

## Foreign exchange trading in emerging currencies: more financial, more offshore<sup>1</sup>

*Foreign exchange turnover evolves in a predictable fashion with increasing income. As income per capita rises, currency trading cuts loose from underlying current account transactions. In parallel, an increasing share of trading in the currency takes place outside the home country. At given income levels, moreover, currencies with either high or very low yields attract more trading, consistent with their role as target and funding currencies in carry trades.*

*JEL classification: C82, F31, G12, G15.*

The 2010 central bank survey of foreign exchange market activity showed rapid growth in turnover in emerging market currencies. In particular, global central banks reported that some up-and-coming currencies traded outside their home market to a much greater extent than market participants had estimated. Where one had put Chinese renminbi offshore trading at \$3 billion, for example, the central banks found \$22 billion. Similarly, offshore trading of \$17 billion in the Indian rupee surprised market participants, who had taken into account rupee trading in Singapore but not that in London or New York.<sup>2</sup>

Confronted every three years with the survey results, policymakers and market participants alike seek benchmarks for perspective. In this special feature, we provide simple benchmarks for turnover and location, and highlight some important cases that deviate from those benchmarks. In doing so, we widen and update the work of Ho et al (2005) and McCauley (2010).

We show that, as income per capita rises, a currency trades in ever greater multiples of the home economy's underlying international trade ("financialisation") and trades to a greater extent outside its home market ("internationalisation"). In April 2010, for example, the Australian dollar turned over 80 times more than Australia's imports and exports of goods and services. At the same time, 78% of this trading took place outside Australia. This first

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<sup>2</sup> HSBC (2009, p 10), Philipose (2010), BIS (2010b). The HSBC estimate, it may be noted, was published several months before the April 2010 survey; see King and Mallo (2010).

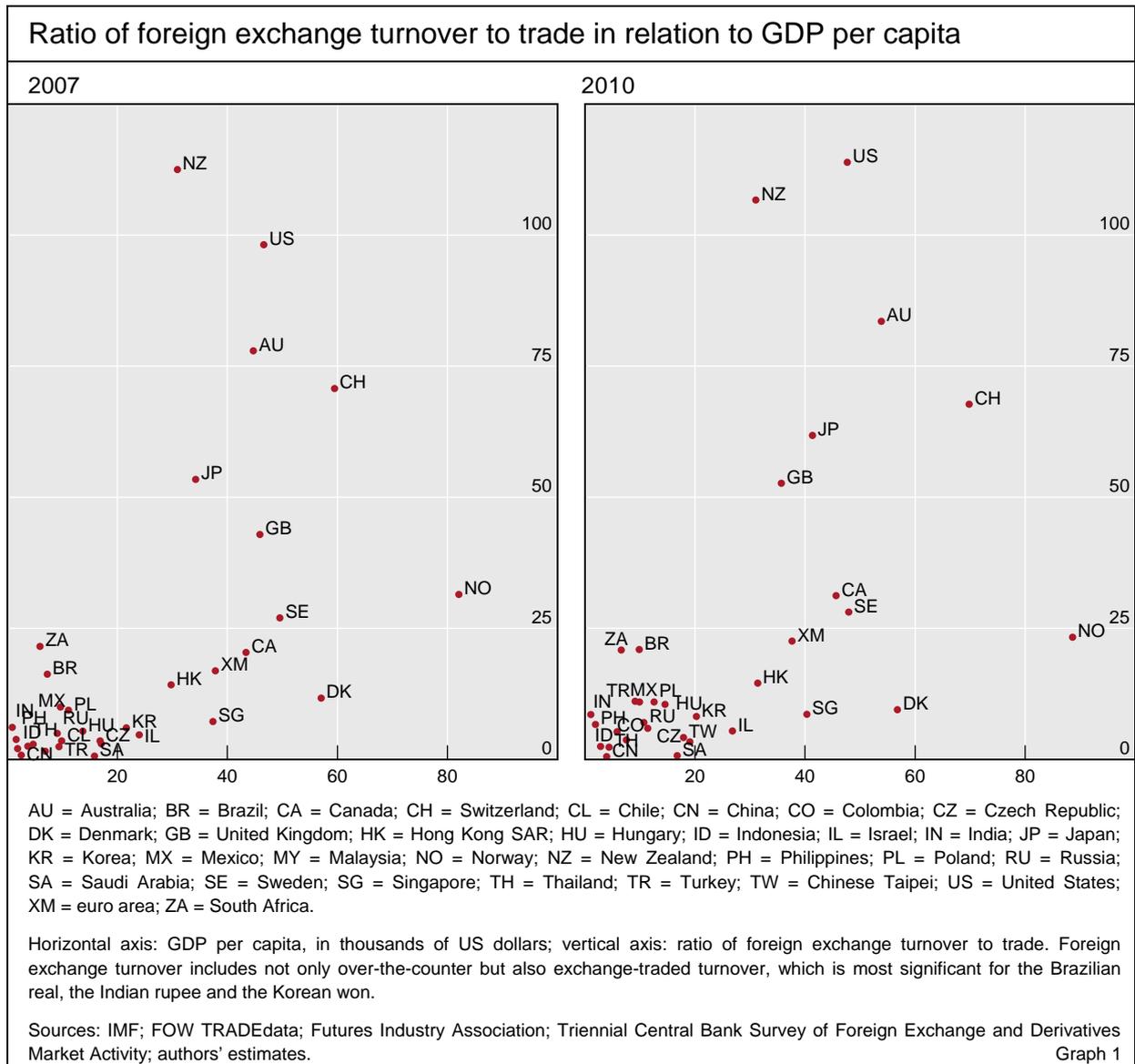
factor, income per capita, proxies for a number of related aspects, such as financial depth and complexity, and creditworthiness.

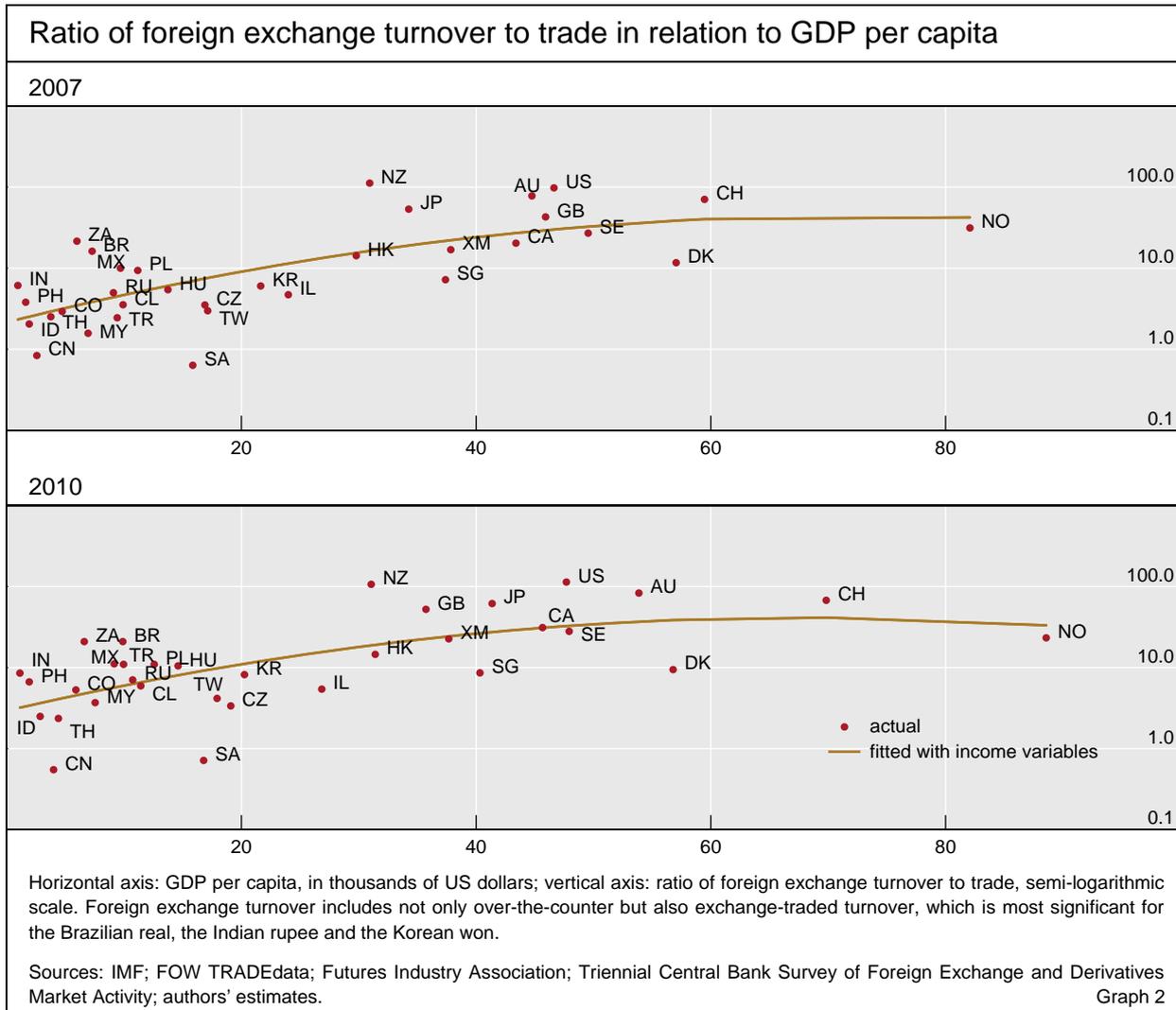
A second factor that is increasingly influencing the cross section of global turnover is the level of yields: higher-yielding and lower-yielding currencies turn over more. This may reflect the growing importance of carry trades that in effect borrow in low-yielding currencies to fund holdings of high-yielding ones.

### Financial trading

For some currencies, international trade drives turnover; for others, financial transactions predominate. If one divides foreign exchange turnover in a given currency by underlying exports plus imports of goods and services of the currency's home country, the resulting ratio ranges widely (Graph 1). Here we employ an inclusive definition of foreign exchange trading, including spot, forward, futures, swap and option trading, both over the counter and on

Trading becomes more financial ...





organised exchanges, both deliverable and non-deliverable. For example, the renminbi trades in daily amounts that are similar to daily Chinese exports and imports of goods and services – a ratio of around 1. Other currencies, such as the US dollar or Japanese yen, trade in amounts closer to 100 times the value of corresponding international trade transactions.

... as economies develop ...

What accounts for such dispersion? As economies develop, trading of their currencies grows faster than their current account transactions. To analyse this relationship, we re-plot this simple relationship, putting the ratio on a logarithmic scale (Graph 2). With this transformation, the relationship is nearly linear, with some evidence of a plateau at higher income levels. Real income and its square can explain half (in 2007) or two fifths (in 2010) of the ratios of foreign exchange to trade (Table 1, column 1).

This relationship between turnover and income held quite consistently from the April 2007 to the April 2010 survey. Thus, currencies trade more actively in relation to flows of goods and services (in Graph 2, they move out the curve) as their respective economies develop.

On this view of the data, the US dollar does not trade much more actively relative to the international benchmark than the yen. Indeed, it is relatively less

Regression analysis of foreign exchange turnover as a ratio of trade								
	Dependent variable: log (FX turnover/trade)							
	2007				2010			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
GDP per capita	0.036 (3.241)***	0.044 (3.913)***	0.041 (3.135)***	0.043 (3.155)***	0.034 (3.116)***	0.050 (4.749)***	0.050 (3.987)***	0.041 (3.360)***
GDP per capita squared	-2.4E-07 (-1.559)	-2.9E-07 (-1.925)*	-2.7E-07 (-1.655)*	-3.2E-07 (-1.924)*	-2.4E-07 (-1.750)*	-3.7E-07 (-2.917)**	-3.7E-07 (-2.634)**	-3.3E-07 (-2.274)**
Interest rates		0.041 (2.151)**	0.041 (2.073)**			0.123 (3.327)***	0.123 (3.242)***	
Interest rate: absolute deviation/median				0.194 (1.922)*				0.285 (2.676)**
Non-deliverable forward dummy			-0.061 (-0.761)	-0.082 (-0.411)			-0.004 (-0.024)	0.013 (0.066)
Adj R <sup>2</sup>	0.48	0.54	0.52	0.51	0.39	0.54	0.52	0.48

Cross section of the currencies of the 33 economies listed in Graph 1. T-statistics in parenthesis; \*\*\*, \*\* and \* denote 1%, 5% and 10% significance, respectively. Non-deliverable forward dummy takes value 1 for the currencies of the following economies: Brazil, Chile, China, Chinese Taipei, Colombia, India, Indonesia, Korea, Malaysia, the Philippines and Russia.

Sources: IMF; FOW TRADEdata; Futures Industry Association; Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity; authors' estimates.

Table 1

active than the New Zealand dollar. This is surprising, given the dollar's unparalleled role in the foreign exchange swap market, in which funding in one currency is briefly exchanged for funding in another currency.<sup>3</sup>

On the basis of the relationship between turnover and income, some currencies do stand out. While the global turnover figures for the Chinese renminbi and the Indian rupee were quite close, at a respective \$34 billion and \$38 billion, the currencies are outliers in opposite directions with respect to underlying trade and income.<sup>4</sup> Recall that the Chinese economy is both larger and more open than that of India, so the similar dollar amounts translate into ratios that differ by an order of magnitude. Thus, the renminbi trades less than China's trade and income would suggest, while the rupee trades more than India's trade and income would seem to warrant. Part of the difference may arise from the contrast between the large outright foreign investment in India's equity market and the restriction of most foreign investment to Chinese shares listed offshore ("H shares" and "N shares"). If, relative to China's trade and income, renminbi turnover were to reach rupee-like levels, the case for including the renminbi in the SDR would strengthen.<sup>5</sup>

... although some currencies stand out

Given the relationship between income and turnover, multivariate regressions show that foreign exchange turnover is higher for currencies with

High yields also raise turnover

<sup>3</sup> For instance, the recent financial crisis highlighted the role of dollar swap transactions in affording Hungarian and Polish banks access to Swiss franc funding (BIS (2010a, pp 57–8)).

<sup>4</sup> The difference may be overstated if Chinese customer trades are underreported. See Ho et al (2005, p 53) for a possible source of underreporting.

<sup>5</sup> See the discussion of the renminbi in IMF (2010, pp 11 and 31–5).

relatively high yields (Table 1, columns 2 and 3). Turnover of high-yielding currencies benefits from activity undertaken in pursuit of strategies in which positions in high-yielding currencies are funded with lower-yielding currencies (“carry trades”).<sup>6</sup> Many such trades occur in forward markets (both deliverable and non-deliverable) and futures (Galati et al (2007)).

From another perspective, interest rate differentials exert a remarkably similar effect on trading as reported in the two surveys. This is evident in column 4 of Table 1, where the extremity of yields is measured with the absolute value of the yield deviation from the international median as a ratio of that median. Here the measured effect is consistent as between 2007 and 2010. This would imply that the 2010 Brazilian yield of 8.7%, at more than four times the median of 2%, attracted more turnover than the 2007 yield of 12.5%, which was less than three times the median then. Globally low yields force international investors to redefine what constitutes a high-yielding currency.

There is no evidence that restrictions on a currency’s international use systematically influence turnover (Table 1, columns 3 and 4). Such controls lead to offshore trading in the form of non-deliverable forwards that are split from onshore trading, which can impair liquidity (Tsuyuguchi and Wooldridge (2007)). At the same time, such restrictions also create arbitrage opportunities that can encourage trading. It appears that these opposing effects leave currencies that trade in non-deliverable form neither more nor less traded than one would predict from income and yields.

## Offshore trading

Trading more  
offshore ...

Currencies also show a wide dispersion in the geography of trading. The central bank survey defines the location of a trade (and hence one of the counterparties) by the location of the sales desk of the reporting dealer. Some currencies trade largely in their home market, either between two residents (“strictly domestic” trading) or between a resident and a non-resident (“onshore-offshore” trading). Others trade for the most part outside the home market between two non-residents (“strictly offshore” trading). For instance, trading in the Brazilian real, the Indian rupee, the Korean won and the Russian rouble occurs mostly at home, or at least involves a resident, while other currencies are overwhelmingly traded outside the home market (Graph 3).

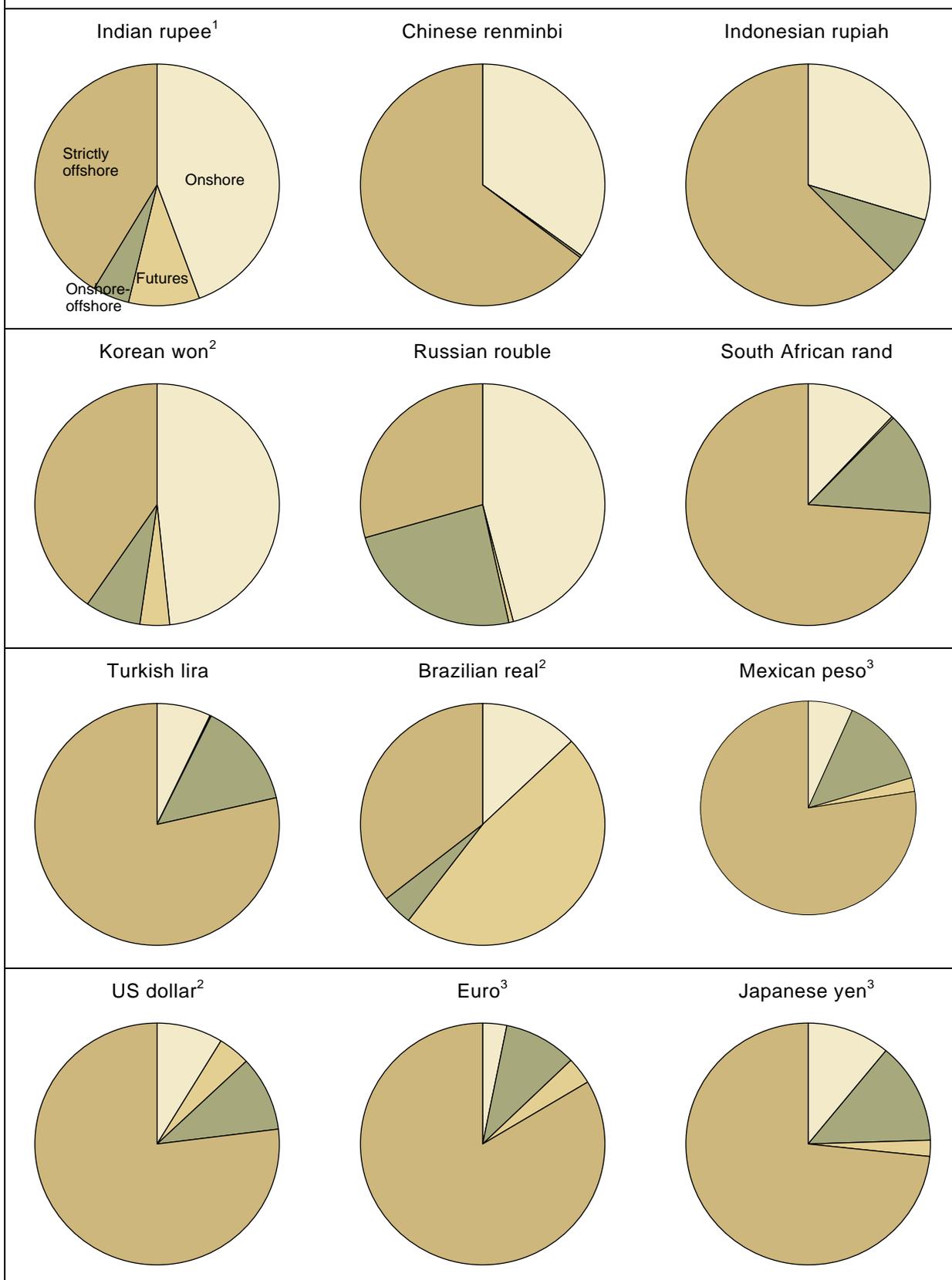
... as economies  
develop ...

The benchmark for the geography of currency trading is similar to that for financial trading. Currencies of higher-income countries also tend to trade more

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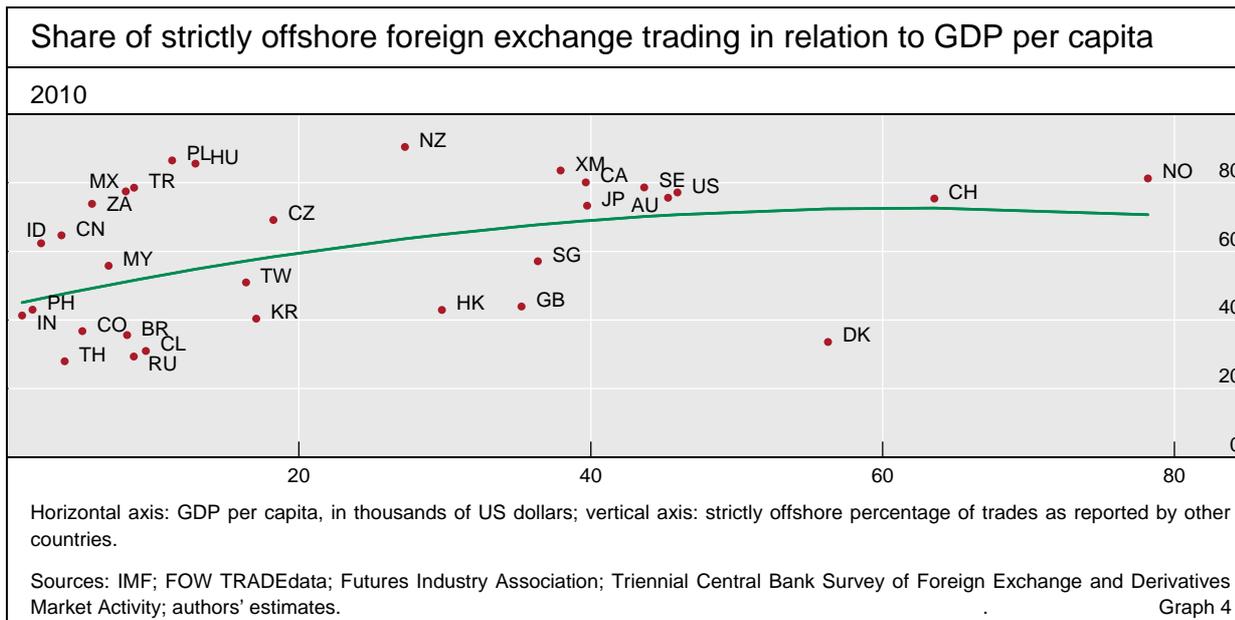
<sup>6</sup> The specification in columns 2 and 3 posits that the target currency, but not the funding currency, trades more in relation to income. If target currencies typically trade considerably less than the big currencies used for funding, the effect would be more readily measured on the high-yield side. (Long Australian dollar against short Swiss franc positions would be an exception, since these currencies have comparable turnover.) The specification in column 4 tests for higher turnover in high-yielding or low-yielding currencies, given income. The ratio of the absolute deviation of yields from the median to that median, rather than the arithmetic difference, makes sense if creditors pay attention to the carry trader’s ratio of interest paid to cash flow. As leverage rises, the interest-to-cash flow ratio approaches the ratio of the yield on funding currencies to the yield on target currencies.

### Geography of currency trading: distribution of turnover in April 2010



<sup>1</sup> Futures are traded onshore between residents. <sup>2</sup> Futures, mostly onshore exchange, are traded among residents and non-residents. <sup>3</sup> Futures, mostly offshore exchange, are traded among non-residents and residents.

Sources: IMF; FOW TRADEdata; Futures Industry Association; Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity; authors' estimates. Graph 3



outside the home jurisdiction. In Graph 4, we plot the simple percentage of strictly offshore trading on the vertical axis, again against income per capita on the horizontal axis. Turnover of the most actively traded bonds in major currencies outside home market hours, for instance, generates offshore foreign exchange transactions. In many emerging market currencies, controls push trading offshore into non-deliverable forwards, resulting in high proportions of forward transactions offshore (Mihaljek and Packer (2010, p 54)).

International financial centres tend to concentrate trading in their own currencies as well as in others' currencies. Thus, we allow the Hong Kong and Singapore dollars as well as sterling and the Swiss franc a lower offshore share (through a financial centre dummy that cuts 17–18% from the estimated offshore share), which improves the fit (Table 2, columns 2 to 4).

Beyond the currencies based in financial centres, this simple benchmark fits most currencies of high-income countries fairly well. Among the big three currencies, the euro has a higher ratio of offshore transactions, especially in London, than do the US dollar or yen. The New Zealand dollar, with its comparatively high yields, stands out as highly internationalised. Dr Alan Bollard, Governor of the Reserve Bank, once described it as an international standard of value that just happens to be used by a small country as its money.

The currencies of many low- to medium-income countries trade offshore to a greater or lesser extent than the norm. Offshore trading of the Indian rupee lines up with India's income, especially when account is taken of the strictly onshore rupee futures trading that has developed in Mumbai over the last several years (Graph 3). Strictly offshore trading bulks large for the Indonesian rupiah and the Chinese renminbi, both in non-deliverable form. The high share of offshore trading, the paucity of onshore-offshore trading, and rapid development of the deliverable renminbi market in Hong Kong SAR reflect the gap between the world's interest in the renminbi and its access to it. At moderate income levels, the South African rand, the Mexican peso and the

... although some currencies stand out

Regression analysis of the strictly offshore foreign exchange turnover								
	Dependent variable: share of offshore trading							
	2007				2010			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
GDP per capita	1.381 (3.068)***	1.681 (3.704)***	1.781 (3.547)***	1.223 (1.741)*	0.917 (2.102)**	1.207 (2.983)***	1.407 (2.909)***	1.002 (1.378)
GDP per capita squared	-1.1E-05 (-1.840)*	-1.4E-05 (-2.506)**	-1.5E-05 (-2.425)**	-1.0E-05 (-1.424)	-7.4E-06 (-1.248)	-1.0E-05 (-2.024)*	-1.2E-05 (-2.132)**	-8.2E-06 (-1.145)
Financial centre		-17.692 (-2.109)**	-17.543 (-1.993)*	-18.518 (-2.101)*		-18.106 (-2.296)**	-16.735 (-2.099)**	-17.729 (-2.142)**
Interest rates			0.709 (0.802)	0.578 (0.790)			1.559 (0.637)	1.104 (0.426)
Non-deliverable forward dummy				-21.077 (-1.771)*				-12.168 (-1.116)
Adj R <sup>2</sup>	0.26	0.27	0.26	0.34	0.13	0.16	0.16	0.18

Cross section of the currencies of the 33 economies listed in Graph 1. T-statistics in parenthesis; \*\*\*, \*\* and \* denote 1%, 5% and 10% significance, respectively. Non-deliverable forward dummy takes value 1 for the currencies of the following economies: Brazil, Chile, China, Chinese Taipei, Colombia, India, Indonesia, Korea, Malaysia, the Philippines and Russia. Financial centre is a dummy variable that takes value 1 for Hong Kong SAR, Singapore, Switzerland and the United Kingdom.

Sources: IMF; FOW TRADEdata; Futures Industry Association; Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity; authors' estimates.

Table 2

Turkish lira all trade heavily offshore, while the Thai baht, the Russian rouble and the Korean won all appear low for their incomes.

In contrast to the overall turnover analysis above, and despite the case of New Zealand, higher yields are not systematically associated with higher proportions of offshore trading (Table 2, column 3). Furthermore, non-deliverability of the currency offshore unsurprisingly seems to limit offshore trading, but this relationship does not rise to conventional levels of statistical significance (column 4). In general, the benchmark relationship fits overall turnover in relation to trade better than the geography of currency trading.

## Conclusions

Foreign exchange turnover evolves in a predictable fashion with rising income, which augments financial depth, complexity and openness. Using income per capita to set a benchmark for both the ratio of turnover to underlying current account transactions and the proportion of offshore turnover can help policymakers discern what is usual and what is unusual in the trading of their currencies. The association of higher interest rates with higher turnover suggests that relatively high inflation, among other causes of relatively high nominal yields, can attract perhaps unwanted attention in a world with low yields in the main economies.

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