



Summary

The role of paper currency in the U.S. economy is changing. While the share of payments made with cash appears to be falling, cash continues to be used widely and plays an important function as a store of value, domestically and internationally. Cash also serves an enduring role in natural or other disasters when other payment systems may not be available. These factors suggest that cash will continue to be an essential and significant part of the payment and financial system for the foreseeable future.

This combination of change and continuity underscores the need for a cash payment system that is strong, but also flexible and cost effective. To maintain confidence in U.S. currency and increase the efficiency of the cash system, the Federal Reserve has taken several innovative steps in recent years to reduce operating costs and provide incentives to the private sector to choose efficient cash handling options. The Federal Reserve is also working to increase the flexibility of the cash system going forward. This paper describes the impact of recent Federal Reserve policy and operational changes on the efficiency of the cash payment system. It also explores further innovations that may be needed as the payment system continues to evolve.

As market forces shift the payments landscape, cash will remain critical

As discussed in John Williams' recent essay *Cash is Dead!, Long Live Cash!*, the role of paper currency in the U.S. economy is changing. The share of payments made with cash appears to be gradually falling as the economy shifts toward electronic forms of commerce and payment. Yet demand for currency, particularly \$100 bills, has grown more quickly than the economy, suggesting a strong demand for cash as a store of value, both domestically and internationally.

While cash's role may be shifting, it is likely to remain an essential component of the financial system for a long time to come. In addition to its continued strength as a store of value, cash remains important as a payment system for at least two reasons. First, cash is convenient to use, and as such, continues to be used heavily and widely, particularly for low-value transactions.¹ As demonstrated in *Cash is Dead!, Long Live Cash!*, the public continues to demand an increasing number of \$1, \$5, and \$20 bills to support these payments, albeit at growth rates that are lower than the economy more broadly. The volume of cash that the banking sector withdraws from and deposits to the Federal Reserve Banks also continues to grow slowly. An econometric analysis published in the FRBSF Economic Letter, *What's in Your Wallet? The Future of Cash*, projects that the volume of currency paid by the Federal Reserve to the banking sector is likely to continue to grow over the next ten years².

Second, as seen in both the financial crises and recent natural disasters, cash is a part of the nation's critical financial infrastructure. It supports continued economic activity when telecommunications systems are unavailable or consumers lose confidence in bank deposits or access to credit. The Federal

¹ The 2009 Survey of Consumer Payment Choice, for example, finds that consumers recalled making about 28% of all payments with cash. See [/www.bos.frb.org/economic/ppdp/2011/ppdp1101.pdf](http://www.bos.frb.org/economic/ppdp/2011/ppdp1101.pdf)

² See Jeremy Gerst and Daniel Wilson, "What's in Your Wallet? The Future of Cash." Federal Reserve Payment Study (2011) http://www.frbsf.org/publications/economics/letter/2011/el2011-33.html?utm_source=home



Reserve regularly observes increases in the volume of currency withdrawn from the Reserve Banks in anticipation of major events, such as hurricanes, and then deposited to the Fed after the event.

As a result, a strong cash payment system—one that is safe, efficient, and flexible enough to deal with large and sudden swings in demand—is required, even if cash’s share of payments declines over time.

Innovative policy and operational changes have improved the safety and efficiency of the cash system

In view of cash’s roles as 1) a store of value, 2) widely used low-value payment system and 3) critical infrastructure in times of disruption, the public’s confidence in cash is critical. The Federal Reserve works to maintain confidence in U.S. currency in three interrelated ways. First, it plays a “wholesale” operational role in the cash supply chain. The Federal Reserve works with key public and private sector partners to 1) provide cash to depository institutions, 2) accept cash deposits from those institutions, and 3) evaluate deposited notes to determine whether they are genuine and fit to be reused, and then either destroy or reuse notes as appropriate.³ Second, it plays a policy role. Rooted in its statutory responsibilities, the Federal Reserve’s cash policies define the scope of its cash operations. Importantly, these policies provide incentives to minimize potential economic distortions arising from the fact that the Federal Reserve does not charge fees for its core cash services, which are a central bank responsibility.⁴ Third, the Federal Reserve also plays a coordination role, such as working with depository institutions and armored carriers to respond to business continuity events. In all three roles, the Federal Reserve relies on market forces to be effective, but it also seeks to address factors that market incentives may not fully incorporate, such as maintaining the quality of currency and ensuring sufficient capacity to address contingencies.

Using these roles, the Federal Reserve has implemented several innovative policy and operational changes over the past decade to improve the safety and efficiency of the cash system. The remainder of this section highlights two specific areas of action: new incentives for market actors and operational changes that increase the cost effectiveness of the Federal Reserve’s cash operations. The subsequent section explores additional innovations that might be necessary as the payments landscape continues to evolve.

Using market-based incentives to increase efficiency and maintain confidence

Implemented in 2006 and 2007, the Federal Reserve’s Recirculation Policy took a new approach to a long-standing concern, and a typical economic dilemma: the propensity to overuse free services. In essence, the policy moved away from difficult-to-enforce administrative limits on the overuse of Federal Reserve

³ The Federal Reserve currently operates cash processing and cash vault facilities in 28 cities across the country. Depository Institutions (commercial banks, thrifts, credit unions, and other entities eligible for Federal Reserve services) make physical deposits and withdrawals of paper currency from these sites. Depository institutions can also make cash deposits and withdrawals at “cash depot” sites in 10 other cities, now operated by third-parties, where the Federal Reserve historically had an operational presence.

⁴ According to the Board of Governors’ interpretation of the 1980 Monetary Control Act, core cash services offered by the Federal Reserve should be free to all depository institutions. Services beyond those related to core central bank responsibilities, however, can be subject to fees. The key cash policies that deal with these fee-based services include the Recirculation Policy and the Uniform Cash Access Policy. Both are available at www.federalreserve.gov, as are other Federal Reserve payment system policies.



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services and implemented a market-oriented indicator of the cost of Federal Reserve cash processing. The key lever in the Recirculation Policy is the cross-shipping fee, which is assessed when a depository institution (DI) deposits “fit” currency⁵ and then re-orders the same denomination of currency within the same week in a given geographical area.⁶ This fee encourages DIs to evaluate whether they can process and recirculate currency more cost effectively than the Federal Reserve. However, to encourage the return of dirty or worn notes back to the Federal Reserve cash offices for destruction, the Federal Reserve excludes these notes from the cross-shipping fee.

Overall, the Recirculation Policy has had positive effects on the cash system. First, it reduced a fundamental economic inefficiency by providing DIs with the incentive to manage cash processing costs previously placed on the public. As a result, DIs chose to reduce the volume of currency they send to the Federal Reserve for processing by nearly 10 percent from 2006 to 2008. This suggests an increase in overall economic efficiency as many DIs decided they were able to process notes more cheaply than the fee they would otherwise pay to the Federal Reserve. Second, this decrease in volume enabled the Federal Reserve to reduce its staffing levels and equipment utilization. More specifically, total cash operations staff fell by more than 120 people from 2006 to 2008, and the Federal Reserve Banks’ direct operating costs (excluding recoveries from cross-shipping fees) fell by over 10 percent during this period, saving nearly \$17 million annually in public funds.⁷

Increasing the cost effectiveness of Federal Reserve cash operations

While the Recirculation Policy provides DIs with better incentives to choose the most efficient way to reuse fit currency, and thereby manage the societal costs of cash processing, the Federal Reserve has also taken many steps in the last decade to increase cost-effectiveness within its own operations. We highlight three key examples.

First, beginning in the early 2000s as the Federal Reserve began to consolidate its check processing infrastructure, it also identified opportunities to reduce its cash processing footprint without imposing costs on DIs. More specifically, the Federal Reserve closed 10 full-service FRB Cash services operations over the past 15 years, replacing them with “cash depots” that are operated by third-party vendors, typically armored carriers. These cash depots allow DIs to continue to make cash deposits to and withdrawals from the Federal Reserve in the same cities that previously had full FRB cash operations.

⁵ Fit currency refers to “currency that the Federal Reserve has deemed suitable for further circulation. The Federal Reserve identifies and destroys notes that are soiled, worn or have defects such as holes, tears, and graffiti, leaving only fit notes to be packaged and returned to circulation.” More information can be found at www.frbservices.org/help/recirculation_policy.html#a23.

⁶ In addition to the cross-shipping fee, the Recirculation Policy also includes a “Custodial Inventory” (CI) program. The CI program allows DIs that meet a minimum recirculation threshold to hold currency in their own vaults but on the Federal Reserve’s books, thereby reducing the opportunity cost of holding idle cash balances and the consequent need to physically transfer currency to a Federal Reserve Bank.

⁷ For a societal perspective, some of the cost savings for the Federal Reserve represents a shift in cost toward DIs, who may need to incur additional currency processing costs. However, many DIs reduced their cross-shipping instead of paying cross-shipping fees. In addition, the Federal Reserve’s direct unit costs for cash operations were essentially stable from 2006 to 2008, suggesting that the Reserve Banks were able to reduce their operating expenses commensurate with the volume decline.



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These conversions contributed to the long-term trend in reducing the number of FRB cash operations staff, as seen in the blue line of Figure 1.

Second, relatively modest investments in cash processing technology have dramatically increased the productivity of Federal Reserve cash processing equipment and resulted in significant cost savings. As shown by the green line in Figure 1, productivity, measured by the number of one thousand note bundles processed each hour (Bundles per Hour, BPH), has grown by more than 25 percent since 2007. As a result, the number of cash staff (Average Number of Personnel, ANP) has continued to fall even beyond the impact of implementing cash depots. While these investments in new technology increased annual equipment depreciation by approximately \$2.5 million per year starting in 2010, they also yielded nearly \$12.3 million in avoided personnel costs from 2010 through 2012, resulting in net savings of approximately \$6.8 million over three years.

Figure 1: Federal Reserve Cash Services Productivity (BPH), Staffing (ANP), and Receipt Volume

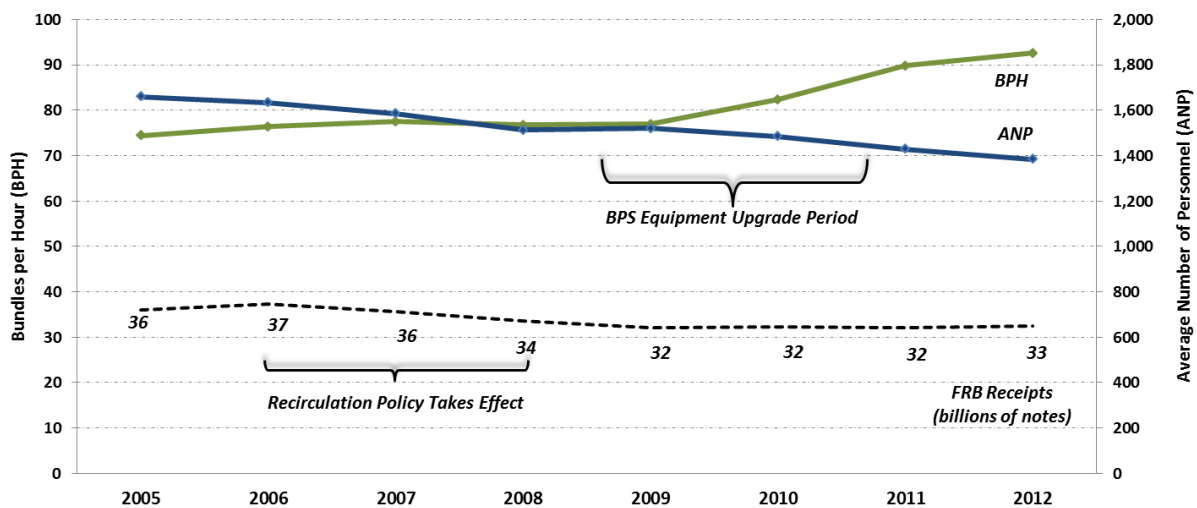
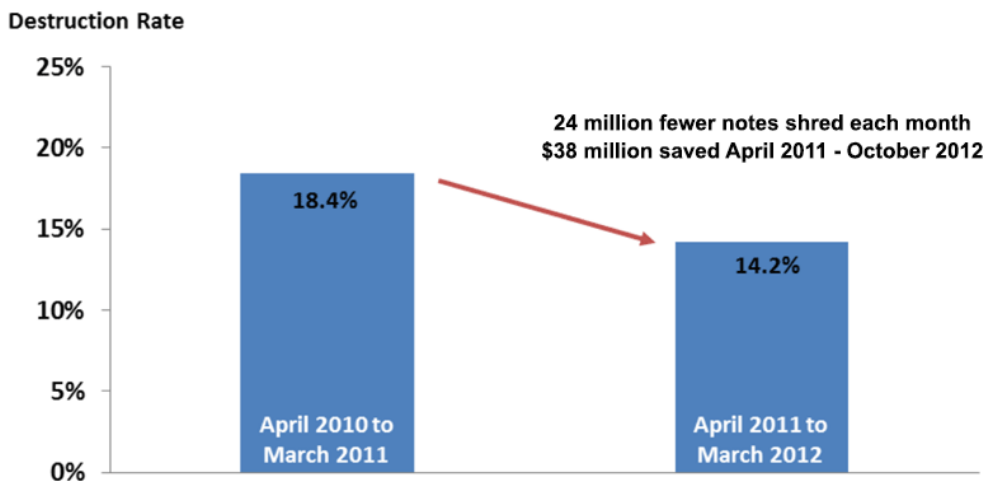


Figure 2: Impact of the notes facing policy change for \$1-\$20 notes





Third, the Federal Reserve has implemented new technology that better differentiates notes that can be re-used from those that should be destroyed, regardless of whether the notes are face up or face down during processing. Prior to this change, it had been more efficient to destroy any notes that inadvertently faced downward, even if they were nearly new. Now, notes are destroyed only when they fall below the Federal Reserve's quality standards, and the Federal Reserve accepts deposits (and makes payments) of \$1 through \$20 notes in any orientation, with the portrait face up or face down. This change reduced the annual currency print order (and the amount of shredded currency needing disposal), while ensuring that the physical quality of currency remains fit for commerce. As seen in Figure 2, the new approach prevents the premature destruction of nearly 24 million notes each month, and saved nearly \$40 million from implementation in April 2011 through October 2012.

Uncertainty creates challenges and may require new approaches and investments going forward

Although cash is a core element of the nation's critical financial infrastructure, and likely will remain essential for a very long time, continued changes in the payments landscape create uncertainty about the level of cash use going forward and could lead to increased volatility in cash demand.

This uncertainty, coupled with the cost structure of cash processing operations, raises several challenges for the Federal Reserve. The large volumes of cash that the Reserve Banks must handle—an average of 124 million notes received and 128 million paid into circulation per day—means that the Federal Reserve is highly optimized for high-speed, high volume cash processing. Indeed, the Federal Reserve has sought to enhance its economies of scale over time by investing in sophisticated technology that facilitates these wholesale operations while preventing the recirculation of poor quality or counterfeit notes. As a result, the Federal Reserve bears the associated fixed costs regardless of the actual volume of currency it processes.⁸ A material decline in cash volumes could therefore raise the unit cost of processing cash, creating new challenges for the Federal Reserve in its efforts to be a good steward of public funds while maintaining confidence in U.S. currency.

Given this challenging dynamic, the Federal Reserve will continue to analyze ideas and opportunities for increasing internal efficiencies and streamlining processes to make its cash operations as flexible and cost-effective as possible. For example, the Federal Reserve is currently investigating how to re-engineer and consolidate certain internal processes while maintaining its current operating footprint. It is also exploring the benefits of alternative processing models for low-value denominations. Cooperation with depository institutions, armored carriers, and other parties in the supply chain to develop data standards that facilitate straight-through processing as cash passes through the supply chain may lead to reduced cost for all parties. Exploration of these and other ideas will continue as the Federal Reserve also plans for future investments in new currency processing equipment. In summary, the Federal Reserve will continue to ensure confidence in US currency, promoting a robust and efficient cash supply chain and serving as a responsible steward of the public's funds, so that cash remains viable as a payment instrument and as a store of value wherever and whenever it is demanded.

⁸ Just over one-third of the Federal Reserve's \$532 million cash operations costs in 2012 reflect facilities, police protection, and equipment depreciation costs.