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A Survey on Exchange Rate Pass through in Emerging Markets

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ABSTRACT

This article reviews the literature on exchange rate pass-through in emerging markets with a special focus on the burgeoning empirical research. The literature has overwhelmingly agreed on the recent decline in the pass through in low inflationary environment after the adoption of inflation targeting in many countries. However, the empirical evidences also suggest varying degrees of the pass-through depending on the size and direction of exchange rate changes. Finally, researches on the exchange rate pass-through on disaggregated price indices or the differential pass-through due to the source of exchange rate changes are becoming promising research strands for the estimation of the pass through.

Keywords
Exchange rate pass-through, Emerging Economies

JEL Classification
E31, E58, F31

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Gelişmekte olan Ülkelerde Döviz Kuru Geçişkenliği üzerine Bir Literatür Taraması

ÖZ

Bu çalışma gelişmekte olan ülkelerde döviz kuru geçişkenliğini son dönemde artan ampirik çalışmaları dikkate alarak incelemektedir. Mevcut literatür, son dönemde birçok ülkede enflasyon hedeflemesinin benimsenmesi sonucu ortaya çıkan düşük enflasyon ortamında döviz kuru geçişkenliğinin azaldığı konusunda mutabıktır. Bununla beraber, ampirik çalışmalar döviz kurundaki değişikliklerin yönü ve büyüklüğü nedeniyle kur geçişkenliğinin değişik düzeylerde gerçekleştiğini ortaya koymuştur. Son olarak, alt bölümlere ayrılmış fiyat endeklerinde kur geçişkenliği konusu ile döviz kuru gelişmelerinin değişik sebeplerinden kaynaklı farklı kur geçişkenlikleri konusu önümüzdeki dönemde gelecek vaad eden araştırma alanları olarak ortaya çıkmaktadır.

Anahtar Kelimeler
Döviz Kuru Geçişkenliği, Gelişmekte olan Ülkeler

JEL Kodu
E31, E58, F31

1. Introduction

The aim of this paper is to provide an overview of the literature on exchange rate pass-through (ERPT) in emerging markets. Although in recent years there is a burgeoning empirical research on various aspects of the ERPT, the focus of this paper will be on the ERPT to consumer prices in emerging markets as it is the one of the most relevant indicator for inflation in these economies. Therefore, this paper contributes to the literature by surveying the empirical researches on the ERPT in emerging markets in a country-wise comparison approach.

ERPT can be simply defined as the extent to which changes in exchange rate are reflected in domestic prices (import, producer, and consumer prices). In theory, ERPT could be complete or incomplete, or even zero. In the case of complete pass-through (i.e. producer currency pricing (PCP)), prices in importing country are set and are sticky in producer's (exporter's) currency. Therefore, changes in the exchange rate elicit equi-proportionate changes in domestic currency. In the complete pass-through, variations in the exchange rate does not affect prices of goods in exporters' own currency, while prices of goods in the importing country vary very closely with exchange rate changes. However, exchange rate pass-through could also be zero if exporters set prices of their goods in the currency of the importing country (i.e. local currency pricing (LCP)). In this case, contrary to PCP, prices of goods in importing country are not affected from exchange rate changes, while they do change in exporting country currency. Finally, in the case

of incomplete pass-through, exchange rate changes are partially reflected in prices of importing country (i.e. the degree of pass-through to prices is between zero and one.).

Furthermore, depending on the type of price indices, ERPT is classified into two stages. The first stage pass-through refers to the percentage change in import prices in domestic currency in response to one per cent change in the exchange rate, while the second stage pass-through corresponds to the related changes in producers or consumer prices. It is empirically found that the degree of pass-through decline along the distribution chain (McCarthy (2000), It and Sato (2008), Peóna and Brindisb (2014), Justel and Sansone (2015)). In other words, the degree of the pass-through is the highest in import prices and then producer prices, and the lowest in consumer prices.

The rest of the paper organized as follows. The main determinants of exchange rate pass-through are discussed in the following section. In Section 3, the widely utilized econometric methods will be discussed. The empirical studies on emerging markets will be discussed in Section 4 and asymmetric responses of prices to exchange rate changes will be touched upon in Section 5. Section 6 covers recently discussed additional topics in the pass-through literature. Finally, the last section concludes.

2. Determinants of ERPT

Both the theoretical and empirical literatures have highlighted a number of factors that have impact on the size of pass-through. Some of these factors are openness, inflation environment and monetary policy, exchange rate volatility, transparency of monetary policy, current account balance, size and direction of exchange rate changes, composition of import, and the level of dollarization.

Trade openness which can be simply measured in terms of trade or the ratio of both import and export to total GDP is expected to affect the pass-through. However, theoretically, due to opposite impacts, the net effect of trade openness is ambiguous. On the one hand, in more open economies exchange rate shocks can be easily transmitted to domestic economies, resulting in higher exchange rate pass through. On the other hand, more openness will also lead to higher competition in the domestic economy, resulting in “pricing to market” and hence lowering ERPT. The empirical evidence also provides mixed results; while Campa and Goldberg (2005), Barhoumi (2006), and Ghosh (2013) claim positive impact of openness on the size of exchange

rate pass-through, Hau (2002), Kohlscheen (2010), and Ozkan and Erden (2015) argue a lower pass-through in more open economies.

It is widely accepted that ERPT is low in low inflationary environments (Taylor (2000), Gagnon and Ihrig (2004), and Choudhri and Hakura (2006)). In a seminal paper, Taylor (2000) explains the link between inflation and pass through using a model of firm behavior with staggered price setting and monopolistic competition. If agents perceive exchange rate changes temporary, then they would not change their prices but rather reduce their mark-ups temporarily and wait until the shock disappears. However, if agents believe that the shock is permanent, then they would change their prices. As higher inflationary regimes tend to have more persistent and permanent shocks, the degree of the pass-through would be higher in such regimes. Low inflation and monetary policy that contributes to low inflation have led to low pass-through by changing the expected persistency of cost and price changes. Therefore, maintaining a low and stable inflation has brought about a low ERPT, which in turn contributes to low inflation. Testing Taylor' hypothesis for a panel of 71 countries for the time period of 1979-2000, Choudhri and Hakura (2006) find strong evidence of positive and significant association between pass-through and inflation. Edwards (2006) compares the degree of ERPT before and after inflation targeting for selected developed and developing countries. The results indicate a substantial decline in the pass-through after the adoption of inflation targeting. Also Devereux and Yetman (2010) argue that sticky prices represent a key determinant of low exchange rate pass-through. In a panel study of 15 emerging countries, Lopez-Villavicencio and Mignon (2016) reveal that inflationary environment matters in the sense that declining ERPT is evidenced with more stable and anti-inflationary environments. Coulibaly and Kempf (2010) suggest that the inflation targeting in emerging countries has helped to reduce the pass-through to various price indexes and the contribution of exchange rate shocks to price fluctuations declines after the adopting inflation targeting.

Another important determinant of ERPT, also related to inflation, is the credibility of monetary policy. With a credible monetary policy, a central bank can anchor inflation expectations to the inflation target and make it less sensitive to external shocks including exchange rate shocks. Therefore, well-anchored inflation expectations due to monetary policy credibility limit the degree of the pass-through to domestic prices. Lopez-Villavicencio and Mignon (2016) highlights the role of central bank transparency on achieving low ERPT.

Volatility of exchange rate could also have sizable impact on the degree of the pass-through. Similar to the openness, the impact of the volatility could be either positive or negative. On the one hand, high volatility in exchange rate might make importer more reluctant of frequent price changes and more willing to adjust markups, thus reducing the pass-through (Floden and Wilander (2006), Przystupaa and Wrobel (2011)). On the other hand, Campa and Goldberg (2005) and Kohlscheen (2010) show a positive association between exchange rate pass-through and exchange rate volatility.

In a recent paper, Kılınç et. al (2016) show that the impact of exchange rate volatility magnifies in countries with large current account deficits. Concerns about financing of higher current account deficit increase vulnerability of these countries to exchange rate movements. Comparing two countries with low current account deficit (i.e. Korea, and Mexico) to two countries with high currency account deficit (i.e. Turkey and Indonesia), the empirical evidence indicate that while in the former group the degree of ERPT was quite low, it was significantly higher for the latter group. Therefore, larger current account deficit magnifies the pass-through of exchange rate changes to domestic prices.

The degree of the pass-through also varies and becomes asymmetric depending on the size and direction of exchange rate movements. Such asymmetries could happen for different reasons. For instance, the fact that prices are rigid downward, which means that prices decrease to a lesser extent when the exchange rate appreciates then they increase when the exchange rate depreciates is a potential reason for the asymmetric pass-through. Furthermore, menu cost can explain part of the asymmetric pass-through with respect to the magnitude of exchange rate movements. Firms can absorb small exchange rate changes (smaller than menu cost) in their margins, but reflect in prices exchange rate changes exceeding a threshold (larger than menu cost).[1]

Campa and Goldberg (2002) suggest that the composition of import has sizable impact on the degree of the pass-through. They show that if a country shifts the content of its trade from industries with high pass-through elasticities into industries with lower elasticities, the country's aggregate import pass-through will decline. Commodities and raw materials are more sensitive to exchange rate changes than manufactured goods as manufactured goods have relatively more rigid prices and are less responsive to exchange rate shocks. Therefore, exchange rate pass-

[1] The asymmetric aspect of exchange rate pass-through is analyzed in Section 5.

through is expected to be higher in countries in which import is composed mainly of raw materials and commodities compared to countries in which the share of raw materials and commodities in import is low.

Substitutability between importing goods and domestically produced goods can impact the degree of the pass through (Menon (1996)). If the degree of substitutability is low, then importing firms can determine the price of goods without much concern about their market share. However, in the case of close substitutes, importing firms would be cautious about their market share and therefore, would not reflect the whole exchange rate changes into their prices in case of local currency depreciations.

The level of dollarization in an economy also contributes to the degree of the pass-through. The empirical literature has clarified that the pass-through from exchange rate to consumer prices is higher in highly dollarized economies (Reinhart et al. (2014), Carranza et. al. (2009), and Sadeghi et. al. (2015)). An argument for this view is that in a highly dollarized economy, services and non-tradable goods are priced in foreign currency in addition to tradable sector. Therefore, exchange rate changes are passed to domestic prices through a broader set of goods in a highly dollarized economy than in a less- or non-dollarized economy.

Using 10 specific products across 76 countries for the time period of 1990-2011, Frankel et. al (2012) show that the significant determinants of exchange rate pass-through are per capita income, bilateral distance, tariffs, country size, wages, long-term inflation, and long term exchange rate variability. Among these factors, the two most important are distance and per capita income. The paper further argues that (i) the more heavily foreign firms outnumber domestic firms, the higher the degree of the pass through, (ii) the low real cost of retail service as a fraction of the value of the products should be considered another possible explanation of higher pass-through in developing countries.

3. Econometric Methods

This section compares the distinctive econometrics methods utilized in estimating ERPT.[2] The existing empirical literature in measuring ERPT utilizes two econometric methods: (i) single equation method, and (ii) vector autoregressive (VAR) method. However, the underlying assumptions and drawbacks of each method are different. Due to these differences in these

[2] Bache (2006) provides a comprehensive review of the econometric methods in measuring ERPT.

distinctive econometric methods, the resulting ERPT measures, indeed, are not directly comparable.

The single equation method, assumes that prices are a linear function of exchange rate and some other variables. There are some drawbacks of the single equation method. The first drawback is that it does not take into account the endogeneity issue that inflation may affect exchange rate. Second, in such models, no evolution of ERPT over time can be traced upon a shock to exchange rate. Third, the single equation model specified in differences, omit possible long-run relationships. If a long-run cointegration relationship between level variables exists, then the single equation model is misspecified and the estimated ERPT will be biased. On the other hand, a distinct feature of the single equation model is that, in such models it is straightforward to test for asymmetry and non-linearities in ERPT as these issues recently receive growing importance in the literature.

The VAR method is the most commonly used one for the estimation of ERPT because it remove possible endogeneity problem between inflation and exchange rate by allowing a dynamic feedback between the two variables. Furthermore, it allows for simultaneous estimation of the pass-through along the distribution chain from the import/producer prices to the consumer prices. The VAR model also provides the flexibility to track the evolution of the pass-through over time. This is particularly important in that the speed and the duration of pass-through provide valuable information for short- and medium-term inflation forecasting. The ERPT in the VAR method is measured as the cumulative response of price to a unitary exchange rate shock to the system.

Despite of its extensive usage in the empirical literature, the VAR method also contains some drawbacks. Among these, the most important one is the order of the variables. Standard recursive VAR model with cholesky decomposition is sensitive to the order of variables. This requires ordering variables according to their relative exogeneity, with the most exogenous variables placed at the top and the least exogeneous ones at the bottom. However, with structural non-recursive VAR model, this restriction can be relaxed. Another important drawback of the VAR models is that it is difficult in such models to analyze asymmetries and non-linearities in ERPT whereas with single equation models, estimations of asymmetric and non-linear ERPT are easier.

4. Empirical ERPT in Emerging Economies

This section presents the empirical evidence on the ERPT in emerging economies. The burgeoning empirical research on emerging markets covers both single country or pooled and panel studies using different econometric specifications and different time periods for the estimation of the pass-through. Table 1 provides a detailed summary of the empirical findings for the ERPT in emerging markets, while Figure 1 compares the latest estimates for the countries.

4.1.Pooled Empirical Studies

Kohlscheen (2010), using a VAR model, examines the extent to which exchange rate changes are reflected in consumer prices for some countries during their floating exchange rate regimes (mostly starting from late 90s). The results of the paper suggest that the estimated pass-throughs are higher for countries with greater nominal exchange rate volatilities and countries that trade more homogeneous goods. The estimated pass-throughs after one year are 0.32 for Brazil, 0.20 for South Korea, 0.13 for Mexico, 0.60 for Indonesia, 0.25 for South Africa, 0.16 for Thailand, 0.51 for Czech Rep., and 0.09 for Philippines. It and Sato (2008) examine the pass-through effect of exchange rate changes on the domestic prices in East Asian countries for the time period starting from mid 1990s to 2006 using a VAR model. The paper finds that the degree of the pass-through declines along the distribution chain with the highest degree of the pass-through in import prices, then producer prices, and lowest in consumer prices. The estimated pass-throughs to consumer prices are 0.40 for Indonesia, 0.07 for South Korea, 0.14 for Thailand, 0.06 for Philippines, and 0.03 for Malaysia after one year.

Prasertnukul et. al. (2010) empirically examines the impact of adopting inflation targeting on exchange rate pass-through in four Asian countries (i.e. Indonesia, South Korea, Philippines, and Thailand). The results, in line with the literature, show that the degree of pass-through declined in both South Korea and Thailand with the adoption of inflation targeting, while less clear evidence is found for Indonesia and Philippines. The estimated long-run pass-through coefficients are 0.10 for Indonesia, 0.06 for South Korea, 0 for Philippines, and 0.12 for Thailand. Ghosh (2013) estimates the exchange rate pass-through for some Latin American countries for the last four decades. Furthermore, estimating pass-through for each decade separately, the paper shows that the degree of the pass-through has declined over time for the region. Country estimates of long-run pass-throughs for the last decade (2000s) are 0.47 for

Brazil, 0.04 for Chile, 0.025 for Colombia, and 0.01 for Mexico.

Edwards (2006) compares the changes in the degree of the pass-through after the adoption of inflation targeting in some selected developed and developing countries. Using a simple single equation error correction framework, the author shows that countries that have adopted the inflation targeting regime have experienced a significant decline in the pass-through from exchange rate to consume prices. For instance, the long-run pass-throughs declined from 0.53 to 0.2 in Mexico, 0.21 to 0.01 in Chile, 0.12 to 0 in Austria.

For some new members of the European Union, Maria-Dolores (2010) estimates the ERPT to both import and consumer prices. As expected, the degree of pass-through is larger for import prices than the consumer prices. The long-run pass-throughs are 0.17 for Czech Rep., 0.49 for Hungary, and 0.24 for Poland. For the same countries, Vonnak (2010) also concludes that a one percent depreciation of local currency increases consumer prices by 0.2 and 0.3 percent by the end of the first and second years in these three economies, respectively.

4.2.Country-Specific Empirical Studies

In the remaining part of this section, I will cover country-specific studies. Country-specific studies are important in the sense that contrary to panel studies, they target a single country and take into account country-specific features that could affect the degree of the ERPT. It is not feasible integrating these country-specific features in more general econometric frameworks utilized for multi-country studies.

Using monthly data from 1995 to 2007, Nogueira and León-Ledesmab (2009) analyze the changes in the degree of the pass-through in Brazil after the adoption of inflation targeting in 1999. Their results indicate a substantial decrease in the degree of the pass-through from 0.87 to 0.08 after the IT adoption. The role of inflation on ERPT is further investigated by Nogueira (2010) in the Brazilian context. The findings of Nogueira (2010) support Taylor (2000)'s claim that the ERPT is endogeneous to inflation environment. The results indicate that when inflation is above the threshold, the long-run ERPT is about 0.39; whereas if inflation is below the threshold, the long-run ERPT is almost zero. Non-linear mechanism of the ERPT in Brazil is also investigated by Correa and Minella (2010) where the non-linearity from the perspectives of business cycles, size of the exchange rate changes, and low and high volatility of exchange rate are considered. Their findings indicate that: (i) when the economy is below the threshold the

degree of ERPT is zero, while it is around 9% when the economic activity is higher than the threshold; (ii) in the case of large depreciations, the ERPT is estimated around 11% while for small depreciations, it is zero; and (iii) during the low volatility periods, the ERPT is 80% while it is not different than zero for high volatility periods.

In the case of Chile, in a recent paper Justel and Sansone (2015) estimate the size of the pass-through by utilizing a VAR model for the period of January 1987 to December 2013. While the estimate of the pass-through for the whole sample is 0.20 after two years, for the sub-sample of 2002-2013, the size of the pass-through becomes 0.14, indicating a decline in the ERPT in Chile over time. Morande and Tapia (2002) analyze the evolution of the pass-through for Chile using a rolling window VAR model. The results show that the size of the pass-through exhibits a declining trend from 0.40 in early 90s to about 0.10 in the last window covering 1996-2001 period.

In recent years, the ERPT is widely discussed in the literature for the Mexico. Espada (2013) estimates the size of the pass-through in Mexico for the time period of June 2001 to August 2012 by employing a VAR model. The results indicate that for the time period, ERPT is low and statistically not significant (0.03 after 12 months). For the very similar time period, Peóna and Brindisb (2014) find that the degree of the pass-through declines along the distribution chain and that the size of the pass-through to import, producer, and consumer prices are 0.91, 0.17, and 0.02, respectively after 6 months. The low degree of the pass-through in Mexico coincides with period in which the country has been experiencing low inflation levels as a result of inflation targeting monetary policy. Contrary to these studies, Aleem and Lahiani (2014) investigate the non-linearities in the exchange rate pass-through to domestic prices taking into account an endogenously determined threshold level of inflation rate. Their result indicates that when inflation is above the threshold level, the pass-through becomes significant, and when the inflation rate is below the threshold level, the pass-through is insignificant.

Odria et. al. (2012) empirically test whether the exchange rate pass-through into domestic prices changed since the adoption of inflation targeting in Peru. By comparing pre- and post-IT time periods, the results reveal that the decision to adopt inflation targeting has decreased the size of the pass-through by 86% in the long run. A similar conclusion is reached by Winkelried (2014), where the evolution of the ERPT is analyzed through a rolling window. The long-run pass-through for the last period (i.e. April 2005 to April 2011) estimated as 0.10 while it was

more than 0.60 before the inflation targeting regime. In a very recent paper, Forero and Vega (2015) find a remarkable asymmetric response of consumer prices to exchange rate changes for Peru. Their result exhibits that while one-year pass-through after currency depreciations is 0.20, it is only 0.10 after currency appreciations.

For another Latin American country, Colombia, Rowland (2013) estimates the ERPT using monthly data from January 1983 to October 2002 by utilizing a VAR model. Similar to the literature, the paper finds that the degree of the pass-through decreases along the distribution chain and it is 0.15 for consumer prices in one year. However, Rincón and Rodríguez (2016), using data from June 2002 to May 2015 and employing the Bayesian approach, claim endogeneity of pass-through to the state of the economy: the pass-through is greater when (1) CPI inflation accelerates, it is high, and its volatility is high (2) the real exchange rate is over-valued, (3) the output gap is positive, (4) the economic openness is low, (5) the commodity price is high, (6) the interbank interest rate is low. They also find that ERPT is asymmetric. If inflationary regime is in "high state", the pass-through is larger than when the regime is in "low state". The size of the pass-through is high if the depreciation/appreciation of the peso accelerates. Finally, if the size of the exchange rate shock is larger, the degree of the pass-through becomes larger.

Khundrakpam (2007) analyzes the ERPT in India for the period of July 1991 to March 2005 using error correction model. The results indicate low (0.09) long-run ERPT to domestic prices and no clear evidence of a declining pass-through over time. Bhattacharya (2008) also finds a pass-through in the range of 0.03 to 0.17 to consumer prices in India for the time period of September 1997 to October 2007. A further corroborating evidence is provided by a recent study by Kapur and Behera (2012) where using VAR model for 1996Q2-2011Q1 period, the authors estimate the long-run pass-through degree for headline CPI in India as 0.10.

In recent years, as the Chinese authorities abandoned the peg to the US dollar and the Chinese economy becomes more open, ERPT in Chine is also investigated in the literature. Shu and Su (2009), for the time period of 1998Q2 – 2007Q4, find that the ERPT is low in the short run but reaches 0.20 in the long run. They further find that (i) the ERPT has been largely stable during the period and (ii) the degree and speed of the pass-through diminishes along the distribution chain. A similar magnitude of the ERPT is also estimated by Wang and Li (2010). However, for an extended time period, Jiang and Kim (2013) find a larger pass through to

consumer prices (i.e. 0.60). On the other hand, Jin (2012) point out the influence of exchange rate regime on the pass-through in Chine. The paper, using a VAR model, reveals that while during the fixed exchange rate regime the ERPT was 0.14, is has decreased to 0.03 during the flexible exchange rate regime.

Country-specific empirical studies on ERPT in Thailand, Indonesia, Malaysia, and Philipines are limited. Applying quarterly data from 1995 to 2005, Jitpokkasame (2007) estimates exchange rate pass through in Thailand to be 0.18, while Chai-anant et al. (2008) find that the pass-through is 0.13 using monthly data. The long-run pass-through of 0.14 for Thailand estimated by Wattanakoon (2013) with more recent data from January 2000 to August 2011 corroborates the result of Chai-anant et al. (2008). Arintoko (2011) shows that incorporating structural breaks such as moving from fixed to flexible exchange rate regime into models help improve estimation results. The estimated exchange rate pass-through in Arintoko (2011) for Indonesia for 1997Q4-2009Q4 period is 0.11. Kuncoro (2015) finds the existence of ERPT to both import and producer prices but no effect to consumer prices. However, according to Bank Indonesia's SSMX model, a 1 per cent exchange rate depreciation leads to a 0.16 per cent increase in consumer prices (Edwards and Sahminan (2008)). Using monthly data from July 2005 to June 2011, Bank Negara (2012) estimate suggests an ERPT to consumer prices in the range of 0.05-0.15 in Malaysia. Using a VAR framework to for the time period of 1980 – 2006, Ahmad (2009) reveals that the pass-through for Malaysia is low, incomplete, and follows the distribution chain of pricing with the long run coefficient of 0.18. In the case of Philippines, Guinigundo (2008) claims that based on the preliminary 2000 input-output (IO) table, a 1 percent depreciation of the domestic currency would increase inflation by about 0.14 percentage points. However, according to the 2015 Annual Report of the Central Bank of Philippines, the estimated pass-through is zero during the inflation targeting period of 2002-2015.

ERPT has been investigated for emerging European countries as well. By joining the European Union, countries are expected to fulfill the Maastricht criteria, which cover many macroeconomic objectives. The exchange rate criterion imposes certain stability requirements such as remaining in the Exchange Rate Mechanism II for at least two consecutive years without devaluing the domestic currency or departing from the central parity by more than by 15%. Therefore analyzing the degree of the pass-through becomes an important topic in these countries as well.

Kucharčuková et. al. (2013) applies a VAR model to the Czech data from January 1998 to March 2011 to estimate the pass-through. The detailed analysis of the pass-through indicates that a 1% change in the exchange rate leads to 0.11% changes in consumer prices. However, for a very similar time period, Hajeka and Horvath (2016) estimate suggests a pass-through of 0.50 to consumer prices. They further find a complete pass-through for food prices, and surprisingly a lower pass-through for tradable goods than the CPI. In an earlier study utilizing Czech data from Jan 1996 to Dec 2006, Babecka-Kucharcukova (2009) find a fast pass-through to consumer prices in the magnitude of 0.25 and completing in half a year. The paper further finds a gradual decrease over time in the size of the pass-through.

Using Polish data from 1996Q1 to 2012Q3, Arratibel and Michaelis (2014) suggest that a time-varying VAR framework is better fit for Poland. Their results indicate a slightly decreasing pass-through to consume prices over time with an estimate of 0.1 after six quarters. Hajnal et. al. (2015) estimate the ERPT for Hungary using rolling windows OLS, vector error correction model, VAR model, and threshold VAR model and covering 2001Q3-2014Q2 time period. The paper finds estimates in the range of 0.10-0.15, but differing according to some asymmetries. The pass-through is higher during appreciations than depreciations, during high inflationary periods than low inflationary periods, and during high growth regimes than low growth regimes. ERPT in Romania is studied in a comprehensive way by Stoian and Murarașu (2015) by using a wide range of econometric models and conducting the analysis for different time periods. The estimated pass-through for consumer prices is around 0.07 for January 2005-December 2014 time period. The ERPT to consumer prices in Russia is reported in 2014 Monetary Policy Report of the Central Bank of Russia as 0.13 for February 2009 – July 2014 period with the duration of six months. However, Ponomarev et. al. (2016) estimate a pass-through of 0.48 to consumer prices in Russia for 2002-2012 time period while the degree of the pass-through displays asymmetry regarding appreciations and depreciations.

The magnitude and duration of exchange rate pass-through in Turkey has been widely discussed in the literature. Using monthly data from 1994-2002, Leigh and Rossi (2002) estimate an exchange rate pass-through of the size of 40% with the duration of one year but mostly in the first four months. Similar results are obtained in Alper (2003) for 1987-2003 time period. This large pass-through is possibly due to the past currency crisis, high dollarization and high inflation of the period investigated. Using a similar methodology, Kara and Ögünc (2008, 2012) and

Yüncüler (2011) find that the magnitude of the pass-through has decreased after 2001 economic crisis to about 15%. They attribute this reduction to two important factors: (1) the implementation of inflation targeting regime and (2) the decline in the indexation of prices to exchange rate. Using several threshold-VAR models, Arbatli (2003) finds significant asymmetries in the relationship between exchange rate and inflation. In another paper, Kara et al. (2007) analyze exchange rate pass-through for different exchange rate and monetary policy regimes using time-varying parameters approach and conclude that monetary and exchange rate regimes might be the main determinants of exchange rate pass through process. In a recent paper, using various methods, Arslaner et al. (2015) estimate the size of the pass-through to consumer prices in Turkey to be around 0.15. In a recent paper, Kılınç and Tunç (2017) estimate the pass-through for Turkey using both a recursive VAR model and a structural VAR model that is more suitable for emerging economies. The results show that while the pass-through estimation in the recursive model is around 8, the model generate some anomalies such as declining global energy prices in response to depreciation of domestic currency. On the other hand, the structural model estimates the magnitude of the pass-through of approximately 18 percent with more suitable responses of other variables. Their analysis shows the importance of using a model setup suitable for the structure of the emerging economies.

Aron et. al. (2014a) examines the exchange rate pass-through to the consumer prices in South Africa using monthly data during 1980- 2009 period in which South Africa switched from fixed to a floating exchange rate regime. Results indicate an incomplete pass-through at about 0.50 within a year. For the sub-sample of 1995 – 2009, the estimated pass-through had declined to 0.40. Using a unique set of micro-consumer price data at the product level, covering six years from 2002-2007 to explore ERPT into micro-prices and some of the key sub-categories underlying the aggregate consumer price index, Aron et. al. (2014b) find that the degree of pass-through varies considerably across CPI components. By weighting the estimates by index weight, the aggregate pass-through to consumer prices after two years was estimated to be around 0.30.

5. Asymmetries in ERPT in Emerging Economies

A growing strand of the literature in emerging markets exchange rate pass-through departs from the linearity assumption by focusing on asymmetries with respect to size, direction, state of the economy, inflationary regime, and volatility level of exchange rate in the transmission

of the pass-through to domestic prices.

Possible explanations for asymmetric responses of prices to exchange rate changes are discussed in the literature. The asymmetry with respect to the size of the pass-through (large vs. small) is explained by the presence of menu cost. Menu cost covers administrative, technical and informational costs of deciding and implementing a price change. Firms can absorb small exchange rate changes (smaller than menu cost) in their margins, but reflect in prices exchange rate changes exceeding a threshold (larger than menu cost).

Exchange rate pass-through can also be higher for depreciation than appreciations if firms face capacity constraints. In the case of an appreciation of importing country's currency, exporting firms might not be able to increase sales due to capacity constraints; they may instead choose to increase their mark-up with same sales volume and local currency price. However in the case of depreciation of importing country's currency, there is no capacity constraint binding. Even when firms absorb part of the effect of depreciation by reducing their mark-ups, import prices in the importing country's currency could still increase. Therefore, exchange rate pass-through could be asymmetric with higher pass-through for depreciations than for appreciations stemming from capacity constraints.

Still another potential reason for the asymmetric response is the market share objectives of firms. Foreign firms with the objective of increasing their market share in importing country may prefer to keep their mark-ups constant while reducing their prices when importing country' currency appreciates. However, in the case of depreciation of importing country's currency, foreign firms reduce their mark-ups to partly offset increases in price in order to maintain or expand their market shares. In such cases, pass-through is higher for appreciations than depreciations.

Table 2 displays the summary of empirical finding on asymmetric exchange rate pass-through. In the empirical studies, ERPT for depreciation is found to be larger than for appreciation. Investigating the non-linearities in the ERPT to emerging markets by utilizing a panel of 28 emerging countries, Caselli and Roitman (2016) reveal that ERPT during depreciations are statistically larger than ERPT during appreciations. Similarly, analyzing the main determinants of ERPT in sub-Saharan African countries, Razafimahefa (2012) finds that the pass-through is larger following a depreciation of local currency than appreciation. Mihaljek and Klau (2008) also reveal that while exchange rate depreciations have a significant and stronger

effect on domestic inflation than appreciation in some countries, in a few countries appreciations seems to have a significant and stronger effect on inflation. The same conclusion is reached in country-specific studies with the exception of Khundrakpam (2007) where the author finds that while ERPT for appreciation in India is 0.20, it is only 0.05 for depreciations. In the case of India, the author states that most of the goods were domestically produced and the objective of foreign firms is to maintain or increase their market share. As discussed above, with the objective of market share concerns, ERPT for appreciation would be higher than for depreciations. However, in the other countries (i.e. Brazil, Colombia, Poland, and Romania, Peru, and Chile), empirical studies conclude that while ERPT for appreciations are either insignificant or very low, it is significant and large for depreciation episodes.

The degree of the pass-through could also depend on the level of inflation. As Taylor (2000) stated, ERPT is expected to be low in low inflationary environments. Lopez-Villavicencio and Mignon (2016), analyzing the determinants of the ERPT for 15 emerging economies from January 1994 to July 2015, find that inflation environment matters in the sense that a declining ERPT is evidenced with more stable and anti-inflationary environments and adopting inflation targeting regime leads to a significant decline in ERPT for most countries. The same conclusion is obtained in country-specific studies as well. Analyzing the asymmetric ERPT in Colombia, Rincón and Rodríguez (2016) show that while the ERPT for high inflationary periods is around 0.29, it is about 0.23 for low inflationary environments after a year. The findings of Hajnal et. al (2015) for Hungary, Stoian and Murarașu (2015) for Romania, and Aleem and Lahiani (2014) for Mexico also corroborate the notion that the pass-through is lower in low inflationary environments than in high inflationary environment.

The magnitude of exchange rate changes could also have differential impact on the size of the pass-through. Empirical findings support this asymmetry. For instance, Caselli and Roitman (2016) find that the reaction of domestic prices during large depreciations is faster and more pronounced. More specifically, the ERPT is close to 0.40 in the presence of exchange rate depreciations of 10 to 20 per cent in magnitude, whereas, for low depreciations the degree of the pass-through is only 0.20. Rincón and Rodríguez (2016) show in Colombian context that the degree of the pass-through is not the same if the size of the shock to exchange rate is 1% than if it is 5%. In the case of a 5% positive shock, the total pass-through of total consumer goods is 11% in one year, while it is 13% if the shock is negative. Furthermore, Mihaljek and Klau (2008)

reveal that while exchange rate changes have differential impact on domestic prices above some threshold levels, the threshold effects do not seem to be significant elsewhere.

Depending on the state of the economy, the impact of exchange rate changes on prices could also be different. For instance, Correa and Minella (2010) show that in Brazil, the ERPT is statistically greater when economic activity is high (i.e. output is above some determined threshold level), whereas it is statistically not different from zero when economic activity is low. Doing a similar analysis for Poland, Przystupaa and Wrobel (2011) support the view that the pass-through is larger during expansions than during recessions.

6. Additional Topics

Some recent studies find that the source of exchange rate movements causes differential impact of even same-size exchange rate movements on prices. These studies suggest that instead of treating exchange rate changes as exogenous movements when estimating ERPT, it is necessary to determine the reasons behind such exchange rate movements. Analyzing the ERPT for the UK using SVAR model with sign restriction assumption, Forbes et. al. (2015) find that exchange rate fluctuations caused by external shocks or monetary policy shocks lead to greater ERPT while the same-size exchange rate fluctuations stemming from domestic demand shocks causes smaller pass-through to prices. In another study on the diffential impact of exchange rate movements on prices, Shambaugh (2008) analyzes the ERPT for a panel of countries for the time period of 1973Q1-1999Q4 using a VAR model. The results indicate that the import prices pass-through do not vary considerably across different shocks to exchange rate while this is not the case for consumer prices. The size of pass through to consume prices do change depending on the type of shocks. For instance, after nominal shocks prices change more than exchange rate, generating pass-through ratio of more than one, while demand shocks have pass through ratios of close to zero. As pass-through appears to be different in response to different shocks, past-measures of pass-through may not be a very good predictor of future patterns of pass-through as the reasons behind exchange rate changes might not be the same. Therefore, policy maker should not assume that pass-through is constant or should not always use a rule of thumb to predict pass-through.

A new strand of the literature examines the pass-through to domestic prices using sub-components of aggregate price indices and micro-data sets. Aggregate price indices could

potentially hide important information about the pass through since they consist of sub-group of indices with quite different responses to exchange rate movements. The price responses of service sector, non-tradable sector or sectors with less or no imported intermediate goods are supposed to be different to exchange rate changes than the price response of tradable sector or sector with heavy usage of imported intermediate goods. While ERPT is expected to be low for the former ones, it is usually higher for the latter group. Aron et. al (2014b) analyzed the ERPT in South Africa using highly disaggregated micro data for 2002-2007 time period. The results of the paper suggest highly heterogeneous response of prices to ERPT with the highest pass-through in foods with the magnitude of over 0.40 after 2 years. Özmen and Topaloğlu (2016), analyzing the pass through for sub-components of CPI in Turkey, also show heterogeneous response of prices to exchange rate changes.

7. Conclusion

This paper surveyed the empirical research on the ERPT in emerging economies. The main conclusions of the paper are as follows. (1) The empirical evidences show the recent decline in the pass-through and the contribution of low inflationary environment on this decline. (2) The size and sign of exchange rate changes , the state of the economy, the level of exchange rate volatility, and the level of inflation cause asymmetric behavior of ERPT to exchange rate changes. (3) Causes of exchange rate changes could lead to differential impacts of even same-size exchange rate movements on prices. (4) The degree of the pass-through is different across different sub-categories of price indices.

The findings in the empirical literature have important suggestions for policy makers. As pass-through appears to be different in different setting and in response to different shocks, past-measures of pass-through may not be very good predictors of future patterns of the pass through. Therefore, policy maker should not assume that the pass-through is constant or should not always use a rule of thumb to predict the pass-through.

Table 1

Summary of Empirical Findings on ERPT Across Countries

Country	Study	Model	Time Period	Horizon	ERPT
Brazil	Kolhscheen (2010)	VAR	Jan 1999 - Oct 2008	12 months	0.32
	Nogueira and León-Ledesmab (2009)*	Single Equation	Jan 1999 - Dec 2007	Long-run	0.08
	Ghosh (2013)	Single Equation	2000Q1 - 2010Q1	Long-run	0.47
South Korea	Kolhscheen (2010)	VAR	Dec 1997 - Oct 2008	12 months	0.20
	Ito and Sato (2008)	VAR	Dec 1997 - Dec 2006	12 months	0.07
	Prasertnukul et. al. (2010)	Single Equation	Apr 1998 - Jun 2007	Long-Run	0.06
	Edwards (2006)	Single Equation	1999Q1 - 2005Q4	Long-run	0.03
Mexico	Kolhscheen (2010)	VAR	Dec 1994 - Oct 2008	12 months	0.13
	Edwards (2006)	Single Equation	1999Q1 - 2005Q4	Long-run	0.02
	Ghosh (2013)	Single Equation	2000Q1 - 2010Q1	Long-run	0.01
	Peóna and Brindisb (2014)*	VAR	Jan 2001 - Mar 2013	6 months	0.02
	Espada (2013)*	VAR	Jun 2001 - Aug 2012	12 months	0.03
Indonesia	Kolhscheen (2010)	VAR	Aug 1997 - Oct 2008	12 months	0.60
	Arintoko (2011)*	Single Equation	1997Q4 - 2009Q4	Long-Run	0.11
	Ito and Sato (2008)	VAR	Jan 1998 - Dec 2006	12 months	0.40
	Prasertnukul et. al. (2010)	Single Equation	Jul 2005 - June 2007	Long-Run	0.10
South Africa	Aron et. al. (2014b)*	Single Equation	Jan 1980 - Dec 2009	12 months	0.50
	Kolhscheen (2010)	VAR	Mar 1995 - Oct 2008	12 months	0.25
	Aron et. al. (2014b)*	Single Equation	Jan 1995 - Dec 2010	13 months	0.40
	Aron et. al. (2014b)	Single Equation	2002 - 2007	2 years	0.30
Thailand	Jitpokkasame (2007)*	Single Equation	1995 - 2005	Long-Run	0.18
	Kolhscheen (2010)	VAR	Jul 1997 - Oct 2008	12 months	0.16
	Ito and Sato (2008)	VAR	Jul 1997 - Dec 2006	12 months	0.14
	Prasertnukul et. al. (2010)	Single Equation	May 2000 - Jun 2007	Long-Run	0.12
	Chai-anant et al. (2008)*	VAR	Jan 2000 - Jun 2008	12 months	0.18
	Wattanakoon (2013)*	Single Equation	Jan 2000 - Aug 2011	Long-Run	0.14
Czech Republic	Kolhscheen (2010)	VAR	May 1997 - Oct 2008	12 months	0.52
	Kucharčuková et. al. (2013)*	VAR	Jan 1998 - March 2011	6 months	0.11
	Hajeka and Horvath (2016)*	VAR	Jan 1998 – Aug 2013	2 years	0.50
	María-Dolores	Single Equation	Jan 2000 - June 2006	Long-Run	0.17
Philippines	Kolhscheen (2010)	VAR	Dec 1997 - Ocr 2008	12 months	0.09
	Ito and Sato (2008)	VAR	Aug 1997 - Dec 2006	12 months	0.06
	Prasertnukul et. al. (2010)	Single Equation	Jan 2002 - June 2007	Long-Run	0.00
	Central Bank of Philippines *	Single Equation	2002-2015	Long-Run	0.00
Malaysia	Ahmad (2009)*	VAR	1980 - 2006	Long-Run	0.18
	Ito and Sato (2008)	VAR	Aug 1997 - Dec 2006	12 months	0.03
	Bank Negara (2012)*		July 2005 - June 2011	Long-Run	0.005-0.015

Chile	Edwards (2006)	Single Equation	1994Q3 - 2005Q4	Long-run	0.01
	Morande and Tapia (2002)*	VAR	Jan 1996 - Dec 2001	12 months	0.10
	Ghosh (2013)	Single Equation	2000Q1 - 2010Q1	Long-run	0.04
	Justel and Sansone (2015)*	VAR	Jan 2002 - Dec 2013	24 months	0.14
Colombia	Ghosh (2013)	Single Equation	2000Q1 - 2010Q1	Long-run	0.03
Poland	Arratibel and Michaelis (2014)	VAR	1996Q1 - 2012Q3	18 months	0.10
	María-Dolores	Single Equation	Jan 2000 - June 2006	Long-run	0.24
Hungary	María-Dolores	Single Equation	Jan 2000 - June 2006	Long-run	0.49
	Hajnal et. al. (2015)*	Single Equation, VAR	2001Q3-2014Q2	Long-run	0.10-0.15
Peru	Winkelried (2014)*	VAR	Apr 2005 - Apr 2011	Long-Run	0.10
India	Khundrakpam (2007) *	Single Equation	July 1991 - March 2005	Long-Run	0.09
	Kapur and Behera (2012)*	VAR	1996Q2 - 2011Q1	Long-Run	0.10
	Bhattacharya (2008)*	Single Equation, VAR	Sept 1997 - Oct 2007	Long-Run	0.03-0.17
China	Jin (2012) *	Single Equation	Jan 1996 - July 2005	Long Run	0.14
	Shu and Su (2009) *	Single Equation	1998Q2 – 2007Q4	Long-Run	0.20
	Jiang and Kim (2013)*	VAR	Jan 1999 - Sept 2009	12 months	0.60
	Wang and Li (2010)*	Single Equation	Jan 2001 - Mar 2008	Long Run	0.20
	Jin (2012) *	Single Equation	Aug 2005 - April 2010	Long Run	0.03
Romania	Stoian and Murarașu (2015)	Single Equation, VAR	Jan 2005 - Dec 2014	Long-Run	0.07
Russia	Ponomarev et. al. (2016) *	VAR	Jan 2002 - Dec 2012	12 months	0.48
	Central Bank of Russia*	VAR	Feb 2009 - July 2014	5 months	0.13
Turkey	Arslaner et al. (2015)*	Single Equation, VAR	Jan 1986 - July 2013	12 months	0.15
	Kara and Öğünç (2008)*	VAR	May 2001 - Dec 2004	18 months	0.30
	Kara and Öğünç (2012)*	VAR	Mar 2002 - Jun 2011	12 months	0.15
	Kilinc and Tunc (2017)	SVAR	Jan 2006 – Jun 2015	12 months	0.18

Note. (*) denotes country-specific studies.

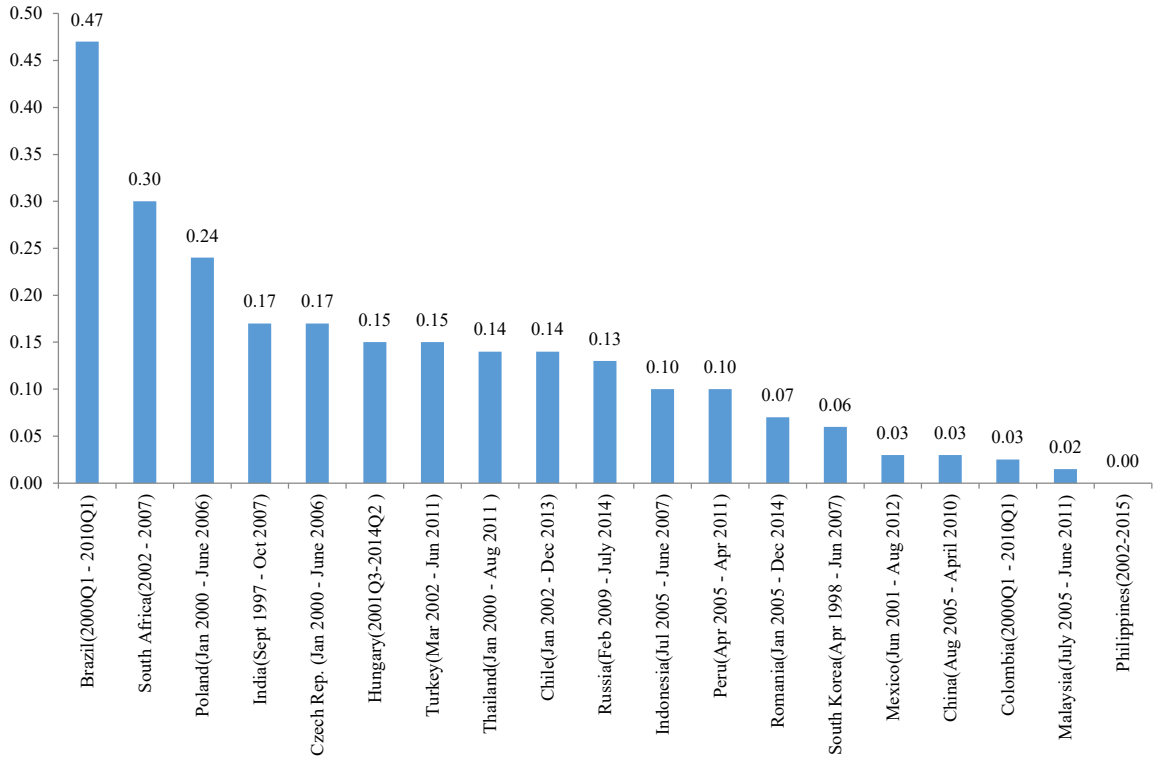

Figure 1. The Latest Estimates of ERPT in the Literature for Some Emerging Countries

Table 2

Summary of Empirical Findings on Asymmetric ERPT Across Countries

Country	Study	Model	Time Period	Horizon		ERPT
India	Khundrakpam (2007)	Single Equation	Jul 1991 - Mar 2005	Long-Run	Appreciations	0.20
					Depreciations	0.05
Brazil	Correa and Minella (2010)	Threshold VAR	1995Q1 - 2005Q4	3 months	Appreciations	0.00
					Depreciations	0.11
Poland	Przystupaa and Wrobel (2011)	Single Equation	1997Q1 - 2008Q1	Long-Run	Appreciations	0.02-0.07
					Depreciations	0.25
Colombia	Rincón and Rodríguez (2016)	Non-Linear VAR	Jun 2002 - May 2015	12 months	Appreciations	0.11
					Depreciations	0.13
Romania	Stoian and Murarașu (2015)	Single Equation, VAR	Jan 2000 - Dec 2014	Long-Run	Appreciations	0.15
					Depreciations	0.29
Peru	Forero and Vega (2015)	VAR	Jan 1992 - Dec 2014	12 Months	Appreciations	0.20
					Depreciations	0.10
Brazil	Correa and Minella (2010)	Threshold VAR	1995Q1 - 2005Q4	3 months	Weak Growth	0.00
					Strong Growth	0.09
Poland	Przystupaa and Wrobel (2011)	Single Equation	1997Q1 - 2008Q1	Long-Run	Weak Growth	0.09
					Strong Growth	0.27
Romania	Stoian and Murarașu (2015)	Single Equation, VAR	Jan 2000 - Dec 2014	3 months	High Inflation Environment	0.14
				3 months	Low Inflation environment	0.07
Hungary	Hajnal et. al. (2015)	Single Equation, VAR	2001Q3-2014Q2	Long-run	High Inflation Environment	0.60
					Low Inflation environment	0.10
Colombia	Rincón and Rodríguez (2016)	Non-Linear VAR	Jun 2002 - May 2015	12 months	High Inflation Environment	0.29
					Low Inflation environment	0.23
Brazil	Correa and Minella (2010)	Threshold VAR	1995Q1 - 2005Q4	3 months	High Volatile Env.	0.07
					Low Volatile Env	0.80
India	Khundrakpam (2007)	Single Equation	Jul 1991 - Mar 2005	Long-Run	Small Changes	0.21
					Large Changes	0.08
Colombia	Rincón and Rodríguez (2016)	Non-Linear VAR	Jun 2002 - May 2015	12 months	Small Changes	0.11
					Large Changes	0.13

References

Ahmad, N. B. (2009). *The dynamics of exchange rate pass-through into domestic prices in Malaysia*. (Doctoral Thesis) International Islamic University of Malaysia.

Aleem, A. & Lahiani, A. (2014). A threshold vector autoregression model of exchange rate Pass-through in Mexico. *Research in International Business and Finance,* 30, 24– 33.

Alper, K. (2013). *Exchange rate pass-through to domestic prices in Turkish Economy*. Master Thesis, Middle East Technical University.

Arbatli, E. C. (2003). Exchange rate pass-through in Turkey: looking for asymmetries. *Central Bank Review*, 3(2), 85-124.

Arslaner, F., Arslaner, N. & Kal,. S. H. (2015). sources of asymmetry and non-linearity in pass-through of exchange rate and import price to consumer price inflation for the Turkish economy during inflation targeting regime. *Central Bank of the Republic of Turkey Working Paper, 1530*.

Arintoko, A. (2011). Structural breaks and bilateral exchange rate pass-through: an empirical case of India-united states. *Jurnal Ekonomi Pembangunan*, 12(1), 1-14.

Aron, J., Farrell, G., Muellbauer, J. & Sinclair, P. (2014a). Exchange rate pass-through to import prices, and monetary policy in south Africa. *The Journal of Development Studies*, 50(1), 144-164.

Aron, J., Creamer, K., Muellbauer, K. & Rankin, J. N. (2014b). Exchange rate pass-through to consumer prices in South Africa: Evidence from micro-data. *The Journal of Development Studies*, 50(1), 165-185.

Arratibel, O. & Michaelis, H. (2014). The Impact of monetary policy and exchange rate shocks in Poland: Evidence from a time-varying VAR. *European Central Bank Working Paper,* 1636.

Babecka-Kucharcukova, O. (2009). Transmission of exchange rate shocks into domestic inflation: The Case of the Czech Republic. *Czech Journal of Economics and Finance*, 59(2), 137-152.

Bache, I. W. (2006). Econometrics of exchange rate pass-through. *Norges Bank Doctoral Dissertations in Economics,* No:6.

Bank Negara (2012). Outlook and Policy in 2012.

Barhoumi, K. (2006). Differences in long run exchange rate pass-through into import prices in developing countries: An empirical investigation. *Economic Modelling,* 23(6), 926–951.

Bhattacharya, R., Patnaik, I. & Shah, A. (2008). Exchange rate pass-through in India. *National Institute of Public Finance and Policy*, New Delhi.

Campa, J. M. & Goldberg, L. S. (2002). Exchange rate pass-through into import prices: A macro or micro phenomenon. *NBER Working Paper*, 8934.

Campa, J. M. & Goldberg L. S. (2005). Exchange Rate Pass-through into Import Prices. *The Review of Economics and Statistics*, 2005, 87(4), 679–690

Carranza, L., Galdon-Sanchez, J. E. & Gomez-Biscarri, J. (2009). Exchange rate and inflation dynamics in dollarized economies. *Journal of Development Economics*, 89(1), 98-108.

Caselli, F. G. & Roitman, A. (2016). Non-linear exchange rate pass-through in emerging markets. *IMF Working Paper* 16/1.

Central Bank of Russia (2014). Monetary Policy Report 3-2014.

Chai-anant, C., Pongsaparn R. & Tansuwanarat K. (2008). Role of exchange rate in monetary policy under inflation targeting: A case study of Thailand. *Bank of Thailand Symposium*.

Choudhri, E. U., & Hakura, D. S. (2015). Exchange rate pass-through to domestic prices: Does the inflationary environment matter? *Journal of International Money and Finance*, 25(4), 614-639.

Correa, A. S. & Minella, A. (2010). Nonlinear mechanisms of the exchange rate pass-through: A Phillips Curve model with threshold for Brazil. *Revista Brasileira de Economia*, 64(3), 231–243.

Coulibaly, D. & Kempf, H. (2010). Does inflation targeting decrease exchange rate pass-through in emerging countries? *Documents de travail du Centre d'Economie de la Sorbonne,* No. 2010.49.

Devereux, M. B. & Yetman, J. (2010). Price adjustment and exchange rate pass-through. *Journal of International Money and Finance*, 29(1), 181-200.

Edwards, K. & Sahminan, S. (2008). Exchange rate movements in Indonesia: Determinants, effects, and policy challenges. *Bank Indonesia Working Paper,* 25/2008.

Edwards, S. (2006). The relationship between exchange rates and inflation targeting revisited. *Central Bank of Chile Working Paper*, 409.

Espada, J. F. C. (2013). Estimating the exchange rate pass-through to prices in Mexico. *Monetaria*, 1(2), 287-316.

Floden, M. & Wilander, F. (2006). State dependent pricing, invoicing currency, and exchange rate pass-through. *Journal of International Economics,* 70, 178–196.

Forbes, K, Hjortsoe, I. & Nenova, T. (2015). The shocks matter: improving our estimates of exchange rate pass-through. *Bank of England Monetary Policy Committee Unit Discussion Papers 43.*

Forero, F. J. P. & Vega, M. (2015). Asymmetric exchange rate pass-through: Evidence from Peru. *Central Bank of Peru Working Paper*, 2015-011

Frankel , J., Parsley, D. & Wei, S. (2012). Slow pass-through around the World: A new import for developing countries. *Open Economies Review*, 23(2), 213-251.

Gagnon E. J., & Ihrig J. (2004). Monetary policy and exchange rate pass-through. *International Journal of Finance & Economics*, 9(4), pages 315-338.

Ghosh, A. (2013). Exchange rate pass through, macro fundamentals and regime choice in Latin America. *Journal of Macroeconomics,* 35, 163–171.

Guinigundo, D. C. (2008). Transmission mechanism of monetary policy in the Philippines. *BIS Papers*, 35, 413-425.

Hajeka, J. & Horvath, R. (2016). Exchange rate pass-through in an emerging market: The case of the Czech Republic. *Emerging Markets Finance and Trade*, 52(11), 2624-35.

Hajnal, M. Molnár, G. & Várhegyi, J. (2015). Exchange rate pass-through after the crisis: The Hungarian experience. *MNB Occasional Papers*, 121.

Hau, H. (2002). Real exchange rate volatility and economic openness: Theory and evidence. *Journal of Money, Credit and Banking,* 34(3), 611-630.

Ito, T. & Sato, K. (2008). Exchange rate changes and inflation in post-crisis Asian Economies: Vector autoregression analysis of the exchange rate pass-through. *Journal of Money, Credit and Banking*, 40(7), 1407-1438.

Jiang, J. & Kim, D. (2013). Exchange rate pass-through to inflation in China. *Economic Modelling*, 33, 900–912.

Jin, X. (2012). An empirical study of exchange rate pass-through in China. *Panoeconomicus*, 59(2), 135-156

Jitpokkasame, P. (2007). *Exchange rate pass through consumer price in Thailand*. Master Thesis, Thammasat Univerisity.

Justel, S. & Sansone, A. (2015). Exchange rate pass-through to prices: VAR evidence for Chile. *Central Bank of Chile Working Paper*, 747.

Kapur, M. & Behera, H. (2012). Monetary transmission mechanism in India: A quarterly model. *Reserve Bank of India Working Paper*, 09/2012

Kara, H., Küçük-Tuger, H., Özlale, U., Tuger, B. & Yücel, E. M. (2007). Exchange rate regimes and pass-through: Evidence from the Turkish Economy. *Contemporary Economic Policy*, 25(2), 206-225.

Kara, A. H. & Ogunc, F. (2008). Inflation targeting and exchange rate pass-through: The Turkish experience. *Emerging Market Finance & Trade* 44(6), 52–66.

Kara, A. H. & Ogunc, F. (2012). Döviz kuru ve ithalat fiyatlarinin yurtici fiyatlara etkisi. *İktisat İsletme ve Finans,* 27(317), 9–28.

Khundrakpam, J. K. (2007). Economic reforms and exchange rate pass-through to domestic prices in India. *BIS Working Paper*, 225.

Kılınç, M., Tunç, C. & Yörükoğlu, M. (2016). Twin stability problem: Joint issue of high current account deficit and high inflation. In: Bank for International Settlements (ed.), Inflation mechanisms, expectations and monetary policy, 89, (361-371) Bank for International Settlements.

Kılınç, M. & Tunç, C. (2017). Exchange rate pass-through in a small open economy: A structural VAR approach. *Bulletin of Economic Research*, forthcoming.

Kohlscheen, E. (2010). Emerging floaters: Pass-throughs and (Some) New commodity currencies. *Journal of International Money and Finance,* 29, 1580–1595.

Kucharčuková, O. B., Franta, M., Hájková, D., Král, D. Kubicová, I., Podpiera, A. & Saxa, B. (2013). What we know about monetary policy transmission in the Czech Republic: Collection of empirical results. *The Research and Policy Notes of the Czech National Bank,* 2013-1.

Kuncoro, H. (2015). Inflation targeting, exchange rate pass-through, and monetary policy rule in Indonesia. *International Journal of Business, Economics and Law*, 7(3), 14-25.

Leigh, D., & Rossi, M. (2002). Exchange rate pass-through in Turkey. *IMF Working Paper* 02/204.

Lopez-Villavicencio, A. & Mignon, V. (2016). Exchange rate pass-through in emerging countries: do the inflation environment, monetary policy regime and institutional quality matter? *Document de Travail Working Paper*, 2016-18.

Maria-Dolores, R. (2010). Exchange rate pass-through in new member states and candidate countries of the EU. *International Review of Economics and Finance,* 19(1), 23–35.

McCarthy, J. (2000). Pass-through of exchange rates and import prices to domestic inflation in some industrialized economies. *BIS Working Paper*, 79.

Menon, J. (1996). The degree and determinants of exchange rate pass-through: Market structure, non-tariff barriers and multinational corporations. *The Economic Journal*, 106(435), 434-444.

Mihaljek, D. & Klau, M. (2008). Exchange rate pass-through in emerging market economies: what has changed and why? *BIS Papers* No:35, 10,-130.

Morandé, F. G. & Tapia, M. (2002). Exchange rate policy in Chile: From the band to floating and beyond. *Central Bank of Chile Working Papers*, 152.

Nogueira, R. P. (2010). Inflation environment and lower exchange rate pass-through in Brazil: Is there a relationship? *Revista Brasileira de Economia,* 64(1), 49-56.

Nogueira, R. P. & Leon-Ledesmab, M. A. (2009). Fear of floating in Brazil: Did inflation targeting matter? *The North American Journal of Economics and Finance*, 20(3), 255–266.

Odria, L. R. M., Castillo, P. & Rodriguez, G. (2012). Does the exchange rate pass-through into prices change when inflation targeting is adopted? The Peruvian case study between 1994 and 2007. *Journal of Macroeconomics,* 34(4), 1154–1166.

Ozkan, I. & Erden, L. (2015). Time-varying nature and macroeconomic determinants of exchange rate pass-through. *International Review of Economics and Finance,* 38, 56–66

Özmen, M. U. & Topaloğlu, M. (2016). Disaggregated evidence for exchange rate and import price pass-through in the light of identification issues, aggregation bias and heterogeneity. *Central Bank of the Republic of Turkey Working Paper, 1708*.

Peóna, S. B. G. & Brindisb, M. A. R. (2014). Analyzing the exchange rate pass-through in Mexico: Evidence post inflation targeting implementation. *Ensayos sobre Política Económica*, 32(74), 18-35.

Ponomarev, Y., Trunin, P. & Uluykaev, A. (2016). Exchange rate pass-through in Russia. *Problems of Economic Transition*, 58(1), 54-72.

Prasertnukul, W. Kim, D. & Kakinaka, M. (2010). Exchange rates, price levels, and inflation targeting: Evidence from Asian Countries. *Japan and the World Economy*, 22(3), 173–182.

Przystupa J. & Wrobel E. (2011). Asymmetry of the exchange rate pass-through. *Eastern European Economics*, 49(1), 30-51.

Razafimahefa, I. F. (2012). Exchange rate pass-through in sub-saharan African Economies and its determinants. *IMF Working Paper,* 12/141.

Reinhart, C., Rogoff, K. S. & Savastano, M. A. (2014). Addicted to Dollars. *Annals of Economics and Finance*, 15(1), 1-50.

Rincón, H. & Rodríguez, N. (2016). Nonlinear pass-through of exchange rate shocks on inflation: A bayesian smooth transition VAR approach. *Central Bank of Colombia Working Paper,* 930

Rowland, P. (2013). Exchange rate pass-through to domestic prices: The case of Colombia. *Central Bank of Colombia Working Paper*, 254.

Sadeghi, S. K., Feshari, M., Marvasti, M. B. & Ghanbari, Z. (2015). Exchange rate pass - through and inflation in Dollarized economies: Evidence from the Middle Eastern and North African Countries. *Iranian Economic Review*, 19(2), 139-147.

Shambaugh, J. (2008). A new look at pass-through. *Journal of International Money and Finance,* 27, 560-591.

Shu, C. & Su, Xiaojing. (2009). Exchange rate pass-through in China. *China & World Economy,* 17(1), 33-46.

Stoian, A. & Murarașu, B. (2015). On the exchange rate pass-through in Romania. *National Bank of Romania Occasional Papers*, 18.

Taylor, J. B. (2000). Low inflation, pass-through, and the pricing power of firms. *European Economic Review*, 44, 1389-1408.

Vonnak, B. (2010). Risk premium shocks, monetary policy and exchange rate pass-through in the Czech Republic, Hungary and Poland. *Ensayos sobre Politica Economic*a, 28(61), 308-351.

Wang, J. & Li, N. (2010). Exchange rate pass-through: The case of China. *Frontiers of Economics in China*, 5(3), 356–374

Wattanakoon, P. (2013). Exchange rate pass-through and inflation in Thailand. *Thammasat Economic Journal*, 31(2). 64-80.

Winkelried, D. (2014). Exchange rate pass-through and inflation targeting in Peru. *Empirical Economics,* 46(4), 1181-1196.

Yüncüler, Ç. (2011). Pass-through of external factors into price indicators in Turkey. *Central Bank Review*, 11(2), 71-84.