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Export Subsidies and Interdependence in Euro Union

Beggar Thy Neighbor?

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Abstract

We examine the inter-linkages between economies in the European Monetary Union. We work through a baseline New Keynesian Model and include export subsidies into the analysis. Theoretically, it is plausible to have a beggar thy neighbor expansion of the core at the cost of periphery.

JEL Codes: E32, E42, F13, F41, F44, F45

1 INTRODUCTION

The¹ looming presence of a fear of crisis has lent itself to a re-discussion of what needs to be done for economies around the world. Monetary policy has ceased to be as effective as was thought before, so much so that a paper by Ramey (2011) starts with the observation of a flurry of fiscal policy discussion papers after the crisis. In this paper, we want to examine a plausibility of fiscal policy based recovery in the Euro monetary area (EMU henceforth). We argue that the EMU becomes an interesting case to examine such an impact because of the magnitude of trade inter-dependencies within the Euro zone. This is coupled with a unified monetary authority setting interest rates, implying an exogenous monetary policy for a single country. Ipso facto, a difference in fiscal policy can explain the differing recovery trajectories across countries within the EMU.

In what follows, we argue that the nature of fiscal policy could be such that the countries which export more to other countries within the union have an additional demand stimulus. The provision of export subsidies would then increase the supply over and above a free trade scenario. This could cause a scenario in which the peripheral importing countries fall prey to a beggar thy neighbor effect by the exporting countries and act as demand centers for the core to ride upon. Moreover, an examination of export subsidies in general equilibrium provides additional information on the distribution of surplus generated from such an exchange.

We further argue that the hypothesis can explain pre-crisis scenario where the differing performances by constituent countries within the union emanated from such a policy. While the empirical evidence for the hypothesis is still being put together², we will argue for the theoretical plausibility

¹This is an initial version of the paper and the author reserves any subsequent changes either mentioned or otherwise.

²We have not estimated the model at the time of submission but only calibrated it to conduct simulations.

of such an explanation in this paper. Section 2 will touch upon the scenario pre crisis and evaluate such a plausibility. Section 3 will review the evidence from a partial equilibrium analysis of export subsidies. Section 4 will present, in brief, the theoretical results from a general equilibrium model. We will subsequently analyze the problem using an aggregate demand and supply construct for two countries within EMU. Section 5 will review the results juxtaposed against the literature and concludes.

2 STATE OF EMU BEFORE CRISIS

To begin with, an analysis of the EMU facilitates a clear case study of international policy analysis and bypasses issues with exchange rate. As is argued by Engel (2000), exchange rate pass-through presents an identification problem in theory. It becomes difficult to identify the extent of price changes in one country affected by the general inflation level in the other country, for a given share of composite consumption good. Hence in our case, there is no distinction between producer currency pricing and local currency pricing.

While this certainly limits our task, the evaluation of the scenario before crisis is imperative before trying to model policy in general equilibrium. We can examine the differences in growth rates in core and periphery economies by examining the growth rates of constituent countries and their exports over a ten year period starting 2002 upto 2012.

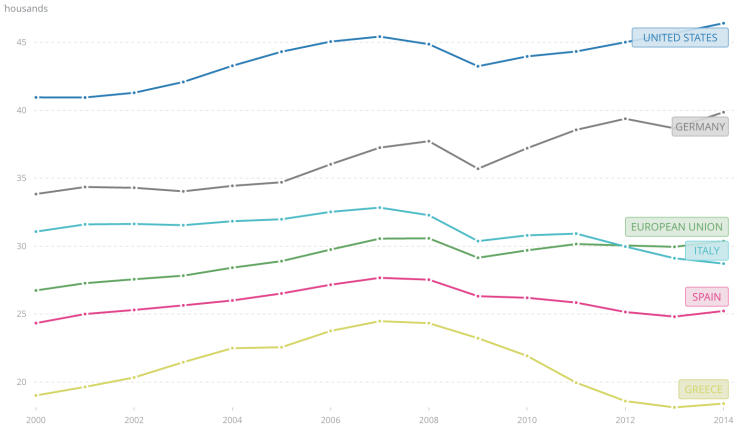


Figure 1: GDP per capita in constant 2005 US \$, World Bank

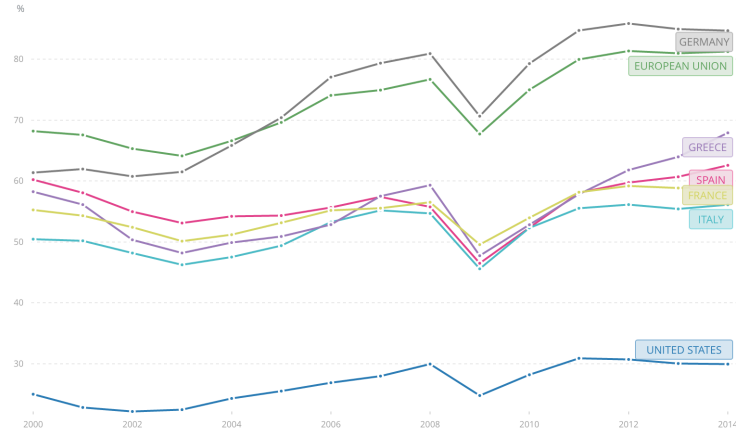


Figure 2: Trade as percentage of GDP, World Bank

In figure (1), we can notice two distinct trends. Firstly before 2008, the rate of increase in GDP for Germany is distinctly higher than Italy and Spain, both of which are periphery in our exposition. GDP for Germany is infact greater than the Eurozone average. Secondly, after the crisis in 2008, the recovery (if it exists) is greater in Germany as compared to Spain or Italy. The later two countries have infact not recovered according to the latest estimates. We can argue that the distinct recovery for Germany is on account of the demand in the periphery coupled with its dependence for demand outside the Euro-zone. Figure (2) merely adds to such an explanation where we see trade as a larger component in German GDP as compared to other countries in the Euro zone.

The factors which provide deviation of GDP growth rates over the decade might be purely technological. However, we can still find evidences against it by arguing that (a) Technological capabilities of these countries are similar and (b) their dependence on the rest of the EMU dictates part of the stunted growth. While we have not collected evidence for the former, the presence of the later can easily be established by a report by the Eurostat provided in figure (3) below. Further evidence is furnished in the appendix.

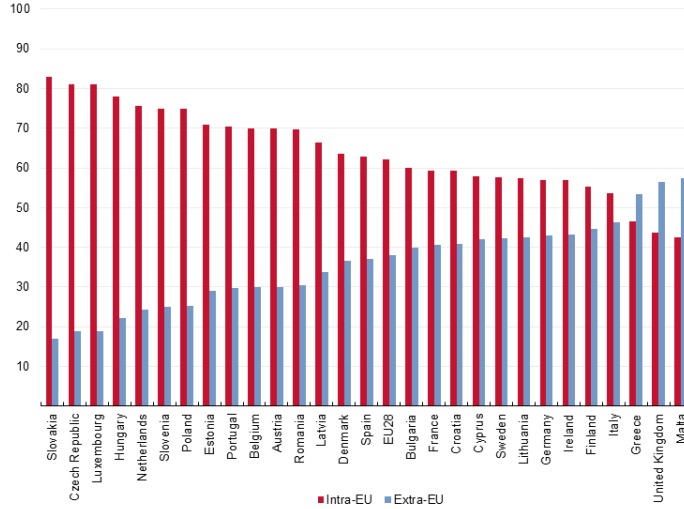


Figure 3: Intra and Extra EU Export of Goods, Eurostat

There is another important issue at hand which can be examined from the above figures. Not only was there a pre-crisis growth and dependence relation between the member countries, there was a crisis response in a differentiated manner which further widened the gap. This is indicative of the fact that German GDP growth after the crisis is positive, however the periphery countries remain sluggish. It is here that the issue of policy comes into being.

As a response to a sluggish economy, the ECB has been lowering its interest rate over the entire ten year period. This is in expectation of spurring investments and easing liquidity in the economy. Expansionary monetary policy like this would have fueled the pre crisis bubbles and led to buoyancy in the economy. However, the continued reduction of interest rates and the subsequent unresponsive economies imply a liquidity trap scenario around the low interest rate (Eggertsson et al., 2003). Figure (4) shows the continuing long term government bond yields which act as the risk free interest rate.

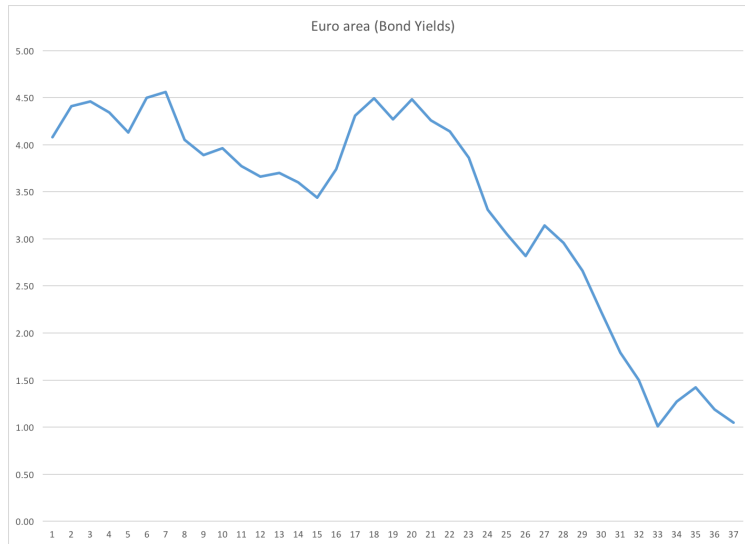


Figure 4: EMU convergence criterion bond yields, Eurostat

It is argued by [Woodford \(2003\)](#), under liquidity trap the plausibility of an investment revival is bleak. In addition to the limited monetary policy there were efforts to ease out debts. The [IMF](#) came with successive bailout packages to Greece, Portugal etc. However, within the governments there were also differing levels of efforts which distinguishes their fiscal policies. The following figure makes this evident.

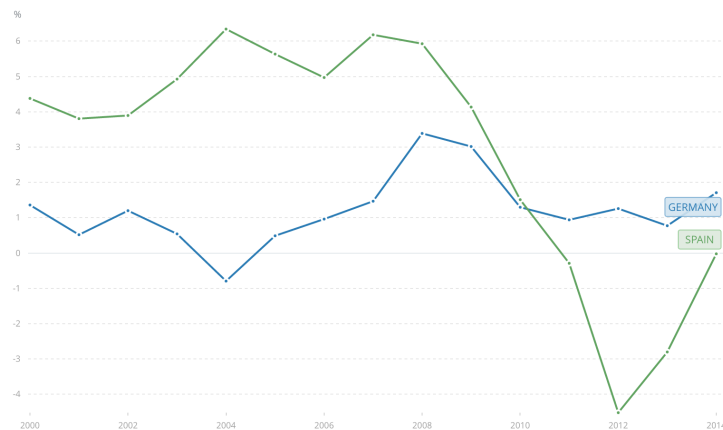


Figure 5: Government Expenditure, Eurostat

Thus not only was Spain spending less post crisis, its growth in government spending was negative. This provided appropriate environment for it to act as a demand center for the core economies such as Germany. As argued by [Girma et al. \(2009\)](#), government expenditures in export subsidies provided the needed buoyancy as well as promoted firms to rely on periphery demand.

While the implications of such export subsidies are examined thoroughly in [Koo and Kennedy \(2008\)](#), we would like to enhance the economic environment in order to complete the picture. In the following section, we will revisit the partial equilibrium and state the roadmap for our contribution to the literature.

3 Export Subsidies in Partial Equilibrium

In the usual partial equilibrium case of a two country two good scenario, we analyzed export subsidies. From the perspective of an export subsidy in case of a country which is already exporting part of its goods, an additional subsidy would be expensive. It would imply that the prices increase from P_w to P_s in the domestic country under the law of one price. However, under export subsidies, there would be over-production in the world market and the additional exports will push down world prices. While this causes subsidy loss to government coupled with welfare loss to consumers, we argue that in general equilibrium the impact of exporting more might increase the revenue base for the firms and improve producer's net welfare.

In a partial equilibrium analysis, for the government to provide export subsidies to its firm when the country is an exporter is unequivocally welfare worsening. The loss of consumer welfare is area (a+b). The remaining analysis follows from [Koo and Kennedy \(2008\)](#). It is sufficient to point out the missing picture on account of a partial equilibrium analysis and place it in context of the EMU. Firstly, we would want to understand how the additional profits would be distributed within the economy. If we think of these firms as being partly owned by the consumers in the economy, then redistribution of profits as dividends etc would improve consumer welfare. We will explore this issue in section 5. Secondly, it is important to note that in situations of recession, the domestic supply would slow down in the foreign country. This would provide an opportunity for countries in the core to exploit. It is this effect which, we argue, has been causing the persistent growth of the core at the cost of periphery.

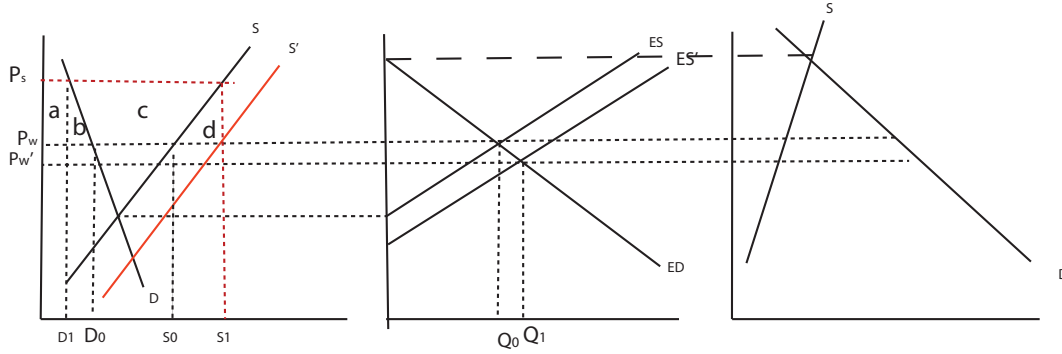


Figure 6: Partial Equilibrium and Export Subsidy

To elaborate on the issue, we exploit the standard New Keynesian Model in the next section. We will state the implications from our derived dynamic IS curve as well as the Phillips curve. The exposition of the complete model is in the appendix.

4 New Keynesian Model with Export Subsidies with Price Stickiness

The standard New Keynesian Model is an extension of the conventional business cycle model a la [Kydland and Prescott \(1982\)](#)³. However the open economy version of the model is attributed to [Mendoza \(1991\)](#). The essence of the open economy model is in evaluation of policies in an environment which is micro-founded in general equilibrium. Solution would imply a dynamic IS curve for each country along with a phillips curve and policy function.

Our model follows closely with that of [Blanchard et al. \(2015\)](#). We model two large open economies each producing one good which is close but imperfect substitutes. Our representative households solves a dynamic optimization problem and consumes both the goods. Hence the ratio of prices (which in this case is the terms of trade) features in their solution functions. In our model economy, we have two types of firms. The final goods firms are aggregators which buy goods from intermediate goods and repackage and sell them to either home consumers or those in the foreign country. Since they operate in a perfect competition, they earn zero profit. However our intermediate goods firms, which supply their goods to these final goods firms, have monopoly price. It is of interest to note that these firms borrow capital, hire labor and are owned by the consumers in the

³For a textbook formulation see - [Galí \(2011\)](#)

home country. The structure of the economy is isomorphic for the foreign country.

A few things are worth mentioning at the outset here. (a) Even though final goods firms are incentivised to produce more on account of export subsidies, the benefits are completely wiped out by the intermediate goods firms⁴. (b) The ownership of the intermediate firms by the consumers imply that most of the export subsidy provided to firms gets redistributed as profits to consumers. (c) For the consumer, it is optimal to consume less in the current time period and substitute it with labor. This has dual effect of increasing the supply from the home economy as well as generating domestic demand. (d) There is also an effect of substitution of domestic goods with foreign goods. (e) However, what is of interest is the effect of a reduction in world prices on account of over-production. This drives out foreign firms and the foreign producers, in effect, substitute domestic consumption with imported goods. We show⁵ that the magnitude of substitution of by foreign consumers is greater than the substitution by domestic consumers which in turn causes foreign country (periphery) to act as demand centers for home (core) economy.

The above exposition can be elucidated by the following aggregate demand and aggregate supply curves. Notice that the export subsidies along with law of one prices pushes the home consumer's from D_0 to D_1 . This in turn would imply that the consumer substitutes part of his domestic goods with foreign goods⁶. However, along with this there is an excess supply which pushes the price level down. This in turn forces some firms in the foreign country to exit the market. This is evident in a reduction of supply from S_0 to S_1 . Further there is a demand increase from home consumers on account of this general price level decrease. This creates an opposite impact on domestic demand also. In addition to this, there is another evident impact on the foreign consumers - (a) a reduction in general price level increases their demand and (b) the reduction of domestic supply channelizes this demand into greater imports. This is also evident from the figure below.

⁴This is by construction of the model and does not in itself mean anything for the analysis

⁵Estimation is a work in progress.

⁶It is difficult to think of a graph where all the simultaneous effects are captured.

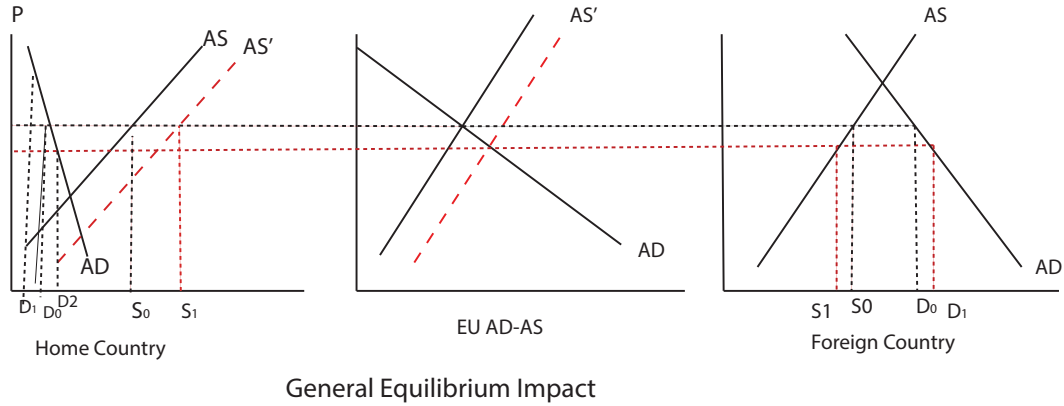


Figure 7: AD-AS and the EMU

While a static point of view is evident in this analysis, it is still partial. The parallel effect of this increase in sales by firms in the home economy is not connected to consumer's substitution of consumption with labor and their income from profits. This can be analyzed as follows:

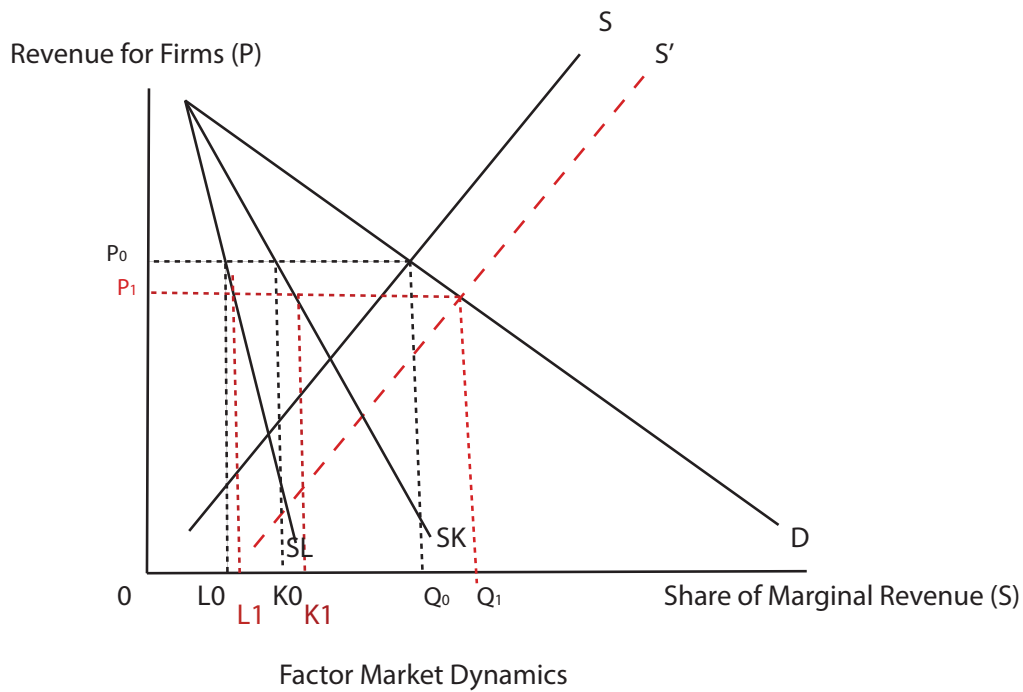


Figure 8: Distribution of Profits

The above figure (8) shows the total demand for the home country good in the EMU, i.e. the sum of home country demand and foreign country demand. It also shows the aggregate supply curve of the home country's good. Since the factor markets are perfectly competitive, both labor

and capital is paid its marginal product. This is important here because the monopoly power by the intermediate goods provides it with positive profits to start with. Before the export subsidy, the firms supplied along the S supply curve. Assuming the households supply whatever labor and capital is demanded by firms, the area under the demand curve for capital and labor can trace the product paid to capital and labor for the economy as a whole. The demand curves for capital and labor are S_K and S_L respectively.

Initially, the area under P_0L_0 was the total product attributed to labor. Similarly for capital. Hence the total profit for the economy as a whole is $PR_0 = P_0Q_0 - P_0L_0 - P_0K_0$. This was the share which at a point of time, which also decides the level of labor and capital supplied. Upon an export subsidy, the aggregate supply shifts which causes the world price to reduce to P_1 . Note that the subsidies are also proportionally distributed among labor, capital and profits. But since on the margin they do not change the shares, we did not depict them here. Upon an increase in supply which gets exported, the proportion of labor capital and profits change. Labor increases from L_0 to L_1 . Similarly for capital. However, profit increases by more than labor and capital increase. Now $PR_1 = P_1Q_1 - P_1L_1 - P_1K_1$. This then gets redistributed back to the consumers and hence they witness an improvement in their welfare.

It is this additional profit on account of a redistribution of total product from foreign consumers to home consumers which creates a positive welfare effect. This effect of welfare is greater under recession when in the foreign market firms are unwilling to invest without any external stimuli. The results from our model are diametrically opposing to the one proposed by [Blanchard et al. \(2015\)](#) because of the nature of policy undertaken by the home country's government in our scenario. To sum up, our exposition of an export subsidy in the home country creates a scenario where firms take advantage of the demand in foreign country. When viewed in a general equilibrium, this creates welfare gains to the home country consumers (or owners of domestic firms). Thus unlike a partial equilibrium, export subsidies could create a positive net benefit of the kind discussed above. We will draw further inferences from our exposition in the section which follows and contrast our results with that of the literature on government multipliers.

5 Government Spending in Export Subsidies

In our model, we examine fiscal expenditures in providing export subsidies. [Hemming et al. \(2002\)](#) provides a succinct analysis of the impact of government expenditures in general, however the literature is limited to conventional tools of fiscal policy. As cited earlier, [Girma et al. \(2009\)](#) provides evidence of the presence of such fiscal expenditures, but does not discuss the multiplier implications of such policies. When viewed dynamically, the impact of such policies would eventually imply a reduction in demand from the foreign countries in the long run. While this might prove troublesome for even the home country, the immediate jump starting of the home economy is managed without any active fiscal policy coordination.

In this light, the policy can be viewed as 'beggar thy neighbor' and might lead to a structural shift in production and consumption patterns in both the economies. We believe that the empirical evidence presented goes well with our version of the narrative and could lend itself to differing performances of these economies. The arguments for a fiscal coordination under a currency union are raised in order to avoid such spring-boarding of the core economies. While the current work is still pending, the econometric estimation presents a challenge as is evaluated in the literature on such models. We must point out to the limitations of such an examination as a concluding note to the discussion presented above.

While the economics underlying the model is intuitive (atleast to the author), the underlying channels of transmission are limited by the structure of the model. It is argued by [Schorfheide \(2011\)](#) that the errors in estimation of a structural model such as ours might reduce the identification in our empiric. Thus the penalty for mis-specification is huge. We still believe that the way to think though the ever increasing interlinkages in the complex global economy is via a structural model backed by macro theory. The challenges still remain!

6 Future Directions

While our analysis holds theoretically, the exposition is not complete. We see two plausible channels of treatment. We suspect that there is a cost advantage to core exporting firms which gets accentuated. Moreover, the peculiarity of exporting firms in itself adds more to the shifting dynamics of the core and periphery economies. We intend to integrate a firm heterogeneity conditional on

productivity of firms into our framework in order to add greater insights(Melitz, 2003).

Appendix A Model Set-Up

The model is isomorphic for the foreign country.

- **Representative household's problem**

- Two country produce two goods (2×2)
- Habit Formation h
- Labor Leisure choices $N_{i,t}$
- Consumption of variety η
- Saving options either in - Government Bond or Internationally Traded Securities or Capital
- Level of Investment and Capital - decides Returns on capital
- Profits on account of Ownership

$$\max_{\substack{C_{i,t}, N_{i,t}, \\ K_{i,t+1}, B_{i,t+1}, B_{G,i,t}}} \mathbb{E}_t \sum_{t=0}^{\infty} \beta^t \left[\frac{1}{1-\sigma} \left(C_{i,t} - hC_{t-1} \right)^{1-\sigma} - \Phi_N \frac{N_{i,t}^{1+\phi}}{1+\phi} + \mu \frac{M_{i,t}}{P_t} \right]$$

$$C_{i,t} = \left[(1-\omega)^{\frac{1}{\eta}} C_{D,i,t}^{\frac{\eta-1}{\eta}} + \omega^{\frac{1}{\eta}} C_{M,i,t}^{\frac{\eta-1}{\eta}} \right]^{\frac{\eta}{\eta-1}}$$

$$C_{D,i,t} = \int_{k=0}^1 C_{D,k,i,t} dk$$

$$C_{M,i,t} = \int_0^1 C_{M,k,i,t} dk$$

Subject to a budget constraint

$$P_t C_{i,t} + (K_{i,t+1} - K_{i,t} + \delta K_t) + \int_s q_{s,t}(s_{t+1}) B_{i,t}(s_{t+1}) ds + B_{G,i,t+1}$$

$$+ M_{i,t} \leq R_t K_{i,t} + \Pi_{i,t} - \tau_{y,i,t}$$

$$+ W_t N_{i,t} + M_{i,t-1} + (1 + i_t^{\text{eu}}) B_{G,i,t} + B_{i,t}$$

- **Final Goods Firms**

- $k \in [0, 1]$. All these k firms are identical so representative firm problem

- Simple aggregating firm.

$$Y_{k,t} = \left(\int_0^1 Y_{j,t}^{\frac{\epsilon_j - 1}{\epsilon_j}} dj \right)^{\frac{\epsilon_j}{\epsilon_j - 1}}$$

- Take goods from intermediate goods and aggregate and sell to domestic consumers and or foreign consumers.
- Perfect Competition
- Input demand functions - *Export Subsidies*

$$Y_{j,t} = \left(\frac{P_{j,t}}{P_{D,t} + \tau_{s,t}} \right)^{-\epsilon_j} Y_{k,t}$$

- **Intermediate Goods Firms** (more interesting problem)

- $j \in [0, 1]$ - not identical - two types.
- Production function is

$$Y_{j,t} = A_{j,t} K_{j,t}^\alpha N_{j,t}^{1-\alpha}$$

- **Monopoly Power** - hence can change price different from competitive price.

- Part of these firms $\phi \in [0, 1]$ (probability of being able to change price) change price every period - if touched by ‘Calvo Fairy’. Their price

$$P_{j,t}^{\text{opt}} = \frac{\epsilon_j}{(1 - \epsilon_j)} \frac{F_t(\text{Marginal Cost, Total Expected Domestic Demand})}{G_t(\text{Total Expected Domestic Demand})}$$

- Rest of them set price according to last years price.

- **Government Budget Balance**

$$(Y_{D,t} - C_{D,t})\tau_{s,t} + i_t^{\text{cu}} B_{G,t} = \tau_{y,t} + B_{G,t+1}$$

- Policy Rule by the **European Central Bank**

$$r_t^{\text{cu}} = \max \left\{ -r, \psi_\pi \pi_t^{\text{cu}} + \psi_x x_t^{\text{cu}} \right\}$$

- Productivity Shock

$$\ln A_t = \rho_a \ln A_{t-1} + \epsilon_{a,t}$$

A.1 Trading Partners

Exports of goods of the EU Member States: top 3 partners, 2014
(based on trade value)

	Main partner	%	Second main partner	%	Third main partner	%
EU*	United States	18	China	10	Switzerland	8
Belgium	Germany	17	France	16	Netherlands	12
Bulgaria	Germany	12	Turkey	9	Italy	9
Czech Republic	Germany	32	Slovakia	8	Poland	6
Denmark	Germany	18	Sweden	12	United Kingdom	8
Germany	France	9	United States	9	United Kingdom	7
Estonia	Sweden	18	Finland	15	Latvia	11
Ireland	United States	22	United Kingdom	15	Belgium	13
Greece	Turkey	12	Italy	9	Germany	7
Spain	France	16	Germany	10	Portugal	7
France	Germany	17	Belgium	7	Italy	7
Croatia	Italy	14	Bosnia and Herzegovina	12	Slovenia	11
Italy	Germany	13	France	11	United States	7
Cyprus	Greece	16	United Kingdom	10	Israel	5
Latvia	Lithuania	17	Russia	15	Estonia	11
Lithuania	Russia	21	Latvia	9	Poland	8
Luxembourg	Germany	24	France	17	Belgium	16
Hungary	Germany	28	Austria	6	Romania	6
Malta	Germany	14	Hong Kong	9	France	9
Netherlands	Germany	25	Belgium	13	United Kingdom	9
Austria	Germany	29	Italy	6	United States	6
Poland	Germany	26	United Kingdom	6	Czech Republic	6
Portugal	Spain	24	France	12	Germany	12
Romania	Germany	19	Italy	12	France	7
Slovenia	Germany	19	Italy	11	Austria	9
Slovakia	Germany	22	Czech Republic	13	Poland	8
Finland	Germany	12	Sweden	11	Russia	8
Sweden	Norway	11	Germany	10	United Kingdom	7
United Kingdom	United States	12	Germany	10	Netherlands	7

* EU exports refer to extra-EU exports only, while exports of Member States refer to total exports (both intra- and extra-EU)

Figure 9: Intra and Extra EU Export of Goods, Eurostat

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