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Oligopolistic competition and optimal monetary policy

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ABSTRACT

This paper studies optimal monetary policy in a DSGE model with supply side strategic complementarity, as arising from oligopolistic competition, and nominal rigidities. Firms' oligopolistic rents induce inefficient fluctuations through both, intra-temporal and intertemporal time-varying wedges. Optimality requires the use of state contingent inflation taxes to smooth and reduce firms' rents. Hence, under optimal (Ramsey) policy PPI deviates significantly from zero. A comparison of welfare costs for a set of operational rules relatively to the Ramsey plan shows that targeting the output gap, the mark-up and the asset price improves upon a rule with aggressive response to inflation.

1. Introduction

Several recent studies show that accounting for firm dynamic and endogenous mark-up movements, as induced by strategic complementarities,[1] helps in improving the empirical performance of DSGE models. Generally speaking it is observed that mark-ups move in response to changes in the number of firms. Less agreement exists on whether endogenous mark-up movements are driven by firms' competition or by consumers' substitution among different products. This paper focuses on the first case and analyzes the design of optimal monetary policy in a DSGE model with oligopolistic (Bertrand) competition and nominal rigidities, in the form of adjustment costs on prices. Recent empirical evidence on industrial structures[2] shows that mark-up variations, and its link with the number of firms, are mainly driven by competition effect. In the model I use, endogenous mark-up variations capture pro-competitive effects, as an increase in the number of firms increases competition and demand elasticity. Even under the flexible price equilibrium, oligopolistic (Bertrand) competition leads to endogenous variations in mark-ups, as the latter depend upon market shares. In this context, time-varying monopolistic rents produce output costs, both in the long run and in the short run. The monetary authority can use state contingent inflation taxes to smooth those rents. However, it must trade-off the benefits of smoothing the wedges associated with the intertemporal variation in mark-ups, the relevant real distortion, with the costs that variable inflation has on firms' price setting behavior.

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[1] See references further below in the review of the literature.

[2] See Manuszak (2002), Campbell and Hopenhayn (2005), and Manuszak and Moul (2008).

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As the model features both, long run and short run distortions, the design of optimal monetary policy follows the Ramsey approach.[3] In this context the optimal path of all variables is obtained by maximizing agents' welfare subject to the relations describing the competitive economy and via an explicit consideration of all wedges that characterize both, the long run and the cyclical dynamics.

Oligopolistic competition introduces both, long run and short run distortions. In the long run, market concentration and market power are higher in the competitive equilibrium than under the planner solution. As oligopolistic firms extract rents, optimality requires taxing them. In the short run, the model features three types of time-varying wedges. First, firms' monopolistic mark-ups induce a time-varying wedge between the marginal rate of substitution between consumption and labour and the marginal productivity of labour. Because of this, output and employment are inefficiently low and the monetary authority is tempted to increase the number of varieties and to reduce mark-ups, by increasing demand. In this respect producer price inflation acts as a state contingent tax on oligopolistic rents. Second, there is an intra-temporal wedge on the evolution of firms' values, as the number of new entrants is dampened by the increase in monopolistic rents of the existing firms. This wedge distorts the allocation of consumption between two different dates. Once again, the policy maker can use producer price inflation to tax rents and to boost output and consumption demand. The role of the two wedges just mentioned is discussed in the paper by comparing the planner solution and the competitive equilibrium under flexible prices. Finally, nominal rigidities and increasing returns to scale interact to induce a third type of time-varying distortion. Due to increasing returns to scale, when the number of varieties increases the price of each variety increases relative to the price of the consumption basket. When firms face adjustment costs on producer prices, increases in producer price inflation act as sales taxes. This additional externality renders PPI stabilization insufficient to eliminate nominal distortions and calls for additional targets. Overall analytical and quantitative results show that the Ramsey planner deviates from full producer (and consumer) price stabilization for all types of shocks considered.

To provide a full assessment of optimal monetary policy design the analysis compares welfare costs of alternative monetary policy rules to the Ramsey plan. Welfare in this context is computed using second order approximations methods which, in models with large distortions, allows us to account for the effects of volatilities on mean welfare. Furthermore, we consider conditional welfare metrics, which allow us to account for the transitional dynamic from one policy regime to the others. Results show that the rules responding to the output gap (the difference between actual output and the one under the Ramsey plan), the mark-up or the asset price are welfare superior to rules which aggressively respond to inflation. In a model with real frictions welfare superior rules shall include the response to real variables, alongside the response to inflation, while partly conceding fluctuations in PPI. The rationale for responding to asset prices derives partly by the possibility of smoothing firms' rents dynamics and partly from the limitation to arbitrage. Firms' rents affect the evolution of asset prices in a way that the consumption allocation between two different dates is distorted compared to a frictionless RBC model. Furthermore, an increase in the share prices today implies a fall in the returns to entry. In a certainty equivalence environment, this implies that risk free interest rates should fall: it might therefore be desirable for the monetary policy to accommodate the increase in asset prices by reducing the nominal rate.

This paper is related to a recent literature which introduces firm entry and heterogenous firms into DSGE models.[4] As in Colciago and Etro (2009) the model employed here features supply side strategic complementarities, as the dependence between the mark-up and number of firms arises from an oligopolistic competition structure. This is in contrast to the demand side strategic complementarities considered in Bilbiie et al. (2007) (BGM Bilbiie et al., 2007 hereafter) and arising from the assumption of translog preferences a'la Feenstra (2003).

Most of the previous studies analyzed the dynamic properties of models featuring firm entry and their ability to replicate stylized facts. Some studies analyze the role of monetary and fiscal policy for a class of models with demand side strategic complementarity. BGM (Bilbiie et al., 2007) consider a model with a wide range of preferences: they show that the equilibrium is efficient under Dixit–Stiglitz preferences and inelastic labour supply. Furthermore, the authors show that stabilizing PPI inflation remains the optimal policy when lump sum taxes are available to correct the real distortion induced by mark-ups variations.[5] Differently this paper considers optimal policy in a model with supply side strategic complementarity and employs a full-fledged Ramsey approach, which allows us to take into account both, long and short run distortions. Contrary to BGM (Bilbiie et al., 2007), this paper shows that optimality requires the PPI inflation to deviate significantly from zero. Lewis (forthcoming) analyzes optimal policy in a model with firm entry, cash in advance constraints and pre-set wages. Finally, Fujiwara (2007)[6] develops an analysis of optimal monetary policy (focused to the long run) in a model, which, along the lines of BGM, features firm entry and demand driven strategic complementarities: he shows that the steady state optimal inflation rate becomes non-zero and that producer price stability cannot achieve

[3] See Lucas and Stokey (1983) for early contributions within the flexible price benchmark. Recent applications in sticky price models include Khan et al. (2003), Schmitt-Grohe and Uribe (2004), and Faia (2009).

[4] Recent contributions in closed economy DSGE models include Bilbiie et al. (2007) and Jaimovich and Floetotto (2004). Devereux and Lee (2001) and Colciago and Etro (2009) introduce oligopolistic competition, both over quantities and prices, into an RBC model. Early studies introducing endogenous mark-up movements into DSGE macromodels are: Rotemberg and Woodford (1995), Hornstein (1993), Chatterjee and Cooper (1993), and Devereux et al. (1996).

[5] In Bilbiie et al. (2007), even under PPI stability, variations in the CPI are optimal since they depend on the number of firms operating in the economy.

[6] The analysis in Fujiwara (2007) had later developed in the paper by Bilbiie et al. (2011).