

March 2011

U.S. COINS

Replacing the \$1 Note with a \$1 Coin Would Provide a Financial Benefit to the Government



G A O

Accountability * Integrity * Reliability

Why GAO Did This Study

Since coins are more durable than notes and do not need replacement as often, many nations have replaced lower-denomination notes with coins to obtain a financial benefit. GAO has estimated the annual net benefit to the U.S. government of replacing the \$1 note with a \$1 coin four times over the past 20 years, most recently in April 2000. Asked to update its estimate, GAO (1) estimated the net benefit to the government of replacing the \$1 note with a \$1 coin and (2) examined other effects stakeholders suggested such a replacement could have. To perform its work, GAO constructed an economic model and interviewed officials from the Federal Reserve, the Treasury Department, the U.S. Secret Service, outside experts, and officials from Canada and the United Kingdom. To determine the effects on stakeholders, GAO interviewed officials from industries and organizations that might be affected by changes to currency.

What GAO Recommends

As in the past, GAO's analysis indicates that replacing the \$1 note with a \$1 coin would provide a financial benefit to the government if production of the \$1 note ceased. GAO previously recommended replacement of the \$1 note and continues to support this recommendation. The Federal Reserve and Treasury reviewed a draft of this report and both noted the importance of societal effects in deciding on such a replacement and offered technical comments.

View [GAO-11-281](#) or key components. For more information, contact David Wise at (202) 512-2834 or wised@gao.gov.

March 2011

U.S. COINS

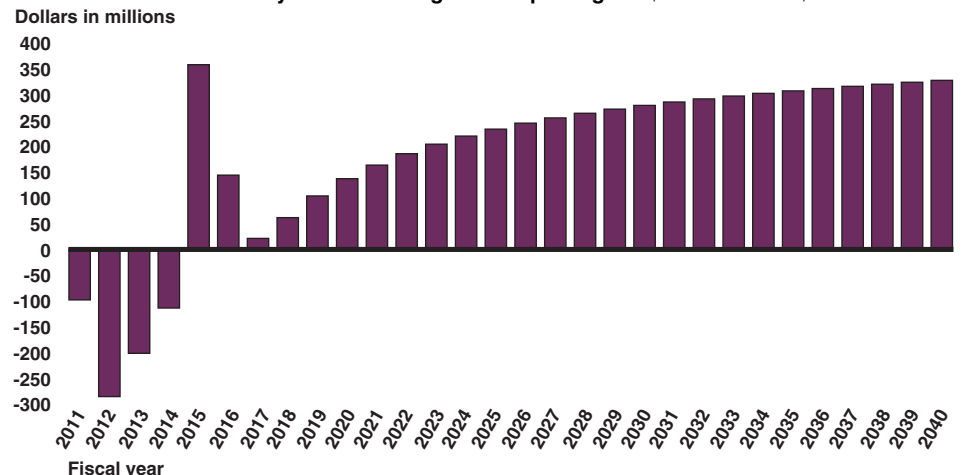
Replacing the \$1 Note with a \$1 Coin Would Provide a Financial Benefit to the Government

What GAO Found

According to GAO's analysis, replacing the \$1 note with a \$1 coin could save the government approximately \$5.5 billion over 30 years. This would amount to an average yearly discounted net benefit—that is, the present value of future net benefits—of about \$184 million. However, GAO's analysis, which assumes a 4-year transition period beginning in 2011, indicates that the benefit would vary over the 30 years. As shown in the figure below, the government would incur a net loss in the first 4 years and then realize a net benefit in the remaining years. The early net loss is due in part to the up-front costs to the U.S. Mint of increasing its coin production during the transition. GAO's current estimate is lower than its 2000 estimate, which indicated an annual net benefit to the government of \$522 million. This is because some information has changed over time and GAO incorporated some different assumptions in its economic model. For example, the lifespan of the note has increased over the past decade, and GAO assumed a lower ratio of coins to notes needed for replacement. GAO has noted in past reports that efforts to increase the circulation and public acceptance of the \$1 coin have not succeeded, in part, because the \$1 note has remained in circulation. Other countries that have replaced a low-denomination note with a coin, such as Canada and the United Kingdom, stopped producing the note. Officials from both countries told GAO that this step was essential to the success of their transition and that, with no alternative to the note, public resistance dissipated within a few years.

Stakeholders representing a variety of cash-intensive entities in the private sector identified potential shorter- and longer-term effects of a replacement. For example, some stakeholders said that they would initially incur costs to modify equipment and add storage and that later their costs to process and transport coins would go up. Others, however, such as some transit agencies, have already made the transition and would not incur such initial costs.

Discounted Net Benefits by Year Resulting from Replacing the \$1 Note with a \$1 Coin



Source: GAO analysis.

Contents

Letter		1
	Background	2
	Replacing the \$1 Note with a \$1 Coin Could Save the Government	
	Approximately \$5.5 Billion in Interest Expense over 30 Years	9
	Stakeholders Identified Near- and Long-Term Challenges to the	
	Private Sector Should the \$1 Coin Replace the Note	19
	Concluding Observation	20
	Agency Comments and Our Evaluation	21

Appendix I	Objectives, Scope, and Methodology	23
-------------------	---	-----------

Appendix II	Design of GAO’s Economic Model and Detailed Results for the Base Case and Alternative Assumptions	26
--------------------	--	-----------

Appendix III	Comments from the Board of Governors of the Federal Reserve System	33
---------------------	---	-----------

Appendix IV	Comments from the Department of the Treasury	34
--------------------	---	-----------

Appendix V	GAO Contact and Staff Acknowledgments	35
-------------------	--	-----------

Related GAO Products		36
-----------------------------	--	-----------

Tables		
	Table 1: Number of \$1 Coins Produced, 1979-2009	5
	Table 2: Selected Countries That Replaced Notes with Coins	7
	Table 3: Assumptions, Values, Sources, and Rationales Used in the Model	29
	Table 4: Comparison of Benefit Estimates under Base Case and Alternative Assumptions	32

Figures

Figure 1: Production and Circulation of Notes and Coins	4
Figure 2: Number of \$1 Coins Shipped from the Mint to Federal Reserve Banks, Fiscal Years 2000 through 2009	6
Figure 3: Discounted Net Benefit to the Government of Replacing \$1 Notes with \$1 Coins over 30 Years, by Year	10
Figure 4: Use of \$1 Coins in National and Target Markets before and after \$1 Coin Pilot Program	18

Abbreviations

BEP	Bureau of Engraving and Printing
CBO	Congressional Budget Office
Mint	United States Mint
Treasury	Department of the Treasury
UK	United Kingdom

This is a work of the U.S. government and is not subject to copyright protection in the United States. The published product may be reproduced and distributed in its entirety without further permission from GAO. However, because this work may contain copyrighted images or other material, permission from the copyright holder may be necessary if you wish to reproduce this material separately.



United States Government Accountability Office
Washington, DC 20548

March 4, 2011

The Honorable Richard C. Shelby
Ranking Member
Committee on Banking, Housing
and Urban Affairs
United States Senate

The Honorable Robert P. Casey
United States Senate

The Honorable Tom Harkin
United States Senate

Over the past 40 years, many countries have replaced lower-denomination notes with coins as a means of providing a financial benefit to their governments. We have reported four times over the past 20 years that replacing the \$1 note with a \$1 coin would provide a net benefit to the government of hundreds of millions of dollars annually.¹ Most recently, in 2000, we estimated a net benefit to the government of about \$522 million annually.² Because this last estimate was a decade old, you asked us to update it and describe some potential effects of replacing the \$1 note with a \$1 coin. To accomplish these objectives, we addressed the following questions: (1) What is the estimated net benefit, if any, to the government of replacing the \$1 note with a \$1 coin? (2) What other effects did stakeholders suggest such a replacement could have?

To estimate the net benefit to the government of replacing the \$1 note with a \$1 coin, we constructed an economic model with data from the Board of Governors of the Federal Reserve System (Federal Reserve), the Bureau of Engraving and Printing (BEP), and the United States Mint (Mint). We analyzed past GAO and Federal Reserve reports that previously estimated the net benefit to the government of such a replacement. We interviewed

¹GAO, *National Coinage Proposals: Limited Public Demand for New Dollar Coin or Elimination of Pennies*, [GAO/GGD-90-88](#) (Washington, D.C.: May 23, 1990); *1-Dollar Coin: Reintroduction Could Save Millions If Properly Managed*, [GAO/GGD-93-56](#) (Washington, D.C.: Mar. 11, 1993); *Dollar Coin Could Save Millions*, [GAO/T-GGD-95-203](#) (Washington, D.C.: July 13, 1995); and *Financial Impact of Issuing the New \$1 Coin*, [GAO/GGD-00-111R](#) (Washington, D.C.: Apr. 7, 2000).

²[GAO/GGD-00-111R](#).

officials from two bureaus of the Department of the Treasury (Treasury)—BEP and the Mint—the Federal Reserve, and the Department of Homeland Security’s U.S. Secret Service to develop the structure, inputs, and assumptions for the model. In addition, we interviewed government officials in Canada and the United Kingdom (UK) to obtain information about their experiences replacing notes with coins and used this information to develop some of the model assumptions. To determine the effects such a replacement could have, we identified industries and organizations that might be affected by changes to currency. We interviewed private entities involved in the production of materials for and processing of notes and coins; 15 associations and companies that represent five major industries that often deal in cash—banking and financial institutions; grocery and convenience stores; and vending, transit, and retail businesses. We conducted this performance audit from June 2010 to March 2011 in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives. Appendix I contains more detailed information on our scope and methodology.

Background

To promote efficient commercial exchange and economic growth, national governments and central banks issue money, including paper notes and coins in various denominations. The federal government experiences a financial gain when it issues notes or coins because both forms of currency usually cost less to produce than their face values. As long as there is a public demand, when the government puts coins into circulation, it creates a value known as “seigniorage.” Seigniorage is traditionally defined as the difference between the face value of coins and their cost of production. In addition, the face value of notes issued, net of their production costs, creates an analogous net value for the federal government. In this report, we use the term “seigniorage” to refer to the value created from the issuance of both coins and notes. Seigniorage reduces the government’s need to raise other revenues, thus reducing the amount of money that the government needs to borrow.³ When the government has to borrow less, it pays less in interest over time. Although

³We are assuming a status quo tax structure.

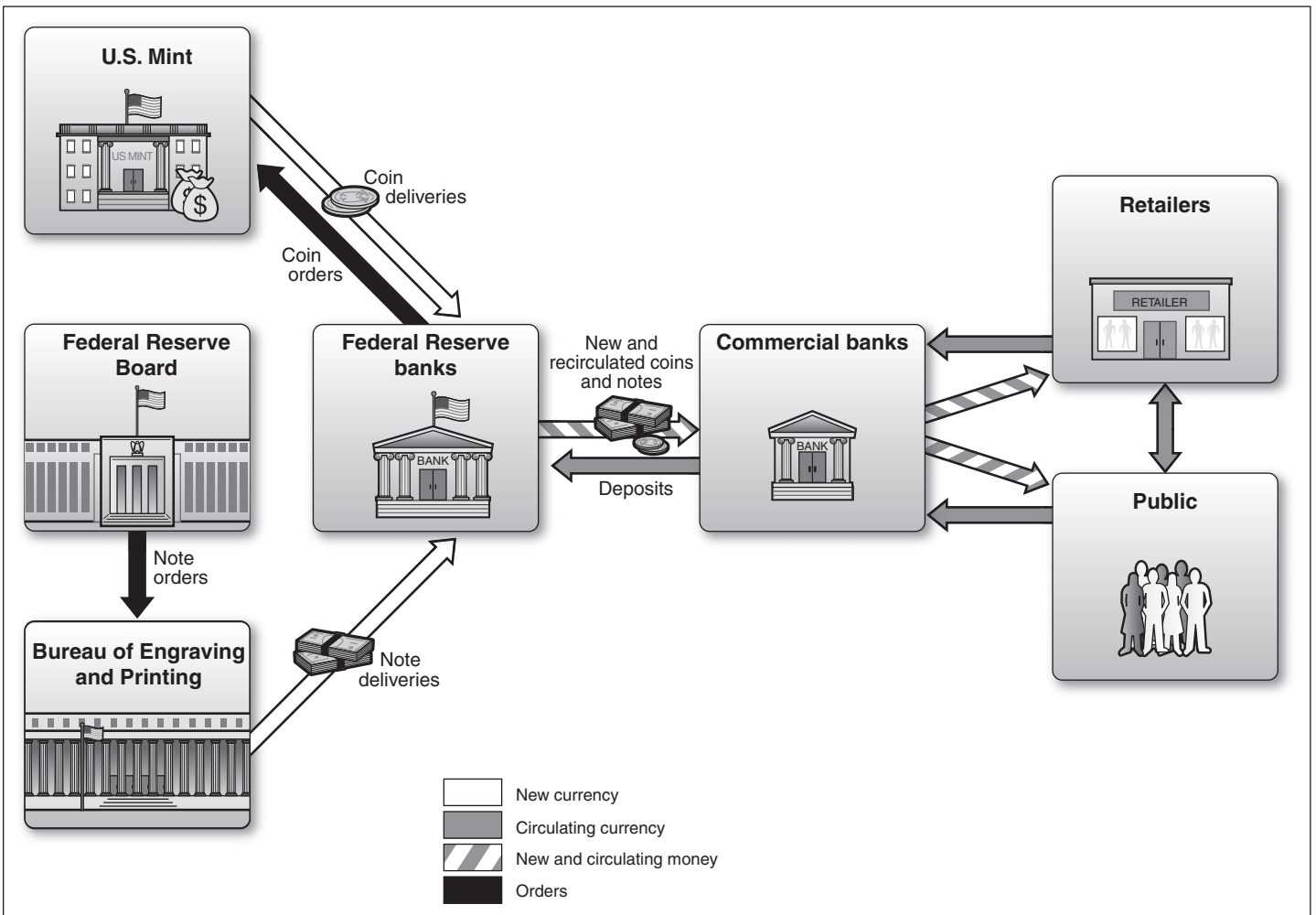
the interest avoided is a benefit to the government, the public effectively finances this benefit by choosing to hold more cash on which it does not earn interest.

Two Treasury bureaus, BEP and the Mint, produce notes and coins, respectively, and the Federal Reserve places them in circulation through banks in response to public demand. Under current law, the Federal Reserve determines the amount of \$1 notes necessary for commerce.⁴ For the circulation of \$1 coins, the Secretary of the Treasury decides what is necessary to meet the needs of the United States.⁵ In practice, according to officials from the Mint and the Federal Reserve, the Federal Reserve makes this determination by producing a short-term forecast of demand for notes and coins. Based on this forecast, the Federal Reserve orders notes from BEP and the 12 regional Federal Reserve banks order coins from the Mint. The Federal Reserve circulates the notes through the Federal Reserve banks and the Mint distributes coins directly to those banks. The Federal Reserve banks distribute notes and coins to commercial banks to meet the demand of retailers and the public. When notes and coins are returned by commercial banks as deposits to the Federal Reserve banks, each note is processed to determine its quality and authenticity. During processing, worn and counterfeit notes are removed from circulation and the rest are wrapped for storage or re-circulation. While the Federal Reserve re-circulates coins received from banks, it does not have a comparable program to test the authenticity or fitness of coins. The Federal Reserve contracts with private entities such as armored carriers to count, sort, and transport notes and coins for circulation or storage. Figure 1 shows the production and circulation of notes and coins.

⁴12 U.S.C. §418.

⁵31 U.S.C. §5111(a)(1).

Figure 1: Production and Circulation of Notes and Coins



Source: GAO.

Currently, there are five different \$1 coin designs in circulation—the Eisenhower coin, the Susan B. Anthony coin, the Sacagawea coin, the

Presidential \$1 coin series, and the Native American \$1 coin series.⁶ Table 1 shows production figures for the four \$1 coin designs produced since 1979.

Table 1: Number of \$1 Coins Produced, 1979-2009

Coin design	Number produced as of November 2009	Production years
Susan B. Anthony	932 million	1979-1982 and 1999-2000
Sacagawea	1,467 million	2000-2008
Presidential series	1,722 million	2007-ongoing
Native American series	92 million	2009-ongoing
Total	4,213 million	

Source: Mint.

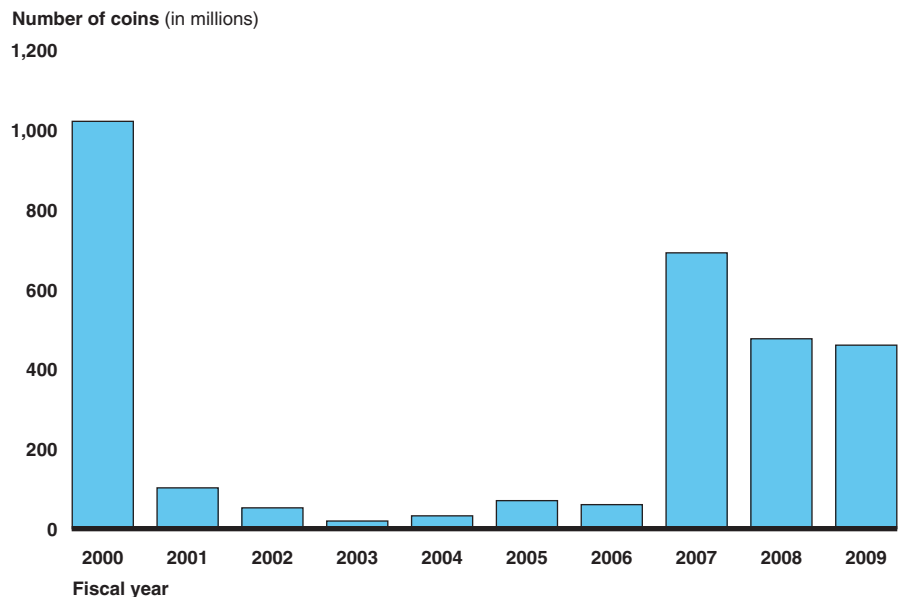
Note: The Eisenhower \$1 coin was minted from 1971-1978; production figures are not readily available.

The four recent \$1 coin designs are the same size and weight and have the same electromagnetic properties. The Susan B. Anthony \$1 coin is silver in color, while the Sacagawea, Presidential, and Native American \$1 coins are golden in color. The golden color was introduced in 2000 so that the public could better distinguish the \$1 coins from the quarter, which the Susan B. Anthony \$1 coin resembles and with which it is often confused.

The number of \$1 coins shipped from the Mint to Federal Reserve banks peaked at over 1 billion in 2000, when the Sacagawea coin was first minted, and immediately declined to about 100 million coins in 2001. The number of \$1 coins shipped averaged less than 50 million annually from 2002 through 2006, until the Presidential coin series was initiated in 2007. (See fig. 2.) About 1.1 billion \$1 coins are held in storage by the Federal Reserve banks because, according to senior Federal Reserve officials, of the limited public demand.

⁶In 2007, the Mint, upon direction by Congress, began issuing four \$1 coins per year featuring images of past Presidents in the order they served. In 2009, the Mint, upon direction by Congress, began issuing \$1 coins featuring designs celebrating the important contributions made by Indian tribes and individual Native Americans to the history and development of the United States. For both the Presidential series and the Native American series, the design on the back of the coins rotates, while the obverse (heads side) continues to feature either a president or Sacagawea, respectively.

Figure 2: Number of \$1 Coins Shipped from the Mint to Federal Reserve Banks, Fiscal Years 2000 through 2009



Source: GAO analysis of Mint data.

In recent years, Congress sought to increase the circulation of the \$1 coin, but circulation has remained limited. To remove barriers to circulation, the Presidential \$1 Coin Act of 2005, among other things (1) mandated the use of \$1 coins by federal agencies, the United States Postal Service, all transit agencies receiving federal funds, and all entities operating businesses, including vending machines, on U.S. government premises; (2) required the Mint to promote \$1 coins to the public; and (3) required the Secretary of the Treasury, in consultation with the Federal Reserve, to review the co-circulation of the different \$1 coin designs and make recommendations to Congress on improving the circulation of \$1 coins.⁷ Even with efforts taken to implement the legislation, the Federal Reserve banks had an inventory of about 1.1 billion \$1 coins as of December 2010, which is sufficient inventory to cover the current level of public demand for the coin for over 13 years.

Other countries have introduced coins of similar value into circulation by replacing the corresponding notes, eventually leaving the public with no

⁷31 U.S.C. §5112(p).

alternative to the coin of that value. Among the rationales for replacing notes with coins cited by foreign government officials and experts are the cost savings to governments derived from lower production costs and the decline over time of the purchasing power of currency due to inflation.⁸ In 1985, for example, the Canadian House of Commons estimated that the conversion to a \$1 coin would save the government \$175 million (Canadian) in total over 20 years because it would no longer have to regularly replace worn out \$1 notes. Canadian officials later determined that the Canadian government saved \$450 million (Canadian) between 1987 and 1991.

Over the last 47 years, Australia, Canada, France, Japan, the Netherlands, New Zealand, Norway, Russia, Spain, and the UK, among others, have replaced lower-denomination notes with coins. Most of these replacements occurred in the 1980s. (Table 2 indicates when selected countries replaced notes with coins.)

Table 2: Selected Countries That Replaced Notes with Coins

Country	Note replaced	Year of replacement	U.S. value as of December 31, 2010
Australia	1 dollar	1984	\$1.04
	2 dollar	1988	2.08
Canada	1 dollar	1987	1.02
	2 dollar	1996	2.04
France	5 franc	1970	NA ^a
	10 franc	1975	NA ^a
Japan	500 yen	1982	5.96
Netherlands	5 guilder	1988	NA ^a
New Zealand	1 dollar	1990	1.34
	2 dollar	1990	2.68
Norway	5 krone	1964	0.81
	10 krone	1984	1.61
Russia	10 ruble	2009	0.32

⁸For example, the U.S. dollar now has the purchasing power that a quarter had in 1975.

Country	Note replaced	Year of replacement	U.S. value as of December 31, 2010
Spain	100 peseta	1982	NA ^a
	200 peseta	1986	NA ^a
	500 peseta	1988	NA ^a
UK	1 pound	1983	1.56

Sources: [GAO/GGD-93-56](#); Bank of Canada, Japan Mint, Bank of Russia, and U.S. Department of the Treasury.

^aBecause some countries have replaced their national currency with the euro, the U.S. dollar value of currencies used prior to the euro can not be determined.

In past work we reported that the annual net benefit to the government of replacing the \$1 note with a \$1 coin would be about \$318 million (1990), \$395 million (1993), \$456 million (1995), and \$522 million (2000).⁹ Based on the experiences of other countries and the potential financial net benefit to the government, we have twice recommended that Congress provide for the elimination of the \$1 note to ensure the success of \$1 coin initiatives.¹⁰

⁹ [GAO/GGD-90-88](#), [GAO/GGD-93-56](#), [GAO/T-GGD-95-203](#), and [GAO/GGD-00-111R](#).

¹⁰ [GAO/GGD-90-88](#) and [GAO/GGD-93-56](#).

Replacing the \$1 Note with a \$1 Coin Could Save the Government Approximately \$5.5 Billion in Interest Expense over 30 Years

Replacing \$1 Notes with \$1 Coins Would Increase the Net Benefit to the Government over 30 Years

We estimate that replacing the \$1 note with a \$1 coin would provide a net benefit to the government of approximately \$5.5 billion over 30 years, amounting to an average yearly discounted net benefit¹¹ of about \$184 million. However, this benefit would not be achieved evenly over the 30 years. In fact, as shown in figure 3, the federal government would incur a net loss during the first 4 years. Yearly net benefits begin to accrue in the fifth year of our analysis, and in the tenth year (2020), the initial start-up costs are paid back and overall net benefits begin to accrue. The early net loss represents the up-front cost of producing a large number of coins during the transition from notes to coins, together with the limited interest expense the government would avoid in the first few years after replacement began. While the estimated benefits in earlier GAO analyses were due to both seigniorage and reduced costs of coins (as compared to notes) over 30 years, our current net benefit estimate is solely due to seigniorage. In fact, the cost of producing coins for a full replacement is never fully recovered during the 30-year analysis, likely due to the longer note life and relatively higher cost of coin production today than was the case when our earlier studies were conducted. Moreover, our estimate, like all estimates, is uncertain, particularly in the later years, and thus the benefits could be greater or smaller than estimated. As a result, we have considered several alternative scenarios that are discussed later in this report and in appendix II.

¹¹A discounted net value uses a rate, known as the discount rate, to convert the value of payments or receipts expected in future years to today's value, taking into account that the further into the future an amount is paid or received, the smaller its value is today. Applying a discount rate establishes a consistent basis for comparing alternative investments that will have differing patterns of costs and benefits over many years.

Figure 3: Discounted Net Benefit to the Government of Replacing \$1 Notes with \$1 Coins over 30 Years, by Year



Source: GAO analysis.

Note: The large net benefits in 2015 and 2016 occur because we assume that the Mint's production at maximum capacity during the 4-year transition period will lead to some overproduction and production drops dramatically in 2015 and 2016. Due to the far lower coin production costs, the net benefits to the government will temporarily spike in those years.

To arrive at our estimate, we developed a model to examine the effects of replacing the \$1 note with a \$1 coin. We assumed that the replacement would be implemented starting in 2011, and during that year the Mint would invest in new equipment to increase its production capability for \$1 coins. We also assumed that it would take 4 years for the Mint to produce enough coins to replace the currently outstanding dollar notes, and that during the transition, production of the paper note would stop. Our model assumptions cover a range of factors including the replacement ratio of coins to notes, the expected rate of growth in the demand for currency over 30 years, the costs of producing and processing both coins and notes, and the differential life span of coins and notes.¹² The cessation of production of \$1 notes in our analysis might suggest a possible shortage of

¹²We recognize that societal costs—such as the costs to banks, retailers, and other extensive users of cash—exist in addition to the cost to government, but we could not quantify them adequately to add to our analysis.

dollar currency during the transition. However, because of the existing \$1 coins that the Federal Reserve banks hold and the rapid ramp up of production during the first 2 years of the transition, the outstanding dollar currency—both notes and coins—during the years of the transition equals or exceeds the demand we estimate for each of those years.

The assumption that contributed the most to the net benefit we estimated was the replacement ratio of coins to notes. Following the example of other countries that have replaced a note with a coin of equal value, we assumed that, because of differences in how people use these two forms of money, the public would need more than one coin for each note that had been in circulation. It is common for people to take coins out of their pockets and store them at the end of each day rather than retain them in their wallets as they do notes, for use the next day. These factors cause coins to circulate with less frequency than notes. Thus, for any given denomination of currency, a larger number of coins would need to be maintained in circulation to meet the public's demand for cash than would be needed if that denomination were provided in notes.

We previously reported that when Canada replaced its \$1 note and the UK replaced its £1 note with a coin, both countries used a 1.6-to-1 replacement ratio. However, in both cases, once the transition was complete, coin production was very low or even nil in some years. Therefore, we determined that a 1.5-to-1 replacement rate would be appropriate for our analysis—low enough to avoid an excess of \$1 coins without creating an undue risk of producing too few. Our analysis thus assumes that the number of \$1 coins issued is 50 percent greater than the number of \$1 notes that were in circulation. This assumption of increased production results in substantially increased seigniorage and accounts for our estimate of a net benefit to the government over the 30-year period of the analysis.

Our Current Estimate of the Yearly Net Benefit of Replacing the \$1 Note with a \$1 Coin Is Lower than Previous Estimates for a Variety of Reasons

In 2000, we estimated that the yearly net benefit to the government of replacing the \$1 note with a \$1 coin would be roughly \$522 million per year, after the replacement was complete. Our current estimate of an average yearly discounted net benefit to the government of about \$184 million is lower than our previous estimate because of differences in the structure of our analysis and in our assumptions about the replacement ratio of coins to notes and the lifespan of the note.¹³

Structure of the analysis. Our 2000 analysis estimated an annual level of net benefit to the government assuming that the transition to coins had already been completed. Hence, that analysis did not fully address the initial production costs of replacing all outstanding notes with coins. For the current analysis, we determined that the Mint would need to make various investments to produce substantially more new coins in relatively few years. We therefore assumed that the minting and distribution of new coins would substantially increase during a 4-year transition period and the production of \$1 notes would cease. We included these increased coin production costs in the 30-year analysis.¹⁴

Lower replacement ratio. For our 2000 model, we assumed that, to meet society's needs, two \$1 coins would be needed to replace each \$1 note that had been in circulation. We arrived at that 2-to-1 replacement ratio based on the experience of other countries that had replaced their lowest-denomination note with a coin of the same denomination. Some of these countries used replacement ratios as high as 4 to 1. As we noted above, however, based on the experience of Canada and the UK, in our current model we used a replacement ratio of 1.5 to 1 because a higher ratio did not appear to be needed. Because a lower replacement ratio entails a reduced level of seigniorage, the net benefit to the government of switching to a \$1 coin is lower in our current analysis than in our 2000 analysis. To examine the extent to which this assumption lowered our estimate, we ran our current model using the same 2-to-1 replacement ratio that we used in 2000 but maintained all other elements of our current

¹³Our 2000 estimate is in 2000 dollars, while our current estimate is in 2011 dollars. The gross domestic product price index rose by 25 percent between 2000 and 2010, which means that the value of the difference between the two estimates is higher than the nominal difference between these numbers, since the 2000 value, if inflated to 2011 dollars, would be 25 percent higher.

¹⁴Our 1990 analysis more closely resembled the current analysis in that it more fully included start-up costs in a 30-year analysis. That study estimated an average annual discounted net benefit to the government of \$318 million (in 1990 dollars) over 30 years.

model unchanged. This higher replacement ratio had the most impact on the estimated net benefit of the various sensitivity analyses we conducted. The average yearly discounted net benefit to the government would have been about \$297 million, and the total net benefit over 30 years would have been about \$8.9 billion if this higher replacement ratio had been used.

The expanded lifespan of the note. Ten years ago, a \$1 note lasted about 1.5 years on average. Because of improvements in the processing of paper notes, the life of the \$1 note has grown considerably—to as high as 40 months on average, according to a BEP analysis.¹⁵ This longer note life reduces the differential between the lives of the note and the coin, which is expected to have an average life of at least 30 years, according to senior Federal Reserve officials. To ascertain the extent to which the current longer life of a paper note led to a lower estimated net benefit to the government in our current analysis, we ran our model using the same 1.5-year average note life we used in the 2000 model, but retained all other elements of our current model. We found that if we had used the shorter note life in our current analysis, we would have estimated that the discounted net benefit to the government of a replacement would have been about \$7.7 billion over the entire 30 years and the average yearly discounted net benefit would have been just over \$256 million.

Our Current Estimate Would Vary with Changes in Other Assumptions

Besides analyzing how differences in assumptions from our 2000 report affected our current estimate (our base case analysis) we analyzed alternative scenarios using the same model as we did for our base case analysis but altered certain assumptions. We compared our base case analysis to two alternative scenarios that relate to possible changes in how society uses money. In the first case, we assumed that the growing use of electronic payment mechanisms would erode society's use of cash over the period of our analysis. In the second case, we assumed that, rather than transferring all demand for the \$1 note to the \$1 coin, the public would prefer, and therefore demand, increased circulation of the \$2 note as production of the \$1 note ceased.

Reduced growth in demand for cash. In our base case, we assumed that the demand for cash would continue to grow with the growth in economic

¹⁵Treasury and Federal Reserve officials said that additional improvements in the processing of \$1 notes in spring 2011 are expected to further increase the lifespan of the \$1 note.

activity, as it has over many years. Even in the last several years, as the use of electronic means of payment has grown substantially, according to the Federal Reserve,¹⁶ the demand for cash has continued to grow with the gross domestic product. However, further changes in the way Americans pay for goods at retail could lead to greater reliance on electronic payment methods. For example, some U.S. companies are planning to develop ways to make payments with a cell phone, a method that is already in use in some countries. If Americans come to rely more heavily on electronic payments, the demand for cash could grow more slowly in the future than we assume in our base case. For example, one possibility is that if the government replaces the \$1 note with a \$1 coin, electronic payments may increase as the public chooses to avoid the \$1 coin. In this scenario, we assumed that the public would respond to the replacement of \$1 notes with \$1 coins by increasing its use of electronic payments, thereby reducing its demand for \$1 currency by 20 percent.¹⁷ In this scenario, we found that the net benefit to the government would be nearly \$4.5 billion over 30 years and the average annual discounted net benefit would be nearly \$149 million.

Replacement-induced demand for the \$2 note. If the \$1 coin replaced the \$1 note, the use of the \$2 note could increase because people and businesses might limit how many coins they kept in their pockets and cash trays, and using the \$2 note would help them do this. In Canada, demand for the \$2 bill did increase when the \$1 note was replaced with the \$1 coin. However, Canada already had a readily circulating \$2 note at the time, whereas the United States does not; therefore, we did not assume an increase in demand for the \$2 note in our base case. In an alternative scenario, we assumed that 25 percent of the demand for cash that had been met with \$1 notes would transfer to \$2 notes and the remainder to \$1 coins. Thus, the government would increase its production of \$2 notes accordingly.¹⁸ This scenario reduced the net benefit of the replacement

¹⁶According to the Federal Reserve, the number of electronic payments increased from 2006 through 2009, with debit card usage growing at double-digit annual rates. While the study did not measure cash usage, it concluded that it is likely that some of the debit card growth has come from its substitution for cash payments. *The 2010 Federal Reserve Payments Study, Noncash Payment Trends in the United States: 2006-2009*, sponsored by the Federal Reserve System (Dec. 8, 2010).

¹⁷The Federal Reserve did not provide us with a projection of a change in the demand for cash based on electronic payments and we did not have any evidence to suggest how much demand might transfer to electronic use, but a 20 percent transfer to electronic use would appear to be a reasonably substantial change in the public's use of money.

¹⁸This is the same assumption made in our 1990 report.

because fewer new coins were produced and less seigniorage was generated. We found that the discounted net benefit to the government of replacement in this scenario would be slightly lower than our base case—about \$5 billion over 30 years, for an average annual discounted net benefit of about \$168 million.

The Model’s Method of Estimating Net Benefit Differs from the Congressional Budget Office’s Method of Estimating How a Replacement Would Affect the Federal Budget

Our estimate of the discounted net benefit to the government of replacing the \$1 note with a \$1 coin differs from the method that the Congressional Budget Office (CBO) would use to calculate the impact on the budget of the same replacement. In the mid-1990s, CBO made such an estimate and noted that its findings for government savings were lower than our estimates at that time because of key differences in the two analyses. Most important, budget scorekeeping conventions do not factor in gains in seigniorage in calculating budget deficits.¹⁹ Thus, the interest expense avoided in future years by reducing borrowing needs, which accounts for our estimate of net benefit to the government, would not be part of a CBO budget scoring analysis. Additionally, CBO’s time horizon for analyzing the budget impact is up to 10 years—a much shorter time horizon than we use in our current analysis.

Replacement Could Increase Coin Counterfeiting Risk and Raise the Government’s Deterrence Costs If Countermeasures Are Considered Necessary

Replacing the \$1 note with a \$1 coin could increase the risk of counterfeiting of the coin, which could increase the government’s costs to deter counterfeiting if the risk were deemed large enough to warrant countermeasures. We did not include such costs in our estimate because counterfeiting of U.S. coins is currently minimal, both domestically and internationally, according to the U.S. Secret Service.²⁰ Moreover, counterfeit \$1 notes accounted for less than 1 percent of all counterfeit U.S. notes detected in fiscal year 2009 (about 24,000 out of about 3 million). Nevertheless, senior officials at the Federal Reserve and Mint told

¹⁹Budget scorekeeping is the process of estimating the budgetary effects of pending and enacted legislation and comparing them with limits set in the budget resolution or legislation. A budget resolution sets forth an overall budget plan for Congress against which individual appropriations bills, other appropriations, and revenue measures are to be evaluated. Scorekeeping tracks data such as budget authority, receipts, outlays, the surplus or deficit, and the public debt limit.

²⁰ Among other things, the U.S. Secret Service is responsible for safeguarding the nation’s financial infrastructure and payment systems to preserve the integrity of U.S. currency. This includes reducing the amount of counterfeit currency in circulation domestically and abroad.

us the increased circulation of \$1 coins could increase the risk of counterfeiting, and senior Secret Service officials told us that counterfeiting of coins is an ongoing problem in the UK. A report by the UK's Royal Mint indicated a counterfeit rate of about 3 percent for £1 coins.²¹

In Canada, however, counterfeiting is minimal. Canadian officials told us that the total face value of the counterfeit Canadian \$1 and \$2 coins detected since the coins were introduced in 1987 and 1996, respectively, is about \$10,000 (Canadian). Whether replacing the \$1 note with a \$1 coin in the United States would increase the risk of counterfeiting, as it apparently did in the UK, or whether it would remain low, as it has done in Canada, is unknown.

Both Canada and the UK created validation programs to maintain the integrity and quality of circulating coins after introducing the \$1 coin and £1 coins, respectively. In both countries, when coins are returned from circulation as bank deposits, they are tested for authenticity, and heavily worn, bent, or otherwise unfit coins are identified and removed from circulation. Canada created its validation program when it introduced its \$1 coin, while the UK created its program in response to a sharp increase in the counterfeiting of £1 coins. According to Canadian officials, the validation program was introduced to enable better management of Canada's coin inventories. The program provides information on the number of coins in circulation and allows for removing unfit coins from circulation, as well as for detecting counterfeit coins. The Federal Reserve banks circulate coins they receive from commercial banks, but do not have a comparable validation program. Coin processing companies run the coins through counting machines that, according to a processing company we interviewed, verify the denomination and genuineness of each coin. This process removes coins that the machines detect as unfit but does not represent a systematic application of criteria and standards of operation such as could be applied through a validation program managed by the Federal Reserve.

²¹The Royal Mint, *Royal Mint Trading Fund Group Annual Report 2009-10* (London, UK: July 26, 2010).

Public Acceptance of the \$1 Coin Requires Production of the \$1 Note to Cease

Our estimate of the net benefit to the government of replacing the \$1 note with a \$1 coin assumes that the \$1 coin would be widely accepted and used by the public. In past work, we reported that the coin was not widely accepted and used. In 2002, we conducted a nationwide public opinion survey and found that the public was not using the \$1 coin because people were familiar with the \$1 note, the \$1 coin was not widely available, and people did not want to carry around more coins.²² In addition, 64 percent of the respondents to that survey were opposed to eliminating the \$1 note. However, when respondents were told that such a replacement would save the government about half a billion dollars a year (our 2000 estimate), the proportion who said they opposed elimination of the note dropped to 37 percent. Two more recent national survey results suggest that opposition to eliminating the \$1 note persists. For example, according to a Gallup poll conducted in 2006, 79 percent of respondents were opposed to replacing \$1 notes with \$1 coins, and their opposition decreased only slightly, to 64 percent, when they were asked to assume that a replacement would result in half a billion dollars in government savings each year.²³

Efforts by the Mint to increase public acceptance and use of the \$1 coin as it co-circulates with the \$1 note have shown moderate success. To increase public acceptance and circulation of the \$1 coin, the Presidential \$1 Coin Act of 2005 requires the Mint to promote \$1 coins to the public.²⁴ In response to the legislation, in 2008, the Mint conducted a pilot program in Austin, Texas; Portland, Oregon; Grand Rapids, Michigan; and Charlotte, North Carolina, to increase public acceptance of the \$1 coin. Enlisting the support of national and local retailers, the Mint carried out advertising and public relations campaigns in which it promoted the \$1 coin as recyclable, lasting for decades, and saving the nation money. As figure 4 shows, data collected as part of the pilot program show modest increases in the public's use of \$1 coins in three of the four target markets as measured in public opinion surveys. Pilot program data also show that

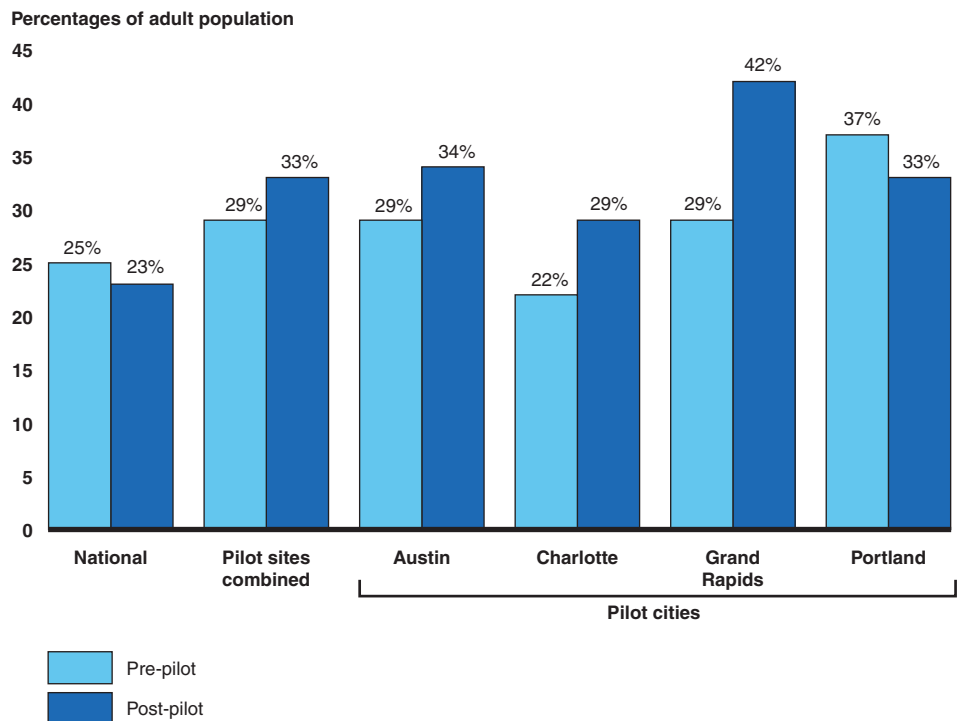
²²GAO, *U.S. Coins: Public Views on Changing Coin Design*, [GAO-03-206](#) (Washington, D.C.: Dec. 17, 2002).

²³Gallup News Service, *Americans Support Dollar Coins Featuring Past Presidents* (Princeton, New Jersey: Nov. 21, 2006). For the survey results reported by Gallup, one can say with 95 percent confidence that the maximum margins of sampling error are +/- 5 percentage points. In addition to sampling error, question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of public opinion polls. We could not evaluate the accuracy of these poll results based on the information available to us.

²⁴Pub. L. No. 109-145, §104, 119 Stat. 2670 (2005).

nationwide usage of the \$1 coin declined during the period that the pilot study was conducted.

Figure 4: Use of \$1 Coins in National and Target Markets before and after \$1 Coin Pilot Program



Source: Mint.

In past reports, we have noted that Congress and the executive branch would have to lead rather than follow public opinion for a transition from the \$1 note to the \$1 coin to succeed.²⁵ Furthermore, we have noted in those reports that past \$1 coin initiatives—such as changes to the color of the \$1 coin and new coin designs—have not led to widespread public acceptance and use, in part because the \$1 note was not simultaneously eliminated. This point was reiterated by Canadian and UK officials we spoke with, who said that the only way to transition from note to coin is to stop producing the note. While observing that the public was resistant at first, they said that, with no alternative to the note, public dissatisfaction dissipated within a few years.

²⁵ GAO/GGD-90-88, GAO/GGD-93-56, and GAO/GGD-00-111R.

Stakeholders Identified Near- and Long-Term Challenges to the Private Sector Should the \$1 Coin Replace the Note

Stakeholders representing a variety of retail and manufacturing industries and organizations that would be affected by a replacement identified two kinds of associated challenges and costs: (1) those that would result in the near term from the transition and (2) those that would result in the longer term from structural changes to the cost of doing business.²⁶ Most stakeholders we interviewed said, however, that they could not easily quantify the magnitude of these costs, and the majority noted that they would need 1 to 2 years to make the transition from \$1 notes to \$1 coins. Most stakeholders identified some likely benefits from replacing the \$1 note with a \$1 coin, including a financial benefit to the government.

According to 13 of the 15 stakeholders we spoke with, replacing the \$1 note with a \$1 coin would involve various up-front, short-term costs during the transition period. Depending on the nature of their businesses, these stakeholders identified transition costs relating to their equipment, armored transportation, vault storage, and staff training. For example, all nine of the stakeholders we interviewed involved in retail sales, banking, and currency transport and processing identified equipment-related actions they would need to take, such as

- modifying vending and self-checkout machines, cash register drawers, and night depository equipment;
- upgrading armored trucks to carry the additional weight;
- acquiring hand trucks for moving coins within a business; and
- obtaining processing equipment such as coin counting and wrapping machines.

In addition, to accommodate higher volumes of \$1 coins, five of the nine retail, banking, and armored carriers we interviewed said they would likely need to increase vault storage capacity. Some of the transitional costs and challenges may be more formidable than others. For example, increasing storage and transport capacity could entail additional investment, while modifying cash register drawers may involve primarily retooling the drawers.

²⁶BEP officials pointed out that replacing the \$1 note with a \$1 coin would also have environmental impacts relating to obtaining raw materials and carbon dioxide emissions, among others. We did not assess the potential environmental effects of a switch.

Ten of the 15 stakeholders we spoke with also identified three areas in which the replacement of \$1 notes with \$1 coins might entail longer-term or ongoing costs: transportation, processing, and labor. For example, since coins are heavier than notes, 7 of 15 stakeholders said that their costs would likely increase because of higher transportation costs incurred by armored carriers from making additional trips or using more fuel with the heavier cargo. Moreover, two stakeholders noted that making additional trips to transport coins could increase security risks for staff. In addition, replacing the \$1 note with a \$1 coin might increase the number and types of personnel needed to physically handle coins and process them. Some stakeholders anticipated that any additional costs associated with \$1 coins would be passed on to customers.

In contrast to the stakeholders who, as noted above, said that a replacement would mean higher short- and long-term costs for their businesses, two stakeholders we interviewed said that it might have only a minimal impact, particularly if the metal content of the \$1 coin remained the same. According to officials from the National Automatic Merchandising Association, an organization representing the food and refreshment vending industry, many of its members have already modified their vending machines to accept all forms of payment, including coins, notes, and electronic transactions. Further, according to an association official, increased use of the \$1 coin could be beneficial for the vending industry because it may reduce rejected sales due to old or damaged notes. He further noted that while the acceptance rate of notes has improved dramatically in vending, wider use of a \$1 coin could improve consumer satisfaction. In addition, since transit agencies that receive federal funds were required under the Presidential \$1 Coin Act of 2005 to accept and distribute \$1 coins, many of the larger transit agencies have already modified their equipment to accept these coins, according to industry officials. For example, industry officials stated that New York City's Metropolitan Transportation Authority, which operates buses, subways, commuter trains, bridges, and tunnels in New York City and the surrounding area, is the largest user of \$1 coins, with over 1,200 ticket vending machines that accept or dispense them.

Concluding Observation

As in the past, our analysis indicates that replacing the \$1 note with a \$1 coin would provide a financial benefit to the government if production of the \$1 note ceased. However, the public continues to favor the \$1 note over the \$1 coin. In Canada and the UK, the public also preferred low-denomination notes to coins, but the governments nevertheless switched from notes to coins to achieve financial benefits. While the public initially

resisted these transitions, opposition dissipated over time with no alternative to the note.

We have previously recommended to the Congress replacement of the \$1 note with a \$1 coin and, in view of the ongoing significant estimated federal financial benefit, continue to support this prior recommendation.

Agency Comments and Our Evaluation

We provided a draft of this report to the Federal Reserve, Treasury, and the Department of Homeland Security for their review and comment. The Federal Reserve and Treasury provided written comments, which are reproduced in appendix III and appendix IV, respectively, and technical comments, which we incorporated into the report as appropriate. The Department of Homeland Security had no comments. Both the Federal Reserve and Treasury maintained that an assessment of the benefits and costs to the U.S. economy—that included the net benefits to the government as we reported as well as the benefits and costs to the private sector—is important in any evaluation of whether to replace the \$1 note with a \$1 coin. We agree that the benefits and costs to the private sector are important considerations. However, we found no quantitative estimates that could be evaluated or modeled. As a result, we addressed the potential effect on the private sector through interviews with industries and organizations that might be affected by changes to currency. We obtained their views on the benefits and costs that might result from the replacement.

In addition, the Federal Reserve commented that if seignorage is not considered, the replacement of the \$1 note with a \$1 coin would result in a net *cost* to the government over 30 years, rather than a net benefit, as we reported. We agree with this statement—and point out in the report that the entire benefit of replacing the \$1 note with a \$1 coin would result from the seignorage. However, we believe that seignorage cannot be set aside since it is a result of issuing currency. The Federal Reserve also noted that the discounted net cost or benefit resulting from such a replacement would be influenced by assumptions about the length and cost of the initial transition and suggested that the report include sensitivity analyses that varied these assumptions. We included analyses that varied a number of assumptions and showed how our estimate would change. We did not include analyses that varied the length and cost of the transition because, at our request, the Mint provided us several scenarios of varying transition time periods and associated costs, which we assessed and used in our model.

We are sending copies of this report to interested congressional committees, the Secretaries of the Treasury and the Department of Homeland Security, and the Chairman of the Federal Reserve. In addition, this report will be available at no charge on GAO's Web site at <http://www.gao.gov>.

If you or your staffs have any questions or would like to discuss this work, please contact me at (202) 512-2834 or wised@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Individuals making key contributions to this report are listed in appendix V.

A handwritten signature in black ink that reads "David J. Wise". The signature is written in a cursive style with a large, stylized "D" and "W".

David J. Wise
Director, Physical Infrastructure Issues

Appendix I: Objectives, Scope, and Methodology

We addressed the following questions: (1) What is the estimated net benefit, if any, to the government of replacing the \$1 note with a \$1 coin? (2) What other effects did stakeholders suggest such a replacement could have?

To estimate the net benefit to the government of replacing the \$1 note with a \$1 coin, we constructed an economic model, which we based on our analyses of past reports of GAO and the Board of Governors of the Federal Reserve System (Federal Reserve) that used an economic model to develop such an estimate, together with information obtained from reviews of agency documents and interviews with experts in government and academia. More specifically, we interviewed officials from the Federal Reserve, two bureaus of the Department of the Treasury (Treasury)—the Bureau of Engraving and Printing (BEP) and the United States Mint (Mint)—and the Department of Homeland Security’s U.S. Secret Service to develop the structure, inputs, and assumptions for the model. Based on our document reviews and these interviews, we determined that the data used as inputs to our model for the production of notes and coins were sufficiently reliable for our analysis. We also interviewed officials from Canada and the United Kingdom (UK), both of which have replaced notes with coins, to gain information useful in determining certain key assumptions in our model. These included officials from the Bank of Canada, the Canadian Department of Finance, the Royal Canadian Mint, and the Royal Canadian Mounted Police’s National Anti-Counterfeiting Bureau, as well as officials from the Royal Bank of England, the Royal Mint, and the Serious Organized Crime Agency. In addition, we interviewed four experts at federal agencies or academic institutions to obtain their views on our economic model. More detailed information on the structure, assumptions, and inputs of the economic model are found in appendix II.

To determine the various effects replacement could have on stakeholders, we identified industries and organizations that might be affected by changes to notes and coins.¹ Through a literature review and interviews with agency officials, we identified private companies involved in the production of materials for \$1 notes and \$1 coins. Because these entities would be affected by any increase or decrease in production, we interviewed the entities that produce the paper and ink for the \$1 note

¹We did not assess the environmental impacts, such as those relating to obtaining raw materials and carbon dioxide emissions, which replacement could have.

(Crane Paper and SICPA Securink Corporation) and process metal for coins (Olin Brass and PMX Industries). Furthermore, through a review of literature and congressional testimonies, as well as interviews with agency officials, experts, and Canadian government officials, we identified other industries and interest groups that are intensive users of currency and might be affected by the replacement of the \$1 note with the \$1 coin. These entities included banks and financial institutions; grocery stores; convenience stores; fast food establishments; vending machine companies, including those that make the note and coin acceptors used in vending machines; armored carriers that process and transport currency; transit agencies; retailers, including companies that make cash register drawers; coin laundry establishments; and consumer and public advocacy groups. To ensure broad representation among these groups, we interviewed officials from the following organizations:

- American Banking Association,
- American Beverage Association,
- American Public Transit Association,
- Coin Laundry Association,
- Food Marketing Institute,
- MEI Group,
- National Association of Convenience Stores,
- National Armored Car Association,
- National Automatic Merchandising Association,
- National Cash Register Company,
- National Consumers League,
- National Federation of the Blind,
- National Franchise Association,
- Wal-Mart, and
- \$1 Coin Coalition.

Finally, to better understand the production, processing, and circulation of currency, we visited the BEP production facility in Washington, D.C.; the Mint production facility in Philadelphia, Pennsylvania; and an armored carrier note and coin processing facility in Baltimore, Maryland.

We conducted this performance audit from June 2010 to March 2011 in accordance with generally accepted government auditing standards. These standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix II: Design of GAO's Economic Model and Detailed Results for the Base Case and Alternative Assumptions

This appendix summarizes information about the model we developed to estimate the net benefit to the government of replacing the \$1 note with a \$1 coin. Specifically, this appendix (1) describes the design of the model, including the assumptions used in it and their sources, and (2) presents detailed results of the model's analysis for our base case, in which we compare a replacement scenario with the status quo, and for two alternative scenarios.

Design of the Model

To estimate the net benefit to the government of replacing the \$1 note with a \$1 coin, we created a model that analyzes the benefits and costs to the government of issuing currency—including both notes and coins—under different scenarios and assumptions over 30 years.¹ The government derives a benefit from issuing coins, known as seigniorage—a term we also apply to notes to mean, for both, the difference between the face value of currency and its production costs. Seigniorage reduces the government's need to borrow, allowing it to avoid interest on debt that it would otherwise incur.

Base Case

To estimate the net benefit to the government of replacing the \$1 note with a \$1 coin, we designed our model to calculate the difference between the baseline and a replacement scenario. Specifically, because the government receives a net benefit from issuing both notes and coins, we calculated the net benefits under the status quo, in which most demand for \$1 currency is provided by notes (as is currently the case), and a replacement scenario, in which notes cease to be produced and are replaced by \$1 coins. The difference between the net benefits under these two scenarios is the net benefit to the government.

For the status quo, we assume that notes remain the dominant form of currency at the \$1 denomination. The Mint continues to produce \$1 coins at current levels, but not all of them enter circulation.

- Currently, about 1 billion of the approximately 4 billion \$1 coins that the Mint has produced since it started minting the Susan B. Anthony \$1 coin in

¹We use the term “benefit” rather than revenue because we consider the income from an economic standpoint instead of a budget scoring standpoint. This is consistent with past GAO work on this issue. A replacement would also have benefits and costs for private businesses and for the general public and consumers, but our model is not designed to estimate these effects.

1979 are stored with the Federal Reserve. We do not count these coins as contributing toward the net benefit to the government because these coins are not being held by the public, and therefore, governmentwide, there has not been a financial gain.²

- We assume that the remaining 3 billion \$1 coins are held by the public. We also assume that some of these remaining \$1 coins are lost or not in active circulation.
- Based on current projections, which incorporate the legislative requirements for producing Presidential and Native American \$1 coins, we assume that the Mint will continue to manufacture more coins than the public demands until it completes its production of Presidential \$1 coins, currently scheduled through part of 2016. In our baseline scenario we assume that production of the \$1 coin essentially ceases after 2016.³ BEP officials commented that it is unrealistic to assume the Mint will cease \$1 coin production after 2016. However, we have no basis on which to make an assumption about the level of \$1 coin production after the completion of the Presidential series. As such, we assume that coins stop being produced after the series is complete. The small level of demand for \$1 coins will be able to be satisfied by coins on hand at Federal Reserve banks for many years after that time.⁴

For our replacement scenario, we assume a 4-year transition period during which

- the production of \$1 notes stops immediately;
- no \$1 notes are withdrawn from circulation, but due to their short life, they would naturally fall out of circulation within a few years;

²The Mint recognizes the seigniorage as soon as the coins are transferred to the Federal Reserve for initial distribution, even if the coins do not necessarily enter active circulation. However, because the Treasury will not have a reduced need to issue debt until coins are put into public circulation, we treat the actualization of seigniorage as occurring at that time. It is only when debt issuance is reduced that the benefit of saved interest expense begins to accrue.

³The Mint has indicated that it will continue to produce Native American \$1 coins after it completes the Presidential series, but given the current stockpile of \$1 coins stored with the Federal Reserve and the modest public demand, production is expected to be limited.

⁴To the extent that some coins need to be minted to meet demand much later, that would add costs to the baseline scenario and would increase the calculated net benefits of a replacement by a small amount.

- the 1 billion coins currently stored with the Federal Reserve are released into circulation in the first year;
- 1 billion \$1 coins that were inactive and held by the public enter active circulation in the first year; and
- the Mint expands its production of \$1 coins during the first 4 years.

During the transition period, we assume the Mint's coin production and the government's associated costs both increase.

- In the first year, the Mint not only increases its production to its current maximum capacity, but also modifies other coin production lines to produce more \$1 coins.
- By the second year, the Mint is able to produce at a new maximum capacity and does so throughout the 4-year transition period until it has produced enough \$1 coins to replace all \$1 notes in circulation.
- These efforts by the Mint to expand its production of \$1 coins increase its costs during the transition period.

In addition, we assume that the government incurs costs to publicize the shift from \$1 notes to \$1 coins and that the variable costs of producing higher-denomination notes increase after the BEP loses some degree of economies of scale that it currently derives from producing \$1 notes. For example, if BEP is unable to purchase certain supplies such as ink and paper in quantities as large as it does now, it may cause the vendors to raise their prices.

After the 4-year transition period, we assume that the Mint reduces its production of \$1 coins to an amount sufficient to offset attrition and meet the growth in demand for currency. As a result, the Mint's coin production costs decline.

To calculate our estimate, we relied on data from several sources, including the Mint, BEP, and the Federal Reserve. We also interviewed relevant officials from international governments and outside experts. All assumptions used in the model are projections of future conditions, hypothetical actions, or both. Therefore, some uncertainty is inevitable, particularly for elements of the assumptions that occur farther in the future. Moreover, some assumptions reflect our analysis of data. We discussed our assumptions with relevant stakeholders and experts to

**Appendix II: Design of GAO's Economic Model
and Detailed Results for the Base Case and
Alternative Assumptions**

verify that our analysis is reasonable. Table 3 lists the values, sources, and rationales for some key assumptions.

Table 3: Assumptions, Values, Sources, and Rationales Used in the Model

Assumption	Value	Source(s)/rationale
Government borrowing rate	About 5.4 percent (varies by year)	We used the average of the 3-month Treasury bill and 10-year Treasury note rates, as forecast by the Congressional Budget Office (CBO).
Discount rate	About 3.4 percent (varies by year)	We used the government borrowing rate (above) minus the level of inflation projected by CBO. This provides a real discount rate, which we use because all of the numbers in the analysis are in real terms.
Growth rate of \$1 currency	About 3.3 percent (varies by year)	We assumed that the demand for notes would grow at a rate between the real and nominal gross domestic product growth rates. This appears to have been the pattern over the last decade, based on Federal Reserve data. In the replacement scenario, we assume the demand for coins grows at the same rate as demand for notes would have grown. In the baseline scenario, we assume negligible demand for the coin after the end of the Presidential coin series.
Replacement ratio	1.5 coins to 1 note	As in our previous studies, we assumed that coins would circulate more slowly than notes and, therefore, more than one coin would be needed to satisfy the demand for one note. Based on our study of experience in Canada and the UK, we used a 1.5-to-1 replacement ratio for our base case. Canada produced 1.6 coins for each note during the transition; once the transition was complete, production was very low or even nil in some years. Because underproduction is a greater risk to the economy than overproduction, we adjusted the ratio downward by only a small amount.
Lifespan of notes	Median of 40 months (19 percent annual attrition rate)	Our analysis of data from BEP and the Federal Reserve indicates an average lifespan for notes of 32 to 40 months. We chose the upper end of that range because of upcoming process changes at the Federal Reserve that are expected to increase the lifespan of notes.
Lifespan of coins	Median of approximately 34 years (2 percent annual attrition rate)	Testimony from the Mint and international experts put the average life of coins at about 30 years. A study of coin attrition rates found a 2.5 percent annual rate for quarters and showed attrition decreasing as coin value increased.
Variable cost of notes	2.7 cents per note	Based on our analysis of 11 years of cost and production data, as well as information on the long-run variability of certain cost categories provided by BEP.
Variable cost of coins	15 cents per coin	Based on our analysis of 10 years of cost and production data provided by the Mint. Specifically, we regressed the total production costs on a constant and the number of notes produced. We use the coefficient on the number produced as the estimate of variable cost.
Time frame	2011 through 2040	We estimated the net benefit to the government over 30 years, as requested. We assumed the policy would go into effect at the beginning of 2011 and discounted all values to this base year. We assumed that the period from 2011 through 2014 would be a transition period.
Note processing cost	Approximately 0.3 cents per note	We used 4 years of data (2006–2009) from the Federal Reserve, which included total direct processing costs and the number of notes processed.

**Appendix II: Design of GAO's Economic Model
and Detailed Results for the Base Case and
Alternative Assumptions**

Assumption	Value	Source(s)/rationale
Coin processing cost	Approximately 0.01 cents per coin	We used 4 years of data (2006–2009) from the Federal Reserve, which included total direct processing costs and the number of coins processed. We did not include additional costs to authenticate coins under the replacement scenario, since it is unknown if such a process would be put in place and we have no basis for determining a reasonable cost.
Note processing frequency	1.3 times per year per note	We used data provided by the Federal Reserve.
Coin processing frequency	0.1 times per year per coin	We used data provided by the Federal Reserve. It is possible that processing frequency would change in a replacement scenario, but we have no basis for a projection.
Initial number of \$1 notes in circulation	Approximately 9.5 billion	Based on Federal Reserve data and our growth projection described above.
Initial number of \$1 coins in circulation	3 billion held by the public; 1 billion stored with the Federal Reserve	Based on data from the Mint and the Federal Reserve. We assumed that there are 3 billion coins held by the public. Some have been lost and some are not actively in circulation. We assume that 1 billion of these coins enter active circulation in the replacement scenario.
Increase in BEP variable costs	— ^a	Based on data provided by BEP and its suppliers.
Cost to Mint to convert production lines	Approximately \$8 million	Based on data from the Mint.
Public awareness campaign	Approximately \$7.8 million	We assumed a public awareness campaign would be conducted to inform the public during the first year of the transition period. We used an estimate provided by the Mint for a previous GAO report, updated for inflation. ^b
Production of and demand for \$1 coins in the base case	380 million produced per year through 2016; approximately 200 million enter public holdings per year	Based on projections provided by the Mint. We assumed that those coins that are not held by the public are returned to the Federal Reserve.

Source: GAO analysis of agencies' data.

^aData are proprietary.

^b[GAO/GGD-90-88](#).

Detailed Results Using the Base Case and Alternative Assumptions

Results Using Base Case Assumptions

Compared to continuing the status quo, replacing the \$1 note with a \$1 coin would increase the government's net benefit by approximately \$5.5 billion over 30 years, or about \$184 million annually, on average, in net

present value terms. This average masks significant variation over the 30-year period of our analysis. In the first few years, a replacement would cause a net loss because the cost of producing so many coins would be large. This early net loss represents the up-front cost of producing a large number of coins during the transition from notes to coins together with the limited interest expense the government would avoid in the first few years after replacement began. While the estimated benefits in earlier GAO analyses were due to both seigniorage and reduced costs of coins (as compared to notes) over 30 years, our current net benefit estimate is solely due to seigniorage. In fact, the cost of producing coins for a full replacement is never fully recovered during the 30-year analysis, likely due to the longer note life and relatively higher cost of coin production today than was the case when our earlier studies were conducted. Moreover, our estimate, like all estimates, is uncertain, particularly in the later years, and thus the benefits could be greater or smaller than estimated. (See fig. 3 in the body of our report and table 4 at the end of this appendix.)

Results Using Alternative Assumptions

Under alternative assumptions, our estimate of the net benefit to the government of a replacement would change. Table 4 shows how changes in two assumptions—the demand for currency and the replacement ratio of coins to notes—would affect our estimate. We conducted several additional alternative analyses, and are presenting these two, which provide the greatest range of benefits. In each of the alternative scenarios, we changed one assumption and held all other values constant.

In the first alternative scenario, the replacement of notes with coins causes a decrease in the demand for currency as people switch to electronic means of payment. Specifically, the demand for currency grows at a rate equal to 80 percent of the growth of demand for notes in the baseline scenario. Using this assumption, our estimate of the net benefit to the government decreases to \$4.5 billion over 30 years, which is a decrease of about \$1 billion from our base case.

In the second alternative scenario, we changed the number of coins needed to replace each note in circulation. Changing our estimate of the replacement ratio of coins to notes from our current estimate of 1.5 to 1 to our 2000 estimate of 2.0 to 1 increases the net benefit to the government to about \$8.9 billion over 30 years, or about \$3.4 billion more than our base case estimate.

Table 4 provides detailed results of our model's analysis using our base case and these two alternative assumptions.

**Appendix II: Design of GAO's Economic Model
and Detailed Results for the Base Case and
Alternative Assumptions**

Table 4: Comparison of Benefit Estimates under Base Case and Alternative Assumptions

Dollars in billions

Key assumption	Base case	Replacement-induced demand decline	Higher replacement ratio
Lifespan of note, in months	40	40	40
Replacement ratio of coins to notes	1.5 to 1	1.5 to 1	2.0 to 1
Annual growth in demand for currency	About 3.3 %	About 3.3% baseline and 2.6 % replacement	About 3.3%
Status quo			
Billions of notes produced over 30 years	109	109	109
Billions of coins produced over 30 years	2	2	2
Present value of reduction in government interest payments, over 30 years	\$10.8	\$10.8	\$10.8
Present value of note production and processing costs, over 30 years	\$2.1	\$2.1	\$2.1
Present value of coin production and processing costs, over 30 years	\$0.3	\$0.3	\$0.3
Total net benefit to the government of status quo	\$8.4	\$8.4	\$8.4
Replacement			
Billions of notes produced over 30 years	0	0	0
Billions of coins produced over 30 years	50	41	67
Present value of reduction in government interest payments, over 30 years	\$19.7	\$17.9	\$24.7
Present value of note production and processing costs, over 30 years ^a	\$0.2	\$0.2	\$0.2
Present value of coin production and processing costs, over 30 years ^b	\$5.6	\$4.8	\$7.2
Total net benefit to the government of replacement	\$13.9	\$12.9	\$17.3
Net benefit to government of replacement over 30 years	\$5.5	\$4.5	\$8.9

Source: GAO analysis.

Note: Totals may not add because of rounding.

^aUnder the replacement, no notes are produced, but limited ongoing processing costs are borne in the first few years.

^bThe replacement incorporates certain costs associated with issuing coins that are not included in the base case, such as the costs of modifying equipment at the Mint to expand its production of \$1 coins during the transition period, losing economies of scale at BEP after it stops producing \$1 notes, and conducting a public information campaign to publicize the new \$1 coins.

Appendix III: Comments from the Board of Governors of the Federal Reserve System



BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D.C. 20551

LOUISE L. ROSEMAN
DIRECTOR
DIVISION OF
RESERVE BANK OPERATIONS
AND PAYMENT SYSTEMS

February 14, 2011

Mr. David Wise
Director
Physical Infrastructure Issues
U.S. Government Accountability Office
441 G Street, N.W.
Washington, D.C. 20548

Dear Mr. Wise:

Thank you for the opportunity to comment on the GAO's draft report "*U.S. Coins: Replacing the \$1 Note with a \$1 Coin Would Provide a Financial Benefit to the Government.*" In the report, the GAO concludes that there would be a net benefit to the federal government from the replacement of \$1 notes to \$1 coins, due to the increased seigniorage revenue. Setting seigniorage aside and considering only the real costs to the government, the report concludes that replacing the \$1 note with a \$1 coin results in a net *cost* to the government over a 30-year period.

Although the GAO was asked to evaluate benefits to the government, we believe an assessment of the benefits and costs to the U.S. economy more broadly is an important consideration in evaluating whether to replace the \$1 note with a \$1 coin. Seigniorage would not be a factor in such an analysis, since it is a revenue transfer from the private sector to the government. The report notes (but does not quantify) the near- and long-term challenges to the private sector should the \$1 coin replace the \$1 note. A societal cost-benefit analysis would include the costs and benefits not only to the government but also to the banking industry, retailers, the Federal Reserve, consumers, and others to handle \$1 coins and \$1 notes. Also, the discounted net cost or benefit of a replacement of \$1 notes by \$1 coins is influenced significantly by the assumptions regarding the initial transition period and cost. A sensitivity analysis in the final report that varies those transition assumptions would provide useful context.

We have provided technical comments on the draft report under separate cover.

Sincerely,

A handwritten signature in cursive script, reading "Louise L. Roseman".

Email: Louise.Roseman@frb.gov
Phone: (202) 452-2789 • Fax: (202) 452-2746

Appendix IV: Comments from the Department of the Treasury



DEPARTMENT OF THE TREASURY
WASHINGTON, D.C. 20220

February 18, 2011

Mr. David Wise
Director, Physical Infrastructure Issues
Government Accountability Office
441 G St., NW
Washington, DC 20548

Dear Mr. Wise:

Thank you for the opportunity to review and comment on the General Accountability Office's (GAO) draft report "Replacing the \$1 Note with a \$1 Coin Would Provide a Financial Benefit to the Government" (GAO-11-281).

The Treasury Department has reviewed the report in consultation with the Bureau of Engraving and Printing and the U.S. Mint and would like to provide feedback for clarification. In this review, several technical issues were cited concerning certain assumptions, definitions, and statements. The attached document highlights these concerns and is provided for your consideration in preparing the final report.

As noted in the draft report, GAO's study did not consider some factors that were outside the scope of the financial benefit to the Government, such as environmental impacts. Furthermore, we note that GAO acknowledged that societal costs would accompany any such transition, but these costs were not included because GAO could not quantify them adequately. The government, of course, must consider these more holistic factors in any broader discussion of the report's recommendations.

Additionally, please note that the Federal Reserve will be revising its processing methodology for \$1 notes shortly after the publication of this report. The new process is expected to significantly reduce the premature destruction of fit (acceptable) \$1 notes when they are processed at the Federal Reserve Banks. As a consequence, the life of a \$1 note in circulation is expected to increase significantly, reducing the estimated savings from replacing the \$1 note with the \$1 coin.

Sincerely,

A handwritten signature in dark ink, appearing to read "Rosie Rios".

Rosie Rios
Treasurer of the United States

Attachment 1: Technical Comments

Appendix V: GAO Contact and Staff Acknowledgments

GAO Contact

David J. Wise, (202) 512-2834 or wised@gao.gov

Staff Acknowledgments

In addition to the contact named above, Teresa Spisak (Assistant Director), Amy Abramowitz, Lindsay Bach, Jenna Beveridge, Patrick Dudley, Elizabeth Eisenstadt, and David Hooper made key contributions to this report.

Related GAO Products

U.S. Coins: Public Views on Changing Coin Design. [GAO-03-206](#). Washington, D.C.: December 17, 2002.

New Dollar Coin: Marketing Campaign Raised Public Awareness but not Widespread Use. [GAO-02-896](#). Washington, D.C.: September 13, 2002.

Financial Impact of Issuing the New \$1 Coin. [GGD-00-111R](#). Washington, D.C.: April 7, 2000.

New Dollar Coin: Public Perception of Advertising. [GGD-00-92](#). Washington, D.C.: April 7, 2000.

New Dollar Coin: Public Prefers Statue of Liberty over Sacagawea. [GGD-99-24](#). Washington, D.C.: January 22, 1999.

A Dollar Coin Could Save Millions. [T-GGD-95-203](#). Washington, D.C.: July 13, 1995.

1-Dollar Coin: Reintroduction Could Save Millions If It Replaced the 1-Dollar Note. [T-GGD-95-146](#). Washington, D.C.: May 3, 1995.

One-Dollar Coin: Reintroduction Could Save Millions if Properly Managed. [GGD-93-56](#). Washington, D.C.: March 11, 1993.

A New Dollar Coin Has Budgetary Savings Potential but Questionable Acceptability. [T-GGD-90-50](#). Washington, D.C.: June 20, 1990.

Limited Public Demand for New Dollar Coin or Elimination of Penny. [T-GGD-90-43](#). Washington, D.C.: May 23, 1990.

National Coinage Proposals: Limited Public Demand for New Dollar Coin or Elimination of Pennies. [GGD-90-88](#). Washington, D.C.: May 23, 1990.

GAO's Mission

The Government Accountability Office, the audit, evaluation, and investigative arm of Congress, exists to support Congress in meeting its constitutional responsibilities and to help improve the performance and accountability of the federal government for the American people. GAO examines the use of public funds; evaluates federal programs and policies; and provides analyses, recommendations, and other assistance to help Congress make informed oversight, policy, and funding decisions. GAO's commitment to good government is reflected in its core values of accountability, integrity, and reliability.

Obtaining Copies of GAO Reports and Testimony

The fastest and easiest way to obtain copies of GAO documents at no cost is through GAO's Web site (www.gao.gov). Each weekday afternoon, GAO posts on its Web site newly released reports, testimony, and correspondence. To have GAO e-mail you a list of newly posted products, go to www.gao.gov and select "E-mail Updates."

Order by Phone

The price of each GAO publication reflects GAO's actual cost of production and distribution and depends on the number of pages in the publication and whether the publication is printed in color or black and white. Pricing and ordering information is posted on GAO's Web site, <http://www.gao.gov/ordering.htm>.

Place orders by calling (202) 512-6000, toll free (866) 801-7077, or TDD (202) 512-2537.

Orders may be paid for using American Express, Discover Card, MasterCard, Visa, check, or money order. Call for additional information.

To Report Fraud, Waste, and Abuse in Federal Programs

Contact:

Web site: www.gao.gov/fraudnet/fraudnet.htm

E-mail: fraudnet@gao.gov

Automated answering system: (800) 424-5454 or (202) 512-7470

Congressional Relations

Ralph Dawn, Managing Director, dawnr@gao.gov, (202) 512-4400
U.S. Government Accountability Office, 441 G Street NW, Room 7125
Washington, DC 20548

Public Affairs

Chuck Young, Managing Director, youngc1@gao.gov, (202) 512-4800
U.S. Government Accountability Office, 441 G Street NW, Room 7149
Washington, DC 20548

