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Markup cycles, dynamic misallocation, and amplification

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Abstract

We develop a tractable dynamic general equilibrium model of oligopolistic competition with a continuum of heterogeneous industries. Industries are exposed to aggregate and industry-specific productivity shocks. Firms in each industry set value-maximizing state-contingent markups, taking as given the behavior of all other industries. When consumers are risk-averse, industry markups are countercyclical with regards to the industry-specific component, but may be procyclical with regards to the aggregate shock. The general equilibrium dispersion of markups implied by the optimization of heterogeneous industries creates misallocation of labor across industries. The misallocation, in turn, generates aggregate welfare losses state-by-state that feed back into the industry problem via a representative agent's marginal utility of aggregate consumption. Misallocation dynamics may transmit industry-specific shocks, or amplify small aggregate shocks, and so lead to aggregate fluctuations through these feedback effects.

JEL classification: E32; L13; L16

Keywords: Oligopolistic competition; Markup cycles; Allocative efficiency; Dynamic games; DSGE models

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1. Introduction

How does industry-level firm strategic interaction influence the aggregate economy? Although the effects of strategic interaction have been thoroughly analyzed in the Industrial Organization literature, the aggregate implications have typically been ignored. In this paper we develop a general equilibrium model in which *oligopolistic* intra-industry competition generates markup dispersion across *heterogeneous* industries, which leads to resource misallocation (see Lerner [34]) and hence affects aggregate consumption. Following standard asset pricing insights, changes in aggregate consumption affect agents' marginal utilities across states and thereby the valuation of firms' future cash flows; this in turn feeds back into the firms' ability to sustain collusion, leading to a rich set of implications.

We study a discrete time, infinite horizon general equilibrium economy with a continuum of industries, each of which is defined by a production technology. Within each industry, a finite number of identical strategic firms hire labor to produce a homogeneous good. The price of the good in each industry is determined by the outcome of a dynamic pricing game similar to Rotemberg and Solaner [42]. A representative agent consumes all goods, supplies all labor, and owns all the firms; thus all profits are valued by her preferences over consumption. We allow industries to differ cross-sectionally, both in their number of firms and their exposure to productivity shocks. These sources of heterogeneity allow us to capture industry-specific strategic behavior, generate heterogeneous markups, and analyze how industry-specific productivity shocks are transmitted to the aggregate economy.

Firms in each industry maximize profits subject to intertemporal incentive compatibility constraints: In each period, each firm weighs the value of high short-term profits that can be obtained by aggressive pricing against the long-term profits that are obtained when all firms cooperate. The value of such long-term profits is determined by the preferences of the representative agent. In general equilibrium, the representative agent's consumption bundle depends on the sum of all outputs produced in each industry. If markups are heterogeneous across industries, relative goods' prices are distorted compared to the first-best outcome, leading to a) misallocation of labor to industries and b) a reduction in aggregate consumption. Such changes in consumption affect the representative agent's marginal utility across states and hence her valuation of each industry's profits, and therefore feed back into each firm's ability to sustain collusion. Thus, while each industry takes the macro dynamics as given, industries jointly affect these macro dynamics through changes in the representative agent's consumption. Our paper therefore provides a tight link between strategic industry behavior and aggregate outcomes.

We make three theoretical contributions. First, we focus on one industry. We characterize markups and derive conditions under which they are procyclical and countercyclical, respectively. Countercyclical markups are often associated with oligopolistic competition, based on Rotemberg and Solaner [42]. In their framework, high product demand in good times increases firms' incentives to undercut competitors to reap immediate rewards; therefore equilibrium markups narrow in good times. Our paper shows that this intuition can be overturned. Our arguments follow from the fundamental insights of consumption based asset pricing that market discount rates vary with the state of the economy, in contrast to the risk-neutral setting of Rotemberg and Solaner [42]. If discount rates are sufficiently low in good times, then the present value of future cooperation compared to current period profits is higher in booms, making procyclical markups possible. This insight is general. Within our model, market discount rates can be endogenously countercyclical if the representative agent's intertemporal elasticity of substitution