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Nondeliverable Forwards: Can We Tell Where the Renminbi Is Headed?

by Patrick Higgins and Owen F. Humpage

Since the early 1990s, international banks have been offering nondeliverable forward (NDF) contracts to clients who need to hedge exposures in currencies of emerging-market economies. Many also use the exchange rate on these contracts as a best guess of where the emerging-market currency is headed. The exchange rates on NDFs, however, likely embody a substantial risk premium that interferes with forecasting accuracy.

After considerable pressure from the United States, China revalued the renminbi, 2.1 percent against the dollar, on July 21 and moved from a pegged to a managed exchange-rate system. Since then, the renminbi's value has remained around 8.1 per dollar, leading many to wonder if the recent move is the first in a near-term series of similar moves or, at least for now, a one-time event.

Many look to the forward exchange market for a guess about a currency's future path. Unfortunately, many emerging-market economies restrict nonresident access to on-shore financial markets and, as a consequence, forward markets either do not exist or are underdeveloped. Since the early 1990s, however, some international banks have been offering an off-shore, over-the-counter market in nondeliverable forwards (NDFs) for many emerging-market currencies, including the Chinese renminbi.

This *Economic Commentary* discusses NDFs and their ability to predict where a currency is headed, using the Chinese renminbi as an example. Recently, the People's Bank of China—China's central bank—announced that it will permit more domestic banks to participate in its forward exchange market, following an application process that will take about six months. The goal is to develop on-shore markets in which firms can hedge their foreign-exchange exposure. Eventually, such a market will probably supplant the NDF market.

The Hedge

Forward markets exist to provide firms and international investors with a means of hedging their foreign-exchange exposures; any prediction about the future value of a currency is an ancillary product of the forward market's hedging activity. Firms or investors that have mismatched cash flows in different currencies often look to protect themselves from unforeseen changes in foreign-exchange rates. Although many methods exist for doing so, the forward foreign exchange market, where individuals can buy and sell foreign currencies for future delivery at a known rate today, provides a fairly standard and simple method for hedging exchange risk.

To see how this hedge might work, imagine that a U.S. manufacturing concern contracts with a Chinese firm for final assembly of its product. As a consequence, the U.S. business might be obligated to pay the Chinese company a specific amount of renminbi upon completion of the job in, say, three months. Although China is currently keeping the renminbi near 8.1 to the dollar, the persistent talk about a further renminbi appreciation has the U.S. firm concerned. An appreciation of the renminbi would increase the dollar costs of buying renminbi three months down the road and could wipe out the company's expected profits from the project.

If the U.S. business had access to the nascent on-shore forward market, it could hedge its exchange-rate risk by contacting a Chinese bank and buying renminbi today at a known exchange rate for delivery in three months. The transactions, of course, would not be costless, and the forward renminbi exchange rate probably would not equal the current spot value, but the U.S. manufacturing firm would know all of the costs up front and would be able tocalculate the project's likely profits before proceeding with it. Any subsequent appreciation of the renminbi–dollar exchange rate then would be the bank's problem; it would not affect the U.S. business. In three months' time, the U.S. company would complete the forward transaction, paying the agreed-upon amount of dollars to the bank and receiving renminbi from it to complete the contract with the Chinese firm.

Unfortunately, many emerging-market economies, including China, India, Indonesia, South Korea, the Philippines, and Taiwan, restrict foreign access to their currency and on-shore money markets, making it very difficult—if not impossible—for foreign firms or international investors to hedge in local forward exchange markets, even when such markets exist. Local monetary authorities fear that easy access to on-shore local-currency loans and deposits, and the ability to easily transfer local currencies to nonresidents, encourages speculative financial movements, greater exchange-

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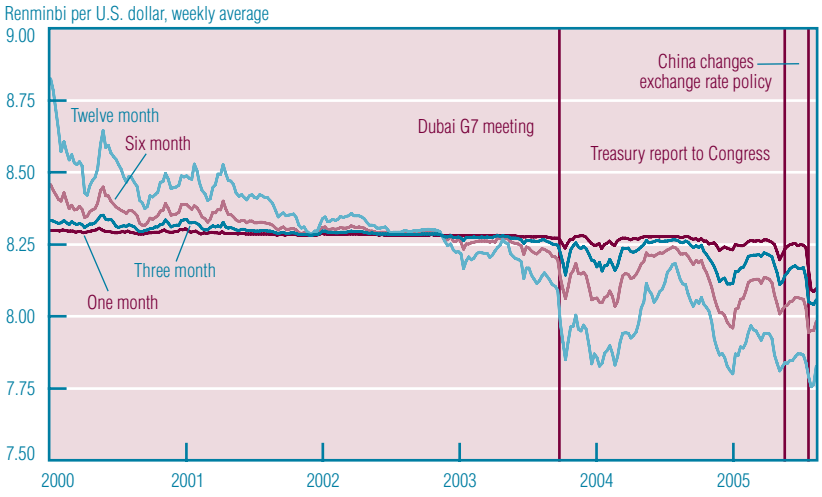
FIGURE 1 CHINESE NONDELIVERABLE FORWARDS



SOURCE: Bloomberg Financial Information Services.

rate volatility, and ultimately some loss of monetary control. Many emerging-market countries tightened their restrictions following the financial crises of 1997 and 1998, giving a further impetus to an already developing offshore market in NDFs. Today, a large and increasingly active market in NDFs exists for many Latin American, East Asian, and Eastern European currencies, with centers in Hong Kong, Singapore, South Korea, Taiwan, Japan, London (for Eastern European currencies), and New York (for Latin American currencies). Being offshore, this market is out of the direct jurisdiction of local monetary authorities.

Unlike a typical forward transaction, where delivery of the foreign currency actually takes place, NDF transactions are not settled in an emerging-market currency. They are instead settled in a convertible currency, typically U.S. dollars. In this one respect, NDFs are similar to futures. Commodities, like wheat or corn, typically trade in organized futures markets, which provide cover to commodity dealers. Usually, parties to a futures contract have no intention of accepting delivery in the underlying commodity. Positions are instead settled in dollars.

In our renminbi example, the U.S. company might enter into an NDF contract to buy a set notional amount of renminbi at a specific exchange rate in three months. Suppose that in the intervening weeks, China permits a further appreciation of the renminbi. At the time delivery is due to the Chinese firm, the U.S. manufacturer would go into the market and buy renminbi at the now more expensive exchange rate. All else constant, the U.S. business's expected profits would be reduced, or might even disappear. Fortunately, however, under its NDF contract with a commercial bank, the manufacturer would receive a cash payment in dollars directly proportional to the difference between its contracted NDF exchange rate and the current spot rate. This cash payment would ameliorate the manufacturer's loss from its spot purchases of renminbi. The NDF thus provides a hedge against unanticipated future movements in the exchange rate.

If instead the Chinese renminbi depreciated—a seemingly unlikely event at present—the U.S. manufacturer would be able to buy renminbi to satisfy its contract with the Chinese firm at a reduced rate and would realize greater profits than it initially projected. However, the U.S. manufacturer would now be obliged to make a payment in dollars to the commercial bank holding the NDF contract. This cash payment would offset some of the profits in the deal with the Chinese firm resulting from the renminbi's depreciation. Although the NDF reduces some of the profits accruing to the U.S. company because of the renminbi depreciation, the NDF provides more certainty to the firm about the ultimate return on the project.

The Prediction

An NDF is a zero-sum game; one side's gain is the other side's loss. Both parties then have an incentive to minimize their potential loss (and the other's gain) by setting the contract's exchange rate equal to the expected future spot exchange rate. Participants in the market, including multinational corporations, portfolio investors, hedge funds, and large banks, are sophisticated. Presumably, they will use all available information in forming their expectations. If, in addition, the NDF market consists of a large number of buyers and sellers with ready access to such information and funding, the law of large numbers should guarantee that NDF exchange-rate quotes are accurate estimates of future spot exchange rates, with errors that are very small and symmetrically distributed around zero.

This, however, does not seem to be the case. Figure 1, which is centered on the previous peg of 8.28 renminbi per dollar, shows the one-, three-, six-, and twelve-month NDF exchange rates. Prior to mid-2002, the NDF market anticipated a depreciation of the renminbi, which never materialized. Since late 2002 or early 2003, the NDF market has consistently anticipated—and missed—an appreciation of the renminbi. Currently, the market seems to expect that the renminbi will appreciate an additional 0.8 percent over the next three months and 4.2 percent over the next year, but such a precise reading of these data is premature because it fails to account for the pricing implications of risk.

While foreign exchange participants are highly efficient processors of information, they are also very cautious and seek compensation for sticking their necks out. Especially in thin or volatile markets, dealers embed risk premia into their forward quotes, which will cause the forward exchange rate to deviate from the currency's expected future spot value. These premia adjust with changing economic circumstances and the evolving probability of risk. Even though NDF contracts settle in dollars, the underlying spot exchange rate—against whose movements NDF participants calculate payoffs—typically is subject to government restrictions, official inter-

ventions, and large discrete changes, which impart risk to the market.

Caution then pervades the pricing of NDF contracts for Chinese renminbi. Even if, at any point in time, a renminbi adjustment—say, a sudden and substantial revaluation from 8.1 per dollar—is not the most likely prediction for the foreseeable future, the market price will nevertheless include compensation for the small probability of a substantial renminbi appreciation. The incorporation of a risk premium for the small probability of a large adjustment will cause the NDF rate to deviate persistently on one side of the pegged value as long as that probability exists. Financial markets refer to this phenomenon—the incorporation of a premium for the small probability of a big, discrete price change—as the peso problem, after a similar event during the early 1970s in the market for Mexican pesos. Because of the peso problem, the NDF market suggests the likely direction the renminbi will take, but it is far from precise about the future level of the exchange rate or the exact timing of the change.

The Bottom Line

The growing market for NDFs in emerging-market currencies offers another example of private financial institutions' ability to develop instruments for their customers. NDFs provide private companies and investors a method of hedging their exchange rate exposures in situations where local governments inhibit nonresident access to on-shore money markets. While the rates quoted on NDFs may accurately reflect the market's guess of the future direction for the renminbi, the small probability of large, discrete changes in many of these markets makes NDFs rather inaccurate with respect to the timing and the amount of the change.

Recommended Reading

On nondeliverable forwards, see:

Guonan Ma, Corrinne Ho, and Robert N. McCauley. 2004. "The Markets for Non-Deliverable Forwards in Asian Currencies," Bank for International Settlements *Quarterly Review* (June), pp. 81–94.

Shogo Ishii, Inci Ötker-Robe, and Li Cu. 2001. "Measures to Limit the Offshore Use of Currencies: Pros and Cons," International Monetary Fund Working Paper WP/01/43, (April).

On related topics, see:

Patrick Higgins and Owen F. Humpage. 2005. "The Chinese Renminbi: What's Real, What's Not," Federal Reserve Bank of Cleveland, *Economic Commentary* (August).

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Keith Sill. 2000. "Understanding Asset Values: Stock Prices, Exchange Rates, and the 'Peso Problem,'" Federal Reserve Bank of Philadelphia, *Business Review*, (September/October): 3–13.

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