RESEARCH NOTE

Exchange Rate Pass-Through for Selected Southeast Asian Countries

Stephanie L. Chan De La Salle University stephanielchan@yahoo.com

> Long- and short-run exchange rate pass-through coefficients were estimated for Malaysia, Indonesia, Thailand, and the Philippines using a simple model based on absolute purchasing power parity. Results were lower than 0.30 for all four countries. Cointegration tests confirmed the existence of a long-run relationship between CPI, GDP, exchange rate, and the U.S. PPI for the countries studied. However, the post-estimation tests showed that a more comprehensive model may need to be developed. The low coefficients reflect the success of the countries in stabilizing their inflation levels, though implying that exchange rate interventions may be less effective in restoring trade balance.

Keywords: Exchange rate pass-through, international trade, inflation, prices

Daniels and Vanhoose (2005) define exchange rate pass-through as the effect of a currency depreciation that results in higher domestic prices of imported goods and services. The degree of pass-through has implications on a country's balance of payment. Complete pass-through means that any change in the value of domestic currency will translate to changes in the current account balance. However, studies have found that passthrough is rarely equal to one. There is also the prevailing belief that the degree of pass-through is lower for industrialized countries than for developing ones. The following section will review the literature on exchange rate pass-through, as well as attempt to estimate the pass-through for four ASEAN countries, namely Indonesia, Malaysia, the Philippines, and Thailand using a simple model used by Ghosh and Rajan (2006).

According to Menon (1995), it was the resilience of trade balances of industrialized countries to

exchange rate changes that led to the massive study on pass-through. The fact that trade flows did not respond to the exchange rate changes prompted researchers to take a second look at the relationship between exchange rates and prices of internationallytraded goods. Menon also reflects the importance of the Marshall-Lerner theory in assessing effects of exchange rate changes on the trade balance, and, ultimately, the economy. However, there are also other theories that have been developed, with emphasis on microeconomic factors. Aside from the elasticity of demand and supply, these theories include models of imperfect competition and prevalence of multinational corporations.

REVIEW OF RELATED LITERATURE

Due to data availability, most studies on passthrough have been conducted on industrialized countries. Recently, however, scholars have taken steps to close the research gap separating industrialized and developing nations. Also, with the developments in time-series econometrics, researchers have tried to re-estimate relationships in order to avoid falling into the spurious regression trap.

Prior to 1995, most of the studies had used ordinary least squares in assessing pass-through. Since McCarthy's (1999) recursive vector autoregressive (VAR) study, there has been a surge in the use of his framework for emerging as well as industrialized nations. On the other hand, there are also those that continue to use single equation systems taking into account the level of integration of the variables. These studies are discussed here.

McCarthy's (1999) study provided a brief overview of the external factors that were suspected to affect pass-through. Among these factors are exchange rate volatility and aggregate demand uncertainty. The study was also one of the first to use a recursive VAR technique for industrialized countries under the rationale of a distribution pricing chain. He argued that the determinants of import, wholesale, and consumer prices were demand, supply, and exchange rate shocks. Using appropriate proxies for the factors (output gap, oil prices, and exchange rate changes, respectively), McCarthy proceeded to use the Cholesky decomposition in order to impose a sequence of how these variables feed into each other. He found that, in general, effects of exchange rates on import price pass-through were negative in the short run, and that the effects on producer price indices were weak and had the wrong sign in some cases. Also, there was low pass-through found for consumer prices. He found that import price shocks had greater effects on producer and consumer prices (compared to exchange rate shocks).

Zorzi, Hahn, and Sanchez (2007) modeled the pricing chain for the emerging markets in Asia, Latin America, and Central and Eastern Europe, using McCarthy's approach as basis. They found that pass-through declines along the pricing chain. They also noted that, contrary to belief, the pass-through for the emerging countries in the sample were not higher than those for industrialized countries such as Japan and the United States. They also found that there was a positive correlation between inflation rates and pass-through. Surprisingly, one of their results showed that the relationship between pass-through and trade openness is weak.

Hyder and Shah (2004) also used McCarthy's recursive VAR system on Pakistan's monthly data to estimate pass-through to consumer prices. The difference is that they also used disaggregated data for wholesale and consumer prices, that is, they were able to assess the effect of exchange rate changes on specific sectors. They found that for the wholesale price index (WPI), the "Fuel and Lighting" sub-classification was more sensitive to changes in the exchange rate. For the consumer price index (CPI), it was the "Transport and Communication" group that was more susceptible.

Gopinath, Itskhoki, and Rigobon (2007) showed that pass-through effects are sensitive to the price index used as the dependent variable. Using unpublished data from the U.S. Bureau of Labor Statistics, they constructed two price indices for the United States – one including only goods priced in dollars, and another using only goods priced in the exporter's currency. Interestingly, they found that the pass-through for the non-dollar index was very close to one (0.96) and the pass-through for the dollar index was very low at 0.03. When they used the published price index, the passthrough was low at around 0.20. The same general pattern was observed when the regression was replicated for the different European countries.

While exchange rate pass-through effects have been estimated for most Asian countries, no studies have focused on India. Ghosh and Rajan (2007) filled this void by using a simple model of passthrough to consumer prices for India. The use of both the ordinary least squares and the vector error-correction approaches revealed that India has incomplete pass-through at around 40%. Given that India has been liberalizing since 1991, Ghosh and Rajan estimated pass-through rates for two sub-periods (before and after liberalization) and found that, as expected, a slightly higher passthrough effect was observed for the postliberalization period, owing to the increased openness of the economy. In contrast, when Hakura and Choudhri (2001) regressed a proxy for openness against pass-through, they found it to be insignificant. This also ran counter to the results achieved by Zorzi, Hahn, and Sanchez (2007).

There is a myriad of methods on how to calculate pass-through to prices. Liu and Tsang (2008) presented pass-through estimates for Hong Kong by using a two-step method. First, they used the conventional specification for import pass-through, that is, estimating the import price index as a function of current and lagged values for foreign production costs of key trading partners and an exchange rate measure. Next, they used a simultaneous equation system to disentangle the effects of internal and external factors in the rise of the consumer price index. In their system, consumer prices are assumed to be affected by import prices and unit labor costs, while unit labor costs are assumed to be affected by price expectations, output gap, and lagged values of import prices. They pointed out that their solutions, when nested into each other, embodied the Phillips' curve idea. They were able to do this as they had unit wage data. The wage data actually proxies domestic costs. However, disentangling the data using the simultaneous equation system, they found that domestic data influenced consumer prices more than exchange rates.

Many studies have found that pass-through has been diminishing through time for a large group of countries. Taylor (2002), as cited in numerous papers, including that of Hakura and Choudhri (2001), and Gagnon and Ihrig (2001), theorized that a low inflationary environment leads to a low exchange rate pass-through to domestic prices. The mechanism is as follows: if costs changes (exchange rate increases) are perceived to be more persistent, prices respond more to cost increases. A high inflation environment would, therefore, tend to increase the exchange rate pass-through. Conversely, a low inflation environment would lessen the pass-through.

In response, Hakura and Choudhri (2001) tested Taylor's hypothesis using panel data covering 71 countries. They also developed a framework incorporating staggered pricing. Initially, they used a simple log-linear relation, expressing the logarithm of current domestic CPI as a function of the logarithm of the past domestic CPI, the nominal effective interest rate, and the past foreign CPI. They separated the countries based on their inflation levels, after which, they regressed the pass-through coefficient against the average inflation rate, variance of the inflation rate, the import-to-GDP ratio, and variance of the exchange rate change. They consistently found that the inflation rate significantly affects the pass-through, which validates Taylor's statement.

Gagnon and Ihrig (2001) developed a theoretical model to explain why inflation does not rise despite depreciation in a country's currency. They proposed that it is the credibility of a country's monetary policy that ultimately determines how inflation reacts to exchange rate changes. More specifically, they employed a Taylor-type rule where the target inflation rate and the intensity of the central bank's response to shocks determine interest rates. They explained that when individuals believe that the central bank will act to stabilize inflation when threatened by external shocks, they are less likely to increase prices, and thus, will not see an attendant increase in pass-through.

DESCRIPTIVE STATISTICS

A quick survey on the exchange rate passthrough literature makes it apparent that the focus is on industrialized nations. In contrast, this study aims to assess the exchange rate pass-through for four ASEAN countries (Malaysia, Thailand, Indonesia, and the Philippines).

This study uses quarterly data, which was derived from the International Financial Statistics (IFS) database. The choice of the length of period was constrained by the availability of data. Table 1 summarizes the data set length for each of the countries under study.

Table 1

Summary of Data Set Lengths

Country	Indonesia	Malaysia	Philippines	Thailand
First observation	1991,Q1	1971,Q1	1981,Q1	1993, Q1
Last observation	2007,Q1	2007, Q1	2007, Q1	2007, Q1
Total observations	69	129	105	57

Global Price Levels

Figure 1 shows the path of the price levels in the world. The U.S. producer's price index (PPI) level and the CPI for the group of industrialized economies have a fairly straight upward path. In contrast, for the rest of the groups, there was a shift in the mid 1990s. The rest of the world is starting to catch up with the price levels of the industrialized nations. Figures for World CPI include every nation, including those of developing and emerging countries. Ghosh and Rajan (2006) used the U.S. PPI and CPI as proxies for the price levels of the source country. Figure 1 is presented for comparative purposes.

Domestic Inflation Rates

Figure 2 presents the inflation levels of each of the countries under study from 1999 to 2007. It can be seen that for all countries except Indonesia, the inflation figures have been tamed to below 10% for the time period. Indonesia's inflation is still volatile and breaches the 10% mark from time to time. According to Hakura and Choudhri, the level of inflation may have something to do with the pass-through coefficients. According to them, a low-inflation environment automatically leads to a lower pass-through coefficient because it tempers expectations of price-setters. Conversely, a high inflation environment may induce higher passthrough. Note that all but Malaysia had adopted inflation targeting as their primary monetary policy, although Indonesia has yet to feel its effects.

Trade Balances

According to Daniels and Vanhoose (2005), the smaller a country is, the more dependent it is on imports and the higher its pass-through is. Figure 3 shows the absolute values of the trade balance for the selected countries in million dollars. It can be seen that only the Philippines is a net importer among the four nations for the last 10 years.

FRAMEWORK

Following Ghosh and Rajan (2006), this study will utilize a single-equation model to determine the passthrough coefficient for consumer prices for the selected ASEAN countries. The model is as follows:

$$\ln CPI = \alpha_0 + \alpha_1 \ln ER + \alpha_2 \ln PPI_{foreign} + \alpha_3 \ln Y + \varepsilon$$

where

- In *CPI* is the natural logarithm of the domestic consumer price index
- In *ER* is the natural logarithm of the bilateral exchange rate of the domestic currency against the US dollar
- In *PPI* foreign is the natural logarithm of the foreign producer price index, proxied by the U.S. PPI following Ghosh and Rajan (2006)
- In Y is the natural logarithm of nominal income, proxied by nominal gross domestic product, or industrial production index for Malaysia (due to the lack of GNP/GDP quarterly data)

ε is an error term



Source: International Financial Statistics (www.imfstatistics.org)



The pass-through equation is based on absolute purchasing power parity, which states that the price of a particular good in country A should be equal to the price of the same good in country B, multiplied by the exchange rate. This is denoted by $P_Y^A = E_B^A P_Y^B$, where Y stands for a particular good. The relation may be estimated as linear by transforming the variables into their logarithm forms, leading to $\ln P_Y^A = \ln ER_B^A + \ln P_Y^B$. If the coefficient for $\ln ER$ is equal to one, then there is complete pass-through. If it is less than one, then pass-through is incomplete (Ghosh and Rajan, 2006).

Ghosh and Rajan (2006) generalized the equation for all goods. They used the CPI as a

proxy for prices of domestic goods and U.S. PPI as a proxy for the price of imported goods. The domestic income variable was included as a control for aggregate demand.

As Menon (1995) pointed out, the time series properties of the data cannot be ignored. Therefore, unit root tests have to be conducted for each variable in question to determine its integration level. It is expected that most economic variables are integrated of order 1 (or I(1)) in nature, as there is a decidedly upward trend through time. Regressions among I(1) variables are spurious, unless they are cointegrated. If the variables for a particular country turned out to be not cointegrated, regressions would have to be done in differenced form. Also, this means that



Source: Bangko Sentral ng Pilipinas (www.bsp.gov.ph)





Source: Bangko Sentral ng Pilipinas (www.bsp.gov.ph)



there is no long-run relationship between the variables of interest.

The coefficient for $\ln ER$ will be the passthrough estimate for each of the countries under study. The existence of a long-run relationship between the said variables will also be tested, using the cointegration tests by Johansen (1988) as cited in Enders (2004). Also, if the variables turn out to be I(1) but are cointegrated, then they may be estimated in level form and those estimates can be interpreted as the long-run relationships between the variables.

GENERAL OBSERVATIONS

Unit root tests for the same variable under different time periods lead to different results. This shows that one cannot trust that a particular series can be characterized as stationary over time. As each country under study has different time spans, the unit root tests have been conducted on the U.S. PPI variable and the World CPI index for each time span to assess their suitability for cointegration with each country. Generally, the U.S. PPI was found to be I(1) when the Augmented Dickey Fuller (ADF) tests (i.e., tests for a unit root in a time series sample) were run in the level form. In this case, when the ADF tests are run on the first differences of U.S. PPI, they should reject the null hypothesis of a unit root. However, in some cases, there were still unit roots found using some variations of the unit root test. On the other hand, evidence for the World CPI series was mixed. From the unit root tests, it appears that the World CPI series is I(2). As such, it will not be used in the regression, lest the results become spurious.

The unit root test was conducted for all four countries. In general, the variables are stationary when tested in differenced form. For all four countries, the data was found to be cointegrated. The Philippines requires that a time trend be included for the said variables to be cointegrated. Others were already cointegrated without alterations.

The Philippines

For the Philippine case, the variables used were the consumer price index, bilateral peso to dollar exchange rate, the U.S. PPI series for all finished goods, and nominal GDP. The variables were found to be cointegrated, but only if a time trend was included in the regression. (See Table 2.)

All of the coefficients were significant and the pass-through estimate was low at 19.24%. This was similar to Ito's (2005) findings as cited in Ghosh and Rajan (2006). Ito's estimate of exchange rate pass-through for consumer prices was 15% for a similar time period. Ito also noted that, generally, pass-through into consumer prices was lower than for import prices. It is interesting how the time trend and the U.S. PPI index had negative coefficients, considering that both the U.S. PPI and the Philippine CPI move upwards through time.

Malaysia

Due to the lack of GDP or GNP data, the industrial production index of Malaysia was used as a proxy for domestic demand, as done by Ghosh and Rajan (2006). (See Table 3.)

The results are similar to the Philippine case, in that the pass-through coefficient was significant and low at 23%. In contrast, the coefficient for U.S. PPI was positive and high.

Indonesia

For Indonesia, the variables used were the CPI index excluding petroleum, average bilateral exchange rate, nominal GDP, and the U.S. PPI. The variables for Indonesia were shown to be cointegrated using four different specifications (no constant, restricted constant, unrestricted constant, and restricted trend). The specification with the lowest Akaike information criterion was restricted trend. When a trend was included in the regression, both the trend and the pass-through coefficient were statistically insignificant. Because of this, the regression was run without the trend. (See Table 4.)

Table 2

Long-Run Relation between Exchange Rate and Prices: Philippines

Philippines	Coefficient	Standard Error	t-stat	<i>p</i> -value
GDP	1.0078	0.1131	8.9150	0.0000
ER	0.1924	0.0908	2.1180	0.0367
USPPI	-0.0088	0.0032	-2.7080	0.0080
Time	-0.5719	0.2882	-1.9850	0.0499
Constant	0.6311	1.4374	0.4390	0.6616

Note: $R^2 = 0.9815$; Adjusted $R^2 = 0.9808$; Durbin-Watson statistic = 1.3260

Table 3

Long-Run Relation between Exchange Rate and Prices: Malaysia

Philippines	Coefficient	Standard Error	t-stat	<i>p</i> -value
Industrial				
Production Index	0.1336	0.0150	8.8960	0.0000
ER	0.2306	0.0288	8.0060	0.0000
USPPI	0.5962	0.0345	17.2630	0.0000
Constant	0.7454	0.1254	5.9430	0.0000

Note: $R^2 = 0.9872$; Adjusted $R^2 = 0.9869$; Durbin-Watson statistic = 0.1504

Table 4

Long-Run Relation between Exchange Rate and Prices: Indonesia

Philippines	Coefficient	Standard Error	t-stat	<i>p</i> -value
GDP	0.6180	0.0572	10.8010	0.0000
ER	0.1108	0.0359	3.0810	0.0030
USPPI	-0.1681	0.3669	-0.4580	0.6484
Constant	-3.4311	1.3683	-2.5080	0.0147

Note: $R^2 = 0.9928$; Adjusted $R^2 = 0.9925$; Durbin-Watson statistic = 0.3762

Table 5

Long-Run Relation between Exchange Rate and Prices: Thailand

Philippines	Coefficient	Standard Error	t-stat	<i>p</i> -value
GDP	0.3493	0.0489	7.1490	0.0000
ER	0.2448	0.0193	12.6720	0.0000
USPPI	0.0971	0.1484	0.6540	0.5158
Constant	0.7197	0.4191	1.7170	0.0918

Note: $R^2 = 0.9691$; Adjusted $R^2 = 0.9673$; Durbin-Watson statistic = 0.6164

Table 6

ECM and Lagged Differences of the Exchange Rate

Significant at 5% and 1% levels	Philippines	Malaysia	Indonesia	Thailand
Optimal lag length	10	5	12	9
ECM coefficient	-0.1720	0.0127	-0.5615	-0.2521
$\beta_j \Delta \ln ER_{t-j}$				
J = 1 $J = 2$	0.1280	0.0535		0.1199 0.1576
<i>J</i> = 3	0.0907			
J = 4			-0.1903	
<i>J</i> = 5			-0.1676	

The pass-through coefficient for Indonesia was very low at 11%, which is contrary to Ito's findings (using VAR) that consumer price pass-through was at 57%. Also, this runs contrary to Hakura and Choudhri's (2001) findings that high inflation nations should have higher pass-through rates. This suggests that perhaps there are other factors that drive Indonesia's prices.

Thailand

Thailand's case is similar to that of Indonesia, wherein the best-fitting model was found to be the one with a time trend. However, the time trend itself was statistically insignificant and had small coefficients. The regression was run without the trend, without much change in the magnitude of the coefficient. (See Table 5.)

ANALYSIS OF THE LONG-RUN PASS-THROUGH ESTIMATES

Overall, the exchange rate pass-through coefficients are statistically significant and low. Also, the specification tests showed that there were omitted variables in the equation for all countries. This signifies that including only a proxy for aggregate demand may be inadequate. Also, the *R*-squared values were very

high for all equations. As Gujarati (2003) notes, when the *R*-squared is greater than the Durbin-Watson statistic, spurious regression may be a problem. However, the results of the cointegration tests show that although the variables all have unit roots, there is a valid long-run relation among them, so the levelform regressions are valid as well.

As the countries mostly have succeeded in stabilizing their inflation rates, the results partly validate Hakura and Choudhri's (2001) theory. As Gagnon and Ihrig (2001) suggest, the low pass-through signifies that the monetary authorities in each country have attained a degree of credibility. Also, it must be noted that, for the most part, the proxy for aggregate demand was significant in all four cases, which signifies that prices are partly demand-driven.

Admittedly, the use of U.S. producer prices as a proxy was made out of convenience. A better way would be to construct an index with weights based on trade volumes with top trading partners.

Also, the low pass-through coefficients may have been the result of using aggregate data. Studies that have used disaggregated data (e.g., Gopinath et al., 2007) saw higher pass-through estimates.

Short Run Relations

As the variables are cointegrated for each case, an error-correction model (ECM) may be estimated for them. The ECM is similar to an autoregressive distributed lag model (ARDL), augmented with an error-correction term. An ARDL is of the firstdifference form – wherein the first difference of the dependent variable is regressed against its own lags, as well as the first-differenced current and lagged terms of the independent variables. The ARDL is intended to capture the short-run effects of the variables on each other. The error-correction term is interpreted as the speed of adjustment when the longrun relationship among the variables is disturbed temporarily.

The ECM used is of the form:

$$\Delta \ln CPI = \sum_{i=1}^{m} \alpha_i \Delta \ln CPI_{i-i} + \sum_{j=0}^{n} \beta_j \Delta \ln ER_{i-j} + \sum_{k=0}^{o} \delta_k \Delta \ln PPI_{i-k}^{foreign} + \sum_{l=1}^{p} \phi_l \Delta \ln Y_{i-l} + \gamma ECM_{i-1} + \varepsilon$$

where the variables of interest are ECM and the various $\beta_i \Delta \ln ER_{t-j}$'s.

The EViews software (a statistical package used mainly for econometric analysis) chose different optimal lag lengths for each of the countries. It is important to note that many of the lags were statistically insignificant. However, the ECM term for each is significant. (See Table 6.)

The ECM term can be interpreted as the shortrun adjustment by the dependent variable in the short run, to any shocks that causes deviation from the long-run relationship. For the ECM to be meaningful, it must be negative and significant. The results show that all ECM terms are significant, with values ranging from 17.20% for the Philippines, to 56.15% in Indonesia. This means that Indonesia adjusts faster that the other countries, given shocks to the long-run priceexchange rate relationship. By the succeeding quarter, it will have returned to half its original level. The coefficient for Malaysia is strange in that it is very small and positive. It implies that shocks to the Malaysian relationship causes it to move further away from the long-run relationship, but the effect is very small.

On the other hand, the coefficients of the lagged exchange rate differences are the short-run passthrough rates. They may be interpreted as the change in prices caused by changes in exchange rates. Although the countries have very long optimal lags as recommended by EViews (as long as 3 years), very few variables are significant beyond the 1.5 year mark. For exchange rates, the furthest significant effect can be found on the fifth lag.

It is expected that depreciation of the domestic currency should cause prices to increase, under the assumption that the countries are net importers. The fact that Indonesia is a net exporter may explain why the signs for differences in exchange rate are negative. However, it is not convincing, as Malaysia has more exports that Indonesia.

Implications for Policy

The degree of pass-through has important implications on monetary policy. If pass-through coefficients are low, then the use of any exchange rate-based adjustments to improve the trade balance may not be as effective as other methods (Ghosh & Rajan, 2006). But as the countries under study have largely abandoned the fixed exchange rate regime, they would not be able to manipulate the exchange rates to improve the trade balance.

Devereaux, Lane, and Xu (2006) outlined a model where the best policy choice is defined by the degree of pass-through. Their model is designed to emulate an emerging market economy with the twin constraints of borrowing ability and exchange rate vulnerability. According to them, a high passthrough environment would benefit from having fixed exchange rates, or targeting non-traded portions of the CPI. On the other hand, countries with low pass-through would do better to target the CPI as a whole. Hakura and Choudhri (2001) also believe that a low exchange rate pass-through leaves the government free to pursue monetary policy, and implement inflation targeting. This is consistent with the floating exchange rates of the countries under study, and their adoption of inflation targeting (except for Malaysia).

CONCLUSION

Using a simple model, this paper estimated the pass-through coefficients for the Philippines, Malaysia, Indonesia, and Thailand. The long-run pass-through rates for all four countries were low, perhaps reflective of the low inflation rate that has been observed for the said countries in recent years. Results for Indonesia were contrary to expectations, as this study found that it was only 11%, while a study using VAR found it was 57%. Also, the significant values for post-estimation tests indicate that one must be wary of the possibility of model misspecification. More accurate results may be achieved by using multiple equation methods such as VAR. Also, better proxies for foreign prices could be constructed instead of using the U.S. PPI, as it assumes that bulk of the trade of these countries are done with the United States. Lastly, the same study could be done on disaggregated data to assess whether the pass-through coefficients were blurred by the aggregation effect.

REFERENCES

- Daniels, J. P., & Vanhoose, D. D. (2005). International monetary and financial economics (3rd ed.). Mason, OH: Thomson/ South-Western.
- Devereaux, M. B., Lane, P. R., & Xu, J. (2006). Exchange rates and monetary policy in emerging market economies. *Economic Journal*, *116*(115), 478-506.
- Enders, W. (2004). *Applied econometric time series* (2nd ed.) New York, NY: Wiley.
- Gagnon, J. E. & Ihrig, J. (2001, July). *Monetary* policy and exchange rate pass-through (FRB International Finance Discussion Paper 704).
 Washington, D.C.: Board of Governors of the Federal Reserve System (U.S.). Retrieved July 15, 2008, from http://www.federalreserve.gov/ pubs/ifdp/2001/704/default.htm
- Ghosh, A., & Rajan, R. S. (2006). Exchange rate pass-through in Asia: What does the literature tell us? Retrieved July 15, 2008, from http://www.apeaweb.org/confer/sea06/ papers/ghosh-rajan.pdf
- Ghosh, A., & Rajan, R. S. (2007). How high is exchange rate pass-through in India? Has it changed over time? The Journal of International Trade & Economic Development, 16(3), 373-382.
- Gopinath, G., Itskhoki, O., & Rigobon, R. (2007, September). Currency choice and exchange rate pass-through (NBER Working Paper W13432). Cambridge, MA: National Bureau of Economic Research. Retrieved July 15, 2008, from http://www.nber.org/papers/ w13432
- Gujarati, D. N. (2003). *Basic econometrics* (4th ed.). Boston, MA: McGraw Hill.
- Hakura, D., & Choudhri, E. U. (2001, December). Exchange rate pass-through to domestic prices: Does the inflationary environment matter? (IMF Working Paper 01/194).
 Washington, D.C.: International Monetary Fund. Retrieved July 15, 2008, from http:// www.imf.org/external/pubs/ft/wp/2001/ wp01194.pdf

- Hyder, Z., & Shah, S. (2004, June). Exchange rate pass-through to domestic prices in Pakistan (SBP Working Paper 5). Karachi: State Bank of Pakistan. Retrieved July 15, 2008, from http://www.sbp.org.pk/publications/ wpapers/2008/wp05.pdf
- Liu, L. G., & Tsang, A. (2008, March). Exchange rate pass-through to domestic inflation in Hong Kong (HKMA Working Paper 0802).
 Hong Kong: Hong Kong Monetary Authority. Retrieved July 15, 2008, from http:// www.info.gov.hk/hkma/eng/research/working/ pdf/HKMAWP08_02_full.pdf
- McCarthy, J. (1999, November). Pass-through of exchange rates and import prices to

domestic inflation in some industrialized economies (BIS Working Paper Series 79). Basel: Bank for International Settlements. Retrieved July 15, 2008, from http:// www.bis.org/publ/work79.pdf

- Menon, J. (1995). Exchange rate pass-through. Journal of Economic Surveys, 9(2), 197-231.
- Zorzi, M. C., Hahn, E., & Sanchez, M. (2007, March). Exchange rate pass-through in emerging markets (ECB Working Paper 739).
 Frankfurt am Main: European Central Bank. Retrieved July 15, 2008, from http:// www.ecb.europa.eu/pub/pdf/scpwps/ ecbwp739.pdf