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Chapter Title: Comment on "Monetary Policy and Business Cycles with Endogenous Entry and Product Variety"

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Comment

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This paper allows for endogenous producer entry in an otherwise standard sticky price model and uses this framework in order to study optimal monetary policy and business cycle fluctuations. The authors find that in this environment optimal monetary policy should stabilize producer prices, as opposed to the consumer price index, which may vary in response to changes in the number of available varieties, even in the absence of price changes at the producer level. Moreover, they prove that determinacy in an environment with endogenous producer entry is achieved, as in a standard New Keynesian framework without capital accumulation, in the presence of aggressive interest rate rules. Finally, business cycle fluctuations in response to aggregate technological disturbances in an environment in which the central bank follows an empirically justified interest rate rule (with producer price inflation as an argument) are similar to those in a world without nominal rigidities, given that the assumed interest rate rule allows the central bank to reproduce very closely the frictionless allocations by stabilizing producer price inflation.

I argue that the paper provides a useful starting point for the study of new product introduction and the role it plays in shaping optimal monetary policy and the monetary transmission mechanism. I raise several questions, particularly in regard to the quantitative importance of this additional transmission mechanism, as well as the role endogenous entry has in changing the dynamics of economies with nominal rigidities, which remains to be addressed in future work. I will start by analyzing the paper's key results and then providing several general comments.

In the presence of producer entry, the monetary authority has two candidate price indices it can choose to stabilize. One is the producer price index, an average of producer prices in the economy. A second is the welfare-based consumer price index, defined as the expenditure necessary for a household to achieve a given level of utility. Given the CES Dixit-Stiglitz preferences with substitution elasticity θ assumed in the paper, the consumer price index P_t is related to the producer price index p_t according to

$$P_t = p_t N_t^{1/(1-\theta)}$$

where N_t is the number of varieties (producers) available to the consumer. An increase in the number of varieties makes consumers better off because of the love-for-variety assumption embedded in Dixit-Stiglitz preferences. Thus, holding producer prices constant, an increase in N reduces the consumer price index, as consumers need to expend less in order to maintain a given level of utility.

This result holds because the versions of the economy the authors study (one with inelastic labor supply, and another in which the markup distortion is eliminated through an appropriate subsidy) the flexible-price version of this economy is efficient. This flexible-price allocation is achieved when (nominal) producer price inflation is zero and no resources are allocated to changing prices.

I see this first result of the paper as providing a set of sufficient conditions that ensure the optimality of producer price inflation stabilization. Whether this result holds more generally in an economy in which the flexible-price optimum is not first-best and for different sources of disturbances is not clear. Given that the authors have focused on a particularly simple setup with no distortions, several questions remain unanswered. What is the role of producer entry in shaping optimal decision rules? How costly is it to distort entry? How does endogenous entry affect the inflation-output tradeoff? How costly is it for the monetary authority to ignore entry altogether: do rules that are optimal in an economy without endogenous entry do poorly in an economy with entry? Is the number of new products introduced in the past quarter a variable the Fed should closely monitor and respond to? These are interesting questions that a complete characterization of optimal monetary policy under endogenous entry and product variety should eventually address. After all, the optimal rate of inflation is zero in this environment even in the absence of producer entry, if only because zero inflation allows firms to avoid paying the costs of changing prices. Allowing for a richer environment may help isolate the importance of the second margin (endogenous entry) that inflation distorts and may quantify its role.

A second result, emphasized by the authors, the presence of a new term in the New Keynesian Phillips curve equation. As in the standard model, firms choose prices that reflect expected future and current disturbances to their marginal cost, which imply that producer price inflation evolves according to:

$$\pi_t = \beta(1 - \delta)E_t\pi_{t+1} + \frac{\theta - 1}{\kappa}(W_t - P_t) - \frac{1}{\kappa}N_t \tag{1}$$

where, as earlier, p_t is the producer price index. The last term captures the effect variation in the number of varieties has on consumer's willingness to supply labor. The marginal value of every additional hour in the labor market increases when there are more varieties available for consumption and thus the marginal cost to the producer of production is lower. The authors emphasize that this variety effect implies that typical estimates of the New Keynesian inflation equation suffer from an endogeneity bias. Moreover, the fact that N_t is predetermined at t imparts an additional source of persistence to the dynamics of inflation.

I believe that an interesting question left for future research is quantifying the importance of this additional term in the inflation equation. Are fluctuations in the number of varieties sufficiently large at business cycle frequencies for them to visibly affect the dynamics of unit labor costs and inflation? Are households more willing to work in periods in which more varieties are available for consumption? How biased are typical estimates of the New Keynesian inflation equation?

A typical policy prescription of New Keynesian models is that aggressive interest rate rules that raise the nominal interest rate more than one-for-one with inflation are desirable, as they avoid indeterminacy.[1] If the monetary authority raises the real interest rate in response to an increase in inflationary expectations, the only paths for inflation that are consistent with expectations that inflation is away from the steady-state are explosive and are ruled out by appealing to transversality conditions. For example, a candidate solution in which $E_t\pi_{t+1}$ is above its steady-state value triggers a rise in real interest rates, which depresses current consumption and therefore the marginal cost of production. Given that current inflation is a weighted average of $E_t\pi_{t+1}$ and the marginal cost of production, it must be the case that current inflation is below $E_t\pi_{t+1}$ and the path for inflation is an explosive one.

This determinacy result is sensitive, however, to the introduction of physical capital accumulation, as forcefully demonstrated by Dupor (2001) and Carlstrom and Fuerst (2005). In standard models with physical capital, the firm's marginal cost is a function of both the wage rate it pays its workers (which falls with a rise in the real interest rate of interest), but also as a function of the rental rate of capital. The rental rate of capital increases, via arbitrage, with the real rate of interest set by the monetary authority. Thus an active interest rate rule is no longer guaranteed to lower the firm's marginal cost of production in response to an increase in inflationary expectations, hence active interest rate rules are not guaranteed to achieve determinacy.

The intuition for why the Taylor Principle is restored in the presence of investment in new production lines (a form of capital accumulation) is that this investment is sunk and thus does not affect the marginal cost of producing the good. As the inflation equation in (1) shows, the inflation equation in this setup is remarkably similar to that in standard models, with the exception of the presence of a predetermined term, N_t. The determinacy conditions are thus, not surprisingly, similar to those in standard models. Note also that there is nothing special to investment in new production lines for the original determinacy results to be restored. Other forms of capital accumulation, whether sunk or irreversible, that break the positive relationship between the real interest rate on bonds and the marginal cost of production inherent in standard models with physical capital would also imply similar determinacy conditions. The result in the paper is thus much more general and can be applied to other environments as well.

I next address several more general issues inspired by my reading of the paper. As I have discussed earlier, this paper studies optimal monetary policy in an environment where there is little the monetary authority can do. Moreover, the study of business cycle fluctuations ignores the role of monetary policy disturbances altogether. I believe that identifying the joint role of nominal rigidities and endogenous producer entry requires allowing for a nontrivial inflation-output tradeoff, monetary policy disturbances, and a richer framework for the study of optimal monetary policy. At this point the authors leave the question unanswered of whether endogenous producer entry should become a key ingredient of economies with sticky price.

A second issue I would like to raise is that of firm-level heterogeneity. Whether endogenous producer entry alters the dynamics of the standard model depends crucially on who the marginal producers whose entry decisions depend on the state of the economy are. In a model without heterogeneity, entrants are as large as incumbent firms: a 10 percent increase in the number of existing producers, for example, may thus have important general equilibrium effects. In contrast, in the presence of heterogeneity, the larger firms that account for most of the economy's output may not necessarily be marginal at all. If most entry and exit is accounted for by small firms, a 10 percent increase in the number of new products or firms may not necessarily have significant aggregate consequences if the 10 percent additional firms jointly account for a tiny share of the economy's output. The dispersion in the distribution of the size of firms is not the only ingredient likely to affect the quantitative implications of endogenous producer entry: the entire shape of this distribution, as in Midrigan (2006), plays a role as well. Thus a careful quantitative assessment of the role endogenous product creation and destruction has at business cycle frequencies must be consistent with the size distribution of firms and varieties of goods in the economy.

Figure 5C1.1 presents a picture of the distribution of average weekly revenues accounted for by different Universal Product Code (UPC)-level products in the Dominick's Finer Foods database.[2] The figure clearly indicates substantial skewness in this distribution: the top 10 percent of products account for 45 percent of Dominick's weekly revenues. The bottom 10 percent of the products account for less than 2 percent of

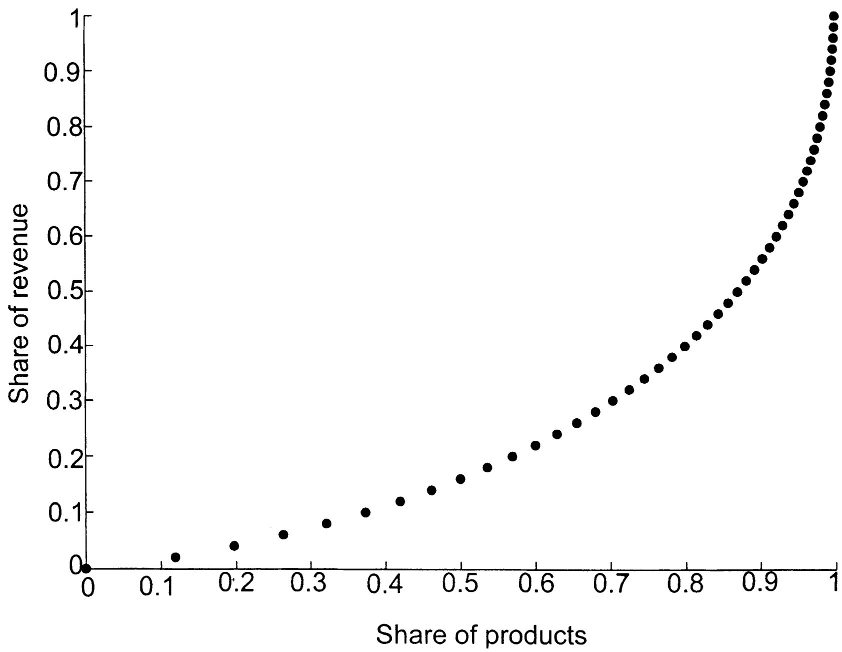

Figure 5C1.1
Distribution of Revenue across Products. Dominick's Finer Foods Database: 1989–1997.

Dominick's revenues and the bottom of 50 percent of the products account for only 16 percent. Thus, to the extent that most (more than 90 percent, as reported by Broda and Weinstein [2007]) new product turnover is accounted for by existing firms, ignoring heterogeneity and the shape of the size distribution of products and calibrating models to information on the number (rather than sales share) of new and dying products is likely to significantly overstate the importance of product creation and destruction. Information on the size distribution of products, together with information on product creation and destruction at business cycle frequencies, can also distinguish between alternative explanations for the high product turnover observed in the data. Are fixed costs of creating new products capable of accounting for the extent of product creation and destruction at business cycle frequencies observed in the data in a model calibrated to match the size distribution of products?

In figure 5C1.2 I use information from the Survey of Business administration to measure the extent of firm creation and destruction at business cycle frequencies. The figure illustrates that net firm creation is procyclical: the correlation between net firm creation and GDP growth in

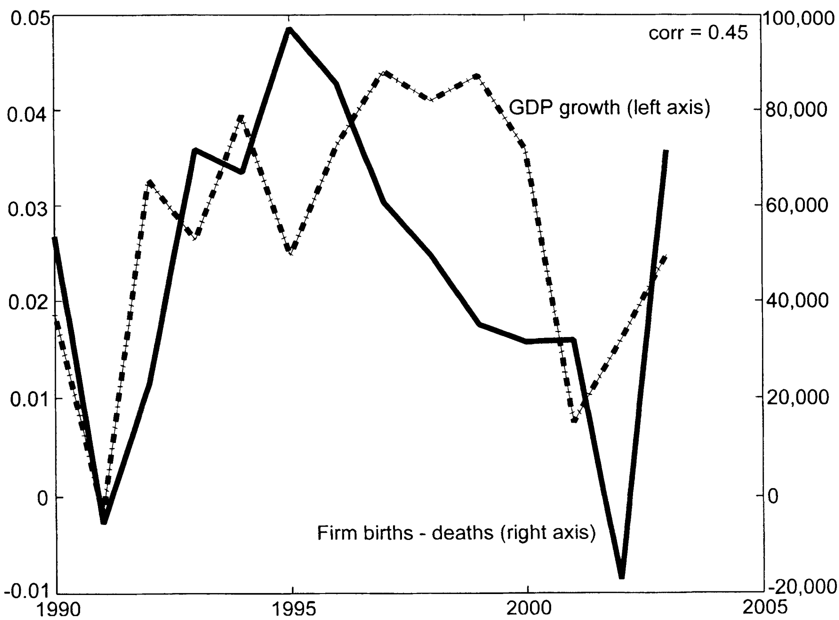

Figure 5C1.2
Cyclicality of Net Firm Creation.

the United States is 0.45. The two recessions of 1990–1991 and 2001 in this time-series are associated with little or negative net firm creation. In contrast, in years with positive GDP growth as much as 100,000 new net firms are created. Figure 5C1.3 shows, however, that most of this firm turnover is accounted for by small firms, with less than 20 employees, which together account for only 18 percent of total U.S. employment. Net product creation from firms with more than 20 employees is only weakly correlated with the cycle, and much less volatile. Moreover, as figure 5C1.4 illustrates, most net job creation accounted for by new or dying firms is also concentrated in firms with less than 20 employees. This evidence once again suggests that merely counting new entries and exits may overstate the importance of entry and exit at business cycle frequencies.

Figure 5C1.5 presents additional evidence from Argentina's financial crisis of 2001–2002, which was associated with a significant drop in real activity. Evidence from developing countries is especially useful, as downturns are especially severe and easier to identify and thus provide an important test of the theory. The figure presents data on net produc-

Figure 5C1.3
Net Firm Births by Employment Size of Firms.

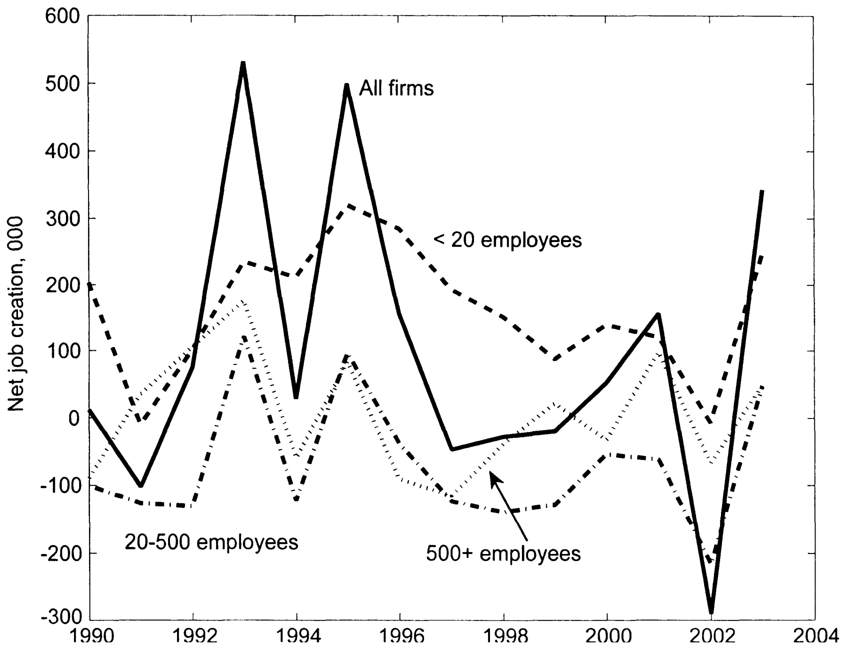

Figure 5C1.4
Net Job Creation Accounted for by New/Dying Firms.

tion creation and destruction in all supermarkets and hypermarkets in Buenos Aires from work by Burstein, Eichenbaum, and Rebelo (2005).[3] Notice that prior to the crisis, the rate of net product creation is as high as 19 percent in the fiscal years ending with December 2000 and June 2001. In contrast, net product creation drops to –8 percent following the currency crisis in the year ending in June 2002. Net product creation is thus highly procyclical if one weighs new products equally. In contrast, the appropriately sales-weighted product turnover is much less procyclical: the difference between the share of new and dying goods drops from 15 percent in the year ending in June 2001 to 12 percent in the year ending in June 2002. Once again, most product turnover is accounted for by products that account for little of a firm's revenue.

A third issue I would like to raise is that of the distinction between a firm and a product. The theory in the paper makes no distinction between the two. In the data, as reported by Broda and Weinstein (2007), most product creation (92 percent) and destruction (97 percent) is accounted for by existing firms. The distinction matters empirically because a good produced by an existing firm is likely to be closely substi-

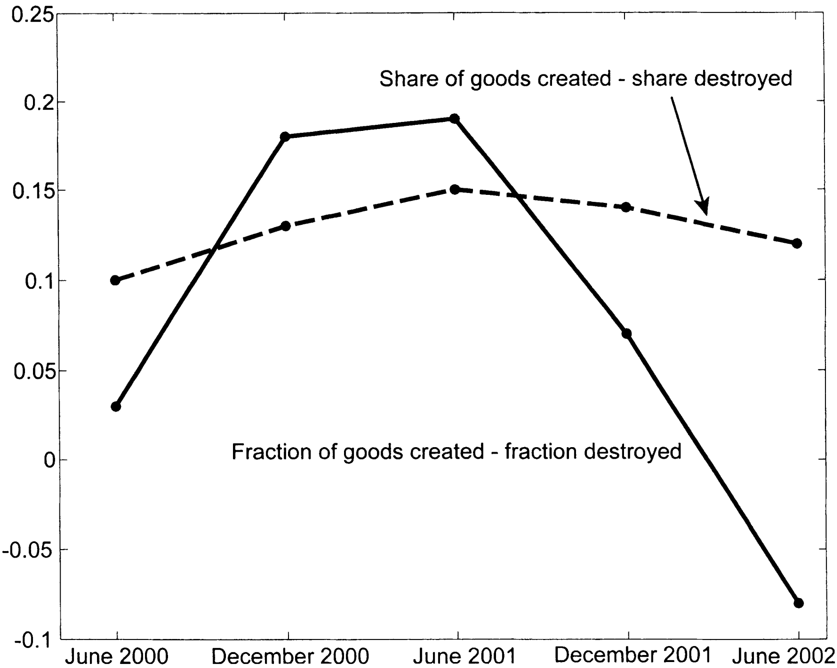

Figure 5C1.5
Net Product Creation in Past Twelve Months, Argentina.[a]
[a]All supermarkets and hypermarkets in Buenos Aires.
Source: Burstein, Eichenbaum, and Rebelo (2005).

tutable with a good already produced by that same particular firm. For example, some of the varieties (UPCs) of lemonade available from Minute Maid are UPC 2500002813: 6 packs, 8 oz; UPC 2500002652: 128 oz; UPC 2500002648: Pink Lemonade, 64 oz. Given this large number of available varieties, are consumers so much better off because of the introduction of yet a fourth variety, say, UPC 2500002650: 16 oz, which varies from all others only in size? This is an extreme example,[4] but work by Broda and Weinstein (2007) does indeed suggest that varieties of goods that belong to a particular brand are indeed highly substitutable: the median elasticity or substitution they estimate is 11.5, higher than the elasticity assumed in the paper of 3.8.

A final issue I would like to address is that of the appropriateness of assuming Dixit-Stiglitz CES preferences in quantifying the importance of product creation and destruction. An average store in the United States sells around 30,000 different products. The typical consumer purchases only a small subset of these, in contrast to the model in which every additional product makes the consumer better off. In this regard, is there a set of aggregation results that predict that the society values each additional product introduced in a manner similar to what is implicit in the Dixit-Stiglitz formulation? Do the frictions (e.g., indivisibilities) that prevent that typical household from purchasing all 30,000 different products a store offers change the elasticity of the consumer price index with respect to the number of available varieties? Is there any evidence that suggests that households are willing to work harder during booms, when, given the higher number of varieties, a given dollar has a higher purchasing power as a literal interpretation of the mechanics the model suggests?

To conclude, I believe that understanding the role producer and product entry and exit has for welfare and business cycle fluctuations is an exciting research agenda in light of the evidence of high product and firm turnover and its correlation with the business cycle. The authors have done a very careful job of further extending the literature on endogenous entry by adding New Keynesian price-setting frictions and studying optimal monetary policy and business cycle fluctuations in this environment. Further questions, particularly in regard to the quantitative importance of this additional transmission mechanism, as well as the role endogenous entry has in changing the dynamics of economies with nominal rigidities, remain to be addressed, but the current paper provide a valuable first step in this direction.

Endnotes

1. Although see Atkeson, Chari, and Kehoe (2007) for an argument *against* the use of aggressive interest rules.

2. More precisely, this is the distribution of average (across weeks and stores) revenues, conditional on the good being sold in a particular week/store.

3. I thank Ariel Burstein for sharing this data with me.

4. Broda and Weinstein (2007) report that only 5 percent of product creation in their sample is due to products that differ from existing ones in size or flavor.

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