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Do Exchange Rates Affect Inflation? Evidence from Emerging Market Economies

Döviz Kurları Enflasyonu Etkiler Mi? Gelişmekte Olan Piyasa Ekonomilerinden Ispat

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ABSTRACT

After the 1980s, chronic inflation in Turkey has shaken confidence in the domestic currency, and thus operating debit-credit transactions through dollars. The aim of this paper is to analyse the impact of exchange rate pass-through into inflation in both Turkey and emerging market economies that were highly dollarized and shifted to a flexible exchange rate regime, together with inflation targeting policy in an attempt to switch to the advanced economy. This paper also studies whether stabilization programs under flexible exchange rate regimes and particularly inflation targeting policy may have eliminated dollarization in the periods 1995-2001 and 2002-2010.

Keywords: De-dollarization, inflation targeting, exchange rate pass-through

ÖZET

Türkiye'de 1980 sonrasında görülen kronik enflasyon ülke parasına olan güvenin azalmasına yol açarak borç alacak ilişkilerinin döviz üzerinden gerçekleşmesine neden olmuştur. Bu çalışmanın amacı güçlü ekonomiye geçiş programı çerçevesinde uygulanan enflasyon hedeflemesi politikası sonucunda geçiş etkisinin, enflasyon üzerinde ne derece belirgin olduğunu saptamaya çalışmaktır. Benzer bir etki, geçmişte dolarizasyon baskısında olan ve daha sonra esnek kur sistemine geçen diğer gelişen piyasa ekonomileri için de incelenecektir. Bu sayede esnek kur sistemi altında uygulanan istikrar politikalarının ve özellikle enflasyon hedeflemesi politikasının dolarizasyon olgusunu azaltıp azaltmadığı anlamaya çalışılacaktır. Sözkonusu çalışma 1995-2001 ve 2002-2010 olmak üzere iki ayrı dönemi kapsamaktadır.

Anahtar Kelimeler: Ters dolarizasyon, enflasyon hedeflemesi politikası, döviz kuru geçiş etkisi

INTRODUCTION

As Reinhart (2006) suggests, dollarization is the phenomenon of emerging market economies. In general governments borrow money denominated in dollars, individuals hold dollar deposits, firms and households borrow in dollars. In this regard, dollarization may be thought of as dollarization of liabilities in emerging market economies.

It has been suggested that dollarization of liabilities is one of the leading issues in emerging market economies. In the 1990s, due to a rapid increase in financial globalization, this phenomenon has had an adverse effect on liabilites, thus leading to the fragile economy. Due to the fact that capital flows have either reversed direction or have stopped suddenly, economies faced a currency crisis (Calvo et al., 2008; Reinhart, 2006; Baqueiro et al., 2002).

Mexico (1994), East Asia (1997), Russia (1998), Brazil (1999), Turkey (2001) and Argentina (2001) serve as well-known examples of financial crises' that have two characteristic features: pre-crisis adopted hybrid exchange rate regimes and control weaknesses over financial systems (Ghosh, 2006; Fischer, 2001; Summers, 2000). Domestic currency-denominated government and private sector debt deepened the effect of the crises'. In this case, the debt structure in emerging market economies, including inconsistency related to exchange rates, is explained by the original sin hypothesis (Eichengreen and Hausmann, 1999). In an attempt to overcome issues resulting from hybrid exchange rate regimes, flexible exchange rate regimes have been suggested (Velasco, 2002; Fischer, 2001; Edwards, 2001).

In a post-crisis economy, in order to coordinate high credibility of macroeconomic policies, a number of these countries adopted inflation targeting policy and thus floating exchange rate regimes were regarded as the ideal system in these countries (Stone and Bhundia, 2004; Eichengreen and Hausmann, 1999).

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Although emerging market economies adopted flexible exchange rate regimes to avoid liability dollarization, exchange rate volatility in countries with high liability dollarization prevents them from the successful launch of flexible exchange rate regimes (Devereux et al., 2006; Calvo and Reinhart, 2002). In the "fear of floating hypothesis", given the issue at stake, together with high capital flows due to financial globalization, weakened the efficiency of monetary policy. The extent of pass-through effect gets bigger in those countries with strong dollarization, and of course, for central banks whose primary objective is to sustain price stability, this has a negative impact on the probability of success of monetary policy.

However, central banks that have achieved inflation targeting policy and increased their credibility can improve the credibility of domestic currency units and facilitate to de-dolarize. A low level of inflation due to credible monetary policies may decrease the exchange rate pass-through effect, and thereby leading monetary policies to function more efficiently (Honohan and Shi, 2001; Taylor, 2000; McCarthy, 2000).

It can be assumed that in emerging market economies, there is a strong correlation between inflation and goods prices. In the late 1970s and early 1980s, there is a high correlation, and in the middle 1980s and the first half of the 1990s, a low correlation between goods prices (oil exclusive) and inflation. In general, the findings suggest that oil prices have a strong impact on inflation. However, other goods prices have an upward pressure on inflation. From the findings, it is likely therefore that in emerging market economies, oil has a stronger effect on inflation in goods prices and there is also a positive correlation between goods prices and inflation (Oduncu et al., 2011; Furlong and Ingenito, 1996). Hence, it could conceivably be hypothesised that goods prices play an important role in determining inflation.

The aim of this paper is to study, as the main determinants of inflation, goods prices and exchange rates and analyse the impact of producer prices on consumer price inflation. Second, the study seeks to compare the period over which the country in question implemented inflation targeting with the period in which it did not. Variables that we used in this study are consistent with other studies in the literature. The paper has been organized in the following way: In Section 2, the literature has been reviewed. Section 3 describes the model and data set. Section 4 presents the method we used and the findings of this study. Section 5 offers some concluding remarks.

LITERATURE REVIEW

The study of McCarthy (2000), who analysed the correlation between a decrease in inflation and a change in exchange rates, is the starting point of other studies in this regard.

In recent years, McCarthy (2000), Hunt and Isard (2003), Hahn (2003), Campa and Goldberg (2006), and Ihrig et al. (2006) are well-known examples of studies pointing out the exchange rate pass-through effect within open-economy macroeconomics in developed countries. However, there have been other studies such as: Mihaljek and Klau (2000), Frankel et al. (2005), and Choudhri and Hakura (2001) for developing economies.

Taylor (2000) found a strong, positive correlation between inflation and exchange rate pass-through effect. A low level of inflation reduces the degree of exchange rate pass-through.

According to Honohan and Shi (2001), there is a strong, positive correlation between the degree of dollarization and exchange rate pass-through. Dollarization hampers the functioning of monetary transmission mechanism and prevents from taking precautions against exchange rate shocks.

Mishkin (2008) suggests that the time horizon and the magnitude of exchange rate pass-through should be analysed to estimate inflation rates and implement monetary policies in a timely and effective manner. Hunt and Isard (2003) mention that in economies with a high level of exchange rate pass-through, because the extent of exchange rate pass-through is ambiguous, estimation models of inflation should be restructured. In these economies, central banks should follow exchange rate shocks and volatility which is the reasoning behind the fear of floating.

In the study of Furlong and Ingenito (1996), the impact of goods prices on inflation have two aspects: the fact that shocks to goods prices have an immediate, direct effect on prices and that a change in goods prices through exchange rates has an indirect effect on inflation. According to the findings of the study, goods prices (oil exclusive) from the 1970s till the 1990s had a substantial impact on inflation; however, this effect has decreased over time.

According to Asia Economic Monitor (2011), an increase in food and energy prices has had an upward pressure on inflation in emerging market economies in Southeast Asia; however, this effect has stemmed from the increase in goods prices after the 2008 crisis. In the same vein, De Gregorio (2012) suggests that in emerging market economics that are dependent on food and energy imports, an increase in goods prices

inevitably has an upward pressure on inflation rates. Oduncu et al. (2011) claim that there is a positive correlation between goods prices and inflation rates in emerging market economies.

Kara et al. (2005) claim that when Turkey switched to a floating exchange rate regime, the exchange rate pass-through had a stronger impact on the downward trend in prices for non-traded goods, in comparision to traded goods.

According to the findings of Türkcan's study (2005), the exchange rate pass-through into the imports of final goods is somewhat slower than it is in intermediate goods. Based on countries by imports, the exchange rate pass-through to final (intermediate) goods prices is faster in the long-run (short-run). However, depending on sectors, the exchange rate pass-through to intermediate goods is faster than it is in final goods in both short- and long-run.

Özçiçek (2007) states that wholesale price index responds more to changes in exchange rates, when compared to consumer price index.

Peker and Görmüş (2008) study the exchange rate pass-through into prices in Turkey. According to the findings of their study, crude oil prices have no substantial impact on inflation. In comparision with monetary policy and demand shocks, exchange rates affect inflation more.

MODEL AND DATA SET

In this study, we refer to the model used in the study of Campa and Goldberg (2006). Variables in a three-month time series were observed and generalized method of moments (GMM) was applied during the period 1995–2001 and 2002–2010. The model is as follows:

where P denotes the Consumer Price Index, RER

$$\Delta P_t = \alpha_0 + \sum_{i=0}^{n} \alpha_1 \Delta P_{t-i} + \sum_{i=0}^{n} \alpha_2 \Delta RER_{t-i} + \sum_{i=0}^{n} \alpha_2 \Delta RER_{t-i} + \sum_{i=0}^{n} \alpha_3 \Delta GDP_{t-i} + \sum_{i=0}^{n} \alpha_4 \Delta MCI_{t-i} + \sum_{i=0}^{n} \alpha_5 \Delta VIX_{t-i} + \varepsilon_t \quad (1)$$

is the Real Exchange Rate, GDP is the Gross Domestic Product, MCI is the Moody's Commodity Price Index that serves as a proxy for goods prices, VIX is the Volatility Index, and ε is the residual term.

In the study, we used the data for Turkey and those countries that had dollarization and switched to a flexible exchange rate regime in the 1990s. We refer to the study of Stone and Bhundia (2004) for countries selected such as: Brazil, The Republic of South Africa, Mexico, Peru, Thailand and Turkey.

The study was implemented for two periods, that is, the first period 1995-2001 in which there was a high level of dollarization and the second period 2002-2010 that is applicable to the countries that had inflation targeting policy and switched to a flexible exchange rate regime. We used the data obtained from IMF International Financial Statistics and Moody's dataset.

In this study, the Levin, Lin & Chu unit root test that serves well for a pooled panel data regression analysis was applied. As can be seen from Table 1, the level of series is not stationary, except for GDP, in the first period whereas the first difference of series is stationary. In the second period, the findings show that the level of both inflation and the VIX is stationary, where as the first difference of all series is stationary (See Appendix for tables of descriptive statistics showing the data set of the study).

Table 1: Unit Root Test

Periods	Period 1995-2001		Period 2002-2010	
Method	Levin, Lin & Chu Unit Root Test		Levin, Lin & Chu Unit Root Test	
Variables	Level	First Difference	Level	First Difference
P	1.08573	-2.17342**	-4.36367***	-5.63163***
RER	-0.99481	-3.85695***	-0.76795	-10.1376***
GDP	-1.94559**	-6.69480***	0.88337	-1.81062**
MCI	-0.52184	-5.84843***	0.76842	-9.06881***
VIX	-	-	-1.76174**	-10.5239***

Note that ** and *** indicate the 5% and 1% levels of significance, respectively.
(**Source:** Authors' calculations.)

METHOD AND RESULTS

In this study, in an attempt to examine the exchange rate pass-through effect, we applied a dynamic panel data approach to those countries noted earlier. In order to examine the attributes of individuals, the Hausman test may be used to differentiate both the fixed effect model and the random effect model. According to the Hausman test, if the null hypothesis (H_0) is not rejected due to higher efficiency, the random effects are preferred. If the alternative hypothesis (H_1) is not rejected, the fixed effects are consistent and thus preferred. Table 2 shows the findings of the Hausman test.

Table 2: Hausman Test

Period 1995-2001			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.961460	4	0.7428
Period 2002-2010			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	1.459940	4	0.8337

(**Source:** Authors' calculations.)

It can be seen from Table 3a that in the period 1995-2001, it is the real exchange rate that has a stronger effect on inflation; it has an immediate, positive, and statistically significant impact on prices. Lagged value of inflation has a positive, statistically significant impact on inflation at the 1% level; it is the second variable that also has a relatively stronger effect on domestic prices. On the other hand, the growth rate has a positive, statistically significant impact on inflation; however, as can be seen from the coefficient of it, it has a relatively lower impact on inflation, in comparision to the real exchange rate and lagged value of inflation. The impact of commodity prices on inflation is positive, but not statistically significant.

Concerning the period 2002-2010, according to the findings in Table 3b, the effect of real exchange rate on inflation becomes less after inflation targeting regime; its impact on inflation is positive, statistically significant. Likewise, the impact of lagged value of inflation on inflation becomes weaker in comparision with the previous period, its effect on inflation is positive, statistically significant at the 1% level. Unlike the previous period, it seems that commodity prices have the most significant influence on inflation and its impact on inflation is positive, statistically significant at the 1% level. In the same vein, the effect of growth rate on inflation increases when compared to the previous period; its impact on inflation is positive and statistically significant.

In an attempt to analyse the impact of financial crisis (that erupted in the U.S. in 2007) on inflation, the variable "Volatility Index" (VIX) that is widely used as a measure of market risk in the literature is added to the model. An increase in the VIX causes a market risk which may lead to a sudden stop in capital flows or the fact that capital flows have reversed in emerging market economies. In that case a unit of currency may devalue, thereby leading to inflationary pressure in the economy. Therefore, an increase in the VIX has an indirect impact on inflation. As can be seen from Table 3b, the effect of the VIX on inflation is not statistically significant for those countries noted earlier.

Table 3: Regression Analysis

Table 3a: Period 1995-2001

Variable	Coefficient	Std. Error	t-Statistic
Constant*	0.279640	0.149773	1.867097
DP(-1)***	0.822284	0.069261	11.87224
DRER**	1.170673	0.464337	2.521169
DGDP**	0.303750	0.103362	2.938697
DMCI	0.507275	0.625184	0.811401
Statistics			
R-squared	0.717609	Durbin-Watson Stat	2.06525
Adjusted R-squared	0.710415	Prob	0.00000

Note that * ,** and *** indicate the 10%, 5% and 1% levels of significance, respectively. (**Source:** Authors' calculations.)

Table 3b: Period 2002-2010

Variable	Coefficient	Std. Error	t-Statistic
Constant***	0.253946	0.033121	7.667320
DP(-1)***	0.797939	0.044124	18.08391
DRER(-1)**	0.958644	0.436056	2.198443
DGDP(-1)**	0.460543	0.226045	2.037397
DMCI(-1)***	1.103810	0.329948	3.345409
DVIX(-1)	0.007972	0.007668	1.039647
Statistics			
R-squared	0.777076	Durbin-Watson Stat	1.539785
Adjusted R-squared	0.771447	Prob(F-statistic)	0.000000

Note that ** and *** indicate the 5% and 1% levels of significance, respectively. (**Source:** Authors' calculations.)

CONCLUDING REMARKS

The countries included in this study that implemented a hybrid exchange rate regime in the 1990s, as well as switching to a flexible exchange rate system and inflation targeting policy in the 2000s were chosen to be analysed. They enabled us to analyse whether inflation targeting policy may help the mechanism of de-dollarization. The findings of the study show that inflation targeting policy may help emerging market economies eliminate the effect of dollarization. These findings are consistent with literature following the study of Taylor (2000) that shows the positive correlation between inflation and de-dollarization.

Concerning monetary policy, the impact of lagged value of inflation on prices becomes weaker due to inflationary pressure decreasing, and consequently

expectations may be successfully managed. It may be that prices of goods have increased due to the fact that economic growth puts upward pressure on the demand for goods in those countries previously mentioned, or due to price increases on goods around the globe. However, the pressure goods put on inflation is not a problem that can be solved by solely monetary policy. In the countries that started to implement inflation targeting policy, it would not be wrong to say that the impact of economic growth on inflation becomes stronger because of demand-pull inflation.

END NOTES

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APPENDIX

Table 1a: Descriptive Statistics in the Period 1995-2001

	P	RER	GDP	MCI
Mean	2.312321	1.223785	10.20451	7.215926
Median	2.093057	1.273872	10.48557	7.208484
Maximum	6.096695	3.818781	13.87585	7.368703
Minimum	-3.186086	-3.194183	6.933774	7.057771
Std. Dev.	1.303283	1.619455	2.327360	0.096802
Skewness	-0.181641	-0.591493	0.047814	-0.124524
Kurtosis	4.494380	3.249598	1.602007	1.640290
Jarque-Bera	16.55603*	10.23227*	13.74471*	13.37586*
Probability	0.000254	0.005999	0.001036	0.001246
Sum	388.4699	205.5959	1714.358	1212.276
Sum Sq. Dev.	283.6571	437.9802	904.5727	1.564891
Observations	168	168	168	168

(**Note:** Jarque-Bera shows the test results of normal distribution, and null hypothesis depicts that series is normally distributed. The symbol * illustrates that series is not normally distributed.)

Table 1b: Descriptive Statistics in the Period 2002-2010

	P	RER	GDP	MCI	VIX
Mean	1.471356	1.733584	11.29126	7.883420	21.55435
Median	1.557477	1.525428	11.52420	7.911381	20.61000
Maximum	4.254899	3.777218	15.07301	8.711104	53.97333
Minimum	-2.635730	0.158712	7.189304	7.150538	11.88333
Std. Dev.	0.924126	1.102717	2.366939	0.417989	9.427842
Skewness	-0.836708	0.426779	-0.270819	0.049928	1.568411
Kurtosis	5.687921	2.026347	1.837660	1.938691	5.666060
Jarque-Bera	90.22718*	15.08905*	14.79966*	10.22713*	152.5278*
Probability	0.000000	0.000529	0.000611	0.006015	0.000000
Sum	317.8130	374.4542	2438.912	1702.819	4655.740
Sum Sq. Dev.	183.6119	261.4365	1204.516	37.56361	19110.10
Observations	216	216	216	216	216

(**Note:** Jarque-Bera shows the test results of normal distribution, and null hypothesis depicts that series is normally distributed. The symbol * illustrates that series is not normally distributed.)