

Comment on "In Search of Real Rigidities"

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1 Introduction

The past ten years experienced a boom in research on the behavior of nominal prices using micro data. Economists obtained access to a number of new datasets that have not been previously available. Two independent literatures have emerged. One of them, which takes root in closed economy macro and monetary economics, focuses on the behavior of domestic consumer and producer prices. The other one, coming from the open economy macro and international finance tradition, focuses on the behavior of prices of imported goods.

Although the focuses of these two literatures differ, both of them are typically motivated by the desire to understand whether prices exhibit real rigidity. Real rigidity denotes a variety of mechanisms that prevent real prices from fully adjusting in response to the shocks to firms' marginal costs, such as strategic complementarities, variable mark ups, etc. A substantial amount of real rigidity is required in workhorse monetary models to generate large and persistent effects of nominal shocks on the real economy.

The two literatures thus far have reached different conclusions about the presence and sources of real rigidities in the micro data. The closed economy literature finds little evidence of real rigidities. The open economy literature consistently arrives to the conclusion that real rigidities, especially in the form of variable mark ups, must be substantial in order to be consistent with the micro data.

In their paper, professors Gopinath and Itskhoki, starting from the open economy tradition, take the first step towards reconciling the findings of the two literatures. In the empirical section, they present evidence that import prices behave differently from domestic retail prices, which are often the focus of the closed economy literature. They argue that the key difference

between the two datasets is the nature of the goods that are being analyzed. While the domestic literature typically focuses on the prices of retail goods, most of the imported goods are intermediate. Gopinath and Itskhoki extrapolate the conclusion of the open economy literature and provide a theory of price determination in final (retail) and intermediate (wholesale) sectors. The main ingredient of their theory is the assumption that price determination differs between the two sectors. While in the retail sector, prices are set by monopolistically competitive firms with constant mark ups, in the wholesale sector, prices are set through bargaining. This implies that real rigidities are present in the wholesale but not the retail sector.

In my comments, I first examine the differences in approaches between the closed and open economy literatures. I will discuss to what extent the open economy approach can provide definitive answers about the presence of real rigidities. I will also examine the evidence on whether the behavior of import prices differs significantly from domestic prices. Finally, I will discuss the theoretical model and the outstanding issues.

2 Domestic versus international prices

First, I briefly review the closed and open economy literatures and examine which results led the researchers to their conclusions about the presence of real rigidities in the data. The goal is not to give an extensive literature review but rather to highlight one important difference between open and closed economy literatures: the two literatures not only use different datasets for their analysis, but also rely on different statistical procedures in making their inferences about the presence of real rigidities. Although suggestive, none of those procedures can give a definitive answer. For this reason, it is not clear whether the difference in conclusions is driven by the differences in the data that the two literatures study, or it is an artifact of inconclusive statistical methodology. One of the most important contributions of the paper by Gopinath and Itskhoki is to present a new set of results from the import price data which is directly comparable to those in the closed economy literature.

Most of the research in the closed economy literature uses a variety of datasets of domestic retail prices. One of the most commonly used ones is the Bureau of Labor Statistics (BLS) micro data on domestic consumer prices that is used to construct consumer price index. Klenow and Willis (2006) and Bils, Klenow, and Malin (BKM, 2009) used this data to argue that there is little evidence of the presence of variable mark up or real rigidity more

generally. In the absence of any measure of marginal costs, both papers had to rely on the indirect inferences to detect whether prices adjust to the real shocks slower than what is implied by the nominal rigidity alone.

Klenow and Willis (2006) examine if there is any evidence of variable mark ups. They argue that to be consistent with the data on relative price movements, variable mark ups must imply implausibly large idiosyncratic shocks and movements in the micro quantities. BKM develop a procedure to test for the presence of real rigidity more generally. They use micro data to construct a "reset price inflation" index. They show that a broad class of models with real rigidities imply that this index must have positive autocorrelation and low variance. Instead in the data they find that the opposite is true - reset price inflation is highly volatile and has large negative autocorrelation.

The open economy literature traditionally focuses on a different set of moments to test for the presence of real rigidities. The main identifying assumption it uses is that changes in the exchange rates, either nominal or real, represent a good measure of the changes in the marginal costs of imports. This literature regresses current prices of good i imported from some country j on past and present changes in the exchange rate of country j . Researchers find that pass through of the changes in the exchange rate to prices is modest even in the medium run of one to two years. Over such horizons, only 10 to 30 percent of the exchange rate change is reflected in the price of imports.

Gopinath and Itskhoki present several new facts about incomplete pass through that are generally in line with the previous findings of the literature. In my opinion, the main empirical results of the their paper lie not in the pass through regressions but in the results that are directly comparable to those in the closed economy literature. Before reviewing them in Section 4, I will briefly discuss which inferences can be drawn from the pass through regressions and why they may be uninformative about the presence of the real rigidities.

3 Pass through regressions

In order to interpret incomplete pass through as an evidence of the presence of real rigidities, one needs to assume that changes in the exchange rates are exogenous shocks. An exchange rate is a price of one country's currency in the units of another country currency. This price is determined endogenously by a variety of shocks that affect each country. The nature of these shocks

determine the optimal amount of pass through by the firm. It is easy to write models in which incomplete pass through is optimal even without real rigidities. Therefore without taking a particular stand on which shocks lead to fluctuations in exchange rates and why – in the absence of real rigidities – they should imply complete pass through, the interpretation of incomplete pass through regressions as a sign of real rigidities is problematic.

One can argue that in the short run exchange rate fluctuations are not affected by any fundamental factor, but rather are driven by sunspot-like fluctuations. Gopinath and Itskhoki indeed say that "exchange rate movements are disconnected from most macro-variables at the frequencies studied in the literature". This interpretation leaves a number of questions unanswered. Does this imply that trade volume and other quantities are completely unaffected by the movements in the exchange rates? Shall we study the pricing decisions of firms in the models that imply that exchange rates and aggregate quantities are uncorrelated? What is the optimal pass through in such environments, with and without real rigidities?

It is hard to make progress without having an explicit model of the exchange rate fluctuations. I am sympathetic to the arguments that no such model is currently available and that the pass through regression is a reasonable method given the available state-of-the-art tools. That said, it is unclear to me why *a priori* real rigidities are considered to be the most plausible explanation for the incomplete pass through.

4 How different are international and domestic prices?

Since pass through regressions are hard to interpret, an important question remains whether there are systematic differences in behavior between domestic and import prices. Here, Gopinath and Itskhoki provide novel evidence on the existence of such differences. Table 1 of their paper reports persistence and volatility of regular and reset price inflation for import prices and compares this statistics to the one for domestic retail prices computed by BKM. The main finding is that the import prices have both higher persistence and volatility than domestic retail prices.

The results reported in Table 1 provide mixed evidence on the presence of real rigidities in the import price data. As BKM showed, the autocorrelation coefficient close to zero for reset price inflation, as found in import price data, can be consistent with models with and without real rigidities. However, models with real rigidities have difficulty matching large volatility of the

reset price inflation implied by the data.

Gopinath and Itskhoki point to an important source of differences between the goods studied by open and closed economy literatures. While the majority of studies on domestic prices focused on retail prices, most imported goods are intermediate goods. Reported results open a possibility that behavior of retail goods and intermediate goods may follow different patterns and in particular real rigidities may be in the markets for the intermediate goods but not final goods. If that conjecture is correct, the closed economy literature did not find real rigidities simply because it focused on a wrong set of goods and prices.

This possibility suggests a promising research agenda. While there exists micro data on the domestic producer prices, it was studied much less than the data on consumer prices. To the best of my knowledge, the only systematic study of both producer and consumer prices was done by Nakamura and Steinsson (2008) who found few systematic difference in the patterns of pricing behavior between the two sets of goods. To fully reconcile the findings of the open and closed macro literatures, one could run a consistent set of tests on all three datasets for domestic consumer, producer and for import prices. Such a study can show whether there are systematic differences between the different types of prices and whether the conclusions about real rigidities can be carried from import to domestic producer prices. This would be particularly important since imports play a relatively minor role in the U.S. economy, and any real rigidity present there will have a much bigger effect if it is present in domestic producer prices.

5 Theoretical model

In the theoretical section, Gopinath and Itskhoki propose a novel theory to reconcile findings from the closed and open economy literatures. The cornerstone of their theory is the assumption that price setting mechanisms are different in the retail and wholesale sectors. They assume that prices in the intermediate sector are set through bargaining while in the retail sector, monopolistically competitive firms post their prices. These assumptions imply in their model that there are real rigidities in the intermediate but not retail sector. Therefore an outside observer who focuses only on the retail consumer prices will not be able to find evidence of real rigidities.

The simulation results show that this model can be successful at reconciling the two literatures. BKM tests on retail prices reject presence of real rigidity even when a significant amount of it is present in the wholesale

sector. The same test performed on the wholesale prices is consistent with the evidence from the import prices that Gopinath and Itskhoki reported in the empirical section of the paper. Pass through regressions indicate a limited pass through.

Although consistent with the micro evidence, their model of variable mark ups does not lead to significant amplifications of monetary shocks. Relative to the benchmark without real rigidity, the half life of the impulse response to monetary shock is only 50% higher in the preferred calibration of variable mark ups. Since monetary shocks lead to small and transient impulse responses in models without real rigidities, such amplification is not sufficient to make the model consistent with the VAR evidence on the effect of monetary shocks on real economy.

The hypothesis that pricing behavior is different in retail and intermediate sector is interesting and promising and can lead to important discoveries about transmission mechanisms for nominal and real shocks. So far, the data on pricing of intermediate goods have been relatively unexplored, and its detailed analysis may found confirmation of this hypothesis. At the same time producer prices may conceptually differ from consumer prices and many traditional assumptions from consumer theory may no longer apply for the prices of intermediate goods.

If we assume that intermediate prices are set as a result of bargaining between firms, it is not clear the recorded price is a correct measure of the marginal cost of purchasing the good for the buyer. In many settings, it is natural for the firms to negotiate both the price and the quantity of the transaction. In such situations, prices measure only the average cost for the buyer but not the marginal cost. The marginal costs are hard to measure even if one has information on both prices and quantities negotiated between firms. At the same time it is the responses of prices to changes of marginal costs rather than average costs which are the key for amplification of monetary shocks in many models.

The repeated nature of the interactions between firms represent another problem. As it was recognized since at least Barro (1977), observed nominal prices may not be allocative. If the real price decreases due to rigidity in nominal prices, firms may not adjust production and quantities they sell if they expect buyers to compensate them in the futures for real losses incurred in current periods. While in anonymous retail markets such possibilities are unlikely, they may exist in the intermediate goods markets in which small number of buyers and sellers are engaged in repeated transactions over the long periods of time. Without knowing the details of such interactions, observed nominal prices shed little light the behavior of real quantities.

6 Concluding remarks

Gopinath and Itskhoki took an important first step towards bringing together two literatures that focus on closely related questions. Although a lot more work is needed to fully reconcile the two, this paper ultimately makes the contribution of pointing researchers towards a promising direction of future research.

7 References

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