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Global versus local shocks in micro price dynamics☆

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ABSTRACT

A number of recent papers point to the importance of distinguishing between the price reaction to *macro* and *micro* shocks. We emphasize instead the importance of distinguishing between *global* and *local* shocks. We exploit a panel of 276 micro price levels collected on a semi-annual frequency over two decades in 59 countries around the world, that enables us to distinguish between different types (*global* and *local*) of *macro* and *micro* shocks. We find that *global macro* and *micro* shocks are always associated with a slower response of prices than the respective *local* shocks. Focusing on structural monetary macro shocks, we show that prices reach their long-run value much slower in response to a *global macro* shock, as compared to the time it takes for prices to reach their long-run value in response to a *local macro* shock.

1. Introduction

How fast do prices adjust to changes in economic conditions? The answer is crucial in assessing the real effects of nominal shocks, for instance. The literature provides conflicting answers: whereas aggregate price indices have been found to be very persistent, more recent work starting with Bils and Klenow (2004) showed that individual prices adjust frequently. The implication that monetary policy might as a result be less effective than originally thought has been challenged more recently. Several studies (e.g. Boivin et al., 2009) attempt to resolve this micro–macro puzzle while retaining the importance of monetary policy by distinguishing between the (sluggish) response of individual prices to *macroeconomic shocks* common to every sector or product, and their (rapid) response to *microeconomic shocks* specific to a sector or product. Our paper emphasizes the distinction between *global shocks* common to every location worldwide, and *local shocks* specific to a location. We show that this distinction is much more striking and no less informative for price-setting models, than the macro–micro split considered in previous work.

For both macro and micro shocks alike, global components are associated with much more persistence than local ones.[3] The slow speed of price adjustment to international macro shocks, such as global (US) monetary policy ones, is particularly striking. In order to close the global–local gap we observe, price-setting theory models would need to include some mechanism that leads to a sufficiently high degree of aggregate price rigidity in response to global shocks, and that can generate different price responses to global versus local shocks.

Our analysis relies on a panel of 276 micro price levels collected from 1990 to 2010 at a semi-annual frequency across 88 cities in 59 countries across the world.[4] This dataset is non-standard and was especially compiled for us by the Economist Intelligence Unit (EIU) at a semiannual frequency for the complete untypically large sample of international

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[3] Considering only one type of micro or macro shock would thus typically lead to misleading inferences about the persistence of local macroeconomic shocks in micro prices.
[4] We focus on the period 1990S1–2008S1 before the onset of the Crisis but also include the abnormal period 2008S2–2010S2 in the analysis to examine the robustness of results.

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locations.[5] The March and September dates for gathering these semi-annual data are specifically designed to avoid standard sales seasons. In addition, EIU correspondents are specifically instructed to take regular retail prices and not to take sale prices.[6]

The three dimensions of our panel—time, location and individual product—allow us to decompose price dynamics for each product in a given location at a given date into four different components: (1) a *global macro* component common to every good in every location, capturing for example oil price or global liquidity shocks; (2) a *local macro* component specific to a location and common to every good, related for example to monetary or other domestic policies; (3) a *global micro* component specific to a good and common to every location, related for instance to technology shocks specific to a product but common across the globe; and (4) a *local micro* or *idiosyncratic* component specific to a good and a location, capturing for instance the idiosyncrasy of economic conditions such as weather in a certain location. We estimate the responses of prices to shocks in each component.

While ignoring the global–local distinction our data then implies that (similar to past research on the micro–macro gap relying solely on US data[7]) macro shocks are more persistent than micro ones, decomposing macro and micro shocks into their global and local components reveals a different more precise picture. Local micro shocks are the most rapidly corrected ones and always more so than global micro shocks. Similarly, local macro shocks are always more rapidly corrected than global macro shocks.[8] These findings hold even when one considers domestic rather than common currency prices, that is when the exchange rate adjustment channel is shut down. We note, however, that as compared to other currency numeraires, the persistence associated with the global macro component is particularly large when we use the USD numeraire. Our decomposition of macro and micro shocks into finer categories provides new facts for price-setting models to rationalize. Our results confirm that prices react differently to different types of shocks, but stress that sorting shocks by geographic distance (global vs local) leads to more striking differences than sorting shocks by mere economic distance (macro vs micro).

To assess whether differences in the persistence of the global and local components documented above stem from differences in the response of prices to the various shocks underlying them or from differences in the nature of these underlying shocks, we identify the response of prices to unpredictable global and local structural monetary shocks using SVAR methods. We show that differences in the persistence of price components documented here are related to prices reacting differently to global versus local monetary shocks. Specifically, prices reach their long-run value much slower in response to global monetary shocks, as compared to the time it takes for them to reach their long-run value in response to local monetary shocks.

In light of the importance of the global or international dimension, it would be useful to have price-setting models that can rationalize differences in the speed of price adjustment to international versus domestic shocks. These models would need to explain why these differences are more striking when shocks are classified with respect to geographic distance (global vs local) rather than mere economic distance (macro vs micro).[9] They should also be able to generate a sufficiently high degree of aggregate price rigidity in response to international shocks, in line with the slow response of prices to such shocks we find.

In that regard, one possible way to rationalize the above facts is to rely on labor market segmentation arguments in the spirit of Woodford (2003), Benigno (2004), and Carvalho and Lee (2011), as shown in a theory appendix. The latter paper allows for labor market segmentation across sectors within a country to explain the micro–macro gap in price dynamics in an otherwise standard New Keynesian model with Calvo pricing. In the same vein, we explain the global–local gap by allowing for labor market segmentation across countries. Since labor market segmentation across countries is plausibly no lower than across sectors within a country, one can reinterpret the Carvalho and Lee (2011) model in this manner.[10] In fact, international labor market segmentation plausibly being larger than within country segmentation could explain why differences are more striking when shocks are classified with respect to geographic distance (global vs local) rather than mere economic distance (macro vs micro). Introducing a real rigidity in the form of labor market segmentation across space in a basic price staggering model leads to pricing decisions for firms in different countries being strategic complements associated with slower price adjustment. By contrast, pricing decisions within a country for firms that share a common labor market will be strategic substitutes associated with faster price adjustment.[11]

Next, we describe the data and undertake preliminary analysis of these. We then present our statistical model. Following that, we discuss our results and relate them to the existing literature and to theory. The final section concludes. In an on-line Appendix, we provide a thorough description of the EIU data, additional robustness checks, and a theoretical model which can qualitatively replicate our main facts.

2. Data and preliminary analysis

2.1. Description and reliability

The main source of data utilized in our application comes from the Economist Intelligence Unit (EIU). EIU prices were provided to us for 327 items in 140 cities in 90 countries twice a year, where available, from 1990S1 to 2010S1. We were able to utilize data that cover 59 countries and 276 goods over this period. However, we focus on the period 1990S1–2008S1 before the onset of the Crisis for all Tables of results shown hereafter. The semiannual (March and September) prices were especially compiled for us by the EIU upon special request, as the standard historical data in the EIU "cityprices" publication contains prices gathered only once a year, every September. In an on-line data Appendix, we undertake a detailed description of how these prices are collected and put together, meant to help the reader understand the potential advantages and disadvantages of using this dataset to study international prices and to assist future users in appropriately handling these data. Although subsamples of these data have been used

[5] The standard EIU city prices edition typically used in the LOP deviations literature, e.g. Crucini and Shintani (2008) or Zachariadis (2012), is at the annual frequency, while the non-standard semi-annual EIU city prices data used in Bergin et al. (2013) ending in 2007, contains 21 cities in 21 industrial countries.

[6] That our price data are not as prone to include temporary price changes is important, as Nakamura and Steinsson (2008) show that temporary price changes bias results towards finding more rapid price adjustment. The implication that, as a result of frequent price adjustment, monetary policy might be less effective than originally thought has thus been challenged by the latter paper who attributes the Bils and Klenow (2004) finding to temporary sales-induced price reductions, and by Kehoe and Midrigan (2015) who allow for temporary sales in their model to propose that the aggregate price level is sticky and monetary policy effective even as micro prices change frequently. Our dataset is specifically designed to avoid sales so that our findings regarding the speed of price adjustment relate to standard rather than sale prices, and are not exposed to this critique.

[7] See for instance Boivin et al. (2009) and Maćkowiak et al. (2009)).

[8] The global micro, local macro and local micro components of prices are mean-reverting on average, but this does not apply to all relative prices for all goods or locations. Some of these relative prices are instead characterized by a specific stochastic trend. The absence of a stochastic trend on average, validates the theoretical assumption by Golosov and Lucas (2007) that goods relative prices within a location have no specific trend, ensuring that their time variance is bounded.

[9] Kehoe and Midrigan (2007), Atkeson and Burstein (2008), Crucini et al. (2010), and Gopinath and Itskhoki (2010) offer examples of open macro models that consider optimal price-setting and price dynamics. Further emphasis on price-setting theory models in an open economy context would be useful to understand the above differences.

[10] In this, our theoretical structure resembles Benigno (2004) who assumes no migration of labor across regions of an otherwise common market for goods.

[11] As Woodford (2003)) points out, the assumption of a common labor market is key in obtaining a high degree of strategic substitutability in pricing decisions and fast price adjustment as a consequence.

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