Crisis and Policy Changes in Luxembourg

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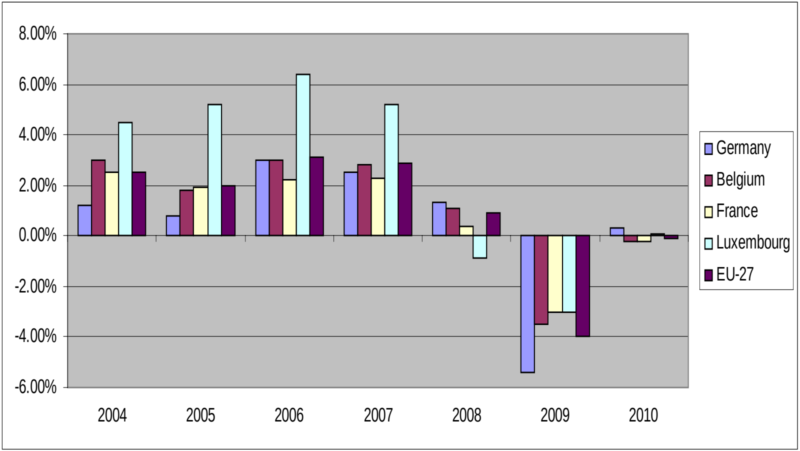
Motivation

- New context:
  - Emergency actions (bank default, credit crunch, billions of liquidity injected).
  - Easiness to mobilize billions for the private sector has suggested that a profound shift of attitude had taken place.
  - Governments ready to shift away from the more liberal positioning of the late 90s.
  - Public interventions to salvage industries: US federal state producing SUVs, general shift away from internal market rules in the EU.
- New atmosphere surrounding public policies might shape policies recommendations in an unusual way.

- Current crisis has heavy consequences on workers in terms of higher unemployment and lower income and wealth.
- Firms negatively affected: decrease in demand and increase in financial costs.
- Will influence their hiring and investment prospects.
- Durable drop in TFP.
- Call on the government to intervene directly in the economy to sustain aggregate demand.
- Structural policies to be abandoned?

GDP, yearly percent change



Objective:

- To present the new tool for policy simulation in Luxembourg: LSM.
- To illustrate how policy reforms can be implemented in this model.
- In a consistent micro-founded dynamic macroeconomic framework.

How to model such policies?

- Intricate given the degree of imagination of policy makers.
- Example: direct support to industry or protection of domestic market.
  - Shortcut: model the actual impact of such policies which aim basically at reducing competitive pressures and accordingly restore markups.
  - A policy to be simulated is accordingly an increase of 1% in the mark-up charged by firms.
  - Mirroring measures to protect the firms and increase their profits and hence investment and hiring possibilities.

How to model the crisis?

- Crisis is a combination of:
  - Drop in external demand (justification: drop in international trade an prospects of low growth in the eurozone).
  - Tightening of credit conditions (justification: credit crunch).
  - Drop in TFP (justification: recent historical perspective, IMF on past banking crisis).
- We will implement these 3 shocks in LSM.

- The assessment of the consequences of crisis and policies is **based on the new Luxembourg Structural Model** (LSM)
- Incorporates the most recent advances in economic theory.
- LSM combines these advances with a careful modelling of the particular institutional features of Luxembourg:
  - Dual labour market characterized by a large share of non-resident workers.
  - Importance of the union-firm relationships.

- For each of the mentioned policy measures, we focus on the effects on a set of key variables.
- We compute changes:
  1. In the per-capita wages of resident and non-resident workers.
  2. In employment of resident and non-resident workers.
  3. In the total wage bill for resident and non-resident workers.
  4. In overall firms' profits.
  5. In the private demand components.
  6. In the overall GDP.
  7. In government deficit.
  8. In total factor productivity.

What is LSM?

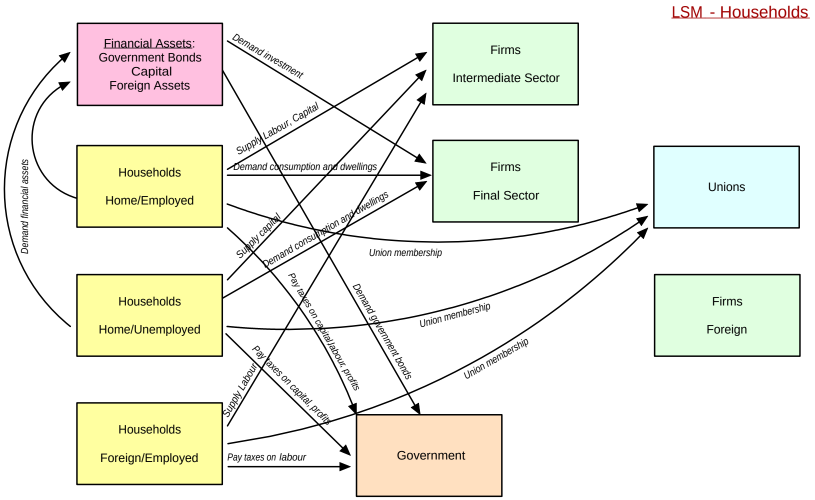
- LSM: Luxembourg Structural Model.
- A Dynamic Stochastic General Equilibrium (DSGE) model.
  - Dynamic: considers also dynamic adjustment of the economy to shocks or policy changes.
  - Stochastic: allows also for random shocks hitting the economy (technological change, oil shock, macroeconomic policies, etc.)
  - General Equilibrium: model all markets and agents jointly, and model agents' reactions to structural policy changes.
- Price to be paid for consistence: a schematic and simplified representation of the Luxembourg economy (e.g. no sectoral disaggregation).
- New generation of models used mainly in central banks.
- LSM: Open economy version of 'ModEL'.

The structure of LSM: Households

- Four types of agents: Households, Government, Firms and Unions.
- Households have finite lives.
- Each household maximizes an intertemporal utility function s.t. budget constraint.
- Optimal amount of consumption, dwellings and assets.
- Individual Households' decisions aggregated to determine aggregate demand of consumption, dwellings and assets.
- Assets include property rights on capital.
- Households supply not only labour but also capital to Firms.

Households (cont.)

- Households supply labour.
- Unions are in charge of the wage bargaining with the Firms.
- Unemployed workers receive benefits.
- Two segments of the labour market: residents non-residents.
- Households pay taxes on wages from labour, rents from capital, and profits.
- Let's start with left-hand side panel, second cell from top.


LSM - Households
Financial Assets:
Government Bonds
Capital
Foreign Assets
Firms
Intermediate Sector
Firms
Final Sector
Unions
Firms
Foreign
Households
Home/Employed
Households
Home/Unemployed
Households
Foreign/Employed
Government
Demand investment
Supply Labour, Capital
Demand consumption and dwellings
Supply capital
Demand consumption and dwellings
Union membership
Union membership
Union membership
Pay taxes on capital/labour, profits
Demand government bonds
Pay taxes on capital, profits
Supply Labour
Pay taxes on labour
Demand financial assets

The structure of LSM: Government

- Government collects taxes on the returns from assets and on labour income, profits, imports and exports.
- Also collects social contributions and possibly value added taxes.
- Tax receipts used to finance expenditures:
  - Unemployment benefits.
  - Other transfers to residents and non-residents.
  - Public investment (productive expenditure that affects TFP).
  - Possible deficit (surplus), whose evolution over time, combined with that of interest rates, determines level of public debt.
  - Government debt financed with emission of public bonds.
- Government also sets relevant policy variables:
  - Replacement rate.
  - Union power.
  - Degree of competition.
  - Degree of openness of the economy.

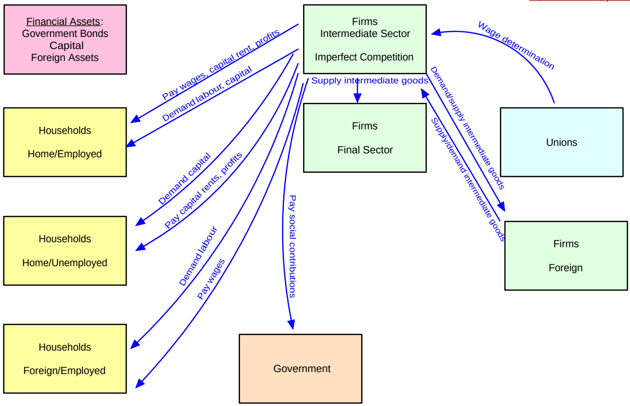
The structure of LSM: Intermediate producers

- Production sector: *intermediate* and final goods.
- In the (differentiated) intermediate goods sector Firms operate under *monopolistic competition*.
- Production function combines capital and two different types of labour as inputs (resident and non-resident, possibly with different productivity).
- Public investment (productive public expenditure) increases productivity.
- Exogenous technical progress increases productivity.
- Some Firms are "importers": buy intermediate goods abroad and resell them internally (mark-up).

The structure of LSM: Unions

- Unions represent workers.
- Wages are determined by interaction between the (intermediate goods) Firms and the Unions.
- Firms and unions bargain separately in the tradable and non-tradable sectors.
- Given resulting wages, labour demand is determined.
- Technically:
  - Interaction between the production and labour markets is represented as a game in two stages.
  - Wage bargaining takes place in the first stage.
  - Production in the second.
- Role of intermediate Firms and of Unions summarized as follows.

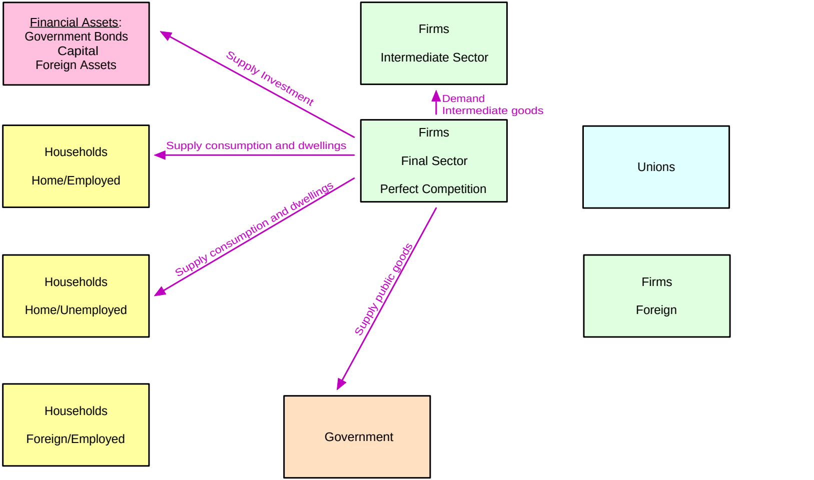
LSM - Firms, intermediate goods, and Unions



The structure of LSM: Final producers

- Production sector: intermediate and *final* goods.
- Final goods sector:
  - Firms operate under *perfect* competition.
  - Production function with a *variety of intermediate goods* only as inputs.
  - Possibly with increasing returns to variety.
- Maximize profits s.t. production function constraint.
- Determines their demand of intermediate goods (supplied by Firms in the intermediate goods sector).
- Supply of final good (that can be differentiated at no cost) matches aggregate demand from Households and Government.
- Role of the Firms in final goods sector summarized as follows.

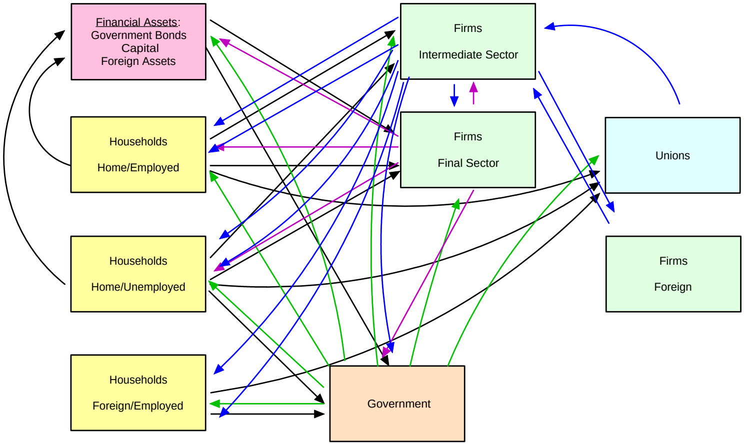
LSM - Firms, final goods



The structure of LSM: Assets

- Interest rate exogenous (small open economy assumption).
- Plus a debt-elastic interest-rate premium (increasing in the country's net foreign debt).
- Exchange rate is also exogenous as long as prices are fixed.
- Three types of assets are perfect substitutes in the household's portfolio, and earn the same (exogenous) real rate of return.
  - Government bonds.
  - Foreign assets.
  - Claims to physical capital.
- Overall set of relations in LSM is messy: this is where a model is worthwhile.

LSM - Overall structure



What we do now

1. We illustrate and discuss the functioning of LSM using a simple policy experiment.
2. We simulate the impact of the crisis (combining the 3 shocks referred to above).
3. We simulate a policy whereby a burden sharing is agreed between unions, government and firms.

Single shock on replacement rate

- An increase of 1% in the replacement rate.
- Such policy would *a priori* combine many advantages:
  - It would facilitate transitory adjustments, by reducing the negative impact of firms' adjustment on the labour market.
  - It would inject purchasing power in the economy, and target such transfer to households potentially highly constrained.
  - All in all, such policy would alleviate the adjustment cost and sustain consumption and thus economic activity.
- We hereafter detail the impacts of such policy.

- We focus on the changes in each variable with respect to its starting value.
- We use $+$, $++$ and $+++$ to denote an increase
- In the range of, respectively: 0-0.5%, 0.5-1% or larger than 1%.
- The symbols -, - -, and - - - have a similar interpretation for negative changes.

+1% replacement rate (permanent)

Variable	1y	2y	5y	10y
GDP	--	--	--	--
Consumption	--	--	--	--
Investment	-	-	--	--
Net exports - intermediate goods	+++	+++	+++	+++
Government deficit	+++	+++	+++	+++
Employment, resident	---	---	---	---
Employment, non resident	+	+	+	+
Profits	--	--	--	--
Wages, resident	++	++	++	++
Wages, non resident	-	-	-	--
Total wages, resident	--	--	--	--
Total wages, non resident	-	-	-	-
Total Factor Productivity	-	-	-	-

Explanation: a change in the relative cost of labour

- As expected positive income effect for the unemployed.
- Unexpected positive effect on the wage of the resident workers that are still employed.
- As the outside option for workers improves, their wage has also to increase.
- Since the replacement rate for the non-resident workers remains fixed, their outside option worsens when compared with that of the resident workers.
- Hence, the wage of the non-resident workers does not increase, actually it can slightly decrease.
- Makes the resident workers more costly for the firms than the non-resident workers.

Explanation: impact on the labour market

- Firms are expected to react by reducing the employment of the resident workers and increasing that of the non-resident workers.
- Will partially offset the positive impact of this policy.
- In total, we have:
  - Higher wages *but* lower employment for resident workers
  - With the latter effect dominating the former
  - So that the total resident wage bill actually *decreases*.
- Instead, we have slightly lower wages for non-resident workers with higher employment, but in this case the wage effects dominates the employment effect, and the non-resident wage bill decreases.

Explanation: impact on income and activity

- Lower *total* wages for resident workers imply lower available income, rather than higher as hoped.
- Consumption ultimately *decreases*.
- Reduces the firms' profits, which in turns reduces investment, which further reduces demand and gross domestic product (GDP).
- The only positive effects is on net trade, since lower consumption decreases imports.
- The higher replacement rate combined with lower employment makes public expenditures for unemployment benefits increase.
- Tax receipts decrease due to lower wages, profits and consumption.
- Induced compression in government investment (infrastructure, but also R & D, education, etc.); negative impact on the evolution of total factor productivity.

Due to the specific patterns of the labour market mimicking the functioning of the labour market in Luxembourg, a policy aiming at alleviating the impact of firms' adjustments on the labour market has ultimately further worsened the situation in LSM.

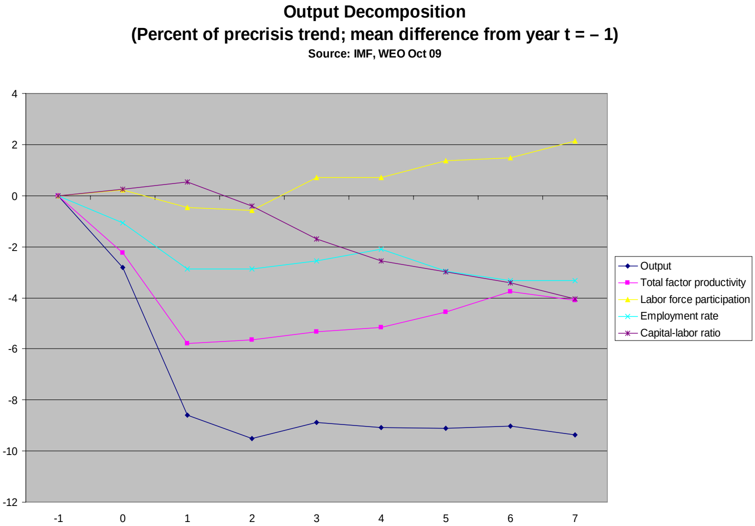
Discussion

- The magnitude of the reaction of the economy is indeed driven by the calibration of the model.
- But the direction of the effect is not.
- Importantly, the general equilibrium structure of the model authorizes to combine a series of shocks and to assess the net effect on the various markets and agents.

Modeling the crisis

- We combine three shocks:
  - Permanent drop in external demand in a small open economy (1%).
  - Permanent increase in capital cost due to tightening of the credit standards in the private banking sector (1%).
  - Permanent drop in TFP (1%).
- This is a rather smoothed version of the reality:
  - We simulate a 1.1% drop in GDP one year after the beginning of the crisis.
  - While a 3% drop in GDP is forecasted in 2009.

- IMF decomposition of output changes after a banking crisis.
- Mean effects.
- Output (endogenous in LSM).
- Labour force participation (not in LSM).
- Capital labour ratio (endogenous in LSM).
- TFP (our shock: exogenous)


Output Decomposition
(Percent of precrisis trend; mean difference from year t = – 1)
Source: IMF, WEO Oct 09
4
2
0
-2
-4
-6
-8
-10
-12
-1
0
1
2
3
4
5
6
7
Output
Total factor productivity
Labor force participation
Employment rate
Capital-labor ratio

- LSM reproduces quite well the crisis.
- Consequences of the crisis on GDP are very serious.
- The effects are more than proportional to the size of the shock.
- These effects become more and more negative over time.
- The main responsible for this pattern appears to be the drop in TFP.

- Consumption follows the same pattern as GDP, reflecting a drop not only in current income but also in permanent income.
- The drop in investment progressively increases over time.
- The only positive contribution to GDP comes from net exports, mostly due to a drop in imports.
- A major deterioration of the deficit, mostly due to a major drop in fiscal receipts.
- The effects on employment are overall rather limited, though still negative and persistent.
- Wages and total wages decline, as well as profits.

Simulated impact of the policy addressing the crisis in Luxembourg

Variable	1y	2y	3y	4y	5y	10y	20y
GDP	---	---	---	---	---	---	---
Consumption	---	---	---	---	---	---	---
Investment	-	-	--	--	---	---	---
Net exports - intermediate goods	+++	+++	+++	+++	+++	+++	+++
Government deficit	+++	+++	+++	+++	+++	+++	+++
Employment, resident	-	-	-	-	-	-	-
Employment, non resident	-	-	-	-	-	-	-
Profits	---	---	---	---	---	---	---
Wages, resident	---	---	---	---	---	---	---
Wages, non resident	---	---	---	---	---	---	---
Total wages, resident	---	---	---	---	---	---	---
Total wages, non resident	---	---	---	---	---	---	---
Total Factor Productivity	---	---	---	---	---	---	---

Combining 3 structural policies

- Labour market reform.
- Product(services) market reform.
- Government subsidizing employment.

- We simulate a **lower replacement rate**.
- Accompanied by **lower mark-up** to compensate the workers with lower goods prices in exchange for more competition in the labour market.
- And by **lower social contributions**, to support job creation.
- Permanent 1% drop in all the three variables.
- Combined with the three previous crisis-related shocks.

Simulated impact of the policy addressing the crisis in Luxembourg

Variable	1y	2y	3y	4y	5y	10y	20y
GDP	+	+	+	+	+	+	-
Consumption	+	+	+	+	+	+	+
Investment	++	++	++	+	+	+	-
Net exports - intermediate goods	---	---	---	---	---	---	---
Government deficit	---	---	---	---	---	+++	+++
Employment, resident	+++	+++	+++	+++	+++	+++	+++
Employment, non resident	+++	+++	+++	+++	+++	+++	+++
Profits	++	++	+	+	+	+	+
Wages, resident	--	--	--	--	--	---	---
Wages, non resident	--	--	--	--	--	---	---
Total wages, resident	++	++	++	++	++	+	+
Total wages, non resident	++	++	++	++	++	+	+
Total Factor Productivity	--	--	--	--	--	--	--

- Wages would still be reduced, but much less than without the reforms.
- A boost in employment, which would make the total wage bill increase, substantially more than profits.
- No problems with the government budget, since the positive effects on employment make welfare spending less needed, and the rather stable GDP prevents a major drop in tax revenues.
- The negative crisis effect on GDP is virtually eliminated, as well as that on consumption, while private investment even increases.

Conclusion:

- Consequences of the crisis and related policies must be modelled using a micro-founded dynamic GE model.
- LSM well designed to address these issues.
- We have disentangled the various channels of adjustment in LSM using an illustrative single policy.
- We have modelled the crisis as a combine shock on external demand, cost of capital and TFP.
- We have modelled a policy sharing the burden between workers, firms and government.

- **Such combination of policies would have two advantages: technical and political**.
- Technical: a given policy can offset the adverse effect of another economic policy on a given variable.
- Political: it is important to share the burden of adjustments between employers and employees, while government can help too.
- Such well balanced policies are the only ones to ultimately achieve their goals.
- There are also the only ones to be accepted in a difficult economic context adversely affecting firms, employees and public budgets.
- **Such policy is able to virtually eliminate the long term effects of the crisis.**

Thank you