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DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

AUG 30 2004

Mr. John Greenwald, Jr.
The Black Vault Headquarters

Dear Mr. Greenwald:

I am responding to your Freedom of Information Act (FOIA) request (2004-05-079) to the Department of the Treasury dated March 31, 2004, requesting a copy of a report entitled "The Future of Money" dated September 1999.

Attached please find a copy of the requested document. No fees were incurred in processing your request.

Sincerely,

M. Lewis
FOIA Contact
Office of the Assistant Secretary for Management
and Chief Financial Officer

THE FUTURE OF MONEY:



IMPLICATIONS FOR U.S. NOTE AND
COIN PRODUCTION AND PROCESSING

SEPTEMBER 1999

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IMPLICATIONS FOR U.S. NOTE AND COIN PRODUCTION AND PROCESSING

SEPTEMBER 1999

PREPARED BY:

THE U.S. DEPARTMENT OF THE TREASURY:

DEPARTMENTAL OFFICES, OFFICES OF THE ASSISTANT
SECRETARY FOR MANAGEMENT AND CHIEF FINANCIAL OFFICER,
THE TREASURER, AND THE FISCAL ASSISTANT SECRETARY;
U.S. MINT, AND BUREAU OF ENGRAVING AND PRINTING

THE BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM:

DIVISION OF RESERVE BANK OPERATIONS AND PAYMENT SYSTEMS
DIVISION OF MONETARY AFFAIRS

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TOTAL NOTES IN CIRCULATION, BY DENOMINATION (Thousands of dollars)

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CIRCULATING COINS, BY DENOMINATION (Billions of dollars)

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COIN DEMAND, BY DENOMINATION (Millions of dollars)

NOTE PRODUCTION, BY DENOMINATION (Millions of pieces)

COIN PRODUCTION, BY DENOMINATION (Millions of coins)

EXECUTIVE SUMMARY

This study identifies the forces that will drive requirements for U.S. coins and notes. It examines how these forces may shape demand and the implications for the production and processing of coins and notes. This study was conducted jointly by the Board of Governors of the Federal Reserve System and the U.S. Department of Treasury (including the U.S. Mint and the Bureau of Engraving and Printing) to provide operational and policy guidance.

Summary of Findings

The key factors that may drive the demand for notes and coins over the next decade are domestic economic growth, dollarization, the impact of the euro, the use of other transactional mechanisms, and new coin programs (summarized in table A-1). Supply drivers include the use of plastic substrate, the production of pennies, and coin recycling.

Table A-1. Anticipated Impact of Drivers on Note and Coin Supply and Demand

DRIVERS	NOTES	COINS
Domestic Economic Growth	Mixed	Mixed
Dollarization	Increase demand	No significant impact
Impact of Euro	Decrease demand in long term	No significant impact
Other Transaction Mechanisms	Decrease demand	Decrease demand
New Coin Programs:		
50 States Quarter	No significant impact	Increase demand
Sacagawea Dollar Coin	Decrease production, but only if \$1 note withdrawn	Increase production, but not significant unless \$1 note withdrawn
Discontinue Penny Production	No impact	Decrease production
Use of Plastic Substrate	Decrease production	Possible decrease in \$1 coin demand
Coin Recycling	No impact	Decrease production

- **Domestic Economic Growth**

The rate of domestic economic growth will continue to affect note and coin demand. Changes in the rate of growth of real gross domestic product (GDP) and inflation appear to influence the growth rate of cash use domestically. The Administration expects that nominal GDP growth will slow down over the next two years to 4.2 percent from an estimated 5.2 percent this year. By the middle of the next decade, growth is forecasted to reach 4.8 percent again. If nominal GDP growth slows over the next several years, as predicted, then it is likely to moderate the effect on demand for notes and coins over the same period.

- **Dollarization**

The “dollarization” of foreign economies, in which the dollar is substituted for the local currency (either formally or informally), has been a significant source of dollar note demand over the last decade. Between 1988 and 1995, large shipments of dollars went to Argentina and the former Soviet Union (FSU). Inflation, declining exchange rates, currency recalls, and an underdeveloped banking system encouraged people in those countries to hold and use U.S. dollars. It is difficult to predict whether these countries or other regions or countries with a history of economic instability will require the same scale of dollar shipments in the future.

- **Impact of the Euro**

The emergence of the euro will affect the dollar, although the nature and extent of that impact is difficult to predict. In the short run, the anticipated introduction of the euro may boost foreign demand for the dollar. However, the new European Central Bank may gradually require smaller dollar reserves after the introduction of the euro in 2002. Regions with close trade ties to the European Union, such as eastern Europe, the Mediterranean basin and certain regions of Africa may substitute euros for dollars. On the other hand, there is the possibility that the euro could set a precedent for regional currencies, and encourage the adoption of the dollar throughout the Western Hemisphere.

It will take time for the euro to stabilize and gain trust worldwide. Any major challenge to the dollar as the primary international currency is unlikely to occur in the short run, if at all. However, foreign demand for the dollar, as opposed to other currencies, will continue to reflect the relative strength of the U.S. economy

- **Use of Other Transaction Mechanisms**

Historically, consumers have continued to use traditional transaction mechanisms even while adopting new ones. Over the next decade this trend is likely to continue because each type of transaction mechanism has a unique mix of features that makes it more useful for certain types of transactions (summarized in table A-2).

The share of cash used by consumers over the past decade has been reduced by growth in check and credit card transactions. Cash transactions are likely to continue to decline relative to checks and credit cards over the next decade. Growth of newer transaction mechanisms, such as point of sales (POS) debits, will grow at the fastest rate, although they currently represent a very small share of total dollar transactions. POS debit cards will provide an alternative primarily to cash and check transactions. However, the total volume of transactions in the U.S. and foreign economies is increasing, so the use of cash is likely to remain substantial over the next decade, despite a declining share of total transactions.

Table A-2. Comparison of Payment Instrument Features (from consumer perspective)

<i>Payment Instrument</i>	<i>Floated</i>	<i>Liability for Loss</i>	<i>Ease of Use</i>	<i>Bulkiness</i>	<i>Pay by Phone, Mail or Computer</i>	<i>Extend Credit Get Cash</i>	<i>Privacy</i>
Coins	No	Yes	High	High	No	No	Yes
Notes	No	Yes	High	Moderate	No	No	Yes
Checks	Yes	No	Low	Moderate	Mail only	Get cash only	No
Credit Cards	Yes	Limited to \$50	Moderate	Low	Yes	Yes	No
Debit Cards	Yes	Limited to \$50	Moderate	Low	No	Get cash only	No
Smart Cards	No	Yes	High	Low	No	No	No
E-Cash	No	Not determined	High	Low	Computer only	No	Unknown

Newer electronic payment mechanisms, such as stored-value cards and digital cash, are still being developed or tested in pilot programs, and their potential is unknown. The success of stored-value cards may depend, in part, on incorporating multiple, cross-industry applications, such as storing both cash and information. Digital cash is being designed for computer transactions and is unlikely to significantly affect cash usage.

- **Fifty States Commemorative Quarter Program**

The Fifty States Commemorative Quarter program, beginning in 1999 and lasting for ten years, will require five new quarter designs each year. Demand projections for this program are very tentative because no comparable, multiyear circulating commemorative program has been attempted. Initial estimates for the first half of 1999 suggest that the commemorative quarters are popular and that, in 1999, incremental demand (in addition to an estimated economic demand of 2.6 billion quarters) will likely fall within the projected range of 1.5 billion to 3 billion additional quarters. However, demand could exceed the range, given that promotion of the program did not begin until June 1999. Demand for other coin denominations has also grown substantially in 1999, suggesting that there might be a carryover effect from the quarter.

Mint production capacity is expected to be sufficient unless most of the new quarters are hoarded and not allowed to circulate. Continued rapid growth in demand for the other coin denominations could also pose a long-term problem.

- **Sacagawea Dollar Coin**

Treasury is authorized to issue a new dollar coin, beginning in 2000. The new Sacagawea dollar coin is expected to be more popular than the Susan B. Anthony dollar coin, in part because it will

be more easily distinguishable from the other coin denominations. However, history suggests that the new dollar coin will not circulate widely unless the \$1 note is withdrawn. Because there are no plans to withdraw the \$1 note, Treasury does not expect demand for the new Sacagawea dollar to significantly affect production capacity. However, in accordance with the legislation, the Mint plans to promote the new dollar coin.

- **Penny Production**

Over the last decade, some stakeholders have advocated eliminating the penny. Treasury policy has been to continue production of the penny, which circulates widely. Because this denomination represents the largest share of coin production (about 57 percent), discontinuation would reduce the Mint's production and distribution requirements.

- **Use of Plastic Substrate**

If developed, a plastic substrate could expand the life span of notes and reduce the volume of notes produced. The cost benefit would be greatest for the \$1 note, because it currently has the shortest average life span (about 18 months), and because it not expected to be redesigned. Although the \$1 note would still be more costly than a \$1 coin over its full life span, it might be more acceptable to consumers, who generally prefer carrying notes.

- **Coin Recycling**

Coin recycling businesses, such as Coinstar, have increased the life span of primarily pennies by returning them to active circulation. The initial result was that the Mint produced fewer pennies. Although the coin recycling businesses do not appear to have reached a saturation point in the market, penny demand has begun to accelerate once again. It is not clear whether the impact of the recycling machines on penny demand had a limited impact, or whether other factors are driving the renewed increase in penny demand

Projections

Note Demand

A Federal Reserve study forecasts an increase in total note demand between calendar year (CY) 1997 and CY 2010, from approximately 18 billion notes to about 33 billion notes (including 20 billion notes held overseas.)¹ The forecast assumes that the annual compounded growth rate for:

- Total demand remains constant at 5 percent between CY 1984 and CY 2010;

¹ A draft study, "The Future Demand for U.S. Banknotes: 1998 to 2010," by Ruth Judson, Richard Porter and Kendrew Witt of the Federal Reserve's Division of Monetary Affairs, presents baseline forecasts of the volume of notes circulating domestically and overseas

- Domestic demand declines slightly, from under 4 percent between CY 1984 and CY 1997 to over 3 percent between CY 1997 and CY 2010; and
- Foreign demand remains constant at 6 percent between CY 1984 and CY 2010.
 - In terms of total volume, the share of foreign-held notes is projected to increase from approximately 55 percent in 1997 to 62 percent by CY 2010.
 - In terms of total value, the share of foreign-held notes is projected to rise from 70 percent in CY 1997 to 77 percent in CY 2010 (reflecting the large number of high denomination notes held overseas).

Coin Demand

The Mint projects that total coin demand (net payout) will increase from 22 billion in FY 1999 to 28 billion in FY 2010. Between FY 1999 and FY 2010, the annual compounded growth rate will decrease for all coins except pennies.

- The rate for total coin demand is projected to be about 2 percent, the same rate of growth experienced between FY 1990 and FY 1998;
- The rate for quarters is projected to decrease to about 3 percent from 7 percent between FY 1990 and FY 1998;
- The rate for nickels and dimes is projected to decrease to about 2-3 percent from 5-7 percent between FY 1990 and FY 1998; and
- The rate for pennies is projected to increase to over 1 percent from a rate of decline of less than 1 percent between FY 1990 and FY 1998.

Recommendations

Many factors will drive demand for notes and coins over the next decade. Some of these factors cannot be predicted with any degree of certainty, and will require joint monitoring by the Department of the Treasury and the Federal Reserve System. The factors that most need to be monitored, and over which there is little control are, foreign demand (the euro and dollarization), the role of other transaction mechanisms, and domestic economic growth.

Foreign demand has accounted for the largest share of growth in the value of circulating notes over the past decade. To determine future foreign requirements, the group should focus on two activities:

- Monitoring the euro and its impact on dollar holdings; and
- Continuing to monitor trends in dollar usage overseas—where the notes are going, and how they are used.

The use of alternate transaction mechanisms will continue to affect both domestic and foreign demand for cash. New technologies will present opportunities for the development of more advanced electronic transaction mechanisms. The group will need to monitor the effects of technology on the use of cash.

- New technologies may affect the use of cash in the long term.
- Existing technologies and payment mechanisms could be adopted over the next decade.
- Consumer preferences for the various transaction mechanisms may change.

The group will need to gather and use information on domestic economic activity, which will continue to affect both domestic and foreign demand for dollar notes and coins.

- Monitor projections of domestic economic growth and inflation.
- Evaluate the Treasury's and the Federal Reserve's forecasting methods for note and coin demand. Have the projections been accurate or useful? Are the proper data being collected?
- Coordinate Treasury and Federal Reserve forecasts and analyses of note and coin demand. Are they based on the same assumptions?

I. INTRODUCTION

Background

This study identifies the forces that will drive requirements for U.S. coins and notes. It examines how these forces may shape demand and the implications for the production and processing of coins and notes. This study was conducted jointly by the Board of Governors of the Federal Reserve System and the U.S. Department of Treasury (including the U.S. Mint and the Bureau of Engraving and Printing) to provide operational and policy guidance.

Demand for U.S. coins and notes has grown steadily, if not continuously, since their introduction. The Mint produced the first uniform U.S. government coinage (copper cents) in 1792. A part of Treasury since 1873, the U.S. Mint currently produces all U.S. circulating and commemorative coins, as well as other numismatic products. Treasury's Bureau of Engraving and Printing (BEP) issued the nation's first uniform paper notes in 1862. By 1877, the Bureau had taken over the printing of all U.S. banknotes from private banknote companies.

The ending of the Cold War and the emergence of a new global economy have created unprecedented demand for the dollar, both domestically and overseas. Since 1960, the value of notes in circulation has climbed from \$30 billion to nearly \$500 billion, approximately 70 percent of which is currently held outside of the United States. In 1998, the estimated value of coinage in circulation was approximately \$8 billion.

The future demand for coins and notes, and the form they will take, will have important ramifications for both policy and operational decisions at Treasury (e.g., plans for production facilities and processes). The Federal Reserve orders notes from BEP and coins from the Mint and places them in circulation. The mix and volume of coins and notes affects both Federal Reserve and bank operations, such as the processing, storage, and distribution of coins and notes.

The supply of coins and notes also affects the calculation of government revenues (both interest and seigniorage). The notes are a claim on the Federal Reserve and represent essentially an interest-free loan for the government. The more notes outstanding, the less interest-bearing debt required by Treasury. Based on an estimated \$340 billion notes held overseas and the current three-month Treasury bill rate of 4.6 percent, the amount of implicit taxpayer savings from overseas holdings is about \$16 billion annually.

The Federal Reserve holds U.S. government securities as assets in amounts that correspond to the face value of U.S. notes outstanding, domestically and overseas. In 1998, the Federal Reserve paid \$27.6 billion to Treasury as interest on Federal Reserve notes. The Treasury also earns "seigniorage" on the coins--approximately \$600 million in 1998.

Method

Meetings are held quarterly by the Assistant Secretary of the Treasury for Management/Chief Financial Officer with the Federal Reserve's Assistant Director for Cash and Fiscal Agency,

Treasury's Fiscal Assistant Secretary, the Treasurer, and the Directors of the Bureau of Engraving and Printing and the U.S. Mint to coordinate and address policy or operational issues regarding coins and notes. The group requested that staff collaborate on a study that would:

- Identify the factors that will drive the supply and demand of notes and coins over the next decade,
- Provide forecasts of note and coin demand to 2010, and
- Recommend next steps.

The goal of this study is to provide the group with a better context for making policy or operational decisions, as well as to identify potentially critical issues that will require further monitoring or analysis.

Chapter 2 discusses the key factors driving historical note and coin demand, such as the rate of real economic growth and inflation, and the use of other transactional mechanisms. Chapter 3 examines how those drivers might behave over the next decade and discusses additional factors that may shape future demand, such as new coin programs. Chapter 4 presents the Federal Reserve's and the Mint's projections of note and coin demand to 2010, and the assumptions underlying them.

Chapter 5 focuses on the supply side and critical factors that could affect production, but not necessarily demand—such as the redesign of notes, elimination of various denominations of coins or notes, and the expansion of the note's life span. Unlike many of the demand-side issues discussed in Chapter 2, these factors should be easier to anticipate.

Finally, Chapter 6 reviews the critical drivers of supply and demand for notes and coins, and identifies those factors that are essentially unpredictable and will require further monitoring or analysis.

2. HISTORICAL DEMAND FOR NOTES AND COINS

Historical Demand for Notes

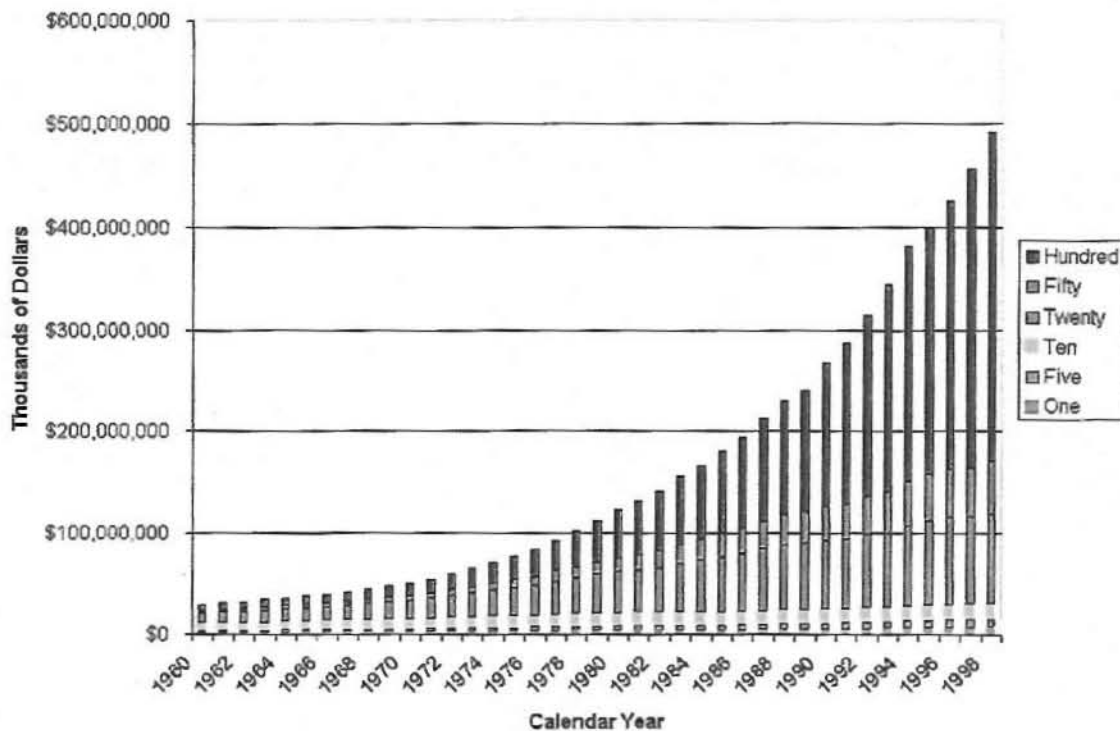
The value of notes in circulation represents the demand for notes.

- The nominal value¹ of circulating notes increased from \$30 billion to \$492 billion between 1960 and 1998—an annual compounded growth rate of about 7 percent² (chart 1).
- The value of the circulating stock of notes increased at 9 percent in the 1970s—partly reflecting high inflation rates, and slowed to 7.5 percent in the eighties and nineties.
- The higher denominations (\$20, \$50, and \$100) accounted for 96 percent of the total growth in the value of circulating notes between 1960 and 1998.
- Hundred dollar notes represented 20 percent of the value of the circulating stock in 1960 compared to over 50 percent in 1990 and 65 percent in 1998 (although only 17 percent of total volume).

¹ The nominal (including inflation) value, rather than the volume, of note and coin demand is used in this chapter to identify the demand drivers. However, projections of note and coin demand, as well as production are based on volume.

² Annual compounded growth rates in this report were calculated by fitting a straight line to the curve, calculating the slope of the line, and dividing by the average value of the data over the period.

Chart 1. Historical Note Demand (1960-1998)



Data Source: *The Federal Reserve System, Division of Monetary Affairs.*

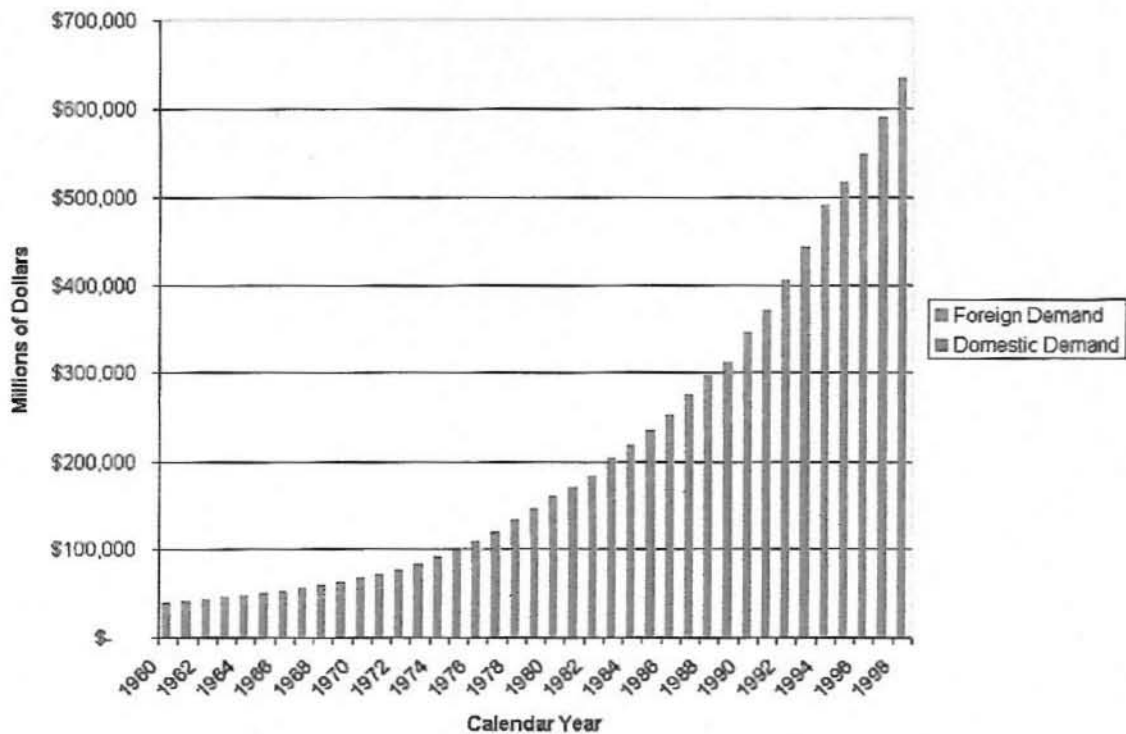
Foreign Demand:

Analysts at the Federal Reserve estimate that since 1980, foreign demand for U.S. notes has accounted for over 75 percent of all growth in the value of circulating notes (chart 2). Between 1960 and 1998, the nominal value of notes circulating abroad increased from \$10 billion to \$342 billion—an annual compounded rate of 8 percent (compared with 7 percent for total demand).³

The dollar emerged as an international currency after World War I, and after World War II, replaced the British pound sterling as the dominant international currency. Since 1960, the share of U.S. notes held overseas has grown from over 30 percent of the total value of circulating stock to over 70 percent in 1998.

³ The Federal Reserve is able to make only rough estimates of the flow of U.S. notes abroad. Cash is often sent in the mail, and individual shipments of up to \$10,000 do not have to be reported to the Customs Service. Customs' records of shipments above \$10,000 provide some information on currency flows abroad. Other important sources of data are the informal reports that commercial banks submit to the Federal Reserve regarding their overseas shipments of notes.

Chart 2. Domestic vs. Foreign Note Demand (1960-1998)



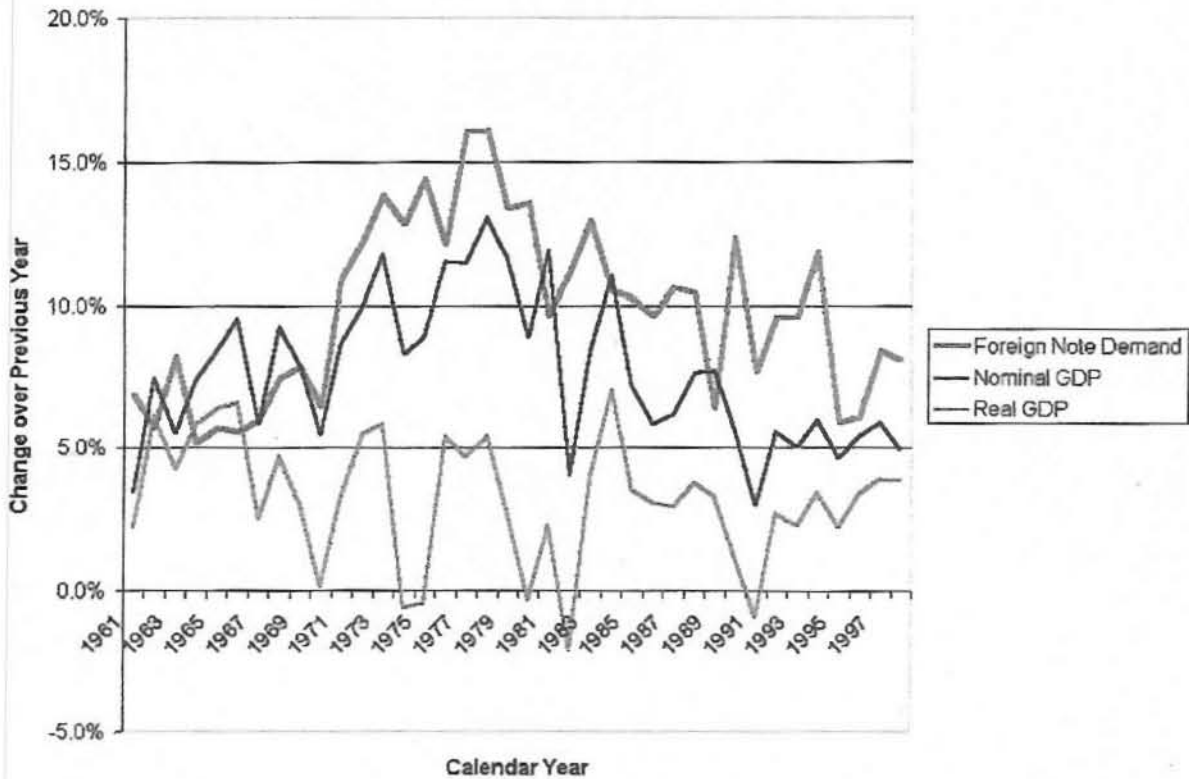
Data Source: Estimates provided by the Federal Reserve System, Division of Monetary Affairs.

The U.S. dollar is used overseas, as it is domestically, as a unit of account, a medium of exchange, and a store of value. The dollar provides overseas users with a store of value when the purchasing power of their domestic currency is uncertain. Reliance on the dollar has been greatest in countries where a history of high inflation and other political or economic crises has increased the risk of holding local currency.

U.S. currency has several advantages as currency overseas:

- Relatively stable purchasing power, and widely accepted as a form of payment worldwide
- Reasonably secure from counterfeiting
- Relatively anonymous compared with other currencies (shipments under ten thousand dollars do not have to be reported)
- Not subject to recall
- Backed by the full faith and credit of the U.S. government.

Chart 3. Foreign Note Demand vs. GDP

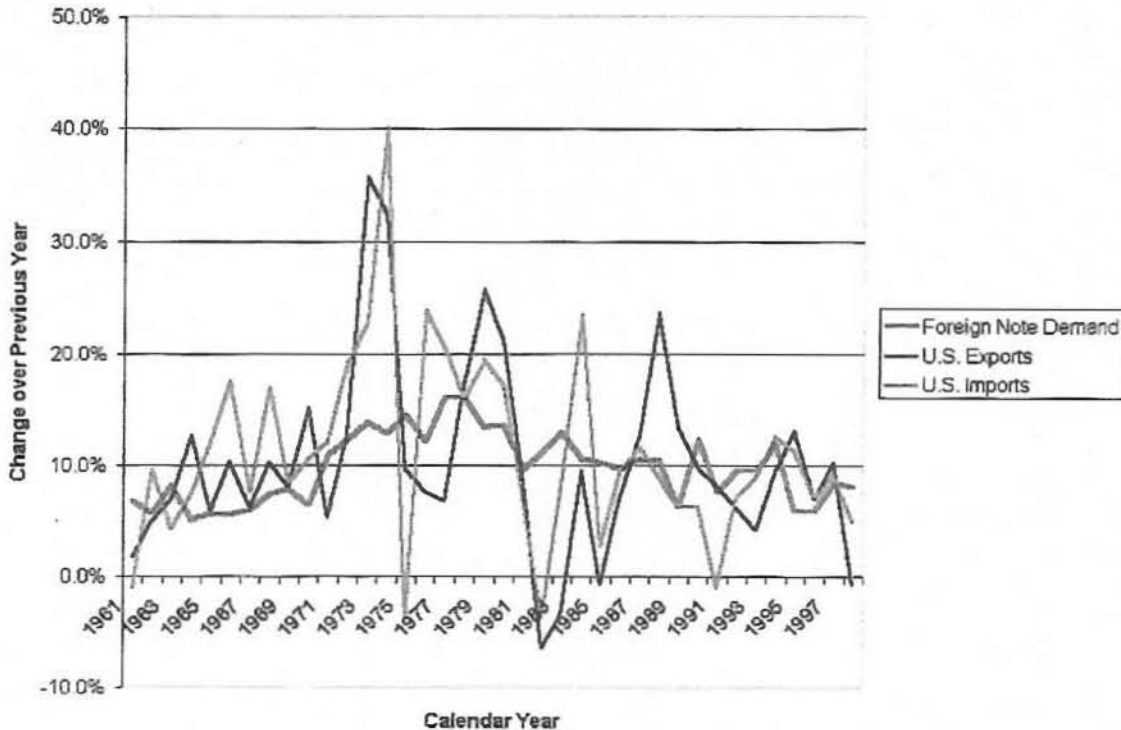


Data Sources: GDP—Dept. of Commerce, Bureau of Economic Analysis; Note Demand—Federal Reserve System

The relative strength of the U.S. economy, reflected in part by growth in real U.S. gross domestic product (GDP)—may drive the dollar’s role as the primary international currency (chart 3). The rate of inflation affects the value of transactions, worldwide, including growth of U.S. foreign trade (see U.S. imports and exports in chart 4). Consequently, periods of high inflation promote increases in foreign trade and foreign demand for dollars.

- In the seventies, as growth in nominal GDP (a combination of real economic growth and inflation) and foreign trade accelerated, growth in foreign demand for dollars peaked at about 13 percent annually. Much of the growth in foreign dollar demand and foreign trade was due to high inflation (driven by high oil prices during this period).
- In the eighties, as inflation and trade growth decelerated, growth in foreign demand for dollars slowed to less than 10 percent.
- In the nineties, as inflation and trade growth continued to decelerate, nominal GDP growth leveled out at about 5 percent annually, and growth in foreign demand for dollar notes slowed to about 8 percent.

Chart 4. Foreign Note Demand vs. U.S. Foreign Trade



Data Sources: Trade Data—Dept. of Commerce, Bureau of the Census; Note Demand—Federal Reserve System

Although the growth rate in foreign demand for dollars was decelerating, the largest flow of dollars overseas—approximately \$100 billion—occurred between 1988 and 1995.⁴ Between 1988 and 1991, most of the notes—approximately \$40 billion—went to Argentina. Argentina experienced chronic high inflation from the 1960s to the early 1990s, including brief bouts of hyperinflation in the mid-1970s and late 1980s. After the crisis passed, many residents continued to hold dollars as insurance against further political or economic upheaval. Between 1990 and 1991, the Persian Gulf War also contributed to a worldwide increase in demand for dollars. Between 1992 and 1995, the dominant destination of overseas shipments was the former Soviet Union (FSU). Inflation, declining exchange rates, currency recalls, and an underdeveloped banking system encouraged people in those countries to hold and use U.S. dollars. Net flows of U.S. notes to Russia alone in both 1994 and 1995 were at least \$20 billion per year.

Growth in overseas note demand slowed in 1995 and 1996 to about 6 percent. The slowdown may have been a reaction to news that a redesigned \$100 note would soon be released. Note holders may have been concerned—despite assurances to the contrary—that the traditional note design might lose value or not be accepted after issuance of the new design. Following the

⁴ Richard D. Porter and Ruth A. Judson, "The Location of U.S. Currency: How Much Is Abroad?" *Federal Reserve Bulletin*, October, 1996, p. 886, 896.

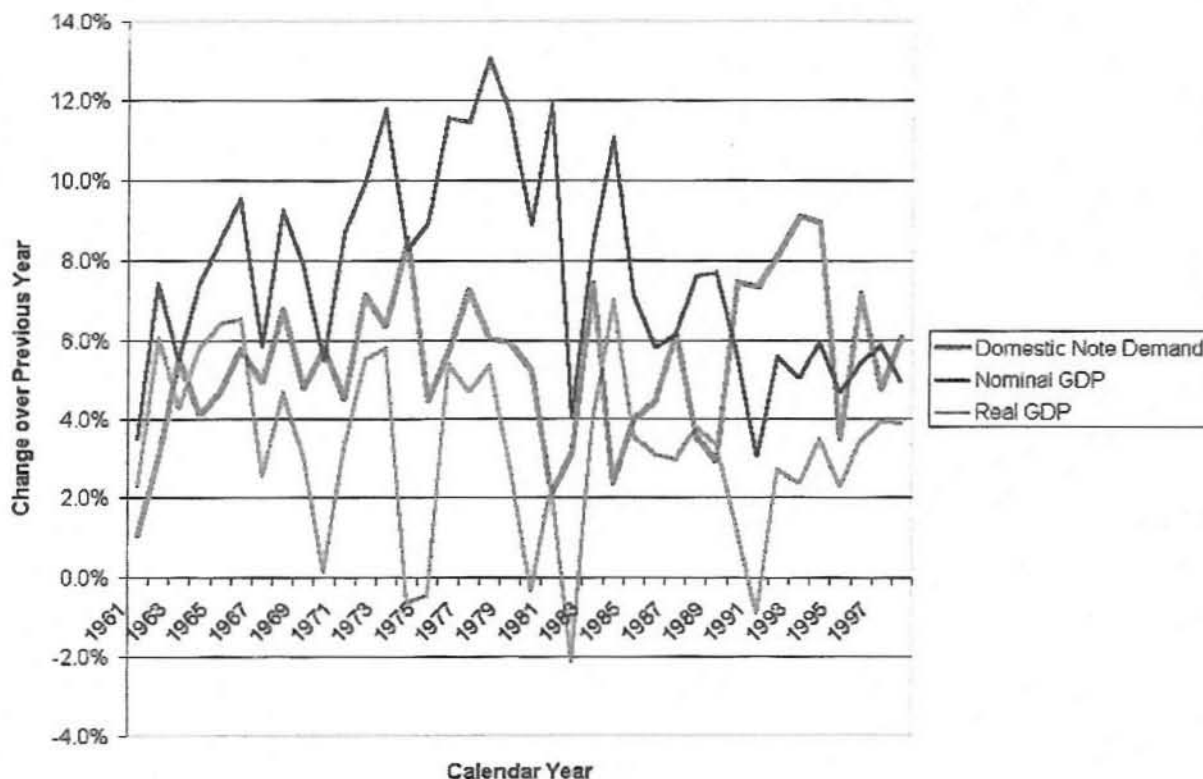
release of the new note, growth in demand, especially for the \$100 notes, accelerated again to an annual rate of about 8 percent. The new anti-counterfeiting features boosted confidence in the dollar overseas, contributing to the increased demand.

Domestic Demand:

Between 1960 and 1998 the nominal value of notes circulating domestically increased from \$20 billion to \$150 billion—an annual compounded growth rate of 5 percent (compared with 8 percent for foreign demand). Domestic note demand reflects nominal GDP (chart 5).

- In the sixties, nominal GDP grew at a rate of about 7 percent annually, and domestic note demand at an annual compounded growth rate of about 4.5 percent.
- In the seventies, high inflation drove nominal GDP growth to about 10 percent annually, and domestic note demand accelerated to 6 percent annually.

Chart 5. Domestic Note Demand vs. GDP



Data Sources: GDP—Dept. of Commerce, Bureau of Economic Analysis; Note Demand—Federal Reserve System

- In the eighties, as inflation dropped, the annual growth rate of nominal GDP slowed to about 7 percent, but domestic note demand grew at an annual rate of about 4 percent.

- In the nineties, as inflation continued to drop, the annual growth rate of nominal GDP slowed to about 5 percent. However, growth in domestic note demand accelerated to about 6.5 percent, suggesting that other factors might be contributing to domestic note demand.

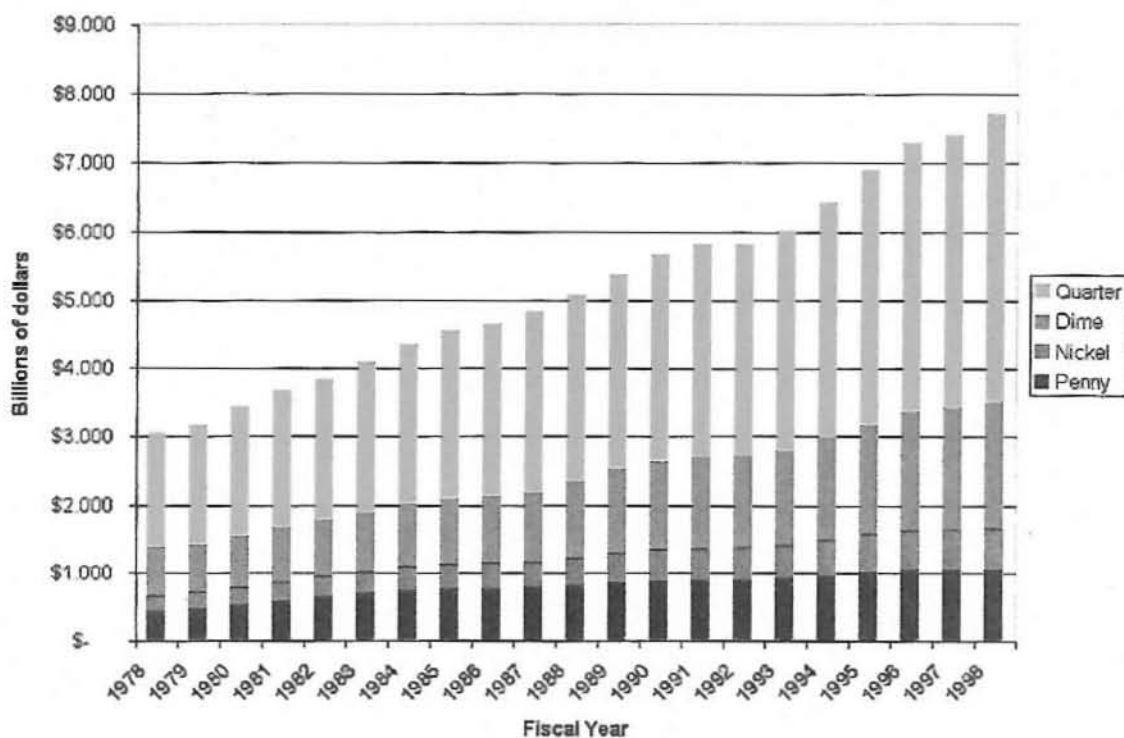
Historical Demand for Coins

The circulating stock or active coin pool is defined as the total number of coins active or available to support cash transactions. Not included are idle or inactive coins that have been withdrawn, either intentionally or unintentionally, from commerce. The Federal Reserve estimates the circulating stock of notes by tracking the notes they destroy, as well as by checking payments and receipts of notes at the Reserve Banks. However, coins (especially pennies) often are not returned to the banks at the end of their life span. Instead, the coins are disposed of or set aside by the public.

The Mint calculates the circulating stock of coins by using attrition rates (the rate at which coins disappear from the circulating stock or active coin pool) estimated from the Federal Reserve's periodic coin samplings. The Mint applies those rates to yearly coin production, over a 30-year horizon. The rate at which coins leave the active coin pool is not linear. For the first four to five years of a coin's life span, the disappearance rate is relatively high, then flattens out for a long period, and finally increases again many years later.

The value of coins (pennies, nickels, dimes, and quarters only) in circulation is used here as the measure of demand for coins. For the purposes of this historical analysis, no data are included on half-dollar and dollar coins because these denominations have never circulated widely and have not represented a significant share of the circulating stock. Between 1978 and 1998 (the period for which estimates are most reliable) the value of circulating coinage increased from \$3 billion to \$7.7 billion, an annual growth rate of about 4 percent (chart 6).

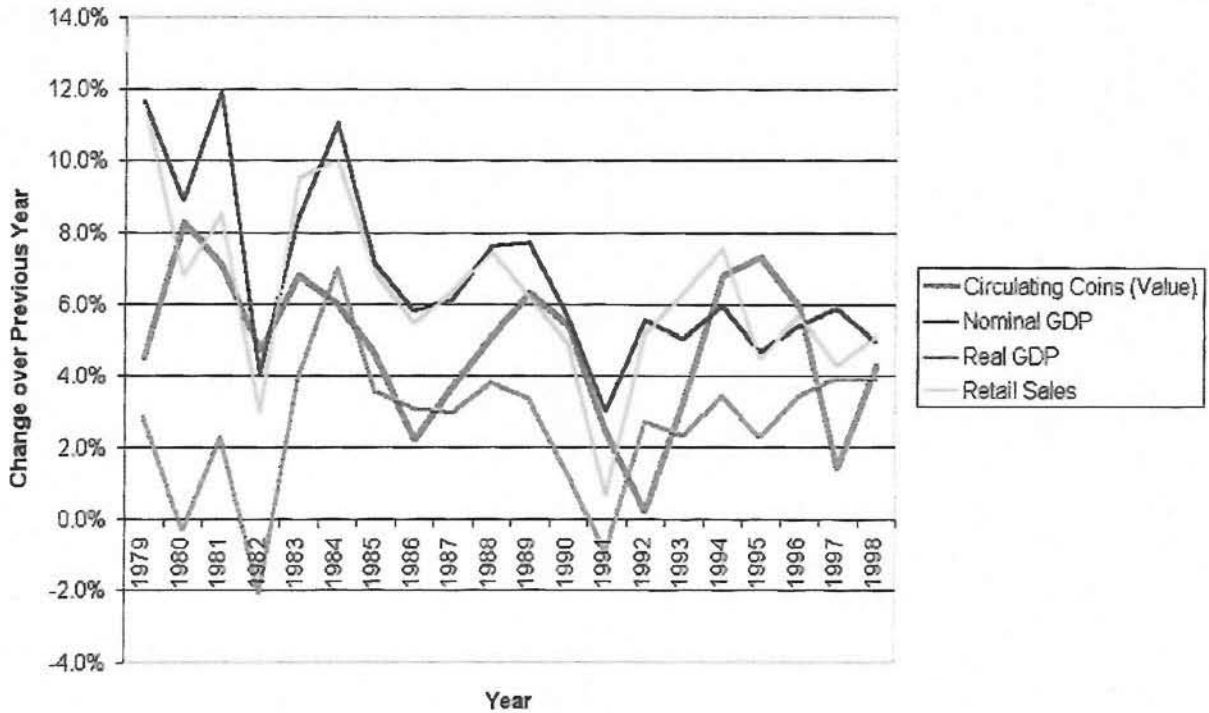
Chart 6. Circulating Coins (1978-1998)



Data Source: Estimates by the U.S. Mint

Coins are used primarily to make change or to pay for small purchases, especially purchases made from vending machines. Growth in coin demand, as with note demand, appears to be largely driven by domestic economic growth (chart 7). The growth rate in coin demand, which slowed moderately from 4.7 percent in the eighties to 4.3 percent in the nineties, parallels the decelerating growth of nominal GDP and retail sales over the same period. The sharp decreases in coin demand, nominal GDP, and retail sales in the early eighties and nineties were due to economic recessions.

Chart 7. Coin Demand vs. GDP and Retail Sales



Data Sources: Coins: U.S. Mint; GDP: Bureau of Economic Analysis, U.S. Dept. of Commerce.

Historical Demand for Other Transactional Mechanisms:

The demand for notes and coins is affected by the use of other transaction mechanisms. However, data are not routinely collected on the value or volume of cash transactions in this country, so the impact of other transaction mechanisms on demand for cash can only be estimated.

Background:

Money, as a means of exchange, has evolved from commodities such as gold or silver coins, which have inherent value to paper money, which does not. The use of paper money has facilitated trade, as it is a portable, efficient way to transfer value. Another important way of improving the efficiency of money has been to eliminate its physical existence and merely “note” who owns it. Thus paper money was extended to notational money—money that exists as notations in the ledgers of depository institutions, such as checking accounts. Electronic funds transfer (EFT) methods, such as automated clearinghouse (ACH) and debit cards, are ways of

transferring notational money from one account to another, or converting notational money into cash. New electronic payments, such as stored-value cards and on-line scrip (also known as e-cash and digital cash) take the concept of money beyond its physical and notational forms to intangible electronic forms that exist only on line.

Most large-dollar payments in the United States are already conducted electronically via Fedwire (a computer network that connects Federal Reserve Banks with over 11,000 domestic depository institutions) or the Clearing House Interbank Payment System (CHIPS—a private network run by the nation's largest banks).⁵ The large-dollar payments, most of which are transfers by financial institutions, constitute only a small fraction of the volume of all noncash payments. New electronic payments methods may bring to small-dollar payments many of the advantages that already accrue to large-dollar payments (e.g., convenience, speed).

Cash:

The use of cash (notes and coins) has remained strong over time, even with the introduction of other financial instruments, such as checks and credit cards. Of all payment methods, cash is used in the largest number of transactions (estimated between 50 and 75 percent of all transactions)⁶ but accounts for a much smaller share of the total value. The extensive use of cash is based on several advantages. Cash is the most widely accepted medium of exchange. It is convenient—easily transferred and requires no authorization to use—and provides a high degree of anonymity and security.

Cash purchases have declined as a share of all consumer purchases (in terms of value, not volume) over the past decade—in part due to increased use of checks and credit cards. According to telephone surveys commissioned by the Federal Reserve and conducted by the University of Michigan in 1984 and 1995,⁷ the share of cash purchases declined from 30 percent of total consumer expenditures to 18 percent over the decade. In contrast, the share of credit cards increased from 7 to 12 percent, checks from 62 to 67 percent, and debit cards reached 1 percent.

U.S. consumers have been able to acquire cash in an increasing variety of ways: from a bank teller; by cashing a check at grocery or other retail stores; by using an automated teller machine (ATM) with either a debit or credit card; or most recently, by using an ATM card or another card to get cash from a merchant. In the future, consumers may even be able to use personal computers to download cash to a stored-value card.

Automated Teller Machines (ATMs):

ATMs have increased the convenience of obtaining cash. ATMs were introduced in the mid-1970s, and growth accelerated in the early eighties as banks competed by improving consumer access to ATMs. By the mid-1980s, however, most of the profitable sites had been occupied and expansion of ATMs slowed. In the nineties, the number of ATMs expanded again as banks placed them in non-traditional locations such as restaurants, stores, and malls. This expansion

⁵ Congressional Budget Office, *Emerging Electronic Methods for Making Retail Payments*, June 1996, p. 2.

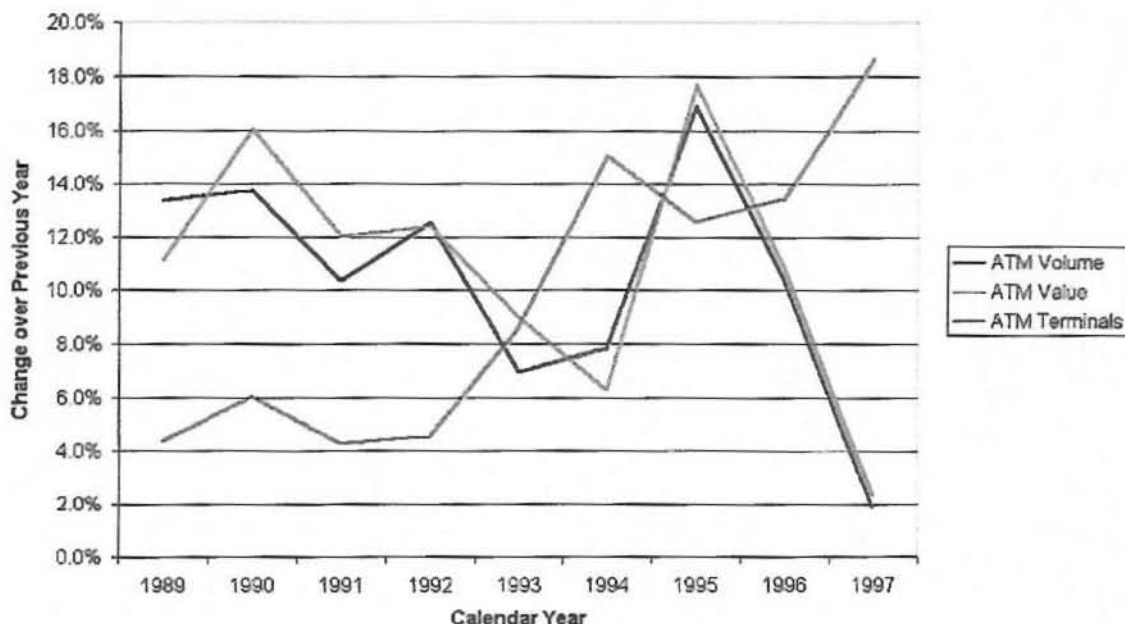
⁶ Congressional Budget Office, *Emerging Electronic Methods for Making Retail Payments*, June 1996, p. 17.

⁷ Federal Reserve System, *Study of the Future Uses of U.S. Currency*, appendix 1, "University of Michigan Survey of Consumers – May 1995 Summary – Payment Methods Survey Results," December 20, 1995.

was made possible by technological advances, especially in telecommunications capabilities that reduced the cost of operating ATMs. Additionally, the introduction of ATM access fees (surcharges) in 1996 made expansion of ATMs even more profitable.⁸

Since 1996, the number of ATMs has been growing much faster than the number of ATM transactions (chart 8), and consequently the number of transactions per ATM has been declining. Some banks are trying to encourage their customers to use ATMs by charging a fee for each assisted transaction that could have been done electronically. However, ATMs have growing competition from alternative methods of obtaining cash, such as cash-back options using POS debit cards

Chart 8. ATM Use in the United States (1988-1997)



Data Source: Bank for International Settlements

The net effect of ATMs on cash holdings is unclear. The increasing availability of ATMs has made it more convenient for consumers to obtain cash. Consequently, consumers might be expected to take out only enough cash to meet their immediate needs. This pattern would result in an overall reduction in cash holdings. (However, surcharges on ATM usage might partly offset this effect by encouraging ATM users to withdraw larger amounts at less frequent intervals to minimize charges.) On the other hand, ATMs, by lowering the cost of obtaining cash, could also make cash more convenient relative to other transaction mechanisms, such as credit cards, thus increasing overall cash holdings.

⁸ Congressional Budget Office, Competition in ATM Markets: Are ATMs Money Machines?, July 1998, Chapter 1.

The decline in overall cash holdings, relative to other transaction mechanisms, over the last decade, suggests that the net effect of ATMs may have been to lower cash holdings. However, any connection between ATMs and overall cash holdings is purely speculative because there have been no studies confirming this connection.

3. DRIVERS OF NOTE AND COIN DEMAND (1999-2010)

Between 1999 and 2010, many factors will drive demand for notes and coins (summarized in table 1). Those factors will include those categories already discussed in chapter 2—domestic economic growth, foreign requirements, and other transactional devices—as well as new coin programs. The timing and impact of many of these variables will be difficult to project.

Table 1. Expected Impact of Drivers on Note and Coin Demand

DEMAND DRIVERS	NOTES	COINS
Domestic Economic Growth	Mixed	Mixed
Euro	Decrease demand in long term	No significant impact
Dollarization	Increase demand	No significant impact
Other Transactional Mechanisms	Decrease demand	Decrease demand
New Coin Programs:		
50 States Quarter	No significant impact	Increase demand
Sacagawea Dollar Coin	Decrease production, but only if \$1 note withdrawn	Increase production, but not significantly unless \$1 note withdrawn

Domestic Economic Growth

In 1998, nominal GDP, reflecting continued low inflation, increased by less than 5 percent. The growth rate of real GDP, however, has risen from 2.3 percent in 1995 to 3.9 percent in 1998, reflecting a strengthening economy. Rising employment and income, as well as wealth effects from the rapid gains in stock prices over the past few years, have fueled the growth in household spending. However, inflation has remained low.

The outlook for the near future is one of moderation.⁹ The Administration expects that over the next two years nominal GDP growth will slow down to 4.2 percent from an estimated 5.2 percent this year. By the middle of the next decade, growth is forecast to reach 4.8 percent again. If nominal GDP growth slows over the next several years, as predicted, then it is likely to moderate growth in demand for notes and coins over the same period.

⁹ "Mid-Session Review of the Budget, FY 2000."

Introduction of Euro Currency

The new European currency, the euro, has the potential to become an international currency, based on the combined economic strength and trade activity of the participating countries.¹⁰ Consequently, there is speculation regarding what impact, if any, the euro will have on the use of the dollar overseas.

In anticipation of the euro, demand for dollars may rise as holders of the national currencies (e.g., the Deutsche Mark) of European Community (EC) countries divest, especially holders in Eastern Europe. However, the introduction of the euro may slow growth in demand for U.S. notes in the long run, especially within the euro area. For instance, the European Union (EU) central banks currently hold six times more currency reserves than the United States.¹¹ With the emergence of the European Monetary Union (EMU), however, the new European Central Bank (ECB) will require smaller reserves than the national central banks. Additionally, more than 60 percent of the external transactions of EU member states will become domestic transactions in the monetary union (assuming all 15 member states eventually participate in EMU), further reducing the size of reserves required. However, the ECB is likely to reduce its excess dollar reserves gradually in order to limit the impact on exchange rates.

The strength of the euro will be determined by internal factors, such as the degree to which monetary policy maintains stability and sustains growth and by external factors, such as demand for the euro versus the dollar in international portfolios. Reallocations in favor of the euro by non-European investors attracted by the European financial market may be offset by reallocations out of the euro by European investors aiming to diversify their risks. Additionally, a diversification of international portfolios away from the dollar has been under way since the beginning of the 1980s. In 1997, it was estimated that 40 percent of world savings were held in dollars and 37 percent in European currencies.¹² Further reallocations in favor of the euro are likely to occur gradually because investors will need to be convinced of the euro's strength (especially against the dollar). Regions with close trade ties to the EU, such as eastern Europe, the Mediterranean basin, and certain regions of Africa, are the most likely to substitute euros for dollars in the short term.

Because the euro will have two note denominations greater than the \$100 note, overseas holders of notes who currently use the dollar as a store of value may find it more convenient to hold fewer, higher denomination notes. The Secretary of the Treasury retains the authority to print \$500, \$1,000, \$5,000, and \$10,000 notes, although printing of those notes was discontinued in 1946. The Federal Reserve would need to order the higher denominations before any would be

¹⁰ On January 1, 1999, eleven European countries officially replaced their national currencies with a single European currency, the euro. Although the euro is now the official currency in those countries, the notes and coins of the national currencies will remain in circulation (as a subdenomination of the euro) until the new euro coins and notes are issued—currently planned for January 1, 2002. The legal tender status of national notes and coins will be canceled no later than July 1, 2002. The euro will be issued in the following denominations: 1, 2, 5, 10, 20 and 50 euro cents, 1 (100 cent) and 2 (200 cent) euro coins, and 5, 10, 20, 50, 100, 200, and 500 euro notes. At an exchange rate of approximately \$1.04, the value of the two highest euro notes—200 and 500—will be about \$208 and \$520, respectively (source: European Central Bank website: www.ecb.int)

¹¹ EU web site: www.europa.eu.int/euro

¹² Ibid.

printed. Any benefits would need to be weighed against the possibility that the higher denomination note might provide an easier mechanism for laundering of illegal profits, and make detection of illicit cash transactions more difficult to detect.

Dollarization

Dollarization of foreign economies, either officially or unofficially, would likely increase demand for dollars. Although FSU demand for dollar notes may have temporarily peaked, other countries or regions may demand dollar notes in the future.

Argentina recently considered formally dollarizing its economy—replacing its own currency, for which the value is fixed to the U.S. dollar, with the dollar. The goal of such a plan would be to eliminate the risk of currency speculation and benefit from the U.S.' lower interest rates and inflation. One article states that Argentina would need a one-time allotment of approximately \$16 billion in U.S. dollar bills to dollarize its economy.¹³ It is not clear whether the plan included U.S. coins. Panama is currently the only foreign country officially using the dollar as its currency.

If the dollar were adopted as a regional currency, Latin American note demand would not be a significant production issue for the Bureau of Engraving and Printing.

- Large stocks of dollars already circulate in Latin America. Latin Americans hold a majority of their savings in dollars, and in some countries, such as Argentina, Bolivia, Peru, and Uruguay, at least 70 percent of all banking assets and liabilities are now dollar-denominated.
- It is estimated that the economies of all Latin American countries do not exceed that of the states of California, New York, and Texas.¹⁴

There is a major potential drawback for any country considering dollarization of its economy. Dollarization would mean the country would lose the ability to use its own monetary policy to change economic conditions, either by lowering rates during slow times or by raising rates if growth is too rapid and inflation becomes a problem. In turn, the U.S. faces the risk that if a country is experiencing economic hard times, its politicians might shift the blame from their own policies to those of U.S. monetary authorities. The Federal Reserve and Treasury have cautioned that adopting the U.S. dollar would not cure all the economic problems of a country, and it would still be necessary to undertake economic reforms.

¹³Robert J. Barro, "Let the Dollar Reign From Seattle to Santiago," *Wall Street Journal*, March 8, 1999.

¹⁴David Ignatius, "Dollarization in Latin America," *The Washington Post*, April 28, 1999.

Other Transactional Mechanisms

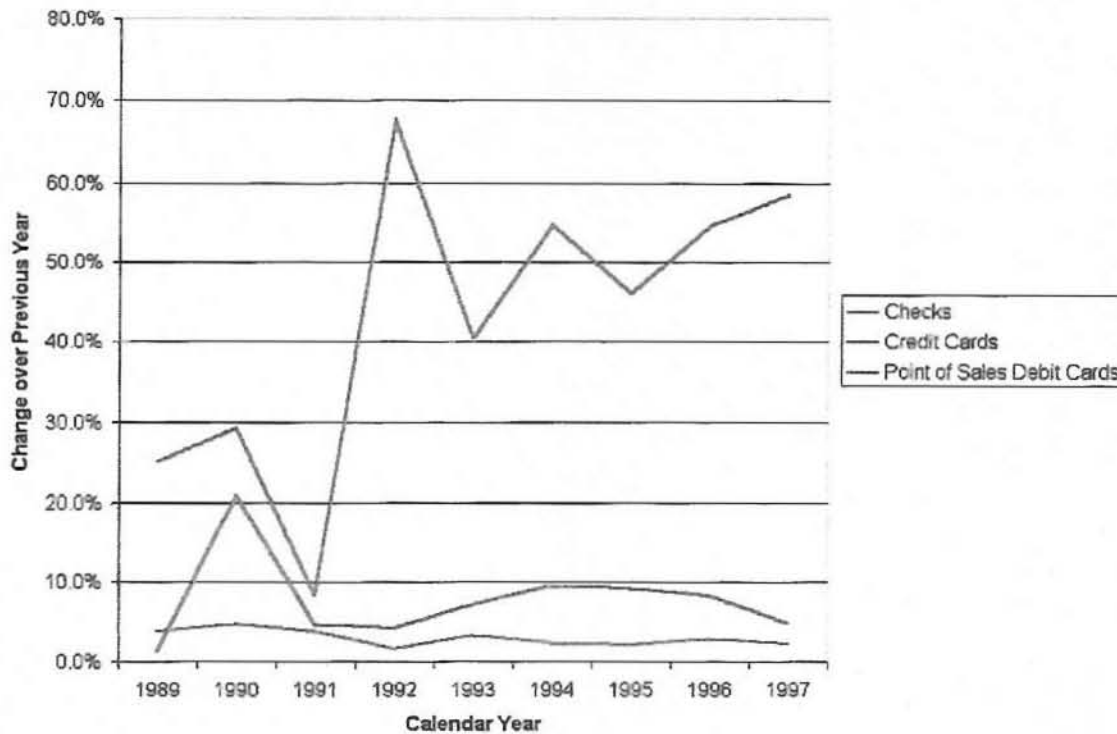
As shown in table 2, each of the major payment or transactional devices has a unique combination of features. In the future, consumers are likely to use a mix of all these payment instruments, as well as new devices yet to be developed.

Table 2. Comparison of Payment Instrument Features (from consumer perspective)

<i>Payment Instrument</i>	<i>Float</i>	<i>Liable for Loss</i>	<i>Ease of Use</i>	<i>Bulkiness</i>	<i>Pay by Phone, Mail or Computer</i>	<i>Extend Credit Get Cash</i>	<i>Privacy</i>
Coins	No	Yes	High	High	No	No	Yes
Notes	No	Yes	High	Moderate	No	No	Yes
Checks	Yes	No	Low	Moderate	Mail only	Get cash only	No
Credit Cards	Yes	Limited to \$50	Moderate	Low	Yes	Yes	No
Debit Cards	Yes	Limited to \$50	Moderate	Low	No	Get cash only	No
Smart Cards	No	Yes	High	Low	No	No	No
E-Cash	No	Not determined	High	Low	Computer only	No	Unknown

The share of cash used by consumers over the past decade has declined as the use of checks and credit cards has increased over the past decade. The use of checks and credit cards is expected to continue to grow over the next decade, but probably at a slower rate. Electronic funds transfers, such as Point of Sale (POS) debits are expected to grow the fastest over the next decade. Newer electronic payment mechanisms, such as stored-value cards and digital cash, are still being developed or tested in pilot programs, and their potential is unknown (chart 9).

Chart 9. Growth Rate of Transaction Mechanisms in the United States



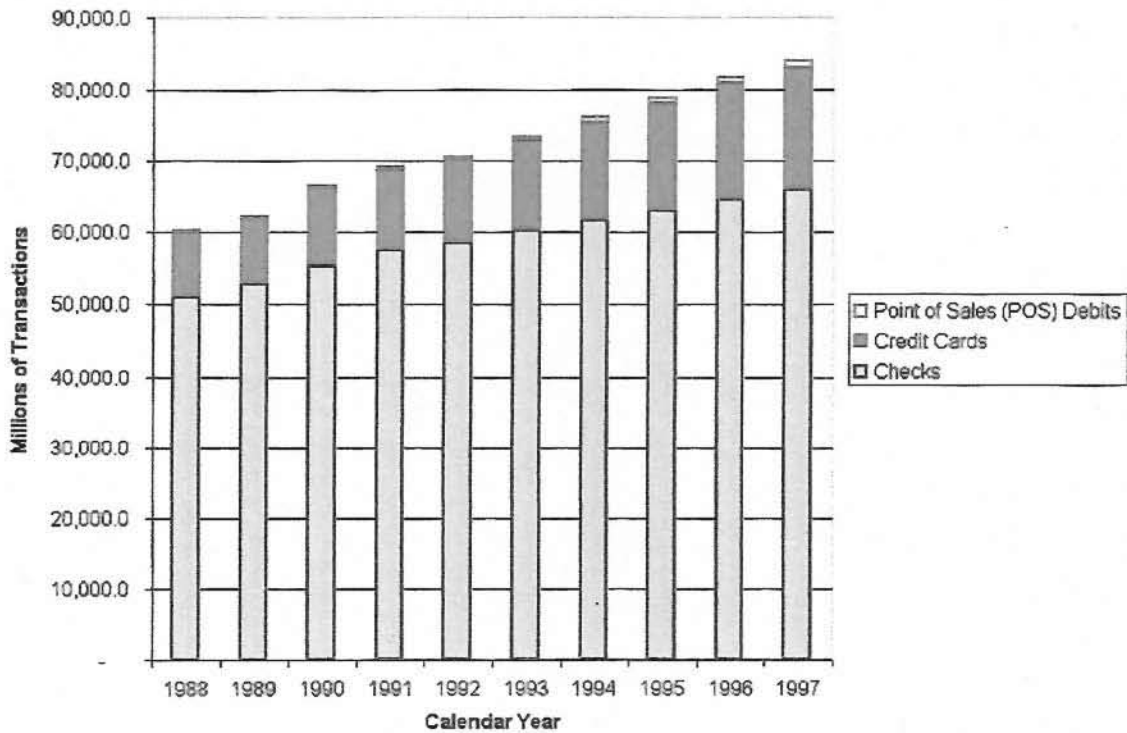
Data Source: Bank for International Settlements

Checks:

Check transactions provide control over the timing and amount of payments, can be conducted through the mail, are not limited by denominations, and allow the consumer to benefit from float. Checks can be used for small and large transactions, although they are less commonly used for transactions under \$10. Checks are a close substitute for cash. Next to cash, checks account for the largest share of transaction volume (chart 10).

Growth in check volume has been moderate (about 2.8 percent, annually) and relatively steady between 1988 and 1997 (chart 9). The number of check transactions is likely to continue to grow at a moderate rate (2-3 percent), annually. Growth in credit and debit cards is likely to exceed that of checks, reducing the share of check transactions overall. However, over the next decade, checks are likely to continue to account for the largest number of non-cash transactions.

Chart 10. Volume of U. S. Transactions, by Mechanism



Data Source: Bank for International Settlements

Credit Cards:

Credit card transactions allow the consumer to delay payment and accrue float. They also are less bulky than cash and can be used to make payments over the computer or phone, and by mail. Credit cards are most often used for transactions over \$10, but not for extremely large transactions (e.g., cars and houses). The rapid increase in the use of credit cards has largely been accomplished through an extraordinary extension of credit to consumers.

Thousands of firms offer bank cards to consumers. Prior to the early nineties, card issuers competed primarily by waiving annual fees and providing credit card program enhancements. Since then, however, interest-rate competition has increased. Card issuers have sought to reduce their interest rates by segmenting cardholders into risk classifications and using variable-rate pricing that ties movements in interest rates to indices, such as the prime lending rate. Other costs associated with credit cards include annual fees, fees for cash advances, rebates, minimum finance charges, over-the-limit fees, and late payment charges.

Credit card transaction volume increased by about 7 percent annually between 1988 and 1997. The rate of growth moderated between 1996 and 1997, suggesting that the market is becoming relatively saturated. Credit card usage is likely to continue to grow at about the same rate, or

slightly less (about 5-7 percent annually), continuing to expand the share of credit card transactions relative to checks and cash.

Debit Cards:

Debit cards (or credit cards with debit features) are compact and provide many of the same benefits as checks, but are more convenient to use. Debit cards can substitute for cash, checks and credit cards where credit card networks or POS terminals are available.

Debit cards direct a bank to pay money from a deposit account. The debit may be in the form of a cash withdrawal at an ATM to the cardholder, or it may be directed to a merchant, as in a point-of-sale (POS) transaction (i.e., one in which cardholders use their ATM card at a grocery store or other merchant to pay for a purchase and perhaps receive cash back). After growing by roughly 33 percent between 1987 and 1991, the total number of debit cards has been stagnant, growing only a couple of percentage points per year since about 1992.¹⁵

On-line debit cards (debits that are verified through the network at the time of the transaction and are posted to the cardholder's account on the same day) are the traditional type of ATM cards issued by depository institutions. Because they require a personal identification number (PIN) as a means of security, use of this card is limited to ATMs and merchants with dial-up connections and number pads for entering the PIN.

Off-line debit cards (debits that, like a check, do not involve verification through the network and take two or three days to be posted to an account) can be used without a PIN at retail establishments accepting credit cards, or with a PIN at ATMs. About 5 million merchants are linked to the credit card networks; there are only 1 million ATMs and POS terminals.¹⁶ Consequently, off-line debit cards can be used much more frequently than on-line debit cards, and have the greatest growth potential. Between 1993 and 1997, the number of on-line debit cards fell 20 percent to about 150 million, whereas the number of off-line debit cards more than tripled to about 70 million.

A study of consumer payment preferences conducted in the latter half of 1998 found that 83 percent of the 1,400 consumers surveyed had debit cards, 59 percent currently used their cards at the checkout, and 40 percent indicated they would increase their use of the debit card over the next two years.¹⁷ Although POS debit card transactions still represent a small share of all transactions, the number of these transactions is likely to continue to grow rapidly. Consequently, POS debit card usage over the next decade is likely to account for an increasing share of transactions relative to cash, checks, and credit cards. The share of debit transactions, however, is unlikely to exceed that of credit card transactions; the need for consumer credit is expanding, and making purchases over the Internet or telephone, or by mail, requires greater flexibility.

¹⁵ Congressional Budget Office, *Competition in ATM Markets: Are ATMs Money Machines?*, July 1998, Chapter 1.

¹⁶ *Ibid.*

¹⁷ "1999 Study of Consumer Payment Preferences, Focusing on Online and Offline Debit," by Dove Associates in conjunction with the American Bankers Association.

E-Cash/Stored-Value Cards:

Advances in computer technology and communication have created opportunities to develop new electronic payment methods. Banks, major credit card associations, other financial institutions, and software companies have shown an interest in providing consumers with these new payment systems. The most commonly discussed mechanisms are prepaid stored-value cards and on-line payments made on the Internet and related computer networks. Of the two methods, stored-value cards are more likely to affect the use of cash.¹⁸ On-line payments, or e-cash, would provide an alternative to credit cards or checks, especially for small purchases over the Internet.

The concept of smart cards originated in the 1970s, and there have been pilot programs throughout the latter half of the 1990s, most notably at the 1996 Atlanta Olympics and in New York, where Citibank tested the Visa Cash stored-value card. The pilot began in October 1997, using more than 90,000 cards and 500 point of sale terminals, and met with limited success. Government agencies, such as the Department of Defense and the Department of Veteran's Affairs, are using smart cards to make payments or transfer funds. Employees at GSA's Federal Technology Service are testing a smart card that combines a personal identification card and a government credit card.

In 1998, however, the use of smart cards was still rare. Most of the smart cards were being used in closed systems, such as college campuses or mass transit systems. Demand for smart cards may be limited by competition from established use of credit cards, ATMs and dollar note changers as well as newer media such as debit cards. Part of making the stored-value card successful may be finding the right combination of features. For example, unlike other payment mechanisms, the stored-value card is also able to store information, such as personnel records, and provide authentication.

Implementing stored-value cards faces several challenges:

- potential for fraud: susceptibility to counterfeiting may constrain growth of electronic money and affect the profitability for issuers
- security: users may not carry large balances, but use cards only for small purchases
- infrastructure: need places to recharge and use the cards
- interoperability: no universally accepted standard yet
- consumer protection and privacy
- financial integrity of issuers

¹⁸A stored-value card, such as a smart card, has a prepaid amount stored on its embedded microprocessor, and stored value is transferred from the card directly to the merchant when a purchase is made. Some cards allow the cardholder to go to an ATM and replenish the card.

New Coin Programs

Fifty States Quarter Program:

The Fifty States Circulating Commemorative Coin Program Act, passed in October 1996, authorized the issuance of quarters honoring each of the 50 states, beginning in January 1999. The quarters are being issued in the order of admittance to the Union; five quarters are issued each year, approximately 10 weeks apart, for ten years. The state quarters will be issued to the Federal Reserve Banks through the normal process.

A feasibility study conducted by Coopers and Lybrand for the U.S. Department of the Treasury¹⁹ projected that the incremental increase in quarter demand due to this program would range between 1.5 billion and 3 billion quarters each year of the program, in addition to the Mint's estimated baseline economic demand of between 1.5 billion and 2.4 billion quarters per year over the decade. In the first six months of the program, the Mint estimates that, on an annualized basis, baseline quarter demand is running at about 2.6 billion (exceeding earlier projections) and incremental demand associated with the program at about 2 billion. However, the Mint is projecting that incremental demand for the Fifty States program quarters in 1999 will range between 2.4 and 3.4 billion coins. Promotion of the Fifty States program, which did not begin until June 1999, is expected to increase awareness of and demand for the quarters.

The demand projection for this program is uncertain because there has been no comparable, multi year circulating commemorative program on which to base a projection. A survey of the possible behavior of potential (adult) coin holders provided some indication of consumer motivations, but is not necessarily indicative of how consumers will behave. The study identified two types of behavior, collecting and hoarding. Of the two behaviors, hoarding is the most difficult to predict, because it is not based on rational economic behavior. If the new quarters do not circulate for as long as the traditional quarters, due to hoarding, then the number of quarters in circulation will decline over time.

In addition to the level of quarter demand, there is the issue of what, if any, impact the state quarter program will have on demand for other coin denominations. If consumers conduct more cash transactions in order to maximize their opportunity of getting the new quarters through their normal transactions, or if hoarding of quarters requires other coins to carry more of the load, demand for other coin denominations could also increase significantly. There might also be a similar but more muted impact on notes.

Sacagawea Dollar Coin:

The 50 States Commemorative Coin Act also authorized the Treasury to produce a new one-dollar coin to replace the dwindling stocks of Susan B. Anthony dollar coins. The new dollar coin will be golden in color, will have a smooth edge (for recognition by the visually impaired), and will feature an image of Liberty based on a representation of Sacagawea. Demand for the new coin, scheduled to be released in early 2000, is stated to be 100 to 200 million per year, given that the dollar note will continue to circulate.

¹⁹ Coopers & Lybrand, 50 States Commemorative Coin Program Study, May 30, 1997, p. 27.

However, if the dollar note were eliminated, coin production would be affected significantly. The Mint estimates that it would need to produce about 9 billion new coins during the first 18 months (the life span of a circulating \$1 note) of the program to replace the entire supply of \$1 notes in circulation. After the gap created by the attrition of the dollar notes is filled, the Mint estimates that annual production would be approximately 1.5 billion coins, depending on economic conditions. Because coins have a much longer life span than one-dollar notes, annual production of the dollar coin would be much lower than historical annual one-dollar note production.

To produce a one-time surge in dollar coins (9 billion) within one and a half years would require that the Mint purchase space and equipment greatly in excess of longer-term needs. In fact, to meet that level of production, the Mint expects that it would incur anywhere from \$100 million to \$250 million in relocation/building and equipment costs, depending on whether penny production were located off site to free up space, or a new facility were constructed.

Alternatively, costs could be significantly reduced if the Mint, BEP, and the Federal Reserve coordinated a phase-out of the dollar bill over a five-to six-year period. Relocation and equipment costs would run between \$27 and \$46 million, depending on how much, if any, penny production needed to be relocated.

4. PROJECTIONS OF NOTE AND COIN DEMAND TO 2010

The Federal Reserve has the primary responsibility for forecasting note demand. The Federal Reserve provides BEP with two-to five-year estimates of the note volumes that will be ordered. The Federal Reserve places annual orders for notes with BEP and pays BEP only for the costs associated with producing the notes.

Although not included in this study, the BEP periodically projects note requirements in order to ensure that there is sufficient capital equipment, materials contracts, and personnel in place to meet demand. BEP projects note demand based on past performance, historical annual growth, and anticipated events (e.g., issuance of redesigned notes).

The Mint has the primary responsibility for forecasting coin demand. The Mint receives orders each year from the various Federal Reserve Banks, bills the Federal Reserve banks for the face value of the coins, and is responsible for transporting the coins to over 100 locations, including the regional Federal Reserve Banks and other coin depots. The Mint retains the profits or seigniorage (face value minus the costs of production, materials, transportation, etc.) from the coins in circulation.

Federal Reserve Projections of Circulating Notes

A draft study, "The Future Demand for U.S. Banknotes: 1998 to 2010," produced by the Federal Reserve's Division of Monetary Affairs, presents baseline forecasts of the volume of notes circulating domestically and overseas, out to 2010 (table 3). To address major variables, the study also projects the impact of the new dollar coin and digital cash (assuming a range of acceptance) on domestic note demand (table 4).

The baseline forecast assumes that the annual compounded growth rate for:

- Total demand remains constant at 5 percent between Calendar Year (CY) 1984 and CY 2010;
- Domestic demand declines slightly, from under 4 percent between CY 1984 and CY 1997 to over 3 percent between CY 1997 and CY 2010; and
- Foreign demand remains constant at 6 percent between CY 1984 and CY 2010.
 - In terms of total volume, the share of foreign-held notes is projected to increase from approximately 55 percent in 1997 to 62 percent by CY 2010.
 - In terms of total value, the share of foreign-held notes is projected to rise from 70 percent in CY 1997 to 77 percent in CY 2010 (reflecting the large number of high denomination notes held overseas).

Table 3. Federal Reserve Note Demand Forecast (Millions of Notes)

Foreign Demand					
\$	1984	1997	Growth Rates 1984-1997	2010	Growth Rates 1997-2010
1	1,204	2,346	5.3%	4,545	5.2%
5	450	894	5.4%	1,920	6.1%
10	727	686	-0.4%	1,091	3.6%
20	1,722	3,228	5.0%	5,924	4.8%
50	239	576	7.0%	948	3.9%
100	463	2,133	12.5%	5,850	8.1%
TOTAL	4,805	9,863	5.7%	20,279	5.7%

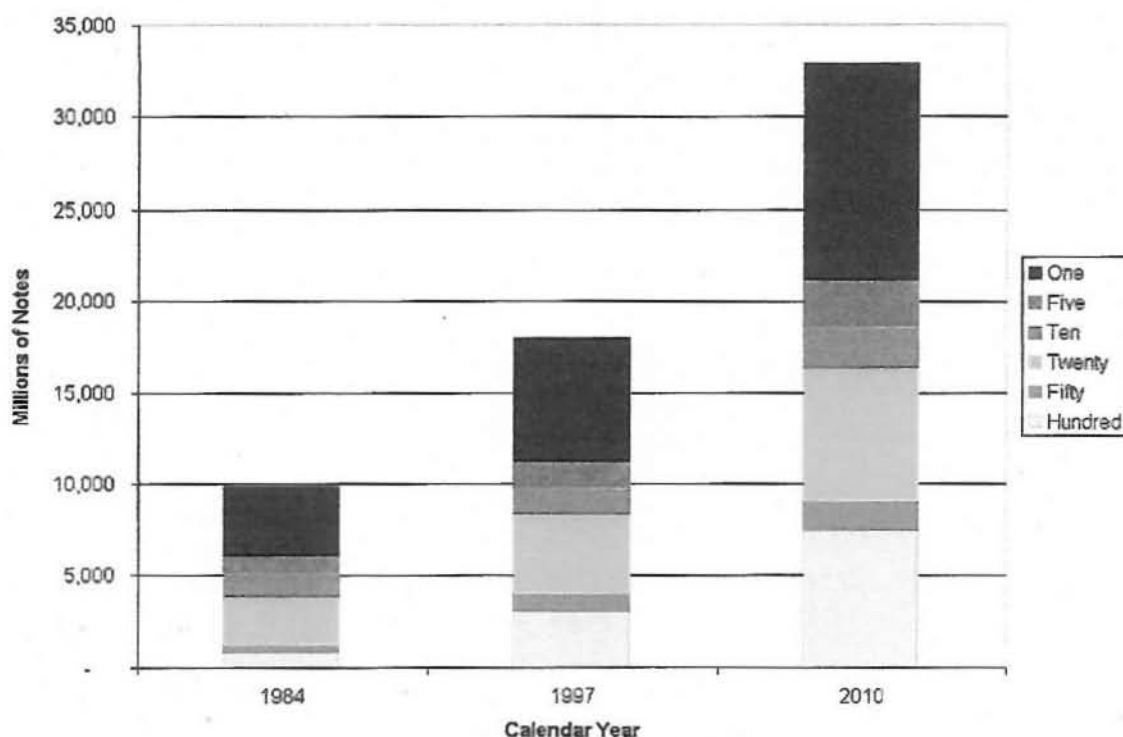
Domestic Demand					
\$	1984	1997	Growth Rates 1984-1997	2010	Growth Rates 1997-2010
1	2,640	4,372	4.0%	7,185	3.9%
5	584	675	1.1%	708	0.4%
10	481	734	3.3%	1,078	3.0%
20	877	1,169	2.2%	1,436	1.6%
50	185	388	5.9%	695	4.6%
100	272	783	8.5%	1,511	5.2%
TOTAL	5,039	8,121	3.7%	12,613	3.4%

Total Demand					
\$	1984	1997	Growth Rates 1984-1997	2010	Growth Rates 1997-2010
1	3,844	6,718	4.4%	11,731	4.4%
5	1,034	1,569	3.3%	2,628	4.0%
10	1,208	1,420	1.3%	2,169	3.3%
20	2,599	4,397	4.1%	7,360	4.0%
50	424	964	6.5%	1,643	4.2%
100	735	2,916	11.2%	7,361	7.4%
TOTAL	9,844	17,984	4.7%	32,892	4.8%

Note: The breakout of historical foreign and domestic demand in this table is different from the breakout shown in chapter 2 due to the use of different methodologies. The primary difference is that the chapter 2 breakout assumes no \$1 notes are held overseas because no reliable data exists on which to make a reliable estimate.

Between the early eighties and the present, most of the growth in volume of circulating notes has been in \$1, \$20 and \$100 notes (chart 11). According to Federal Reserve projections, the largest growth in note volume by 2010 will be in \$100 notes, followed by growth in \$1 and \$20 notes.

Chart 11. Volume of Circulating Notes



Data Source: Federal Reserve System

The forecast assumes that current domestic economic indicators will remain constant throughout the forecast period. Although major shifts in interest rates, prices or income could alter the forecast outcomes, these economic effects are expected to have relatively mild effects on the forecast and lead to relatively small deviations in the next decade. However, two factors that could significantly affect the forecast include a large-scale substitution from the one-dollar note to the redesigned one-dollar coin or the rapid growth of stored-value cards. The Federal Reserve study includes several additional scenarios that address these key variables.

Redesigned One-Dollar Coin:

The one-dollar coin will be introduced in 2000, but the dollar note will not be withdrawn. Although the previous one-dollar coin did not have any discernible effect on one-dollar note demand, the new design could prove to be more popular. The dollar coin scenario assumes that the new dollar coin would displace 25 percent of \$1 notes and 5 percent of \$5 notes²⁰ (table 4). Under this scenario, growth in average annual domestic demand would decline from 3.4 percent in the baseline case, to 2.2 percent. The share of notes circulating abroad would rise from 62 percent in the baseline case to 65 percent.

²⁰ This would require the Mint to produce and issue over 1.8 billion new \$1 coins annually. The Mint has stated that it expects to produce no more than 100-200 million Sacagawea \$1 coins a year.

Table 4. Projected Impact of Dollar Coin and Stored-Value Cards on Note Demand in 2010 (Millions of Notes)

A. Domestic Demand

\$	Base Demand	Growth Rate	With \$1 Coin	Growth Rate	With Card	Growth Rate	With Both	Growth Rate
1	7,185	3.9%	5,389	1.6%	6,466	3.1%	4,670	0.5%
5	708	0.4%	673	0.0%	673	0.0%	637	-0.4%
10	1,078	3.0%	1,078	3.0%	1,024	2.6%	1,024	2.6%
20	1,436	1.6%	1,436	1.6%	1,436	1.6%	1,436	1.6%
50	695	4.6%	695	4.6%	695	4.6%	695	4.6%
100	1,511	5.2%	1,511	5.2%	1,511	5.2%	1,511	5.2%
TOTAL	12,613	3.4%	10,781	2.2%	11,805	2.9%	9,974	1.6%

B. Total Demand

\$	Base Demand	Growth Rate	With \$1 Coin	Growth Rate	With Card	Growth Rate	With Both	Growth Rate
1	11,731	4.4%	9,935	3.1%	11,012	3.9%	9,216	2.5%
5	2,628	4.0%	2,593	3.9%	2,593	3.9%	2,557	3.8%
10	2,169	3.3%	2,169	3.3%	2,115	3.1%	2,115	3.1%
20	7,360	4.0%	7,360	4.0%	7,360	4.0%	7,360	4.0%
50	1,643	4.2%	1,643	4.2%	1,643	4.2%	1,643	4.2%
100	7,361	7.4%	7,361	7.4%	7,361	7.4%	7,361	7.4%
TOTAL	32,892	4.8%	31,060	4.6%	32,084	4.6%	30,253	4.1%

Stored-Value Cards:

In this scenario, the Federal Reserve assumes that use of stored-value cards grows at 40 percent per year for ten years (from a base of 1 million digital cash users in 2000). This level of growth would amount to about 20 million users, or about 10 percent of the adult population (table 4).

This scenario measures the impact of 10 percent of the population substituting smart cards for all of the \$1 notes and half of the \$5 and \$10 notes they would normally use. Despite these “high-end” assumptions, the impact is modest. Domestic demand for all denominations would decline from 3.4 percent in the baseline case to 2.9 percent.

Coins Plus Cards:

The impact of both the one-dollar coin scenario and the stored-value card scenario reduces the domestic demand growth rate even further, to 1.6 percent (table 4). Overseas holdings at the baseline level would rise to 68 percent. Demand for \$1 notes would drop most sharply, growing at an annual rate of less than 1 percent. The \$5 and \$10 notes would also grow at a slower rate, although \$10 notes are only affected by the use of stored-value cards.

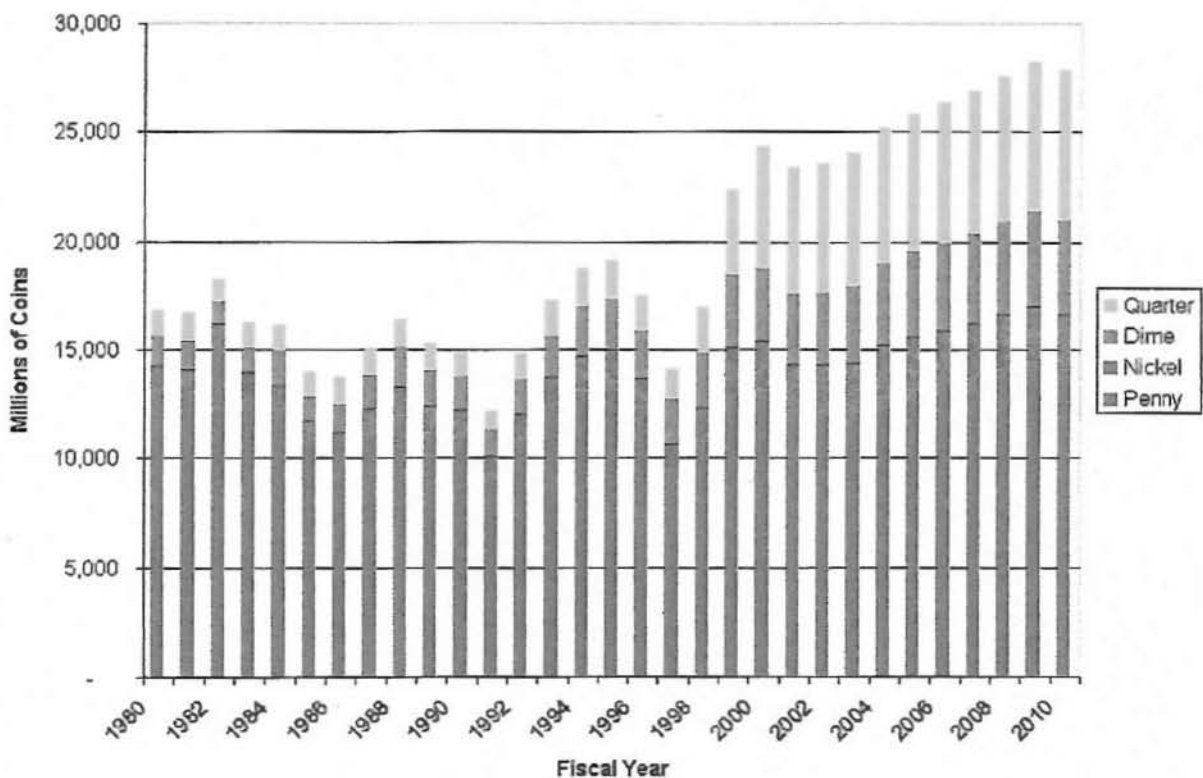
Mint Projections of Net Coin Demand

The U.S. Mint forecasts the annual “net pay of coins,” defined as the difference between the amount of coins the Federal Reserve Banks pay to, and the amount the Banks receive back from commercial institutions. The Mint forecasts coin demand using an econometric model and projected economic data updated monthly by DRI/McGraw-Hill. The model uses variables that represent the number of cash transactions and the overall strength of the economy, such as the money supply (M1); consumer durable spending; consumer spending to personal savings ratio; and number of Coinstar units. Final coin demand forecasts are a weighted average of several scenarios representing a range of economic assumptions.

In its baseline case, the Mint projects that total coin demand (net payout) will increase from 22 billion in FY 1999 to 28 billion in FY 2010 (chart 16). Between FY 1999 and FY 2010, the annual compounded growth rate for:

- total coin demand is projected to be about 2 percent, the same rate of growth experienced between FY 1990 and FY 1998;

Chart 12. Net Coin Demand (Historical and Projected)

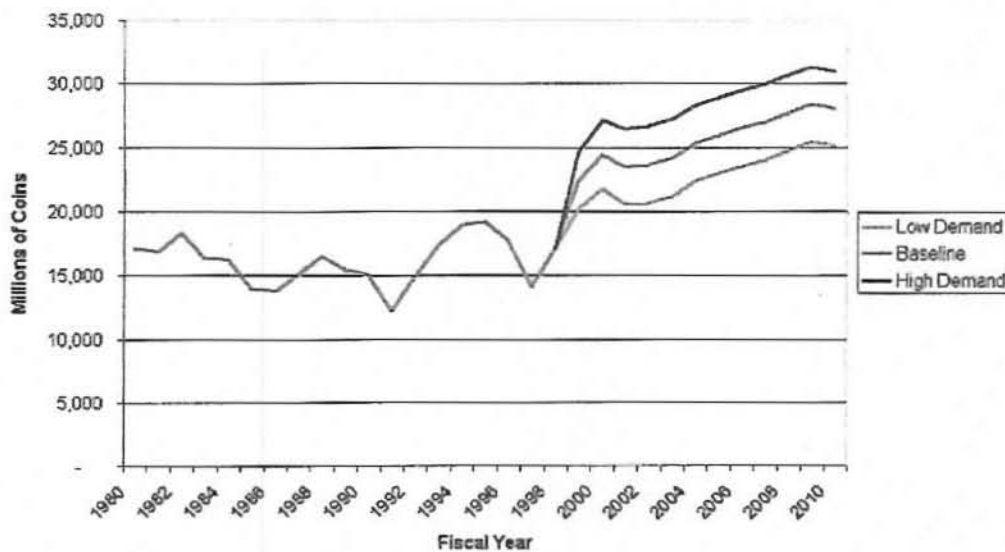


Data Source: U.S. Mint

- quarters is projected to decrease to about 3 percent from 7 percent between FY 1990 and FY 1998;
- nickels and dimes is projected to decrease to about 2-3 percent from 5-7 percent between FY 1990 and FY 1998; and
- pennies is projected to increase to over 1 percent from a rate of decline of less than 1 percent between FY 1990 and FY 1998.

The Mint projects, in its low-demand scenario, that total coin demand will only increase to 23 billion in FY 2010, an increase of nearly 50 percent from FY 1998, compared to 65 percent in the baseline scenario (Chart 13). In the high-demand scenario, total coin demand increases to 31 billion in FY 2010, an increase of more than 80 percent.

Chart 13. Net Coin Demand (Low, Base, High)



Data Source: U.S. Mint

5. PRODUCTION ISSUES

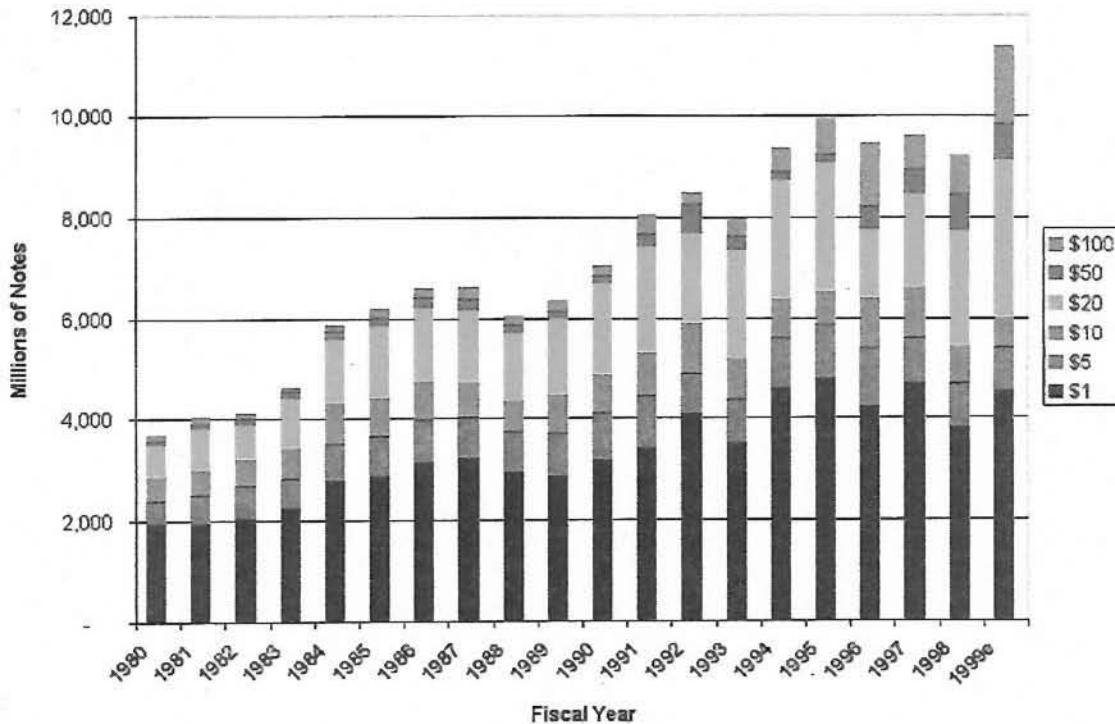
The previous chapters have examined historical and projected demand for notes and coins, and discussed the key factors that have driven demand and those which are likely to shape future demand. This chapter provides an overview of currency production (volume, capacity, costs, and revenues) and a discussion of additional factors that would primarily influence production and not necessarily demand (e.g., changes in design, denomination, or life span).

Notes

Production:

Between FY 1980 and FY 1998, the annual note order increased from 3.7 billion to 9.2 billion notes (chart 14), representing an annual compounded rate of about 5 percent. Production of the \$50 and \$100 notes increased at an annual rate of about 10 percent and 13 percent, respectively, increasing their share of total production. Part of the increase was due to production of the redesigned \$100 notes in 1996, and the redesigned \$50 notes in 1998. Annual production of \$1 notes rose from 1.9 billion in FY 1980 to over 4 billion in the mid-nineties. Normal (non-

Chart 14. Note Production (1980-1999)

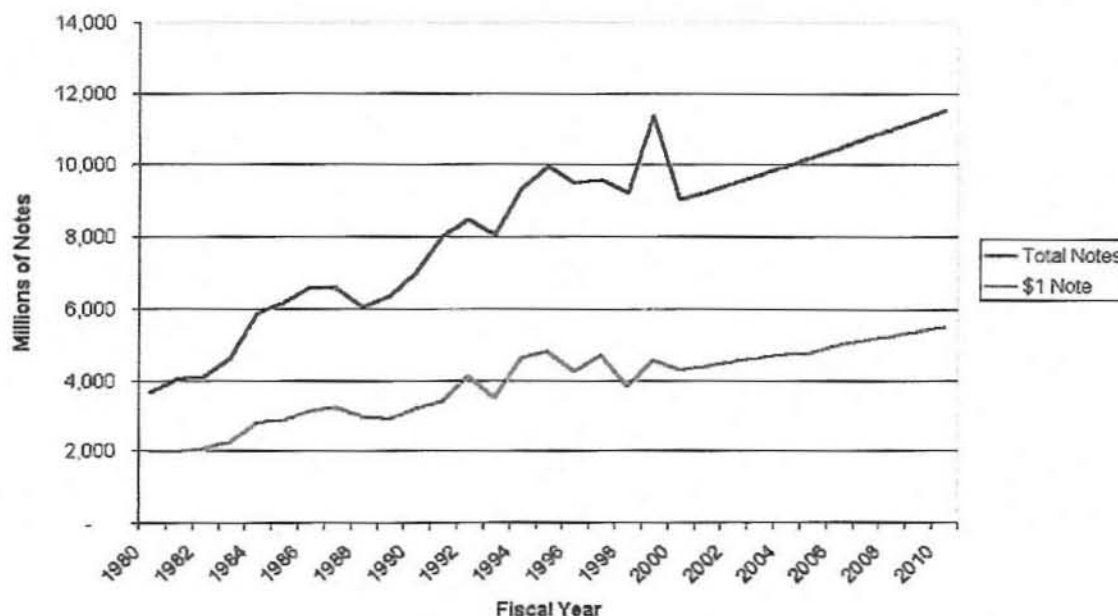


Data Source: Bureau of Engraving and Printing

Y2K) demand for \$1 notes is expected to stay below 4 billion in 1999, but will still represent about 40 percent of total production.

In 1999, the Federal Reserve is expected to order 11.4 billion notes (8.7 billion for normal requirements and 2.6 billion to meet the expected demand surrounding the year 2000, and consumer uncertainty regarding the performance of electronic and check payment systems). Many of the additional 2.6 billion notes are expected to be returned to the Federal Reserve banks in the first part of 2000, thus reducing the need for new notes over the next few years. The annual note order that BEP is expected to print is a composite that the Federal Reserve Board staff makes from the cash budgets of the individual Federal Reserve Banks, based on their anticipation of denomination needs, and tempered by budgetary considerations and the physical condition of notes within each District.

Chart 15. Historical and Projected Note Production



Source: Bureau of Engraving and Printing

The Federal Reserve projects that its print orders for the next three years (FY 2000 to FY 2002) will be flat—about 9 billion notes, annually. The Federal Reserve estimates that it will order between 9 and 11 billion notes in FY 2003, and between 9 and 12 billion notes in FY 2004.

BEP projects note manufacturing demand over a ten-year period for planning purposes (chart 15). BEP predicts that annual orders will continue to grow through 2010, but at a much slower rate (2.5 percent) than the 5 percent growth rate of the past two decades. BEP believes that several factors are slowing the growth rate:

- additional notes produced in FY 1999 for Y2K preparedness, which will still be in circulation
- increased use of other transactional devices, such as the debit and smart cards
- increasing share of notes used overseas (which turn over less)
- increasing cost of the new currency design (NCD) notes.

Production Capacity:

With present equipment and staffing levels, BEP can manufacture a total of 9 billion notes (split approximately equally between the Washington and Fort Worth facilities) on a five-day-per-week, 245-day-per-year basis. On a six-day-per-week schedule, the Bureau could produce about 11-12 billion notes. With improvements to production technology in Washington, more staffing, and expansion of the Fort Worth facility, capacity could be increased significantly.

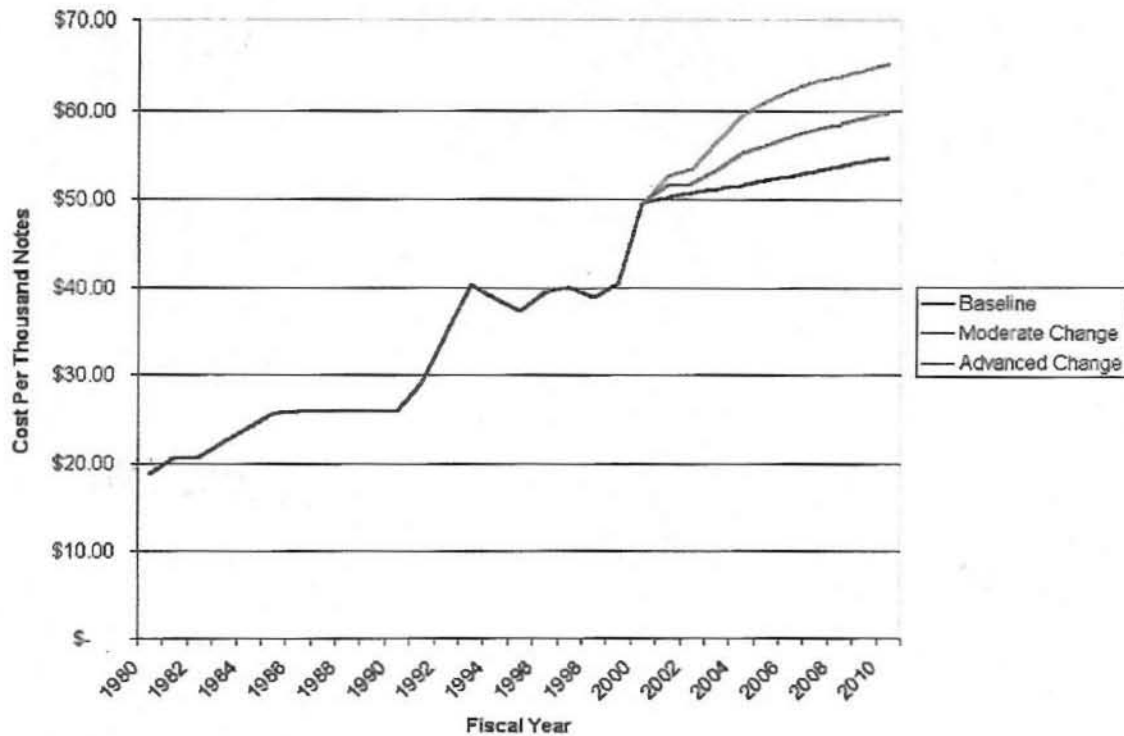
These capacity data do not take into consideration the ramifications of producing more complex counterfeit-deterrent notes. Additional sophisticated features may reduce output capacity. Other potential changes to notes, such as efforts to introduce features that will extend the life of notes in circulation, could reduce the volume of notes BEP would need to produce.

Production Costs:

BEP bills the Federal Reserve for all of the costs involved in the production of currency. The billing rate includes the cost of materials, such as paper and ink; the cost of shipping these materials to the bureau, including en route security services; and manufacturing and manufacturing support costs, such as labor, security, equipment and capitalization. The Federal Reserve System covers the costs of shipping notes once the Bureau has manufactured it.

In FY 1980, BEP billed the Federal Reserve System \$69.1 million for 3.6 billion notes, at \$18.70 per thousand notes (chart 16). All note denominations had the same features and therefore the same cost. By FY 1997, some of the denominations contained advanced security features and were on special paper. The billing rates in 1998 ranged from \$26.90 per thousand \$1 notes, to \$53.50 per thousand \$20 through \$100 notes. The chart below shows weighted average unit cost (NCD and non-NCD rate) beginning in FY 1998.

Chart 16. Note Cost to Federal Reserve (Historical and Projected)

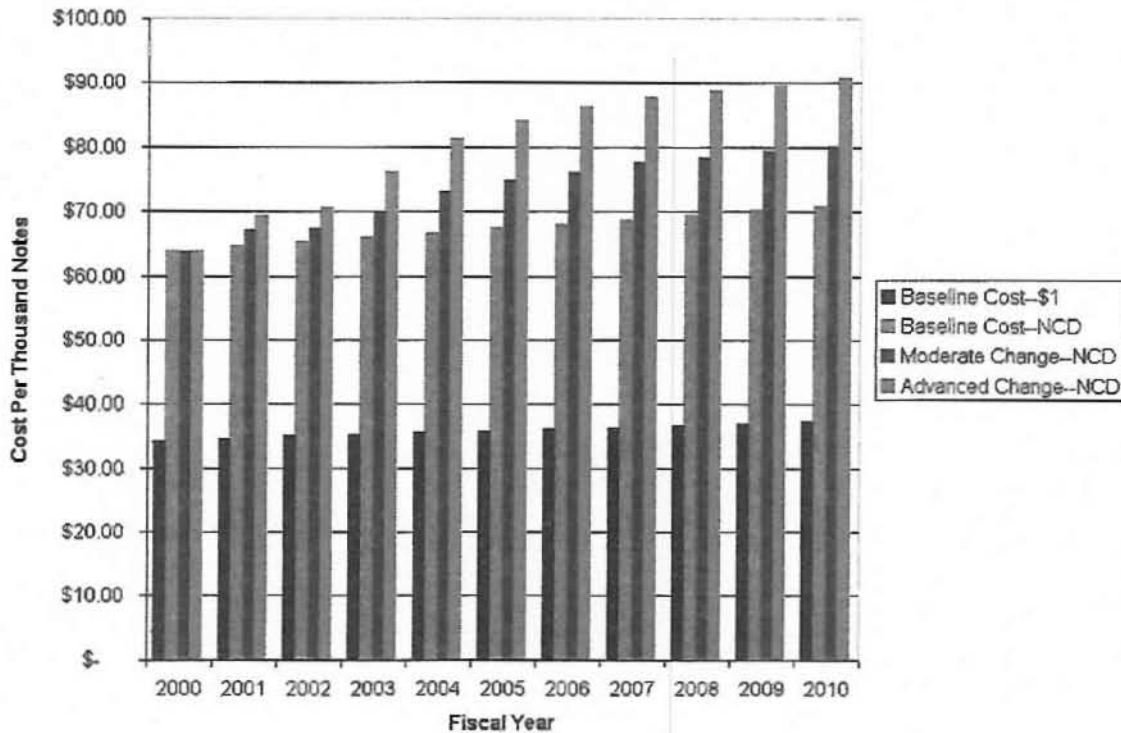


Data Source: Bureau of Engraving and Printing

While costs have increased in part because of labor rate inflation, most of the increase has been due to the cost of materials, such as ink and paper. As the Federal Reserve and Treasury turn to more sophisticated materials and more specialized processes and equipment (in part to support the NCD program), note manufacturing costs will continue to rise.

BEP has developed three scenarios for estimating costs out to FY 2010. Chart 16 shows the projected, weighted average unit cost to the Federal Reserve for each scenario. All three scenarios assume that no changes will be made in the \$1 note. The cost of the \$1 note is projected to increase from \$34.12 per thousand in FY 2000 to \$37.12 in FY 2010 (chart 17).

Chart 17. Note Cost by Scenario



Data Source: Bureau of Engraving and Printing

In the baseline scenario, BEP assumes that all of the denominations except the \$1 note will be NCD notes. The only changes in the cost of the NCD program will be average annual increases in labor and materials. Under this scenario, the cost per thousand NCD notes is expected to increase from about \$64 in FY 2000 to \$71 in FY 2010, for an overall unit cost (weighted average including \$1 notes) of \$50 in FY 2000 and \$55 in FY 2010.

In the “moderate change” scenario, BEP assumes that one new feature will be added to the NCD notes beginning in FY 2003. Cost increases will be associated with adding equipment for one new manufacturing process. Under this scenario, the cost per thousand NCD notes is expected to increase from the baseline cost, \$64 in FY 2000, to \$80 in FY 2010, for an overall unit cost of \$60 in FY 2010.

In the “advanced change” scenario, BEP assumes that two new features will be added to the NCD notes beginning in FY 2003. Both of these features would require adding materials and equipment for a new manufacturing process and would be incorporated in all notes (except \$1 notes) between FY 2003 and FY 2007. Under this scenario, the cost per thousand NCD notes is expected to increase from the baseline cost in FY 2000 to \$91 in FY 2010, for an overall unit cost of \$65 in FY 2010.

Revenue:

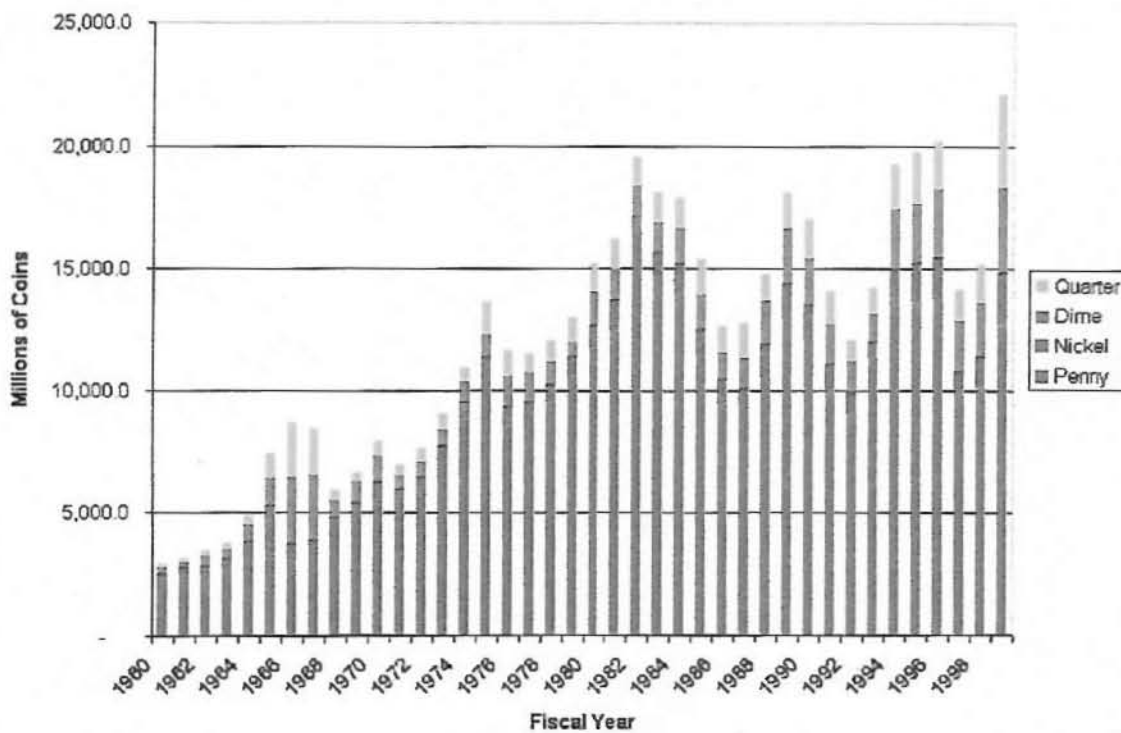
In 1998, the Federal Reserve paid \$27.6 billion to Treasury as interest on Federal Reserve notes. Generally, the difference between the face value of notes and the cost of printing them and an allocation of the Federal Reserve's operating costs is used by the Federal Reserve to purchase Treasury securities, which make up the Federal Reserve portfolio. The Federal Reserve's holdings of Treasury securities back up the Federal Reserve notes, which are obligations of the Federal Reserve System. The earnings from these securities are returned to the Treasury.²¹

Coins

Production:

Total coin production has fluctuated significantly between FY 1980 and FY 1999. During this period, production fell to 12 billion coins in 1992, following a recession, and is projected to reach over 22 billion coins in 1999 (chart 18). Penny production declined at an annual rate of about 1 percent over the period, while production of nickels, dimes, and quarters increased at a rate of 2-4 percent. In FY 1999, pennies accounted for 57 percent of total coin production.

Chart 18. Coin Production (1980-1999e)



Data Source: U.S. Mint

²¹GAO Report, "National Coinage Proposals," May 1990, GAO/GGD-90-88, p.2.

Production Capacity:

Circulating coin production capacity is based on separate product lines for pennies and clad coins (all other circulating coins). Distinguishing between these product lines is important because the equipment requirements to manufacture each type are significantly different. Pennies go through a simpler, shorter (three-step) production process. The coin blanks are purchased from an independent supplier and delivered to the Mint, where they are pressed with the images and bagged for delivery to the Federal Reserve Bank. Therefore, the only major production equipment required for penny production is coining presses.

By contrast, a clad coin production line at the Mint includes a seven-step process (blanked, annealed, washed, dried, upset, pressed, and bagged), consisting of one blanking press, one annealing furnace washer/dryer system, multiple upset mills, multiple coining presses, and a variety of material handling systems. This extended process is designed to deter counterfeiting.

The Mint is currently considering plans to relocate penny production in a satellite facility (requiring less security) to expand capacity for clad coin production at its Denver and Philadelphia Mints. By the end of FY 1999, the Mint expects to be able to produce, at peak capacity, 14 billion clad coins—sufficient capacity to meet projected demand under the low, base and high-demand scenarios till 2010, as presented in chapter 4.

Production Costs:

Overall, the unit cost of coins increased from 1 cent in 1980 to 1.6 cents in 1998.

Pennies:

In FY 1981, unit cost for the penny reached .91 cents per unit due to the rise in copper prices. Following the substitution of zinc for copper, the unit cost of the penny dropped to between .6 and .7 cents per unit. Unit cost peaked in 1991 at .92 cents, possibly reflecting the sharp drop-off in production due to the recession, and declined to a low of .7 cents in 1994 and 1995. However, by 1998, unit cost had climbed to .88 cents.

Clad Coins:

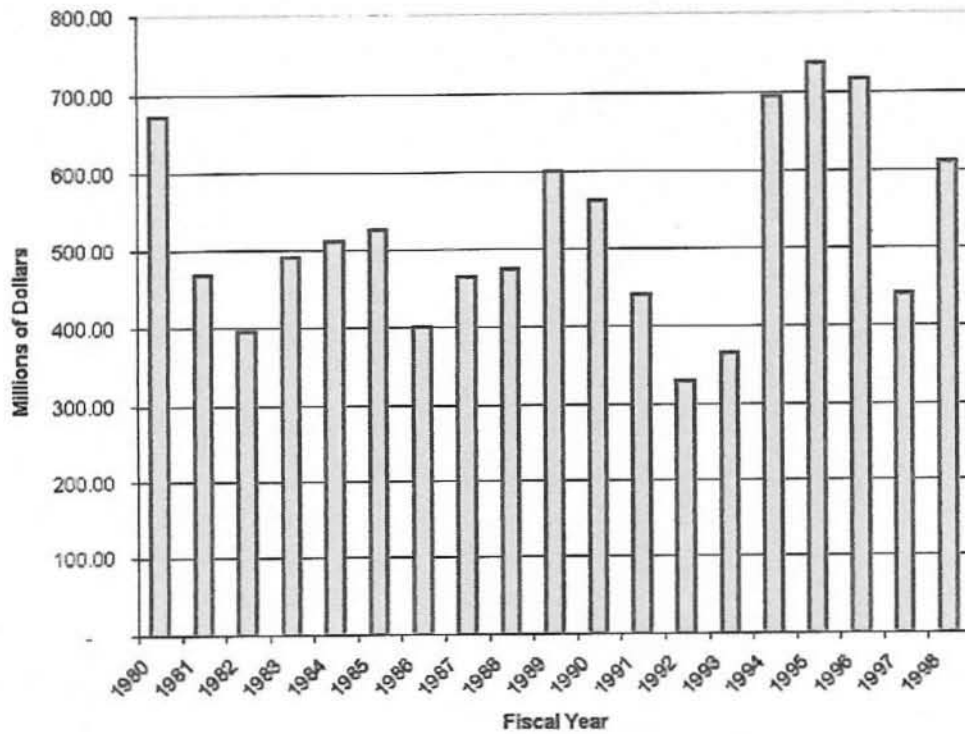
Between 1980 and 1998, the unit cost for all clad coins has increased.

- For the nickel, from approximately 2 cents to 3 cents
- For the dime, from approximately 1 cent to 2 cents
- For the quarter, from approximately 2 cents to 4 cents
- For the half dollar, from 4 cents to 10 cents

Revenue/Seigniorage:

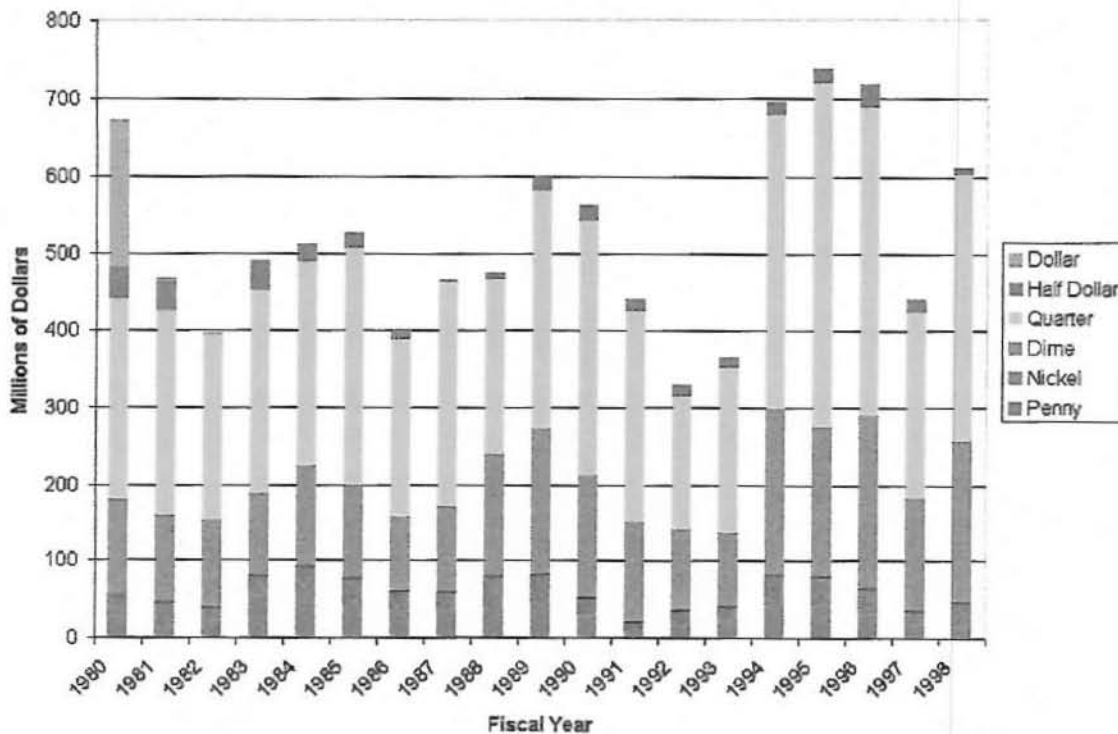
Seigniorage fluctuated widely, as did production, between FY 1980 and 1998 (chart 19). In FY 1980, with dollar coins in production, seigniorage was \$672 million. However, not until FY 1994 did seigniorage again top \$600 million, peaking at \$735 million in 1995 and dropping back to \$611 million in 1998. Variations in quarter production accounted for much of the swing.

Chart 19. Seigniorage



Of the \$611 million in seigniorage in FY 1998, quarters accounted for 56 percent; dimes, 35 percent; nickels, 5 percent; pennies, 2 percent; and half-dollars, 1 percent (chart 20).

Chart 20. Seigniorage, by Denomination



Data Source: U.S. Mint

Production Issues

There are a number of factors that primarily influence note and coin production, rather than demand: design, denomination, and life span. All of these factors will affect the amount and type of materials, equipment, facilities, and personnel needed, as well as the manufacturing processes used and the costs of production. New coin designs and denominations may require new materials, equipment and processes. Changes in the life span of notes and coins will affect the amount the banks order and consequently the amount Treasury produces.

While many of the forces affecting note and coin production are externally driven (e.g., economic demand and use of other transactional devices), the factors listed above are largely influenced by Treasury. For example, Treasury, along with the Federal Reserve, plays a major role in determining note and coin denominations and design, as well as the materials used in producing them. The Secretary of the Treasury approves all note and coin design changes.

Changes in Design:

Some redesign efforts, such as the Fifty States Quarter Program, seek to make the coins more attractive as "collectibles" and consequently affect demand as well as production. Other redesign efforts impact demand only secondarily, if at all. For instance, note redesigns aimed at deterring counterfeiting or assisting the visually impaired have significant operational impact

(materials, processes, etc.). Demand would increase only if these design changes increased confidence in the notes (especially overseas) or facilitated their use.

From the 1960s until 1988, there had been minimal changes to the currency note or to the currency program. In 1988, the Bureau began instituting a series of changes to currency to meet increasing threats of counterfeiting and projected technologies, which had the potential to dramatically increase the risk of counterfeiting. Initially these changes consisted only of authentication features, which were introduced in 1988 for the \$100 note, 1989 for the \$50 note, and 1990 for the \$20 note. A second round of changes, which included a security thread, microprinting, and covert features, began with the \$100 note in 1991 and ended with the \$5 note in 1995.

The most significant changes to date have been for the New Currency Design notes (NCD) beginning with the \$100 in 1996, the \$50 in 1997, the \$20 in 1998, and the \$5 and \$10 in 2000. These notes include all of the previous features, plus an enlarged and off-center portrait, a watermark identical to the portrait, color-shifting ink on one of the denomination counters, a large denomination counter for visually-impaired users, a universal Federal Reserve Seal and an expanded serial number. Although the main purpose of the redesign was to discourage counterfeiting, the new security features are expected to build the confidence in its users abroad.

The interagency Advanced Counterfeit Deterrence Committee is considering making further design improvements, especially for the \$50 and \$100 note, beginning as early as 2002.

Efforts, such as the NCD, have several requirements.

- Extensive R&D efforts
- A wider range of materials
- More sophisticated equipment and processes
- More highly skilled personnel
- Public information campaigns

The introduction of the new notes has created spikes in production, and to some extent demand, as the public seeks to replace older notes. However, the impact on production and demand levels appears to be temporary. The requirements listed above, however, are likely to result in a long-term increase in unit cost for the new currency.

Changes in Denomination:

Since World War II, Treasury has introduced new denominations and designs (\$2 notes, 50-cent, and \$1 coins—Eisenhower and Susan B. Anthony), and discontinued production of some notes (\$500, \$1,000, \$5,000, and \$10,000 notes) and coin designs (50-cent and \$1 coins—Eisenhower and Susan B. Anthony). These changes did not significantly affect production levels because none of these denominations circulated widely. A redesigned \$1 coin will be introduced in 2000, but is not likely to impact significantly production since there are no plans to withdraw the \$1 note.

In 1976, Treasury produced a quarter commemorating the bicentennial that circulated widely but had a short life span. The Fifty State commemorative quarters, begun in 1999, are also circulating widely and will increase production.

Over the last decade, some stakeholders have advocated eliminating the penny and the one-dollar note. Treasury policy has been to continue production of these denominations, which circulate widely. Because these denominations represent the largest share of coin and note production, discontinuation would have a significant impact on production capacity.

Changes in Life span:

Notes:

The life span of currency (defined here as the time in circulation) is partly determined by the durability of its materials. Coins circulate considerably longer than notes: 11-15 years for coins versus 18 months to 4 years, on average, for notes. Between 1980 and 1997, prior to the New Currency Design notes, notes were withdrawn from circulation only when they were judged "unfit" to serve their purpose. During this period, the estimated life span of currency was: 18 months for \$1 notes, two years for \$5 notes, three years for \$10 notes, four years for \$20 notes, and nine years for \$100 notes. However, \$100 notes held overseas have had a longer life span than might be expected because—as noted previously—they circulate less and function more as a store of value.

With the introduction of the redesigned currency, beginning in 1997, the life span of older-style notes is expected to decline. Both banks and individuals are likely to withdraw the old notes from circulation, both domestically and overseas, before the notes are worn out. Banks may choose to withdraw the notes to avoid confusion associated with co-circulating designs. The Federal Reserve established extended custodial inventories (ECIs) overseas, beginning in 1998, to more effectively roll out new currency and support U.S. currency transaction needs abroad. These facilities have expedited the retirement of older notes and accelerated circulation of U.S. currency overseas.

Individuals may hold old-style notes for their collectibility. The anticipated redesign of notes on a periodic basis may permanently reduce the life span of notes, particularly the larger denominations.

A way to increase the life span of the currency is to use a more durable substrate. BEP is examining the potential for using a plastic substrate, similar to that of Australian currency, to increase the durability and life span of the \$1 note. The development of a plastic substrate is still in the R&D stage, and production of such a note is years away. Although a change in substrate would not be expected to affect demand for notes, it could decrease production requirements by expanding the life span of the notes. To apply the substrate to larger denominations might not be cost effective if the notes are redesigned more frequently to discourage counterfeiting.

The degree to which a plastic substrate would extend the life of dollar notes is unknown. Australia estimates that use of a plastic substrate has extended the life of its notes by a factor of four. However, the circulating life span of Australia's original currency was considerably

shorter than that of U.S. currency now, and therefore may not be comparable. Canadian officials estimate, based on their tests of plastic substrates, that the life of their currency would only be expanded one and one-half times.

Coins:

In 1997, a sample of coins at the Federal Reserve Banks was used to estimate that pennies, nickels, and dimes spend approximately 11 years, on average, in active circulation. Quarters remain in circulation over 15 years. However, because of the durability of the coins, the Mint has estimated that coins have the potential to remain in circulation for approximately 30 years before decaying beyond recognition.

Since 1996, Coinstar and other coin recycling businesses have increased the life span of pennies in active circulation. Coinstar has installed machines in grocery stores across the country that allow the public to exchange their coins for grocery store vouchers or paper money, at a cost of 8.9 percent from the face value of each transaction. The Mint estimates that by 1996, Coinstar had over 1,000 coin processing machines in place and was processing approximately 275 million coins per month. By 1999, Coinstar had over 5,000 machines, which were processing over 1.7 billion coins per month—nearly as many coins as the Mint produces in one year. As a consequence, fewer new coins, primarily pennies, have been required to sustain the circulating stock.

Another factor that may be drawing pennies back into circulation—although probably not on the scale of coin recycling businesses—is the common practice among retailers of using “give a penny, take a penny” jars to facilitate change transactions.

In contrast, the 50 States commemorative quarters are likely to be withdrawn from active circulation faster than the traditional quarters because of their collectability. Consequently, the Mint will need to produce extra quarters to meet the additional demand.

6. FINDINGS AND RECOMMENDATIONS

The future of money demand will influence both operational and policy decisions at the Department of the Treasury and the Federal Reserve regarding notes and coins. Those decisions may address facilities, equipment, employee skill mix, and the form of the money being produced.

Summary of Findings

The key factors that may drive the demand for notes and coins over the next decade are domestic economic growth, dollarization, the impact of the euro, the use of other transactional mechanisms, and new coin programs. Supply drivers include the use of plastic substrate, the production of pennies, and coin recycling.

- **Domestic Economic Growth**

The rate of domestic economic growth will continue to affect note and coin demand. Changes in the rate of growth of real GDP and inflation appear to influence the growth rate of cash use domestically. The Administration expects that nominal GDP growth will slow down over the next two years to 4.2 percent from an estimated 5.2 percent this year. By the middle of the next decade, growth is forecasted to reach 4.8 percent again. If nominal GDP growth slows over the next several years, as predicted, then it is likely to moderate the effect on demand for notes and coins over the same period.

- **Dollarization**

The “dollarization” of foreign economies, in which the dollar is substituted for the local currency (either formally or informally), has been a significant source of dollar note demand over the last decade. Between 1988 and 1995, large shipments of dollars went to Argentina and the former Soviet Union (FSU). Inflation, declining exchange rates, currency recalls, and an underdeveloped banking system encouraged people in those countries to hold and use U.S. dollars. It is difficult to predict whether these countries or other regions or countries with a history of economic instability will require the same scale of dollar shipments in the future.

- **Introduction of the Euro**

The emergence of the euro will affect the dollar, although the nature and extent of that impact is difficult to predict. In the short run, the anticipated introduction of the euro may boost foreign demand for the dollar. However, the new European Central Bank may gradually require smaller dollar reserves after the introduction of the euro in 2002. Regions with close trade ties to the European Union, such as eastern Europe, the Mediterranean basin and certain regions of Africa may substitute euros for dollars. On the other hand, there is the possibility that the euro could set a precedent for regional currencies, and encourage the adoption of the dollar throughout the Western Hemisphere.

It will take time for the euro to stabilize and gain trust. Any major challenge to the dollar as the primary international currency is unlikely to occur in the short run, if at all. However, foreign demand for the dollar, as opposed to other currencies, will continue to reflect the relative strength of the U.S. economy.

- **Use of Other Transaction Mechanisms.**

Historically, consumers have continued to use traditional transaction mechanisms even while adopting new ones. Over the next decade this trend is likely to continue because each type of transaction mechanism has a unique mix of features that makes it more useful for certain types of transactions.

The share of cash used by consumers over the past decade has been reduced by growth in check and credit card transactions. Cash transactions are likely to continue to decline relative to checks and credit cards over the next decade. Growth of newer transaction mechanisms, such as point of sales (POS) debits, will grow at the fastest rate, although they currently represent a very small share of total dollar transactions. POS debit cards will provide an alternative primarily to cash and check transactions. However, the total volume of transactions in the U.S. and foreign economies is increasing, so the use of cash is likely to remain substantial over the next decade, despite a declining share of total transactions.

Newer electronic payment mechanisms, such as stored-value cards and digital cash, are still being developed. The success of stored-value cards may depend, in part, on incorporating multiple, cross-industry applications, such as storing cash and information. Digital cash is being designed for computer transactions and is unlikely to significantly effect cash use.

- **Fifty States Commemorative Quarter Program**

The Fifty States Commemorative Quarter program, beginning in 1999 and lasting for ten years, will require five new quarter designs each year. Demand projections for this program are very tentative because no comparable, multi year circulating commemorative program has been attempted. Initial estimates for the first half of 1999 suggest that the commemorative quarters are popular and that, in 1999, incremental demand (in addition to an estimated economic demand of 2.6 billion quarters) will likely fall within the projected range of 1.5 billion to 3 billion additional quarters. However, demand could exceed the range, given that promotion of the program did not begin until June 1999. Demand for other coin denominations has also grown substantially in 1999, suggesting that there might be a carryover effect from the quarter.

Mint production capacity is expected to be sufficient unless most of the new quarters are hoarded and not allowed to circulate. Continued rapid growth in demand for the other coin denominations could also pose a long-term problem.

- **Sacagawea Dollar Coin**

Treasury is authorized to issue a new dollar coin, beginning in 2000. The new Sacagawea Dollar coin is expected to be more popular than the Susan B. Anthony dollar coin, in part because it will

be more easily distinguishable from the other coin denominations. However, history suggests that the new dollar coin will not circulate widely unless the \$1 note is withdrawn. Because there are no plans to withdraw the \$1 note, Treasury does not expect demand for the new Sacagawea dollar to significantly impact production capacity. However, in accordance with the legislation, the Mint plans to promote the new dollar coin.

- **Penny Production**

Over the last decade, some stakeholders have advocated eliminating the penny. Treasury policy has been to continue production of the penny, which circulates widely. Because this denomination represents the largest share of coin production (about 57 percent), discontinuation would reduce the Mint's production and distribution requirements.

- **Use of Plastic Substrate**

If developed, a plastic substrate could expand the life span of notes and reduce the volume of notes produced. The cost benefit would be greatest for the \$1 note, since it currently has the shortest average life span (about 18 months), and is not expected to be redesigned. Although the \$1 note would still be more costly than a \$1 coin over its full life span, it might be more acceptable to consumers, who generally prefer carrying notes.

- **Coin Recycling**

Coin recycling businesses, such as Coinstar, have increased the life span of primarily pennies by returning them to active circulation. The initial result was that the Mint produced fewer pennies. Although the coin recycling businesses do not appear to have reached a saturation point in the market, penny demand has begun to accelerate once again. It is not clear whether the impact of the recycling machines on penny demand had a limited impact, or whether other factors are driving the renewed increase in penny demand. A reduction in penny production could benefit the Mint by freeing up space and equipment.

Recommendations

This report presents many factors that will drive demand for coins and notes over the next decade. Some of these factors cannot be predicted with any degree of certainty, and will require joint monitoring by the Department of the Treasury and the Federal Reserve System. The factors that most need to be monitored, and over which there is little control are, foreign demand (the euro and dollarization), the role of other transaction mechanisms, and domestic economic growth.

Foreign demand has accounted for the largest share of growth in the value of circulating notes over the past decade. To determine future foreign requirements, the group should focus on two activities:

- Monitoring the euro and its impact on dollar holdings; and

- Continuing to monitor trends in dollar usage overseas—where the notes are going, and how they are used.

The use of alternate transaction mechanisms will continue to affect both domestic and foreign demand for cash. New technologies will present opportunities for the development of more advanced electronic transaction mechanisms. The group will need to monitor the effects of technology on the use of cash.

- New technologies may affect the use of cash in the long term.
- Existing technologies and payment mechanisms could be adopted over the next decade.
- Consumer preferences for the various transaction mechanisms may change.

The group will need to gather and use information on domestic economic activity, which will continue to affect both domestic and foreign demand for dollar notes and coins.

- Monitor projections of domestic economic growth and inflation.
- Evaluate the Treasury's and the Federal Reserve's forecasting methods for note and coin demand. Have the projections been accurate or useful? Are the proper data being collected?
- Coordinate Treasury and Federal Reserve forecasts and analyses of note and coin demand. Are they based on the same assumptions?

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APPENDIX

TOTAL NOTES IN CIRCULATION
(Thousands of pieces)

Year	One	Two	Five	Ten	Twenty	Fifty	Hundred	Five Hundred	One Thousand			TOTAL
									One	Five	Ten	
1960	1,533,010	43,895	449,250	669,062	526,815	56,302	59,538	499	316	0.62	1.04	3,338,688
1961	1,588,463	45,928	462,614	687,763	546,734	57,370	61,064	485	300	0.61	1.01	3,450,723
1962	1,636,277	48,549	474,942	707,141	569,729	59,794	64,479	480	293	0.56	0.95	3,561,685
1963	1,721,930	51,460	493,836	737,336	605,468	64,423	71,100	497	298	0.52	0.43	3,746,350
1964	1,806,301	55,645	503,438	754,303	635,846	67,626	75,902	496	293	0.49	0.41	3,899,850
1965	1,907,766	63,552	523,503	779,374	668,433	70,805	81,348	489	288	0.54	0.38	4,095,560
1966	2,051,433	68,652	551,103	807,044	710,030	73,998	87,346	482	286	0.56	0.40	4,350,374
1967	2,034,694	68,182	570,082	836,604	758,121	78,297	93,108	480	285	0.60	0.39	4,439,855
1968	2,049,265	67,980	598,607	878,648	825,386	83,721	100,681	489	292	0.65	0.40	4,605,070
1969	2,213,183	67,852	618,374	898,946	873,318	89,987	110,156	467	276	0.64	0.47	4,872,562
1970	2,310,285	67,784	632,115	917,003	929,034	97,919	120,839	430	252	0.57	0.44	5,075,663
1971	2,407,808	67,737	654,599	934,754	994,632	107,537	134,137	406	237	0.49	0.43	5,301,847
1972	2,523,154	67,703	689,876	982,737	1,094,146	117,358	151,180	386	225	0.45	0.42	5,626,765
1973	2,638,678	67,683	722,744	1,022,633	1,195,731	130,278	172,883	370	216	0.44	0.41	5,951,217
1974	2,719,942	67,672	743,639	1,050,343	1,309,873	148,885	202,977	359	209	0.43	0.40	6,243,900
1975	2,809,210	67,648	768,284	1,077,692	1,417,202	163,139	231,386	351	204	0.39	0.38	6,535,117
1976	2,858,054	318,687	781,034	1,077,453	1,499,331	180,525	266,682	344	200	0.38	0.37	6,982,312
1977	3,037,596	325,183	838,008	1,136,064	1,661,664	201,581	308,177	338	197	0.38	0.37	7,508,809
1978	3,194,081	330,369	878,638	1,166,074	1,802,262	225,579	363,063	334	194	0.37	0.36	7,960,594
1979	3,307,567	335,453	909,795	1,189,432	1,930,650	251,701	419,605	329	192	0.37	0.36	8,344,724
1980	3,498,973	338,365	926,950	1,192,435	2,036,934	274,613	492,638	325	189	0.37	0.35	8,761,423
1981	3,612,517	339,953	959,423	1,182,409	2,125,992	297,770	538,069	322	187	0.37	0.35	9,056,643
1982	3,682,318	342,135	962,032	1,167,749	2,259,025	335,693	593,921	319	185	0.37	0.35	9,343,376
1983	3,627,989	349,693	987,147	1,189,033	2,467,760	386,135	675,049	315	183	0.37	0.35	9,683,305
1984	3,844,210	353,045	1,034,655	1,208,582	2,599,363	423,681	735,674	311	180	0.37	0.35	10,199,701
1985	3,813,585	357,138	1,064,044	1,191,691	2,763,428	468,919	811,858	308	179	0.36	0.35	10,471,151
1986	4,021,294	365,508	1,099,910	1,213,606	2,896,382	513,913	895,611	305	177	0.36	0.35	11,006,707
1987	4,398,736	375,454	1,128,497	1,238,943	3,065,875	564,802	1,003,745	303	176	0.36	0.35	11,776,532
1988	4,688,067	388,815	1,192,865	1,253,028	3,244,044	610,887	1,106,771	301	175	0.36	0.35	12,484,954
1989	4,944,027	404,623	1,225,539	1,249,349	3,355,847	634,601	1,187,407	300	174	0.36	0.35	13,001,869
1990	5,075,389	421,684	1,253,498	1,259,065	3,450,982	678,171	1,401,760	296	172	0.36	0.35	13,541,018
1991	5,282,574	437,596	1,288,932	1,262,841	3,501,639	712,431	1,572,445	295	171	0.36	0.35	14,058,925
1992	5,496,340	455,972	1,333,914	1,295,597	3,664,690	759,823	1,771,109	294	170	0.36	0.35	14,777,908
1993	5,748,996	474,621	1,374,925	1,319,239	3,747,322	819,477	2,014,585	293	169	0.36	0.35	15,499,627
1994	6,109,786	498,085	1,467,437	1,381,505	4,023,637	878,090	2,290,865	291	169	0.36	0.35	16,649,865
1995	6,336,567	521,472	1,506,006	1,414,070	4,207,513	928,093	2,415,449	290	168	0.35	0.35	17,329,629
1996	6,560,089	544,880	1,552,232	1,425,841	4,356,681	971,156	2,614,130	289	168	0.35	0.35	18,025,467
1997	6,718,483	564,203	1,569,630	1,420,104	4,397,670	964,801	2,915,812	289	167	0.35	0.35	18,551,160
1998	6,972,250	581,747	1,609,229	1,426,032	4,543,235	1,009,067	3,200,926	288	167	0.35	0.34	19,342,942

TOTAL NOTES IN CIRCULATION
(Thousands of dollars)

Year	One	Two	Five	Ten	Twenty	Fifty	Hundred	Five Hundred	One Thousand	Five Thousand	Ten Thousand	TOTAL
1960	\$1,533,010	\$87,790	\$2,246,248	\$6,690,618	\$10,536,292	\$2,815,117	\$5,953,767	\$249,458	\$316,186	\$3,085	\$10,370	\$30,441,941
1961	\$1,588,463	\$91,857	\$2,313,069	\$6,877,630	\$10,934,687	\$2,868,524	\$6,106,378	\$242,352	\$300,188	\$3,045	\$10,070	\$31,336,261
1962	\$1,636,277	\$97,098	\$2,374,711	\$7,071,407	\$11,394,584	\$2,989,694	\$6,447,863	\$239,925	\$292,822	\$2,780	\$9,530	\$32,556,691
1963	\$1,721,930	\$102,920	\$2,469,179	\$7,373,365	\$12,109,364	\$3,221,145	\$7,110,011	\$248,716	\$298,324	\$2,600	\$4,260	\$34,661,814
1964	\$1,806,301	\$111,290	\$2,517,189	\$7,543,032	\$12,716,918	\$3,381,321	\$7,590,151	\$247,823	\$293,288	\$2,465	\$4,070	\$36,213,848
1965	\$1,907,766	\$127,105	\$2,617,517	\$7,793,737	\$13,368,660	\$3,540,261	\$8,134,779	\$244,628	\$287,781	\$2,720	\$3,840	\$38,028,794
1966	\$2,051,433	\$137,304	\$2,755,515	\$8,070,435	\$14,200,600	\$3,699,895	\$8,734,574	\$240,813	\$285,959	\$2,815	\$3,950	\$40,183,293
1967	\$2,034,694	\$136,364	\$2,850,411	\$8,366,038	\$15,162,421	\$3,914,845	\$9,310,776	\$240,217	\$285,202	\$3,015	\$3,930	\$42,307,914
1968	\$2,049,265	\$135,960	\$2,993,035	\$8,786,479	\$16,507,716	\$4,186,044	\$10,068,129	\$244,414	\$292,227	\$3,245	\$3,970	\$45,270,484
1969	\$2,213,183	\$135,704	\$3,091,870	\$8,989,464	\$17,466,369	\$4,499,371	\$11,015,562	\$233,558	\$276,087	\$3,220	\$4,710	\$47,929,099
1970	\$2,310,285	\$135,569	\$3,160,577	\$9,170,031	\$18,580,683	\$4,895,959	\$12,083,858	\$215,159	\$252,201	\$2,840	\$4,400	\$50,811,562
1971	\$2,407,808	\$135,474	\$3,272,995	\$9,347,536	\$19,892,630	\$5,376,867	\$13,413,681	\$203,167	\$236,593	\$2,445	\$4,250	\$54,293,447
1972	\$2,523,154	\$135,405	\$3,449,380	\$9,827,371	\$21,882,911	\$5,867,882	\$15,118,028	\$193,106	\$225,313	\$2,240	\$4,170	\$59,228,958
1973	\$2,638,678	\$135,367	\$3,613,721	\$10,226,330	\$23,914,613	\$6,513,876	\$17,288,271	\$185,199	\$216,044	\$2,210	\$4,100	\$64,738,408
1974	\$2,719,942	\$135,343	\$3,718,195	\$10,303,431	\$26,197,465	\$7,444,258	\$20,297,696	\$179,416	\$209,181	\$2,140	\$4,010	\$71,411,078
1975	\$2,809,210	\$135,296	\$3,841,422	\$10,776,921	\$28,344,034	\$8,156,966	\$23,138,603	\$175,381	\$203,982	\$1,935	\$3,760	\$77,587,509
1976	\$2,858,054	\$637,375	\$3,905,171	\$10,774,535	\$29,986,625	\$9,026,266	\$26,668,237	\$172,043	\$199,644	\$1,915	\$3,670	\$84,233,534
1977	\$3,037,596	\$650,366	\$4,190,042	\$11,360,637	\$33,233,277	\$10,079,072	\$30,817,693	\$169,060	\$196,569	\$1,875	\$3,680	\$93,739,867
1978	\$3,194,081	\$660,737	\$4,393,188	\$11,660,739	\$36,045,245	\$11,278,933	\$36,306,288	\$166,780	\$194,238	\$1,840	\$3,600	\$103,905,669
1979	\$3,307,567	\$670,906	\$4,548,977	\$11,894,319	\$38,613,009	\$12,585,049	\$41,960,458	\$164,480	\$191,793	\$1,840	\$3,570	\$113,941,966
1980	\$3,498,973	\$676,730	\$4,634,749	\$11,924,355	\$40,738,681	\$13,730,645	\$49,263,849	\$162,655	\$189,029	\$1,830	\$3,490	\$124,824,985
1981	\$3,612,517	\$679,906	\$4,797,114	\$11,824,088	\$42,519,837	\$14,888,509	\$53,806,866	\$161,239	\$187,350	\$1,835	\$3,500	\$132,482,761
1982	\$3,682,318	\$684,269	\$4,810,158	\$11,677,486	\$45,180,490	\$16,784,638	\$59,392,070	\$159,467	\$185,027	\$1,853	\$3,500	\$142,561,277
1983	\$3,627,989	\$699,386	\$4,935,736	\$11,890,335	\$49,355,203	\$19,306,738	\$67,504,867	\$157,409	\$182,924	\$1,830	\$3,480	\$157,665,897
1984	\$3,844,210	\$706,090	\$5,173,273	\$12,085,822	\$51,987,251	\$21,184,031	\$73,567,437	\$155,441	\$180,258	\$1,825	\$3,480	\$168,889,117
1985	\$3,813,585	\$714,276	\$5,320,221	\$11,916,910	\$55,268,568	\$23,445,937	\$81,185,841	\$153,858	\$178,563	\$1,815	\$3,480	\$182,003,053
1986	\$4,021,294	\$731,015	\$5,499,549	\$12,136,063	\$57,927,642	\$25,695,625	\$89,561,081	\$152,712	\$177,064	\$1,800	\$3,460	\$195,907,304
1987	\$4,398,736	\$750,908	\$5,642,486	\$12,389,429	\$61,317,508	\$28,240,124	\$100,374,475	\$151,509	\$175,709	\$1,785	\$3,460	\$213,446,128
1988	\$4,688,067	\$777,630	\$5,964,325	\$12,530,278	\$64,880,888	\$30,544,346	\$110,677,135	\$150,724	\$174,715	\$1,790	\$3,450	\$230,393,348
1989	\$4,944,027	\$809,247	\$6,127,697	\$12,493,486	\$67,116,945	\$31,730,055	\$118,740,738	\$149,955	\$173,825	\$1,790	\$3,450	\$242,291,215
1990	\$5,075,389	\$843,369	\$6,267,489	\$12,590,655	\$69,019,631	\$33,908,532	\$140,175,959	\$148,194	\$171,920	\$1,785	\$3,450	\$268,206,372
1991	\$5,282,574	\$875,192	\$6,444,659	\$12,628,410	\$70,032,783	\$35,621,575	\$157,244,479	\$147,531	\$170,961	\$1,780	\$3,450	\$288,453,393
1992	\$5,496,340	\$911,943	\$6,669,569	\$12,955,970	\$73,293,791	\$37,991,140	\$177,110,934	\$146,785	\$170,020	\$1,780	\$3,450	\$314,751,722
1993	\$5,748,996	\$949,242	\$6,874,624	\$13,192,387	\$74,946,437	\$40,973,833	\$201,458,475	\$146,315	\$169,485	\$1,780	\$3,450	\$344,465,024
1994	\$6,109,786	\$996,170	\$7,337,184	\$13,815,048	\$80,472,745	\$43,904,478	\$229,086,486	\$145,587	\$168,883	\$1,775	\$3,450	\$392,041,592
1995	\$6,336,567	\$1,042,944	\$7,530,029	\$14,140,700	\$84,150,253	\$46,404,651	\$241,544,912	\$145,046	\$168,329	\$1,770	\$3,450	\$401,468,650
1996	\$6,560,089	\$1,089,760	\$7,761,158	\$14,258,409	\$87,133,628	\$48,557,818	\$261,412,965	\$144,718	\$167,876	\$1,770	\$3,450	\$427,091,642
1997	\$6,718,483	\$1,128,405	\$7,848,150	\$14,201,043	\$87,953,394	\$48,240,047	\$291,581,250	\$144,284	\$167,495	\$1,755	\$3,450	\$457,987,756
1998	\$6,972,250	\$1,163,494	\$8,046,147	\$14,260,318	\$90,864,690	\$50,453,374	\$320,092,615	\$143,917	\$167,107	\$1,755	\$3,440	\$492,169,107

DOMESTIC NOTES IN CIRCULATION, BY DENOMINATION (CY 1960-1998)

(Thousands of dollars)

Year	One	Two	Five	Ten	Twenty	Fifty	Hundred	TOTAL
1960	\$ 1,533,010	\$ 87,790	\$ 1,594,836	\$ 3,813,652	\$ 5,373,509	\$ 2,026,884	\$ 5,358,390	\$ 20,367,171
1961	\$ 1,588,463	\$ 91,857	\$ 1,642,279	\$ 3,713,920	\$ 5,576,690	\$ 2,094,023	\$ 5,312,549	\$ 20,575,434
1962	\$ 1,636,277	\$ 97,098	\$ 1,662,298	\$ 3,677,132	\$ 5,811,238	\$ 2,212,373	\$ 5,545,162	\$ 21,186,635
1963	\$ 1,721,930	\$ 102,920	\$ 1,728,425	\$ 3,686,682	\$ 6,175,776	\$ 2,415,859	\$ 5,972,410	\$ 22,357,901
1964	\$ 1,806,301	\$ 111,290	\$ 1,762,032	\$ 3,696,086	\$ 6,485,628	\$ 2,569,804	\$ 6,299,825	\$ 23,278,612
1965	\$ 1,907,766	\$ 127,105	\$ 1,832,262	\$ 3,740,994	\$ 6,818,017	\$ 2,726,001	\$ 6,670,519	\$ 24,361,632
1966	\$ 2,051,433	\$ 137,304	\$ 1,901,305	\$ 3,793,105	\$ 7,384,312	\$ 2,885,918	\$ 7,075,005	\$ 25,761,919
1967	\$ 2,034,694	\$ 136,364	\$ 1,966,784	\$ 3,932,038	\$ 7,884,459	\$ 3,092,728	\$ 7,448,620	\$ 27,028,051
1968	\$ 2,049,265	\$ 135,960	\$ 2,065,194	\$ 4,129,645	\$ 8,584,012	\$ 3,390,696	\$ 7,953,822	\$ 28,852,450
1969	\$ 2,213,183	\$ 135,704	\$ 2,102,471	\$ 4,135,154	\$ 9,082,512	\$ 3,554,503	\$ 8,481,983	\$ 30,223,086
1970	\$ 2,310,285	\$ 135,569	\$ 2,149,193	\$ 4,218,214	\$ 9,847,762	\$ 3,769,888	\$ 9,062,893	\$ 31,968,404
1971	\$ 2,407,808	\$ 135,474	\$ 2,258,366	\$ 4,299,867	\$ 10,344,168	\$ 3,978,882	\$ 9,523,713	\$ 33,394,733
1972	\$ 2,523,154	\$ 135,405	\$ 2,345,578	\$ 4,520,590	\$ 11,379,113	\$ 4,166,196	\$ 10,280,259	\$ 35,775,125
1973	\$ 2,638,678	\$ 135,367	\$ 2,457,330	\$ 4,601,848	\$ 12,196,453	\$ 4,364,297	\$ 11,237,376	\$ 38,038,902
1974	\$ 2,719,942	\$ 135,343	\$ 2,528,373	\$ 4,726,544	\$ 13,360,707	\$ 4,838,768	\$ 12,584,571	\$ 41,288,996
1975	\$ 2,809,210	\$ 135,296	\$ 2,573,753	\$ 4,849,614	\$ 13,888,577	\$ 5,057,319	\$ 13,420,390	\$ 43,119,216
1976	\$ 2,858,054	\$ 637,375	\$ 2,577,413	\$ 4,740,795	\$ 14,393,580	\$ 5,325,497	\$ 14,667,530	\$ 45,577,516
1977	\$ 3,037,596	\$ 650,366	\$ 2,765,428	\$ 4,998,680	\$ 15,287,308	\$ 5,745,071	\$ 16,025,200	\$ 48,880,832
1978	\$ 3,194,081	\$ 660,737	\$ 2,855,572	\$ 5,014,118	\$ 15,859,908	\$ 6,090,624	\$ 17,790,081	\$ 51,831,579
1979	\$ 3,307,567	\$ 670,906	\$ 2,956,835	\$ 5,114,557	\$ 16,217,464	\$ 6,544,225	\$ 19,721,415	\$ 54,894,651
1980	\$ 3,498,973	\$ 676,730	\$ 2,966,239	\$ 5,008,229	\$ 16,702,859	\$ 6,865,323	\$ 21,676,093	\$ 57,751,450
1981	\$ 3,612,517	\$ 679,906	\$ 2,974,210	\$ 4,847,876	\$ 16,582,736	\$ 7,295,370	\$ 22,598,884	\$ 58,945,423
1982	\$ 3,682,318	\$ 684,269	\$ 2,934,196	\$ 4,787,769	\$ 16,716,781	\$ 7,888,780	\$ 23,756,828	\$ 60,800,789
1983	\$ 3,627,989	\$ 699,386	\$ 2,912,085	\$ 4,756,134	\$ 17,767,873	\$ 8,881,099	\$ 26,326,898	\$ 65,317,107
1984	\$ 3,844,210	\$ 706,090	\$ 2,897,033	\$ 4,834,329	\$ 17,675,665	\$ 9,320,974	\$ 27,219,952	\$ 66,839,256
1985	\$ 3,813,585	\$ 714,276	\$ 2,872,919	\$ 4,766,764	\$ 17,685,942	\$ 10,081,753	\$ 29,226,903	\$ 69,499,857
1986	\$ 4,021,294	\$ 731,015	\$ 2,804,770	\$ 4,854,425	\$ 17,957,569	\$ 10,535,206	\$ 31,346,378	\$ 72,585,694
1987	\$ 4,398,736	\$ 750,908	\$ 2,821,243	\$ 4,955,771	\$ 18,395,252	\$ 11,296,050	\$ 34,127,321	\$ 77,077,744
1988	\$ 4,688,067	\$ 777,630	\$ 2,862,876	\$ 5,012,111	\$ 18,815,458	\$ 11,912,295	\$ 35,416,683	\$ 79,815,799
1989	\$ 4,944,027	\$ 809,247	\$ 2,818,741	\$ 5,247,264	\$ 18,792,745	\$ 12,374,721	\$ 36,809,629	\$ 82,125,393
1990	\$ 5,075,389	\$ 843,369	\$ 2,820,370	\$ 5,288,075	\$ 18,635,300	\$ 13,224,327	\$ 42,052,788	\$ 88,264,967
1991	\$ 5,282,574	\$ 875,192	\$ 2,835,650	\$ 5,430,216	\$ 18,908,851	\$ 13,892,414	\$ 47,173,344	\$ 94,721,963
1992	\$ 5,496,340	\$ 911,943	\$ 2,934,610	\$ 5,700,627	\$ 20,522,261	\$ 15,196,456	\$ 51,362,171	\$ 102,446,444
1993	\$ 5,748,996	\$ 949,242	\$ 3,024,835	\$ 5,936,574	\$ 20,985,002	\$ 16,389,533	\$ 58,422,958	\$ 111,778,170
1994	\$ 6,109,786	\$ 996,170	\$ 3,301,733	\$ 6,354,922	\$ 22,532,369	\$ 18,000,836	\$ 64,144,216	\$ 121,759,727
1995	\$ 6,336,567	\$ 1,042,944	\$ 3,388,513	\$ 6,646,129	\$ 23,562,071	\$ 19,489,954	\$ 65,217,126	\$ 126,001,898
1996	\$ 6,560,089	\$ 1,089,760	\$ 3,492,521	\$ 6,844,036	\$ 25,268,752	\$ 20,879,862	\$ 70,581,501	\$ 135,034,335
1997	\$ 6,718,483	\$ 1,128,405	\$ 3,610,149	\$ 7,100,522	\$ 25,506,484	\$ 21,225,621	\$ 75,811,125	\$ 141,417,773
1998	\$ 6,972,250	\$ 1,163,494	\$ 3,781,689	\$ 7,272,762	\$ 27,259,407	\$ 23,208,552	\$ 80,023,154	\$ 149,997,526

FOREIGN NOTES IN CIRCULATION, BY DENOMINATION (CY 1960-1998)

(Thousands of dollars)

Year	One	Two	Five	Ten	Twenty	Fifty	Hundred	TOTAL
1960	\$ -	\$ -	\$ 651,412	\$ 2,876,966	\$ 5,162,783	\$ 788,233	\$ 595,377	\$ 10,074,770
1961	\$ -	\$ -	\$ 670,790	\$ 3,163,710	\$ 5,357,997	\$ 774,502	\$ 793,829	\$ 10,760,827
1962	\$ -	\$ -	\$ 712,413	\$ 3,394,275	\$ 5,583,346	\$ 777,320	\$ 902,701	\$ 11,370,056
1963	\$ -	\$ -	\$ 740,754	\$ 3,686,682	\$ 5,933,588	\$ 805,286	\$ 1,137,602	\$ 12,303,912
1964	\$ -	\$ -	\$ 755,157	\$ 3,846,947	\$ 6,231,290	\$ 811,517	\$ 1,290,326	\$ 12,935,236
1965	\$ -	\$ -	\$ 785,255	\$ 4,052,743	\$ 6,550,644	\$ 814,260	\$ 1,464,260	\$ 13,667,162
1966	\$ -	\$ -	\$ 854,210	\$ 4,277,331	\$ 6,816,288	\$ 813,977	\$ 1,659,569	\$ 14,421,374
1967	\$ -	\$ -	\$ 883,628	\$ 4,434,000	\$ 7,277,962	\$ 822,117	\$ 1,862,155	\$ 15,279,863
1968	\$ -	\$ -	\$ 927,841	\$ 4,656,834	\$ 7,923,704	\$ 795,348	\$ 2,114,307	\$ 16,418,034
1969	\$ -	\$ -	\$ 989,398	\$ 4,854,311	\$ 8,383,857	\$ 944,868	\$ 2,533,579	\$ 17,706,013
1970	\$ -	\$ -	\$ 1,011,385	\$ 4,951,817	\$ 8,732,921	\$ 1,126,071	\$ 3,020,964	\$ 18,843,158
1971	\$ -	\$ -	\$ 1,014,628	\$ 5,047,670	\$ 9,548,462	\$ 1,397,985	\$ 3,889,967	\$ 20,898,713
1972	\$ -	\$ -	\$ 1,103,802	\$ 5,306,780	\$ 10,503,797	\$ 1,701,686	\$ 4,837,769	\$ 23,453,833
1973	\$ -	\$ -	\$ 1,156,391	\$ 5,624,481	\$ 11,718,161	\$ 2,149,579	\$ 6,050,895	\$ 26,699,506
1974	\$ -	\$ -	\$ 1,189,823	\$ 5,776,887	\$ 12,836,758	\$ 2,605,490	\$ 7,713,124	\$ 30,122,082
1975	\$ -	\$ -	\$ 1,267,669	\$ 5,927,306	\$ 14,455,457	\$ 3,099,647	\$ 9,718,213	\$ 34,468,293
1976	\$ -	\$ -	\$ 1,327,758	\$ 6,033,740	\$ 15,593,045	\$ 3,700,769	\$ 12,000,707	\$ 38,656,019
1977	\$ -	\$ -	\$ 1,424,614	\$ 6,361,957	\$ 17,945,970	\$ 4,334,001	\$ 14,792,493	\$ 44,859,034
1978	\$ -	\$ -	\$ 1,537,616	\$ 6,646,621	\$ 20,185,337	\$ 5,188,309	\$ 18,516,207	\$ 52,074,090
1979	\$ -	\$ -	\$ 1,592,142	\$ 6,779,762	\$ 22,395,545	\$ 6,040,824	\$ 22,239,043	\$ 59,047,315
1980	\$ -	\$ -	\$ 1,668,510	\$ 6,916,126	\$ 24,035,822	\$ 6,865,323	\$ 27,587,755	\$ 67,073,535
1981	\$ -	\$ -	\$ 1,822,903	\$ 6,976,212	\$ 25,937,101	\$ 7,593,140	\$ 31,207,982	\$ 73,537,338
1982	\$ -	\$ -	\$ 1,875,962	\$ 6,889,717	\$ 28,463,709	\$ 8,895,858	\$ 35,635,242	\$ 81,760,487
1983	\$ -	\$ -	\$ 2,023,652	\$ 7,134,201	\$ 31,587,330	\$ 10,425,638	\$ 41,177,969	\$ 92,348,790
1984	\$ -	\$ -	\$ 2,276,240	\$ 7,251,493	\$ 34,311,586	\$ 11,863,058	\$ 46,347,485	\$ 102,049,862
1985	\$ -	\$ -	\$ 2,447,301	\$ 7,150,146	\$ 37,582,626	\$ 13,364,184	\$ 51,958,938	\$ 112,503,196
1986	\$ -	\$ -	\$ 2,694,779	\$ 7,281,638	\$ 39,970,073	\$ 15,160,419	\$ 58,214,703	\$ 123,321,611
1987	\$ -	\$ -	\$ 2,821,243	\$ 7,433,657	\$ 42,922,256	\$ 16,944,074	\$ 66,247,153	\$ 136,368,384
1988	\$ -	\$ -	\$ 3,101,449	\$ 7,518,167	\$ 46,065,430	\$ 18,632,051	\$ 75,260,452	\$ 150,577,549
1989	\$ -	\$ -	\$ 3,308,957	\$ 7,246,222	\$ 48,324,201	\$ 19,355,334	\$ 81,931,109	\$ 160,165,822
1990	\$ -	\$ -	\$ 3,447,119	\$ 7,302,580	\$ 50,384,331	\$ 20,684,204	\$ 98,123,171	\$ 179,941,405
1991	\$ -	\$ -	\$ 3,609,009	\$ 7,198,193	\$ 51,123,932	\$ 21,729,161	\$ 110,071,135	\$ 193,731,430
1992	\$ -	\$ -	\$ 3,734,959	\$ 7,255,343	\$ 52,771,529	\$ 22,794,684	\$ 125,748,763	\$ 212,305,278
1993	\$ -	\$ -	\$ 3,849,789	\$ 7,255,813	\$ 53,961,435	\$ 24,584,300	\$ 143,035,517	\$ 232,686,854
1994	\$ -	\$ -	\$ 4,035,451	\$ 7,460,126	\$ 57,940,376	\$ 25,903,642	\$ 164,942,270	\$ 260,281,865
1995	\$ -	\$ -	\$ 4,141,516	\$ 7,494,571	\$ 60,588,182	\$ 26,914,698	\$ 176,327,786	\$ 275,466,753
1996	\$ -	\$ -	\$ 4,268,637	\$ 7,414,373	\$ 61,864,876	\$ 27,677,956	\$ 190,831,465	\$ 292,057,306
1997	\$ -	\$ -	\$ 4,238,001	\$ 7,100,522	\$ 62,446,910	\$ 27,014,426	\$ 215,770,125	\$ 316,569,983
1998	\$ -	\$ -	\$ 4,264,458	\$ 6,987,556	\$ 63,605,283	\$ 27,244,822	\$ 240,069,461	\$ 342,171,581

Circulating Coins, by Denomination (FY1978-1998)

(Billions of Coins)

FY	Penny	Nickel	Dime	Quarter	Total
1978	44.062	3.993	7.392	6.492	61.939
1979	47.653	4.278	7.281	6.876	66.088
1980	53.054	4.813	7.858	7.368	73.093
1981	58.194	5.240	8.334	7.848	79.616
1982	66.120	5.337	8.503	8.125	88.085
1983	71.113	5.822	8.959	8.676	94.570
1984	75.346	6.415	9.552	9.135	100.448
1985	77.035	6.828	9.877	9.642	103.382
1986	77.221	7.045	10.086	9.913	104.265
1987	78.309	7.172	10.534	10.352	106.367
1988	81.098	7.876	11.460	10.709	111.143
1989	84.878	8.551	12.481	11.289	117.199
1990	87.750	9.053	13.142	11.964	121.909
1991	88.506	9.296	13.473	12.305	123.580
1992	89.318	9.379	13.539	12.269	124.505
1993	92.863	9.466	13.908	12.733	128.970
1994	97.456	10.108	15.110	13.564	136.238
1995	101.595	10.890	16.119	14.711	143.315
1996	105.086	11.592	17.406	15.541	149.625
1997	105.139	11.643	17.841	15.775	150.398
1998	106.264	12.085	18.575	16.601	153.525

Circulating Coins, by Denomination (FY1978-1998)

(Billions of Dollars)

FY	Penny	Nickel	Dime	Quarter	Total
1978	\$ 0.441	\$ 0.200	\$ 0.739	\$ 1.623	\$ 3.002
1979	\$ 0.477	\$ 0.214	\$ 0.728	\$ 1.719	\$ 3.138
1980	\$ 0.531	\$ 0.241	\$ 0.786	\$ 1.842	\$ 3.399
1981	\$ 0.582	\$ 0.262	\$ 0.833	\$ 1.962	\$ 3.639
1982	\$ 0.661	\$ 0.267	\$ 0.850	\$ 2.031	\$ 3.810
1983	\$ 0.711	\$ 0.291	\$ 0.896	\$ 2.169	\$ 4.067
1984	\$ 0.753	\$ 0.321	\$ 0.955	\$ 2.284	\$ 4.313
1985	\$ 0.770	\$ 0.341	\$ 0.988	\$ 2.411	\$ 4.510
1986	\$ 0.772	\$ 0.352	\$ 1.009	\$ 2.478	\$ 4.611
1987	\$ 0.783	\$ 0.359	\$ 1.053	\$ 2.588	\$ 4.783
1988	\$ 0.811	\$ 0.394	\$ 1.146	\$ 2.677	\$ 5.028
1989	\$ 0.849	\$ 0.428	\$ 1.248	\$ 2.822	\$ 5.347
1990	\$ 0.878	\$ 0.453	\$ 1.314	\$ 2.991	\$ 5.635
1991	\$ 0.885	\$ 0.465	\$ 1.347	\$ 3.076	\$ 5.773
1992	\$ 0.893	\$ 0.469	\$ 1.354	\$ 3.067	\$ 5.783
1993	\$ 0.929	\$ 0.473	\$ 1.391	\$ 3.183	\$ 5.976
1994	\$ 0.975	\$ 0.505	\$ 1.511	\$ 3.391	\$ 6.382
1995	\$ 1.016	\$ 0.545	\$ 1.612	\$ 3.678	\$ 6.850
1996	\$ 1.051	\$ 0.580	\$ 1.741	\$ 3.885	\$ 7.256
1997	\$ 1.051	\$ 0.582	\$ 1.784	\$ 3.944	\$ 7.361
1998	\$ 1.063	\$ 0.604	\$ 1.858	\$ 4.150	\$ 7.675

Coin Demand, by Denomination (FY1960-1998)

(Millions of Coins)

FY	Penny	Nickel	Dime	Quarter	Half Dollar	Dollar	Total
1960	2,245	264	258	88	22	-	2,877
1961	2,222	274	283	118	30	-	2,927
1962	2,463	406	434	177	59	-	3,539
1963	2,686	419	474	206	66	-	3,851
1964	2,960	705	759	341	167	-	4,932
1965	2,878	1,341	1,121	877	192	-	6,409
1966	3,414	88	763	1,291	204	-	5,760
1967	3,241	265	623	548	314	-	4,991
1968	4,576	560	2,193	1,353	267	-	8,949
1969	5,259	592	1,525	657	95	-	8,128
1970	5,182	544	824	481	63	-	7,094
1971	5,405	454	656	378	244	-	7,137
1972	5,721	457	665	358	302	170	7,673
1973	6,885	602	805	542	191	62	9,087
1974	9,136	746	1,083	641	228	57	11,891
1975	9,023	528	714	583	280	46	11,174
1976	7,361	639	933	950	167	122	10,172
1977	8,747	766	944	855	96	44	11,452
1978	9,934	917	1,180	998	96	63	13,188
1979	10,163	923	1,189	983	106	365	13,729
1980	13,144	1,076	1,391	1,205	122	37	16,975
1981	12,990	1,015	1,449	1,231	93	10	16,788
1982	15,271	877	1,113	944	29	5	18,239
1983	12,831	974	1,171	1,157	42	16	16,191
1984	12,194	1,132	1,611	1,143	35	9	16,124
1985	10,821	862	1,151	1,097	36	5	13,972
1986	10,137	995	1,333	1,199	27	12	13,703
1987	11,083	1,145	1,555	1,204	31	10	15,028
1988	11,930	1,311	1,881	1,271	38	12	16,443
1989	11,140	1,158	1,705	1,269	34	13	15,319
1990	11,010	1,118	1,582	1,232	39	12	14,993
1991	9,202	798	1,270	842	29	12	12,153
1992	10,888	1,075	1,666	1,147	30	14	14,820
1993	12,385	1,252	1,996	1,623	41	18	17,315
1994	13,098	1,527	2,371	1,730	44	50	18,820
1995	13,484	1,475	2,395	1,709	37	65	19,165
1996	12,324	1,277	2,227	1,674	37	67	17,606
1997	9,425	1,155	2,128	1,298	16	51	14,073
1998	10,732	1,551	2,539	2,118	15	47	17,002

Coin Demand, by Denomination (FY1960-1998)

(Millions of Dollars)

FY	Penny	Nickel	Dime	Quarter	Half Dollar	Dollar	Total
1960	\$ 22.5	\$ 13.2	\$ 25.8	\$ 8.8	\$ 11.0	\$ -	\$ 81.3
1961	\$ 22.2	\$ 13.7	\$ 28.3	\$ 11.8	\$ 15.0	\$ -	\$ 91.0
1962	\$ 24.6	\$ 20.3	\$ 43.4	\$ 17.7	\$ 29.5	\$ -	\$ 135.5
1963	\$ 26.9	\$ 21.0	\$ 47.4	\$ 20.6	\$ 33.0	\$ -	\$ 148.8
1964	\$ 29.6	\$ 35.3	\$ 75.9	\$ 34.1	\$ 83.5	\$ -	\$ 258.4
1965	\$ 28.8	\$ 67.1	\$112.1	\$ 87.7	\$ 96.0	\$ -	\$ 391.6
1966	\$ 34.1	\$ 4.4	\$ 76.3	\$322.8	\$ 102.0	\$ -	\$ 539.6
1967	\$ 32.4	\$ 13.3	\$ 62.3	\$137.0	\$ 157.0	\$ -	\$ 402.0
1968	\$ 45.8	\$ 28.0	\$219.3	\$338.3	\$ 133.5	\$ -	\$ 764.8
1969	\$ 52.6	\$ 29.6	\$152.5	\$164.3	\$ 47.5	\$ -	\$ 446.4
1970	\$ 51.8	\$ 27.2	\$ 82.4	\$120.3	\$ 31.5	\$ -	\$ 313.2
1971	\$ 54.1	\$ 22.7	\$ 65.6	\$ 94.5	\$ 122.0	\$ -	\$ 358.9
1972	\$ 57.2	\$ 22.9	\$ 66.5	\$ 89.5	\$ 151.0	\$170.0	\$ 557.1
1973	\$ 68.9	\$ 30.1	\$ 80.5	\$135.5	\$ 95.5	\$ 62.0	\$ 472.5
1974	\$ 91.4	\$ 37.3	\$108.3	\$160.3	\$ 114.0	\$ 57.0	\$ 568.2
1975	\$ 90.2	\$ 26.4	\$ 71.4	\$145.8	\$ 140.0	\$ 46.0	\$ 519.8
1976	\$ 73.6	\$ 32.0	\$ 93.3	\$237.5	\$ 83.5	\$122.0	\$ 641.9
1977	\$ 87.5	\$ 38.3	\$ 94.4	\$213.8	\$ 48.0	\$ 44.0	\$ 525.9
1978	\$ 99.3	\$ 45.9	\$118.0	\$249.5	\$ 48.0	\$ 63.0	\$ 623.7
1979	\$101.6	\$ 46.2	\$118.9	\$245.8	\$ 53.0	\$365.0	\$ 930.4
1980	\$131.4	\$ 53.8	\$139.1	\$301.3	\$ 61.0	\$ 37.0	\$ 723.6
1981	\$129.9	\$ 50.8	\$144.9	\$307.8	\$ 46.5	\$ 10.0	\$ 689.8
1982	\$152.7	\$ 43.9	\$111.3	\$236.0	\$ 14.5	\$ 5.0	\$ 563.4
1983	\$128.3	\$ 48.7	\$117.1	\$289.3	\$ 21.0	\$ 16.0	\$ 620.4
1984	\$121.9	\$ 56.6	\$161.1	\$285.8	\$ 17.5	\$ 9.0	\$ 651.9
1985	\$108.2	\$ 43.1	\$115.1	\$274.3	\$ 18.0	\$ 5.0	\$ 563.7
1986	\$101.4	\$ 49.8	\$133.3	\$299.8	\$ 13.5	\$ 12.0	\$ 609.7
1987	\$110.8	\$ 57.3	\$155.5	\$301.0	\$ 15.5	\$ 10.0	\$ 650.1
1988	\$119.3	\$ 65.6	\$188.1	\$317.8	\$ 19.0	\$ 12.0	\$ 721.7
1989	\$111.4	\$ 57.9	\$170.5	\$317.3	\$ 17.0	\$ 13.0	\$ 687.1
1990	\$110.1	\$ 55.9	\$158.2	\$308.0	\$ 19.5	\$ 12.0	\$ 663.7
1991	\$ 92.0	\$ 39.9	\$127.0	\$210.5	\$ 14.5	\$ 12.0	\$ 495.9
1992	\$108.9	\$ 53.8	\$166.6	\$286.8	\$ 15.0	\$ 14.0	\$ 645.0
1993	\$123.9	\$ 62.6	\$199.6	\$405.8	\$ 20.5	\$ 18.0	\$ 830.3
1994	\$131.0	\$ 76.4	\$237.1	\$432.5	\$ 22.0	\$ 50.0	\$ 948.9
1995	\$134.8	\$ 73.8	\$239.5	\$427.3	\$ 18.5	\$ 65.0	\$ 958.8
1996	\$123.2	\$ 63.9	\$222.7	\$418.5	\$ 18.5	\$ 67.0	\$ 913.8
1997	\$ 94.3	\$ 57.8	\$212.8	\$324.5	\$ 8.0	\$ 51.0	\$ 748.3
1998	\$107.3	\$ 77.6	\$253.9	\$529.5	\$ 7.5	\$ 47.0	\$1,022.8

Note Production (1980-1999e)
(Millions of pieces)

FY	One	Five	Ten	Twenty	Fifty	Hundred	Total
1980	1,940	428	495	635	57	100	3,655
1981	1,955	520	536	813	67	118	4,009
1982	2,040	614	540	684	95	109	4,082
1983	2,230	584	593	994	115	86	4,602
1984	2,771	717	813	1,293	128	138	5,859
1985	2,851	778	784	1,450	138	160	6,160
1986	3,123	845	768	1,475	182	176	6,570
1987	3,232	781	698	1,472	195	218	6,595
1988	2,960	746	653	1,350	144	160	6,013
1989	2,861	835	771	1,526	134	202	6,330
1990	3,181	912	771	1,834	115	189	7,002
1991	3,411	1,005	896	2,112	218	374	8,016
1992	4,090	787	1,037	1,760	557	218	8,448
1993	3,514	841	826	2,170	259	323	8,032
1994	4,602	973	794	2,368	147	451	9,334
1995	4,787	1,069	672	2,554	147	730	9,958
1996	4,218	1,158	1,011	1,363	442	1,251	9,443
1997	4,691	896	998	1,882	464	650	9,581
1998	3,814	858	762	2,278	723	765	9,200
1999e	4,543	831	614	3,130	694	1,542	11,354

Coin Production, by Denomination (FY 1960-1998)
(Millions of Coins)

FY	Penny	Nickel	Dime	Quarter	Half	Dollar	Total
1960	2,202.7	236.2	296.5	97.2	22.9		2,855.5
1961	2,395.1	265.1	266.1	90.8	20.8		3,037.9
1962	2,373.1	362.6	432.4	178.8	45.5		3,392.4
1963	2,650.2	393.5	413.1	176.3	62.9		3,696.0
1964	3,077.2	680.7	723.8	311.9	167.3		4,960.9
1965	3,252.2	1,996.3	1,159.8	961.7	194.8		7,564.8
1966	3,165.7	465.6	2,828.2	2,206.6	208.0		8,874.1
1967	3,559.6	231.4	2,759.4	1,865.5	318.3		8,734.2
1968	4,660.4	103.6	736.8	365.4	273.1		6,139.3
1969	5,055.6	286.5	921.4	295.8	96.7		6,656.0
1970	5,499.5	708.0	1,148.0	522.3	51.1		7,928.9
1971	5,402.0	519.0	631.0	400.0	384.0	51.0	7,387.0
1972	5,954.0	461.0	685.0	497.0	325.0	220.0	8,142.0
1973	7,046.0	626.0	748.0	581.0	157.0	18.0	9,176.0
1974	8,794.0	730.0	855.0	507.2	172.2	38.4	11,096.8
1975	10,469.0	867.0	981.0	1,228.0	482.0	76.0	14,103.0
1976	8,576.0	720.0	1,261.0	1,032.0	155.0	171.0	11,915.0
1977	8,525.9	993.0	1,216.0	702.0	98.3	41.1	11,576.3
1978	9,529.0	676.2	993.8	792.9	33.6	37.6	12,063.1
1979	10,586.0	761.0	626.0	921.4	51.5	682.0	13,627.9
1980	11,677.3	929.2	1,399.6	1,137.0	85.6	198.8	15,427.5
1981	12,364.8	1,273.9	1,300.7	1,189.4	80.6	8.4	16,217.8
1982	16,433.3	639.7	1,306.0	1,085.5	1.8	1.5	19,467.8
1983	14,619.2	985.5	1,243.4	1,184.5	85.3		18,117.9
1984	13,869.1	1,248.3	1,499.7	1,182.5	50.4		17,850.0
1985	11,329.9	1,136.2	1,427.2	1,369.9	43.6		15,306.8
1986	9,429.5	978.4	1,121.5	1,033.9	29.3		12,592.6
1987	9,354.6	706.9	1,277.4	1,310.3	-		12,649.2
1988	10,524.2	1,293.0	1,854.3	1,013.3	20.2		14,705.0
1989	12,837.1	1,497.5	2,240.4	1,417.3	41.2		18,033.5
1990	12,031.4	1,415.2	1,956.1	1,560.4	43.6		17,006.7
1991	9,913.9	1,096.2	1,632.5	1,321.6	40.5		14,004.7
1992	9,007.0	902.8	1,294.1	806.1	34.6		12,044.6
1993	11,281.5	654.8	1,177.5	1,009.2	30.0		14,153.0
1994	13,459.1	1,450.5	2,521.2	1,752.4	37.5		19,220.7
1995	13,540.0	1,662.3	2,400.4	2,107.6	52.8		19,763.1
1996	13,669.4	1,740.2	2,800.8	1,955.1	69.9		20,235.4
1997	9,779.1	964.5	2,067.3	1,207.1	41.3		14,059.3
1998	10,116.6	1,199.8	2,231.5	1,516.9	30.7		15,095.5
1999e	12,610.0	2,190.0	3,475.0	3,750.0	30.0		22,055.0