

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM

DIVISION OF RESERVE BANK OPERATIONS AND PAYMENT SYSTEMS

2017 Currency Budget

Action

On December 16, 2016, the Board approved the 2017 currency budget of \$726.6 million, which includes approximately \$726.0 million in operating expenses and \$0.6 million in capital. The 2017 operating budget of \$726.0 million represents a decrease of \$11.3 million, or 1.5 percent, from the approved 2016 budget, and an increase of \$17.1 million, or 2.4 percent, from estimated 2016 expenses. The 2017 capital budget includes \$0.6 million, which is a new component of the currency budget.

Discussion

Under authority delegated by the Board, the director of the Division of Reserve Bank Operations and Payment Systems (RBOPS) submits an annual fiscal year (FY) print order for new currency to the director of the Bureau of Engraving and Printing (BEP).¹ Upon reviewing the order, the BEP estimates printing costs for new currency during the upcoming calendar year (CY), which staff uses to prepare the annual currency budget. The Board then reviews and approves the final budget. Printing costs for Federal Reserve notes constitute about 93 percent of the operating budget. Expenses for currency transportation, quality assurance, counterfeit-deterrence and analysis, currency education, outreach, and research, other BEP initiatives, and depreciation make up the remaining 7 percent.

Once the Board approves the currency budget, it assesses the costs of currency to each Federal Reserve Bank on a monthly basis. Table 1 provides details on the Board's CY 2016 budget, 2016 estimate, and 2017 budget.

¹ Please refer to [the Board's public website](#) for more information about the Board's annual print order for new currency.

Table 1
Currency budget
(calendar year)

	2016 Budget (000's)	2016 Estimate (000's)	Variance 16E to 16B		2017 Budget (000's)	Variance 17B to 16E		Variance 17B to 16B	
			Amount (000's)	Percent		Amount (000's)	Percent	Amount (000's)	Percent
Print order (number of notes)	7,841,005	7,491,280	-349,725	-4.5	6,611,120	-880,160	-11.7	-1,229,885	-15.7
BEP expenses	\$688,132	\$672,586	-\$15,546	-2.3	\$679,514	\$6,928	1.0	-\$8,618	-1.3
Printing Federal Reserve notes ^a	\$670,422	\$666,051	-\$4,371	-0.7	\$673,799	\$7,748	1.2	\$3,377	0.5
Currency reader	\$8,478	\$1,835	-\$6,643	-78.4	\$1,715	-\$120	-6.5	-\$6,763	-79.8
Other ^b	\$4,232	\$3,900	-\$332	-7.9	\$4,000	\$100	2.6	-\$232	-5.5
New BEP facility	\$5,000	\$800	-\$4,200	-84.0	\$0	-\$800	-100.0	-\$5,000	-100.0
Board expenses	\$49,245	\$36,325	-\$12,920	-26.2	\$46,516	\$10,191	28.1	-\$2,729	-5.5
Currency transportation	\$26,400	\$20,780	-\$5,620	-21.3	\$21,200	\$420	2.0	-\$5,200	-19.7
Quality assurance	\$9,200	\$9,200	\$0	0.0	\$12,500	\$3,300	35.9	\$3,300	35.9
Counterfeit deterrence and analysis	\$9,995	\$5,201	-\$4,794	-48.0	\$8,100	\$2,899	55.7	-\$1,895	-19.0
Currency education, outreach, and research	\$3,650	\$1,144	-\$2,506	-68.7	\$4,645	\$3,501	306.1	\$995	27.3
Depreciation	\$0	\$0	N/A	N/A	\$71	\$71	N/A	\$71	N/A
Operating budget and expenses	\$737,377	\$708,911	-\$28,466	-3.9	\$726,030	\$17,119	2.4	-\$11,347	-1.5
Capital expenses	\$0	\$0	\$0	N/A	\$600	\$600	N/A	\$600	N/A
Single cycle capital	\$0	\$0	\$0	N/A	\$600	\$600	N/A	\$600	N/A

^a The number of notes in the CY 2017 budget declined by 11.7 percent, but printing costs increased by 1.2 percent, because the BEP increased its fixed cost billing rate to support the acceleration of the next design family of notes, in accordance with guidance provided by the Secretary of the Treasury.

^b Other BEP expenses include costs to reimburse the BEP for expenses incurred by its Destruction Standards and Compliance Division of the Office of Compliance and Mutilated Currency Division of the Office of Financial Management.

2016 Currency Expenses

Staff estimates that total currency expenses will be \$708.9 million in 2016, which is approximately \$28.5 million, or 3.9 percent, below the 2016 budgeted amount. Over half of the budget underrun is attributable to lower-than-budgeted BEP expenses because it purchased fewer currency readers than budgeted, encountered significant delays with the new building project, and delivered fewer Federal Reserve notes than budgeted. The remainder of the budget underrun is attributable to lower-than-projected costs for transporting new and fit notes from the BEP to Reserve Banks and among Reserve Banks, and delays in awarding contracts for activities related to counterfeit deterrence and currency education.² These factors are discussed in more detail below.

² The procurement activities that were delayed included new activities and services, for which the Board had not previously contracted and needed more time to investigate legal authority and procedural issues. As a result, we did not include enough time in our planning for the required approvals of these new activities. Based on what we learned during 2016 and the work that has been conducted with the Board's legal and procurement staff, we are confident that these contracts will be awarded in a timely manner during 2017.

2016 Printing and Transportation Expenses

Estimated expenses for printing Federal Reserve notes in CY 2016 are \$666.1 million, which is \$4.4 million, or 0.7 percent, lower than the budgeted amount. This budget underrun does not reflect a change in the annual print order or less-than-planned deliveries by the BEP, but rather a shift of deliveries between budget years.³ The BEP delivered and the Board paid for 0.2 billion more notes in the last quarter of CY 2015 (after we submitted the CY 2016 budget) than we had budgeted to be delivered and paid for in CY 2016. Furthermore, the BEP will deliver 0.1 billion fewer notes during the last quarter of CY 2016 than we budgeted.

Currency transportation expenses are estimated to be \$20.8 million, which is \$5.6 million, or 21.3 percent, lower than the budgeted amount. During 2016, Reserve Bank receipts from circulation declined, which resulted in fewer shipments of unprocessed currency between Reserve Banks. Additionally, international payments were relatively stable in 2016 and resulted in a reduced need to transport new \$100 notes from the BEP to the Reserve Banks in 2016.

2016 Currency Reader Program Expenses

Estimated CY 2016 expenses for the currency reader program are \$1.8 million, which is \$6.6 million, or 78.4 percent, lower than the budgeted amount primarily because the BEP procured and distributed fewer readers than the 130,000 it estimated in 2016. The BEP estimates currently that it will procure and distribute only about 10,000 readers in 2016 because some potential users have downloaded the BEP's smart-phone currency reader application, instead of ordering a currency reader.

2016 BEP New Facility Expenses

Estimated CY 2016 expenses for the BEP's new facility are \$0.8 million, which is \$4.2 million, or 84.0 percent, lower than the budgeted amount primarily because the BEP made less progress on this project than expected. In 2016, the BEP entered into an interagency

³ The BEP operates on a fiscal year that begins on October 1 and ends September 30 and the Board operates on a calendar year that begins on January 1. This difference in timing requires that we estimate the Board's calendar-year budget for new currency by eliminating the estimated volume and associated printing costs of notes that the BEP will produce in the first quarter of its fiscal year and estimating the volume and associated printing costs of notes Board staff projects the BEP will produce in the fourth quarter of the calendar year. The BEP, however, fulfilled the Board's fiscal year 2016 print order.

agreement with the General Services Administration and paid it nearly \$0.8 million to evaluate potential sites for a new facility to replace the existing facility in Washington, D.C..

2016 Quality Assurance Expenses

Estimated CY 2016 expenses for the quality assurance program are \$9.2 million, which is unchanged from the budgeted amount.

During 2016, the Board staff and currency quality assurance (CQA) consultants continued to build on the improved processes established to date. The CQA consultants helped the BEP execute a sampling program and processing standards for \$100 notes using single note inspection equipment. The CQA consultants also assisted the BEP in improving the banknote development process so that functional, security, and manufacturing requirements are considered at the conceptual stage and continue through the development and testing stages of designing the next family of notes. In addition, the CQA consultants facilitated the development of quality assurance standards, procedures for releasing banknotes that meet agreed-upon quality standards, and metrics reports that detail the costs of poor quality to enable greater evidence-based decision making in the BEP's manufacturing processes. The CQA consultants also were able to transition day-to-day management of key programs to the BEP, including internal quality audits and workplace organization and standardization.

2016 Counterfeit Deterrence and Analysis Expenses

Estimated CY 2016 expenses for counterfeit deterrence and analysis are \$5.2 million, which is \$4.8 million, or 48.0 percent, lower than the 2016 budget. The underrun is primarily the result of several contracts being awarded later in 2016 than we anticipated because of procurement delays, and the BEP contracted for some of the work that it had asked us to perform and for which we had budgeted.

2016 Currency Education, Outreach, and Research Expenses

Estimated CY 2016 expenses for currency education, outreach, and research are approximately \$1.1 million, which is approximately \$2.5 million, or 68.7 percent, lower than the 2016 budget. This budget underrun is largely attributable to delays in awarding contracts, which shifted some planned expenditures from 2016 to 2017.

2017 Operating Budget

The 2017 operating budget is approximately \$726.0 million, which is \$11.3 million, or 1.5 percent, less than the 2016 budget, and about \$17.1 million, or 2.4 percent higher than 2016 estimated operating expenses.⁴ The budget-to-budget decrease is primarily attributable to expectations that the BEP will purchase fewer currency readers, and no funding will be needed in 2017 for expenses associated with a new BEP facility in the metropolitan Washington, D.C. area.

BEP Expenses

2017 Printing Budget

The currency budget includes \$673.8 million in printing costs for CY 2017, which represents an increase of 0.5 percent from the 2016 budget and 1.2 percent from 2016 estimated expenses. The printing budget includes \$418.7 million (62 percent) in fixed costs and \$255.1 million (38 percent) in variable costs.⁵

Fixed Costs

Fixed costs, which include capital, prepress and engraving, fixed manufacturing overhead and support, research and development, and general and administrative staff, are budgeted to increase nearly \$21.5 million, or 5.4 percent, from 2016 estimated expenses, because the BEP included an additional \$9.3 million for staffing and overtime expenses to support the acceleration of the next design family of notes. The remainder of the increase is primarily attributable to an adjustment to the BEP's working capital fund. For budget planning purposes, the BEP also provided us with a three-year working capital plan that includes approximately \$212.9 million for anticipated 2017 capital investments and obligations. During 2016, we worked closely with the BEP to review capital projects that exceed \$1 million and helped the

⁴ The attachment shows the new currency expenses, the value and number of notes printed, and the number and cost of notes printed from the 1997 through 2017 budget periods.

⁵ The BEP does not receive federal appropriations. All operations of the BEP are financed by a revolving fund that is reimbursed through product sales, virtually all of which are sales of Federal Reserve notes to the Board to fulfill its print order. The BEP recovers its costs of operations and obtains funds necessary for capital investment through customer billing rates. Section 16 of the Federal Reserve Act requires that all costs incurred for the issuing of notes shall be paid for by the Board and included in its assessments to the Reserve Banks.

BEP develop a long-term manufacturing strategy and the production equipment purchases to support this strategy.⁶

Variable Costs

Variable costs, which include paper, ink, direct labor, and other variable manufacturing costs, are budgeted to decrease by \$13.7 million, or 5.1 percent, from 2016 estimated expenses primarily because of a smaller volume of Federal Reserve notes budgeted to be delivered in 2017 compared with 2016.

**Table 2
BEP Printing Costs**

Note type	2016 estimated variable unit costs (per thousand notes)	2017 budgeted variable unit costs (per thousand notes)	2016 estimated total unit cost ^b (per thousand notes)	2017 budgeted total unit costs ^b (per thousand notes)
\$1, \$2 ^a	\$20.93	\$22.06	\$53.87	\$54.26
\$5	\$37.54	\$37.57	\$112.63	\$114.93
\$10	\$37.52	\$38.38	\$132.80	\$108.77
\$20	\$40.95	\$41.18	\$118.03	\$122.20
\$50	\$40.95	\$39.33	\$81.92	\$194.19
\$100	\$74.84	\$71.37	\$134.14	\$154.84
Average cost per thousand notes ^c	\$38.31	\$38.87	\$94.91	\$102.67

a. \$1 and \$2 notes do not include the number of security features that are in all other denominations; \$5 notes include two watermarks and additional security features; and \$10, \$20, and \$50 notes include watermarks, additional security features, and a color-shifting ink. The \$100 note includes a watermark, a 3-D security ribbon, a new color-shifting feature (“the Bell in the Inkwell”), additional security features, and a color-shifting ink.

b. The total costs per thousand notes are fixed costs divided by the number of notes in the Board’s budget, plus variable costs per thousand notes.

c. The average cost per thousand notes is budgeted costs divided by the number of notes included in the budget, excluding the volume of \$100 notes which were processed on single-note inspection (SNI) equipment. The SNI \$100 notes were provided to the Board at no cost because we paid for these notes through surcharges in 2010, when the notes were originally printed, but not accepted because of quality concerns.

The BEP provided us with estimates of 2017 printing costs, as shown in table 2, which reflect the number of notes in our order. Variable costs, by denomination, remained relatively stable between 2016 and 2017 and range from \$22.06 per thousand notes for \$1 notes to \$71.37 per thousand notes for \$100 notes. Consistent with the stable variable costs by

⁶ By memorandum of understanding between the Board and the Treasury, the BEP is required to consult with the RBOPS director before funds are committed for capital projects that exceed \$1 million. During 2016, however, the director of RBOPS and the BEP agreed to a long-term manufacturing strategy to replace aging production equipment, which will allow the BEP to acquire the agreed-upon production equipment without consulting with RBOPS director. The BEP will continue to consult with the RBOPS director for capital projects that exceed \$1 million that are not part of the long-term manufacturing strategy and RBOPS staff will review with the BEP annually, its progress in achieving the plan.

denomination, the average variable costs remained relatively unchanged between 2016 and 2017. The total projected average cost per thousand notes will increase from \$94.91 in 2016 to \$102.67 in 2017 primarily because of higher fixed costs at the BEP.

2017 Currency Reader Program Budget

The 2017 currency reader budget is approximately \$1.7 million, which is \$0.1 million lower than 2016 estimated expenses and \$6.8 million lower than the 2016 budget. The budget includes \$0.5 million to purchase and distribute nearly 8,500 currency readers to qualified blind or visually-impaired individuals at no cost to the user. The BEP expects to distribute fewer readers in 2017 than it did in 2016 because the BEP believes that a majority of qualified individuals have either received a reader or downloaded the BEP's smart-phone currency reader application. In addition, the budget includes nearly \$1.2 million to reimburse the Library of Congress for administering the currency reader program through the existing infrastructure of its book reader program, which is managed by the National Library Service, and other administrative and outreach expenses. The BEP will continue to bill the Board quarterly based on actual, rather than budgeted, expenses.

2017 Budget for Other Reimbursements to the Bureau of Engraving and Printing

The 2017 budget includes \$4.0 million to reimburse the BEP for expenses incurred by its Destruction Standards and Compliance Division of the Office of Compliance (OC) and Mutilated Currency Division (MCD) of the Office of Financial Management. The OC develops standards for cancellation and destruction of unfit currency and for note accountability at the Reserve Banks, and reviews Reserve Banks' cash operations for compliance with its standards. As a public service, the MCD also processes claims for the redemption of damaged or mutilated currency.

Board Expenses

2017 Currency Transportation Budget

The 2017 currency transportation budget is \$21.2 million, which is nearly \$0.4 million, or 2.0 percent, higher than 2016 estimated expenses. The budget includes the cost of shipping new currency from the BEP to Reserve Banks, of intra-System shipments of fit and unprocessed currency, and of returning currency pallets from the Reserve Banks to the BEP.

The majority of the increase is attributable to a growth in armored carrier rates between 2016 and 2017, which are associated with new contracts.

2017 Quality Assurance Budget

The 2017 budget for the quality assurance program is \$12.5 million, which is about \$3.3 million, or 35.9 percent, higher than 2016 estimated expenses and the 2016 budget. The budget includes \$11.5 million to fund the CQA program and \$1.0 million to fund the research and development of a quality inspection sensor.

The budgeted funding will allow the CQA consultants to continue facilitating the implementation of the new quality system at the BEP; to support the research, technology, and product development required for the next design family of notes; and to continue providing temporary resources to the BEP to sustain critical programs that have been implemented for the quality system. The increased funding would help enhance the overall implementation effort for the CQA program as well as provide additional resources to the BEP to facilitate the acceleration of the next design family of notes. Because Treasury has changed priorities in support of the acceleration of the new family of notes, we believe that increased funding in 2017 for the CQA program is necessary to complete the successful implementation of the quality system, as well as facilitate the acceleration of the development of the new-design family of notes. Without this additional support, we believe that full implementation of the quality system, and therefore the investments made by the Board, will be in jeopardy. We also believe that the quality of new-design notes will suffer and that the ultimate costs to the Board of new currency will be increased.

The budget also includes \$1 million for the Board to contract for the research and development necessary to develop a new optical currency sensor that could be used at the BEP (and possibly the Reserve Banks) for inline sheet inspection and monitoring of print quality, features, characteristics, and other attributes. This research supports our strategy to inspect for quality throughout the production process and to align new and circulated note inspection processes.

2017 Counterfeit Deterrence and Analysis Budget

The 2017 budget for counterfeit deterrence research is \$8.1 million, which is nearly \$2.9 million, or 55.7 percent, higher than 2016 estimated expenses and \$1.9 million, or 19.0 percent lower than the 2016 budget. The budget includes approximately \$5.9 million for

the renewal of annual memberships and \$2.2 million for Board-led research, development, and partnerships with other government agencies.

The budget includes about \$5.9 million for membership in the Central Bank Counterfeit Deterrence Group (CBCDG), which is an increase of nearly \$0.8 million from 2016 expenses. The CBCDG operates under the auspices of the G-10 central bank governors to combat digital counterfeiting and includes 35 central banks. The augmented 2017 membership fee will allow the CBCDG to develop enhanced counterfeit deterrence technologies. The Board's counterfeit deterrence and analysis budget also includes membership in the Reproduction Research Center at the Danmarks Nationalbank to perform adversarial analysis on design concepts and potential security features.

The budget also includes nearly \$2.2 million to contract with commercial vendors and national labs to research, develop, test, and evaluate new or existing security features. These additional responsibilities are consistent with the customary role of an issuing authority and focused on security issues in particular. Although they have not been core activities at the Board in the past, we believe they are necessary to support a new-design family of notes with the requisite security features, and are typically associated with the role of an issuing authority.

2017 Currency Education, Outreach, and Research Budget

The 2017 budget for currency education, outreach, and research is \$4.6 million, which is about \$1.0 million, or 27.3 percent, higher than the 2016 budget. The budget includes nearly \$3.1 million to fund the Board's currency education program (CEP), \$1.0 million to contract for design-related work for the next design family of notes, \$0.5 million to conduct cognitive and perception studies, and \$65 thousand to host the XXII Pacific Rim Banknote Conference.

The CEP program is designed to protect and maintain confidence in U.S. currency worldwide by providing information on all circulating designs of Federal Reserve notes to the global public and key stakeholder groups. In 2017, the CEP will continue to conduct outreach to domestic and international businesses and retailers and maintain the uscurrency.gov educational website.

2017 Capital Budget

The 2017 capital budget includes \$0.6 million to equip an office-size adversarial analysis workspace at the Board, which will be used to assess the counterfeiting threat to

potential new security features from casual counterfeiting using commercially-available materials. We would purchase commercial evaluation tools, equipment, and materials similar to those used by the casual counterfeiter to assess the threat to potential new security features using less-sophisticated techniques.

2017 Budget Risks

Test equipment

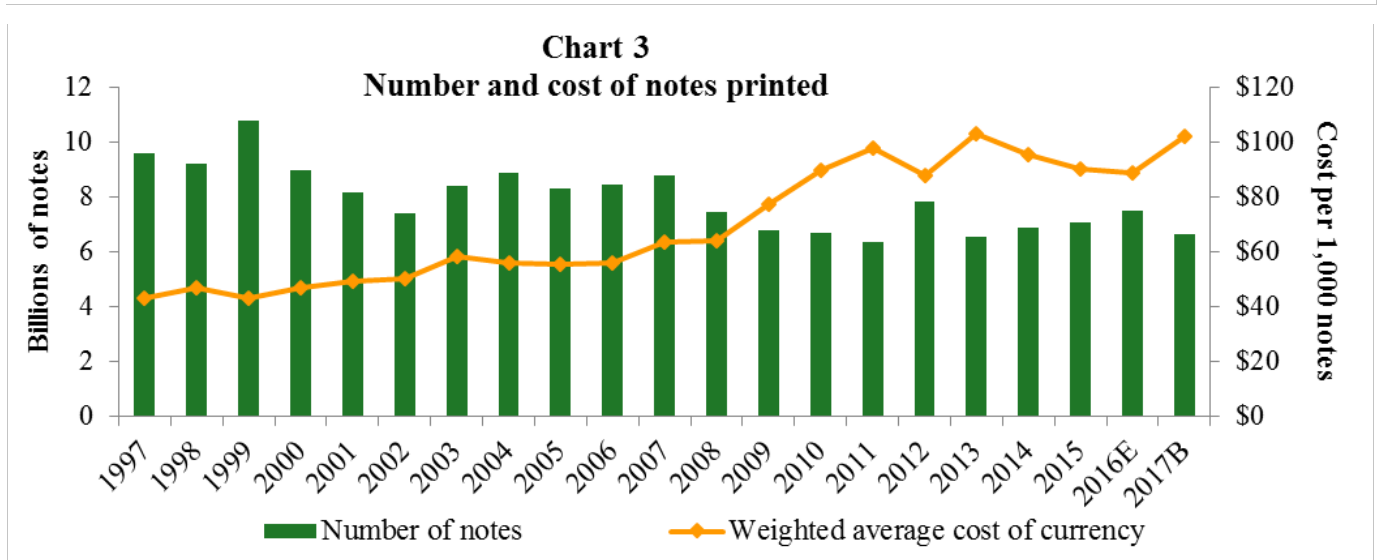
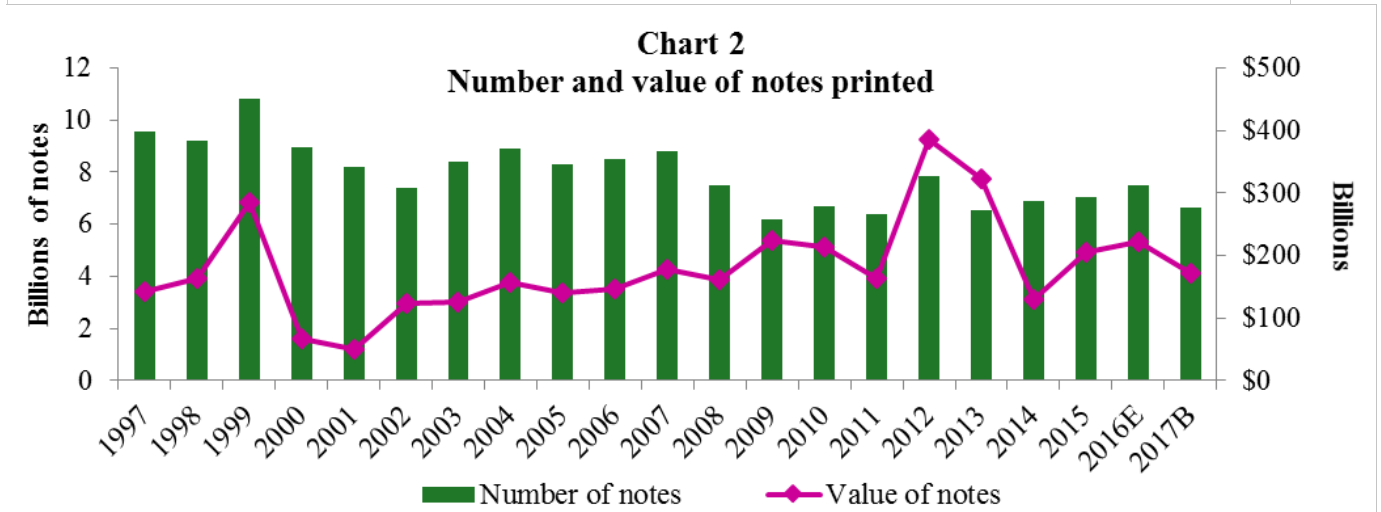
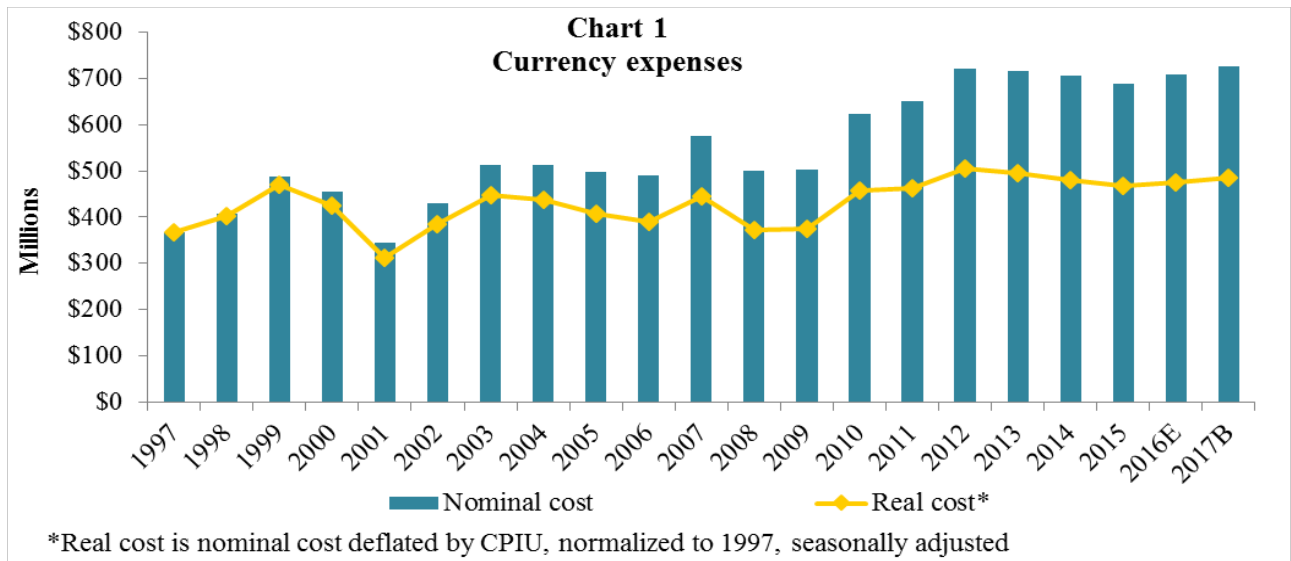
In order to support our role as issuing authority and to facilitate the Treasury Department's and BEP's plan to accelerate a new-design family of Federal Reserve notes, we believe that the Board should also equip an adversarial analysis test facility to assess the counterfeiting threat from the professional counterfeiter using commercial printing equipment.⁷ The test facility would be located at the BEP and use specialized, scientific staff from the Board and BEP to conduct the analysis. To advance this initiative, the Board and BEP need additional test equipment to analyze potential new security features, ensure that security features are manufacturable, and can be integrated effectively into the new-design family of notes. This capability would provide us with more comprehensive information about threats to our notes and support the acceleration of the new-design family of notes. The BEP has developed requests for proposals for this additional test equipment and has included the associated capital costs in its billing rates. If, however, the BEP is unable to acquire this equipment in 2017, it may request that the Board purchase this equipment, which could cost between \$7 million and \$14 million.

New BEP Facility

The BEP received Treasury approval in 2015 to pursue a new building in the metropolitan Washington D.C. area. The BEP continues to pursue strategies with the Government Services Administration that will facilitate necessary approvals to move the project forward. The BEP requested that we include \$40 million in the 2017 budget; however, based on the current status of the project, we have not included any funding in the budget.

⁷ On June 17, 2015, the Secretary of the Treasury announced that the theme of the new-design family of notes will be "democracy," and that the \$10 note will be the first denomination to be redesigned, will be unveiled in 2020, and will include a raised tactile feature. On April 20, 2016, the Secretary announced that he directed the BEP to work closely with the Federal Reserve to accelerate work on the redesign of the \$5, \$10, and \$20 notes.

Attachment: New Currency Expenses



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016E	2017B
Nominal cost	190	260	295	355	368	373	403	367	408	487	456	344	430	514	514	497	489	576	500	502	622.859	650.011	721.0740527	717.28005	707.402	689.1985492	708.910808	726.55837
Real cost*	190	306.43823	337.4682266	394.4626478	398.516669	392.908564	412.42089	367	401.76351	469.2878083	425.061556	311.8471386	383.7229558	448.5013817	436.807024	408.500704	389.364557	445.91744	372.7700948	375.5965948	458.50369	463.848073	504.1266121	494.234393	479.64708	466.7507132	476.226913	485.186348
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016E	2017B
Number of notes	7	8.02	8.45	8.03	9.33	9.96	9.44	9.58	9.2	10.8	8.97	8.18	7.39	8.39	8.88	8.3	8.5	8.8	7.5	6.2	6.663424	6.3616	7.824	6.544992	6.874864	7.060816	7.49128	6.61112
Value of notes	84.47	107.96	103.19	104.89	128.82	148.24	194.64	142.2	163.26	285.49	67.46	50.2	123.3	126.2	157	140.8	146.1	178.1	160.3	224.2	213.76128	162.496	386.5536	321.755584	130.1168	205.8057934	221.6464	172.5872
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016E	2017B
Number of notes	7	8.02	8.45	8.03	9.33	9.96	9.44	9.58	9.2	10.8	8.97	8.18	7.39	8.39	8.89	8.29	8.46	8.8	7.4592	6.7808	6.663424	6.3616	7.824	6.544992	6.874864	7.060816	7.49128	6.61112
Weighted average cost of currency	26	30	36	41	38	37	40	43	47	43	47	49	50	58.25	55.67	55.32	55.74	63.3	63.99	77.42	89.756423	97.9184886	87.88945961	102.858358	95.5379224	90.26527242	88.9101697	101.918996