7.1. How different are demand and supply factors in export-based internationalization strategies?

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1. Motivation

Internationalization is a strategic goal for most countries, Portugal included. Instead of being restricted by demand constraints imposed by domestic conditions, firms can benefit *inter alia* from worldwide demand and market diversification. The effects are expected to feedback on the domestic economy, boosting employment, income, consumption and ultimately welfare.

Export-based internationalization strategies depend on firms' ability to find new markets and, if needed, to scale up their production in an highly competitive environment. Such goals require firms to adopt best practices and to embrace innovation, in the benefit of their survival. Investing in high-quality products that are less vulnerable to price changes is a necessary condition to achieve better positions in international markets.

Augmenting total factor productivity (TFP, henceforth) is another development that is by and large desirable. The conditions under which the economy operates and the quality of institutions are among the main driving forces behind the evolution of TFP. The aim is, naturally, to promote a transition from relatively low-skilled, labour-intensive, low productivity, and thus low-wage sectors, to relatively high value-added sectors on the technology frontier, as a means to achieve better living standards.

We use in this Section a general equilibrium model to discuss demand-pull and supply-push factors leading to an increase in Portuguese exports. The analytical work is carried out with the *Portuguese Economy Structural Small Open Analytical* model (henceforth PESSOA model), a Dynamic Stochastic General Equilibrium (DSGE) model specially designed to fit the operating environment of the Portuguese economy. The model, estimated by Júlio and Maria (2017a) with Portuguese and euro area data, features a multi-sectoral production structure, non-Ricardian characteristics,

imperfect market competition, and a number of nominal, real and financial frictions. By allowing permanent changes in deep parameters, DSGE models provide a privileged environment to evaluate a wide range of structural changes (which give rise to a new steady state), including a higher degree of competition in product and labour markets (Almeida *et al.*, 2010), fiscal consolidation strategies (Almeida *et al.*, 2013), or aging effects (Castro *et al.*, 2017).[43] Our estimates have both a "qualitative flavour," given that they are model dependent and conditional on the selected simulations, and a "reality-based quantitative nature," given that they are computed with an estimated model.

The ratio of Portuguese exports to euro area Gross Domestic Product (GDP) (the latter assumed to remain unchanged, reflecting the small-economy framework), oscillates in PESSOA due to an exogenous demand component or due to endogenous movements in the real exchange rate. This Section compares the main effects of an increase in this exogenous component to those of an exogenous rise in TFP, *i.e.*, a demand and a supply shock. The former mimics, for instance, a strategy that successful introduces domestic products abroad and thereby creates a permanently higher external demand level. The latter captures an indirect effect on exports *via* more efficient firms. Selected simulations assume a gradual increase in both shocks, and a stabilization around 2.9 and 0.9 percent above initial steady-state levels, respectively. These figures represent the 75th percentile of all estimated temporary shocks over 1999–2017, which allow us to investigate what would happen if such increases were to take a permanent nature.

The chosen demand and supply-driven processes bear some similarities. Exports increase in both cases and, as expected, GDP, capital and labour expand in the short, medium and long term. The trade balance improves under both simulations in the long run. Another identical result is that macroeconomic responses surpass the period when the shocks' rate of change tends to zero, *i.e.*, the economy continues expanding after demand and supply shocks stabilize at their new steady-state values.

The shocks differ, however, along key dimensions. The demand shock is more expansionary over the short run, boosted by higher investment rates, reflecting the capital-intensive requirements of higher exports (employment augments almost the same). At shorter time

43 DSGE models are currently standard instruments in the suite of models used by policy-making institutions, such as the *Riksbank* (Adolfson *et al.*, 2008), the *Bundesbank* (Gadatsch *et al.*, 2015), the *Bank of Finland* (Kilponen *et al.*, 2016), the *European Central Bank* (Christoffel *et al.*, 2008), the *Banco Central do Brasil* (de Castro *et al.*, 2011), or the *European Commission* (Ratto *et al.*, 2009)

spans, the TFP shock presents limited effects on GDP due to its disinflationary nature, which increases real interest outlays of debt holders and hence hinders private consumption. Over longer horizons, in turn, impacts build up and the multiplicative effects become noteworthy. In the long run, model estimates suggest an increase in GDP of around 1.3 percent *vis-à-vis* the initial steady-state level for both shocks. However, the elasticity of the TFP shock is much higher than that of the demand-side shock (1.61 *versus* 0.47).[44]

Finally, whereas higher demand brings about a permanent increase in domestic price levels and an appreciation of the real exchange rate, the opposite applies to the supply shock. Impacts on international trade follow as expected: the positive effect of the former reduces exports and increases imports whereas the positive technology shock has the opposite effect. In the long run, imports increase under the demand shock, given the import content of exports, but decrease under the supply shock, given the price-effect dominance.

2. The PESSOA model: key features

The Portuguese economy is modelled as a stylised system of equations that can be solved to find equilibrium outcomes in labour, product and financial markets.[45] Key interactions between all agents are clarified in Figure 51. Labour unions are assumed to hire labour services from households and rent them to intermediate good producers (termed "manufacturers").

Final good producers ("distributors") combine domestic intermediate goods with imported goods to produce four types of final goods. Consumption goods are acquired by households, government consumption goods by the government, investment goods by capital goods producers, and export goods by foreign distributors. The interactions between capital goods producers, entrepreneurs and banks are assumed to capture key elements of the financial intermediation sector.

International trade and financial flows take place solely with euro area agents, who are immune to domestic shocks, real or nominal. Interest rates are set by the Central Bank.

The *PESSOA* model is estimated by Bayesian techniques using Portuguese and euro area data between 1999Q1 and 2015Q4. The database comprises twenty four observable time series, including

44 The demand shock elasticity surpasses the ratio of exports to Portuguese GDP due to the presence of positive general equilibrium effects.

45 For details see Júlio and Maria (2017a,b)

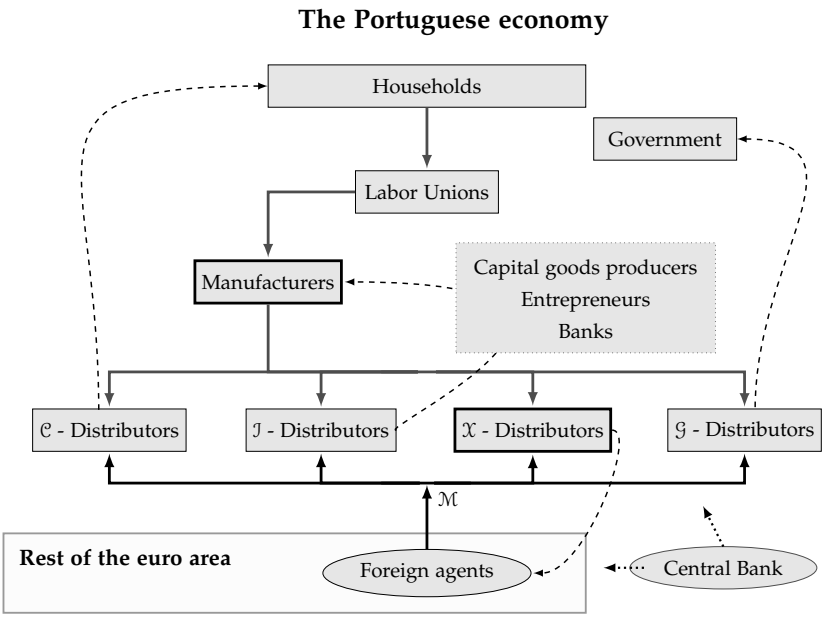

Figure 51: An overview of *PESSOA*

Notes: Identifier C stands for consumption goods, I for investment goods, G for government consumption goods, X for export goods, and M for import goods. The financial accelerator mechanism comprises capital goods producers, entrepreneurs, and banks. The simulation exercises evaluated in this Section consider an increase in TFP, directly affecting manufacturers, and in the non-price competitiveness of exports, directly affecting the final good producer X-Distributor.

real and nominal developments in gross domestic product, private consumption, public consumption and investment, private investment, exports, imports, wages and hours worked. The external sector is represented by a VAR model encompassing foreign output, the interest rate, and inflation.

The stochastic behavior of the model is driven by twenty four structural shocks, among them temporary TFP and non-price competitiveness disturbances. The supply capabilities of manufacturers are directly affected by the TFP disturbance $A_t^{\alpha^U}$, whose impact in intermediate output Z_t is implemented with a Cobb-Douglas production function featuring labour services U_t and capital K_t, namely

$$Z_t = A_t^{\alpha^U}\left[K_t^{1-\alpha^U}\left(T_t U_t\right)^{\alpha^U}\right], \tag{21}$$

where T_t represents the worldwide level of technology, and $\alpha^U = 0.54$. The TFP shock shifts the supply schedule outwards. In other words, for the same utilization of capital and labour, manufacturers now produce more. Successful innovation strategies or improved institutional arrangements can justify this kind of shock.

The ratio of Portuguese exports $Y_t^{\mathcal{X}}$ to foreign GDP Y_t^* is directly affected by the non-price competitiveness disturbance α_t^*, as well as by endogenous movements in the real exchange rate $\vartheta_t^{\xi^*}$. In short,

$$\frac{Y_t^{\mathcal{X}}}{Y_t^*} = \alpha_t^* \cdot \vartheta_t^{\xi^*}, \tag{22}$$

where $\xi^* = 1.62$ is an estimated parameter. The non-price effect shifts upward the demand schedule faced by exporting firms. In other words, for the same price, foreign agents are willing to buy additional domestic goods. A marketing strategy that successful introduces domestic products worldwide provides one rationale for this type of shock.

Figure 52 reports the evolution of both shocks over 1999–2017. The estimated results show that the supply shock is less persistent than the demand shock, depicting lower amplitudes, in part due to developments in the ratio of actual Portuguese exports to foreign GDP. The 75^{th} percentile imply an increase of 0.9 and 2.9 percent in supply and demand shock, respectively, *vis-à-vis* initial steady-state values. Figure 52 also reports the 90^{th} percentile, which imply increases of 2.2 and 5.8 percent, respectively.[46]

The contributions to GDP growth, reported in the last column of Figure 52, attach a larger relevance to export shocks.

3. Higher exports to the euro area and better technology

3.1. *The simulations*

To calibrate the simulations of this Section we take the 75^{th} percentile of all temporary disturbances reported in Figure 52 and investigate what would happen if those shocks were to take a permanent nature. We assume a gradual increase in both shocks, close to 60 percent of the total increase over the first five years. The level of each shock largely stabilizes after forty quarters (ten years). It is important to clarify that these working hypothesis are arbitrary and serve merely as a benchmarking exercise. However, the selected simulations allow us to investigate structural changes in the Portuguese economy brought about by permanent higher levels of supply or demand.

The transition path to the new steady state is known and fully anticipated once the shock is observed.

46 The standard deviation of temporary TFP shocks stand at 2 percent and of export shocks at 5 percent.

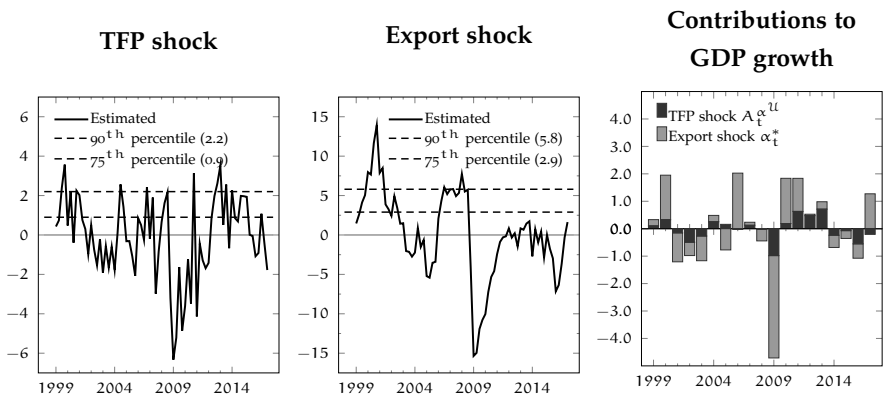

Figure 52: Selected demand and supply factors in *PESSOA*

Notes: Estimated TFP and export shocks are reported in quarterly terms. The contributions to GDP growth are in annual terms (in percentage points).

3.2. *Impacts on GDP, labour, and capital*

Figure 53 reports general equilibrium outcomes of the model, namely the impact on real GDP, labour, and capital. Results support two main conclusions. First, the dynamic macroeconomic responses clearly outlive both disturbances. Both the demand and supply shocks reach the new steady-state level soon after ten years, however, at that date, all main macroeconomic variables are still far away from their new long-run values. For instance, after ten years GDP has increased by less than 50% of its full long-run impact.

Second, higher exogenous exports are more expansionary in the short and medium run than the TFP shock. The significant increase in exports' demand directly requires more capital and labour to support the new production level of export goods. Since future income and hence wealth are indirectly boosted, households increase consumption in the very short run, benefiting from better future prospects. In the case of the TFP shock, the short- and medium-run responses are severely contained since private consumption is negatively impacted by disinflation (see the next subsection). Nevertheless, consumption gains are supported from higher real wages in both cases. When compared with the export shock, firms take advantage of the higher technology level to accumulate more modest capital levels and yet achieve the same level of output.

In short, both shocks have beneficial and long-lived effects on output, wealth and employment, providing a general equilibrium rationale on why policy makers should lay ground for favourable condi-

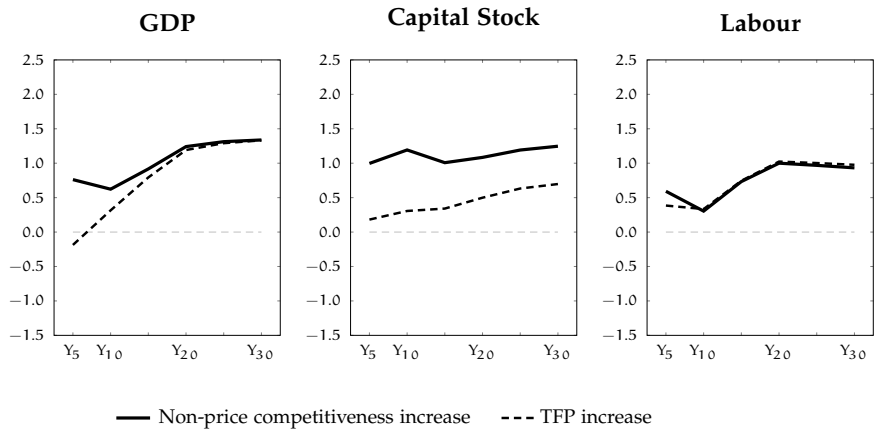

Figure 53: GDP, capital stock and labour developments

Notes: All shocks are permanent, deterministic and anticipated. Each figure refers to deviations from initial steady-state values. Identifier Y_i refers to the average value over the previous five years ending on year i.

tions that encourage technological progress and export-based internationalization strategies.

3.3. *Other impacts*

Qualitatively similar effects on GDP, capital or labour hide important differences in other variables.

While both shocks deliver basically the same long-run impact on GDP, the long-run elasticities are quite different. They stand at 0.47 percent in the case of the demand shock, and at 1.61 percent in the case of the supply shock, *i.e.* the amplification properties of the TFP shock are more than threefold, given that intermediate goods are used as inputs in the production function of all final goods, including exports. If simulations took into account the 90^{th} percentile reported in Figure 52—a more optimist scenario—GDP would reach higher levels under both shocks but the long run impact of the TFP shock would in this case be larger than that of the demand shock. Long-run elasticities would remain unchanged however, given that the model is linear.

Another key difference is the impact on prices. The demand shock is inflationary, whereas the supply shock is disinflationary. This brings along opposite effects on real interest rates and thus on consumption. Higher expected inflation lowers real interest rates and boosts consumption goods' demand, largely reflecting the improved

financial position of households, who are net debtors. The external finance premium of firms is reduced, with positive effects on capital demand and hence investment. The opposite applies to the technology shock, which increases real interest rates in the short run and thus depresses wealth and private consumption.

Real interest rate developments have, however, a temporary nature. Given that the macroeconomic response of the Portuguese economy has no influence on the Monetary Union's nominal anchor, nominal interest rates remain unchanged. It follows that the relative law of one price holds in the long run, implying that any domestic inflationary process *vis-à-vis* the euro area must be fully cancelled out, at some point in time, through a disinflationary process and *vice-versa*. Inflation and thus the real interest rate must therefore converge to its initial value (identical to the euro area). However, permanent shocks like those implemented herein violate the absolute version of the law of one price, *i.e.* inflation returns to its pre-shock figure but the price level does not.

Permanent changes in price levels have permanent effects on the real exchange rate and thus competitiveness. A higher export level directly increases the trade balance but leads to a permanent real exchange rate appreciation that reduces the initial impact. In contrast, higher TFP does not directly affect the trade balance but triggers a permanent depreciation with favourable effects on international trade. Results also suggest that higher production, supported by better technology, does not require additional imports in the long run, only more capital and employment.

4. Some caveats

Current simulations are conditional on several working assumptions that justify some discussion. First, results depend on the hypothesis that all agents benefit from perfect foresight. This implies that short-term results should be seen as optimistic outcomes, as expected future production translates into greater wealth and thus into an expansion in current aggregate demand, which in turn justifies higher capital and labour.

Second, the banking system is acknowledgedly very simple, as we abstract from possible credit supply restrictions or banking frictions that may limit the ability of firms to expand their balance sheet.

Third, capital utilization remains unchanged throughout the entire simulation period. This assumption avoids entrepreneurs to set abnormal levels of capital utilization associated with permanent shocks.

In the standard set up, however, entrepreneurs can optimally choose the level that maximizes the net (of taxes) return per unit of capital.

Finally, exports depend, in the model, on euro area GDP and not on a weighted average world demand, where the weights could be set by the importance of each country in Portuguese trade.

5. Final remarks

This Section claims that Portugal should benefit either from upward shifts in foreign customers' demand or better domestic firms' technology. Both demand-pull and supply-push factors boosts production, capital, employment, and promote an improvement in international trade.

There are however some noticeable differences. Demand shocks are more expansionary in the short and medium run, which can be the preferred internationalization strategy. Supply shocks, however, have higher multiplicative effects in the long run, which should not be ignored. Rather significantly, the former leads to a real exchange rate appreciation, while an increase in total factor productivity leads to real depreciation.

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