it is fixed at 1.5 as in Bouakez and Eyquem (2015), and the home bias (ω) is set at 0.72, which corresponds to a trade openness degree at 0.28, as for example in Kitano et al. (2015), Elekdağ and Tchakarov (2007) or Cook (2004).

Furthermore, the consumption to GDP ratio (C/Y) at the steady state is set at 60% in line with most of the literature.

Finally, the country premium elasticity ϕ_d is set at 0.0007 in line with Schmitt-Grohé and Uribe (2003) or Sangaré (2016). Alternative calibrations for this parameter are tested in Section 2.6.

2.4.2 Firms

Following Kitano et al. (2015), the capital intensity (α) is set at 0.35, which means a labor intensity ($1 - \alpha$) at 0.65. The depreciation rate of capital δ is fixed at 0.025, which is in line with, among others, Christensen and Dib (2008). The adjustment cost function parameter Φ is equal to 6 following Chang and Fernández (2013). A sensitivity analysis is led in Section 2.6.

Wholesale firms support an external finance premium which depends on the capital to net worth ratio with an elasticity of 0.042 (Christensen and Dib, 2008); a smaller value of this parameter is tested in Section 2.6 following Badarau and Levieuge (2011).

Wholesalers exit at the end of a period with probability $1 - \xi_e$, with ξ_e equal to 0.985, in line with Levieuge (2009), and at the steady state, the consumption of existing firms (C^e/Y) is assumed to be 2% of GDP.

Regarding the price setting, the price rigidity parameter ρ_H is fixed at 0.75, a widely used value in the literature (e.g. Bouakez and Eyquem (2015)). This corresponds to a probability of 0.25 to set the price optimally.

The steady state leverage ratio (K/N) is set at 3 following Devereux et al. (2006), and investment at the steady state (I/Y) is assumed to represent 18% of GDP that is consistent with most of the literature.³⁶

2.4.3 Monetary and fiscal policies

Regarding the monetary policy, the temporal autocorrelation of nominal interest rate, ρ is commonly fixed at 0.85. Regarding the home economy, a not-too-aggressive monetary policy is considered: the weight for expected inflation, γ_π , is fixed at 1.1, and the weight for the output-gap, γ_y , is set to 0. In the foreign economy, the monetary authority is supposed to be more aggressive: $\gamma_\pi^* = 1.8$ and $\gamma_y^* = 0$.

36. For the foreign economy, I^*/Y^* is set at 20% since C^e/Y is zero.

As in Bouakez and Eyquem (2015), this configuration allows to obtain a decrease in the interest rate differential between H and F, that should lead to the depreciation of the real exchange rate, as found in empirical studies (e.g. Kim, 2015).

For the fiscal policy, the autocorrelation of public spending shocks ρ_g is set at 0.8 in line with most of the literature, and alternatives values are tested in Section 2.6.

2.5 The effects of public spending

In a closed-economy model, an increase in public spending acts as an increase in total demand, and the rise in total demand leads to an increase in firms' revenue. When firms' revenue rises, their net worth increases too. As a consequence, this decreases the external finance premium and thus the debt burden. The financing constraints of firms are therefore relaxed, boosting investment and economic activity.

However, in an open-economy model, we show that the currency composition of firms' indebtedness and the changes of the real exchange rate also interfere.

Following a positive public spending shock, it has been shown that the RER depreciates, allowed by an increase in the interest rate differential between the two countries (see for example Kim, 2015; Bouakez and Eyquem, 2015; Kollmann, 2010). The central mechanism in our model is that a depreciation of the RER should lead to a decrease in the net worth of firms that are indebted in foreign currency. This raises the financing constraints, and the investment is reduced. Consequently, a high foreign currency denomination of external debt reduces the positive effect of public spending on economic growth.

On the contrary, if firms are indebted in local currency, the increase of the demand through the increase of public spending leads to a rise in firms' net worth. The financing constraints are reduced and the investment increases stimulating economic growth. The depreciation of the RER following the spending shock accentuates this positive effect by further increasing the demand since exports increase and imports reduce.

In sum, the currency denomination of external debt could modify the effect of public spending on economic activity by making firms vulnerable to exchange rate fluctuations.

Regarding our results more in details, Figure 2.3 shows the responses to an increase by 1% in public spending of output, consumption, investment, real exchange rate (RER), net worth, external finance premium (EFP). The red dotted line corresponds to a large share of debt denominated in foreign currency ($\kappa = 0.1$) and the blue line to the case $\kappa = 0.9$.³⁷

An increase in public spending leads to an increase in the real exchange rate, which is consistent with the results found by the existing literature (see for example Kim, 2015; Bouakez and Eyquem, 2015; Kollmann, 2010). In fact, in the case where financial markets are imperfect and incomplete, exchange rate fluctuations are led by the real interest rate differential. Intuitively, when public spending at home increases, the global demand rises at home and abroad since government consumes home goods in proportion ω and foreign goods in proportion $1 - \omega$. As a response, interest rates increase in the two countries. However the home monetary authority is assumed to be less aggressive than the foreign one, and the increase in demand is higher in the home economy because of the home bias. Hence, the real interest rate increases less in the home economy than in the foreign country. The real interest rate differential, defined as $R^* - R$, increases, which leads to a depreciation of local currency in real terms (see equations 2.18 and 2.91).

As explained before, this depreciation has different effects depending on the currency denomination of external debt.

In the case firms are indebted in local currency at the 90% level ($\kappa = 0.9$), the rise of the RER after a public spending shock does not directly impact the firms' net worth. In that case, net worth and the cost to acquire capital are mostly determined by the local cost of borrowing (see equation 2.32). The depreciation of the RER has therefore more traditional effects: the

37. Note that changing the value of κ does not imply any change in the steady state values. Indeed, at the steady state, κ is only used in the computation of N which is a state variable. N only appears in the K/N ratio which remains unchanged whatever κ . Hence, the value of κ only modifies the path to the steady state.

depreciation makes local goods more attractive than foreign ones, exports increase and imports decrease leading to an increase in firms' revenue. It follows a decrease in the EFP and thus a (large) increase in private investment. Consumption reduces because of the rise of tax, but the large increase of investment offsets this fall in consumption, generating output growth.

In the case firms are indebted in foreign currency at the 90% level ($\kappa = 0.1$), following a public spending shock, the rise in the RER leads to a decline of net worth because of the increase in the borrowing cost.³⁸ In fact, the depreciation of the RER implies an increase in the real value of foreign currency denominated debt (negative wealth effect), that is equivalent to an increase in firm leverage. The EFP therefore rises, and investment decreases since the cost to acquire new capital increases.³⁹ In the standard case, a depreciation of the RER stimulates economic activity by increasing exports and reducing imports. However, here, this effect is partly offset by the reduction of private investment. A positive effect of public spending on output remains, but this effect is weak and especially smaller than in the case firms are indebted in local currency.

In order to measure the effect of public spending on output, we compute the fiscal multiplier that is the ratio of a change in output (ΔY) to a change in public spending (ΔG). Four types of multipliers can be computed (Spilimbergo et al., 2009):⁴⁰

- the impact multiplier, which measures the change in output at time t due to a change in public spending at the same time

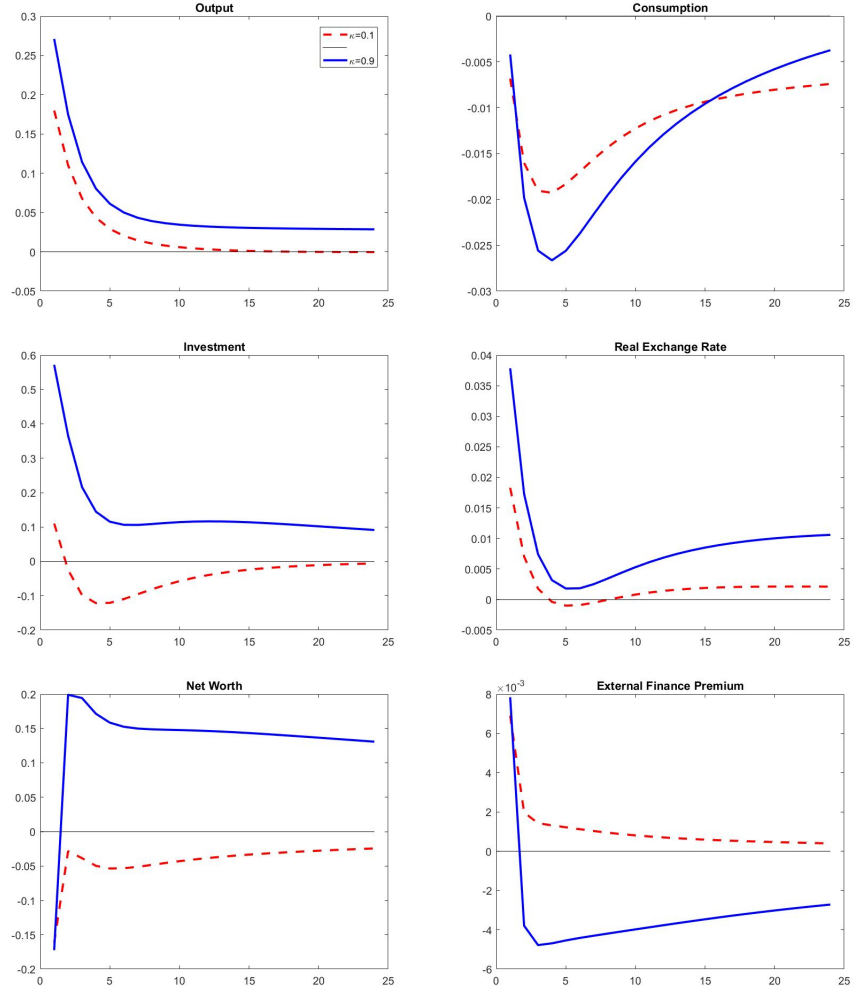
$$\Lambda_t = \frac{\Delta Y_t}{\Delta G_t}$$

38. Following the log-linearized version of equation 2.32, the elasticity of net worth to the variation of the RER ($-\Theta(1 - \kappa)\frac{R_N^*}{\pi}(\frac{K}{N} - 1)$) is negative for capital-to-net worth ratio larger than 1. Actually, it is always the case here since $\frac{K}{N} \leq 1$ would mean that firms do not borrow.

39. The investment increases at the impact, but decreases from the second period, and the cumulative effect of public spending on investment is highly negative, around -1 since the 10th period. The positive response at the impact is justified by the initial increase of net export following the depreciation of the real exchange rate.

40. Following Zubairy (2014) among others, the fiscal multiplier is computed as follows: $\frac{\Delta Y_{t+T}}{\Delta G_t} \frac{Y}{G}$, with G and Y the steady state values of government spending and output.

FIGURE 2.3: Impulse response functions to a 1% increase in public spending



- the peak multiplier, defined as the largest impact of public spending on output over a period $[t; t + T]$

$$\Lambda_T^{max} = \max_T \frac{\Delta Y_{t+T}}{\Delta G_t}$$

- the multiplier at some horizon T , measuring the change in output at time $t + T$ due to a change in public spending at time t

$$\Lambda_T = \frac{\Delta Y_{t+T}}{\Delta G_t}$$

- the cumulative multiplier, which gives the cumulative change in output over a period $[t; t + T]$ due to the cumulative change in public spending over the same period;

$$\Lambda_{t+T} = \frac{\sum_{s=0}^T \Delta Y_{t+s}}{\sum_{s=0}^T \Delta G_{t+s}}$$

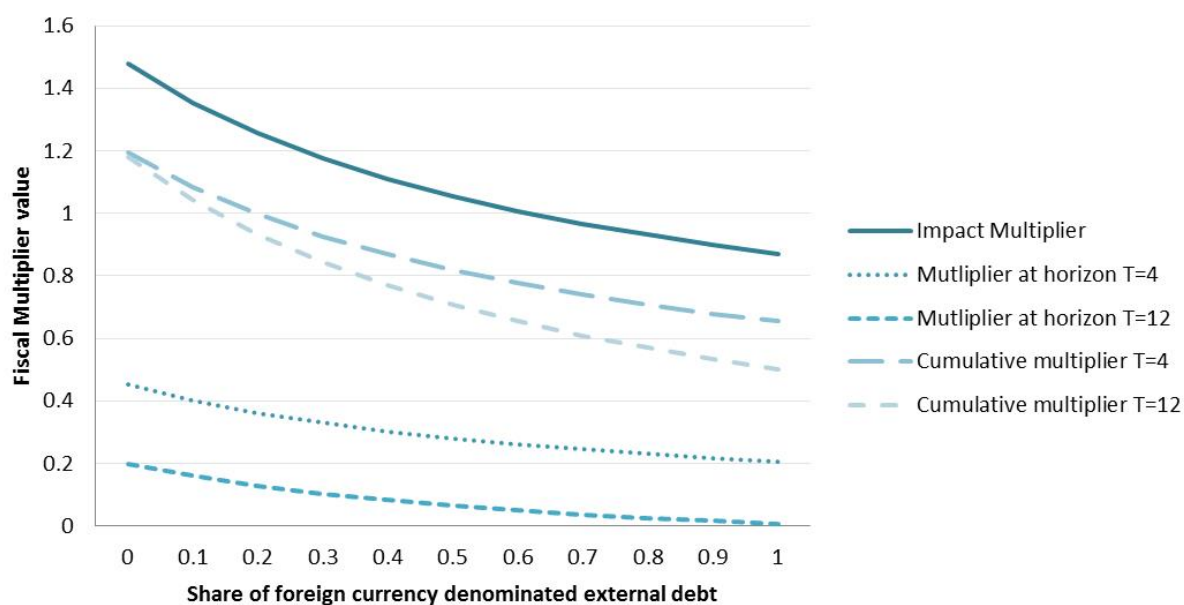
Note that, in our case, the impact multiplier coincides with the peak multiplier since the most important effect of public spending on GDP is observed at the impact.

Figure 2.4 shows the value of these multipliers as a function of the share of debt denominated in foreign currency (i.e. $(1 - \kappa)$). The higher this share is, the smaller the multiplier is. This is true whatever the used definition of the multiplier.

When 90% of firms' indebtedness is denominated in local currency, the multiplier is around 1.4, rather than it is less than 0.9 when firms are indebted at the 90% level in foreign currency.

These results are consistent with the estimates presented in Section 2.2: countries with external debt mostly denominated in foreign currency have smaller multipliers than countries indebted in local currency.

FIGURE 2.4: Value of the fiscal multiplier as a function of the share of foreign currency denominated external debt



2.6 Sensitivity Analysis

2.6.1 Changing the parameters

In this section, the sensitivity of the results to alternative calibrations of some parameters is tested. Especially, the fiscal multiplier is computed for different values of the autocorrelation of spending shocks parameter, the country risk premium elasticity, the capital adjustment cost parameter, the elasticity of external finance premium, and the elasticity of substitution between home goods.

Table 2.1 shows the value of the fiscal multiplier with alternative parameters and for different values of κ . Overall, the negative effect of foreign currency denomination of indebtedness on the fiscal multiplier remains whatever the calibration of the parameters, even if the magnitude of this effect changes.

Regarding the autocorrelation of spending shocks, the higher the coefficient is, the larger the multiplier is. The spread between the multiplier for $\kappa = 0.1$ and that for $\kappa = 0.9$ also slightly increases with the value of ρ_g . A higher autocorrelation in spending shocks means larger persistence of an increase in public spending. The consequences of an expansive fiscal policy are larger when the persistence degree is higher. Furthermore, for a given level of public spending shock autocorrelation, a high share of debt denominated in foreign currency reduces the fiscal multiplier; and for a given level of foreign currency denominated debt, the multiplier increases with the degree of public spending shock autocorrelation.

Considering the elasticity of the country risk premium, the spread between the multiplier for $\kappa = 0.1$ and that for $\kappa = 0.9$ does not significantly change according to the value of ϕ_d . The same observation can be made about the impact of a different elasticity of substitution between home goods. The calibration of these parameters does not really affects our results.

In contrast, changing the capital adjustment cost parameter implies relatively large changes in the multiplier values. A smaller adjustment cost implies both larger multipliers whatever

the value of κ and a larger spread between the extreme cases $\kappa = 0.1$ and $\kappa = 0.9$. This result is consistent with the mechanism explained in the previous section: the negative effect of foreign currency denomination of debt occurs through the RER, the net worth and, by the way, through the investment level. The higher adjustment costs are, the less firms adjust their decisions, hence the observed change in investment is smaller. The responses of investment and output to fiscal policy are therefore reduced.

Regarding the elasticity of the external finance premium, a smaller elasticity leads to a smaller spread between the value of the multiplier when $\kappa = 0.1$ and $\kappa = 0.9$. Once again, this result seems consistent with results in Section 2.5 since a smaller elasticity of the EFP means that financing costs do not increase so much following a decrease in the net worth. Investment therefore declines less in the case θ is small than in the case θ is relatively higher.

TABLE 2.1: Sensitivity: value of the impact multiplier with alternative calibrations

	$\kappa=0.1$	$\kappa=0.5$	$\kappa=0.9$	Spread
$\rho_g = 0.6$	0.83	0.92	1.09	0.26
$\rho_g = \mathbf{0.8}$	0.90	1.06	1.35	0.46
$\rho_g = 0.9$	0.97	1.21	1.68	0.70
$\phi_d = 0.0001$	0.88	1.02	1.26	0.38
$\phi_d = \mathbf{0.0007}$	0.90	1.06	1.35	0.46
$\phi_d = 0.001$	0.91	1.07	1.39	0.48
$\Phi = 3$	0.98	1.22	1.75	0.77
$\Phi = \mathbf{6}$	0.90	1.06	1.35	0.46
$\Phi = 12$	0.86	0.97	1.14	0.28
$\theta = 0.025$	0.91	1.03	1.23	0.32
$\theta = \mathbf{0.042}$	0.90	1.06	1.35	0.46
$\zeta = 1.1$	0.80	0.93	1.16	0.36
$\zeta = \mathbf{6}$	0.90	1.06	1.35	0.46

2.6.2 What about the financial accelerator mechanism?

The model has been reformulated to eliminate the financial accelerator in order to test whether this mechanism actually affects the value of the multiplier. The model is exactly the same, but firms do not accumulate net worth anymore, and they do not have to support an external finance premium. The only "price to pay" to invest is the real interest rate.

Using the same calibration than the benchmark case, the values of the multiplier obtained are really different when the financial accelerator is eliminated from the model, and the impact of foreign currency denominated debt is significantly reduced. In fact, for a share of foreign currency denominated debt at the 90% level (i.e. $\kappa = 0.1$), the multiplier is around 0.9, and for a share of foreign currency denominated debt at the 10% level (i.e. $\kappa = 0.9$) the multiplier is 0.95. In both cases, the multiplier is below one, showing that the financial accelerator mechanism magnifies the effect of public spending, or at least, modifies the impact of public spending on economic growth. Without the financial accelerator, the fiscal multiplier remains below one whatever the value of κ .

The financial accelerator mechanism seems therefore important in the analysis of fiscal policy efficiency.

2.7 Concluding Remarks

The empirical literature shows that fiscal multipliers in emerging market economies are smaller than those in advanced economies. While the existing literature often considers the level of development as a determinant of the fiscal multiplier, we argue that this gap can be due to specificities in EMEs. Especially, this paper considers the role of the currency denomination of private indebtedness, a feature that, to the best of our knowledge, has not been analyzed in the literature yet.

First, using a PCH-VAR, the negative impact of foreign currency denominated debt on

the fiscal multiplier is underlined. Countries with a high share of external debt denominated in foreign currency have smaller multipliers than countries mainly indebted in local currency.

Second, this result is rationalized in a DSGE model with sticky prices, imperfect and incomplete international financial markets, a not-too-aggressive monetary policy and a financial accelerator à la Bernanke et al. (1999). In this framework, firms can borrow both in local and foreign currency, and their financial structure generates economic fluctuations, affecting the efficiency of fiscal policy.

We show that when firms are indebted in foreign currency, the increase in public spending generates a depreciation of the exchange rate, leading to a decrease in firms' net worth. The financing cost of investment therefore increases and this generates a decline in the investment level. The effect of public spending on growth remains positive but the decrease in investment weakens this impact, and the fiscal multiplier falls below one. On the contrary, when firms are indebted in local currency, the increase in public spending generates a depreciation of the exchange rate that stimulates the demand, therefore reducing the financing costs. Hence, investment increases, and the positive effect of an expansive fiscal policy is magnified. The fiscal multiplier is larger than one in that case.

These results show that the currency denomination of indebtedness is an important determinant of the fiscal multiplier. The high share of debt denominated in foreign currency in EMEs could be part of the features that makes fiscal multipliers so small in these countries. This statement outlines the need for reforms regarding the financial sector in emerging countries. While an increasing number of reforms have been implemented there,⁴¹ fostering the use of local currency to finance economic activity seems still an important task for governments.

41. According to the database of Cerutti et al. (2017), in 2000, only 6 EMEs and LICs countries had implemented some reforms to constrain foreign currency loans. In 2013, the same number of countries was three times higher.

Appendix

TABLE 2.2: Stationarity tests (p-values)

	No time trend				Time trend			
Variables in levels	IPS		Fisher		IPS		Fisher	
GDP	1.36	(0.91)	1.02	(0.85)	2.03	(0.98)	1.74	(0.96)
Public consumption	0.75	(0.77)	-0.09	(0.47)	2.01	(0.98)	1.92	(0.97)
Variables in first difference	IPS		Fisher		IPS		Fisher	
GDP	-12.88	(0.00)	-12.95	(0.00)	-15.43	(0.00)	-13.05	(0.00)
Public consumption	-14.4	(0.00)	-15.36	(0.00)	-11.44	(0.00)	-14.96	(0.00)

TABLE 2.3: Optimal lag length selection

lag	MMSC-AIC
1	4.29E-31
2	1.12E-31
3	7.63E-31
4	2.83E-30
5	3.79E-31
6	1.08E-30

The Steady State

Variable without time index denotes its steady state value.

Home Economy

$$C = \left[w^{1/\mu} C_H^{\mu-1/\mu} + (1-w)^{1/\mu} C_F^{\mu-1/\mu} \right]^{\mu/\mu-1} \quad (2.47)$$

$$C_H = w \left(\frac{P_H}{P} \right)^{-\mu} C ; \quad C_F = (1-w) \left(\frac{P_F}{P} \right)^{-\mu} C \quad (2.48)$$

$$P = \left[wP_H^{(1-\mu)} + (1-w)P_F^{1-\mu} \right]^{1/(1-\mu)} \quad (2.49)$$

$$RER = \frac{SP^*}{P} \quad (2.50)$$

$$\tau = \frac{P_F}{P_H} \quad (2.51)$$

$$I = \left[w^{1/\mu} I_H^{\frac{\mu-1}{\mu}} + (1-w)^{1/\mu} I_F^{\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{1-\mu}} \quad (2.52)$$

$$I_H = w \left(\frac{P_H}{P} \right)^{-\mu} I ; \quad I_F = (1-w) \left(\frac{P_F}{P} \right)^{-\mu} I \quad (2.53)$$

$$I = \delta K \Leftrightarrow \frac{I}{K} = \delta \quad (2.54)$$

$$mc = \frac{P_H^W}{P_H} \quad (2.55)$$

$$\frac{WL}{Y} = mc \frac{P_H}{P} (1-\alpha) \quad (2.56)$$

$$q = 1 \quad (2.57)$$

$$\frac{Y}{K} = \frac{P}{\alpha mc P_H} [R^K - (1-\delta)] \quad (2.58)$$

$$\frac{I}{Y} = \frac{\alpha mc \delta}{R^K - (1-\delta)} \quad (2.59)$$

$$R_n = \frac{1}{\beta} \quad (2.60)$$

$$\Theta = \Theta\left(\frac{K}{N}\right) \quad (2.61)$$

$$R^k = \Theta\left(\kappa \frac{R_n}{\pi} + (1 - \kappa) \frac{R_n^*}{\pi^*}\right) \quad (2.62)$$

$$C^e = \frac{(1 - \xi_e)}{\xi_e} N \quad (2.63)$$

$$P_H = \hat{P}_H = \frac{\zeta}{\zeta - 1} mc P_H \quad (2.64)$$

$$mc = \frac{P_H^W}{P_H} = 1 - \frac{1}{\zeta} \quad (2.65)$$

$$PG = T \quad (2.66)$$

Foreign Economy

$$C^* = \left[(1-w)^{1/\mu} C_H^{*\mu-1/\mu} + w^{1/\mu} C_F^{*\mu-1/\mu} \right]^{\mu/\mu-1} \quad (2.67)$$

$$P^* = \left[(1-w) P_H^{*(1-\mu)} + w P_F^{*1-\mu} \right]^{1/(1-\mu)} \quad (2.68)$$

$$I^* = \left[(1-w)^{1/\mu} I_H^{*\frac{\mu-1}{\mu}} + w^{1/\mu} I_F^{*\frac{\mu-1}{\mu}} \right]^{\frac{\mu}{1-\mu}} \quad (2.69)$$

$$I_H^* = (1-w) \left(\frac{P_H^*}{P^*} \right)^{-\mu} I^* ; \quad I_F^* = w \left(\frac{P_F^*}{P^*} \right)^{-\mu} I^* \quad (2.70)$$

$$I^* = \delta^* K^* \Leftrightarrow \frac{I^*}{K^*} = \delta^* \quad (2.71)$$

$$mc^* = \frac{P_F^{*W}}{P_F^*} \quad (2.72)$$

$$\frac{W^* L^*}{Y^*} = mc^* \frac{P_F^*}{P^*} (1 - \alpha^*)$$

$$q^* = 1 \quad (2.73)$$

$$\frac{Y^*}{K^*} = \frac{P^*}{\alpha^* P_H^{*W}} \left(R^{*K} - (1 - \delta^*) \right) \quad (2.74)$$

$$\frac{I^*}{Y^*} = \frac{\alpha mc^* \delta}{R^{*K} - (1 - \delta)} \quad (2.75)$$

$$R_n^* = \frac{1}{\beta} \quad (2.76)$$

$$R^{K^*} = \left(\frac{R_n^*}{\pi^*} \right) \quad (2.77)$$

$$P_F^* = \hat{P}_F^* = \frac{\zeta^*}{\zeta^* - 1} mc^* P_F^*$$

$$mc^* = \frac{P_F^{W^*}}{P_F^*} = 1 - \frac{1}{\zeta^*} \quad (2.78)$$

Log-linearization

Home Economy

DEMAND

Total demand: (following Equation 2.44)

$$\begin{aligned}\widehat{Y}_t = & \mu(1-w)(\widehat{\tau}_t + \widehat{rer}_t) \\ & + w \left(\frac{I}{Y} \widehat{I}_t + \frac{C^e}{Y} \widehat{C}_t^e + \frac{G}{Y} \widehat{G}_t + \frac{C}{Y} \widehat{C}_t \right) \\ & + (1-w) \left(\frac{I^*}{Y^*} \widehat{I}_t^* + \frac{C^*}{Y^*} \widehat{C}_t^* + \frac{G^*}{Y^*} \widehat{G}_t^* \right)\end{aligned}\quad (2.79)$$

Households consumption: (following Equation 2.8)

$$\widehat{C}_t = E_t \widehat{C}_{t+1} + \frac{1}{\sigma_c} \left(\widehat{\pi}_{t+1} - \widehat{R}_{n,t} \right) \quad (2.80)$$

Capital demand: (following Equation 2.29)

$$\widehat{R}_t^K = \left(1 - \frac{1-\delta}{R^K} \right) \widehat{mpc}_t - \frac{\Phi \delta^2}{R^K} \widehat{K}_t + \frac{1-\delta}{R^K} \widehat{q}_t - \widehat{q}_{t-1}$$

Expected cost of capital: (following Equation 2.31)

$$\begin{aligned}\widehat{R}_{t+1}^k = & \theta \left(\widehat{q}_t + \widehat{K}_{t+1} - \widehat{N}_{t+1} \right) + \Theta \left(\kappa \frac{R_n}{\pi R^k} \right) \left(\widehat{R}_{n,t} - \widehat{\pi}_{t+1} \right) \\ & + \Theta(1-\kappa) \left(\frac{R_n^*}{R^k \pi^*} \right) \left(\widehat{R}_{n,t}^* - \widehat{\pi}_{t+1}^* + \widehat{rer}_{t+1} - \widehat{rer}_t \right) - \Theta \left(\phi_d (1-\kappa) \frac{R_n^*}{R^k \pi^*} \right) \widehat{d}_t\end{aligned}\quad (2.81)$$

Real price of capital: (following Equation 2.28)

$$\widehat{q}_t = \frac{\Phi \delta (\widehat{I}_t - \widehat{K}_t)}{q} \quad (2.82)$$

Consumption of exiting firms: (following Equation 2.33)

$$\widehat{C}_t^e = \widehat{N}_t \quad (2.83)$$

SUPPLY

Marginal productivity of capital: (following Equation 2.29)

$$\widehat{mpc}_t = \widehat{mc}_t + \widehat{Y}_t - \widehat{K}_t - \frac{(1-w)}{(2w-1)} \widehat{rer}_t \quad (2.84)$$

Inflation:

$$\widehat{\pi}_t = \widehat{\pi}_{H,t} + (1-w)\Delta \widehat{\tau}_t \quad (2.85)$$

Domestic inflation: (following Equation 2.40)

$$\widehat{\pi}_{H,t} = \beta E_t \widehat{\pi}_{H,t+1} + \frac{(1-\rho_H)(1-\beta\rho_H)}{\rho_H} \widehat{mc}_t \quad (2.86)$$

Terms of trade and RER: (following Equation 2.17)

$$\widehat{rer}_t = (2w-1)\widehat{\tau}_t \quad (2.87)$$

Production function: (following Equation 2.19)

$$\widehat{Y}_t = \widehat{a}_t + \alpha \widehat{K}_t + (1-\alpha)\widehat{L}_t \quad (2.88)$$

Labor supply: (following Equation 2.7)

$$\widehat{L}_t = \frac{1}{\sigma_l} \left(\widehat{W}_t - \sigma_c \widehat{C}_t \right) \quad (2.89)$$

Wholesale marginal costs: (following Equation 2.27)

$$\widehat{W}_t = \widehat{mc}_t + \widehat{Y}_t - \widehat{L}_t - \frac{(1-w)}{(2w-1)} \widehat{rer}_t \quad (2.90)$$

Real Exchange Rate: (following Equation 2.18) :

$$\widehat{rer}_t = E_t \widehat{rer}_{t+1} + \widehat{R}_{n,t}^* - E_t \widehat{\pi}_{t+1}^* - \widehat{R}_{n,t} + E_t \widehat{\pi}_{t+1} - \phi_d \widehat{d}_t \quad (2.91)$$

STATE VARIABLES

Net foreign assets accumulation: (following Equation 2.46)⁴²

$$\widehat{d}_t = \frac{1}{\beta} \widehat{d}_{t-1} - (1-w) \widehat{\tau}_t + \widehat{Y}_t - \frac{C}{Y} \widehat{C}_t - \frac{C^e}{Y} \widehat{C}_t^e - \frac{I}{Y} \widehat{I}_t - \frac{G}{Y} \widehat{G}_t \quad (2.92)$$

Net worth accumulation: (following Equation 2.32)

$$\begin{aligned} \frac{\widehat{N}_t}{\xi_e} = & R^K \frac{K}{N} \widehat{R}_{t-1}^K + R^K \theta \left(1 - \frac{K}{N} \right) \left(\widehat{q}_{t-1} + \widehat{K}_t \right) + R^K \left(\theta \left(\frac{K}{N} - 1 \right) + 1 \right) \widehat{N}_{t-1} \\ & + \Theta (1 - \kappa) \frac{R_n^*}{\pi^*} \left(\frac{K}{N} - 1 \right) \left(\widehat{\pi}_t^* - \widehat{R}_{n,t-1}^* + \widehat{rer}_{t-1} - \widehat{rer}_t - \phi_d \widehat{d}_t \right) \\ & + \Theta \kappa \frac{R_n}{\pi} \left(\frac{K}{N} - 1 \right) \left(\widehat{\pi}_t - \widehat{R}_{n,t-1} \right) \end{aligned} \quad (2.93)$$

Capital accumulation: (following Equation 2.24)

$$\widehat{K}_{t+1} = \delta \widehat{I}_t + (1 - \delta) \widehat{K}_t \quad (2.94)$$

42. Since $d=0$, $\widehat{d}_t$ denotes d_t/Y (e.g. Bouakez and Eyquem (2015))

MONETARY POLICY, FISCAL POLICY AND PRODUCTIVITY SHOCKS

Monetary policy:

$$\widehat{R}_{n,t} = \rho \widehat{R}_{n,t-1} + (1 - \rho) \left(\gamma_\pi E_t \widehat{\pi}_{t+1} + \gamma_y \widehat{Y}_t \right) \quad (2.95)$$

Fiscal policy:

$$\widehat{G}_t = \rho_g \widehat{G}_{t-1} + \varepsilon_{g_t} \quad (2.96)$$

Productivity:

$$\widehat{a}_t = \rho_a \widehat{a}_{t-1} + \varepsilon_{a_t} \quad (2.97)$$

Foreign Economy

Total demand:

$$\begin{aligned} \widehat{Y}_t^* = & \mu(1 - w) (\widehat{\tau}_t^* - r \widehat{e} r_t) + w \left(\frac{C^*}{Y^*} \widehat{C}_t^* + \frac{I^*}{Y^*} \widehat{I}_t^* + \frac{G^*}{Y^*} \widehat{G}_t^* \right) \\ & + (1 - w) \left(\frac{C}{Y} \widehat{C}_t + \frac{C^e}{Y} \widehat{C}_t^e + \frac{I}{Y} \widehat{I}_t + \frac{G}{Y} \widehat{G}_t \right) \end{aligned} \quad (2.98)$$

Households consumption:

$$\widehat{C}_t^* = E_t \widehat{C}_{t+1}^* + \frac{1}{\sigma_c} \left(E_t \widehat{\pi}_{t+1}^* - \widehat{R}_{n,t}^* \right) \quad (2.99)$$

Capital demand:

$$\widehat{R}_t^{K^*} = \left(1 - \frac{(1 - \delta^*)}{R^{K^*}} \right) \widehat{mpc}^* - \frac{\Phi \delta^{*2}}{R^{K^*}} \widehat{K}_t^* + \frac{(1 - \delta^*)}{R^{K^*}} \widehat{q}_t^* - \widehat{q}_{t-1}^* \quad (2.100)$$

Expected cost of capital:

$$\widehat{R}_{t+1}^{K^*} = \widehat{R}_{n,t}^* - E_t \widehat{\pi}_{t+1}^* \quad (2.101)$$

Real price of capital:

$$\widehat{q}_t^* = \frac{\Phi \delta^* (\widehat{I}_t^* - \widehat{K}_t^*)}{q^*} \quad (2.102)$$

Marginal productivity of capital:

$$\widehat{mpc}_t^* = \widehat{mc}_t^* - (1 - w) \widehat{\tau}_t^* + \widehat{Y}_t^* - \widehat{K}_t^* \quad (2.103)$$

Inflation:

$$\widehat{\pi}_t^* = \widehat{\pi}_{F,t}^* + (1 - w) \Delta \widehat{\tau}_t^* \quad (2.104)$$

Domestic inflation

$$\widehat{\pi}_F^* = \beta^* E_t \widehat{\pi}_{F,t+1}^* + \frac{(1 - \rho_F^*)(1 - \beta^* \rho_F^*)}{\rho_F^*} \widehat{mc}_t^* \quad (2.105)$$

RER:

$$\widehat{rer}_t^* = -\widehat{rer}_t \quad (2.106)$$

Terms of trade:

$$\widehat{\tau}_t^* = -\widehat{\tau}_t \quad (2.107)$$

Wholesale production:

$$\widehat{Y}_t^* = \widehat{a}_t^* + \alpha \widehat{K}_t^* + (1 - \alpha) \widehat{L}_t^* \quad (2.108)$$

Labor supply:

$$\widehat{L}_t^* = \frac{1}{\sigma_l^*} (\widehat{W}_t^* - \sigma_c^* \widehat{C}_t^*) \quad (2.109)$$

Wholesale marginal cost:

$$\widehat{W}^* = \widehat{mc}_t^* + \widehat{Y}_t^* - \widehat{L}_t^* - (1 - w) \widehat{\tau}_t^* \quad (2.110)$$

Capital accumulation:

$$\widehat{K}_{t+1}^* = \delta^* \widehat{I}_t^* + (1 - \delta^*) \widehat{K}_t^* \quad (2.111)$$

Monetary Policy:

$$\widehat{R}_{n,t}^* = \rho^* \widehat{R}_{n,t-1}^* + (1 - \rho^*) \left(\gamma_\pi^* E_t \widehat{\pi}_{t+1}^* + \gamma_y^* \widehat{Y}_t^* \right) \quad (2.112)$$

Fiscal policy:

$$\widehat{G}_t^* = \rho_g^* \widehat{G}_{t-1}^* + \varepsilon_{g_t}^* \quad (2.113)$$

Productivity:

$$\widehat{a}_t^* = \rho_a^* \widehat{a}_{t-1}^* + \varepsilon_{a_t}^* \quad (2.114)$$

TABLE 2.4: Parameters – Calibration

Parameter	Definition	Value	Source
σ_c	Inverse of inter-temporal elasticity of substitution of consumption	2	Bonam and Lukkezen (2014)
σ_l	Inverse of Frisch elasticity of labor supply	1	Bonam and Lukkezen (2014)
β	Discount factor	0.99	
ϕ_d	Country premium elasticity	0.0007	Schmitt-Grohé and Uribe (2003)
ζ	Elasticity of substitution between varieties	6	Bouakez and Eyquem (2015) and Kitano et al. (2015)
α	Capital intensity	0.30	Kitano et al. (2015)
δ	Depreciation rate of capital	0.025	
μ	Elasticity of substitution across domestic and foreign goods	1.5	Bouakez and Eyquem (2015), Kitano et al. (2015)
ρ_H	Prices rigidity parameter	0.75	
w	Home bias	0.72	Kitano et al. (2015)
Φ	Adjustment cost function parameter	6	Chang and Fernández (2013)
θ	Elasticity of extern financing premium to the capital-to-net wealth ratio	0.042	Christensen and Dib (2008)
ξ_e	Probability of firms to exit	0.985	Levieuge (2009)
γ_π	Weight of inflation for (home) monetary policy	1.1	
γ_y	Weight of output for (home) monetary authority	0	
γ_π^*	Weight of inflation for (foreign) monetary policy	1.8	
γ_y^*	Weight of output for (foreign) monetary authority	0	
ρ	Temporal autocorrelation of nominal interest rates	0.85	
ρ_g	Autocorrelation of public spending shocks	0.8	
ρ_a	Autocorrelation of productivity shocks	0.8	

Troisième partie

Les interactions budgétaires

Chapitre 3

Delayed-mimicking: The timing of fiscal interactions in Europe

3.1 Introduction

The issue of spending and revenue interactions among localities is largely addressed in the academic literature. Since fiscal choices spill-over localities, governments have strategic interactions to implement their tax and spending policies. Some theoretical papers identify the rationales for these interactions, which can be extended to the case of fiscal policy interactions between countries (Salmon, 2014). In fact, countries can interact because of tax competition (Wilson, 1986; Zodrow and Mieszkowski, 1986), yardstick competition (Besley and Case, 1992) or even because they cooperate.

However, it is widely recognized that differentiating among the different sources of fiscal interactions is not obvious. Especially, the evidence of (positive) fiscal interactions can be consistent with all the theories cited above. Since the political and normative implications are really different according to the reason why countries interact, differentiating between the different sources is an important task.

In that context, this paper firstly aims to evaluate fiscal interactions between (national) governments. Secondly, the reasons why fiscal interactions occur are investigated.

On the first point, it is especially argued that interactions between governments could be observed but not only in a contemporaneous way. Hence, interactions are analyzed, both in a contemporaneous way and with a delay. In that sens, a Spatial Dynamic Panel Data (SDPD) model is estimated for 31 European countries over the period 1995-2013. Positive fiscal interactions are found, but these interactions occur with a delay: governments mimic the behaviors of the others on the previous year.

Then, the reasons why fiscal interactions exist are investigated. Since different theories should lead to different empirical implications, these implications are tested. Particularly, we assume that each theory implies a specific transmission channel between governments' fiscal choices. Hence, using original weighting schemes based on political proximity and similarities between investment contexts, it is shown that fiscal interactions are likely due to yardstick competition.

The remainder of the paper is organized as follows. Section 3.2 outlines the existing literature on fiscal interactions. Section 3.3 introduces the method used, and results are shown in Section 3.4. In Section 3.5, the nature of fiscal interactions is investigated. Section 3.6 presents some robustness checks and Section 3.7 concludes.

3.2 Literature Background

In the literature, three main theories are put forward to explain fiscal interactions.

The first one is tax competition (Wilson, 1986; Zodrow and Mieszkowski, 1986). Governments aim to attract mobile tax basis by lowering fiscal burdens. Theoretically, tax competition should imply positive interactions between states since models predict tax harmonization

(Brueckner, 2003). While it is often argued that governments compete by using tax rates, this idea can be extended to the use of public spending. Governments can respond to a change in tax rates or in spending in other countries by changing their own tax rates or spending (see for example Hauptmeier et al., 2012). Hence, in the following, the term "fiscal competition" will be used to refer to the tax competition theory encompassing behaviors both in terms of revenue and spending.

Another rationale for fiscal interactions between governments is yardstick competition. According to Besley and Case (1992), voters compare home government decisions with those applied abroad and they sanction their government if they believe policies are better abroad. Yardstick competition should lead to positive interactions since each government will mimic the others in order to avoid voters' sanctions.

The last case for fiscal interactions among countries is (non-)coordination. Investments in one country can benefit another one, both by increasing external demand (i.e. the trading partners exports) and by implementing infrastructures that are useful for neighboring countries. In such a case, countries may decide to cooperate by financing public goods together, or they may be free-rider taking the advantage from neighbor's choices without any cost. Generally, governments do not have incentives to share the policy costs, but in the particular context of the European Union, institutions have been implemented in order to foster cooperation between states. Moreover, some papers show that an area-wide fiscal shock is more effective than an (equivalent) isolated one (see for example Hebous and Zimmermann, 2013). Cooperation⁴³ between countries should lead to positive fiscal interactions, but free-rider behaviors should imply negative ones (Redoano, 2003).

Based on all these theoretical explanations for fiscal interactions, and given that the sign of fiscal interactions remains uncertain, a lot of papers empirically estimate fiscal interactions, both on the spending and the revenue sides. Most of them are related to the national level (see

43. Here, the term "cooperation" refers to the cost sharing of fiscal choices.

for example Foucault et al., 2008; Gérard et al., 2010; Delgado et al., 2015), but some papers are interested in fiscal interactions at the international scale. Besley et al. (2001) and Winner (2005) find there are interactions among OECD governments which are consistent with the tax competition hypothesis. More recently, Kammas (2011) finds strategic interdependencies over capital tax rates, but no one over public investment spending, and Cassette et al. (2013) show that fiscal interactions among OECD countries could be due to tax competition as well as yardstick competition. These papers have a common feature: they consider public spending and public revenue separately. Only few papers are about the interdependence between global fiscal stances – i.e. considering spending and revenue jointly. A change in tax policy could be offset by an equivalent change in spending, at least partially. Therefore analyzing fiscal stances interdependencies is necessary to conclude about the presence of strategic interactions, and even more if we consider that global fiscal stances reflect fiscal policy. In fact, the advantage from using fiscal stances, and not only spending or revenue, is that recent years have been characterized by an increasing taste of agents for fiscal discipline – and a growing concern about fiscal sustainability. Fiscal stances are decisive variables, analyzing their interactions seems relevant, especially because, to the best of our knowledge, only Beetsma and Giuliadori (2008) do it.

Generally, papers dealing with fiscal interactions consider these interactions occur contemporaneously. In the seminal theoretical contributions explaining fiscal interactions (Wilson, 1986; Besley and Case, 1992), governments' decisions are taken simultaneously. However, some papers show that countries can get benefit from setting their fiscal choices in a second period (Gordon, 1992; Kempf and Rota-Graziosi, 2010). These articles model tax competition between two countries with one country that acts as a Stackelberg leader. Especially, Kempf and Rota-Graziosi (2010) show that tax rates at the potential equilibrium obtained in a leader-follower game are higher than the ones at a (Nash) equilibrium when decisions are made simultaneously. This point is true for both the leader and the follower,

which reduces the race to the bottom phenomena between tax rates across countries. While some advantages are highlighted from a theoretical point of view, it seems necessary to test the actual possibility for this leader-follower phenomena.

In addition, fiscal policy is subject to an implementation lag. Blanchard and Perotti (2002) argue that the reaction of fiscal policy to the economic context needs at least one quarter and Beetsma and Giuliodori (2011) support that the budget is often planned once a year, and sometimes revised in mid-year. These points show that governments do not respond to the economic context without a delay. Therefore, considering the time needed to take fiscal decisions and to implement a new fiscal policy, we argue that fiscal interactions should occur with a delay: governments shall react to the last year neighboring fiscal decisions, not only to the current ones.

From an empirical point of view, only a few papers about fiscal interactions take these potential lagged interactions into account. Altshuler and Goodspeed (2015) estimate tax reaction functions for European countries with a delay to identify a potential US leadership. Chirinko and Wilson (2011), using the Pesaran's Common Correlated Effects estimator, show that omitting the delayed response of tax policy leads to misspecified model and biased results. Regarding the fiscal stances interactions, to the best of our knowledge, there is no study which considers that interactions can occur with a delay.

While most of the papers about international fiscal interactions are interested in OECD countries, the question of strategic interactions is a major challenge in Europe. European countries are increasingly interdependent. Especially, countries from the European Union (EU) are still called for political cooperation. Since the recent crisis, new councils as the Ecofin Council have been created to reinforce dialogs among European countries. However, even if the financial crisis had led to a "revival" of cooperation with the implementation of coordinated (expansionary) fiscal policies, debt sustainability concerns can lead to competition among countries which have to face to budgetary austerity (Timbeau, 2015).

In sum, this paper aims to fill the existing gap in the literature by estimating fiscal interactions among European governments in two ways. Interactions are not constrained to occur contemporaneously, which allows to empirically test the existence of a leader-follower game, and also to consider some specific patterns of fiscal policy. Besides, empirical implications of the theory are used to shed new light on theoretical rationales for fiscal interactions.

3.3 Empirical Design

To empirically estimate to what extent fiscal stances interact in Europe, four preliminary points of methodology have to be discussed. First, the suitable empirical specification and estimator have to be used. Second, it is necessary to discuss the definition and the indicator of fiscal stance. Then, obviously, fiscal stance in one country does not depend only on fiscal stances abroad, that is why the role of other factors has to be discussed and considered. Finally, since the results may crucially depend on the definition of the linkages (i.e. the neighboring) between countries, the weighting schemes used are discussed.

3.3.1 Empirical Specification

In order to account for interdependences, two main methodologies are used in the literature. A growing literature pertains to Global Vector AutoRegressive (GVAR) models, and the other one relates to spatial econometrics.

Regarding the GVAR literature, some recent articles use GVAR in order to deal with fiscal policy issues.⁴⁴ The idea is to estimate a VAR for each country including both national and foreign variables. The foreign variables are obtained from the VAR estimated for the other

44. See for example Ricci-Risquete and Ramajo-Hernández (2015) about spillovers from fiscal policy among European countries, Dragomirescu-Gaina and Philippas (2015) that focus on the impact of capital flows on fiscal reactions, or Belke and Osowski (2016) that analyze spillovers from French and German fiscal policies on the rest of Europe.

countries. Then these country-specific VAR are stacked to be estimated as a GVAR.

However, GVAR models present, in our view, an important limitation. Using GVAR does not allow to identify any shock, that means the spillovers or the change in fiscal policy they observe do not only contain the effect of a discretionary measure in another country. In fact, for example, the observed change in public spending following a change in public spending in another country could be due to an increase in GDP in this other country and/or at home. This point makes difficult the interpretation of results obtained using a GVAR, especially if we want to draw conclusions about potential strategic behaviors. Another inadequacy of GVAR regarding the motivation of this paper is that using this method does not tell anything about the rationales responsible for fiscal interactions.

Spatial econometrics allow to address this limitation given that, among others, the direct effect and the indirect (spatial) effect of each control variable can be estimated separately. Moreover, if positive interactions are found, for example, it should be clear that an increase in public spending observed at home is not due to a change in GDP in neighboring countries, but rather to a positive change in (neighbors) public spending.

In this way, spatial econometrics toolbox will be preferred. Spatial econometrics methods allow to account for interdependences, and, using control variables, allow to measure the change in fiscal stance that can be attributed to a change in fiscal stance in another country, other things being equal.

Estimating interactions between fiscal stances using spatial econometrics implies some specific needs.

First, since governments cannot fully change their fiscal stance within one year, there are some persistence effects that have to be controlled for. Hence, the endogenous variable has to appear as time-delayed in the estimated equation, that leads to use a dynamic (in time) model.

Second, the aim of the paper is to test the impact of fiscal stances in one country on the other countries. It means that the dependent variable needs to be introduced as spatially lagged in the regressors. Since the main objective of the paper is to test the timing of the (potential) interactions, the spatially lagged variable should be introduced contemporaneously but also time-delayed.

Finally, two questions have to be addressed: the first one is about the need for spatially lagged control variables and the second question is about the need to account for spatial autocorrelation among error terms.⁴⁵

Including spatially lagged control variables means that we assume the (exogenous) characteristics of a country affect the fiscal stance of other countries. This impact seems limited and, above all, this question goes beyond the core issue of this article. Moreover, since the endogenous variable is introduced timely lagged, spatially-lagged and timely-spatially lagged, adding spatially lagged exogenous variables would significantly complicate the estimation. The control variables are therefore assumed to affect the dependent variable only through the spatially lagged endogenous variable.

Regarding the issue of spatial interaction effects among the error terms, it is not directly controlled for because of several reasons. When a spatial term is introduced in the error term, the model becomes more sophisticated that prevents from determining the (true) spatial spillovers. On the other hand, spatial fixed effects will be introduced in the specification, that automatically controls for spatial autocorrelation between the individual effects (Lee and Yu, 2010a) which is a form of spatial error autocorrelation.

Taking into account all these requirements, the most appropriate method is the Spatial Dynamic Panel Data model from Yu et al. (2008) and Lee and Yu (2010b). It allows for contemporaneous interactions, delayed interactions, and also for the presence of the timely lagged endogenous variable in the regressors. This dynamic model is estimated in two steps.

45. See Elhorst (2012) for a review of dynamic spatial panel models.

First, it is estimated by the Quasi-Maximum Likelihood (QML) estimator:⁴⁶ this estimation is based on the log-likelihood function of the model conditionally to the first observation of each spatial unit in the sample. Second, coefficients are corrected for the presence of fixed effects.⁴⁷

The estimated equation is defined as follows:

$$Y_{n,t} = \gamma Y_{n,t-1} + \lambda W_n Y_{n,t-1} + \rho W_n Y_{n,t} + X_{n,t} \beta + c_n + D_t + \varepsilon_{n,t} \quad (3.1)$$

Where:

- $Y_{n,t}$ is a $n \times 1$ column vector of fiscal stances of countries 1 to n at time t ;
- $X_{n,t}$ is a $n \times k$ matrix of k control variables at period t ;
- W_n is a $n \times n$ matrix row normalized with all weights between 0 and 1, which is discussed below;
- $\varepsilon_{n,t}$ is a $n \times 1$ column vector of error terms that is assumed to be *i.i.d.* across individuals and times with zero mean and with σ_0^2 variance;
- c_n is a $n \times 1$ column vector of individual fixed effects;
- D_t is a $n \times t$ matrix of dummy variables for each time period.

In this setting, the presence of interdependencies and interactions between governments is evaluated by testing the significance of the coefficients λ and ρ . In fact, if at least one of these coefficients is statistically different from zero, we have evidence that there are some interactions between countries in the implementation of fiscal policy. If both of these coefficients are insignificant, the presence of interactions would be rejected.

46. Dynamic spatial models can also be estimated by the Generalized Method of Moments. However, Lee and Yu (2014) show that QMLE performs better overall and particularly in the case of large persistent effects in the endogenous variable.

47. See Elhorst (2012) or the original contributions from Yu et al. (2008) and Lee and Yu (2010b) for more explanations.

Regarding the control variables, to be interpreted, their marginal effects have to be re-calculated. Indeed, this dynamic space-time model has two kinds of derivatives: own-partial derivatives and cross-partial ones. The own-partial derivatives show the impact of a change in the kth variable in country i on $Y_{i,t}$, and the cross-partial derivatives show the spillover effect: the effect of a change in the kth variable in country j on $Y_{i,t}$. Here, we are more interested in the direct effect in order to measure the response of fiscal stance in country i to a change in country i 's explanatory variables. Following Debarsy et al. (2012), the response of Y to a change in the kth variable at time t at horizon T for country i is computed as follows:⁴⁸

$$\frac{\partial Y_{t+T}}{\partial k_t} = D_T [I_N \beta_k] \quad (3.2)$$

With $D_T = (-1)^T (F^{-1}C)^T F^{-1}$, $C = -(\gamma I_N + \lambda W)$, and $F = (I_N - \rho W)$.

Since the effect can differ across countries, we take the average effect – i.e. the average of the main diagonal elements of $\frac{\partial Y_{t+T}}{\partial k_t}$.

The SDPD model is estimated over a sample of 31 European countries⁴⁹ over the 1995-2013 period. This choice is constrained by data availability knowing only few data are available for Eastern European countries before 1995, and data are yearly since quarterly data are not available for a large set of countries.

3.3.2 Fiscal stance measurement

Generally, the fiscal stance is represented by the budget balance calculated as the difference between public revenue and spending. The budget balance varies according to govern-

48. The effect is computed assuming the shock in the kth i 's variable at time t is transitory.

49. Countries are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

ments' decisions, but also depending on the business cycle due to the so-called *automatic stabilizers*. Analyzing the interactions between fiscal stances in Europe implies that the analyzed fiscal stances must be the results of governments' decisions. Otherwise, the measured interactions could be due to an involuntary reaction to a change in the economic context, and not really to government discretion. For this purpose, two strategies are combined.

First, fiscal stances are measured using the yearly Cyclically Adjusted Primary Balance (CAPB). The CAPB is the budget balance prevailing when the economy is at its potential. It is measured in percentage of the cyclically adjusted output. Interest debt payments are also deleted since they are due to past deficits and not really to the current government decisions. CAPB is computed as follows:

$$CAPB = \frac{B^p}{GDP^p} = \frac{B}{GDP} - \varepsilon * OG \quad (3.3)$$

With:

- B the budget balance of general government excluding interest debt payments, and B^p the potential budget balance (i.e. the budget balance which should prevail when economy is at its potential level);
- GDP the GDP level, and GDP^p the potential output;
- OG the Output Gap;⁵⁰
- ε the semi-elasticity of B to GDP .⁵¹

In theory, using CAPB eliminates the contemporaneous (and unintentional) reactions of fiscal policy to cyclical variations in domestic output, and allows us to measure the governments discretion. However, while the response of fiscal policy to the economic context is substantially reduced using CAPB, CAPB can still contain the (voluntary) changes in fiscal

50. The output gap is computed as the difference between potential GDP and actual GDP using the production function approach, see Roeger (2006).

51. $\varepsilon = \frac{d(\frac{B}{Y})}{\frac{dY}{Y}}$

stance due to the economic context. This point makes the CAPB not fully exogenous to economic factors. Nevertheless, in this paper, we focus on (political) interactions among fiscal stances, leaving apart the consequences in terms of economic growth. In this way, if countries choose to implement an expansionary (or restrictive) fiscal policy in response to a negative economic shock or even because of sustainability concerns, it does not change our key issue: do countries interact with each other? Hence, CAPB appears as a convincing indicator given our objective.

Second, and to partly respond to the limitation of the indicator we have chosen, some control variables are introduced in the specification. They are presented in the next subsection and they ensure that the results obtained are not due to common shocks among countries, or to other factors apart from interactive behaviors.

The aim of this paper is to analyze the interactions among global fiscal stances, that is why public revenue and spending are not studied separately. In the literature, some papers estimate interactions between revenue and/or between spending (See for example Cassette et al., 2013), but a change in public revenue (or spending) does not always reflect the orientation of fiscal policy. In fact, a change in public revenue can, even partly, be offset by a change in public spending, that does not lead to any change in fiscal stance. CAPB represents the *true* orientation of fiscal policy, that is why it is preferred instead of spending or revenue. Moreover, the budget balance reflects the health and the orientation of a government that can affect the attractiveness of a country. The budget balance has become a strategic variable for governments, and even more since the recent sustainability concerns some countries had known after the 2008 crisis, that makes the analyze of CAPB more relevant.

Unlike Beetsma and Giuliadori (2008) who use real-time data (planned budget), we use effective data about public budget. In fact, we argue that some governments can announce an expansive fiscal policy under a (relative) coordination program, but the actual fiscal change

can be different. In this paper, the presence of actual coordination is tested, while using planned budget leads to conclude about planned coordination.

The CAPB is introduced in level in Equation 3.1 since an increase in CAPB can be viewed as a restrictive fiscal policy, and vice versa. In this way, the spatial correlation coefficient represents the impact of an increase in CAPB abroad on the CAPB at home. A positive spatial autocorrelation coefficient means that there are mimicking behaviors: governments mimic their neighbors. On the opposite, a negative spatial autocorrelation coefficient would mean that governments have reverse reactions to their neighbors: when the (weighted) neighboring CAPB increases, CAPB at home decreases.

3.3.3 Control variables

To ensure that the estimated interaction effects are really due to interactions among fiscal decisions, the other sources of fiscal stance variations have to be controlled. Data sources and descriptions are presented in Appendix, Table 3.18.

The fiscal stance is first influenced by economic and demographic conditions. A high employment rate (*unemployment*) and a high share of inactive population (*young* and *old* people) imply larger public spending, but also lower revenue: they are expected to deteriorate the CAPB.

The fiscal stance can also be influenced by the level of GDP per capita in constant terms (*gdp_perk*) as it can be viewed as a proxy of the development level. In this way, GDP per capita can control for differences between Eastern and Western European countries. Since the former are often considered as exercising more fiscal discipline, a negative sign for this variable can be expected.

Even if fiscal stances here are purged from their main cyclical components, the growth rate (*growth*) could have a positive impact on the CAPB if fiscal policy is pro-cyclical, or a

negative effect if the reactions of governments are counter-cyclical.

European countries can also be influenced by their main trading partners out of Europe. As an example, Altshuler and Goodspeed (2015) show that European countries consider the US fiscal policy for implementing policy at home. Moreover, a large volume of trade can imply favorable economic context leading to higher CAPB. A variable *trade* is therefore introduced in the specification; it measures the volume of trade for each country with countries out of Europe.

The occurrence of banking crisis (*crisis*) can imply larger spending the following year, reducing the CAPB. Finally, the concerns about high public debt (*debt*) can lead to restrictive measures which would improve CAPB.

All these variables are lagged since the budget is generally decided once a year (and before its execution), and this avoids endogeneity issues.

The fiscal stance is also influenced by political factors. A relaxation of fiscal policy on the election year (*election_year*) might be expected, and left wings governments (*left*) are expected to be less stressed about fiscal discipline. Note that this result could be affected by the recent responses to the crisis which do not always depend on the political orientation of government. Hence the effect of the *left* variable seems *a priori* unclear. Fiscal stance can also be affected by the size of government: the bigger governments may have more power to intervene in the economy than the smaller. To approximate this government size, a composite index is constructed (*GovSize*) relying on the share of state's employees compensation in GDP and the share of social contributions collected by the government.⁵²

We also take into account the peer pressure as suggested in Beetsma and Giuliodori (2008). We construct a variable which equals to zero when CAPB is under the 3% deficit

52. The quartile of these variables are computed, and a score is assigned to each country (and year) from 1 for countries belonging to the first quartile, to 4 for countries belonging to the higher quartile. The two scores are added to form the *GovSize* variable, which therefore ranges from 1 (countries not too interventionist) to 8 (interventionist countries).

threshold, and equals to the inverse distance from this threshold otherwise. This variable is then multiplied by the inverse of the number of years before the entrance in the Euro Area. The variable *sgp* therefore increases both with the distance to the 3% deficit threshold and the closer the date for entrance in the Euro Area (EA) is.⁵³

In addition to these control variables, both time and individual fixed effects are introduced. Individual fixed effects allow to control for cross-sectional heterogeneity that cannot be accounted for by observable characteristics. Time fixed effects control for common shocks and variations among countries, which ensures the results are not due to external events affecting all the European countries.

3.3.4 The Weighting Schemes

The weighting matrix W_n is a $n \times n$ matrix whose each element $w_{i,j}$ represents the channel for interactions between i and j . W has to be exogenous and unvarying across time dimension. In practice, and to estimate the SDPD model, W has to be normalized. Here, W is row-normalized, meaning that each line sums to one. In this way, we test the impact of the weighting average of fiscal stances abroad on fiscal stance at home. Even if Kelejian and Prucha (2010) show that a normalization using the maximal eigenvalue of the matrix is more neutral for the estimation of the spatial correlation parameter, we argue that using relative distance is more suitable in our case. Moreover, this row-normalization is the most frequently used in the literature about fiscal interactions⁵⁴, our results are therefore more comparable using the same method.

Regarding the definition of weights, different schemes have to be used to ensure the results found are not only due to the matrix used.

First, we use a traditional geographical distance matrix (W_d) that measures the euclidean

53. We wanted to introduce variables controlling for EU and EA memberships, but their are almost identical with individual (and/or time) fixed effects, which gives poor quality estimates. They are therefore omitting.

54. See for example Beetsma and Giuliodori (2008) or Cassette et al. (2013).

distance between economic capitals. For $i \neq j$, each element of W_d is defined as follows:

$$w_{i,j} = \frac{1}{d_{i,j}} \quad (3.4)$$

With $d_{i,j}$ the euclidean distance between i and j economic capitals.

Second, we use a weighting matrix that represents the intensity of trade between countries ($W_{imports}$). This transmission channel is frequently used to test fiscal interactions, especially cross-country spillovers from fiscal policy (See for example Goujard, 2017). Each element of W_{trade} is constructed as follows:

$$w_{i,j} = import_{j,i} \quad (3.5)$$

Where $import_{j,i}$ is the import average of j from i over the period 1980-1994. This matrix is predetermined that ensures its exogeneity. In that case, country j is assumed to have a larger impact on country i if country j imports a lot from country i .

Finally, a third matrix is used in order to capture structural economic similarities among governments. This matrix is based on an index measuring the relative share of educated workers in total workers. When the spread between this index value for two countries decreases, the proximity between these two countries is supposed to increase. Countries are therefore considered as close if they share structural economic similarities. Each element $w_{i,j}$ of this matrix is computed in the following way:

$$w_{i,j} = \left| \frac{1}{EducatedWorkers_i - EducatedWorkers_j} \right| \quad (3.6)$$

Where $EducatedWorkers_i$ is the average share of educated workers in country i for the period 1995-2013.

3.4 Results

Results using the three matrices described above are presented in Table 3.1, and the marginal effects computed following Equation 3.2 are shown in Appendix, Table 3.15.

Before interpreting these results, stationary has to be tested. As explained in Elhorst (2012), the stationary conditions imply, regarding our specification, that the spatial and time coefficients (γ , λ and ρ) sum to less than one and that γ is less than one. In fact, Equation 3.1 can be written as follows:

$$Y_{n,t} = (I_n - \lambda W_n)^{-1}(\gamma I_n + \rho W_n)Y_{n,t-1} + (I_n - \lambda W_n)^{-1}[X_{n,t}\beta + c_n + D_t + \varepsilon_{n,t}] \quad (3.7)$$

Denoting $A_n = (I_n - \lambda W_n)^{-1}(\gamma I_n + \rho W_n)$, Lee and Yu (2010b) show that all the eigen values of A_n have to be less than 1 in absolute value to ensure stationarity. This condition is equivalent to ensure that $\gamma + \lambda + \rho < 1$. Also, two extreme cases can be emphasized. First, if $\gamma + \lambda + \rho = 1$ and $\gamma = 1$ we have a unit root SDPD model (see Yu and Lee (2010) in such a case); second, if $\gamma + \lambda + \rho = 1$ and $\gamma < 1$, we have a spatial co-integration model. In this way, two Wald statistics are computed to check the stationarity conditions hold. In its first version, under the null hypothesis we have $\gamma + \lambda + \rho = 1$ and $\gamma = 1$; and then we test $\gamma + \lambda + \rho = 1$ given that γ is less than 1. Tables 3.16 and 3.17 in Appendix show the results of these tests for each weighting schemes, the null hypothesis of non-stationarity is rejected in any case, therefore our specifications are stable.

Regarding the control variables, effects are similar whatever the matrix used.

First, the lagged GDP per capita has a negative impact on CAPB (-2.5). Since the GDP per capita can be viewed as a proxy for the development level, this result leads to conclude that less advanced economies (i.e. Eastern European countries) are more concerned about

TABLE 3.1: Results using general weighting schemes

Variables	Weighting matrix					
	Distance		Imports		Educated Workers	
Y_{t-1}	0.59***	(0.00)	0.58***	(0.00)	0.59***	(0.00)
WY_{t-1}	0.15*	(0.09)	0.32**	(0.04)	0.17*	(0.07)
WY_t	0.01	(0.98)	0.01	(0.89)	0.01	(0.95)
GDP_{t-1}	-2.54*	(0.08)	-2.57*	(0.07)	-2.6*	(0.07)
$Growth_{t-1}$	0.00	(0.19)	0.00	(0.27)	0.00	(0.21)
$Unemployment_{t-1}$	0.06	(0.12)	0.06	(0.11)	0.06	(0.11)
$Crisis_{t-1}$	-0.09	(0.77)	-0.06	(0.84)	-0.06	(0.85)
$Trade_{t-1}$	0.03**	(0.05)	0.02*	(0.09)	0.03**	(0.05)
$PublicDebt_{t-1}$	0.25*	(0.08)	0.24*	(0.10)	0.24*	(0.09)
$GovtSize_{t-1}$	-0.41***	(0.00)	-0.42***	(0.00)	-0.42***	(0.00)
$Young_{t-1}$	-4.00***	(0.00)	-4.28***	(0.00)	-4.49***	(0.00)
Old_{t-1}	-0.13	(0.94)	0.16	(0.93)	-0.31	(0.88)
$ElectionYear$	-0.37**	(0.03)	-0.37**	(0.03)	-0.35**	(0.04)
$Left$	-0.11*	(0.08)	-0.10*	(0.09)	-0.11*	(0.06)
SGP	0.78	(0.13)	0.80	(0.12)	0.78	(0.13)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	2.99		2.98		2.98	
Log-Likelihood	-904.23		-902.59		-902.98	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

fiscal discipline than the more advanced (i.e. Western European countries). This result is consistent with the literature given that it is often argued that, for example, the threshold from which public debt has a negative impact on growth is lower in emerging economies (See for example Batini et al., 2014). Eastern European economies therefore have to (more) control their budget balance to ensure debt stability.

The variable *trade* has a (not always significant) positive impact on CAPB (0.03). It seems that a larger volume of extra-European trade improves the budget balance of European countries. This result can be due to the the stronger activity implied by more international trade.

The coefficient associated to the *debt* variable (around 0.25) seems express sustainability

concerns. A high public debt leads governments to control their budget balance, and to reduce their deficit in order to control the public debt progression.

Concerning the political variables, we find that fiscal stance is highly deteriorated during election years. This result is consistent with political budget cycles literature (see for example Alesina et al., 1993; Klomp and De Haan, 2013). The variable *left* also has a negative impact on fiscal stances (around -0.11), meaning that left-wing governments are less stressed about fiscal discipline than right-wing governments. In the same way, governments that are more interventionist, as measured by the variable *GovSize* have lower fiscal stances.

Regarding the spatial correlation, all these weighting schemes show that there are positive interactions between countries. However, and contrary to the results from previous articles like Beetsma and Giuliadori (2008), Redoano (2007) and Cassette et al. (2013), these interactions are not contemporaneous. Countries consider neighboring fiscal stances of the previous year to set their current fiscal stance, which can be called "delayed mimicking" behaviors.⁵⁵

Nevertheless, the weighting schemes used here are not really informative about the reason why fiscal stances interact. Regarding geographical distance, neighboring countries can interact because of tax competition since the closer countries are, the easier investing there is. Geographical distance can also imply yardstick competition since the nearest neighbors are better known than the farthest; it is therefore easier to compare our own government to its nearest neighbors. Finally, geographical proximity can also imply common investments, both for infrastructures or international projects (such as educational or health programs for example), that is a kind of cooperation.

Concerning the trade matrix, it is often considered that this scheme represents the transmission channel for cross-country spillovers. The idea is that an increase in public spending

55. A second lag has also been tested, but the second lag is not significant, and the AIC and BIC have shown that one lag is the best specification.

(or a decrease in public revenue) leads to a rise in imports that therefore benefits to trading partners by boosting their growth. Since trading partners can benefit from positive spillovers without spending any money, they have incentive to being free-riders.

However, the trading proximity could also imply other forms of interactions. Hence, since trading partners are likely to have language, history and/or institutions similarities (Srivastava and Green, 1986; Linders and Slangen, 2015), it is easier for capitals to move there, and even more in case of trade agreements. Tax competition is therefore not excluded. In the same way, an important trading partner is often much more known than a less important one since our main trading partners are likely to have similar language, history and/or institutions. Aside from a few exceptions, it is easier to compare government efficiency to trade partner countries' one. The positive interaction coefficient found using trading proximity could therefore be due to cooperation, as well as fiscal competition or yardstick competition.

Finally, the matrix based on structural similarities ($W_{\text{Educated Workers}}$) can also reflect cooperation, fiscal competition or yardstick competition. Similar countries can have common needs (and thus cooperate), they also attract the same kind of investments (i.e. they have to compete to attract capitals), and they are more comparable to the others.

While the geographical, trading and structural weighting schemes do not allow to identify the rationale for fiscal interactions, our results are informative. Finding positive interactions allows to exclude potential free-rider behaviors since free-riding should imply negative interactions (Redoano, 2007; Brueckner, 2003). Then, the cooperation hypothesis does not seem to be realistic since the interactions are not contemporaneous. Since countries mimic the others one year after, a situation in which there are leader(s) and follower(s)⁵⁶ is more likely than a cooperation case. This point however needs further investigation to be confirmed.

In this way, two reasons for fiscal interactions remain: fiscal competition and yardstick

56. See for example the paper of Altshuler and Goodspeed (2015) that shows the American leadership by introducing the US' lagged tax policy in the regressors. For a theoretical model, see also Kempf and Rota-Graziosi (2010).

competition. Both of them are compliant with the presence of positive interactions, and the delay between neighbor and domestic actions is not inconsistent with them. What we know is that governments mimic the others the year after, whatever the reason is. However, it should be interesting to discriminate between fiscal and yardstick competition since each one of them does not imply the same consequences in normative terms.

3.5 On the interpretation of fiscal interactions

In this section, we model different transmission channels to confirm our intuition about cooperation and attempt to discriminate between fiscal and yardstick competition. First, the existence of cooperation is tested. Second, the fiscal competition assumption is distinguished from the yardstick competition.

3.5.1 Is there fiscal cooperation?

First, in order to confirm our intuition about the absence of cooperation among countries, we test whether the political proximity between governments induces some interactions or not.

Some articles in the literature have shown that governments with a similar ideology follow the same trend in terms of budget evolution. Among others, De Haan and Sturm (1994) show that left-wing governments lead to a larger share of public spending in GDP, Perotti and Kontopoulos (2002) find that left-wing governments are more likely to increase transfer spending, and Volkerink and De Haan (2001) show that right-wing governments seem to be historically more stressed about fiscal discipline. Hence, if two governments are politically close, there is a common understanding that should facilitate cooperation about fiscal questions.

Consequently, we test whether interactions are stronger between governments with simi-

lar political guidelines. A matrix $W_{politics}$ is constructed as follows:⁵⁷

$$w_{i,j} = \left| \frac{1}{gov_party_i - gov_party_j} \right| \quad (3.8)$$

Where gov_party_i is an indicator ranged from 1 to 5, with 1 for governments with hegemony of right-wing parties; 5 for governments with hegemony of left parties. The average of this indicator over our period of interest is used.⁵⁸

Results (Table 3.2) show that considering political proximity does not imply any fiscal interactions. Actually, we find that politically close governments do not interact each other. This result leads to conclude that cooperation among European countries is unlikely to be the reason for the positive interactions found.

57. Data sources for weighting matrices construction are presented in Appendix, Table 3.19.

58. For this matrix, as well as for the following ones, in each case where there is no differences between i and j , $w_{i,j}$ is replaced by $Max w_{i,j} + 1$ to ensure that a stronger weight is given to countries that are exactly similar.

TABLE 3.2: Results for cooperation

Weighting Matrix	
Variable	Politics
Y_{t-1}	0.56*** (0.00)
WY_{t-1}	-0.57 (0.23)
WY_t	0.01 (0.95)
GDP_{t-1}	-2.48* (0.08)
$Growth_{t-1}$	0.01 (0.15)
$Unemployment_{t-1}$	0.06 (0.14)
$Crisis_{t-1}$	-0.10 (0.73)
$Trade_{t-1}$	0.03** (0.05)
$PublicDebt_{t-1}$	0.25* (0.08)
$GovtSize_{t-1}$	-0.41*** (0.00)
$Young_{t-1}$	-3.91*** (0.01)
Old_{t-1}	-0.33 (0.87)
$ElectionYear$	-0.37** (0.03)
$Left$	-0.10* (0.08)
SGP	0.82 (0.11)
Individual FE	Yes
Time FE	Yes
Observations	589
σ^2	2.98
Log-Likelihood	-902.83

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

3.5.2 Is there fiscal competition?

While cooperation can be excluded from the reasons why countries interact, fiscal competition has to be differentiated from yardstick competition.

According to the tax competition theory, governments compete to attract mobile tax basis, which means mainly capitals. In the literature about Foreign Direct Investment (FDI), several factors that influence the location of investment flows are emphasized, and governments can act on these determinants to be more attractive.

Among others, Busse and Hefeker (2007) show that institutions⁵⁹ in developing countries are crucial to attract FDI. Ali et al. (2010) reach the same conclusion, and also find that openness to trade increases the received FDI. Dunning and Lundan (2008) underline that institutions, defined in a broad sens as "the rules of the game", largely affect the attractiveness of countries. Blonigen (2005), in a literature review, relates that the main determinants of FDI emphasized by the empirical literature are the exchange rate uncertainty, institutions, trade regulation, and tax rates. Also about tax rates, the OECD, in the February 2008 policy brief issue explains that empirical studies find a decrease in FDI inflows which could go up to 5% when tax rates increase by one percentage point. Following the same idea, Cassou (1997) shows that tax rates, both on corporation and income, significantly affect the location of FDI.

In sum, to attract mobile tax basis, governments have several instruments that can be grouped into two wide categories: the institutional instruments and the fiscal ones.

Institutional instruments are likely to require more time and to imply more difficulties to be used. In fact, the rules of the game cannot be changed quickly and without costs. Over a large time period, countries that have similar institutional contexts cannot put themselves forward compared to the others on this matter. Hence, to be more attractive than the others, they have to use the second category of instruments, namely the fiscal instruments.

59. More precisely, they consider in their estimates government stability, external conflicts, ethnic tensions, democratic accountability, corruption and the quality of bureaucracy.

In other words, and regarding our specific case, countries can compete on their institutional contexts and by using fiscal policy. If they are similar on the structural side (the institutional context), they can more easily be considered as substitutes for investors, so they are more likely to compete using the more short-term instrument (fiscal policy).

Therefore, to test the fiscal competition assumption, we test whether fiscal interactions are stronger between countries with similar institutional contexts. Fiscal competition would be confirmed if a positive coefficient is found. In fact, it would mean that countries mimic especially countries that share similar (institutional) characteristics. As an example, considering that countries i and j share similar characteristics, country i implements an expansive (restrictive) fiscal policy, country j does it also, and vice versa. This behavior is consistent with the existence of fiscal competition.

To measure the proximity in terms of institutional context, four matrices are used. The first one is based on financial openness that can make easier an investment, and therefore affects the cost of an investment. The second one is based on the time needed to implement a contract: a similar time to contract in two countries more broadly reflects similar investment conditions. In the same spirit, the third matrix is based on the number of procedures needed to set a business relationship. The last matrix is constructed using the *Investment Profile* index from the International Country Risk Guide (ICRG) and it assesses the risk to invest. The computation of these matrices is explained below.

To begin, we consider the *kaopen* indicator from Chinn and Ito (2006) that measures the *de jure* financial openness. This index takes into account the presence of multiple exchange rate, restrictions on current and capital accounts transactions, and the requirement of the export proceeds surrender. Two countries with a close *kaopen* index should share some characteristics making them comparable for foreign investors. In this way, we construct a weighting matrix W_{kaopen} as follows:

$$w_{i,j} = \left| \frac{1}{kaopen_i - kaopen_j} \right| \quad (3.9)$$

Where $kaopen_i$ is the average of the index value for country i over our analysis period.

Another way to measure the investment context is using the *Invest Profile* variable from the International Country Risk Guide (Howell, 2011). This index assesses the risk to investment measuring the contract viability, profits repatriation and payment delays. A score is attributed to each of this component, and the index is the sum of these three scores, ranging from 0 (very low risk) to 12 (very high risk). Each element $w_{i,j}$ of this matrix $W_{Invest\ Profile}$ is:

$$w_{i,j} = \left| \frac{1}{InvestProfile_i - InvestProfile_j} \right| \quad (3.10)$$

Where $InvestProfile_i$ is the index value for country i , in average over our analysis period.

Then, we use the Doing Business database from the World Bank to analyze differences in terms of time to contract. Assuming that similar countries are in a direct competition about fiscal choices, we construct two matrices measuring the time difference among countries – i.e. the spread between opportunity costs.

$W_{contract}$ is constructed with regard to the spread between the time needed to enforce a contract for country pairs. Each element is computed as follows:

$$w_{i,j} = \left| \frac{1}{ContractTime_i - ContractTime_j} \right| \quad (3.11)$$

Where $ContractTime_i$ is the number of days needed, in average over our analysis period, to enforce a contract in country i .

The last matrix $W_{procedures}$ measures the similarities between countries in terms of procedural difficulties to implement a business. $W_{procedures}$ is computed as follows:

$$w_{i,j} = \left| \frac{1}{Procedures_i - Procedures_j} \right| \quad (3.12)$$

With $Procedures_i$ the number of procedures needed to legally operate a commercial or industrial firm in country i .

TABLE 3.3: Results using investment similarities weighting schemes

Variables	Weighting Matrix							
	Kaopen		Contract		Procedures		Invest profile	
Y_{t-1}	0.59***	(0.00)	0.59***	(0.00)	0.59***	(0.00)	0.58***	(0.00)
WY_{t-1}	-0.18	(0.13)	-0.03	(0.80)	-0.05	(0.79)	-0.42	(0.42)
WY_t	-0.00	(0.98)	-0.00	(0.99)	-0.01	(0.94)	-0.01	(0.92)
GDP_{t-1}	-2.34	(0.11)	-2.53*	(0.08)	-2.52*	(0.08)	-2.62*	(0.07)
$Growth_{t-1}$	0.00*	(0.10)	0.00	(0.15)	0.00	(0.16)	0.00	(0.17)
$Unemployment_{t-1}$	0.07	(0.11)	0.06	(0.13)	0.06	(0.13)	0.06	(0.16)
$Crisis_{t-1}$	-0.15	(0.65)	-0.09	(0.78)	-0.11	(0.74)	-0.10	(0.76)
$Trade_{t-1}$	0.03**	(0.04)	0.03**	(0.04)	0.03**	(0.05)	0.03**	(0.04)
$PublicDebt_{t-1}$	0.24	(0.11)	0.25*	(0.09)	0.26*	(0.08)	0.26*	(0.08)
$GovtSize_{t-1}$	-0.43***	(0.00)	-0.41***	(0.00)	-0.41***	(0.00)	-0.41***	(0.00)
$Young_{t-1}$	-4.17**	(0.01)	-4.05**	(0.01)	-4.08**	(0.01)	-3.98**	(0.01)
Old_{t-1}	0.70	(0.75)	-0.19	(0.93)	-0.15	(0.94)	-0.18	(0.93)
$ElectionYear$	-0.35**	(0.05)	-0.36**	(0.04)	-0.36**	(0.04)	-0.36**	(0.04)
$Left$	-0.10*	(0.09)	-0.11*	(0.08)	-0.1*	(0.09)	-0.11*	(0.08)
SGP	0.82	(0.12)	0.78	(0.13)	0.76	(0.15)	0.81	(0.12)
Individual FE	Yes		Yes		Yes		Yes	
Time FE	Yes		Yes		Yes		Yes	
Observations	589		589		589		589	
σ^2	2.98		2.99		2.99		2.99	
Log-Likelihood	-903.05		-904.29		-904.24		-903.75	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

Results using these four matrices are presented in Table 3.3. They show that there is no more interactions between countries that are close in terms of investment conditions than between countries without similarities. There is even no interaction between them. It reveals that fiscal competition is unlikely to be the best explanation for fiscal interactions in Europe.

Testing for yardstick competition is very difficult since a lot of weighting schemes could reflect both tax competition and yardstick competition. However, this is the last theoretical

rationale for fiscal interactions that is not rejected by our analysis. This is therefore likely to be the explanation for the observed *delayed mimicking* behaviors. Moreover, the large negative impact of the variable *election* is conform with such an explanation. In fact, it shows that governments implement (large) changes in fiscal policy in election times, that is consistent with the yardstick competition theory.

As explained in Revelli (2005) certain approaches could be explored to test for yardstick competition by using natural experiments. In case of yardstick competition, fiscal interactions should be stronger when governors run for re-elections or after the implementation of an assessment system that brings public information. According to Redoano (2007), interactions should be stronger during elections periods if they are due to yardstick competition. This last case can be tested using a two-regime spatial Durbin model as in Elhorst and Fréret (2009) or Cassette et al. (2013), but our analytical framework prevents us from doing that. Precisely, we have shown that it is necessary to introduce spatial dependence at a one-period time lag, which seems not fully compatible with a two-regime model. Nevertheless, this point should be further analyzed and can constitute a subject for future researches.

3.6 Robustness Check

This section presents some robustness checks. The first subsection tests the robustness of the general results obtained in Section 3.4. The second subsection analyzes what is going on if only revenue or spending are considered. Subsection 3.6.3 confirms the exclusion of cooperation from the rationales for delayed-mimicking behaviors. Finally, Subsections 3.6.4 and 3.6.5 present other procedures that could allow to determine the theoretical rationales for fiscal interactions, respectively fiscal competition and yardstick competition.

3.6.1 Alternative weighting matrices

The first way to test the robustness of the results is to change the weighting matrices used.

Firstly, in the same spirit than $W_{imports}$, two matrices are computed. The first one ($W_{imports+exports}$) considers both imports and exports, and the second ($W_{exports}$) considers only exports. Each element $w_{i,j}$ of $W_{imports+exports}$ is computed as follows:

$$w_{i,j} = exports_{j,i} + imports_{j,i} \quad (3.13)$$

Where $exports_{j,i}$ is the average volume of exports of country j to country i over the period 1980-1994, and $imports_{j,i}$ the average of imports of j from i for the same period. Unlike the previous matrix based only on imports, this one is symmetric: it assumes that a country j has the same impact on country i than i on j .

And each element of $W_{exports}$ is:

$$w_{i,j} = exports_{j,i} \quad (3.14)$$

Where $exports_{j,i}$ is the average volume of exports of country j to country i over the period 1980-1994.

Secondly, and regarding the structural economic similarities, a new matrix is constructed based on the share of the value added that comes from the agricultural sector. This matrix, $W_{agriculture}$ is supposed to measure the similarities in terms of productive structure between two countries. Each element is computed as:

$$w_{i,j} = \left| \frac{1}{Agriculture_i - Agriculture_j} \right| \quad (3.15)$$

Where $Agriculture_i$ is the share of the value added that comes from the agricultural sector in country i , as an average over the period 1995-2013.

The results obtained using these three matrices are shown in Table 3.4. Using them, fiscal interactions remain positive and time-delayed, which confirms the previous results.

TABLE 3.4: Robustness: Alternative general weighting matrices

Variables	Weighting Matrix					
	Imports + Exports		Exports		Agriculture	
Y_{t-1}	0.58***	(0.00)	0.58***	(0.00)	0.59***	(0.00)
WY_{t-1}	0.41***	(0.01)	0.39***	(0.00)	0.11*	(0.09)
WY_t	0.01	(0.84)	0.02	(0.76)	0.01	(0.99)
GDP_{t-1}	-2.52*	(0.08)	-2.43*	(0.09)	-2.44*	(0.09)
$Growth_{t-1}$	0.00	(0.28)	0.00	(0.28)	0.00	(0.13)
$Unemployment_{t-1}$	0.06	(0.11)	0.07	(0.11)	0.06	(0.12)
$Crisis_{t-1}$	-0.08	(0.79)	-0.12	(0.71)	-0.13	(0.67)
$Trade_{t-1}$	0.02	(0.13)	0.02	(0.18)	0.02*	(0.07)
$PublicDebt_{t-1}$	0.25*	(0.09)	0.25*	(0.08)	0.25*	(0.09)
$GovtSize_{t-1}$	-0.41***	(0.00)	-0.41***	(0.00)	-0.41***	(0.00)
$Young_{t-1}$	-4.17***	(0.00)	-3.94***	(0.01)	-4.26***	(0.00)
Old_{t-1}	0.56	(0.78)	1.13	(0.59)	0.57	(0.78)
$ElectionYear$	-0.37**	(0.03)	-0.37**	(0.03)	-0.36**	(0.04)
$Left$	-0.10*	(0.09)	-0.10*	(0.09)	-0.11*	(0.08)
SGP	0.81	(0.12)	0.80	(0.12)	0.77	(0.13)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	2.97		2.96		2.98	
Log-Likelihood	-902.16		-901.41		-903.22	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

3.6.2 Is the interaction design the same for revenue and spending?

Analyzing public revenue and spending jointly allows to test whether there are global strategic behaviors among governments, that is the key issue of this paper. However, it can hide some behaviors in terms of the use of revenue and spending. For example, the interactions could occur more in terms of revenue than spending, and this point could depend on the weighting scheme used. In order to ensure the results obtained are not due to interactions between revenues or spending only, the original specification is estimated by using public revenue and public spending separately.

Nevertheless, using public revenue and spending separately does not allow to fully conclude about the theoretical rationale(s) that explain fiscal interactions. Whatever the governments interact using revenue or using spending, they can do it because of cooperation, fiscal competition or yardstick competition. That is why all the weighting schemes previously presented are used to estimate interactions in terms of revenue and spending.

Table 3.5 shows the general results for revenue, and Table 3.7 the ones for spending. The general weighting schemes exhibit positive and time-delayed interactions, apart from the weighting matrix $W_{EducatedWorkers}$ that does not imply any interaction neither between revenue nor spending.

Tables 3.6 and 3.8 show that, for revenue and spending respectively, the specific weighting schemes used to test cooperation and tax competition lead to no significant interactions. Implications are twofold. First, the interactions between CAPB are not due to interactions only between spending or revenue: both revenue and spending interact in the same way, and the magnitude of the interaction coefficients is close, excepted for $W_{EducatedWorkers}$. Second, using only revenue or only spending leads to the same conclusions than using CAPB: cooperation and fiscal competition do not seem to explain the observed fiscal interactions. The rationale for revenue and spending interactions could therefore be the same than for CAPB.

TABLE 3.5: Revenue interactions – General weighting matrix

Variable	Weighting Matrix					
	Distance		Imports		Educated workers	
Y_{t-1}	0.73***	(0.00)	0.71***	(0.00)	0.70***	(0.00)
WY_{t-1}	0.62***	(0.00)	0.26*	(0.09)	-0.01	(0.80)
WY_t	0.03	(0.77)	0.00	(0.94)	0.00	(0.99)
GDP_{t-1}	-0.13	(0.76)	-0.16	(0.73)	-0.16	(0.73)
$Growth_{t-1}$	0.00*	(0.05)	0.00**	(0.03)	0.00**	(0.02)
$Unemployment_{t-1}$	0.00	(0.98)	0.00	(0.78)	0.00	(0.87)
$Crisis_{t-1}$	0.15	(0.14)	0.18*	(0.09)	0.20**	(0.05)
$Trade_{t-1}$	0.00	(0.42)	0.00	(0.28)	0.00	(0.33)
$PublicDebt_{t-1}$	0.03	(0.49)	0.02	(0.61)	0.03	(0.52)
$GovtSize_{t-1}$	-0.05	(0.23)	-0.04	(0.36)	-0.06	(0.19)
$Young_{t-1}$	-1.20**	(0.01)	-0.95*	(0.07)	-0.62	(0.21)
Old_{t-1}	0.69	(0.32)	0.60	(0.40)	0.87	(0.21)
$ElectionYear$	-0.06	(0.24)	-0.06	(0.23)	-0.06	(0.25)
$Left$	0.06***	(0.00)	0.06***	(0.00)	0.06***	(0.00)
SGP	0.20	(0.23)	0.18	(0.30)	0.18	(0.28)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	0.34		0.34		0.34	
Log-Likelihood	-294.11		-295.47		-295.47	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

TABLE 3.6: Revenue interactions – Cooperation and fiscal competition matrix

Weighting matrix						
Variable	Politics	Kaopen	Contract	Procedures	Invest Profile	
Y_{t-1}	0.78*** (0.00)	0.81*** (0.00)	0.81*** (0.00)	0.81*** (0.00)	0.77*** (0.00)	
WY_{t-1}	-0.55 (0.20)	-0.07 (0.38)	0.02 (0.78)	0.20 (0.12)	-0.60 (0.25)	
WY_t	-0.01 (0.92)	0.07 (0.29)	0.00 (0.97)	0.01 (0.90)	-0.01 (0.91)	
GDP_{t-1}	-0.06 (0.89)	-0.15 (0.75)	-0.12 (0.79)	-0.35 (0.46)	-0.14 (0.76)	
$Growth_{t-1}$	0.00** (0.02)	0.00** (0.02)	0.00** (0.02)	0.00*** (0.00)	0.00** (0.01)	
$Unemployment_{t-1}$	0.00 (0.98)	0.00 (0.84)	0.00 (0.93)	0.00 (0.80)	0.00 (0.81)	
$Crisis_{t-1}$	0.22** (0.04)	0.20* (0.06)	0.20* (0.05)	0.21** (0.04)	0.20* (0.06)	
$Trade_{t-1}$	0.00 (0.31)	0.00 (0.36)	0.00 (0.32)	0.00 (0.27)	0.00 (0.28)	
$PublicDebt_{t-1}$	0.02 (0.57)	0.03 (0.48)	0.03 (0.50)	0.02 (0.60)	0.03 (0.43)	
$GovtSize_{t-1}$	-0.05 (0.29)	-0.06 (0.17)	-0.06 (0.20)	-0.05 (0.22)	-0.06 (0.14)	
$Young_{t-1}$	-0.65 (0.19)	-0.58 (0.27)	-0.61 (0.22)	-0.70 (0.15)	-0.62 (0.21)	
Old_{t-1}	0.89 (0.20)	0.85 (0.23)	0.89 (0.21)	0.69 (0.32)	0.96 (0.17)	
$ElectionYear$	-0.07 (0.23)	-0.07 (0.23)	-0.06 (0.25)	-0.06 (0.26)	-0.06 (0.25)	
Left	0.06*** (0.00)	0.06*** (0.00)	0.06*** (0.00)	0.06*** (0.00)	0.06*** (0.00)	
SGP	0.18 (0.29)	0.19 (0.27)	0.18 (0.28)	0.21 (0.23)	0.17 (0.30)	
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	589	589	589	589	589	589
σ^2	0.34	0.34	0.34	0.34	0.34	0.34
Log-Likelihood	-294.59	-295.36	-295.99	-295.02	-293.99	-293.99

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

TABLE 3.7: Spending interactions – General weighting matrix

Variable	Weighting matrix					
	Distance		Imports		Educated	
Y_{t-1}	0.69***	(0.00)	0.68***	(0.00)	0.69***	(0.00)
WY_{t-1}	0.41**	(0.03)	0.28**	(0.02)	-0.08	(0.29)
WY_t	0.00	(0.94)	0.10	(0.16)	0.00	(0.97)
GDP_{t-1}	4.57***	(0.00)	4.33***	(0.00)	3.61**	(0.02)
$Growth_{t-1}$	0.00	(0.45)	0.00	(0.32)	0.00	(0.75)
$Unemployment_{t-1}$	0.09*	(0.05)	0.08*	(0.07)	0.09**	(0.04)
$Crisis_{t-1}$	0.43	(0.22)	0.36	(0.30)	0.35	(0.32)
$Trade_{t-1}$	0.00	(0.63)	0.01	(0.52)	0.00	(0.89)
$PublicDebt_{t-1}$	-0.38**	(0.02)	-0.37**	(0.02)	-0.41**	(0.01)
$GovtSize_{t-1}$	0.57***	(0.00)	0.62***	(0.00)	0.58***	(0.00)
$Young_{t-1}$	6.66***	(0.00)	6.66***	(0.00)	7.51***	(0.00)
Old_{t-1}	5.92**	(0.01)	5.40**	(0.02)	6.13***	(0.00)
$ElectionYear$	-0.19	(0.32)	-0.20	(0.30)	-0.21	(0.28)
$Left$	0.05	(0.41)	0.02	(0.71)	0.04	(0.48)
SGP	-1.65***	(0.00)	0.12	(0.91)	-1.68***	(0.00)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	3.72		3.70		3.72	
Log-Likelihood	-964.68		-963.64		-965.15	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

TABLE 3.8: Spending interactions – Cooperation and fiscal competition weighting matrix

Weighting matrix					
Variable	Politics	Kaopen	Contract	Procedures	Invest Profile
Y_{t-1}	0.68*** (0.00)	0.69*** (0.00)	0.69*** (0.00)	0.69*** (0.00)	0.69*** (0.00)
WY_{t-1}	-0.14 (0.73)	0.00 (0.97)	0.00 (0.97)	-0.02 (0.87)	0.18 (0.12)
WY_t	-0.01 (0.93)	0.00 (0.99)	0.00 (0.98)	0.00 (0.95)	0.00 (0.99)
GDP_{t-1}	4.04** (0.01)	4.09*** (0.00)	4.09*** (0.00)	4.09*** (0.00)	3.77** (0.01)
$Growth_{t-1}$	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.00 (0.50)
$Unemployment_{t-1}$	0.09** (0.04)	0.09** (0.04)	0.09** (0.04)	0.10** (0.04)	0.09* (0.05)
$Crisis_{t-1}$	0.39 (0.27)	0.38 (0.28)	0.38 (0.28)	0.39 (0.27)	0.33 (0.34)
$Trade_{t-1}$	0.00 (0.83)	0.00 (0.86)	0.00 (0.86)	0.00 (0.85)	0.00 (0.83)
$PublicDebt_{t-1}$	-0.40** (0.01)	-0.40** (0.01)	-0.40** (0.01)	-0.40** (0.01)	-0.38** (0.02)
$GovtSize_{t-1}$	0.57*** (0.00)	0.57*** (0.00)	0.57*** (0.00)	0.57*** (0.00)	0.56*** (0.00)
$Young_{t-1}$	7.50*** (0.00)	7.58*** (0.00)	7.56*** (0.00)	7.52*** (0.00)	7.68*** (0.00)
Old_{t-1}	6.01** (0.01)	6.07*** (0.00)	6.09*** (0.00)	6.07*** (0.00)	5.17** (0.03)
$Election\ Year$	-0.20 (0.29)	-0.20 (0.30)	-0.20 (0.29)	-0.20 (0.29)	-0.20 (0.30)
$Left$	0.05 (0.45)	0.05 (0.42)	0.05 (0.42)	0.05 (0.42)	0.05 (0.43)
SGP	-1.65*** (0.00)	-1.65*** (0.00)	-1.65*** (0.00)	-1.65*** (0.00)	-1.60*** (0.00)
Individual FE	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Observations	589	589	589	589	589
σ^2	3.73	3.73	3.73	3.73	3.72
Log-Likelihood	-965.64	-965.90	-965.86	-965.94	-964.93

(z-probabilities); *significant at 10%; **significant at 5%; ***significant at 1%

3.6.3 Confirming the absence of cooperation

Another way to measure the opportunity of fiscal cooperation is by exploring to what extent countries are used to cooperate in other areas. An idea, for example, is to measure the occurrence of the idea of cooperation in official declarations. Or, in the same spirit, it is possible to count the number of articles in press that deal with cooperation issues between some countries.

To do this, we use the Europress website that allows to access to more than 14000 press resources in all European languages. Among these articles, it is possible to search the ones that deal with special concerns, and especially in our case, about cooperation. Hence, for every pair of countries, we search the number of articles that contain both the name of these countries and the word "cooperation". To simplify the research, the analyze is limited to the press releases and news feeds and to the last two years (from March 2015 to March 2017). While it restricts the number of sources, there is no reason why the result cannot be considered as representative enough.

The matrix W_{press} based on the cooperation word is composed by the following elements $w_{i,j}$:

$$w_{i,j} = articles_{i,j} \quad (3.16)$$

Where $articles_{i,j}$ is the number of press releases and news feeds that are about country i and country j and that contain the word cooperation.

Finally, the matrix contains a total of 155240 articles. The countries that are the most cited together with the word "cooperation" are France and Germany, which represents 4255 articles. At the contrary, Malta and Lithuania are the less cited together: there are only 51 articles that contain both the these two country names and the word "cooperation".

Table 3.9 shows the results. As in the case of political proximity, no interactions are

found. It means that countries do not interact together on fiscal policy questions, even if there are used to be cited about cooperation questions in other domains. This result seems to confirm the previous one: cooperation is unlikely to be the best explanation for the positive interactions observed among European countries.

TABLE 3.9: Testing for fiscal cooperation
– Robustness

Variable	Weighting Matrix	
	Press	
Y_{t-1}	0.60***	(0.00)
WY_{t-1}	0.44	(0.38)
WY_t	0.01	(0.99)
GDP_{t-1}	-2.50*	(0.08)
$Growth_{t-1}$	0.01	(0.16)
$Unemployment_{t-1}$	0.06	(0.12)
$Crisis_{t-1}$	-0.11	(0.73)
$Trade_{t-1}$	0.02*	(0.09)
$PublicDebt_{t-1}$	0.25*	(0.09)
$GovtSize_{t-1}$	-0.42***	(0.00)
$Young_{t-1}$	-4.19***	(0.00)
Old_{t-1}	0.39	(0.85)
$ElectionYear$	-0.37**	(0.03)
$Left$	-0.10*	(0.09)
SGP	0.77	(0.13)
Individual FE	Yes	
Time FE	Yes	
Observations	589	
σ^2	2.99	
Log-Likelihood	-904.32	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

3.6.4 Can fiscal competition really be excluded?

To confirm that fiscal competition can be excluded from the theoretical rationales explaining fiscal interactions in Europe, a new specification is estimated. In this section, we test whether countries mimic more their neighbors when they implement large tax (spending) measures. According to the fiscal competition assumption, countries should be more encouraged to mimic their neighbors in such a case. In fact, if countries compete to attract mobile tax basis, a large change in tax (or spending) in a neighboring country j implies a large increase of the spread between tax rate in country i and the one in country j . That is why a larger interaction coefficient should be found in case of large changes in neighboring tax or spending.

In the original specification, the terms WY_{t-1} and WY_t are replaced by $W * LY_t$ and $W * LY_{t-1}$ where L is a $n \times t$ vector of which each element $l_{i,t}$ takes the value 1 if country i experiments a change in tax revenue at time t larger than $x\%$,⁶⁰ 0 otherwise. In this way, only large changes are considered. The neighborhood is defined according to the general weighting schemes presented in Section 3.4.

Fiscal competition would be confirmed if we obtain a positive coefficient, and especially a higher coefficient associated to one of the spatially lagged variable (contemporaneous or time-delayed).

Results are presented Table 3.10 for changes in tax revenue, and Table 3.11 for spending. For revenue as well as for spending, interactions remain significant only using the weighting matrix based on imports, and the coefficient is really close to the one obtained previously. Hence, countries do not mimic more their neighbors when they implement large tax (spending) reforms. This result tends to confirm the previous results: fiscal competition does not seem to be the best explanation for the delayed-mimicking observed.

60. Results are presented here using the median (in absolute value) of the sample to discriminate between large and small changes in tax and spending. The same results are obtained using the third quartile.

Besides, to confirm once again this result, another empirical prediction of theory is used. As emphasized by Devereux and Loretz (2013), theoretical fiscal competition literature leads to some testable hypothesis. In our case, the more relevant is Gordon (1992) that models tax competition as a Stackelberg competition. The theoretical conclusions from Gordon (1992) lead to consider that, in case of tax competition, countries should positively interact together, but also that tax rates should be higher in large countries than in small ones.

In this way, the country size, as measured by the population size,⁶¹ is introduced in the model in two ways. First, the population is introduced as a control variable. The idea is that a specific pattern should be observed in case of fiscal competition: for example, fiscal stance should be systematically more deteriorated for small population sizes than for large ones. Results presented Table 3.12 shows that the country size, measured by the population size, has no significant effect on fiscal stances.

Second, if larger countries have larger tax rates than smaller ones, it should induce that large countries are similar among themselves, and small countries are similar among themselves. In case of fiscal competition, we should therefore observe some interactions among large countries and among small countries because they should have similar fiscal policy patterns. A weighting matrix is therefore constructed based on the proximity in terms of population size; thus we test whether countries that have a similar size also have similar CAPB.

Each element of $W_{population}$ is computed as follows:

$$w_{i,j} = \left| \frac{1}{pop_i - pop_j} \right| \quad (3.17)$$

Where pop_i is the population size of country i , as an average over the period 1995-2013.

Table 3.13 shows the results using this new weighting scheme. The assumption of sim-

61. Using population size allows to ensure exogeneity of the weighting matrix. The same results are obtained when the surface area is used.

ilarities in fiscal choices between countries with similar size is rejected. Once again, fiscal competition seems therefore unlikely to be the best explanation for fiscal interactions.

TABLE 3.10: Testing for fiscal competition on the revenue side – Robustness

Variable	Weighting matrix					
	Distance		Imports		Educated workers	
Y_{t-1}	0.59***	(0.00)	0.59***	(0.00)	0.59***	(0.00)
WDY_{t-1}	-0.02	(0.92)	0.38**	(0.03)	-0.10	(0.24)
WDY_t	0.00	(0.99)	0.02	(0.74)	0.00	(0.96)
GDP_{t-1}	-2.52*	(0.08)	-2.45*	(0.09)	-2.55*	(0.07)
$Growth_{t-1}$	0.00	(0.15)	0.00	(0.22)	0.00	(0.15)
$Unemployment_{t-1}$	0.06	(0.13)	0.06	(0.12)	0.06	(0.14)
$Crisis_{t-1}$	-0.10	(0.74)	-0.03	(0.91)	-0.09	(0.77)
$Trade_{t-1}$	0.03**	(0.04)	0.02*	(0.07)	0.03**	(0.04)
$PublicDebt_{t-1}$	0.25*	(0.08)	0.23	(0.11)	0.25*	(0.09)
$GovtSize_{t-1}$	-0.40***	(0.00)	-0.40***	(0.00)	-0.41***	(0.00)
$Young_{t-1}$	-4.05***	(0.00)	-4.29***	(0.00)	-3.84**	(0.01)
Old_{t-1}	-0.16	(0.93)	0.10	(0.96)	-0.20	(0.92)
$ElectionYear$	-0.35**	(0.04)	-0.37**	(0.03)	-0.37**	(0.03)
$Left$	-0.10*	(0.08)	-0.10*	(0.08)	-0.10*	(0.08)
SGP	0.77	(0.13)	0.91	(0.39)	1.16	(0.27)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	2.99		2.97		2.98	
Log-Likelihood	-904.31		-901.85		-903.48	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

TABLE 3.11: Testing for fiscal competition on the spending side – Robustness

Variable	Weighting matrix					
	Distance		Imports		Educated workers	
Y_{t-1}	0.59***	(0.00)	0.59***	(0.00)	0.59***	(0.00)
WDY_{t-1}	0.21	(0.34)	0.35**	(0.04)	0.02	(0.77)
WDY_t	0.00	(0.97)	0.01	(0.89)	0.00	(0.98)
GDP_{t-1}	-2.55*	(0.08)	-2.38	(0.10)	-2.53*	(0.08)
$Growth_{t-1}$	0.00	(0.17)	0.00	(0.21)	0.00	(0.15)
$Unemployment_{t-1}$	0.06	(0.13)	0.06	(0.11)	0.06	(0.13)
$Crisis_{t-1}$	-0.08	(0.79)	-0.07	(0.81)	-0.09	(0.76)
$Trade_{t-1}$	0.03*	(0.05)	0.02*	(0.09)	0.03**	(0.04)
$PublicDebt_{t-1}$	0.26*	(0.07)	0.25*	(0.08)	0.25*	(0.08)
$GovtSize_{t-1}$	-0.41***	(0.00)	-0.41***	(0.00)	-0.40***	(0.00)
$Young_{t-1}$	-4.13***	(0.00)	-4.28***	(0.00)	-4.09***	(0.00)
Old_{t-1}	-0.10	(0.96)	0.10	(0.96)	-0.16	(0.93)
$ElectionYear$	-0.37**	(0.03)	-0.36**	(0.03)	-0.35**	(0.04)
$Left$	-0.10*	(0.08)	-0.10*	(0.08)	-0.10*	(0.08)
SGP	0.75	(0.14)	0.77	(0.13)	0.77	(0.13)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	2.99		2.97		2.99	
Log-Likelihood	-903.97		-901.95		-904.27	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

TABLE 3.12: Adding population size

Variable	Weighting matrix					
	Distance		Imports		Educated	
Y_{t-1}	0.59***	(0.00)	0.58***	(0.00)	0.59***	(0.00)
WY_{t-1}	0.12	(0.60)	0.32**	(0.05)	0.16	(0.11)
WY_t	0.00	(0.99)	0.01	(0.90)	0.00	(0.96)
Population	-6.77	(0.17)	-6.81	(0.17)	-5.84	(0.24)
GDP_{t-1}	-2.23	(0.12)	-2.26	(0.12)	-2.33	(0.11)
$Growth_{t-1}$	0.00	(0.21)	0.00	(0.30)	0.00	(0.24)
$Unemployment_{t-1}$	0.07	(0.10)	0.07	(0.10)	0.07	(0.10)
$Crisis_{t-1}$	-0.12	(0.70)	-0.09	(0.77)	-0.08	(0.78)
$Trade_{t-1}$	0.03**	(0.05)	0.02*	(0.09)	0.02**	(0.05)
$PublicDebt_{t-1}$	0.26*	(0.07)	0.25*	(0.08)	0.25*	(0.08)
$GovtSize_{t-1}$	-0.44***	(0.00)	-0.46***	(0.00)	-0.45***	(0.00)
$Young_{t-1}$	-1.17	(0.65)	-1.43	(0.58)	-2.01	(0.44)
Old_{t-1}	2.44	(0.38)	2.76	(0.33)	1.94	(0.49)
ElectionYear	-0.37**	(0.03)	-0.37**	(0.03)	-0.35**	(0.04)
Left	-0.08	(0.17)	-0.08	(0.19)	-0.09	(0.13)
SGP	0.87*	(0.09)	0.90*	(0.08)	0.87*	(0.09)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	2.98		2.96		2.97	
Log-Likelihood	-903.21		-901.56		-902.18	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

TABLE 3.13: Population based weighting scheme

Variable	Population Size
Y_{t-1}	0.59*** (0.00)
WY_{t-1}	0.10 (0.34)
WY_t	0.00 (0.98)
GDP_{t-1}	-2.70* (0.06)
$Growth_{t-1}$	0.00 (0.17)
$Unemployment_{t-1}$	0.05 (0.15)
$Crisis_{t-1}$	-0.14 (0.65)
$Trade_{t-1}$	0.02* (0.07)
$PublicDebt_{t-1}$	0.26* (0.07)
$GovtSize_{t-1}$	-0.40*** (0.00)
$Young_{t-1}$	-4.35*** (0.00)
Old_{t-1}	-0.20 (0.92)
$ElectionYear$	-0.35** (0.04)
$Left$	-0.10* (0.08)
SGP	0.73 (0.15)
Individual FE	Yes
Time FE	Yes
Observations	589
σ^2	2.99
Log-Likelihood	-904.06

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

3.6.5 Confirming yardstick competition

This paper shows that cooperation and fiscal competition can be excluded from the rationales for fiscal interactions. The third rationale that remains is yardstick competition, but it is not tested so far.

Papers in the literature use different ways to determine whether yardstick competition exists among governments. Most of them are about localities, but some methods could be applied to the international case.

Bordignon et al. (2003) test the yardstick competition hypothesis among Italian municipalities by analyzing the incentives and constraints due to the electoral system. Firstly, they assume that the existence of terms limits prevents a government from a re-election, that should not lead to any interactions if interactions are generated by yardstick competition. Governments have no incentive to mimic their neighbors in order to be re-elected since they cannot run for the next election. Secondly, they look for interactions according to the size of the majority that supports the mayor. If the majority is large, the uncertainty about the issue of the election reduces and the interest for strategic mimicking is lower. In the case of European countries, these two predictions are not testable because almost all governments in Europe have no terms limit, and there is no data about the extend in which a government is backed by voters.

Still in the idea that yardstick competition theory has some testable empirical predictions, Allers and Elhorst (2005) analyze yardstick competition among local governments in the Netherlands. Especially, they use three political phenomena that can indicate yardstick competition. First, as in Bordignon et al. (2003), they deal with the size of the majority supporting the government coalition. Second, they analyze the impact of the political color of the local government given that mimicking should be stronger for right-wing governments since right-wing electors could support higher tax levels.⁶² This last point does not really fit

62. See also Ollé (2003) for this point.

our problematic because regarding the total budget, there is no evidence that right or left-wing electors should prefer low or high deficit.

Thirdly, and finally, Allers and Elhorst (2005) affirm that the political fragmentation of a government affects the interest for strategic interactions. According to the yardstick competition hypothesis, governments mimic their neighbors by increasing (or decreasing) their spending or revenue, and they do it in order to be re-elected. However, in a highly fragmented government, the political party responsible of a policy is hardly identifiable. There are therefore less incentives to adopt strategic behaviors, and especially yardstick competition.

This last point can be tested in Europe. To do this, we use an index of legislative fragmentation that depends on the share of seats held by a party.⁶³ This index is extracted from the Comparative Political Data Set from Armingeon et al. (2016) and it ranges from 0 (minimal fragmentation) to 1 (maximal fragmentation). Hence, in case of yardstick competition, an increase in this index should be associated with a decrease in fiscal interactions.

The original specification is estimated by adding an interactive variable which is the product of the fragmentation index and the spatially-timely lagged CAPB. A positive coefficient means that a higher degree of fragmentation increases the interactions, and a negative coefficient means that a higher degree of fragmentation decreases the magnitude of interactions.

Results are presented in Table 3.14 and whatever the weighting scheme used, the coefficient associated with the interactive variable is negative. It means that the more fragmented a government is, the less it mimics their neighbors. This result is consistent with the existence of yardstick competition.

63. The index is computed as follows: $rae_{leg} = 1 - \frac{\sum_{i=1}^m s_i^2}{m}$ where s is the number of seats held by party i and m the number of parties.

TABLE 3.14: The impact of political fragmentation on fiscal interactions

Variable	Weighting matrix					
	Distance		Imports		Educated	
Y_{t-1}	0.60***	(0.00)	0.59***	(0.00)	0.60***	(0.00)
WY_{t-1}	0.97***	(0.00)	0.87***	(0.00)	0.49***	(0.00)
WY_t	0.06	(0.60)	0.11	(0.14)	0.03	(0.61)
Frag * WY_{t-1}	-1.12***	(0.00)	-0.72**	(0.01)	-0.50***	(0.00)
Frag	1.33	(0.52)	2.28	(0.27)	1.51	(0.47)
GDP_{t-1}	-2.88**	(0.04)	-2.64*	(0.07)	-2.79*	(0.05)
$Growth_{t-1}$	0.00*	(0.07)	0.00	(0.20)	0.00	(0.10)
$Unemployment_{t-1}$	0.05	(0.18)	0.06	(0.11)	0.05	(0.16)
$Crisis_{t-1}$	-0.21	(0.50)	-0.15	(0.63)	-0.16	(0.61)
$Trade_{t-1}$	0.02*	(0.07)	0.02	(0.16)	0.02*	(0.07)
$PublicDebt_{t-1}$	0.28*	(0.06)	0.25*	(0.08)	0.27*	(0.06)
$GovtSize_{t-1}$	-0.34**	(0.01)	-0.40***	(0.00)	-0.38***	(0.00)
$Young_{t-1}$	-3.98**	(0.01)	-4.21***	(0.00)	-4.55***	(0.00)
Old_{t-1}	0.74	(0.72)	0.75	(0.71)	-0.29	(0.88)
ElectionYear	-0.45***	(0.00)	-0.41**	(0.01)	-0.34**	(0.04)
Left	-0.11*	(0.06)	-0.10*	(0.09)	-0.10*	(0.08)
SGP	0.73	(0.15)	0.76	(0.14)	0.72	(0.16)
Individual FE	Yes		Yes		Yes	
Time FE	Yes		Yes		Yes	
Observations	589		589		589	
σ^2	2.96		2.97		2.95	
Log-Likelihood	-901.58		-902.08		-900.15	

(z-probabilities); *significant at 10% ; **significant at 5% ; ***significant at 1%

3.7 Concluding remarks

There is an abundant literature about fiscal interactions among local governments. While economies are increasingly interdependent, only few papers are interested in that at the international scale.

There is even fewer papers which investigate the interactions between fiscal stances (i.e. without separating spending and tax receipts), rather than deficit has become a strategic variable for governments.

This paper therefore analyzes fiscal stances interdependence at the international level,

focusing on European countries. Using a SDPD model and weighting matrices based on geographical distance, trade intensity and structural similarities, positive interactions are found out. However, these interactions occur with one year delay. In fact, countries mimic their previous year neighbors' decisions leading to what we call *delayed mimicking* behaviors. It is therefore shown that introducing spatial dependence at a one-period time lag is necessary to analyze fiscal interactions.

This result is informative about the reason why fiscal stances interact. Indeed, since interactions are positive, free-riding phenomena are excluded (Redoano, 2007).

Then, original weighting schemes are used to discriminate between cooperation, fiscal competition and yardstick competition. The idea is to use some empirical implications of these theories. Each theoretical rationale for fiscal interactions can imply a specific transmission channel between fiscal choices. These channels are therefore tested. Firstly, in case of cooperation, politically close governments should experiment stronger interactions together than with the others. Since no interactions are found for politically close governments, cooperation does not seem to be the true explanation for fiscal stance interactions. This result is confirmed by exploiting information provided by press releases about cooperation. This conclusion emphasizes the need for European agencies for fiscal cooperation in order to improve fiscal policy efficiency in Europe.

Secondly, in order to discriminate between fiscal competition and yardstick competition, we argue that, in case of fiscal competition, countries that have similar investment conditions should experiment direct competition between themselves. Similar countries can be considered as relatively substitutable for investors, they therefore have to rely on fiscal policy to be more attractive. Fiscal competition is thus more likely to occur. In that way, four weighting matrices that approximate investment condition similarities are tested. Since no interactions are found, it seems that fiscal competition is not the most appropriate explanation for fiscal interactions in Europe. This result is confirmed by considering only large changes in fiscal stances and by analyzing the interactions according to country sizes.

Since fiscal competition cannot be confirmed with our data, yardstick competition remains possible and seems to be the most likely assumption for fiscal interactions in Europe.

In order to ensure that interactions are due to yardstick competition, the characteristics of political systems are considered. Particularly, the impact of political fragmentation on the magnitude of fiscal interactions is analyzed. Political fragmentation decreases the identifiability of the political party that initiates a fiscal change and thus reduces the benefit from mimicking behaviors. Results show that fiscal interactions are reduced by political fragmentation, which is consistent with the yardstick competition theory.

Our results are consistent with the leader and follower concept, and they show that yardstick competition is more likely to explain fiscal interactions in Europe than fiscal competition. Some theoretical papers present a theoretical framework for interactions between leader(s) and follower(s) engaged in a tax competition process (Gordon, 1992; Kempf and Rota-Graziosi, 2010). Nevertheless, and in line with our results, it could be an interesting task for further research to develop a theoretical framework for yardstick competition including leader-follower phenomena.

Appendix

TABLE 3.15: Marginal (average) effects at time t+1 following a transitory shock at time t

	Weighting matrix		
	W2	Imports	Educated Workers
GDP	-1.52	-1.51	-1.55
Growth	0.00	0.00	0.00
Unemployment	0.04	0.04	0.04
Crisis	-0.05	-0.04	-0.04
Trade	0.02	0.02	0.02
Debt	0.15	0.14	0.14
Govt Size	-0.25	-0.25	-0.25
Young	-2.38	-2.52	-2.68
Old	-0.08	0.09	-0.18
Election Year	-0.22	-0.22	-0.21
Left	-0.06	-0.06	-0.07
SGP	0.46	0.47	0.47

TABLE 3.16: Wald tests for stationarity conditions (1)

	Weighting matrix	Distance	Imports	Educated Workers
H0: $\gamma + \lambda + \rho = 1$ and $\gamma = 1$				
	Statistic	123.66	128.04	126.81
	p-value	< 0.001	< 0.001	< 0.001
H0: $\gamma + \lambda + \rho = 1$				
	Statistic	15.74	4.00	9.60
	p-value	< 0.001	0.04	0.002

TABLE 3.17: Wald tests for stationarity conditions (2)

Weighting matrix	Politics	Kaopen	Contract	Procedures	Invest Profile
H0: $\gamma + \lambda + \rho = 1$ and $\gamma = 1$					
Statistic	109.87	23.68	14.14	20.73	76.97
p-value	<0.001	<0.001	<0.001	<0.001	<0.001
H0: $\gamma + \lambda + \rho = 1$					
Statistic	189.93	30.62	16.61	30.60	116.36
p-value	0.003	<0.001	<0.001	<0.001	<0.001

TABLE 3.18: Data sources

Variable	Description	Unit	Source
Capb	Cyclically Adjusted Primary Balance, adjustment based on potential GDP	% of potential GDP	Ameco
Young & Old	People under 15-years and over 64-years	% of total population	World Development Indicators, World Bank
Unemployment	Unemployment rate	% of total working force	Ameco
Gdp_per_k	GDP per capita at constant price	USD base 2005	World Economic Outlook, IMF
Growth	GDP growth rate	Percentage change between t and $t - 1$	World Development Indicators, World Bank
Crisis	Variable =1 when a banking crisis occurs, 0 otherwise	Dummy	Laeven and Valencia (2012)
Debt	Public debt	% of GDP	IMF, Historical Dataset
GovSize	Compensation and Social contribution	% of GDP	World Development Indicators, World Bank
ElectionYear	Variable = 1 the year of election (presidential or parliament)	Dummy	Comparative Political Data Set, Klaus et al. (2015)
Left	From 1 (for hegemony of right-wing parties) to 5 (for hegemony of social-democratic and left parties)	1 to 5	Comparative Political Data Set, Klaus et al. (2015)
SGP	= 0 if current deficit < 3% ; = $\frac{1}{t}$ with t = time before entrance in the EU otherwise		Own calculation using Eurostat data
Pop	Total population	Thousands of people	World Development Indicators, World Bank
Frag	Political fragmentation of government	From 0 (minimal fragmentation) to 1 (maximal fragmentation)	Armingeon et al. (2016)
Trade	Total imports and exports with extra-EU countries	USD – logarithm	United Nations Com-trade Database

TABLE 3.19: Data sources for weighting matrices

Variable	Description	Unit	Source
GDP	GDP at constant price (2005 USD)	Average over 1980-1994	World Development Indicators, World Bank
Bilateral trade flows	Imports from origin to destination	USD; average	United Nations Comtrade Database
Political proximity	Government composition	From 1 to 5; average over 1995-2013	Comparative Political Data Set (Armingeon et al., 2015)
Press	Articles containing two country names and "cooperation"	Number of articles	Europress
Kaopen	Index of <i>de jure</i> financial openness	Average over 1995-2013	Chinn and Ito (2006)
Time to Contract	Number of days to enforce a contract	Average over 1995-2013	Doing Business, World Bank
Procedures	Number of procedures required to start a business	Average over 1995-2013	Doing Business World Bank
Invest Profile	Index measuring the investment risk	From 0 to 12; average over 1995-2013	ICRG, Howell (2011)
Educated Workers	Labor force with tertiary education	% of total working force; average over 1995-2013	World Development Indicators, World Bank
Agriculture	Value added from agricultural sector	% of total value added; average over 1995-2013	World Development Indicators, World Bank

Chapitre 4

Fiscal Interactions in Europe: Is there a German leadership?

4.1 Introduction

Chapter 3 emphasizes that fiscal interactions in Europe are time-delayed. This statement is consistent with the existence of a leader-follower phenomena.

Furthermore, Chapter 3 concludes that fiscal interactions in Europe are due to yardstick competition. According to the original contribution from Besley and Case (1992), people judge the efficiency of their government by comparing local policies with policies implemented abroad. This comparison passes through the media, leading to conclude that the more the media talk about another country, the more the government is likely to mimic this other country's government.

In Europe, Germany is often discussed in the media. Particularly, Germany is frequently presented as successful in terms of economic policies. In France, for example, journalists use the phrase "German model" to talk about Germany. If people think that the German economic policy is an example, it seems therefore possible that governments mimic Germany in order to be re-elected.

Moreover, since the beginning of the European construction, Germany and France have had a key role in the definition of some European rules for the implementation of both monetary and fiscal policies (Schild, 2013). Recently, some papers claim that historical European Union member states as France or Spain suffer from domestic issues, implying an increasing pressure on the German government to *lead* Europe (See for example Fratzscher, 2016). The role of Germany in the conduct of fiscal policy in Europe therefore seems central. A lot of papers present Germany as a leader or, at least, deal with the question of a German political leadership (See for example Paterson, 2011; Bohn and de Jong, 2011). Germany is also used by Schoeller (2015) to illustrate his theory regarding the emergence of a political leadership.

These papers deal with the political aspects of a potential German leadership. Nonetheless, one cannot exclude that Germany also has a leader position in the implementation of fiscal policy.

This paper therefore tests whether there is a German leadership in the conduct of fiscal policy in Europe. To the best of our knowledge, the only paper relating to a similar question in the one by Altshuler and Goodspeed (2015). They estimate interactions between European countries, and especially they test whether the US acts as a leader for Europe. They analyze tax competition process by using tax reaction functions. The US tax rate is therefore introduced as an input in European tax reaction functions. They first show that European countries act as if the US are a leader. In other words, when the US change their tax rate(s), European governments change their tax rate(s) the year after. Second, they show that, on the contrary, the United Kingdom and Germany's tax policies have no impact on European countries' policies. Hence, they conclude that neither Germany nor the UK have a leader position in Europe.

However, Altshuler and Goodspeed (2015) only consider tax policy and focus on tax competition. The issue of a German leadership in terms of fiscal policy therefore remains unsolved. Thus, this paper deals with this issue by considering European interactions in terms of fiscal stances. Using a Spatial Dynamic Panel Data (SDPD) model, we show that Euro-

pean countries interact with each other, but also follow Germany in fiscal decision.

This paper is organized as follows. Section 4.2 presents the methodology used, Section 4.3 discusses the results and Section 4.4 briefly concludes. Note that, in order to avoid repetitions, the methodology and the data used are only briefly presented since they are similar to the ones used in the previous chapter.

4.2 Empirical Design

4.2.1 Empirical Specification

This paper aims to empirically estimate how German fiscal decisions affect fiscal stances in other European countries. In order to account for interdependences, spatial econometric tools can be used.

In the previous chapter, we show that there are time-delayed fiscal interactions and there is a persistence effect across time in fiscal stances. This leads to use a SDPD model from Yu et al. (2008) and Lee and Yu (2010c) that allows to control for these specificities.

Hence, we use the same methodology as in Chapter 3, but an important change is made. Testing for a German leadership requires to assume that Germany acts first, and the other countries follow. Therefore, Germany is not considered as the other countries, the German fiscal stance is introduced as an independent variable that is common to all countries. In this way, we test whether German fiscal decisions lead to a change in fiscal stances in European countries.

The following equation is therefore estimated by the Quasi-Maximum Likelihood (QML) estimator:

$$B_{n,t} = \gamma B_{n,t-1} + \lambda W_n B_{n,t-1} + \rho W_n B_{n,t} + \kappa \mathbf{BG}_{t-1} + X_{n,t} \beta + c_n + D_t + \varepsilon_{i,t} \quad (4.1)$$

Where:

- $\kappa \mathbf{BG}_{t-1}$ is the German fiscal stance at time $t - 1$;
- $B_{n,t} = (y_{1,t}, y_{2,t}, \dots, y_{n,t})'$ is a $n \times 1$ column vector of fiscal stances of countries 1 to n ;
- $X_{n,t}$ is a $n \times k_x$ matrix of k control variables;
- W_n is a $n \times n$ matrix row normalized with all weights between 0 and 1, which is discussed below;
- $\varepsilon_{n,t} = (e_{1,t}, e_{2,t}, \dots, e_{n,t})'$ is a $n \times 1$ column vector where $e_{i,t}$ is assumed to be *i.i.d.* across individuals and times with zero mean and with σ_0^2 variance;
- c_n is a $n \times 1$ column vector of individual fixed effects;
- D_t is a $n \times t$ matrix of dummy variables for each time period.

The original specification contains period fixed effects (D_t). However, introducing the German fiscal stance implies there is a common variable among individuals which varies over time. The presence of both time fixed effects and a variable that is common across countries leads to collinearity issues: the German fiscal stance can be written as a perfect linear combination of fixed effects. However, omitting time fixed effects can lead to wrongly conclude that the German fiscal stance has an effect on European countries. Indeed, some shocks can impact all European fiscal stances simultaneously, and, if the model is estimated without time fixed effects, the effect of these shocks can be captured by the German fiscal stance variable leading to find a (wrong) significant effect of this variable. To address this issue, only 16 periods fixed effects are introduced, which avoids collinearity problems and allows to control for potential common shocks.⁶⁴

64. The years 1999 and 2006 are removed because following estimates in Chapter 3, they have no significant effect. We also have estimated the model by removing other years in a random way, and the results do not change.

4.2.2 Fiscal Stance measurement

As in the previous chapter, we want to measure the intentional changes in fiscal stance, namely the discretionary fiscal policy. The Cyclically Adjusted Primary Balance (CAPB) is used; it measures the budget balance prevailing when the economy is at its potential and a change in the CAPB can be reasonably attributed to a change in fiscal policy orientation. More details about this point can be found in Chapter 3, Section 3.3.

As a remainder, an increase in the CAPB is interpreted as an improvement in the budget balance, which means a restrictive fiscal policy. On the contrary, a decrease in the CAPB means that the budget balance deteriorates, which can be interpreted as an expansionary fiscal policy.

4.2.3 Control Variables

Regarding the control variables, we use the same set of variables as in Chapter 3. Data sources and descriptions are shown in Appendix, Table 4.3.

First, we control for economic and demographic conditions.

A large share of inactive population (*Young & Old*) can require more health and education spending, and also implies less tax receipts. This should lead to a lower CAPB.

The GDP per capita (*Gdp*) can also affect the CAPB in a positive way if a high GDP per capita is related to larger tax receipts and to lower needs for social spending. However, the GDP per capita is also a proxy for development, and high income countries are often less stressed about fiscal discipline. The effect of GDP per capita on CAPB is therefore unclear.

Then, the occurrence of a banking crisis (*Crisis*) can lead to a higher need for spending and to a smaller public revenue.

Furthermore, a high public debt (*PublicDebt*) should lead governments to implement restrictive fiscal policies in order to avoid sustainability concerns.

Finally, since a large government could have more facilities to intervene in the economy, we construct a variable that measures the size of government (*GovtSize*). We use the share of state's employees compensation in GDP and the share of social contributions collected by government to construct this index variable. A negative effect of this variable is expected.

Note that all these variables are introduced with one year delay in order to avoid endogeneity issues.

Second, controls for political factors are also introduced.

A relaxation of fiscal policy could be expected on election years (*ElectionYear*) if there are political budget cycles for example. Also, left-wing governments (*Left*) are often considered as less stressed about fiscal policy (Volkerink and De Haan, 2001).

A variable designed to measure the peer pressure is constructed. This variable increases when the date for entrance in the Euro Area gets closer and when the public deficit move away from the 3% threshold. It is expected that the higher the peer pressure variable (*sgp*), the higher the CAPB.

4.2.4 Weighting Schemes

The weighting matrices are used to represent the channel for interactions between countries. In Chapter 3, we deal with several weighting schemes in order to determine why governments interact with each other. Here, the issue is about the influence of Germany on the other European countries. Therefore, we do not really need to have an informative weighting scheme. We only retain the most frequently used in the literature, more precisely geographical distance and trade intensity between countries.

Geographic distance based matrix (W_d)

The weighting matrix based on geographic distance is made up of $w_{i,j}$ elements that measure the distance between capitals of countries i and j . Each of them is computed as follows:

$$w_{i,j} = \frac{1}{d_{i,j}} \quad (4.2)$$

with $d_{i,j}$ the euclidean distance between i and j economic capitals.

Trade based matrix (W_{trade})

The weighting scheme based on trade intensity between countries is constructed using imports of country j from country i . Each element of this matrix is computed as follows:

$$w_{i,j} = import_{j,i} \quad (4.3)$$

where $import_{j,i}$ is the average import of j from i over the period 1980-1994. This matrix is predetermined which ensures its exogeneity.

4.3 Results

Equation 4.1 is estimated for a sample of 30 countries⁶⁵ from 1995 to 2013. Results are shown in Table 4.1.

Before interpreting the results, the stationarity conditions have to be checked. Stationarity is ensured if the sum of the coefficients associated to spatially and timely lagged variables is less than 1 (i.e. $\gamma + \lambda + \rho < 1$). Wald statistics are computed to test this condition, and for

65. Countries are: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom.

the two weighting schemes used, the stationarity condition holds (see Table 4.5 in Appendix).

Regarding the control variables,⁶⁶ we show that fiscal stances are affected by several factors. CAPB is reduced during election years, which is consistent with the existence of political budget cycles. Actually, the increase in public spending (or the decrease in public revenue) during election periods can be a way to attract voters.

CAPB is also negatively affected by the government size variable, confirming our expectations: large governments face to larger structural imbalances.

Regarding the demographic features of countries, only the young share of the population decreases the CAPB. A large young population implies larger health and education spending, but also smaller revenue especially from labor taxes.

Finally, governments that face large public debt seem more stressed about fiscal discipline since an increase in public debt leads to an increase in the CAPB. This result shows that governments are careful about sustainability concerns.

Concerning the impact of the German fiscal policy, the coefficient associated to the past German CAPB is significantly positive. It means that European governments mimic German changes in fiscal stances. This result can be viewed as an evidence of a German leadership: a positive (negative) shock in German fiscal stance is followed by a positive (negative) shock the following year in the other European countries.

These results allow to compute the reaction of each country to a change in the German fiscal stance. Following Debarsy et al. (2012), the cumulative effect at time $t + T$ of a shock in German fiscal policy at time t is measured by the elements of the following matrix:

$$\frac{\partial Y_{t+T}}{\partial BG_t} = D_T [I_N \kappa_{BG}] \quad (4.4)$$

66. The average marginal effects computed using equation 4.4 are presented in Appendix, Table 4.4.

With $D_T = (-1)^T (F^{-1}C)^T F^{-1}$, $F = [I_N - \rho W]$, $C = -(\gamma I_N + \lambda W)$, and $D = (I_N - \rho W)$.

TABLE 4.1: Results

Variable	Weighting matrix			
	W_{trade}		W_d	
Capb _{t-1}	0.59***	(0.00)	0.61***	(0.00)
WCapb _{t-1}	0.29***	(0.00)	0.28*	(0.09)
Wcapb _t	0.08	(0.36)	0.01	(0.90)
GermanCapb _{t-1}	0.67**	(0.03)	0.74**	(0.05)
ElectionYear _t	-0.44**	(0.01)	-0.40**	(0.03)
Left _t	-0.07	(0.27)	-0.10	(0.12)
sgp _t	0.83	(0.12)	0.76	(0.15)
GovtSize _{t-1}	-0.42***	(0.00)	-0.45***	(0.00)
Young _{t-1}	-4.67***	(0.00)	-3.54**	(0.02)
Old _{t-1}	-0.05	(0.98)	-0.85	(0.68)
Unemploy _{t-1}	0.05	(0.24)	0.05	(0.22)
Gdp _{t-1}	0.00	(0.67)	0.00	(0.65)
Crisis _{t-1}	0.18	(0.56)	-0.29	(0.35)
PublicDebt _{t-1}	0.02***	(0.00)	0.02***	(0.00)
Observations	570		570	
σ^2	3.00		3.04	
Log-Likelihood	-875.47		-879.10	

(z-probabilities); *significant at 10%; **significant at 5%; ***significant at 1%

Table 4.2 shows the effects of a change in German fiscal stance on fiscal stances in all European countries using the weighting matrix based on geographical distance. Figures 4.1, 4.2, 4.3 and 4.4 show the corresponding response functions respectively for Western, Eastern, Southern and Northern European countries.

In average, an increase by one unit in the German CAPB leads to an increase by 0.29 unit in the CAPB of European countries the period after. The largest effects are observed for Eastern and Western European countries with an average impact at the first period of 0.34 for the former and 0.32 for the latter. Especially, Austria and Slovakia are strongly affected by

German fiscal stances, which can be due to a stronger geographical and historical proximity.

Nevertheless, some positive interactions among European countries remain leading to mitigate our results. Actually, even if Germany impact Europe, countries also consider their neighbors' behaviors in order to implement fiscal decisions.

TABLE 4.2: Cumulative effects of a German fiscal change at time t

	BGR	CZE	EST	HRV	HUN	LTU	LVA	POL	ROM	SVK	SVN
T=1	0.28	0.36	0.36	0.39	0.37	0.29	0.31	0.31	0.26	0.47	0.39
T=2	0.43	0.57	0.56	0.62	0.59	0.46	0.49	0.49	0.41	0.76	0.62
T=3	0.52	0.70	0.67	0.77	0.72	0.55	0.59	0.59	0.49	0.95	0.76
T=4	0.57	0.78	0.74	0.86	0.81	0.61	0.65	0.66	0.54	1.07	0.85
T=5	0.60	0.83	0.79	0.92	0.87	0.65	0.69	0.70	0.57	1.16	0.91
T=6	0.62	0.87	0.82	0.96	0.91	0.67	0.72	0.73	0.58	1.23	0.95
	AUT	BEL	CHE	FRA	GBR	IRL	ISL	LUX	NLD		
T=1	0.47	0.39	0.32	0.33	0.31	0.22	0.12	0.38	0.35		
T=2	0.76	0.61	0.51	0.52	0.48	0.34	0.19	0.59	0.56		
T=3	0.95	0.75	0.62	0.63	0.58	0.41	0.22	0.72	0.68		
T=4	1.07	0.83	0.69	0.70	0.64	0.45	0.25	0.80	0.75		
T=5	1.16	0.88	0.73	0.74	0.68	0.48	0.26	0.85	0.80		
T=6	1.23	0.91	0.75	0.77	0.70	0.49	0.27	0.88	0.83		
	CYP	ESP	GRC	ITA	MLT	PRT					
T=1	0.14	0.20	0.22	0.27	0.20	0.16					
T=2	0.22	0.30	0.33	0.42	0.30	0.25					
T=3	0.26	0.36	0.40	0.51	0.36	0.30					
T=4	0.29	0.39	0.43	0.57	0.40	0.32					
T=5	0.30	0.41	0.45	0.60	0.42	0.34					
T=6	0.31	0.42	0.47	0.62	0.43	0.35					
	DNK	FIN	NOR	SWE							
T=1	0.30	0.34	0.25	0.29							
T=2	0.47	0.52	0.39	0.45							
T=3	0.57	0.63	0.48	0.55							
T=4	0.63	0.70	0.53	0.60							
T=5	0.67	0.75	0.56	0.64							
T=6	0.69	0.78	0.57	0.66							

FIGURE 4.1: Reaction functions to a change in German fiscal stance in Western European countries

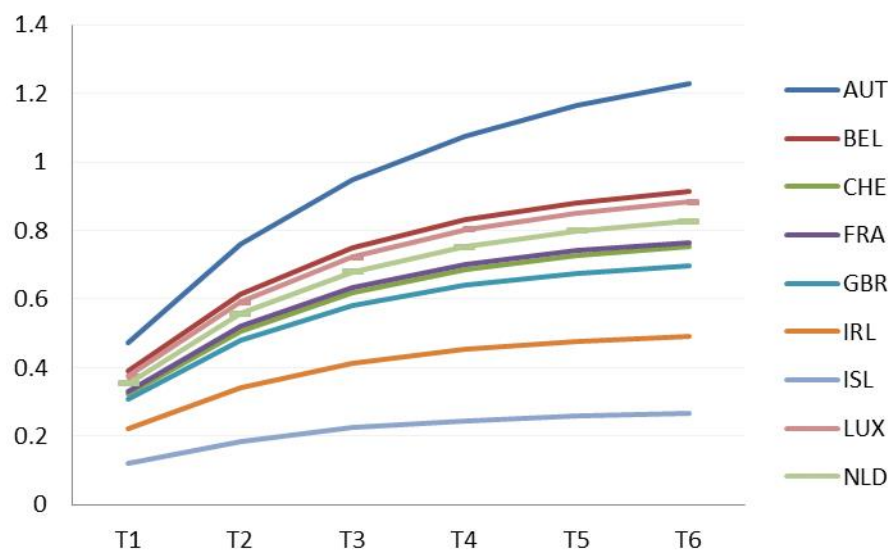


FIGURE 4.2: Reaction functions to a change in German fiscal stance in Eastern European countries

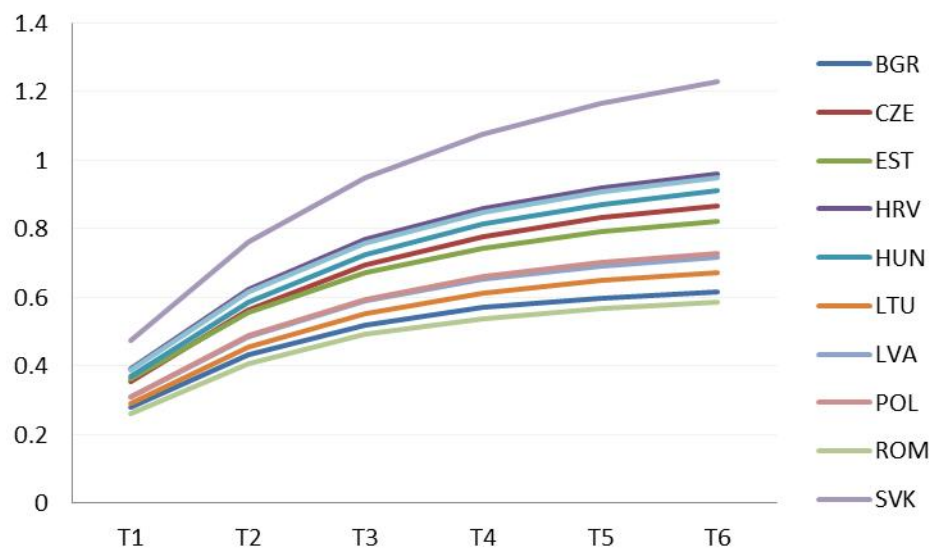


FIGURE 4.3: Reaction functions to a change in German fiscal stance in Southern European countries

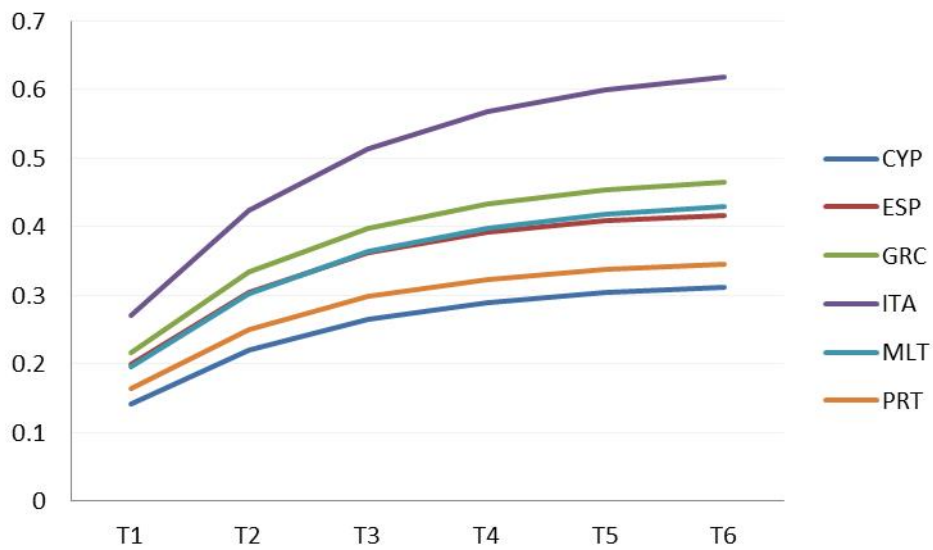
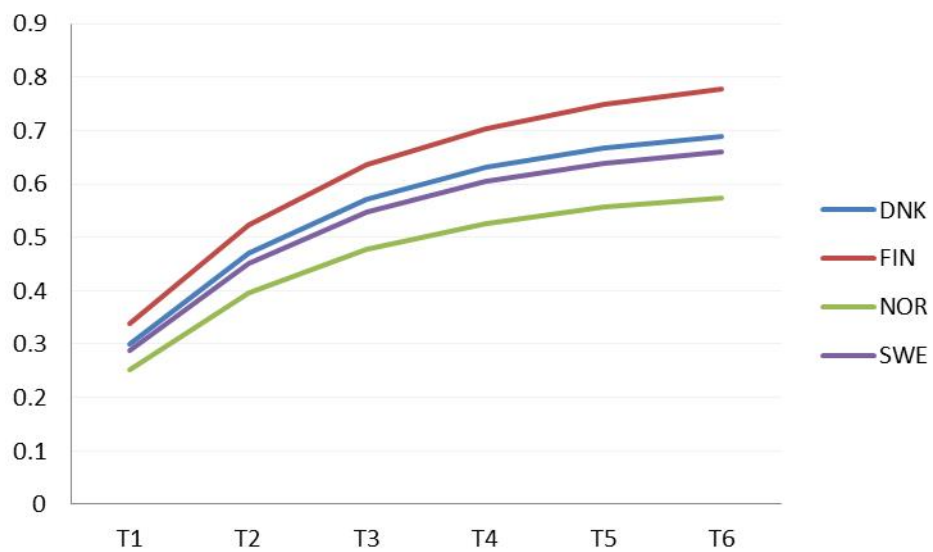


FIGURE 4.4: Reaction functions to a change in German fiscal stance in Northern European countries



4.4 Concluding remarks

Positive and time-delayed fiscal interactions are observed in Europe. This process is consistent with a leader-follower process in which at least one country sets its fiscal stance first, while the others mimic it.

If there is any leader in Europe, we might wonder who this leader is. A lot of papers and media argue that Germany has a powerful function in Europe (see for example Matthijs, 2016; Hellman, 2016). The political leadership of Germany is often addressed, but nothing is said in the literature about the role of Germany in the conduct of fiscal policy in Europe.

This paper therefore deals with this issue. We analyze fiscal stance interactions in Europe by assuming that Germany could act first. In this way, we test whether European countries follow German choices, or set their own fiscal stances regardless of Germany behavior.

Using a Spatial Dynamic Panel Data model, we find that Germany fiscal stance positively affects European fiscal stances with one year delay. This result shows that Germany acts as a leader in Europe: European countries mimic German decisions when they implement fiscal policy. In average, a one unit increase in German CAPB leads to an increase by 0.29 in CAPB of European countries. Moreover, the influence of Germany is the strongest on Austria and Slovakia, which can be due to geographical and historical proximity.

We show in Chapter 3 that fiscal interactions in Europe are not due to cooperation but to yardstick competition. In the case where fiscal coordination increases fiscal policy efficiency, it seems that Germany could play an important role in federating fiscal decision. If countries follow Germany, the push for fiscal cooperation could come from Germany.

Appendix

TABLE 4.3: Data sources

Variable	Description	Unit	Source
Capb	Cyclically Adjusted Primary Balance, adjustment based on potential GDP	% of potential GDP	Ameco
Young & Old	People under 15-years and over 64-years	% of total population	World Development Indicators, World Bank
Unemployment	Unemployment rate	% of total working force	Ameco
Gdp	GDP per capita at constant price	USD base 2005	World Economic Outlook, IMF
Crisis	Variable =1 when a banking crisis occurs, 0 otherwise	Dummy	Laeven and Valencia (2012)
PublicDebt	Public debt	% of GDP	IMF, Historical Dataset
GovtSize	Compensation and Social contribution	% of GDP	World Development Indicators, World Bank
ElectionYear	Variable = 1 the year of election (presidential or parliament)	Dummy	Comparative Political Data Set, Klaus et al. (2015)
Left	From 1 (for hegemony of right-wing parties) to 5 (for hegemony of social-democratic and left parties)	1 to 5	Comparative Political Data Set, Klaus et al. (2015)
SGP	Variable = 0 if current deficit < 3%, and equal to 1/time before entrance in the EU		Own calculation using Eurostat
Bilateral trade flows	Imports from origin to destination	USD; 1985-1994 average	United Nations Com-trade Database

TABLE 4.4: Marginal average effects at time t+1 following a transitory shock at time t

Variable	Weighting matrix	
	W_{trade}	W_d
ElectionYear _t	-0.22**	-0.20**
Left _t	-0.06	-0.07
sgp _t	0.48	0.45
GovtSize _{t-1}	-0.28***	-0.31***
Young _{t-1}	-2.31***	-2.18**
Old _{t-1}	-0.08	-0.39
Unemploy _{t-1}	0.04	0.04
Gdp _{t-1}	0.00	0.00
Crisis _{t-1}	0.11	-0.15
PublicDebt _{t-1}	0.01***	0.01***

(z-probabilities); *significant at 10%; **significant at 5%; ***significant at 1%

TABLE 4.5: Wald tests for stationarity conditions

Weighting matrix		Trade	Distance
H0: $\gamma + \lambda + \rho = 1$ and $\gamma = 1$			
	Statistic	124.54	127.32
	p-value	< 0.001	<0.001
H0: $\gamma + \lambda + \rho = 1$			
	Statistic	5.50	9.62
	p-value	0.03	0.002

Quatrième partie

Conclusion Générale

La crise économique et financière de 2008 a remis au goût du jour l'utilisation de l'instrument budgétaire et les débats portant sur son efficacité ont repris toute leur importance. Cette thèse a été réalisée dans l'objectif de nourrir la réflexion relative à l'efficacité de la politique budgétaire, d'en étudier les déterminants et les modalités de mise en œuvre. Si certains critères d'efficacité ont déjà été mis en avant dans la littérature, d'importantes questions subsistent. Ainsi, nous nous sommes interrogés sur les implications de l'hétérogénéité des structures économiques dans la définition d'une politique budgétaire efficace. Par ailleurs, il a été montré que la coordination des politiques budgétaires augmentait l'efficacité de ces dernières. Nous avons donc cherché à déterminer la mesure dans laquelle une coordination des politiques budgétaires s'opérait au niveau international.

La première partie de cette thèse s'intéresse aux déterminants de l'efficacité de la politique budgétaire, et plus particulièrement aux déterminants du multiplicateur budgétaire.

Dans un premier temps, nous montrons que les pays émergents font face à des valeurs plus faibles du multiplicateur budgétaire que les économies avancées. Nous montrons ensuite qu'une grande ouverture commerciale, un taux d'épargne élevé et une dette publique importante réduisent la valeur du multiplicateur budgétaire, et ce de manière plus importante dans les économies émergentes que dans les économies avancées. Un taux de chômage élevé et un fort développement financier augmentent l'effet multiplicateur des dépenses publiques, là aussi, de manière plus importante dans les économies émergentes.

Par ailleurs, alors que l'ouverture commerciale constitue le facteur le plus influent dans les économies avancées, nous montrons que la dette publique constitue le principal déterminant de la valeur du multiplicateur dans les économies émergentes.

En somme, nous montrons que les pays émergents font face à une efficacité moindre des dépenses publiques et à une plus grande sensibilité aux différents facteurs macroéconomiques déterminant la valeur du multiplicateur budgétaire. Il est donc d'autant plus crucial pour les gouvernements des pays émergents de contrôler et d'agir sur les facteurs déterminant la valeur

du multiplicateur s'ils souhaitent améliorer l'efficacité de leurs politiques budgétaires.

En outre, la dette publique est le facteur ayant la plus forte influence sur le multiplicateur budgétaire dans les pays émergents. Il semble alors nécessaire de développer davantage le système de prélèvements fiscaux dans ces pays de manière à assurer le financement des mesures conjoncturelles sans trop creuser la dette. Cette amélioration pourrait passer par un perfectionnement des institutions au sens large, qu'il s'agisse des règles organisant l'intervention publique ou de celle régissant l'activité des agents économiques. En effet, l'importance du secteur informel dans les pays émergents est en partie responsable de la fragilité de leur assiette fiscale, et réduit ainsi les marges de manœuvre des gouvernements.

La relative faiblesse des institutions dans les pays émergents pourrait de plus expliquer la sensibilité accrue du multiplicateur à ses déterminants dans ce groupe de pays. Dans un tel cadre, les agents économiques pourraient être moins confiants et faire preuve de pessimisme au sujet l'efficacité de leur gouvernement. Lorsqu'une politique budgétaire expansionniste est mise en place, les ménages auraient tendance à augmenter leur épargne et les entreprises à réduire leurs investissements. L'efficacité de la politique budgétaire en serait réduite. À l'heure où un nombre croissant d'enquêtes de conjoncture sont lancées, comprenant pour certaines des indicateurs de confiance, estimer la valeur du multiplicateur conditionnellement à la valeur de tels indicateurs constituerait une extension intéressante à ce chapitre.

Une seconde extension envisagée des suites de ce chapitre a trait à l'impact positif du développement financier sur la valeur du multiplicateur. Ce résultat suggère qu'il serait bon de favoriser le développement financier afin d'établir un cadre structurel qui rende la politique budgétaire efficace. En même temps, le développement financier peut aussi être source d'instabilité. De ce fait, une analyse approfondie de l'impact des caractéristiques du système financier sur l'efficacité de la politique budgétaire constitue une piste de recherche intéressante.

Le deuxième chapitre de cette thèse analyse un facteur d'efficience très peu étudié en

tant que tel dans la littérature : l'endettement des agents, et plus particulièrement des firmes, en monnaie étrangère. En effet, l'endettement en monnaie étrangère des entreprises les rend vulnérables aux variations de taux de change. Or, la politique budgétaire a des effets sur ce dernier. A l'aide d'un modèle DSGE, nous montrons qu'une hausse des dépenses publiques peut s'accompagner d'une dépréciation de la monnaie locale, ce qui entraîne une augmentation de la valeur réelle de la dette des firmes endettées en monnaie étrangère. Leur structure de bilan est ainsi dégradée, leur coût de financement s'en voit augmenté, et leur niveau d'investissement diminue. Ainsi, l'endettement en monnaie étrangère des entreprises réduirait l'effet positif des dépenses publiques.

Ce résultat apporte une explication supplémentaire à la faiblesse des multiplicateurs budgétaires dans les pays émergents. En effet, ces économies, et contrairement aux économies avancées, sont très largement endettées en monnaie étrangère. Afin de recouvrer une certaine efficacité de la politique budgétaire, nous montrons qu'il est essentiel pour les gouvernements d'inciter les agents économiques à privilégier la monnaie locale comme monnaie d'endettement. Développer davantage le système financier local ou instaurer des mesures visant à limiter les emprunts en monnaie étrangère pourraient constituer des moyens d'y parvenir.

Ce travail pourrait être étendu en analysant les interactions entre politiques budgétaire et monétaire. En effet, la réponse de la politique monétaire à un choc de demande initié par une relance budgétaire modifie la valeur du multiplicateur. En cas de marchés financiers incomplets et imparfaits, cette interaction peut être d'autant plus intéressante à étudier que l'évolution des taux d'intérêt influence le taux de change et donc la structure de bilan des entreprises.

La seconde partie de la thèse porte sur les interactions budgétaires. Des études, notamment empiriques, ont montré qu'une politique budgétaire conduite de manière coordonnée entre plusieurs pays est plus efficace qu'une politique budgétaire conduite par un gouvernement isolé. Nous avons donc cherché à déterminer dans quelle mesure une telle coordination existait en Europe.

Dans le troisième chapitre de cette thèse, nous avons donc mesuré les interactions budgétaires tout en cherchant à en identifier la nature. Nous montrons que les gouvernements interagissent effectivement entre eux. Néanmoins, ces interactions n'auraient pas pour objectif d'améliorer l'efficacité de la politique budgétaire par une coordination des actions. Nous montrons en effet que les interactions budgétaires entre gouvernements européens ont une visée politique puisqu'elles seraient dues à de la concurrence par comparaison. Ainsi, les gouvernements imiteraient leurs voisins pour éviter d'être sanctionnés lors de prochaines élections.

Nous montrons aussi que les interactions budgétaires n'ont pas lieu de manière simultanée mais sont décalées dans le temps. Les gouvernements imitent les décisions prises par d'autres avec un an de décalage. Ce résultat est compatible avec un processus de *leader-suiveur*.

Cette étude nous pousse à conclure qu'un renforcement des institutions européennes visant à favoriser la coopération budgétaire est essentiel si l'on souhaite modifier la nature des interactions budgétaires, et ainsi accroître l'efficacité de la politique budgétaire. En effet, l'objectif électoral des actions budgétaires pourrait réduire l'efficacité de ces dernières. Les gouvernements vont imiter les politiques d'autres pays, alors même que les besoins liés au contexte local ne coïncident pas nécessairement avec ceux des pays imités.

Ces résultats suggèrent de nouvelles pistes de recherche. D'abord, nous avons montré que des interactions positives et décalées dans le temps sont observées en termes de politique budgétaire. Toutefois, la question du timing et du design des interactions demeure en ce qui concerne la politique fiscale. Cette question a été abordée dans un article⁶⁷ dans lequel nous nous intéressons aux niveaux des impôts sur les entreprises. Dans ce cas, des interactions contemporaines positives coexistent avec des interactions décalées dans le temps. Ce résultat tend à confirmer l'existence de concurrence fiscale en ce qui concerne le choix des gouvernements en termes de taux d'imposition sur les entreprises.

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Ensuite, l'existence d'un phénomène de *leader-suiveur* dû à de la concurrence par comparaison pose la question de l'existence d'un leader européen en matière budgétaire. Compte tenu du rôle structurant de l'Allemagne dans la construction européenne et de son importance politique en Europe, il nous a semblé que le gouvernement allemand était susceptible d'occuper cette place de leader.

Le quatrième chapitre de cette thèse vise donc à déterminer si l'Allemagne joue ce rôle de leader en Europe. Nous montrons, en effet, que la politique budgétaire allemande influence de manière significative les politiques budgétaires des gouvernements européens.

Ce résultat nous permet d'affirmer que l'Allemagne pourrait avoir un rôle décisif en vue d'une politique budgétaire davantage coordonnée au niveau européen. En effet, la concurrence par comparaison mise en avant dans le chapitre précédent, couplée à ce phénomène de leadership, implique que les gouvernements européens calquent leurs décisions sur celles du gouvernement allemand. Si l'Allemagne semble disposée à mener une politique budgétaire coordonnée, nous pouvons supposer que d'autres pays suivront. Néanmoins, les résultats des élections allemandes du 24 septembre dernier pourraient remettre en cause les éventuels espoirs concernant la mise en place d'une trajectoire budgétaire commune à l'Europe.

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Marie-Pierre HORY

Essais sur la politique budgétaire

Multiplicateurs et interactions budgétaires

Résumé :

Cette thèse étudie les déterminants de l'efficacité de la politique budgétaire, et en analyse les modalités de mise en œuvre. Le premier chapitre compare la valeur du multiplicateur budgétaire dans les économies émergentes (EMEs) et dans les avancées (AEs). Le multiplicateur est plus faible dans les EMEs que dans les AEs, et si les déterminants du multiplicateur y sont similaires, leur impact et leur hiérarchisation y sont différents. Dans les EMEs, l'amélioration de l'efficacité de la politique budgétaire semble devoir passer par des changements structurels relatifs aux institutions. D'après le chapitre 2, le multiplicateur décroît avec la part de la dette des firmes libellée en monnaie étrangère qui se trouve être particulièrement élevée dans les EMEs. Des mesures limitant les prêts en monnaie étrangère et favorisant le développement du système financier local devraient permettre de recouvrer l'efficacité de la politique budgétaire. Le troisième chapitre montre que les gouvernements européens interagissent entre eux pour fixer leurs politiques budgétaires : ils s'imitent avec un an de délai. Ces interactions sont dues à de la concurrence par comparaison. L'objectif électoral des politiques budgétaires peut en réduire l'efficacité. Aussi, davantage d'institutions seraient nécessaires pour garantir une certaine coordination budgétaire en Europe. Les interactions décalées dans le temps témoignent d'un phénomène de leader-suiveur en Europe, et le chapitre 4 montre que l'Allemagne occupe la place de leader. L'Allemagne pourrait donc amorcer une certaine coordination budgétaire en Europe.

Mots clés : multiplicateur budgétaire, VAR, DSGE, interactions, coopération, économie politique, économétrie spatiale

Essays on fiscal policy

Fiscal multipliers and fiscal interactions

Abstract :

This thesis analyzes the determinants of fiscal policy efficiency and the way fiscal policy is implemented. The first chapter compares the fiscal multiplier in emerging market economies (EMEs) with the one in advanced economies (AEs): the fiscal multiplier is smaller in EMEs than in AEs. While the determinants of fiscal multipliers are similar in both groups, their weights differ across groups. To improve fiscal policy efficiency EMEs seem to need structural policies to better their institutional quality. Chapter 2 empirically and theoretically shows that the fiscal multiplier decreases with the share of firms' indebtedness that is denominated in foreign currency. EMEs have large debt denominated in foreign currency. Fostering the use of local currency to finance activity, for example via quotas on foreign loans, shall allow EMEs to improve the efficiency of their fiscal policies. Chapter 3 shows that European governments mimic each other in the implementation of fiscal policy with one year delay. These interactions are due to yardstick competition. The electoral objectives of governments may reduce fiscal policy efficiency and the incentive of governments to fiscally cooperate. If we believe in fiscal cooperation as a force to enhance fiscal policy efficiency, more institutions should be set up to foster cooperation in Europe. Moreover, the delayed interactions found are consistent with a leader-follower process, and Chapter 4 shows that Germany is the leader: European countries follow Germany in the implementation of fiscal policy. Hence, the push for fiscal cooperation could come from Germany.

Keywords: fiscal multiplier, VAR, DSGE, interactions, cooperation, political economy, spatial econometrics