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Journal of International Money and Finance

journal homepage: www.elsevier.com/locate/jimf

The role of two frictions in geographic price dispersion: When market friction meets nominal rigidity

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ARTICLE INFO

Article history:

Available online 7 January 2016

JEL Classification:

E31
F45
L16
R12

Keywords:

Intercity price differences
Distance
Price stickiness
Persistence
Volatility
State-dependent pricing

ABSTRACT

This paper empirically investigates and theoretically derives the implications of two frictions, market friction and nominal rigidity, on the dynamic properties of *intra*-national relative prices, with an emphasis on the interaction of the two frictions. By analyzing a panel of retail prices of 45 products for 48 U.S. cities over the period 1985–2009, we make two major arguments. First, the effect of each type of friction on the dynamics of intercity price gaps is quite different. While market frictions arising from physical distance and transportation costs have a positive impact on volatility and persistence of intercity price dispersion, nominal rigidities have a positive impact on persistence but a negative impact on volatility. This empirical evidence is different from what is predicted by standard theoretical cross-country models based on price stickiness. Second, complementarities exist between market frictions and nominal rigidities such that the marginal effect of a market friction dwindles as nominal rigidities increase. We provide an alternative theoretical explanation for this finding by extending the state-dependent

We are grateful to the Editor, Kees Koedijk, and two anonymous referees for their extensive and constructive comments and suggestions. We also have benefited from helpful comments from Daniel Allen, Nathan Balke, Anton Cheremukhin, Alex Chudik, Mario Crucini, Yongwan Chun, Jinill Kim, Soyoung Kim, Virgiliu Midrigan, Anthony Murphy, Róisín O'Sullivan, Kwanho Shin, Moto Shintani, Mike Sposi, Adriaan Soetevent, Taka Tsuruga, Mike Ward, Mark Wynne, Tack Yun, Carlos Zarazaga, and the participants at the 11th Econometric Society World Congress (ESWC) in Montreal, the 10th annual International Industrial Organization Conference (IIOC) in Washington, D.C., the 2012 Midwest Macroeconomics Meetings at the University of Notre Dame, the 15th KEA International Conference in Seoul, Korea, the Federal Reserve Bank of Dallas, Baylor University, and Korea University. The authors would also like to thank Arsalan Nadeem for excellent research assistance and Moto Shintani for sharing the data on distribution margins. Any remaining errors are the authors'.

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pricing (SDP) model of Dotsey et al. (1999) and show that our two-city model with nominal rigidity and market frictions can successfully explain the salient features of the dynamic behavior of intercity price differences that have not been captured in previous analysis.

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1. Introduction

“There appears to be potential for a marriage of the new-Keynesian literature on menu costs and the new trade literature emphasizing the role of geography.” – Engel and Rogers (1996, p. 1123)

Price differentials across locations have long been an important issue for both researchers and policymakers alike.¹ According to the tenet of the Law of One Price (LOP), the same good should sell for the same price everywhere in a fully flexible price world with no obstacles to trade. In practice, however, geographic price dispersion is large and persistent even within a national border where trade barriers are relatively low (e.g., Crucini, Shintani and Tsuruga (here after CST), 2010, 2012; Engel and Rogers, 2001). Economic theories suggest numerous factors conducive to the observed spatial price dispersion, such as transportation costs, other trade costs, and menu costs, that are pertinent in the *intra*-national setting. Among them a leading explanation in the literature is that market segmentation arises due to geographic barriers or transport costs (henceforth, ‘market friction’) which drive a wedge between relative prices in different locations by limiting arbitrage opportunities (e.g., Rogoff, 1996). As a popular metric for market friction, the role of distance in geographic price differentials is well established, such that price difference is greater and more persistent between cities located farther apart (e.g., Anderson and van Wincoop, 2004; Choi and Choi, 2014). Another well-known contributing factor to the large and persistent movements of price differences is ‘nominal rigidity’ due to sluggish adjustment of prices, in which relative price fluctuations are thought to result from the interaction of fundamental shocks, e.g., monetary and productivity shocks, and sticky prices. Starting with Dornbusch (1976), price stickiness has been incorporated in many macroeconomic models as an important mechanism capable of generating persistent and volatile movements in relative prices (e.g., Bergin and Feenstra, 2001; Carvalho and Nechio, 2011; Kehoe and Midrigan, 2011). In fact, empirical evidence based on micro-data generally put forth supportive evidence that relative prices are more persistent for the products with stickier price adjustment (e.g., Crucini et al., 2010; Engel and Rogers, 2001). For all of its theoretical appeal and empirical support on the importance of the two frictions, relatively little work has explored their interplay in explaining the observed movements of intercity relative prices.² If mechanisms exist that lead one type of friction to either amplify or dampen the impact of the other on relative prices, a focus of these interactions could greatly enhance our understanding of the dynamics of relative prices.

The primary objective of this study is to examine both empirically and theoretically the roles of market friction and nominal rigidity in accounting for dynamic behaviors of price differences across locations, with a particular emphasis placed on the interface between the two frictions. To this end, we use retail price data from the American Chamber of Commerce Researchers Association (ACCRA) for 45 individual products across 48 U.S. cities, which enable us to investigate the absolute level of price difference. With the coverage of numerous cities for long time span, the ACCRA data set is particularly well suited to the analysis of intercity relative price dynamics. Moreover, the *intra*-national data set facilitates our focus on market friction and nominal rigidity by ruling out the influences of external factors such as nominal exchange rates and trade policies that are known to play a

¹ From the perspective of policymakers, large and persistent price differences across locations within a national border imply distortions in efficient resource allocation due to market segmentation.

² The literature on the purchasing power parity (PPP) and LOP has largely discussed the two frictions in isolation with few notable exceptions including Engel and Rogers (1996, 2001, hereafter ER) and Crucini et al. (2010, 2012, henceforth CST).

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