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Foreign exchange markets and oil prices in Asia

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ABSTRACT

In this paper, we examine whether oil price can predict exchange rate returns for 14 Asian countries. A new GLS-based time series predictive regression model proposed by Westerlund and Narayan (WN, 2012) is used. The main finding is that higher oil price leads to future depreciation of the Vietnamese dong but future appreciations of the local currencies of Bangladesh, Cambodia, and Hong Kong. A comparison of the widely used Lewellen (2004) and WN (2012) estimators show that both provide similar results in in-sample analysis, although WN is relatively superior at longer horizons in out-of-sample analysis.

1. Introduction

Exactly how the price of oil influences exchange rates is well-established in theory. Krugman (1983) and Golub (1983) argue that higher oil prices will transfer wealth from the oil importers to oil exporters. This means that when the oil price rises, oil exporting countries may experience an appreciation of their exchange rate and oil importing countries may see a depreciation of their exchange rate. However, if the oil importer makes up a small share of the oil exporter's export market but a larger share of the oil exporter's imports, then the transfer of wealth from oil importers to oil exporters would improve the oil importer's trade balance, which would mean that the long-run effect on the exchange rate is positive for the oil importers (Corden, 1984; De Grauwe, 1996).

In the last two decades, many studies have provided strong empirical evidence that oil price and exchange rates co-move, and that oil price causes exchange rates; see, *inter alia*, Wu, Chung, and Chung (2012), Amano and van Norden (1998) and Benhad (2012) for evidence on the US; Mohammadi and Jahan-Parva (2012) for oil exporting countries; Tiwari, Dar, and Bhenja (2013) for evidence on India; Narayan, Narayan, and Prasad (2008) for evidence on Fiji; Akram (2004) for evidence on Norway; Camarero and Tamarit (2002) for evidence on Spain; and Amano and van Norden (1995) for evidence on Canada. Moreover, Chen and Chen (2007) found that oil price predicts exchange rates in G7 countries.

Some studies point to weak or no evidence of causation and co-movement. Some examples are Czudaj and Beckmann (2013) and Reboredo (2012) for the EU countries; Huang and Guo (2007) for China; Chen, Rogoff, and Rossi (2010) for

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Australia, Canada, South Africa, and Chile; Chaudhari and Daniel (1998) for 16 OECD countries; and Chinn (2000) for Asia-Pacific countries.

A key feature of this empirical literature is that there are voluminous studies on the short- and long-run co-movement and causation relationships. However, rather surprisingly, not much has been done on the subject of forecasting exchange rates using oil prices. Chen and Chen (2007) and Chen et al. (2010) are the only studies that investigate whether oil prices can predict exchange rates. Chen and Chen (2007) consider the G7 countries and use data from 1972:1 to 2005:10. Using in-sample and out-of- sample forecasting models, they find that real oil price predicts future real exchange rates. They also find that in out-of-sample evaluations, the oil price-based predictor model outperforms the random walk model at various horizons. Chen et al. (2010), on the other hand, contend that commodity prices, including the oil price, are not good predictors of exchange rates. In particular, they find that currencies belonging to four commodity exporting countries (Australia, Canada, South Africa and Chile) cannot be predicted by commodity prices, neither in in-sample nor in out-of-sample evaluations. Thus, it is evident that the limited empirical evidence on exchange rate predictability using the oil price predictor has evinced mixed results.

The aim of this paper is to fill the existing empirical research gap on the subject of exchange rate predictability based on the oil price predictor through considering a sample of 14 Asian countries. In terms of methodological contribution, the paper is particularly concerned with the selection of estimators when conducting in-sample and out-of-sample forecasting of real exchange rate returns by using the real oil price as a predictor variable. The key econometric issue in the predictability literature is that if one uses ordinary least squares (OLS), which is typically the case, one ends up with bias inference on the null hypothesis of no predictability. This is because the OLS estimator performs poorly when subjected to a persistent and an endogenous predictor. It will be shown later that for many countries in our sample, the real oil price is not only persistent, it is also endogenous. These are not the only source of biasness though. In a recent study, Westerlund and Narayan (WN, 2012) show that the OLS estimator performs even more poorly if data are characterised by heteroskedasticity. Therefore, this paper makes an econometric contribution by modelling these salient features of the data by applying a recently developed generalised least squares (GLS) estimator proposed by WN (2012). The main feature of the GLS estimator is that it accounts for not only heteroskedasticity in the model but also the persistent and endogenous behaviour of the predictor variable.

The countries studied are Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Korea, Malaysia, Myanmar, Japan, Singapore, Thailand, the Philippines, and Vietnam. These countries are especially interesting for two reasons. First, they add variety to the analysis because some of these nations are oil importers while others are oil exporters (see Table 1). They also tend to follow a mixture of exchange rate regimes, including free float, managed float, crawling peg, and Currency Board Arrangement (see Table 2). Therefore, we have at hand a set of Asian countries which are heterogeneous both in terms of the oil consumption/production, suggesting that oil price should affect them differently, and in terms of exchange rate regimes, suggesting that exchange rate responsiveness to oil price (shocks) may well be different.

Second, an interesting feature of half of the countries in our sample is that they employ oil price subsidy on petroleum products (petrol, diesel and kerosene). This subsidy has come under scrutiny since 2003 when oil prices began to rise. For

Table 1
Oil supply, petroleum consumption and trade of refined petroleum of 14 Asian economies.

	Total oil supply[a,b]			Total petroleum consumption[a,c]			Exports less imports of refined petroleum[a,d]		
	90–09	90–99	00–09	90–09	90–99	00–09	90–09	90–99	00–09
Bangladesh	4	1	6	67	48	86	−40	−24	−57
Cambodia	0	0	0	18	8	27	−18	−8	−27
China	3382	3049	3715	4890	3294	6487	−356	−254	−458
Hong Kong	0	0	0	238	176	299	−237	−173	−300
India	760	698	822	2031	1525	2538	5	−254	264
Indonesia	1405	1597	1213	1002	807	1197	−29	110	−169
Japan	6	−12	25	5363	5552	5174	−1031	−1108	−954
Korea	108	90	126	1971	1773	2169	65	−61	192
Myanmar	NA	NA	17.56	30.05	21.27	38.83	NA	NA	NA
Malaysia	737	712	763	444	377	511	−19	−69	30
Philippines	10	2	18	320	311	329	−56	−27	−85
Singapore	6	0	11	667	517	818	305	502	108
Thailand	194	97	291	741	615	867	21	−85	127
Vietnam	254	157	351	166	97	236	−160	−95	−225

Sources: US Energy Information Administration (EIA). Data for Myanmar is extracted from www.indexmundi.com/energy.

[a] These are averages for thousand barrels per day.
[b] Total oil supply includes the production of crude oil, natural gas plant liquids, and other liquids, and refinery processing gain.
[c] Total petroleum consumption includes internal consumption, refinery fuel and loss, and bunkering. Also included, where available, is direct combustion of crude oil.
[d] Refined petroleum products include but are not limited to gasoline, kerosene, distillates, liquefied petroleum gas, asphalt, lubricating oils, diesel fuels, and residual fuels.