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# Excess capacity in a fixed-cost economy☆

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ABSTRACT

This paper proposes a new mechanism that can explain persistent economic slack. The theory shows that when producers face negligible marginal costs and desired spending is below the economy's capacity, the economy features slack in equilibrium, even when prices are flexible and there are no other frictions. A heterogeneous household version of the model demonstrates how an economy can enter a capacity trap in response to a temporary negative demand shock: when demand by some consumers falls temporarily, other consumers' permanent income (and hence their desired consumption) also falls. Since output is determined by demand, the permanent fall in desired consumption causes a permanent state of excess capacity.

## 1. Introduction

Between 2009Q1 and 2013Q4, the difference between potential output and real GDP averaged $900 billion in 2009 dollars, or approximately 5.6% of potential output. The persistent output gap has inspired new theoretical models to help explain economic slack (e.g., Michaillat, 2012; Michaillat and Saez, 2015; Eggertsson and Krugman, 2012; Rendahl, 2016). A common feature of this theoretical work is that economic slack depends on price rigidity. In this paper I propose a new theory of economic slack in which prices are fully flexible.

The working definition of slack explored here is the value of goods and services that firms (or workers) could produce without incurring additional costs. This definition is consistent with the notion of excess capacity (which I use synonymously with slack) underlying the Federal Reserve Board's index of capacity utilization (Fig. 1). This notion of excess capacity is distinct from the notion of suboptimal production in canonical models of imperfect competition. In Blanchard and Kiyotaki (1987), for example, monopolists incur marginal production costs, and in that sense have no excess capacity even when their production levels are socially suboptimal.

This paper shows that when monopolistically competitive producers operate in regions of negligible marginal costs (NMC), economic slack can occur in equilibrium even when prices are flexible. I demonstrate this result in the simplest setting possible. The economy is static and NMC firms take as given their production capacity. Homogenous workers inelastically supply labor as operators of the firms. Additional output is costless to the firm when production is below capacity. If demand curves feature price-dependent demand elasticities, excess capacity exists in equilibrium when consumers' preferences for consumption are sufficiently low relative to firms' production capacity.

The result is quite different when firms are assumed to face marginal production costs. I show that when the setting is modified only slightly to incorporate marginal production costs (along the lines of a closed-economy version of Krugman (1980)), aggregate

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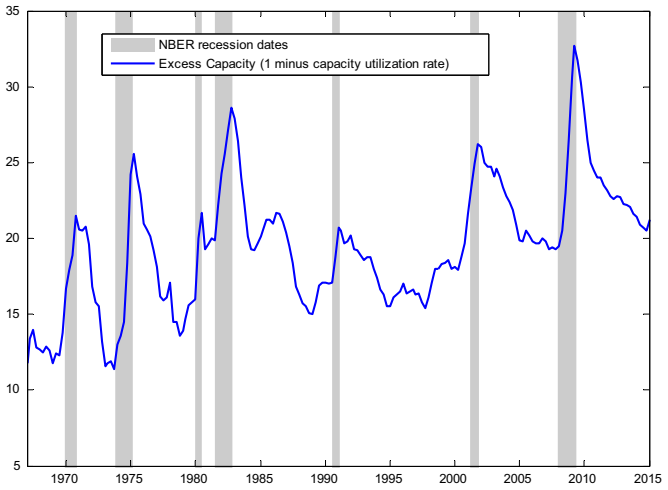


**Fig. 1.** Excess Capacity. Note: Data from the Board of Governors of the Federal Reserve based on the Quarterly Survey of Plant Capacity. The excess capacity series indicates how much more firms can produce without incurring additional costs.

output depends on labor supply and production technology regardless of consumers' level of utility from consumption or the nature of competition in the goods market. In other words, the assumption of marginal costs is equivalent to imposing Say's Law that "supply creates its own demand." In the presence of marginal costs, income depends on factor supply, whereas in the NMC economy, income depends on spending.

In the setting with positive marginal costs, there is no effect of monopoly power (relative to perfect competition) on equilibrium output, which may seem inconsistent with the standard distortionary effect of monopoly power in models such as Blanchard and Kiyotaki (1987). The key difference between my setting and that in Blanchard and Kiyotaki (1987) is that labor is inelastically supplied in my model and hence there is no effect of markups on the marginal rate of substitution between consumption and labor. While monopoly power in my model with marginal costs has the standard partial equilibrium effect of reducing firms' output for a given wage, in general equilibrium, prices (and wages) adjust so that aggregate output equals the effective labor supply. The assumption of inelastic labor provides a clear notion of an economy's capacity level and isolates the effect of desired spending on excess capacity from the effect of consumption preferences on labor supply.

In the economy with NMC firms, aggregate output depends entirely on a representative consumer's taste for consumption, which is exogenous. In an extended version of the model, I show that incorporating heterogeneous households gives rise to endogenous aggregate demand which does not perfectly track an aggregate measure of preferences. When some agents receive a large share of income (and others a small share), the economy can enter a capacity trap in response to a temporary shock to consumer preferences. Specifically, when rich agents (those receiving a large share of income) temporarily demand less, poor agents (those receiving a small share of income) choose to permanently lower their consumption each period to smooth their consumption over time. Since aggregate income is determined by aggregate (poor plus rich) demand, aggregate income falls permanently and excess capacity increases. The model with rich and poor households also predicts that an increase in inequality due to a decline in the income share of poor households causes an increase in excess capacity, thus providing a potential explanation for the upward trend in excess capacity (Fig. 1) that coincided with increasing inequality in the U.S. during the latter part of the 20th century.

Michaillat and Saez (2015) is the most closely related paper to mine in that it also examines notions of excess capacity. There are a number of important distinctions between their work and mine. First, excess capacity in their framework relies on a matching friction between buyers and sellers. In the absence of such a friction, their economy achieves the optimal level of output. In my model, in contrast, there is no friction preventing buyers from meeting sellers; rather excess capacity results from low desired purchases by consumers. Second, excess capacity and output depend on consumer preferences in my model even when prices are flexible. In Michaillat and Saez (2015), aggregate demand has no effect on excess capacity or output when prices are flexible. In that sense, my model offers a new and complementary perspective on the forces that contribute to demand-determined output and excess capacity.

The remainder of the paper proceeds as follows. Section 2 presents a model with positive marginal costs as a baseline for comparison with the NMC model. I show that when labor supply is inelastic, the budget constraint pins down aggregate output regardless of price-setting behavior or the nature of competition in goods markets. Section 3 presents the model with NMC firms and a representative household. It also discusses the model's assumptions. Section 4 presents the model with rich and poor households.

## 2. Implications of marginal costs for the determination of aggregate output

Here I present a one-country adaptation of the model in Krugman (1980) to demonstrate the implications of marginal costs for the determination of aggregate output. The model features an inelastic supply of labor, a perfectly competitive labor market, and firms that face positive marginal production costs. There is a representative consumer who inelastically supplies $L$ units of labor. The