Macroeconomic effects of EU Competition Policy

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Abstract

I estimate the macroeconomic impact of competition policy to deter collusion and merger control in the EU using a dynamic macroeconomic model [1, 4, 6, 7] . The impact was estimated using a traditional Dynamic Stochastic General Equilibrium Model and an upgraded version that includes Central Bank quantitative easing policies. When these are included in the model the macroeconomic effects are higher than previously estimated.

1 Introduction

There is a growing interest on the macroeconomic impact of competition and regulatory authorities, but very little research has been done on this subject. [2]. Previous papers estimate the direct impact of competition policy on consumers [2], leaving aside indirect deterrent effects but most of all macroeconomic impact except for [3]. This paper studies the effects of competition policy on production, employment and productivity in the EU. The direct effects are due to the interventions of the authorities against cartels or anticompetitive mergers, which end situations that would have reduced competition and increased prices. On the other hand, the indirect effects are divided between those that affect productivity, innovation and growth, and the dissuasive effects that are associated with the interventions of the authorities. For example, penalties on collusive agreements not only mean ending the infringement, but discourages other companies from committing the same infringement. In neither case is there a consolidated methodology that allows estimating them without discussion, so indirect effects are usually excluded from the studies, although there is consensus as to the undoubted benefits of deterrent effects [2].
Some authors have measured the indirect effects, see [3], who applied a model that includes not only static effects but also dynamic, and the differences between the effects in the short and long term. For this, they used a long-term general equilibrium model and calculated the positive effects that the Competition Agency policies had between 1998 and 2007 on the production, employment and labor productivity of the Netherlands In this paper I follow this last line of research to estimate the impact of interventions for the EU between 2010 and 2018 using a database of macroeconomic models [7].

2 Model

The effects of competition policy are transferred to a dynamic stochastic general equilibrium model as a shock in the mark-up as a result of interventions made by the competition authority to increase the level of competition in the national market. We assume that companies operate in a monopolistic competition market and each company produces a variety of a national product that is an imperfect substitute for varieties produced by other companies. In this paper we compare the estimation results of QUEST III model [6] with [5] which is also a QUEST III model but taking into account the effects of quantitative easing (QE) captured by long-term bond purchases by the Central Bank.

2.1 Aggregate Demand

According to [5] model there are two types of households: liquidity- and non-liquidity-constrained households. They possess the same utility function, non-separable in consumption and leisure with habit persistence in both consumption and leisure. Liquidity-constrained households do not optimize, they just consume their labor income. On the other side, non-liquidity-constrained households have access to domestic and foreign currency denominated assets, accumulate capital subject to investment adjustment costs and rent it to firms, earn profits from owning the firms and pay taxes. Income from foreign financial assets is subject to an external financial intermediation risk premium while real asset holdings are subject to an equity risk premium. Both types of households supply differentiated labor to a trade union which sets the wages by maximizing their joint utility (weighted by the share of each type). The wage setting process is subject to a wage mark-up and to slow adjustments in the real consumption wage. The wage mark-up arises because of wage adjustment costs and the fact that a part of workers index the growth rate of wages to past inflation.

2.2 Aggregate Supply

The final production of firm j in time t (Y_t^j) used (K_t^j) and labour (L_t^j) with Cobb-Douglas production function, with fixed cost (FC_Y^j):

$$Y_t^j = (L_t^j - FC_L^j)^{\alpha}(u_t^j K_t^j)^{1-\alpha} - FC_Y^j \tag{1}$$

The firm maximizes present value of profits (PR_t^j):

$$PR_t^j = P_t^j Y_t^j - W_t^j L_t^j - i_{K,t} P_{I,t} K_t^j \tag{2}$$

where P_t^j are firm prices, W_t salaries and $i_{K,t}$ is cost of capital. In equilibrium where $P_t^j = P_t, \forall j$, firms use a mark up over marginal cost (MC):

$$P_t^j = (1 + \tau_t^j) MC_t^j \tag{3}$$

where τ_t^j is the mark-up over the price, that depends on elasticity of substitution between varieties $\triangle^d$, and the mark-up shock $\epsilon_{mpk,t}$:

$$\tau_t^j = 1/(\triangle^d - 1) + \epsilon_{mpk,t}. \tag{4}$$

We then simulate the impact of interventions of a competition authority as a reduction in mark-up through $\epsilon_{mpk,t}$ in the previous equation 4.

2.3 Foreign Sector

According to [5] the Foreign Sector: Demand behavior is considered the same for the home country and the rest of the world, therefore export demand and import demand are symmetric. Both equations are characterized by a lag structure in relative prices which captures delivery lags. Export firms buy domestic goods, transform them using a linear technology and sell them in the foreign market, charging a mark-up over the domestic prices. The same situation is faced by importer firms. Mark-up fluctuations arise because of price adjustment costs in both sectors. Markup equations are given as a function of past and future inflation and are also subject to random shocks.

2.4 Assets and QE

[5] adds to the QUEST III assets and QE: QE is modelled as purchases of domestic long-term bonds in exchange for central bank liquidity. Next to physical capital and money, the model features long-term and short-term bonds. The assets are held by the household and long-term and short-term bond holdings are subject to portfolio adjustment costs.

Finally, the transmission mechanism is as follows: the interventions of the competition authority generate an increase in competition and a reduction in markups which leads to a decrease in prices (Equation 4). As

companies think about the future when making decisions today, their demand for labor and capital is based on the future flow of benefits, taking into account the effect of markups on prices and demand. They take into account the direct effect of markups on future benefits, which will be negative due to lower markups, and at the same time they also take into account the increase in future demand for their products due to lower prices. To meet a greater demand, companies require more work and capital. However, the fall in the future profitability of the companies partially mitigates the increase in demand for the inputs since higher production costs and lower pre-payments can lead to lower profits generated by companies (Equation 2) .

3 Mark-up shock simulation

We can obtain antitrust policy effects on savings by just multiplying price reduction as a direct result of competition policy by duration market size.

Mark-up aggregate change ($\triangle MUP_n$) due to N antitrust measures can be defined as:

$$\epsilon_{mpk,t} = \triangle MUP_N = \sum_k \left[\frac{\triangle P_k}{P_k}(1 + MUP_k) \right] \frac{GO_k}{GO} \tag{5}$$

where K_n are total sectors k where these interventions have reduced prices, equation $\triangle P_k/P_k$ 5 shows that aggregate mark-up is weighted by the relative mark-up in the specific sector $(1 + MUP_k)$ and its share in total production k of the economy, $\frac{GO_k}{GO}$.

3.1 Direct effect of antitrust decisions

We can make a distinction between shocks that only have direct effects and other that have deterrent effects on other firms. In the first case, price changes in each sector k is computed as a weighted average of price changes in all affected markets n:

$$\frac{\triangle P_k}{P_k} = \sum_M \frac{\triangle P_n}{P_n} MS_{nk} + \sum_C \frac{\triangle P_n}{P_n} MS_{nk} \tag{6}$$

where $M_k yC_k$ are ldecisions on cartels and mergers that impact sector k. In each decision lCompetition Authority defines a relevant market. The weights MS_{nk} used to estimate price changes for each sector is defined as a share in the affected market n in sector $k(mkt_{nk})$ over the total value of production in that sector at a two digit level (GO_k):

$$MS_{nk} = \frac{mkt_{nk}}{GO_k} \tag{7}$$

We estimate merger decisions to reduce prices in 3 per cent and antitrust decisions 10 per cent against non intervention. Equation (6) is also:

$$\frac{\triangle P_k}{P_k} = -0,03 \sum_M MS_{nk} - 0,1 \sum_C MS_{nk} \tag{8}$$

Substituting equations (7) and (8) in (5), mark-up changes due to merger and antitrust decisions can be estimated in the following way:

$$\triangle MUP_N = -\frac{1}{GO} \sum_{k_N} \left[0,03 \sum_M mkt_{nk} + 0,1 \sum_C mkt_{nk} \right] \tag{9}$$

3.2 Deterrent effects of antitrust decisions

In general, only direct effects of decisions are estimated leaving deterrent effects due to the complexity of estimating unknown cartels that dissappear without being detected. As in [2] we assume that in each decision of a competition agency, price reduction impacts all the sector. An airline merger decision, for example, would have deterrent effects over total passenger air transport sector . Deterrent effects would impact all firms of the same sector.
When estimating mark-up shocks including deterrent effects, we use 4 digit NACE rev2. Unfortunately due to the lack of data at 4 dígit NACE rev2, the value added at four digit divided by 2 digit value added:

$$MS_{nk} = \frac{VA4_{nk}}{VA2_k} \tag{10}$$

3.3 Size and duration of shock

One can obtain the direct impact of interventions by adding markup changes as a result of the merger and cartel decisions. Given that effects on prices have an impact in several years, consumers will benefit not only from the interventions in that year, but also from those carried out in previous years. We take into account decisions of 2015, that is, all the decisions made in 2014, in addition to the decisions made in previous years that still have an impact in 2015. The reduction in the markup MUP_N) associated with these decisions is obtained from the equation 9 and added to reach a total effect in 2014 of 0.04 percentage points. This figure includes the effects of anticartel decisions.
However, the simulations presented consider not only the direct effect but also deterrent effects. Using the equation **??**, the reduction of markup MUP_N) derived from the decisions that still have an impact in 2015 can be calculated: the reduction of the markup is 0.57 percentage points in 2014, which corresponds to a reduction of 4.49 percentage points at the markup level. The magnitude of the shock and the simulation results come essentially from the deterrent effects of competition policy and not from the direct effects.

The competition authority is supposed to continue interventions at the same rate in the near future. This permanent shock can be applied to a baseline scenario where interventions are not performed. The assumption of a permanent shock reflects the idea that a single intervention by the authority will have little effect on firms. The deterrent effects of interventions of a competition authority mainly come from the expectation of firms that the antitrust authority will sanction if competition law is violated.

4 Macroeconomic effects of a mark-up shock

We apply the same negative mark up shock as in [2] of 0,57 per cent to a QUEST III model and to the same model with Quantitative Easing [5] . The increase in consumption due to a fall in prices, will increase real salaries and employment due to competition. On the other hand, investment would be determined by production scale, while increasing factor remuneration. Regarding external demand, export and export increase similarly, due to respectively an increase in competitiveness of firms, and an internal demand increase. From the supply side, it is obtained an increase of employment above GDP increase in the four initial years after the measure is implemented, while on the long run it is slightly lower. This higher increase is due to the higher dynamism of an increase in competition. A more competitive environment, will not only reduce prices but increase efficiency as they reach their optimal scale while searching for new resources and lower cost technologies In general, competition will stimulate innovation, technological progress and more efficient ways to provide services to society.

[5] adds to the traditional QUEST III model Central Bank purchases of bonds. When the central bank intervenes by purchasing long-term bonds, private investors that aim at re-establishing the portfolio mix of shortterm and long-term assets can respond by holding more corporate equity and foreign bonds, and by lowering their savings. The first response means portfolio reallocation towards equity and foreign-currency assets that increases the prices of corporate equity (rising stock market) and foreign currency (euro depreciation). Regarding transmission to the real economy, rising stock markets reduce the financing costs of

Table 1: Macroeconomic Effects of the markup shock

	1 year		5 years		10 years		20 years	
	PV17	QUESTIII	PV17	QUESTIII	PV17	QUESTIII	PV17	QUESTIII
GDP	0.081	0.156	0.310	0.269	0.486	0.359	0.552	0.470
Inflation	-0.162	-0.007	-0.507	-0.03	-0.220	-0.02	-0.1373	-0.023
Consumption	0.041	0.161	0.184	0.239	0.300	0.327	0.296	0.431
Output Gap	0.060	0.003	0.218	0.0128	0.297	0.0195	0.237	0.019

corporations and lower the required return to capital, which (under decreasing returns to capital) translates into stronger investment and capital accumulation. Exchange rate depreciation strengthens net exports provided trade is sufficiently price elastic. The decline in savings associated with the general decline in returns on savings strengthens contemporaneous consumption demand. The figure and table below illustrate that competition policy interventions increase output, price reduction increase consumption. The table shows that the model with bond purchases (PV17) is more expansive than the benckmark model QUESTIII as GDP increases 0.3 percent after five years and 0.55 percent in 20 years. QUEST III estimates are slightly lower, 0.27 percent growth in five years and 0.47 percent in 20 years. In conclusion, the expansive effect of a mark up shock is greater if we include Quantitative Easing policy in the tranditional macroeconomic model.

5 Conclusion

This essay aims to apply a general equilibrium dynamic model to show quantitative effects of competition policy interventions. Although they are widely used in macroeconomics its implementation for impact assesment for antitrust policies is not common. Its dynamic and general equilibrium approach is better suited to explain and forecast the effects of interventions than partial equilibrium static models. The paper shows that the postiive macroeconomic effects due to competition policy interventions will be estimated higher in a macroecoomic model that includes Quantitative Easing policy compared to traditional DSGE model.

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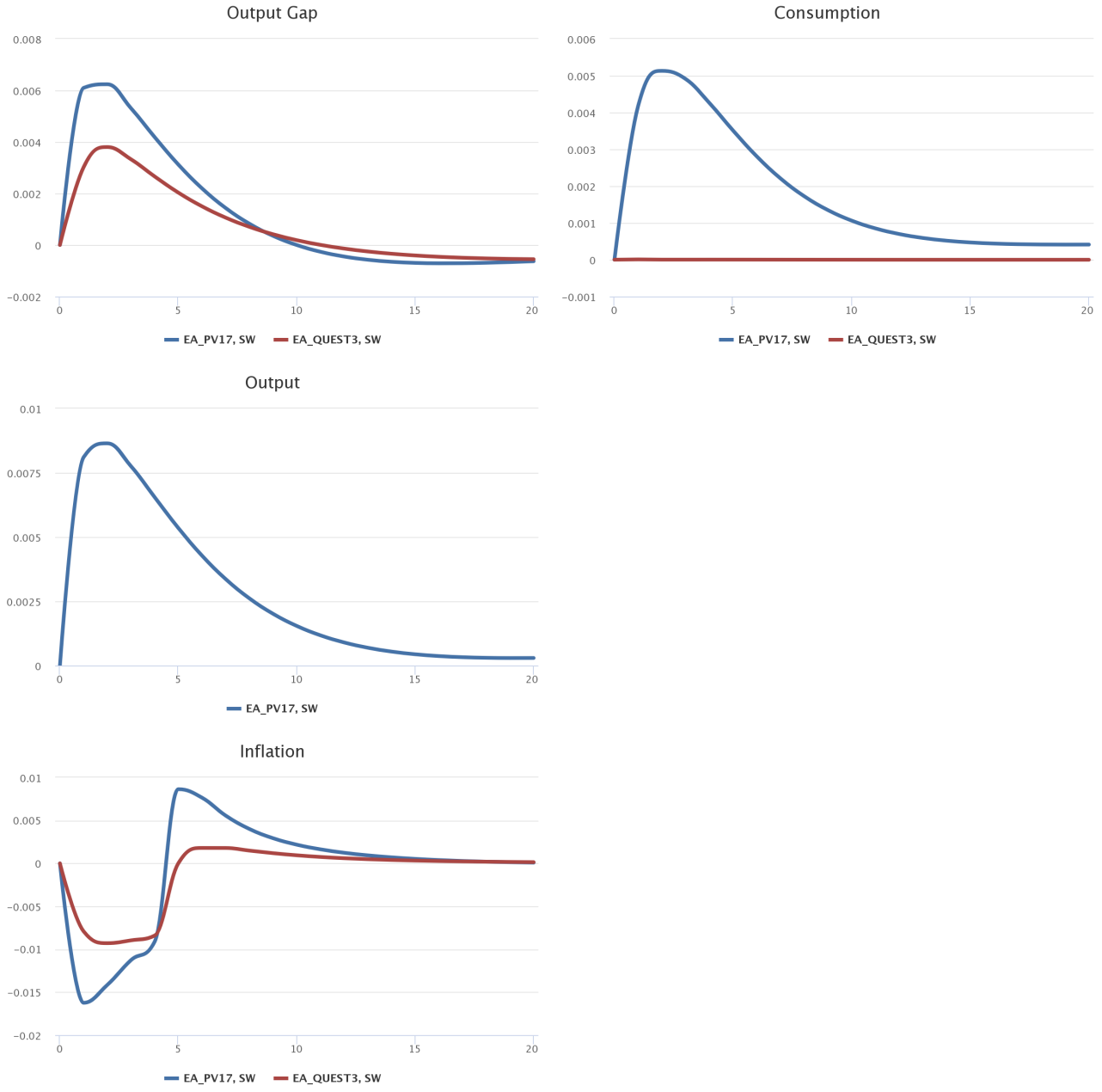
Figure 1: Macroeconomic Effects of the markup shock



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