



How does global demand for financial services promote domestic growth in Luxembourg? A dynamic general equilibrium analysis[☆]



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ABSTRACT

This paper studies the transmission of a change in the global demand for financial services on the domestic growth of an international financial center. To capture most of the possible interactions, we develop a dynamic general equilibrium model that we calibrate on Luxembourg data. Results show that the financial multiplier (ratio of a change in output to a change in the financial sector value added) is above 2 in the medium run and largely above 1 in the long run. The main transmission channels are net exports (expenditure approach) or capital income (income approach) in the medium run and investment in the long run. Moreover, the global demand for financial services has substantial implications for public finances. These findings also mean that a sudden loss of confidence towards a specific international financial center might have dramatic consequences for its whole economy.

1. Introduction

During the last 30 years, the financial services sector has grown enormously in the United States, United Kingdom or Canada as well as in other smaller economies as Switzerland, Ireland, the Netherlands or Luxembourg. This growth is apparent whether one measures the financial sector by its value added, by employment or by tax contributions, see Fig. 1.¹ Greenwood and Scharfstein (2013) attribute a sizeable proportion of the growth of finance in the United States to the increase in active asset management and to an extension of household credit (mostly mortgages), which in turn were likely facilitated by the advent of non-regulated shadow banking (Pozsar et al., 2013).

The role of asset management in the growth of finance is also prominent in smaller economies as Switzerland and in big financial centers as New York (Credit Suisse, 2012). These financial centers are dependent of the global demand for financial services and the financial crisis of 2008–2009, that originated in the United States and propagated to the rest of world, has shown how fragile economies are to external financial shocks. The aim of our paper is to understand how structural changes in the global demand for financial services affect the development of a single country's financial sector as well as the rest of

its economy. This may be important when discussing events and decisions that can affect financial activity like the Brexit.

Our study develops a quantitative dynamic general equilibrium model to look at the economic implications – in terms of production, intermediate consumption, employment and public finance – of financial sector activity. To do so, we introduce model elements – overlapping generation dynamics, labour market frictions à la Diamond-Mortensen-Pissarides and a New Open Economy Macroeconomics structure à la Obstfeld-Rogoff – that reproduce various characteristics of the financial sector and of the rest of the economy. We calibrate the model to Luxembourg, where the financial sector is important and where its development has been accompanied by inflows of cross-border workers (see Fig. 2).

We devote particular effort to the calibration of the financial sector and of the rest of the economy, which is coherent with our quantitative approach that aims at being as complete as possible in measuring how changes in financial sector activity trickle down to the rest of the economy.

In our model, the financial sector produces financial services in the form of asset management using real resources (employment, capital and intermediate goods), like in Christiano et al. (2010). The financial sector also pays taxes on labour, profits and assets under management.

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¹ While the share remained on average around 5% in the whole EU.

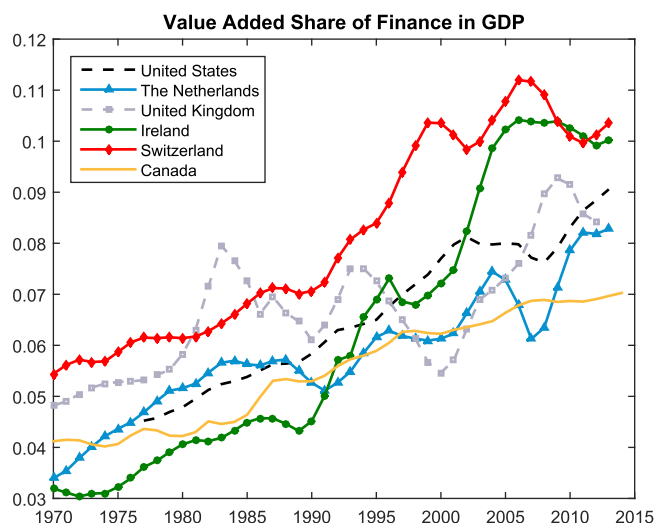


Fig. 1. Share of financial gross value added in total for selected countries (in %). *Data sources:* Eurostat and OECD. Financial gross value added corresponds to the NACE-K sector ‘Financial and insurance activities’.

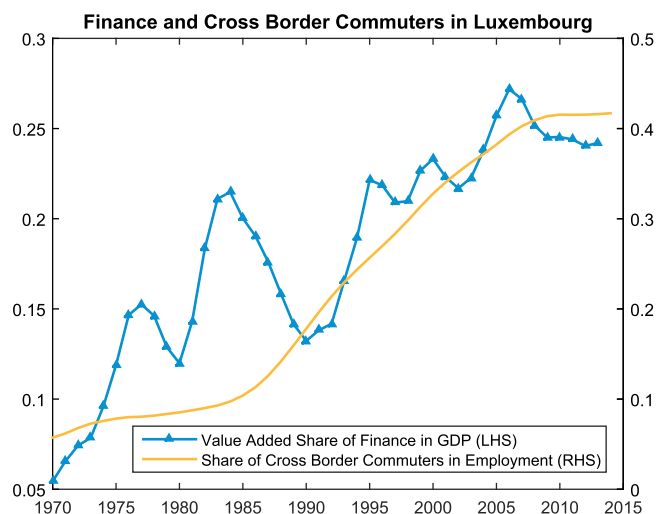


Fig. 2. Financial sector value added and cross-border worker inflows in Luxembourg. *Data sources:* STATEC (National Accounts). Financial gross value added corresponds to the NACE-K sector ‘Financial and insurance activities’.

The overlapping generation structure allows distinguishing between workers and retirees and, together with historical and projected population data, reproducing the evolution of pension expenditures and contributions. Moreover, search and matching in the labour market makes it possible to distinguish between employment and – involuntary – unemployment and to have a more detailed description of the public budget. The New Open Economy Macroeconomics structure reproduces the large degree of openness of the Luxembourg economy and permits a more detailed representation of GDP components. With these modeling elements, we can calibrate and match the size of the Luxembourg financial sector in terms of employment, value added, net exports and taxes. We also reproduce sectoral employment, unemployment, a detailed public budget with various government revenues and expenditures as well as the components of output following the three approaches (production, income and expenditure). Finally, we investigate how a shock related to the financial sector affects the whole economy, and in particular the macroeconomic performance and public finance.

To study the expected evolution of the Luxembourg economy, we explore the effects of different developments in financial sector activity and cross-border worker inflows, because both evolutions are intimately linked. A summary of our results can be expressed in terms of what we define as the financial multiplier, i.e. the response of total output to a given permanent change in the financial sector's value added.² The simulations show that in Luxembourg, the financial multiplier ranges between 2.1 in the medium run, i.e. after 5 years, and 1.6 in the long run, i.e. after 40 years. The main transmission channels are net exports (expenditure approach) or capital income (income approach) in the medium run and investment in the long run. Moreover, a 1 euro increase in the value added of finance reduces public deficit between 0.3 euro in the medium run and 0.2 euro in the long run.

Although we focus on Luxembourg, our research question, modeling approach and results may also be relevant for other economies. Indeed, we observe that, beyond the high value added share of finance in GDP (as already shown in Figs. 1 and 2), several small international financial centers share other characteristics with Luxembourg. For instance, the high level of trade opening, the importance of foreign labour or the economic strength as illustrated by low unemployment rates. The Table 4 that we introduce in Appendix A shows that Switzerland and, to slightly lesser extends, Ireland and the Netherlands are to all these aspects close to Luxembourg.³ As a result, our modeling approach (small open economy with a financial sector) could be helpful for similar international financial centers. Moreover, although we here calibrate the model on Luxembourg data, our main results (high financial multiplier and effects on public finances) could also be relevant for these countries. Our findings also mean that a sudden loss of confidence towards a specific international financial center might have dramatic consequences for its whole economy.

Moreover, our study contributes to the vast literature on quantitative general equilibrium (GE) models with overlapping generation (OLG) dynamics à la Allais-Samuelson-Diamond (Auerbach and Kotlikoff, 1987), usually used to examine the macroeconomic implications of population aging.⁴ The GE-OLG framework is also employed to address questions that are not directly linked to demographic change and that focus on, e.g., labour market issues (Hairault et al., 2010) or optimal taxation (Conesa et al., 2009; Fehr and Kindermann, 2015). However, to our knowledge, our paper is the first to incorporate a financial sector in a quantitative general equilibrium model with overlapping generation dynamics (and population projections) and to look at the effects of a financial shock on public finance and the macroeconomic performance of an economy. Our paper relates also to the dynamic stochastic general equilibrium (DSGE) literature, which, since the 2008–2009 financial crisis, has developed more and more models with a financial sector. Our approach differs, however, from these existing models for several reasons. First, they focus on short-term macroeconomic fluctuations (typically over a few quarters) generated by small shocks, while we are interested in the long-term consequences of structural changes. Second, in these models, the financial sector acts on the *credit relation* between savers and borrowers and a financial sector shock only affects the intermediation process - and therefore capital accumulation and related prices - and not directly the rest of the economy. Instead, we consider a model where the financial sector produces financial services in the form of

² A financial multiplier larger (lower) than 1 means that a 1 euro increase in the financial sector's value added increases output by more (less) than 1 euro, implying that the financial sector stimulates (crowds out) the other sectors.

³ We could probably also mention smaller places as Monaco, Lichtenstein or more exotic islands, although we have no proper standardized data to back our guess...

⁴ Without any claim to completeness, let us mention in order of publication, De Nardi et al. (1999), Storesletten (2000), Börsch-Supan et al. (2006), Aglietta et al. (2007), Diaz-Gimenez and Diaz-Saavedra (2009), Heijdra and Romp (2009), Marchiori (2011), Ludwig et al. (2012), de la Croix et al. (2013) or Kudrna et al. (2015).

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