

# The Federal Reserve Bank of New York's experience of managing cross-border migration of US dollar banknotes

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## 1. Introduction

This paper discusses the manager's or practitioner's view of the size and scope of the distribution of US banknotes outside the United States.<sup>1</sup> The main issues discussed in this paper are:

- The main (direct and indirect) benefits and costs of the internationalisation of the stock of US dollars and its implications for monetary policy.
- The estimation of international stocks and flows of US dollars, and characteristic patterns and variations in the circulation of currency.
- The management of large cross-border flows of cash and the selection of institutions which arrange cross-border currency shipments.

The Federal Reserve supplies currency on demand, so the quantity of US currency in circulation increases when new demands originate anywhere in the world. While the international popularity of the US dollar has not been a deliberate policy objective, neither has it been a complete surprise. The extraordinary strength and stability of both the US economy and the US dollar, as well as the dollar's nearly unchanging appearance and the US policy of never recalling older-series notes, have given rise to near universal recognition and acceptance of the US dollar. Meeting the international demands for US currency results in many direct and indirect benefits and costs, several of which are discussed below.

## 2. Costs, benefits and monetary policy implications of international dollar circulation

### Benefits of external dollar circulation

The circulation of US currency overseas provides benefits to both the United States and its foreign users. Foreign holders of US banknotes benefit by acquiring an asset that is liquid, secure and stable in value. These characteristics are often unavailable in their own country's currency during and after periods of turmoil. US citizens and businesses, as well as international users of the dollar, all gain a common medium of exchange that may be used to acquire goods and services. In addition, US taxpayers gain by effectively receiving an interest-free loan in the amount of the currency held overseas. The earnings from this interest-free loan are commonly referred to as seigniorage.

Seigniorage benefits are realised from the interest earned on the asset counterpart to the Federal Reserve liability for the currency in circulation. Thus, the Federal Reserve issues non-interest bearing obligations (Federal Reserve banknotes) and then uses the proceeds to acquire interest bearing assets. As currency in circulation has increased in response to the growing demands from the international markets, interest earnings have also increased. For 2000, the securities counterpart to

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<sup>1</sup> The information and analysis presented here is largely drawn from research conducted at the Federal Reserve Board by Richard Porter and Ruth Judson (1993, 1996, 2001) and from US Department of the Treasury (2000).

Federal Reserve banknotes earned USD 32.7 billion in interest income. The Federal Reserve remits the bulk of these earnings to the US Treasury.

### **Costs of external dollar circulation**

The Federal Reserve incurs limited direct costs in connection with the international circulation of US currency. These costs are mainly incremental expenses associated with the physical handling of payments and receipts and authentication when banknotes are ultimately returned to the United States and deposited at a Federal Reserve Bank. In addition, the Federal Reserve Bank of New York (FRBNY), manages the international banknote business for the Federal Reserve System, and incurs expenses for its Extended Custodial Inventory programme.

The large volume of dollars held overseas represents a windfall to US taxpayers in the form of billions of dollars in seigniorage revenue. However, the international use of the dollar also presents challenges, including the responsibility to ensure that the dollar is used for legitimate purposes and not for illicit trade or activities and the responsibility to ensure the integrity of US currency.

The universal acceptance of the dollar makes it an inviting target for counterfeiters, who range from organised professionals with sophisticated printing facilities to casual amateurs using copying machines or inexpensive computer printers. Where genuine dollars circulate and are accepted, counterfeits also have a chance of being accepted. Inside the United States, jurisdiction over counterfeiting cases is held by the Secret Service, which was established in 1865.<sup>2</sup> It routinely receives information about counterfeiting from the Federal Reserve, commercial banks and the local law enforcement authorities. Outside the United States, where the Secret Service has no jurisdiction, it is both more dependent upon and less connected to other sources of information. Further, procedures invoked when counterfeit notes are found overseas vary widely. The United States Secret Service and the Federal Reserve System have invested resources, such as opening overseas offices and providing technical assistance, to help ensure the worldwide integrity of US currency.

### **Implications for monetary policy**

Currency makes up a small share of the domestic monetary aggregates in the United States. Currently, it comprises approximately 50% of the narrow monetary aggregate, M1, and about 10% of the broad monetary aggregate, M2.<sup>3</sup> However, a large volume of currency is outstanding: currency in circulation at the end of May 2002 was about USD 620 billion and it is estimated that between 50% and 70% of all notes, or between USD 310 billion and USD 435 billion, is now held abroad.<sup>4</sup>

Since fluctuations in the demand for currency affect the Federal Reserve's day-to-day open market operations, the FRBNY cash office is in constant communication with the FRBNY's trading desk. The FRBNY manages monetary policy for the Federal Reserve System and the US Treasury. This communication helps to keep the desk informed of international movements of banknotes so that this activity may be factored into the desk's decisions, especially at times when international demand is heavy or erratic. Data on the flows of US banknotes are also provided to the monetary affairs staff at the Board of Governors, as well as to the research function at the FRBNY, in order to assist these areas as they conduct economic research and projections.

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<sup>2</sup> Lambert and Stanton (2001).

<sup>3</sup> M1 is defined as a measure of the US money stock that consists of currency held by the public, traveller's checks, demand deposits and other checkable deposits, including NOW (negotiable order of withdrawal) and ATS (automatic transfer service) account balances and share draft account balances at credit unions. M2 includes M1, certain overnight repurchase agreements and certain overnight eurodollar deposits, savings deposits (including money market deposit accounts), time deposits in amounts of less than USD 100,000, and balances in money market mutual funds (other than those restricted to institutional investors (Board of Governors of the Federal Reserve System (1994)).

<sup>4</sup> Board of Governors of the Federal Reserve System (2002).

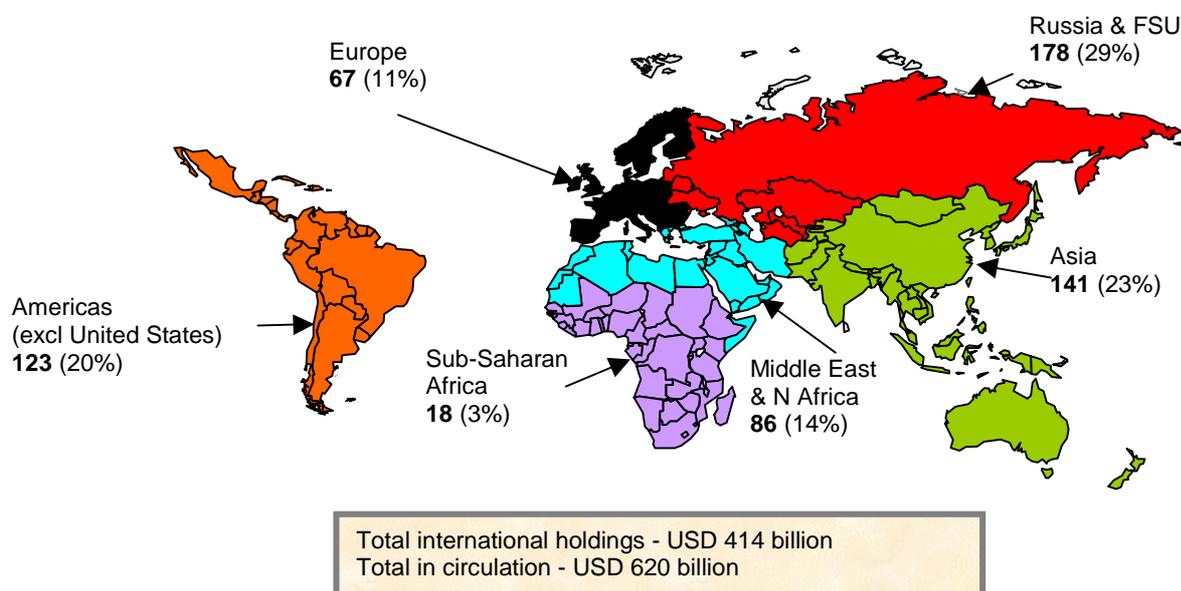
### 3. Estimation of international stocks and flows of US dollars, and characteristic patterns and variations in the circulation of currency

#### Estimation of international dollar holdings

The Federal Reserve has developed several statistical models for estimating the stocks and flows of US currency abroad. These models use confidential data on the currency shipments to and from the Federal Reserve Banks, data collected by the US Customs Service, data on cash processing at the Federal Reserve Banks and less formal information collected during international study trips. Figures 1 and 2 display the current estimates of the stock of US dollars held in various regions and the estimates of the stock of dollars held abroad from 1980 to 2005.

Figure 1

**International holdings of US currency by region**  
(in billions of US dollars, Federal Reserve estimates as of May 2002)



#### Measuring flows of US currency abroad

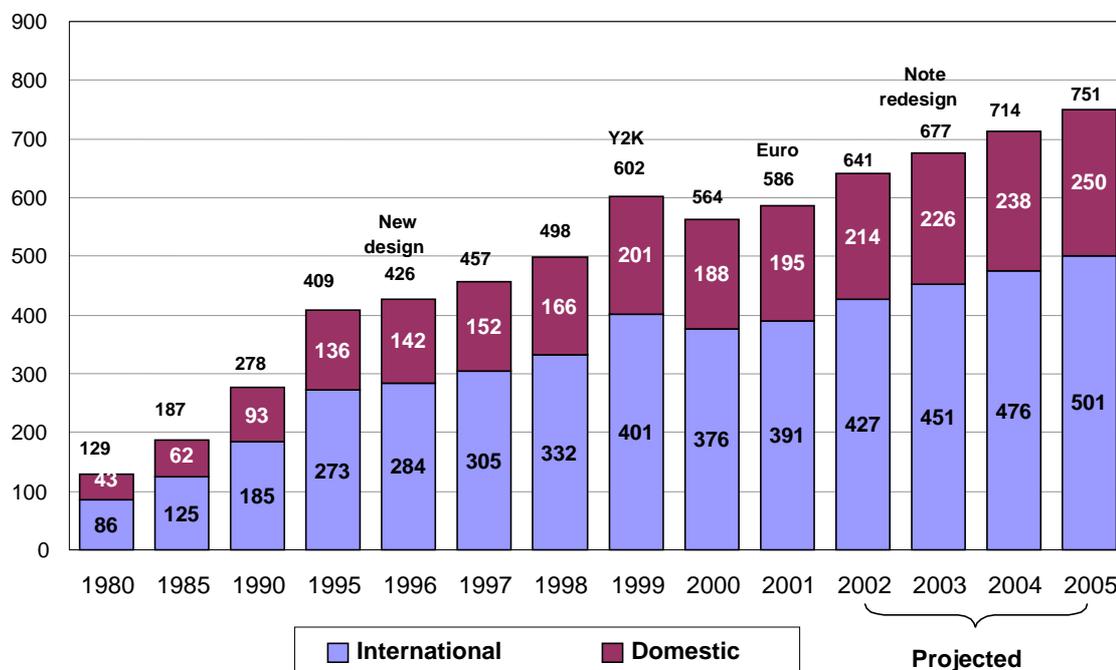
Currently, monthly reports on the volumes sources and destinations of incoming and outgoing international currency shipments are provided to the FRBNY by large commercial banks and other banknote brokers. These reports have been provided since 1988 and present the most complete overview of currency flows. Because currency can move quickly throughout the world, often without being reported or detected, the determination of its location on any occasion is extraordinarily difficult. Nonetheless, it is clear that the lion's share of overseas US currency is in emerging market countries.

#### Patterns in the use of US dollars abroad

The dollar is widely used in many countries as a store of value, a transaction medium and a unit of account, even when it is not the official currency. In countries with underdeveloped banking sectors, cash is used to settle transactions of all magnitudes. In those countries with the additional burden of unstable currencies, US dollars are being held as cash and as a store of value, used for many transactions, and are often the unit of account, especially for larger transactions. Even in some countries with developed banking sectors and stable currencies, dollars are the preferred currency for

travellers, cross-border trade, settlement of large cash transactions, and transactions in the informal or “grey market” sector.

Figure 2  
**Currency in circulation 1980–2005**  
 (in billions of US dollars,  
 Federal Reserve operations planning estimates)



Although the relative importance of each varies with economic and political conditions, there are five basic motivations for holding and using cash dollars:

- In times and places where the political or economic situation is uncertain, dollars are held for security against inflation and general calamity.
- Expatriate workers throughout the world often carry their earnings to their home countries in dollars and, between visits home, some of these workers hold dollars in cash rather than in a bank.
- Travellers to other parts of the world carry dollars because they are easier to exchange than local currencies.
- Cross-border trade in many areas is conducted largely in dollars.
- The informal or “off the books” sectors in many economies are highly dollarised.

Even though the circumstances in each country are unique, demand for US dollars (or any other currency that circulates widely outside its home country) during a crisis does follow certain patterns. A crisis leading to increased dollar usage typically originates as a growing fiscal deficit that is eventually financed by rapid money creation, which leads to inflation. Surging prices sharply reduce the purchasing power of the domestic currency and the value of accumulated savings. Monetary and fiscal reforms are proposed or promised, but, if they come at all, their arrival is usually slow and erratic. Inflation is correspondingly volatile, which in turn generates uncertainty about the future purchasing power of both cash and bank holdings denominated in domestic currency. Similarly, high and unstable inflation complicates the calculation and evaluation of any large or long-term financial transactions or investments, such as leases or time deposits.

Residents of countries experiencing these crises naturally seek other, more stable assets, and the US dollar is often the most convenient and familiar of those available. Similarly, they seek to set prices

and conduct financial negotiations in terms that are less likely to be affected by domestic inflation. Thus, as the inflationary process evolves, the first use of the US dollar is as the unit of account for large-scale and longer-term transactions in the economy. As “dollarisation” spreads, more transactions for large items like cars and real estate are either priced in US dollars or conducted in US dollars. As the realisation that usage of US dollars will prevent further losses spreads across the economy, US dollar inflows accelerate. In a simple model of this process, the demand for the foreign currency (dollars) depends on the variability of inflation rates and on the difference between the inflation rates of the United States and the developing country. The larger the variability and the difference, the greater will be the demand for US dollars.

The degree to which a country becomes dollarised and the degree to which residents prefer cash dollars to dollar-denominated bank accounts depends on confidence in the domestic banking system. Periodic bouts of inflation often wipe out the savings held in domestic currency, which encourages flight to other assets. Interest rate premiums and indexation of accounts for domestic inflation are alternatives to dollarisation, but they are only effective when people have confidence that they will provide full protection against inflation. Similarly, allowing dollar-denominated deposits is not always sufficient to eliminate a flight to the cash dollar. The bitter experience of having one’s foreign currency account confiscated or devalued even once is enough to keep many people from trusting banks for decades.

A country’s demand for cash dollars also depends on its economic circumstances: in order to buy US dollars, countries must have something of value to sell. Thus, richer countries or countries with well developed export sectors are more likely to be able to afford to buy US dollars. Although dollars flow into countries when the domestic currency weakens or political crisis looms, they often remain when the crisis passes. For example, an estimated 50% of the currency that flowed into Argentina in the late 1980s, into the Middle East before Operation Desert Storm, and into Taiwan after the 1996 crisis in the straits is still in those areas. Thus, it is reasonable to anticipate that US banknotes will remain abroad even after local currencies stabilise in parts of eastern Europe, the former Soviet Union and Latin America.<sup>5</sup>

#### **4. How large cross-border flows of cash are managed and the role of individuals versus institutions**

##### **International distribution of US banknotes**

US banknotes circulate freely throughout the world via bank and non-bank channels. In most periods, a majority of dollars in international commerce move through banking channels, which include local retail banks and major wholesale banknote dealers. Transactions in this channel represent sales and purchases to and from the public and wholesale banks. However, a significant volume of currency also moves across borders outside banking channels, in the pockets and suitcases of travellers and traders. There is presently a joint US Treasury Department/Federal Reserve effort, the International Currency Awareness Program, to further the understanding of these two markets. Unfortunately, no formal data collection system can definitively measure the total dollar value or location of US banknotes circulating outside the United States. In part, this situation arises because currency so easily and invisibly moves across national borders in the hands of travellers.

##### **Structure of the international market for US banknotes**

As with other financial instruments, US banknotes are traded internationally with small bid-ask spreads. While many financial institutions trade US dollars for other currencies in the international foreign exchange markets, no more than 30 institutions worldwide participate actively in the wholesale buying and selling (including transport and delivery) of physical US banknotes. This group of

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<sup>5</sup> US Department of the Treasury (2000).

wholesalers includes those who are active globally and those who trade only in regional markets. Wholesale dealer banks purchase from the FRBNY approximately 90% of the US dollars that are exported to the international markets.<sup>6</sup> Most of the remaining purchases are distributed among the offices of the Federal Reserve Banks of San Francisco and Atlanta. The wholesalers purchase banknotes to fill customer orders and the notes are shipped either directly to the customer overseas or to distribution centres. Approximately 60% of the dollar value of US notes that the wholesale dealing banks purchase in the markets and return to the United States is deposited for processing at the FRBNY. Most of the remaining repatriated notes are deposited at the Federal Reserve Banks of San Francisco, Dallas and Atlanta.

Six geographical locations serve as the principal international distribution and consolidation hubs for US banknotes: one in the western hemisphere (Buenos Aires), three in western Europe (Frankfurt, London and Zurich) and two in offshore Asian centres (Hong Kong and Singapore). The pre-eminence of all these locations arises from their accessible transportation networks as well as their historical focus on international commerce.

US banknotes are distributed over international wholesale channels either as new notes (bundled in blue plastic wrappers from the Bureau of Engraving and Printing (BEP)), which are the preferred form for the majority of international market participants, or as fit notes (recirculated banknotes) in good condition. The preference for new notes reflects the associated lower shipping and insurance costs together with the labour costs saved by not having to count and authenticate the new notes. Most importantly, BEP notes are attractive to the international market because their original wrapping and direct delivery from the FRBNY ensures that they are counterfeit-free.

## **5. Extended Custodial Inventory (ECI) programme**

### **Overview of the ECI programme**

In 1996, the FRBNY introduced the ECI pilot programme, in response to the Treasury's introduction of the new design banknotes and recognition that an assured supply of US currency abroad helps to maintain stability in international financial markets throughout the world. The programme gave the Treasury an efficient and cost-effective means to distribute the new design banknotes to international markets and to facilitate the repatriation of old design currency.

An ECI facility is an overseas cash depot maintained by a private sector bank that holds currency for the FRBNY on a custodial basis in a segregated area of its vaults. The FRBNY manages the ECI programme and bears the costs associated with providing management oversight and monitoring the programme. It coordinates the shipment and receipt of currency between Federal Reserve facilities and the ECIs. All banknotes, while in inventory at an ECI, and during transit between a Federal Reserve facility and an ECI, are carried on the books of the FRBNY.

### **Requirements for ECI facilities**

Each wholesale dealer that enters into an ECI arrangement maintains an account at a Federal Reserve Bank. That account is debited whenever the dealer sells banknotes and the banknotes are paid out of the ECI inventory to its overseas customers. Conversely, that account is credited when the bank purchases currency from its overseas customers and deposits it into the ECI inventory.

The dealers that operate the ECIs must meet the following requirements:

- They must sort the currency they deposit into the ECI inventory into old design and new design notes, and then sort the new design notes into fit and unfit bundles.

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<sup>6</sup> US Department of the Treasury (2000).

- Old design and unfit notes must be sent back to a designated Federal Reserve cash processing operation for verification and ultimate destruction.
- Fit notes must be placed in the inventory for recirculation.
- Counterfeits detected must be reported to either the United States Secret Service or the appropriate national law enforcement agency.

Dealers that operate ECI sites bear the costs for insurance coverage and staffing of the ECI site, maintaining processing operations, and making the necessary physical renovations to house the ECI. The dealers are contractually obligated to pass on any savings realised from operating ECIs to their customers. Nonetheless, global wholesale dealers have recognised that the ECI programme has become a valuable supplement to the private distribution network.

Economists at the Federal Reserve evaluated the implicit costs and benefits of the ECI programme to the US Treasury and concluded that the implicit cost is small compared with the benefit of potential additional seigniorage that might occur as a result of increased overseas traffic in US currency. The cost is even less significant when viewed in the light of continued confidence in large stocks of US currency held abroad. Finally, the ECI programme has provided important new knowledge and information on international flows of the US currency, both genuine and counterfeit, which is critical to the US Treasury Department.

In summary, the ECI programme represents a successful new approach in the Federal Reserve System's currency distribution and processing policies. It has demonstrated that partnership with the private sector can be a cost-effective and market-sensitive approach.

### **ECI programme results**

The ECI programme has been an efficient vehicle for the international markets to recirculate fit notes and circulate new design notes while simultaneously expediting the repatriation of older design notes. During the disruptions to the international air transportation network after the 11 September 2001 terrorist attacks, the ECI inventories allowed for a prompt response to market demands. The ECI operators have also played a significant ongoing role in the distribution of public education material relating to the new design of US banknotes and its authentication features. The planned introduction of a new design banknote in autumn 2003 will once again have the Federal Reserve and the Treasury conducting a worldwide international public education campaign, and the commercial banks that operate the ECIs and all the international wholesalers and retailers will be involved in this effort.

## **6. Conclusion**

The US dollar is the most widely used currency in the world, reflecting the inherent trust in the stability of the economic and political structure of the United States. Foreign holders of US banknotes benefit by acquiring an asset that is liquid, secure and stable in value. As such, the dollar is used in many countries as a store of value, as a transaction medium and as a unit of account, even when it is not the official currency of the country.

Domestically, seigniorage benefits are realised from the interest earned on the asset counterpart (Federal Reserve banknotes) to the Federal Reserve liability for the currency in circulation. The Federal Reserve issues these non-interest bearing obligations and then uses the proceeds to acquire interest bearing assets. The bulk of the interest income earned is remitted to the US Treasury Department.

While there are benefits to both the United States and to the foreign users of dollars, there are challenges that must be addressed when large volumes of currency are held overseas. These include ensuring the integrity of the currency and preventing it from becoming a target for counterfeiters and ensuring that the currency is used for legitimate purposes and not for illicit trade or activities. In addition, estimating the extent of holdings and measuring the flows into and out of the United States can be challenging, but are critical data elements in making effective monetary policy decisions.

Several mechanisms are utilised to measure holdings and international flows of US currency. These include the use of statistical models which estimate stocks and flows of US currency abroad, collection

of data by the US Customs Service, and analysis of data on cash processing at the Federal Reserve Banks. Furthermore, key data regarding volumes, sources and destinations of incoming and outgoing international currency shipments are provided to the Federal Reserve by large commercial banks and other banknote dealers.

On a broader level, the US Treasury Department and the FRBNY have joined forces to establish the International Currency Awareness Program. The goal of this programme is to create a comprehensive understanding of good strategies for the introduction of new currency designs and the general patterns of currency use and counterfeiting abroad. Another tool which the FRBNY uses to manage international flows of US currency is the ECI programme, which was introduced in 1996. This programme began as a pilot when the Treasury was preparing to introduce the 1996-series new currency design banknotes. Since the programme proved useful both during the introduction process and, later, in expediting the repatriation of old design notes and promoting the recirculation of fit currency, it became a longer-term programme.

In conclusion, the liberalisation of a currency, such as the Chinese renminbi, can present a host of benefits to the Chinese domestic market. However, as experience with overseas holdings of the US dollar has shown, certain care must be taken prior to the liberalisation of any currency. Control mechanisms should be well thought out and implemented in order to ensure the future integrity of the currency as well as to shield the currency from counterfeiting. In addition, since data on the volume of currency held outside the country can be critical for monetary policy decision-making, mechanisms should be put in place to measure overseas flows and holdings. These mechanisms may include record-keeping on the part of the central bank or monetary authority as well as development of relationships with organisations such as domestic banks that can provide data on currency shipments overseas. If liberalisation of the Chinese renminbi is accompanied by such control mechanisms, positive results can be realised.

## **Appendix: International Currency Awareness Program (ICAP) overview**

The ICAP report presents the result of a joint study done by the US Treasury, US Secret Service and Federal Reserve on currency usage and counterfeiting activities abroad.<sup>7</sup> Activities included study trips to areas of the world where dollars are believed to circulate in significant quantities. The establishment of the ECIs was an outgrowth of an earlier project similar to ICAP.

ICAP operates under a congressional mandate, and its reports include three components as specified in that mandate: models of US currency usage overseas, models of counterfeiting abroad, and information obtained from country surveys with cash handlers and others knowledgeable about the extent of currency usage and counterfeiting issues abroad.<sup>8</sup>

### **Overseas currency holdings**

The FRBNY supplies currency on demand and implicitly accommodates new demands. Between half and two thirds of all US banknotes in circulation are held overseas. Although the circumstances in each country are unique, demand for US dollars (or indeed any other currency that circulates widely outside its home country) during a crisis does follow certain patterns. In a simple model of this process, the demand for foreign currency (dollars) depends on the volatility of inflation and the differential between the inflation rate in the United States and the developing country. The degree to which a country becomes “dollarised” and the degree to which residents desire cash dollars rather than dollar-denominated bank accounts depends on confidence in the domestic banking system. In addition, the quantity of cash dollars demanded also depends on a country’s experience with dollars in the past and its economic circumstances.

### **Overseas counterfeiting**

Numerous news reports in the mid-1990s suggested that vast quantities of counterfeit dollars might be circulating overseas. However, examination of the data and information gathered on the ICAP country visits indicated that the incidence of counterfeiting is quite low, of the order of one in 10,000 notes. Nonetheless, it does not follow that one should be complacent about the future. The nature of counterfeiting appears to be moving from an activity involving offset printing to one involving computers and attached printers, for which prices are falling and technology and accessibility are rising. Given these technology changes, improvements in both banknotes and Secret Service procedures are needed to stay ahead of the advancing counterfeiting threats.

In addition, improvements in US Secret Service capabilities are necessary, including more field offices and improvements in the traditional methods of record-keeping. In terms of the former, the US Secret Service has increased foreign offices and task forces significantly since the ICAP trips began in 1994. On the latter, the US Secret Service has recently developed two new systems to improve statistical reporting: the Counterfeit Contraband System and the Counterfeit Note Search on the internet.<sup>9</sup>

### **Currency distribution and education campaign**

Historically, new banknotes from the Bureau of Engraving and Printing have been attractive to the international market for one reason: their newness guarantees they are counterfeit-free. The 1996-Series Currency Introduction Plan provided for the establishment of an ECI pilot programme to facilitate the introduction of the new design currency, expedite the repatriation of the old design banknotes, and promote the recirculation of fit new design currency. In addition, the ECI programme

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<sup>7</sup> US Department of the Treasury (2000).

<sup>8</sup> US Department of the Treasury (2000).

<sup>9</sup> US Department of the Treasury (2000).

was intended to facilitate information flows about the circulation of both genuine and counterfeit currency. Both of these goals have been realised. Currency circulation and redistribution have become more efficient, and the European and Asian ECIs have also become an important direct source of information on external counterfeiting, as the US Secret Service receives information directly from ECI operators regarding counterfeit notes detected during their verification process.

In addition, the ECIs provided a natural safety valve to deal with potential increases in currency demand related to concern about the year 2000 date change. By stockpiling US currency inventories in strategic international distribution centres, banks and currency dealers overseas have an assured, immediate supply of US currency to meet financial panics.<sup>10</sup>

### **ICAP conclusions and recommendations**

ICAP has reached five main conclusions:

- The ICAP country visits have been successful in establishing new sources of information and building relationships with banknote traders as regards the use and circulation of genuine and counterfeit US banknotes abroad.
- The ECIs have worked well in providing more up-to-date information on overseas counterfeiting threats and encouraging the repatriation of old design notes.
- Due to the success of the new design note in deterring counterfeiting, more aggressive strategies for the repatriation of old design notes should be considered.
- The US Secret Service has obtained valuable information and has developed very valuable contacts through the ICAP country visits, and continues to draw upon information arising from the visits to evaluate its international strategy.
- The public education campaign did contribute to the smooth reception of the new design 1996-series notes. Information on any future new currency design should reach the international markets well before the new notes do. In particular, in future campaigns additional emphasis should be placed on early delivery of training and educational material to both cash handlers and the general public.<sup>11</sup>

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<sup>10</sup> US Department of the Treasury (2000).

<sup>11</sup> US Department of the Treasury (2000).

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