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THE FUTURE OF MONEY: COINAGE PRODUCTION

HEARING

BEFORE THE

SUBCOMMITTEE ON
DOMESTIC MONETARY POLICY
AND TECHNOLOGY

OF THE

COMMITTEE ON FINANCIAL SERVICES
U.S. HOUSE OF REPRESENTATIVES

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THE FUTURE OF MONEY: COINAGE PRODUCTION

Tuesday, April 17, 2012

U.S. HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON DOMESTIC MONETARY
POLICY AND TECHNOLOGY,
COMMITTEE ON FINANCIAL SERVICES,
Washington, D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 2128, Rayburn House Office Building, Hon. Ron Paul [chairman of the subcommittee] presiding.

Members present: Representatives Paul, Luetkemeyer, Huizenga, Hayworth, Schweikert; Clay, Maloney, Green, and Cleaver.

Also present: Representative Stivers.

Chairman PAUL. This hearing will come to order. Without objection, all Members' opening statements will be made a part of the record.

The Chair also notes that the gentleman from Ohio, Mr. Stivers, wishes to sit in on this hearing. Without objection, he will be seated for this hearing and recognized for an opening statement and for questions.

I now recognize myself for 5 minutes to make an opening statement.

I want to welcome everybody to the hearing this morning. This is a subject that is not brand new. It has come up in the past on what we should do with our coinage, what we should do with the penny, what we should do with the nickel, and why we have to keep changing it all the time.

I see a hearing like this and this discussion, which has gone on literally for years, as being a technical discussion which cannot be ignored. But there is also a monetary issue involved here, which is generally ignored, and I don't think it should be. Why should we have to change the nature of our coinage? Why shouldn't a penny be a copper penny? Why shouldn't a dime be a silver dime? Why shouldn't a double eagle be gold?

And the reason is very simple. It is because we as a country live beyond our means. We want to spend too much money overseas. We want to spend too much money at home. We run up huge deficits. We can't cover it by taxes. We can't borrow enough money, so therefore, we print money. And that is where the problem comes from.

We print money. The value of the money goes down and the cost of things go up. The cost of labor goes up. The cost of commodities go up. First, the so-called value or the dollar value of silver and

gold and copper and zinc—they go up essentially because the value of the dollar goes down.

But we can tinker. We can change. We can take the penny and dilute the metal. In the old days, they might just clip the coins or dilute the gold or the silver. Today, we even dilute base metals.

First, we were on gold standards and silver standards. We couldn't maintain it. And then, we thought at least we could have a copper standard. The penny had real value up until about 1980. And then, the value of the copper became worth more than the penny itself.

So this is where our problem lies. And if we are trying to deal with this by saving money, by changing the technicalities on how we produce the coinage itself, and think there might be a savings—this idea that we can save money is rather interesting to me, because the U.S. Mint isn't even in the appropriations business. They so-call earn their own money. Yes, they mint their own money. It is sort of like saying the Federal Reserve doesn't—the Fed can make profits. Of course, they create as much money as they want.

But diluting the metals doesn't solve the problem. And so, we haven't been able to maintain the zinc standard. Now, we are going to the steel standard. But it seems we are not even starting off really well with the steel standard. Under the steel standard—the best I can do with these calculations—it will cost us more than a penny to make a penny. And a lot of people don't even like the penny. I don't know how this is all going to work out.

Sometimes, we mint coins and there seems to be no market for them. We mint silver—not silver dollars—but metallic dollars. And they keep making it and the Mint makes money with seigniorage. But the truth is dollars, metal dollars, don't circulate. The Fed buys them. I think sometimes we kid ourselves about this.

But my prediction is this may be helpful. It may save a couple of dollars. Others will argue it doesn't save anything—that it might hide the problem for a little bit, but eventually we will have to deal with the real problem in this country.

The reason we have a problem with our coinage—the problem we have with our money, whether it is silver dollars or gold dollars—is the fact that we live beyond our means. And we think we can get away with just creating money out of thin air and believe that is real wealth. But that is all coming to an end.

So the most I think we could expect if we do anything about silver—steel pennies or not—will not address, I think, the real problem that we have in this country. Since the Mint is not even in the budget, to say that there will be a savings, I think might be a bit of a stretch. I would like to save literally billions, if not trillions of dollars, and address the subject.

But in the meantime, we will be dealing with these technicalities on how we mint the coinage. And obviously, it is the Congress that has this responsibility. It is not the Treasury. It is not the Mint. It is not the Executive Branch. Explicitly, in the Constitution, it says that Congress should have this responsibility and we shouldn't be reneging and giving up on this responsibility.

So with that, I would like to yield to Congresswoman Maloney.

Mrs. MALONEY. In some ways, this hearing is timely. Canada's recent announcement to eliminate the penny has many in Congress

questioning whether we should be doing the same thing. Have we simply stopped using smaller denomination coins like the penny to warrant making it a thing of the past?

And there are several legislative proposals that would change the composition of the penny to make it cheaper to produce. But under the Coin Modernization Act that this Congress passed in 2010, the Mint is required to undertake an extensive study of alternative compositions of coins. This study will be completed at the end of this year. So I hope that this subcommittee will take another look at this issue when that study is released and specific recommendations are made in terms of how we can move forward.

For now, Congress has the authority to set the weights and measures of coins that are produced, so I look forward to the testimony. But I think we should wait until the report comes out later this year before taking any specific actions. Thank you. I yield back.

Chairman PAUL. I thank the gentlelady. And now, I recognize Congressman Stivers from Ohio.

Mr. STIVERS. Thank you, Mr. Chairman. I would like to thank Chairman Bachus and Chairman Paul from the subcommittee for allowing this important hearing today.

I am a new Member of Congress. And I came here to help cut excessive government spending and save taxpayers money. I appreciate Chairman Paul's comments about the real problem in Washington being spending. I believe that to be true, and I am working hard to address that. But in these tough fiscal times, I think there are some things we can do to be much more efficient in America about the way we mint our coins, more specifically, the composition of our coins.

I recognize what the gentlelady from New York stated about a study that the Mint is currently conducting, which will be finished by the end of year. But that is no reason for us to wait to do our own due diligence. We need to forge ahead, which I appreciate this committee is doing. I am not saying we are going to absolutely run roughshod over a study or go ahead of it, but I do think we need to continue to do our job.

So earlier this year, I introduced legislation to change the composition of the 1-cent and 5-cent coins. Because since 2006, the commodity metals required to manufacture those coins have made those couple of denominations—the penny and the nickel—very expensive and uneconomical. Specifically, the cost of minting a 1-cent and 5-cent coin is greater than their face value.

In fact, included in the U.S. Mint's recent annual report, the unit cost to produce a penny was 2.41 cents. And the cost to produce a nickel was 11.18 cents. Last year, the Mint produced 4.3 billion pennies and 914 million nickels.

Currently, the penny is produced from highly expensive zinc, which is copper-plated. And the nickel is made of a nickel-copper alloy. The production costs of these denominations have resulted in millions more in cost to the Treasury—to the Mint—than they need to have.

And so that is why I suggested, in my legislation, creating steel coins. An American multi-ply steel composition would the material we would use. Most nickel is from Canada, but even Canada makes

their nickels out of steel, ironically. And because it is an American resource, it would help American jobs and these new coins could easily resemble the current coins. You could put a copper plating on a steel penny and they could co-circulate with the existing currency and be used in things like vending machines.

In fact, there was a recent study that estimated that replacing the metallic content of nickels and dimes could actually save as much as $182 million to $207 million annually. So, I think it is a great opportunity for the U.S. Mint to operate more efficiently.

I know the U.S. Mint is considering various materials, but I think that the Royal Canadian Mint recently made their transition to steel coins. It has been an effort that has saved the taxpayers in Canada money. I think it could work here. And I think it is worth examining.

I appreciate Chairman Paul for having this hearing and I look forward to addressing the issues related to making our coins much more economical.

Thank you, Chairman Paul. I yield back the balance of my time.

Chairman PAUL. I thank the gentleman.

I thank the Members for their opening statements, and now I would like to introduce our witnesses.

Mr. John Blake is executive vice president of engineering at Cummins Allison Corporation, a leading producer of coin and currency counting machines.

Mr. Rodney Bosco is the director of the disputes and investigations practice at Navigant Consulting, Incorporated.

Mr. Dennis Weber is a coin industry consultant, and was formerly the vice president of marketing and sales for Jarden Zinc Products.

Without objection, your written statements will be made a part of the record. You will now be recognized for a 5-minute summary of your testimony. We will start with Mr. Blake.

STATEMENT OF JOHN BLAKE, EXECUTIVE VICE PRESIDENT OF ENGINEERING, CUMMINS ALLISON CORPORATION

Mr. BLAKE. Mr. Chairman, members of the subcommittee, on behalf of Cummins Allison Corporation, we would like to thank you for this opportunity for me to speak with you today. My name is John Blake. I am executive vice president of Cummins Allison, in charge of the engineering and product development function.

Cummins Allison is a privately held company located near Chicago in Mt. Prospect, Illinois. And we are a global leader in the development of systems for counting, sorting, and authenticating currency, checks, and coins. We have a 125-year heritage of leadership and product innovation. We serve financial institutions worldwide, as well as retail, gaming, armored carriers, government, and virtually anybody who handles coin and currency sorting and processing.

We have 50 branch offices in the United States that sell and service our products. We also have wholly owned subsidiaries in France, Germany, Canada, the U.K., and Ireland. And we work with a network of dealerships worldwide in 70 different countries that also sell and service our products.

All Cummins products are designed, developed, and manufactured in the United States. And we have a portfolio of 350 patents that we depend on to protect our IP and support our R&D investments.

As far as products, we have a broad portfolio of products from small desktop machines for retailers to large high-speed machines for volume customers who demand industry leading speed, accuracy, and dependability. We also have a line of self-service coin machines used by the public to count coins that are collected at home.

And one of the critical features of our products is our sensing technology. We have a research group near San Diego that develops state-of-the-art sensing technologies that are used in our equipment. What that allows our customers to do is to authenticate and denominate currency and coin, and off-sort any strangers or counterfeit.

Cummins Allison supports congressional efforts to identify cost-savings opportunities, including efforts to reduce costs associated with the circulation of coin and currency. And being an IP-intensive engineering and manufacturing company, we understand the challenge; that is, how to reduce cost while still being innovative and maintaining features and functionality and quality. We know firsthand it is not an easy endeavor.

Cummins Allison has been through a number of coin changes from various countries. Some have gone well. Some have not gone very well. And I offer the following points for consideration.

The United States has been through a number of changes. Take the penny, for instance. Most of those changes, more recently, have been done to material only. They have maintained the size; that is, the diameter and the thickness of the coin. And those transitions to those new designs or new materials have gone relatively smoothly.

In other countries—we have been talking about the Canadian one dollar and two dollars that was recently introduced, 2 weeks ago. There again, they have changed the material only. They have maintained the diameter and the thickness of the coin. And at least from what I understand today, the transition has been relatively smooth in that regard.

Cummins Allison's machines can process material changes. It becomes more difficult when you start talking about changing the diameter and thicknesses of coins. Those changes could require significant modifications to our machines or perhaps even replacement, which would be a significant impact in the marketplace.

Coin construction can have impact in other ways. It can impact machine function and coin durability, such as if you use soft materials. If you use soft materials, that impacts not only the wear characteristics of the coin, but also the durability of the machines that we have in the marketplace.

Common metals also are more readily available, and therefore, are an open opportunity for counterfeiting—maybe not so much a threat for low-value coins. But certainly for higher-value coins, that would become a significant concern. So, the ease of counterfeiting should be carefully studied in any change that is proposed.

Coins should be unique to other coins in other countries. Again, counterfeiting—we had one particular case in the U.K. with the

U.K. pound, where they used the same blank in another country, and it is creating a problem in the U.K.

Some competitors use scales. While Cummins equipment can process coins of different weights, when you are talking about scales and different weights of material, it is very difficult to separate denominations, count and authenticate, based on the differences of weight of a particular denomination of coin.

Finally, changes could impact worldwide the value of American currency and could affect public commerce. Confidence in commerce will cost the government far more than what would be saved by initial material alteration.

So for seamless transition, Cummins Allison believes that stakeholder input is essential, and early involvement is the key. Stakeholders should work collectively to raise and address issues. And we suggest the development of a government industry stakeholder taskforce that would ensure technical, commercial, and public issues are addressed early and at every stage of the project.

For Cummins directly, we would welcome the ability to test and report on options early and we believe this is very important. We prefer to establish a strong partnership with Congress, the Treasury Department, and the U.S. Mint. This relationship would ensure that decisions made are in the best interest of the American public.

So in conclusion, Mr. Chairman and members of the subcommittee, again, thank you for the opportunity to appear here. Cummins appreciates your efforts and supports the efforts of the U.S. Mint to reduce costs. However, we encourage everyone to proceed slowly and cautiously on decisions to alter weight, appearance, size, and material of our Nation's coins. Any savings realized would mean nothing if there are societal costs due to the inability to process and circulate American currency. If changes make coins attractive to counterfeit, that puts our economic and national security at risk.

So, we commend the subcommittee for taking the time and care to research this important matter. Going forward, we encourage Congress, the Treasury Department, and the United States Mint to consult with all stakeholders long before decisions are made. This should ensure a smooth transition and public acceptance while protecting the security of our Nation's monetary system. Thank you.

[The prepared statement of Mr. Blake can be found on page 26 of the appendix.]

Chairman PAUL. Thank you. Now, I recognize Mr. Bosco.

STATEMENT OF RODNEY J. BOSCO, DIRECTOR, DISPUTES AND INVESTIGATIONS PRACTICE, NAVIGANT CONSULTING, INC.

Mr. BOSCO. Thank you, Mr. Chairman, members of the subcommittee, Congressman Stivers. My name is Rodney Bosco. I am a director in the Disputes and Investigations Practice at Navigant Consulting, Incorporated. Navigant is a global advisory firm that provides independent, objective analysis and opinions on accounting, financial, economic, and operational issues facing our clients.

I am pleased to testify today concerning our Nation's coinage, the factors that influence their cost of production, and two studies we recently conducted that have applicability to legislation being considered by this body.

Our first study examines potential cost savings available to the United States Mint if it were to move to multi-ply plated steel compositions for the vended nickel, dime, and quarter denominations. Our second study looks at the potential consequences of a hypothetical decision to eliminate production of the penny on the United States Mint's costs and profits.

Both studies were commissioned by Jarden Zinc Products, North America's leading plated coin blank producer and a licensee of the Royal Canadian Mint's multi-ply plated steel technology. The studies were conducted by myself and by Kevin Davis, who is a director and colleague of mine at Navigant.

As the subcommittee endeavors to find ways in which to make our coins more cost-effective to produce, our work has led us to three key findings that I would like to share with you today. First, raw material costs—that is, the cost of the metal itself—currently make up between 50 and 70 percent of the total production costs for the nickel, the dime, and the quarter.

The change in the metallic content of these coins to multi-ply plated steel will reduce the per unit raw material cost of each of these coins by over 80 percent, based on recent metal prices. Applied to the average, historical production of these coins over the past 30 years, raw material cost savings would average approximately $200 million annually.

Our second finding relates to the opportunity presented by the parallel adoption of an alloy recovery program. Under such a program, the United States Mint would collect and replace existing copper nickel alloy coins with multi-ply plated steel coins and salvage the copper in the nickel from the retrieved coins. Since its launch of multi-ply plated steel coins in 2001, the Royal Canadian Mint has had in place an alloy recovery program that has generated more than $200 million in revenue for the Canadian people.

The United States Mint could execute a similar program for its current copper and nickel alloy coins—the 5-cent, 10-cent, and quarter, dollar denominations. Based on the analysis we have conducted, which assumes the recovery of one-third of the coins minted in the last 30 years, such a program has the potential to generate more than $2 billion in additional revenue for the United States Mint.

Our third finding relates to the impact of eliminating penny production on the United States Mint's costs and profits. The United States Mint has reported that its production of 4.3 billion pennies during Fiscal Year 2011 resulted in a loss of $60.2 million, or roughly 2.4 cents per coin, leading some to suggest that the penny should be dropped as a means of eliminating such losses.

We have found that ending production of the penny would not eliminate these losses, as a portion of the United States Mint's fabrication, distribution, and administrative costs currently assigned to the penny are fixed and would continue to be incurred regardless of whether the penny is produced.

We estimate this fixed portion to equal $30.7 million, based on 2001 production, resulting in an apparent cost reduction at first blush of $29.5 million in Fiscal Year 2011. However, the analysis does not end here. Dropping the penny will result in increased demand for the nickel, which the U.S. Mint currently reports costs an

excess of 11 cents to produce each coin. If production of the nickel doubled in response to elimination of the penny, a scenario posed by the U.S. Mint's acting Director in answering a question from this subcommittee in 2006, the United States Mint would incur losses of approximately $40 million related to the additional nickel production. This amount is greater than the perceived cost reduction of $29.5 looking at the penny alone, resulting in an overall increase in net loss to the Mint of as much as $10 million. So our analysis of the United States Mint's costs found the possibility of greater losses to the Treasury without the penny.

Mr. Chairman, I thank you for the opportunity to appear here today. And I welcome the opportunity to answer your questions.

[The prepared statement of Mr. Bosco can be found on page 30 of the appendix.]

Chairman PAUL. Thank you. I recognize Mr. Weber.

STATEMENT OF DENNIS H. WEBER, COIN INDUSTRY CONSULTANT

Mr. WEBER. Thank you, Mr. Chairman. I appreciate the opportunity to visit with the committee this morning and speak to the Canadian experience with controlling costs for circulating coinage. I am a technical consultant under contract to the Royal Canadian Mint. I am not an employee of the Mint, nor am I a spokesman for the Royal Canadian Mint.

For nearly 3,000 years, mankind has used coinage to facilitate commercial transactions. And one would think that in that amount of time, every possible combination of materials, shapes, and designs would have been used. But societies change. Technologies change. And the demands of the marketplace necessitate the continuous evolution of coinage systems.

On April 10th, the Royal Canadian Mint completed a process that was initiated in 1996. Last week, the Canadian 1-dollar and 2-dollar coins were converted from nickel and copper-based alloy to the modern, safe, and secure multi-ply technology.

Multi-ply technology is a proprietary process developed in Canada that applies electroplated layers of nickel and copper to an inexpensive steel core, which creates circulating coinage that is both attractive and affordable. In an age of escalating global metal costs, governments need to produce coins more cost-effectively without compromising quality. Canada has been using the multi-ply process for circulating coins since 2001 when the 5-cent, 10-cent, 25-cent, and 50-cent denominations were converted from expensive nickel and nickel-based alloys to the more affordable steel coins.

Because the multi-ply steel coins are nearly identical in size, weight, and appearance to the nickel alloy coins they replace, the transition went almost unnoticed by the general population of Canada. The major reason the transition from pure nickel and nickel alloy coins to multi-ply electroplated steel went so smoothly was the commitment by the Royal Canadian Mint to involve the major stakeholders early and continuously throughout the process.

The national banks of Canada, charitable organizations, coin handling and coin transportation companies, and the vending industry were personally and continuously updated during the conversion. Particular attention was given to the vending industry as

their support was critical for a seamless changeover. Despite the fact that the vending industry represented only a fractional percentage of retail transactions, nevertheless, every reasonable effort was made to address their concerns.

The annual production volume of Canadian circulation of coins has traditionally been only about one-tenth the volume of circulating coins produced by the U.S. Mint. Nevertheless, the transformation from nickel and nickel alloy to multi-ply has saved Canadian taxpayers over $250 million.

The older pure nickel and nickel alloy coins have successfully co-circulated in Canada with the new multi-ply coin for over a decade. The Royal Canadian Mint, however, has for the last 6 years maintained an active program of removing the older nickel and nickel alloy coins from circulation.

Again, with the escalating global prices for commodity metals, the older coins are eventually defaced and sold for their metal content. The profit from these sales is returned to the Canadian taxpayers. But Canada is not alone in enjoying the cost-saving benefits of multi-ply technology. Since its introduction, multi-ply technology has been adopted internationally by 28 different countries, representing over 60 denominations.

The New Zealand experience is a good illustration of this process. In 2004, the Reserve Bank of New Zealand sought public input on a proposal to reduce the size of the 10-cent, 20-cent, and 50-cent coin, while concurrently changing the composition from expensive alloy to electroplated steel. The Reserve Bank wanted to reduce the size of the coins to make coin usage more convenient for the public and for cash-handling businesses. The conversion to electroplated steel was motivated by the desire to maintain positive seigniorage well into the future.

The Reserve Bank also recognized that to be accepted by the public, the new coins had to be durable and they needed to function in vending machines. After extensive, independent testing, the Reserve Bank of New Zealand selected multi-ply as the only process that met their criteria for public acceptance. Multi-ply coins have been in circulation in New Zealand since 2006.

The Reserve Bank of New Zealand took a very aggressive approach with the introduction of their new multi-ply coins. Rather than co-circulate coins of different sizes and different compositions, the Reserve Bank elected to completely replace the old coins and over a period of 6 months, old coins were removed from circulation as the new coins were introduced.

After the coins were recalled, they were demonetized, and the demonetized coins were sold to recoup the current metal value. The profit generated from the demonetized coins was sufficient to cover the cost of the new multi-ply coins and to generate additional revenue for the taxpayers of New Zealand.

I brought with me samples today for the committee of current circulation coins for the Canadian 5-cent and 25-cent coin. And I think the committee will notice that the 5-cent coin is almost identical in weight and feel to the U.S. nickel. The major difference is that the Canadian 5-cent coin costs approximately 3 cents to produce versus the reported 11-cent cost to manufacture the U.S. 5-cent coin. Assuming that approximately a billion coins or a billion

nickels are produced every year, this generates a cost savings to the American taxpayer of approximately $80 million a year.

So I want to thank the committee for the opportunity to appear today, and I look forward to your questions.

[The prepared statement of Mr. Weber can be found on page 98 of the appendix.]

Chairman PAUL. I thank the panel, and I will yield myself 5 minutes for questioning.

I want to talk a little bit about a cost, but not the cost to the government because we are debating on how much money the government might save or what it will be—how much cost it will be to change. But what about the cost to private industry or local government that has meters—parking meters—or other coin machines? There have been some estimates that there will be a cost to them, too. They have to change their equipment and change their coin machines. One estimate was as low as $530 million, which would be not inconsequential. It is really hard to calculate absolutely how much it would cost—some have even said it could cost over a billion dollars.

Mr. Blake or Mr. Bosco, could you address that? What is the cost? We can't say there would be no cost. There has to be some cost when these machines have to be changed.

Mr. BLAKE. I can speak on behalf of Cummins Allison and our equipment. It is a difficult thing to say because it depends mostly on the nature of the changes. As I mentioned earlier, if you change metal only and you maintain the size and diameter of the coin, the cost, at least for our equipment, would most likely be less significant, maybe because we most likely will have to change things like software or sensors or things like that.

As far as the other industries, the vending industries, again, I would encourage the committee to engage those organizations and really study this and consider any changes. It could be significant, or it could be simple. It depends on what it is.

Chairman PAUL. But you wouldn't be able to eliminate some costs to the vendors?

Mr. BLAKE. There is always going to be an associated cost. Even if I had to update software for a particular machine, there is always a cost involved. How extensive that is depends on the nature of the changes.

Chairman PAUL. Do you have anything to add, Mr. Bosco?

Mr. BOSCO. We certainly recognize the fact that there will be additional costs. Unfortunately, the scope of our analysis was centered on the impact of the Mint's operations and did not look at external consequences of changing the coins. So unfortunately, I am not in a position to add anything further to the discussion.

Chairman PAUL. Mr. Weber, I wanted to ask about the cost of the blanks. This is a basic cost and we can't ignore that. But if we could buy blanks from a foreign country at one-half the price that they can be produced in the United States, would that be a wise move for us in the Congress to recommend that we buy the steel blanks at the best price?

Mr. WEBER. I think there is adequate capacity from vendors in the United States to supply blanks to the U.S. Mint, so that shouldn't ever be an issue. And there is certainly—if those blanks

could be purchased domestically, the impact on transportation costs—I don't know if it would be exempt from import duties or whatever, but certainly, I think if we can keep that business at home, it would be a lot better.

I should mention that in fact, all of the steel that goes into the Canadian coins for their circulation business and for the coins that they produce and export to foreign countries, comes from steel which is precision-rolled here in the United States. So, the steel for those coins are used in Canada. And the coins that are exported do come from the United States.

Chairman PAUL. Yes, but wouldn't it be a wise and frugal move that if it came up—we don't know how to predict future prices—if it were 50 percent lower, wouldn't this be a wise thing for us to do since we are in the business of trying to save some money?

Mr. WEBER. I think that all of those options need to be considered.

Chairman PAUL. Okay. Also, I would like to ask a little bit about eliminating the penny—you really don't save money. Was that you, Mr. Bosco? You mentioned that you don't save a whole lot of money by just stopping? To me, this is rather amazing, astounding that you can stop something—I can't imagine anything in private industry where you no longer produce something and there would be no savings. But why don't you explain that to me, that you wouldn't save money, because you are not—if you got rid of the penny, you wouldn't be buying blanks anymore, so there has to be some savings. Would you address that?

Mr. BOSCO. And you are absolutely right, Mr. Chairman. If the United States were to stop production of the penny, they would no longer purchase blanks from their current supplier and that would save them approximately $47 million. In addition, they would lose the revenue that they receive from selling those finished pennies to the Federal Reserve of approximately $43 million. So we are looking at a net savings just at that level, of approximately $4.3 million.

The other issue, though, which is perhaps unique to the penny, but perhaps is not as prevalent in other types of commercial goods, is that in order to facilitate commerce, there needs to be low denomination coins. And in the absence of the penny being available as a low denomination coin, the nickel would need to pick up the slack. Additional nickels would need to be produced. And under the current composition of the nickel, the Mint would lose approximately 6.5 cents for each nickel it makes.

So yes, up to a point, there is savings for the penny, but then when you take into account the additional demand for the nickel, those savings become eroded, and eventually they flip over and become additional loss.

Chairman PAUL. But I am not sure we can compare selling something to the Federal Reserve as a real sale. The Federal Reserve has no money, except they print it. It is not really a cost. It really indirectly is a part of the problem, because the Fed just creates the money and they buy these pennies or the dollars and that so-called profit goes to the Mint. And it is just sort of a game that we play.

So if you didn't have that money coming in, and let's say the Mint was on budget where it should be and the Congress had to

appropriate the money, they are going to go to the Fed, too. They won't have the money. They just go to the Fed and the Fed prints the money and gives it to the Mint. So this idea that we are actually selling something which might not ever be used, and quite frankly, I am not sure too many people are using these pennies. They tell me there are a lot of jars filled with pennies in people's homes. And this whole idea that the Fed keeps buying them—I can't imagine a bank actually ordering pennies from the Federal Reserve, because they have a high demand for pennies. Most people are trying to get rid of their pennies. Though, what I would like to sort of hone in on is actually where we are, but anyway, I want to go ahead and yield to Mr. Cleaver his 5 minutes.

Mr. CLEAVER. Thank you, Mr. Chairman. Let me first present a statement from Richard Peterson, the Deputy Director of the U.S. Mint, who is not here with us today. And I ask for unanimous consent that this statement be placed in the hearing record.

Chairman PAUL. Without objection, it is so ordered.

Mr. CLEAVER. Thank you, Mr. Chairman. I understand the desire to want to get this issue out in the discussion arena for the Members, but we are going to receive a report from the Treasury in December. Many of the issues we are discussing, I think, would be discussed at that time when the report comes in. And many of the answers that we are considering may be provided in the report.

Nonetheless, I do have some issues. One is, of course, whether or not, with the Coin Modernization and Taxpayer Savings Act, it would allow the Treasury the authority to make these changes, including coin composition, without Congress.

Now, I am assuming, Mr. Weber, that when Canada did this, they went through the budget process. And so, therefore, I guess maybe the legislators did make some changes if it went through the legislative process. Is that what happened?

Mr. WEBER. Yes. The Canadian Mint and the U.S. Mint are very similar, in that neither one of those organizations makes policy. They implement policy. So just as the U.S. Mint produces coins that are specified by Congress, the Royal Canadian Mint produces coins that are specified by Parliament.

Mr. CLEAVER. Were there provisions made for the high possibility that the metals would increase in cost at some point, and a candidate could again face a situation where the cost of the metal exceeds the monetary unit? Was there some provision made for that?

Mr. WEBER. I am a little off base here, but I think that the provisions that were established back in the mid-1990s that allowed for the creation of multi-ply coins, which we believe will be in positive seigniorage well into the future, did allow for the Canadian 1-cent coin to be produced in either copper-plated zinc or copper-plated steel, at the discretion of the Mint, whichever was more cost effective for the taxpayer.

So, there was on the lowest denomination coins some flexibility built in. But the multi-ply was seen as a real solution to the long-term negative seigniorage potential. The elimination of commodity metals and going to a very cost effective steel core coin was—is perceived to be effective in keeping all of those coins in positive seigniorage for at least the next decade.

Mr. CLEAVER. Yes. That is where I was going is that ultimately, or eventually, you are going to end up having to address that issue, even if it is 10 years from now. Am I correct?

Mr. WEBER. I am a bit of a coin collector and I have, as Dr. Paul alluded to, $20 gold pieces and $1 Morgan silver dollars. And I think it would be extremely difficult in a commodity-driven marketplace to maintain an alloy coin in a positive seigniorage position for an indefinite period of time. But that is why modernization efforts have to take place. The economy is constantly changing.

If you look at the number of coins produced by the U.S. Mint, they are half of what they were a decade ago. And that is because of e-commerce, debit cards, etc.

Mr. CLEAVER. I don't have time to get my next question out to Mr. Bosco, so I will ask it later. Thank you, Mr. Chairman. And I yield back the balance of my time.

Chairman PAUL. I thank the gentleman. And now, I yield 5 minutes to Mr. Luetkemeyer from Missouri.

Mr. LUETKEMEYER. Thank you, Mr. Chairman. Mr. Bosco, I was interested in—we were discussing this before at the committee hearing and I want to follow up a little bit with the comments made by the chairman.

I had two interns in my office in the last 2 years from Australia—one last year and one this year. And when they got ready to leave, I asked them what was the unique thing about our country or just interesting thing that they thought off the top of their head would be something that would stick out with them. And both of them made a comment with regards to the penny, which is interesting, because they said, "In Australia, we don't have pennies. We just round it up to the nearest nickel." They said, "It is very inconvenient to carry all those pennies in our pocket all the time."

Do you know of any other countries in the world that don't have pennies or pence or whatever it is?

Mr. BOSCO. I know that there are other sovereignties that have dropped their pennies—

Mr. LUETKEMEYER. Their lowest denomination?

Mr. BOSCO. I can't name them for you as I sit here, but I know certainly Australia and New Zealand—

Mr. LUETKEMEYER. It begs the question that the chairman was asking about your comment with regards to saving money by not—that we can't save any money by getting rid of the penny. I really have a problem with trying to grasp how you cannot save money by doing that.

Your comment that we are going to use more nickels, I really don't see how that is even close to being accurate from the standpoint you may use a few more, but I don't think you are going to use many more, because you are going to have the same amount of economic activity instead of having your 95—instead of being 97 cents, you have 95 cents with a nickel on the end of it and two pennies—you will just have 95 cents if you round it down. Or if it goes to the upper—the next nickel, it would be the dollar. So I don't know why we would have more nickels. Can you explain to me why we would need more nickels?

Mr. BOSCO. Certainly. What we do know is when countries have retired their lowest denomination coin, there has always been an

increase in the usage of the new lowest denomination coin. In the case of Australia, there was an increase in the number of 5-cent coins that were minted once the 1- and 2-cent coins had been retired.

The motivation for our analysis really centered on the testimony or the answer provided by the Mint's then-acting Director in 2006 to a question posed by the subcommittee: What would happen to the United States coinage and the costs to create that coinage if the penny were to be dropped at that time? And the acting Director responded in part by saying that there would be an increase in the production of nickels to compensate for that. And the challenge that was faced was that the nickels were being made at a loss at the present time.

Mr. LUETKEMEYER. I understand that part of it. I was just kind of curious about the increased usage. I really would have to have somebody sit down with me and go through the transaction and show me how we were going to be using more nickels. I really have a problem with that. But that is neither here nor there.

Mr. Weber, in your written testimony, you said something about the Canadian Mint investigating issuance of special digital currency. Can you tell me what digital currency is?

Mr. WEBER. Yes. That wasn't actually in my testimony, but there was an announcement recently that the Canadian Mint is investigating a product that they call Mint Chip and it is e-currency. And it is something that they are looking into, but I do not have a lot of details on that. I can have someone from the Canadian Mint provide a statement to the committee if that would help.

Mr. LUETKEMEYER. I was kind of curious what digital currency would be, how you—what it would look like—how it would interact, and what—it is kind of interesting. Everything else has gone digital. Why not currency, I guess.

I guess the next question I have is with regards to the amount of money that seems to be coming out of circulation. One of the comments that was made or some of the discussion that was had was how much of the money that comes out of circulation is due to collecting and loss and things like that.

How much—every year we produce more, I guess, coinage to be able to supply more activity. How much of it is—or do you have any research that shows why we are producing more? Is it because of loss—just dropping in the back of your seat of your car or something or, it comes out of—are people collecting it? Why do we need to continue to do more?

Mr. WEBER. We haven't conducted any studies about the reasons for coinage leaving circulation. At the time that the Mint was completing the 50-State Quarter Program, it did provide what it believed to be an estimate that approximately half of the coins that it had minted for the program were likely held by collectors because of the unique collector value of those coins at the time. I don't believe that would necessarily apply to the other denominations. But as I mentioned, we have not studied that issue.

Mr. LUETKEMEYER. Okay. I see my time is up. Thank you, Mr. Chairman.

Chairman PAUL. I thank the gentleman. I yield 5 minutes to Ranking Member Clay.

Mr. CLAY. Thank you, Mr. Chairman, for yielding. And thank you for conducting this hearing.

Let me ask Mr. Weber—as a consultant to the Royal Canadian Mint, in your experience, did Canada face higher manufacturing costs as a result of the replacement die they had to use?

Mr. WEBER. Actually, Canada not only advanced their coinage material, but concurrently came up with technology to improve tool-and-die life. And the Canadian Mint actually markets that technology internationally to other mints.

So in fact, with the transition to multi-ply and improvements in their tool-and-die manufacturing, they actually saw an improvement in tool and die.

Mr. CLAY. Time-wise, how long did the process take from start to finish?

Mr. WEBER. The approval for multi-ply came in 1996, and the coins were introduced in 2001. But the majority of that time was taken up with the construction of a manufacturing facility in Winnipeg, so all of the technology in and around the multi-layer plating process had to be developed. And equipment needed to be purchased and installed.

So from initiation to introduction was a period of 5 years, but that is primarily due to the fact that the manufacturing facility had to be constructed.

Mr. CLAY. Thank you. And Mr. Bosco, your testimony discusses significant raw material cost savings associated with a transition to copper-plated steel, but does not address the concerns outlined by former Mint Director Moore that the savings incurred from using steel could be offset by higher manufacturing costs. Is this something that you can address?

Mr. BOSCO. Not at this time. Our study did not look at the costs associated with transitioning the penny to plated steel. So I am not in a position to address that—

Mr. CLAY. What factors should Congress consider in order to mitigate the impact that changes to composition of the penny and the nickel could have on existing coin-operated devices? Mr. Blake?

Mr. BLAKE. Yes. I think I can answer that for you. I strongly encourage the establishment of a subcommittee with Congress involved with all stakeholders in trying to make these kinds of decisions. They are not easy. There are a lot of considerations that need to be made. And I think that is the best approach.

If I could go to the example of what has happened in Canada, when they were working on the $1 and $2 coin changes, Cummins Allison was involved very early in the process. We were given test coins before the coins were introduced to make sure that whatever impact it had on our equipment, we could manage and minimize costs.

The same thing happened with the introduction of the euro coins back in the early 2000s. Again, we were involved early. The Mint engaged us early in that process to make sure that what they were doing was something that was more compatible with what would be taking place when they introduced those changes in industry and in the marketplace.

Mr. CLAY. In Representative Stiver's bill, the Steel Nickel Act includes a provision to ensure that the Secretary of the Treasury sets

specifications of the 5-cent coin in a way that would ensure that not more than one change would have to be made to coin accepting and coin handling equipment. Should a similar provision be included in the bill he introduced to change the composition of the penny?

Mr. BLAKE. I think anything you can do to reduce the cost of the penny and the nickel is something that Cummins supports. However, I still strongly—I don't know how you could simply say, "It is only limited to one change."

I think you have to go through a series of investigative activities with stakeholders and try to arrive at an acceptable solution that quite honestly works. And whatever those changes are, the objective should always be to try to minimize the societal costs and the cost of making those changes to existing equipment and machines that are installed in the vending and anybody who is processing coin and currency.

Mr. CLAY. Thank you for your response. And Mr. Chairman, I yield back.

Chairman PAUL. I thank the gentleman. I yield 5 minutes to Mr. Huizenga from Michigan.

Mr. HUIZENGA. Thank you, Mr. Chairman. I appreciate that. And having a formerly Canadian wife, I am very familiar with the "loonie" and the "toonie" as they are dubbed up in Canada.

But at this time, I am actually going to give my time to my good friend and colleague from Ohio, Mr. Stivers. If that is okay, I will yield to him.

Mr. STIVERS. Thank you for yielding me time. I do want to address one thing that has come up a couple of times from the gentleman from Missouri and the gentlelady from New York about the study that is going on.

Congress has a constitutional mandate to regulate security in Article I, Section VIII, Clause V, which I would like to read, since it is only one sentence long: "Congress has the responsibility to coin money, regulate the value of foreign coin, and fix the standard weights and measures thereof."

So, I don't think Congress should cede its authority and constitutionally mandated requirement to deal with currency. And while I consider the folks at the U.S. Mint to be experts, it is Congress' job to do this. That is why I have introduced these bills and that is why I think it is important.

The first question I have is for Mr. Blake. It is pretty simple. When you suggested that counterfeiting may be a problem, do you expect that is a high likelihood or a low likelihood with the 1-cent and 5-cent coins?

Mr. BLAKE. Let's face it. We are talking about going with materials that are lower cost and more readily available. Whenever you do that, you always open yourself up to the possibility—

Mr. STIVERS. I understand that. I am asking if you think it is a high likelihood or a low likelihood that the 1-cent and the 5-cent coins—

Mr. BLAKE. On low-value coins, it is probably less likely.

Mr. STIVERS. Thank you. That is all I needed there.

The second question I have is for Mr. Weber. You talked about an alloy recovery program that over 6 years has been in place in

Canada. What percent of the previous coins have been recovered? Do you have any idea?

Mr. WEBER. I am really not sure, but I could get that information for you, Congressman.

Mr. STIVERS. Okay. That kind of goes to the question that I had for Mr. Bosco. You suggested that maybe a third of the coins could be recovered. I didn't know if that was—what you used for that or how you came by that number. that is why I wanted to compare it to the experience that Mr. Weber might have seen in Canada.

Mr. BOSCO. It was essentially—it was judgment. We looked at the dollars retrieved in Canada and tried to back into what that might translate into in terms of number of coins. But that number is subject to refinement, clearly.

Mr. STIVERS. Sure. And obviously, that money can be used to—for any capital expenditures and the balance could be returned to the U.S. taxpayers or to pay down the national debt. Obviously, we would have to do that legislatively.

The next question I have is actually for Mr. Blake. We talked a little bit about the impact on the vending machine industry and that is what I want to get to next. What is the cycle for capital expenditures on vending machines? And over what period of time would they typically update or replace their machine through capital expenditures? Obviously, that varies a little bit, but can you give us an idea?

Mr. BLAKE. Cummins Allison is not involved directly in vending machine devices and so forth. We make machines that count currency and handling, so I am not in a good position to speak on that regard.

Mr. STIVERS. Okay. My understanding is that it is a 5- to 7-year cycle that they update and replace most of their machines. And I guess the point of that is that as long as we work within that cycle, we can help ensure and limit the cost to these folks.

And that is, I guess, my question for Mr. Weber. What did the Royal Canadian Mint do to pacify the vending machine industry's concerns? Obviously, you had a 5-year window of phasing in. Did that help? What else did you do? Obviously, you limited some of the changes. Could you help us understand how you worked with the vending industry in Canada? Or how they worked with the vending industry?

Mr. WEBER. I think the more relevant experience is the introduction of the $1 and $2 coin. As I mentioned, in the first 5 years, a lot of that time was taken up with the construction of the plating facility. So what Canada did was they invited all of the stakeholders in. And these are the cash handling people, cash transportation folks, charitable organizations, national banks, and of course, the vending machine people.

And what Canada did was actually delayed for 1 year the introduction of these coins to allow the vending machine people more time primarily to upgrade software, because essentially the shape of the coin didn't change. And with that allowance of additional time and great communications and getting samples into people's hands early, the impact on the vending industry in Canada was minimal.

I don't think you can eliminate it. There is going to be some expense there, but I think it can be managed. And it is managed through education and communication.

Mr. STIVERS. Thank you. I yield back the balance of time to Mr. Huizenga.

Chairman PAUL. I thank the gentleman. And now, I yield 5 minutes to the gentleman from Texas, Mr. Green.

Mr. GREEN. Thank you, Mr. Chairman. I thank Ranking Member Clay. I also thank acting Chairman Cleaver. I thank the witnesses for testifying as well.

I would like to make mention of a few things that I believe are important as it relates to this effort, to the effort itself. Obviously, we all agree that we should not pay 2.4 cents to produce a penny, and we should not pay 11.2 cents to produce a nickel.

The question becomes, what is the approach that we would utilize to remedy this? And in seeking an approach, I would like to acknowledge some of my colleagues who have been associated with this endeavor. Of course, our former chairman, the Honorable Barney Frank, and Mr. Gutierrez introduced a piece of legislation. I would like to note that this piece of legislation passed the House in 2008. It did not make it through the Senate, but the House has acted on this issue. And I want to thank the current Members, Representatives Roskam and Castle.

I think everyone is trying to move in the same direction. It is just that there are different approaches. I think it is important to make mention of Representative Watt, because he did pass a bill in the House that made it to the President's desk and did receive the President's signature. This bill gave authority to conduct R&D on all circulating coins.

And it is important to note his bill, titled the Coin Modernization Oversight and Continuity Act—it is important to note that this authority has been accorded the Treasury. Actually, it requires the Mint to report to Congress. And that report is due by December 14th of this year. It is important to note this, because he seems to have taken a rather holistic approach without giving a sense of direction—simply said, "Help us with our sense of direction."

And that report, I would assume, was thought to be something that would be beneficial at the time we passed the law that required the report. And if we thought it would be beneficial to have the report, it would seem that we would think it beneficial to utilize the report that passed in the bill that passed the House, passed the Senate, and was signed by the President.

So I do express a desire to know what the report will contain, such that we will have an opportunity to get some additional sense of direction. Let me just ask each of you to respond to the concern that we hear by way of the report, some of the needs thought to be associated with this issue. Mr. Blake?

Mr. BLAKE. Again, I commend the Members of Congress for taking the steps to try to reduce cost. I think that is a step in the right direction. We are all looking for direction in this matter. I think it is an important matter. And if we can start to get some direction from the report that is due later in the year, then that would be a good thing.

I also encourage the establishment, again, of a committee. What we don't want to happen is something in the report and then act on it in haste. So I think we are all interested in what is going to happen in December with this report.

Mr. GREEN. Because my time is about to elapse and I would like to hear from the other two—let me just simply say this to you, sir, and to all of you—do you think that, given that the bill that requires the report passed the House, passed the Senate, and was signed by the President, should we look into the report before we take action? Or should we simply ignore the fact that a bill passed the House, passed the Senate, and was signed by the President calling for information, calling for intelligence on how to do this—required an R&D research be done? Do you think that we ought to honor what we required—the House, the Senate, signed by the President? Is that of no consequence?

I will start with Mr. Blake, again. Mr. Blake, let me just go to the next person now, because my time is up. Go ahead, sir.

Mr. BOSCO. We certainly are not in any position to direct Congress with regard to the timing of approaching this issue. The purpose of our studies, which predated actually the bills that—

Mr. GREEN. Because my time is about up, your position is that you would not direct Congress. Thank you. And I don't mean to be rude, crude, and unrefined; it is just that I would like to hear from others.

What is your position, Mr. Weber?

Mr. WEBER. I think there is—certainly, waiting for the report is a good idea. But I think in the interim, you continue to lose money on these coins. So I think the committee needs to be aware of taxpayer losses on an ongoing basis, so that when the report is issued, you can act relatively quickly to make whatever changes are necessary.

Mr. GREEN. So your position is to use the report, but start a process now. Okay.

I thank all of you for your time. And thank you, Mr. Chairman, you have been more than generous. I yield back.

Chairman PAUL. I thank the gentleman. We will have time for a second round of questioning.

I would like to direct my question to Mr. Weber.

You are not with Jarden Zinc Products at the moment. Is that correct?

Mr. WEBER. That is correct.

Chairman PAUL. Does that company do any blanks or participate in any private mintage? Or is this always blanks and different things for governments?

Mr. WEBER. Jarden produces blanks for a number of different countries that are struck for circulating coinage. They do not, to the best of my knowledge, participate in token programs and things of that nature, though they have some, I believe, capacity for striking coins—it is very limited.

Chairman PAUL. So it is mostly government, then. I am interested, obviously, in the nature of money and our finances. And there is a private coin that is issued now and it is an ounce of copper. And it is a large coin. It reminds me of the big penny that we had many, many years ago.

That coin today, because it is one ounce—my estimate—it is probably worth about 25 cents. So in reality, in real money, it is worth about a quarter. What is your opinion about more of that coming up? One of my answers to our dilemma is not so much to close down the system we have, but just allow some competition out there—competition with our current monetary system, instead of trying to doctor up and tinker around and make this money work that is constantly losing value, where we can't even afford steel in our money.

What is your opinion about maybe encouraging private alternatives, say in coinage? There is a lot of resistance in the government, because governments like a monopoly on coinage. But the whole idea that you can have today a copper coin that is worth a quarter and the worst thing that could happen to that is that its purchasing power will probably go up.

Do you have any sympathy at all for private competition in the use of coinage?

Mr. WEBER. I think there is a very, very robust market in bullion coins. And bullion coins can be purchased from the Mint. They can be purchased from private producers. They can be purchased internationally.

To consider copper or nickel a bullion product is a bit of a stretch. Because what people are doing is, they want to make that investment. They are not making that investment in the hopes that they are going to lose money. So it is an investment vehicle. They are buying it today in the hopes it will go up in the future. It is different than having coins and currency for commerce.

Chairman PAUL. But overall, the precious metals, they have obviously, in terms of dollars, gone up in value. The dollar keeps going down.

Yes, buying bullion coins may be as an investment protection one thing, but I am talking about permitting competition. Because the monopoly laws say that if you tried to use a silver ounce in circulation and use it as money or call it a dollar, you can get into really serious trouble with that. The government doesn't like that. The Treasury comes down pretty hard on an individual.

But I am trying to see a transition period where we would have more of this. So in your personal view, would you have any sympathy for maybe permitting a little competition—true competition—in coinage? Where in a way, it would indirectly place even a bigger check on government destroying the value of money—it would be an incentive to say, hey, maybe we ought to keep up with the private market.

Mr. WEBER. I think the real challenge there is interstate commerce. If I buy a copper coin of some sort minted in New York, I have no idea what the purchasing power of that coin would be in California if it is coming from a private facility. Whereas, if I am getting a quarter from Denver or Philly, it doesn't matter, I can take it anywhere in the country and use it. So I think managing that would have some real challenges.

Chairman PAUL. But the purchasing power of our dollar is different in New York as in Texas, also. It varies a whole lot.

Okay. I think we will go on, and I will yield 5 minutes to Mr. Cleaver.

Mr. CLEAVER. Thank you, Mr. Chairman. I actually only have one question, and any of the three of you can answer, I would hope. Given the emerging technologies which generate a higher and higher demand for metals and alloys, and as Dr. Paul mentioned earlier, that when you have that demand for those metals and alloys, that then the cost is going to rise. Is there any benefit in considering non-metallic alternatives? Plastic? Pigskin? The sky is the limit.

Are there some non-metallic alternatives that—with you, Mr. Weber—that Canada considered? What are some options? Why would we go into an area where we know the cost of the metals and alloys are rising and start using that for new coinage?

Mr. WEBER. I am not aware of any attempts to make plastic coins, for example. There was some discussion of ceramics, but that looks to be more expensive than the metals. It is interesting. The human experience is that if you go to a country that uses aluminum for coins, there is a perception that those are useless because people want to feel the weight of a coin. So generally, the heavier metals have been the coins that have gotten the most viability in the commercial marketplace.

Mr. CLEAVER. Okay, maybe I am out here by myself. We know that the cost of the metal will rise. We have new technologies coming out every day and they are demanding more metals. And so, am I way out there to assume that the cost is going to continue to rise for metals and alloys?

Mr. WEBER. I think it is a reasonable assumption that demand could drive prices higher. I think that is why it is really incumbent to have ongoing development programs and ongoing research programs to stay ahead of the curve. It is one of the things that Canadians have really done a very good job at—very innovative—very research-driven. And they have a few things on the shelf that look very promising.

Mr. CLEAVER. Thank you, Mr. Chairman.

Chairman PAUL. I thank the gentleman. I want to thank the witnesses today for their testimony. And our hearing is now adjourned.

The Chair notes that some Members may have additional questions for the panel, which they may wish to submit in writing. Without objection, the hearing record will remain open for 30 days for Members to submit written questions to these witnesses and to place their responses in the record.

[Whereupon, at 11:13 a.m., the hearing was adjourned.]

A P P E N D I X

April 17, 2012

United States House of Representatives
Committee on Financial Services
Subcommittee on Domestic Monetary Policy & Technology
Hearing on The Future of Money: Coin Production
April 17, 2012

Congressman Ron Paul
Statement for the Record

There is an old German saying that goes, "whoever does not respect the penny is not worthy of the dollar." It expresses the sense that those who neglect or ignore the small things cannot be trusted with larger things, and fittingly describes the problems facing both the dollar and our nation today. For nearly a century monetary policy has been delegated to the Federal Reserve System. Congress has ignored the importance of monetary policy and relegated monetary oversight to the sidelines, considering it less important than such matters as welfare spending, warfare spending, and who to tax and how much they should be taxed. While Congress has dithered, the Federal Reserve has destroyed the value of the dollar, so much so that the metal value of our already much-debased token coinage now exceeds its face value.

The cost to mint pennies and nickels is alleged to be more than double their face value, so that the Mint loses tens of millions of dollars every year by placing them into circulation. Inflation continues to erode the purchasing power of the penny and nickel, so that many consumers find it aggravating and time-consuming to fish around for small change. But changing the composition of the penny and nickel to steel fails to address the root cause behind currency debasement. It also fails to provide a viable solution both for the devalued dollar and for our circulating coinage.

If Congress were truly interested in the cost of coinage, it would begin by reining in and eventually abolishing the Federal Reserve System. The Fed alone is responsible for the devaluation of the dollar. The problem with the penny and nickel is not that the price of copper and nickel are rising, but that the purchasing power of the dollar is declining due to the Fed's currency debasement. The same pattern has been seen throughout history, as debased currency results in the value of the metal content of coins outstripping their face value. Coins disappear from circulation and only paper money circulates. Finally, the currency collapses. Coins will begin to reappear once the monetary unit is restabilized, usually with the introduction of an entirely new currency and after much economic hardship for the people.

The United States is no different in this regard, as it now takes more and more devalued dollars to purchase the raw materials and employ the capital and labor necessary to mint coins. It is only a matter of time before inflation obviates the need for pennies and nickels, and other coins will disappear from use in due time. Unless Congress puts an end to the Fed's loose monetary policy and returns to a sound and stable dollar, the issue of U.S. coin composition will be revisited every few years until inflation finally forces coins out of circulation altogether and we are left with only worthless paper.

In addition to ending the Fed, the United States should embrace currency competition. Economics demonstrates that monopolies lead to suboptimal output, decreased quality, and higher prices. The circulating currency of the United States has been monopolized by the U.S. Government since the 1860s. Issuance of paper currency has been delegated to the Federal Reserve System, while the U.S. Mint maintains a monopoly on the issuance of coins. The result of this monopolization has been calamitous. Whenever government tries to monopolize the issuance of money, and forces that money on the people through legal tender laws, the temptation to debase that money is too great to withstand.

Government mints throughout history have succumbed to the temptation to use their ability to

coin money to amass huge profits to themselves. When gold and silver circulated as money, this often took the form of outright debasement of the coins' purity. Minting coins that were a little underweight or that contained less than their required content of precious metals could produce handsome profits to the king's treasury. The Founding Fathers knew their monetary history, and knew the proclivity of governments to debase coinage until it contained paltry amounts of gold or silver. Therefore the Coinage Act of 1792 made currency debasement a crime punishable by death.

Unfortunately, the proponents of easy money won out in the succeeding decades. By the 1860s, the federal government launched its first major experiment with unbacked fiat paper currency in a bid to fund the Civil War. Although these "greenbacks" were unpopular and eventually ruled unconstitutional by the Supreme Court, they marked the first step on the road towards government monopolization of currency and thence to the debasement of the dollar. Since the creation of the Federal Reserve System in 1913, the dollar's devaluation has only accelerated, with the dollar's purchasing power having declined 99% since then. Without competition, the money monopolists will continue driving the dollar to destruction.

In the 1840s, Lysander Spooner's American Letter Mail Company engaged in competition with the U.S. Post Office. Successfully undercutting the Post Office's prices, Spooner's company forced the Post Office to cut its prices significantly in order to remain competitive. This competition benefited consumers, who were able to pay lower prices for mail. Unfortunately for both Spooner and the American people, the American Letter Mail Company was driven out of business by a Congress more intent on maintaining a government monopoly over the mail than on allowing affordable and efficient service to consumers. The U.S. Mint operates in much the same way today, with a monopoly on coinage and therefore no incentive to keep costs under control. Imagine how much more efficient the Mint might be if private mints were allowed to compete with it, an idea that is not without precedent.

In 18th century Britain, as described in Prof. George Selgin's recent book "Good Money," the Royal Mint focused more on minting gold and silver coinage and neglected the minting of token copper coinage. Private mints took up the slack, minting coins that were superior in quality to those from the government's mint, and ensuring adequate supplies of coinage for use in commerce. During the first half century of the United States' existence, changes in the statutory bimetallic ratio of silver to gold led to American silver and gold coins leaving the country. To fill the shortage created by misguided government policy, the people used foreign gold and silver coins as money based on the foreign coins' metal content. Privately minted coins also circulated at times—up until the 1860s when Congress began to monopolize the monetary system. The American people could benefit from a similar system of competition today, if the government got out of the way.

While the state of United States coinage is in disarray, the remedy is clear. Ending the Federal Reserve's monetary policy and breaking up the government's money monopoly by allowing monetary competition and parallel currencies will restore monetary stability to this country. Focusing on symptoms rather than causes is only hacking at the branches, when we need to strike at the root.

Testimony of Mr. John Blake
Executive Vice President of Engineering
Cummins Allison Corporation
Mt. Prospect, Illinois

U.S. House of Representatives'
Committee on Financial Services
Subcommittee on Domestic Monetary Policy and Technology

April 17, 2012

Mr. Chairman and Members of the Subcommittee, thank you for giving me the opportunity to speak with you today. My name is John Blake and I am Executive Vice President of Engineering for Cummins Allison, which is a privately held corporation headquartered near Chicago in Mt. Prospect, Illinois.

Cummins Allison is a global leader in developing solutions that quickly and accurately count, sort and authenticate currency, checks, and coins. With a 125 year heritage of leadership in technology and product innovation, Cummins Allison serves the majority of financial institutions in the United States and worldwide, as well as, retail, gaming, law enforcement, and government. Our products are sold and serviced by an extensive network of more than 50 branch offices located in the major US cities. We also have wholly owned subsidiaries in Canada, France, Germany, Ireland, and the United Kingdom. In addition, we have a worldwide dealer network which sells and services our products in more than 70 countries. All Cummins Allison products are designed, developed and manufactured here in the United States. Cummins Allison has a portfolio of more than 350 patents which are utilized to protect our intellectual property and support our research and development investments. A strong US patent system is critical to our business model and our ability to continue to manufacture our products here in the United States.

The commercial coin counting, sorting, and authentication products developed and manufactured by Cummins Allison are available in a variety of sizes and formats to accommodate the varied needs of our diverse customer base. For example, our smaller machines provide coin counting and sorting in retail operations such as McDonalds, Home Depot, and Safeway. Our larger machines, which process at a rate upwards of 10,000 coins per minute, provide the major US banks, armored carriers, the gaming industry, governments, and others with exceptional dependability and accuracy for high volume coin processing. We also have a complete line of self-service machines, for public use, in some retail and banking locations. These machines enable the public to count the coins they have accumulated or collected at home.

One of the most critical features of our equipment is the ability to not only count and sort coins at a high rate of speed, but to also authenticate and identify counterfeits while doing so. Cummins Allison has a sensor research and development division near San Diego which provides state of the art coin and currency sensor technology for our equipment. When

incorporated into our machinery, these sensors enable our customers to identify, reject, and cull coins that are illegal or foreign.

Cummins Allison supports Congressional efforts to identify new government cost saving efficiencies, including methods for reducing production, manufacturing, and circulation costs associated with coin or paper currency. Being an intellectual property intensive engineering and manufacturing company, we understand the challenges associated with an effort to reduce cost while providing innovative solutions, maintaining features and quality. Often this is not an easy endeavor.

Over a period of many years, Cummins Allison has been through a variety of coin changes initiated by a number of countries. From our perspective, some changes have gone well and others have not. I would like to offer the following points:

- First, material changes to the US coin set is nothing new. For example, the US penny has been through a number of changes since inception. Most of these changes involved alterations to the metallurgical content only; the diameter and thickness was maintained. While all stakeholders were impacted by these changes, the implementation and transition was smooth, seamless, and of little impact.

- Second, other countries have made changes to their coins. For example, last week the Canadian Central Bank announced changes to the Canadian $1 and $2 coins. The changes were to the material and appearance only, not size, and the implementation has been smooth. One significant reason for this is the Mint consulted very closely with industry and other stakeholders, early on, to ensure their decisions were as compatible as possible.

  Machinery manufactured by Cummins Allison can accommodate and process coins which contain varied metallurgical properties. It is much more difficult and expensive, however, to alter or retrofit machinery that will accommodate new or changed coins which have a different diameter or thickness. Changes to diameter or thickness may require significant, expensive changes to our equipment, or the outright replacement of equipment. For example, a few years ago Mexico made changes to a number of their coins. In one instance they introduced a new coin that was the same size of one of their existing coins of a different value. Cummins Allison equipment, and that of our competitors, could not accurately count and sort these coins when they were introduced.

- Third, coin metallurgical content changes can impact how well a machine functions or the life of the coin. Not too long ago, this consideration was neglected in Japan. A very soft, all aluminum coinage was introduced creating expensive equipment and coin durability problems. In short, metallurgical content of coins can impact a coin's durability. While coin manufacturing cost savings can occur with use of less expensive metals and methods, these savings will not be fully realized if the coins are not durable, or they cause equipment to fail, or deteriorate prematurely.

Also, coins manufactured from more common metals are easier to counterfeit than those containing less common metals or a unique combination of materials. While counterfeiting may not be as much of a threat with the modification of lower value coins, Cummins Allison and the general public as a whole very much care about every penny. The penny, like the larger denomination coins, should be nearly free from the threat of counterfeiting.

In addition, in order to provide a high level of security, the metallurgical content of any new coin must be unique to every other coin in the world. For example, the United Kingdom is experiencing a relatively high degree of one pound coin counterfeiting. The metallurgical properties of the pound coin are nearly identical to coins from other countries that are significantly less in value. The health and integrity of America's currency is extremely important to everyone.

Cummins Allison is not opposed to the co-circulation of coins, like the penny, of the same value but of different weights. Our equipment can manage most of these differences. However, some coin processing stakeholders use scales and weigh coins as a method of valuating large volumes. Coin content changes which alter the weight of coins would make this method of coin counting and bulk valuation difficult or impossible if different coins, of the same value and physical appearance, are co-circulated.

- Finally, it is critical to note that **any** alteration to coin design, content, or size can impact the ability of our machinery to process high volumes of coins both quickly and accurately. If coin design or material content changes are orchestrated hurriedly or without regard for our equipment and other stakeholders, the currently reliable US coin circulation infrastructure could be adversely impacted or fail altogether. To alter the size, design, or content of a coin without comprehensive consultation and coordination with our industry and others, could be disastrous for the American economy. In fact, a poorly conceived or implemented change could impact the worldwide integrity and value of American currency, disrupt public confidence and commerce, and cost the American government many, many times more than what might be saved as a result of the initial cost saving alteration.

  When introducing a new or altered coin, the transition must be nearly seamless for the coin circulation system and the public. While stakeholder input is essential for this to occur, stakeholder input will not help the process avoid critical issues if too little is requested too late. All stakeholders (banking, vending, armored carriers, retail, currency processors, government agencies and others that process and handle large volumes of coin and currency) must collectively work to fully raise and address issues that are vital to each and every component of the coin circulation system. Recently, Canada introduced new coins into circulation with ease and strong public acceptance. They were able to succeed and achieve public buy-in because they fully communicated with and listened to all stakeholders early and often during the process… from conception through circulation.

For Cummins Allison, the ability to test and report on new material technologies or options, well prior to decision making, is very important. We would prefer to establish and maintain a strong partnership with Congress, the Treasury Department, and the United States Mint with the hope that all will benefit from the exchange of technical and marketplace expertise. Over the past several years, Cummins Allison has been working very closely with a number of Central Banks and Mints throughout the world to provide expertise and feedback in the development of new coins and banknotes.

If a decision is made to introduce a new coin, we strongly encourage the development of a government – industry/stakeholder task force, very early in the process, to generate a seamless transition. That would allow all stakeholders to carefully review options and alternatives from conception through circulation. This task force would help to assure that all technical, scientific, commercial and public issues are thoroughly addressed early on and at every stage of the process.

We would also like to suggest that legislation contain a provision requiring all new or changed coins to have a significant level of counterfeiting deterrence technology. All American coin, regardless of value, should not be susceptible to counterfeiting or be too similar to another world coin.

Conclusion

Mr. Chairman and Members of the Subcommittee, thank you again for the opportunity to appear here today and provide you with our testimony. Cummins Allison appreciates and supports your efforts, and that of the United States Mint, to reduce the cost of American coin production and circulation. However, we encourage everyone to proceed slowly and cautiously when making any decision which changes the appearance, weight, size, or metallurgical content of our nation's coins. To achieve cost savings through new manufacturing efficiencies will mean nothing if there are societal costs incurred due to the inability to properly process and circulate American currency throughout the world. In fact, a coin which lacks a proper level of technology and uniqueness is susceptible to counterfeiting and places our economic and national security at risk.

We commend the Subcommittee for taking the time and care to consider and research these important matters. The appearance and ease-of-use of both coin and currency is paramount to all Americans. Going forward, we encourage Congress, the Treasury Department and the United States Mint to consult with all stakeholders including retailers, armored carriers, vending machine manufacturers, the gaming industry, financial services institutions and our industry, the currency processing industry, long before **any** decisions are made with respect to coin design, size and content. This will help assure that coin production cost savings occur in tandem with a smooth transition and public acceptance, while protecting the security of our nation's monetary system.

STATEMENT OF

RODNEY J. BOSCO

NAVIGANT CONSULTING, INC.

ON THE

"THE FUTURE OF MONEY: COIN PRODUCTION"

BEFORE THE

HOUSE FINANCIAL SERVICES SUBCOMMITTEE
ON DOMESTIC MONETARY POLICY & TECHNOLOGY

UNITED STATES HOUSE OF REPRESENTATIVES

APRIL 17, 2012

Mr. Chairman and Members of the Subcommittee, my name is Rodney Bosco and I am a Director in the Disputes and Investigations practice at Navigant Consulting, Inc. ("Navigant"). I am pleased to testify today concerning our coin system, its cost drivers, and an analysis we conducted recently that identified approximately $200 million in annual cost savings if the United States moved to a steel-based composition for our vended nickel, dime, and quarter.

Navigant is an international consulting firm that provides independent, objective analysis of and opinions on accounting, financial and economic issues. Our report was commissioned by Jarden Zinc Products, North America's leading plated coin blank producer and a licensee of the Royal Canadian Mint's multi-ply plated steel technology. We acknowledge the significant assistance of the Royal Canadian Mint ("RCM") and Worthington Industries in the preparation of our analysis.

As the Subcommittee examines ways to make our coins less expensively, and awaits the United States Mint's recommendations on alternative metals later this year, our work has led us to three major conclusions which I want to share with you today.

(1) Adoption of a multi-ply plated steel composition for the vended five-cent, dime and quarter-dollar coins will reduce the per-unit raw material costs of these coins by 84% to 89%, based on recent prices of copper, nickel and low-carbon steel during the United States Mint's 2011 fiscal year. Applied to average historical production of these denominations, raw material cost savings on an annual basis would be approximately $200 million.

(2) Parallel adoption of an alloy recovery program – in which the United States Mint collects and replaces copper-nickel alloy coins in circulation with multi-ply plated steel coins and salvages the copper and nickel material from the retired coins – has the potential to generate over $2 billion in additional revenue for the United States Mint.

(3) Losses reported by the United States Mint associated with penny production have led some to suggest retiring the penny as a means of eliminating such losses. We have found that ending production of the penny would not completely eliminate the losses, as a portion of the United States Mint's fabrication, distribution, and selling, general and administrative ("SG&A") costs assigned to the penny are fixed and will continue to be incurred. Indeed, the United States Mint's total losses from circulating coin production could worsen from current levels depending on the extent to which elimination of the penny increased demand for the nickel, which is also currently produced at a loss.

These findings, which are discussed in more detail below, provide insights into the policy and economic issues associated with United States Mint coin production.

1. RAW MATERIAL COST SAVINGS FROM CONVERTING UNITED STATES VENDED COINAGE TO MULTI-PLY PLATED STEEL

Navigant examined the potential raw material cost savings the United States Mint could achieve through the substitution of copper- and nickel-coated steel blanks for the compositions currently in use. Multi-ply plated steel compositions have been successfully used by the RCM to manufacture circulating coinage for Canada, as well as for more than two dozen nations, for over a decade.

A. The Royal Canadian Mint's Experience with Transitioning from Alloy-based Coins to Multi-Ply Plated Steel Coins

Prior to 2000, the RCM's circulating coins were comparable to current United States coins in that they were made from copper and nickel (see Figure 1). However, Canadian circulation coins now employ a less costly primary material – low carbon steel.[1] The changes made by the RCM, including financing costs related to new fabrication techniques, have resulted in significantly lower unit production costs across all denominations.

Figure 1: Base Metal Content of Circulating Coins in Canada (1982-1999) and the United States (current) [2]

Canada (1982-1999)	Five-Cent	Dime	Quarter-Dollar
Copper	75.00%	0.00%	0.00%
Nickel	25.00%	99.90%	99.90%
Total	100.00%	99.90%	99.90%

United States (current)	Five-Cent	Dime	Quarter-Dollar
Copper	75.00%	91.67%	91.67%
Nickel	25.00%	8.33%	8.33%
Total	100.00%	100.00%	100.00%

Since 2000, only 6% of each coin is comprised of semi-precious metals, applied in a 3-ply layered fashion to an all-steel core using an electroplating process.[3] The RCM can alter the order and "recipe" of each layer of copper, nickel, bronze or brass to adjust the coin's color and Electronic Magnetic Signal (used by coin acceptors to discriminate coins inserted into their machines).[4] Testing performed on the coins and reported by the RCM has found them to exhibit other desirable characteristics with regard to wear, durability and appearance.[5]

According to the RCM, the changes made to the production of its circulating coinage saves Canadians $10 million per year on production volumes of approximately 350 million coins.

In addition to producing circulating coins for Canada, the RCM sells circulating coins and blanks utilizing its multi-ply plating process to foreign countries. Since its introduction, 27 countries in addition to Canada have accepted this technology for their coinage needs.[6]

B. Raw Material Cost Savings From Converting United States Vended Coinage to Multi-Ply Plated Steel

Figure 2 compares the per-unit raw material costs of producing each United States vended coin using the United States Mint's current composition and using the RCM's multi-ply plated steel compositions. The potential savings, represented as the difference between the two sets of figures, are substantial — at least 84% for each denomination. For a detailed analysis of the derivation of the per-unit raw material costs under each composition, refer to Section III of our February 6, 2012 report.

Figure 2: Potential Per-Unit Raw Material Cost Savings from Converting United States Circulating Coins to Multi-ply Plated Steel, Fiscal Year 2011 [7]

	Five-Cent	Dime	Quarter-Dollar
Current Composition	$0.0644	$0.0235	$0.0587
RCM Composition	0.0068	0.0037	0.0081
Savings (dollars)	$0.0576	$0.0198	$0.0506
Savings (percent)	89%	84%	86%

In order to estimate the total savings to the United State Mint assuming the per-unit raw material cost savings above, we determined the average production levels of vended coins over the 30-year period 1982-2011. Applying the per-unit cost savings under the alternative composition scenario (as set forth in Figure 2) to each coin's average production level, we calculate the aggregate dollar value of raw material cost savings on an annual basis to be $207.5 million (see Figure 3).

Figure 3: Potential Annual Raw Material Cost Savings from Converting United States Vended Coins to Multi-ply Plated Steel [8]

	Average Production	Cost Savings Per Unit	Cost Savings Total
			(A) × (B)
	(A)	(B)	(C)
Mean:			
Five-Cent	1,194,895,000	$0.0576	$ 68,825,952
Dime	1,962,359,000	$0.0198	$ 38,854,708
Quarter-Dollar	1,972,734,000	$0.0506	$ 99,820,340
Total	5,129,988,000		$ 207,501,001
Median:			
Five-Cent	1,214,160,000	$0.0576	$ 69,935,616
Dime	1,982,193,000	$0.0198	$ 39,247,421
Quarter-Dollar	1,475,417,000	$0.0506	$ 74,656,100
Total	4,671,770,000		$ 183,839,138

To assess the sensitivity of the cost savings calculation (Figure 3), we prepared the analysis in Figure 4 to show the material costs savings under several different price change assumptions for both copper/nickel and steel. For purposes of this analysis, we used the mean production level over the past 30 years.

Figure 4: Sensitivity of Annual Raw Material Cost Savings (in millions) to Movements in Metal Prices [9]

		Prices of Copper and Nickel				
		Decrease 20%	Decrease 10%	No Change	Increase 10%	Increase 20%
Price of Steel	Decrease 20%	$166.1	$188.2	$210.4	$232.6	$254.7
	Decrease 10%	$164.7	$186.9	$209.0	$231.2	$253.3
	No change	$163.3	$185.5	$207.5	$229.8	$251.9
	Increase 10%	$161.9	$184.1	$206.2	$228.4	$250.5
	Increase 20%	$160.5	$182.7	$204.8	$227.0	$249.1

To assess the sensitivity of the average (mean) production level to the inclusion of particular years we also calculated the median production level of each coin during the benchmark period. The mean and median production levels for the five-cent coin and dime were not significantly different.[10] However, median production for the quarter-dollar over the 30-year benchmark period was significantly less than mean production.[11] As shown in Figure 3, the savings based on median historical production is $183.8 million.

C. Options for the United States Mint to Consider in Changing its Vended Coins to Multi-ply Plated Steel Compositions

As discussed above, the United States Mint can achieve significant cost savings related to its production of vended coins by changing each coin's composition from copper-nickel alloys to multi-ply plated steel. While base metal costs make up the largest portion of production costs,[12] the United States Mint would incur new or additional costs in other parts of its production process in order to implement this change. With the exception of the one-cent coin, we understand the United States Mint operates as a fully-integrated manufacturing operation, handling all aspects of the production process from receiving raw material through the coining of the final product.

We have identified three production options for the United States Mint to consider if it were to change its coin compositions from the current clad- and alloy-based compositions to multi-ply plated steel coins – (1) continue to perform all production operations in-house; (2) purchase "ready-to-strike" blanks of plated steel coins, similar to the process currently employed with the copper-plated zinc penny; or (3) outsource the plating function but keep all other operations in-house.

Given the lack of publicly available data on the detailed operating costs of the United States Mint's operations in general, and coin plating facility operations specifically, we did not

evaluate the relative merits of the options based on expected costs. Rather, we include in our February 6, 2012 report a discussion of the issues, including machinery and equipment, facilities, employees, technology licensing, and production disruptions, which would need to be addressed by the United States Mint in evaluating each option.

2. POTENTIAL ADDITIONAL REVENUE TO THE UNITED STATES MINT FROM IMPLEMENTING AN ALLOY RECOVERY PROGRAM

Since its launch of multi-ply plated steel circulation coins, the RCM has implemented an alloy recovery program that has generated more than $200 million in revenue between 2004 and 2010. The United States Mint could execute a similar program for its current copper and nickel-based five-cent, dime and quarter-dollar coins. It was beyond the scope of our study to estimate with precision the amount of revenue the United States Mint could expect to receive from launching such a program. However, to provide insight into the potential revenue opportunity we present a scenario based on publicly available information and reasonable assumptions.

In Figure 2 we report the raw material cost associated with the five-cent ($0.0644), dime ($0.0235) and quarter-dollar ($0.0587) coins during fiscal year 2011. The average annual production of each coin over the period 1982 through 2011 is presented in Figure 3. Combining these two sets of information results in a reasonable measure of the revenue, on a per-coin basis, that the United States Mint could receive from retrieving, extracting and selling the copper and nickel material through an alloy recovery program ($0.0466 per unit). Our calculation, set forth in Figure 5, assumes that the shares of coins retrieved will mirror their relative unit production quantities over the past 30 years.

Figure 5: Average Per-Coin Raw Material Cost of Producing Five-Cent, Dime and Quarter-Dollar Coins, Based on Fiscal Year 2011 Spot Prices [13]

	Average Production	Material Cost Per Unit	Material Cost Total
			(A) × (B)
	(A)	(B)	(C)
Five-Cent	1,194,895,000	$0.0644	$ 76,949,541
Dime	1,962,359,000	$0.0235	$ 46,120,080
Quarter-Dollar	1,972,734,000	$0.0587	$ 115,894,896
Total	5,129,988,000		$ 238,964,517
Average material cost per coin minted			**$ 0.0466**

The actual number of coins reclaimed through an alloy recovery program will depend on the United States Mint's ability to access inventories of circulating coins under the control of (a) the Federal Reserve Banks and (b) private coin recycling companies, as well as the effectiveness of campaigns designed to encourage the redemption of coin holdings removed from circulation. Between 1982 and 2011, 153.9 billion five-cent, dime and quarter-dollar coins were produced (equal to average annual unit coin production of 5.130 billion, as shown in Figure 5, multiplied by 30 years). If one-third of these coins were recovered through an alloy recovery program, the United States Mint's additional revenue could be $2.4 billion (equal to 51.3 billion coins multiplied by $0.0466). This calculation assumes that current material prices do not significantly change.

The United States Mint would incur costs to implement and run an alloy recovery program, including the possible production of replacement coins out of multi-ply plated steel. Consistent with our assessment of the costs to change from the current composition of vended coins to multi-ply plated steel composition, the United States Mint would be in the best position to determine the costs to implement such a program. Assuming it is patterned after the RCM's program, one would expect that the United States Mint would also earn high margins.

3. IMPACT OF ELIMINATING THE PENNY ON UNITED STATES MINT COSTS AND PROFIT

In a separate report dated April 12, 2012, Navigant was asked to estimate the impact of eliminating production of circulating pennies on losses currently being incurred by the United States Mint. We have found that ending production of the penny would not completely eliminate the losses, and could even increase the overall loss to the United States Mint due to increased production of the nickel and ongoing United States Mint overhead costs.

The United States Mint shipped 4.29 billion pennies (valued at $42.9 million) during fiscal year 2011 at a reported cost of $103.1 million (2.4 cents per coin), resulting in a net loss of $60.2 million. However, eliminating production of the penny would not eliminate this loss, and could even increase the overall loss to the United States Mint if production of the nickel was increased to substitute for no production of the penny.

We analyzed publicly available information on the United States Mint's past and projected operations to identify patterns in costs related to its product offerings. We observed the following:

- Cost reductions from eliminating the purchase of penny blanks will be largely offset by the loss of revenue from shipments to the Federal Reserve Banks (FRB). In other words, the payments received from the FRB ($42.9 million), which offset all but $4.3 million of the cost of penny blanks ($47.2 million), would not be received if the United States Mint eliminated production of the penny.

- The United States Mint's fabrication and distribution costs include fixed components that will continue to be incurred if the United States Mint eliminated the penny. Using FY 2011 balances and prior United States Mint disclosures, we have estimated this fixed component to be approximately $13 million.

- The United States Mint's total SG&A expense is not sensitive to circulating coin demand or total sales. Thus, the $17.7 million in SG&A assigned to the circulating penny in FY 2011would have been reallocated to other products.

- Substitution of loss-generating nickels will offset potential cost reductions from eliminating the penny.

Without the penny, only $4.3 million in net cost reductions would have been likely in 2011, while an additional $25.2 million in cost reductions would have been possible, based on 2006 comments by the Mint regarding the amount of fixed production costs. However, the substitution of nickels for pennies would have resulted in an increased net loss to the Mint of as much as $10.9 million if penny production were not maintained. Our findings are summarized in Figure 6.

Figure 6: Impact of Eliminating the Penny on the United States Mint's FY 2011 Costs and Profit (millions)

	Penny produced?	
	Yes (Actual)	No (Estimate)
Value of Shipments	$ 42.9	$ -
Gross Cost		
Cost of Goods Sold (purchase of penny blanks)	$ (47.2)	$ -
Cost of Goods Sold (fabrication and distribution)	$ (38.2)	$ (13.0)
Sales, General and Administrative (SG&A)	$ (17.7)	$ (17.7)
Profit (loss) before substitution effect	**$ (60.2)**	**$ (30.7)**
Substitution of 914 million Nickels for 4.3 billion Pennies		$ (40.4)
Profit (loss) after substitution effect		**$ (71.1)**

A. Cost Reductions from Eliminating the Purchase of Penny Blanks Will be Largely Offset by Revenue Losses from Shipments to the Federal Reserve Banks

The United States Mint purchases ready-to-strike penny blanks from an outside supplier. In FY 2011, the average price paid was 1.1 cents per blank, according to one press report.[14] The United States Mint shipped 4.29 billion pennies to the FRB in FY 2011,[15] resulting in a cost of $47.2 million. Had the penny not been produced, those costs would not have been incurred.
The value of coins shipped to the FRB is revenue to the United States Mint. Thus, the value of the 4.29 billion pennies shipped to the FRB in FY 2011 was $42.9 million.[16] Had the penny not been produced, those revenues would not have been received.

The net reduction in cost had the penny not been produced in FY 2011 is equal to $47.2 million in cost less $42.9 million in revenue, or $4.3 million.

B. The United States Mint's Fabrication and Distribution Costs Include Fixed Components that Will Continue to be Incurred if the United States Mint Eliminated the Penny

Cost of Goods Sold, which comprise costs to fabricate and distribute coins, include outlays that do not decrease with reductions in production volume. In fact, the United States Mint itself has described in past Annual Reports how "fixed production costs" are spread over units produced:

- "When production volumes decline because of lower demand, fixed production costs are spread over fewer units. This offsets any per-unit gains from lower base metal costs. For example, the per-unit metal cost of a nickel fell about $0.0154 from $0.0815 in FY 2007 to $0.0661 in FY 2008. However, the per-unit fixed production costs increased $0.0082, resulting in only a small decline in the nickel overall unit cost. Similarly, the penny unit cost fell slightly from FY 2007 because of higher per-unit vendor fabrication costs offset lower per-unit metal costs. The unit costs for dime and quarter denominations increased in FY 2008 because of higher per-unit fixed production costs."[17]

- "When production volumes decline because of lower demand, production costs are spread over fewer units....The dime coin unit cost increased about 1.3 cents in FY 2009 largely because the 1.8 cent increase in per-unit production cost offset the 1.0 cent reduction in per-unit metal cost....Slight increases in per-unit production and SG&A costs did not offset the 3.1 cent decline in the five-cent coin's per-unit metal cost."[18]

The United States Mint has acknowledged that a portion of penny production costs are also fixed. In response to a question posed in a 2006 Congressional hearing, the United States Mint responded as follows:

> "**Question**: Do you have the ability to calculate how much the Mint would lose if we were to eliminate the penny and make more nickels?
>
> **Answer**: ...the fixed costs associated with production of the penny would have to be absorbed by the remaining denominations of circulating coins. The total amount of fixed costs to be absorbed would be approximately $10.1 million over a fiscal year of production."[19]

The United States Mint's commentary can be seen graphically in Figure 7 (for the penny) and Figure 8 (for the nickel, dime and quarter), which compares shipments and per-unit non-raw material costs from FY 2002 through FY 2011. The lines cross at FY 2007, the year before the onset of the demand declines discussed by the Mint.[20] Shipments and per-unit costs diverge after FY 2007,[21] confirming the existence of fixed costs in the production process.

Figure 7: Coins Shipped and Per-Unit Non-Raw Material Cost of Goods Sold, Fiscal Years 2002-2011 (Penny) [22]

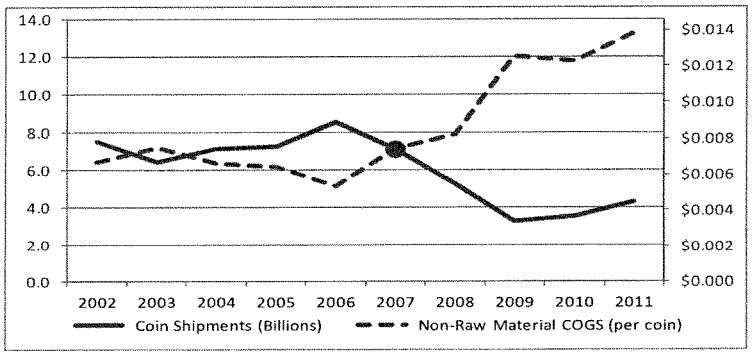
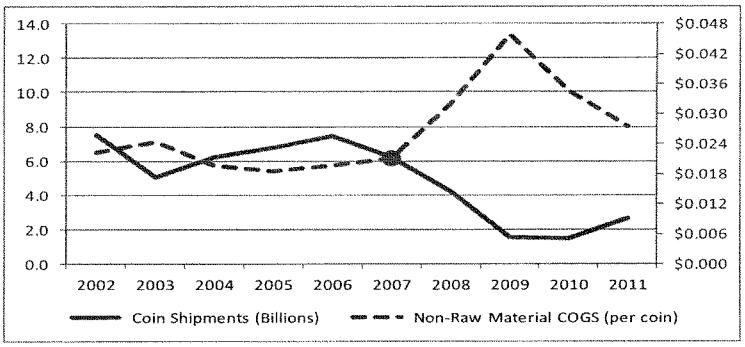


Figure 8: Coins Shipped and Per-Unit Non-Raw Material Cost of Goods Sold, Fiscal Years 2002-2011 (Nickel, Dime and Quarter) [23]



The United States Mint has not reported the fixed costs incurred in FY 2011 to produce the penny. However, insight may be gleaned by linking Mr. Lebryk's statement above to the United States Mint's costs at that time. In FY 2005 and FY 2006, non-raw material costs associated with the penny were $46.5 million and $45.2 million, respectively.[24] The $10.1 million in fixed costs cited by Mr. Lebryk represent 21.7% (FY 2005) and 22.3% (FY 2006) of the non-raw material costs, resulting in average fixed costs of 22% over the two years. We applied this average to the non-raw material costs of penny shipments incurred by the United States Mint in FY 2011 ($59.3 million)[25] and estimated fixed costs of $13.0 million for FY 2011 in the production of the penny. As production of the penny in FY 2011 was significantly less than in either FY 2005 or FY 2006, it is possible that fixed costs as a percent of total non-raw material costs in FY 2011 could be higher than we have calculated.

Cost of Goods Sold for penny shipments during FY 2011 was $85.4 million. Purchases of ready-to-strike blanks totaled $47.2 million (see Section I), leaving $38.2 million as the amount attributable to fabrication and distribution operations executed by the United States Mint. The fixed cost analysis performed above suggests that potential fabrication and distribution cost reductions from the United States Mint eliminating the penny would have been $25.2 million ($38.2 million less $13.0 million) in FY 2011.

C. The United States Mint's Total SG&A Expense Is Not Sensitive to Circulating Coin Demand or Total Sales

For FY 2011, the United States Mint assigned $17.7 million of SG&A expense to circulating pennies, equal to 0.41 cents for each penny shipped.[26] This was in stark contrast to prior years – a total of $5.1 million in SG&A had been assigned to circulating penny production for the nine-year period FY 2002 through FY 2010.[27]

Since FY 2004, the United States Mint's published financial statements do not report the individual expense items and amounts included in SG&A. However, we examined historical financial information reported by the United States Mint over the past decade (FY 2002 through FY 2011) and found that total SG&A expense is not sensitive to either the amount of total sales or the relative contributions of circulating and numismatic products.

Our findings are graphically depicted in Figures 9 and 10. In Figure 9 we compare SG&A to total sales from all products – annual sales grew by more than 170 percent while SG&A expense stayed relatively constant. In Figure 10 we compare SG&A to the distribution of total sales among circulating coins (lower bars) and numismatic products (upper bars) – circulating coins fell from 76% of total sales in 2002 to 16% in 2011 while SG&A stayed relatively constant.

Figure 9: Total SG&A Expense and Total Sales, Fiscal Years 2002-2011 [28]

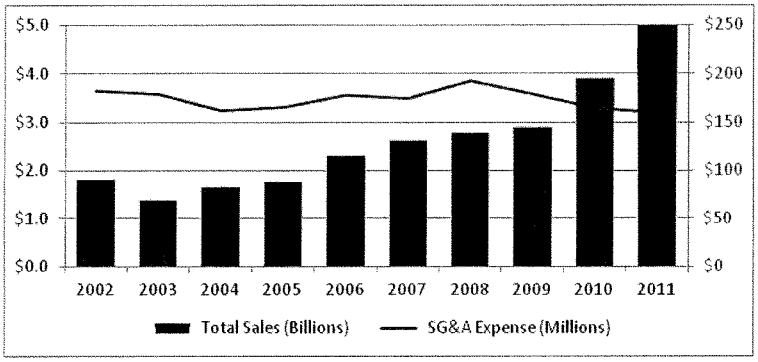
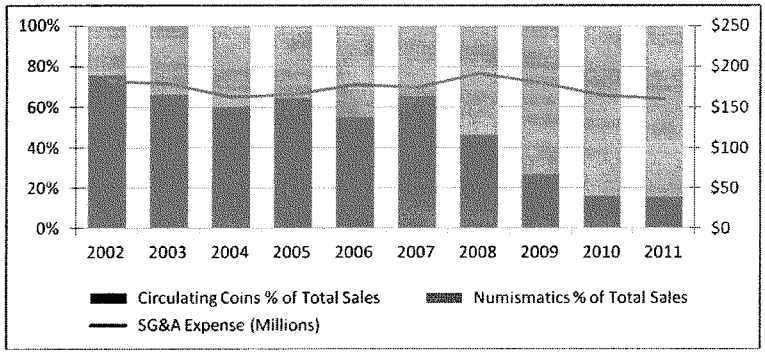


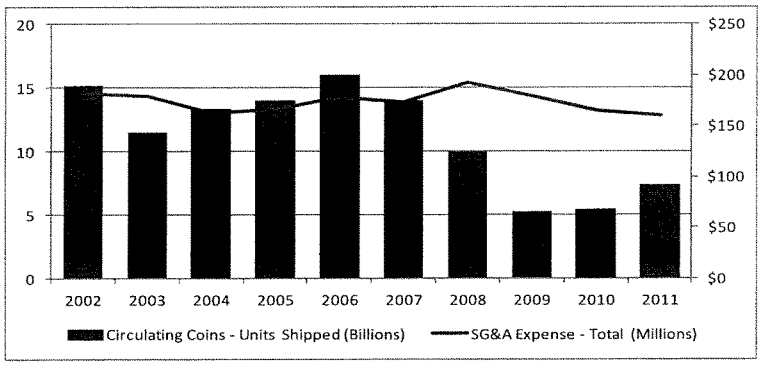
Figure 10: Total SG&A Expense and Composition of Sales, Fiscal Years 2002-2011 [29]



In Figure 11 we compare total SG&A to the number of circulating coins shipped. While total SG&A stayed relatively constant throughout the period, there were three years in which circulating coin shipments fell by an amount comparable to the United States Mint's current (FY 2011) volume of penny shipments (4.3 billion coins):

- In FY 2003, relative to FY 2002, SG&A fell 2% while circulating coin shipments fell by 3.6 billion coins or 24%
- In FY 2008, relative to FY 2007, SG&A rose 10% while circulating coin shipments fell by 4.0 billion coins or 29%
- In FY 2009, relative to FY 2008, SG&A fell 7% while circulating coin shipments fell by 4.8 billion coins or 48%

Figure 11: Total SG&A Expense and Circulating Shipments, Fiscal Years 2002-2011 [30]



We conclude that eliminating the penny would not generate significant reductions in the United States Mint's SG&A expenses. Instead, it would simply result in the United States Mint reallocating SG&A expenses to other circulating coins and numismatic products.

D. Substitution of Nickels for Pennies Would Offset Potential Cost Reductions

In a House Subcommittee hearing held in July 2006, acting United States Mint director David Lebryk was asked about the potential substitution effects that may occur if the penny were eliminated – specifically, what additional losses would the United States Mint incur if more nickels were demanded.[31] The question was likely prompted by Mr. Lebryk's statement that current production costs for the nickel exceeded the coin's face value.[32] Mr. Lebryk responded that the United States Mint was unable to model the potential substitution effect but acknowledged the potential for such substitutions by presenting a graph displaying "estimates of potential costs based on various scenarios."[33]

A scenario posed by Mr. Lebryk in his response envisioned nickel production doubling.[34] In FY 2011, the United States Mint shipped 914 million circulating nickels at an average Cost of Goods Sold of $0.0942,[35] resulting in a loss of $0.0442 ($0.0942 less $0.05) for each nickel shipped.[36] If Mr. Lebryk's scenario were applied to FY 2011 cost and shipment data, the United States Mint would have incurred a substitution-related loss of $40.4 million (914 million × $0.0442). In contrast, we have identified a total of $29.5 million in possible net cost reductions if penny production had been eliminated. Thus, if Mr. Lebryk's substitution scenario were to occur, eliminating the penny would likely have resulted in increased net costs to the United States Mint, relative to the current state, of $10.9 million.

4. SUMMARY AND CONCLUSION

The key findings of our overall work conducted to date are as follows:

- By changing the compositions of the nickel, dime and quarter-dollar coins from copper-nickel alloys to multi-ply plated steel, the United States Mint would incur significantly lower raw materials costs – approximately $200 million per year based on average historical production levels. Multi-ply plated steel compositions have been successfully used by the Royal Canadian Mint to manufacture circulating coinage for Canada, as well as for more than two dozen nations, for over a decade.

- By implementing a parallel alloy recovery program that collects and replaces copper-nickel alloy coins in circulation with multi-ply plated steel coins and salvages the copper and nickel material from the retired coins, the United States Mint could earn over $2 billion in additional revenue based on modest recovery levels.

- Elimination of the penny would not eliminate government losses since the United States Mint's fabrication, distribution, and SG&A costs include fixed components that will continue to be incurred whether or not the United States Mint produces the penny. Additionally, eliminating the penny could increase the overall loss to the United States Mint if production of the nickel was increased to substitute for elimination of the production of the penny.

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[1] "Technical Proposal on Multi-ply Technology by the Royal Canadian Mint," Royal Canadian Mint, pp. 3, 9.

[2] <http://www.mint.ca/store/mint/learn/5-cents-5300006>; <http://www.mint.ca/store/mint/learn/10-cents-5300008>; <http://www.mint.ca/store/mint /learn/25-cents-5300010>; and <http://www.usmint.gov /about_the_mint/?action=coin_specifications>.

[3] Ibid, pp. 4-5.

[4] Ibid, pp. 4 and 7.

[5] Ibid, pp. 5-6.

[6] Royal Canadian Mint, Annual Report 2010, p. 14.

[7] Source: Rodney J. Bosco and Kevin M. Davis, "Potential Benefit to the United States Mint from Changing the Metallic Content of its Vended Coins to Multi-Ply Plated Steel," February 6, 2012, Figure 18 (Per Unit Cost Savings).

[8] Yeoman, pp. 134-136, 157-158, 174-185 and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere> (Average Production); and "Potential Benefit to the United States Mint from Changing the Metallic Content of its Vended Coins to Multi-Ply Plated Steel," February 6, 2012, Figure 18 (Per-unit Cost Savings).

[9] Yeoman, pp. 134-136, 157-158, 174-185 and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere> (Average Production); and "Potential Benefit to the United States Mint from Changing the Metallic Content of its Vended Coins to Multi-Ply Plated Steel," February 6, 2012, Figure 18 (Per-unit Cost Savings). The prices of copper, nickel and steel were adjusted from their fiscal year

2011 averages ("No Change") by 10% or 20%, as noted in the column and row headings, for purposes of this sensitivity analysis.

[10] Per "Potential Benefit to the United States Mint from Changing the Metallic Content of its Vended Coins to Multi-Ply Plated Steel," February 6, 2012, Figure 19 (Potential Raw Material Cost Savings), the mean and median values for the nickel and the dime differed by less than 2.0%.

[11] Per "Potential Benefit to the United States Mint from Changing the Metallic Content of its Vended Coins to Multi-Ply Plated Steel," February 6, 2012, Figure 19(Potential Raw Material Cost Savings),, median production for the quarter was 25.2% less than mean production.

[12] United States Mint, 2011 Annual Report, p. 10.

[13] Yeoman, pp. 134-136, 157-158, 174-185 and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere> (Average Production); and "Potential Benefit to the United States Mint from Changing the Metallic Content of its Vended Coins to Multi-Ply Plated Steel," February 6, 2012, Figure 18 (Per-unit Cost Savings).

[14] Chris Isidore, "Obama wants cheaper pennies and nickels," CNNMoney.com, February 15, 2012.

[15] United States Mint, 2011 Annual Report, page 11.

[16] Id.

[17] United States Mint, 2008 Annual Report, page 29.

[18] United States Mint, 2009 Annual Report, page 30.

[19] Coin and Currency Issues Before Congress: Can We Still Afford Money?, Hearing Before the Subcommittee on Domestic and International Monetary Policy, Trade and Technology of the Committee on Financial Services, U.S. House of Representatives, One Hundred Ninth Congress, Second Session, July 19, 2006.

[20] Shipments in FY 2007 were lower than in FY 2006, but within the range of prior years.

[21] The same pattern was observed, separately, for the nickel, the dime, and the quarter.

[22] Source: Rodney J. Bosco and Kevin M. Davis, "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2012, Appendix A-1.

[23] Source: "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2102, Appendix A-2.

[24] Source: "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2012, Appendix A-1. FY 2005 was the last full fiscal year prior to Mr. Lebryk's July 2006 testimony, which occurred during FY 2006.

[25] Source: "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2012, Appendix A-1.

[26] United States Mint, 2011 Annual Report, page 11.

[27] United States Mint, Annual Report, 2002 through 2011. In FY 2011 the United States Mint changed the method it uses to allocate SG&A expense among its products from a gross margin basis to a gross cost basis. (United States Mint, 2011 Annual Report, page 10)

[28] Sources: "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2102, Appendix B-1 (total sales) and Appendix B-2 (total SG&A expense).

[29] Sources: "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2012, Appendix B-1 (shares of total sales) and Appendix B-2 (total SG&A expense).

[30] Sources: "Impact of Eliminating the Penny on the United States Mint's Costs and Profit in Fiscal Year 2011," April 12, 2012, Appendix B-1 (circulating coin shipments) and Appendix B-2 (total SG&A expense).

[31] Coin and Currency Issues Before Congress: Can We Still Afford Money?

[32] Testimony of David A. Lebryk, July 19, 2006.

[33] Coin and Currency Issues Before Congress: Can We Still Afford Money?

[34] Coin and Currency Issues Before Congress: Can We Still Afford Money?

[35] United States Mint, 2011 Annual Report, page 11.

[36] The Mint also assigned SG&A of $16.1 million, or $0.0176 per coin shipped, to the nickel. For the reasons set forth in Section III, we have assumed that increased demand for nickels will not result in additional SG&A expense.

NAVIGANT

POTENTIAL BENEFITS TO THE UNITED STATES MINT FROM CHANGING THE METALLIC CONTENT OF ITS VENDED COINS TO MULTI-PLY PLATED STEEL

PURSUANT TO "THE COIN MODERNIZATION, OVERSIGHT, AND CONTINUITY ACT OF 2010" (PUBLIC LAW 111-302)

Rodney J. Bosco
Kevin M. Davis

February 6, 2012

Abstract

Since 1792, the United States Mint has been responsible for the manufacture and distribution of sufficient volumes of circulating coins to facilitate the nation's daily transactions of goods and services. The first American legal tender coins were made from precious metals (gold and silver) and designed to establish their monetary value based on the intrinsic value of the material contained in them. Apart from periods of occasional material shortages, the United States Mint maintained the intrinsic value standard for its circulating coinage into the 20th century.

Between 1933 and 1970 the United States transitioned its legal tender coinage from precious metals to "semi-precious" metals such as copper and nickel. The change to a fiat money standard was intended to give the United States Mint greater supply flexibility to meet the needs of a growing economy. It also allowed the United States Mint to earn a profit (called "seigniorage") on its production of circulating coins, which is used by the United States government to reduce its requirement to borrow money from the public to finance the national debt.

Between 2002 and 2006 prices for copper and nickel climbed more than fourfold. In 2006 the United States Mint disclosed that the cost of producing the five-cent coin exceeded the coin's face value. In July 2007 the Secretary of the Treasury asked Congress to enact legislation authorizing changes to the composition of circulating coins. The "Coin Modernization, Oversight, and Continuity Act of 2010" authorized the Secretary of the Treasury to conduct tests and solicit input from independent research facilities and current or potential suppliers as to the use of alternative metallic materials in circulating coins.

This study provides insights into the potential raw material cost savings the United States Mint could achieve through the substitution of copper- and nickel-coated steel blanks for the compositions currently in use. Multi-ply plated steel compositions have been successfully used by the Royal Canadian Mint to manufacture circulating coinage for Canada, as well as for more than two dozen nations, for over a decade.

Key findings of this study, based upon analyses conducted to date, include the following:

(1) Adoption of a multi-ply plated steel composition for the five-cent, dime and quarter-dollar coins will reduce the per-unit raw material costs of these coins by 89% (five-cent), 84% (dime) and 86% (quarter-dollar), based on recent prices of copper, nickel and low-carbon steel.

(2) Applied to long-term average annual historical production of these denominations, raw material cost savings on an annual basis range from $183.8 million to $207.5 million, depending on the extent to which the United States Mint continues its successful rotating design program for its circulating quarter-dollar coins.

(3) Parallel adoption of an alloy recovery program that collects and replaces copper-nickel alloy coins in circulation with multi-ply plated steel coins and salvages the copper and nickel material from the retired coins, has the potential to generate over $2 billion in additional revenue for the United States Mint.

Adoption of multi-ply plated steel coin compositions by the United States Mint could be handled through total in-house production, out-sourced production up to the receipt of "ready-to-strike" planchets or a combination of these two options with a third-party handling the plating process. Given that detailed cost data for the United States Mint's current operations and for the operation of a coin plating facility is not available for public inspection and analysis, our study does not include an evaluation of the merits of the options based on expected net cost savings. Rather, we include in our report a discussion of the issues — including machinery and equipment, facilities, employees, technology licensing, and production disruptions — that will need to be addressed by the United States Mint in evaluating each option.

The adoption of multi-ply plated steel compositions in vended coins may have impacts on certain industries and/or organizations that rely on these coins to conduct their activities. For example, when the Royal Canadian Mint planned the release of its multi-ply plated steel coins it worked closely with Canada's vending industry to address their concerns. The identification of industries and organizations within the United States that may be impacted, and the related impacts thereon, are beyond the scope of this report.

This report was commissioned by Jarden Zinc Products, North America's leading plated coin blank producer and licensee of the Royal Canadian Mint's multi-ply plated steel technology. The authors also gratefully acknowledge the significant contributions of the Royal Canadian Mint and Worthington Industries.

Section I – Evolution of Metal Compositions Used in United States Vended Coins

The United States Mint was established by an Act of Congress on April 2, 1792.[1] Since 1793, the United States Mint has manufactured and distributed coins to support the nation's commerce (hereafter, "circulating coins").[2] The United States Mint operates as a bureau within the Department of the Treasury.[3] Regulations pertaining to the coining of money, including circulating coins, are effectuated through Acts of Congress.[4]

A. The First Circulating Coins Were Tied to an Intrinsic Value Standard

The Coinage Act of 1792 authorized the manufacture of coinage based on "dollars"[5] or fractions thereof. Coins with a value in excess of one dollar were to be made of gold, while coins with a value between one dollar and "one twentieth" of a dollar were to be made of silver.[6] The remaining coins – cents and half cents – were to be made of copper,[7] a semi-precious metal. The dollar coin was defined to be "of the value [in silver] of a Spanish milled dollar as the same is now current....", while the amount of silver in the lower denominations was set in proportion to their relative currency value.[8] Thus, the first United States legal tender coins were designed to tie their monetary values to the "intrinsic value" of the precious metal contained in them. While technically based on a silver standard, the Coinage Act of 1792 also established a proportional value of silver to gold, by weight, of 15:1.[9] This linking of silver and gold values effectively placed the new United States legal tender coinage on a bi-metal standard.

A series of Congressional Acts during the mid 19th century moved United States legal tender coinage from a bi-metal standard to a gold standard. In 1834, Congress changed the legal exchange ratio between silver and gold from 15:1 to 16:1.[10] In 1849, Congress authorized production of a gold dollar coin.[11] In 1853, the legal tender status of sub-dollar silver coins, previously unlimited, became limited to obligations up to five dollars.[12] In 1866, Congress authorized the United States Mint to begin production of a new five-cent coin comprised of an alloy of copper (75%) and nickel (25%).[13] The Coinage Act of 1873 ended production of the silver half-dime and the silver dollar, and ended the free coinage of silver (which allowed silver producers to have their bullion coined); it also granted, for the first time, legal tender status to non-precious metal based coins.[14] In 1874, the legal tender status of silver dollars became restricted to obligations of up to five dollars.[15] Collectively the Acts served to demonetize silver, moving the United States to a de-facto gold standard for its monetary system. Despite these changes, most denominations of circulating coins continued to be made from gold or silver.

B. Transition of Coin Compositions from Gold/Silver to Copper/Nickel

A banking crisis during the early 1930s led Congress to enact legislation authorizing the President to direct the withdrawal of gold, in all its tradable forms, from the United States economy.[16] On April 5, 1933, President Franklin D. Roosevelt issued Executive Order 6102, which prohibited "the withdrawal and withholding of gold coin, gold bullion or gold certificates from the recognized and customary channels of trade." It also directed persons to deliver their gold holdings to authorized agents of the Federal Reserve System, where the holdings were exchanged for their equivalent value in other currency. The United States Mint ceased production of circulating gold coins in 1933.[17]

By the early 1960s, worldwide silver consumption was outpacing new silver production.[18] The resulting global shortage of the precious metal posed a long-term supply risk to the United States Mint regarding its ability to produce silver-based circulating coins. As a consequence, on June 3, 1965 President Lyndon Johnson proposed to Congress to authorize the removal of silver from United States circulating coins.[19] The Coinage Act of 1965, signed into law by President Johnson on July 23, 1965,[20] directed the United States Mint to (a) remove silver from the dime and quarter-dollar coins and substitute a "clad" or layered composition of copper and nickel, and (b) reduce the silver content of the half-dollar coin from 90% to 40%.[21] In 1971 silver was removed from the circulating half-dollar coin, replaced with the same clad composition as the dime and quarter-dollar coins.[22]

By moving to semi-precious metals as the basis for its circulating coinage, the value of which was less than the face value of the coins, the United States Mint was able to increase the amount of profit or "seigniorage"[23] earned from its operations. The seigniorage is used by the United States to reduce the amount of money it would otherwise borrow from the public to finance the national debt.[24]

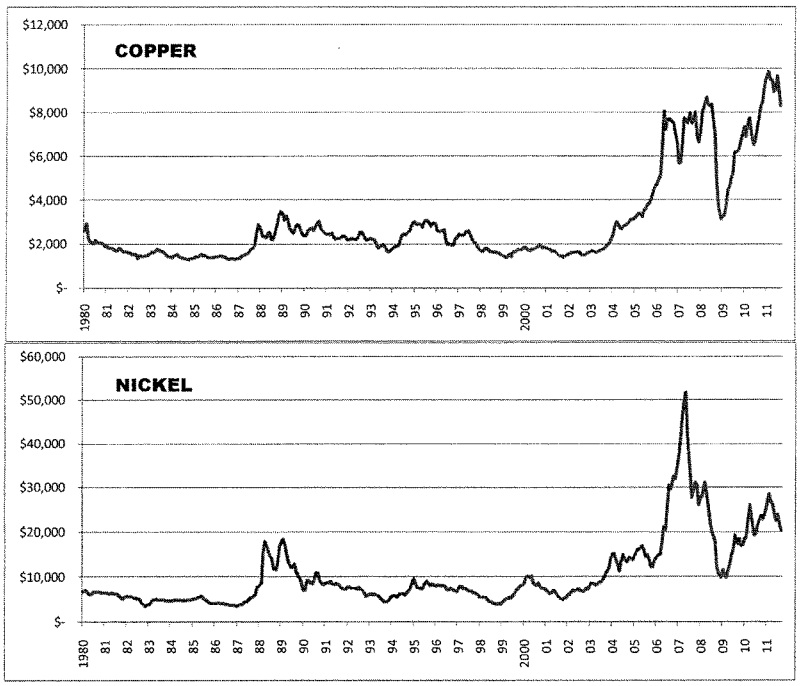
C. Semi-Precious Metal Five-Cent Coins Become Unprofitable to Produce

In 2002 prices for copper and nickel began to increase. Within five years, prices had risen more than fourfold. The average price levels for each metal, expressed in dollars and on an index basis (relative to fiscal year 2002), are shown in Figure 1.[25] The five-cent coin has been particularly hard hit by rising metal costs given its composition of 75% copper and 25% nickel. During the United States Mint's 2011 fiscal year (October 2010 through September 2011), the price of nickel was more than twice that of copper. Figure 2 provides a graphical depiction of the surge in monthly average prices of each metal during the period 2002 through 2011, relative to the previous two decades.[26]

Figure 1: Annual Average Spot Price per Metric Ton for Copper and Nickel, Fiscal Years 2002-2011

	Copper		Nickel	
Fiscal Year	Average Price	Index (2002=100)	Average Price	Index (2002=100)
2002	$ 1,528.99	100	$ 6,278.13	100
2003	1,652.64	108	8,302.13	132
2004	2,605.25	170	13,408.09	214
2005	3,373.84	221	15,117.51	241
2006	6,039.99	395	19,068.39	304
2007	7,098.21	464	38,063.18	606
2008	7,786.78	509	25,720.37	410
2009	4,478.95	293	13,026.23	207
2010	7,043.74	461	20,292.75	323
2011	9,104.04	595	24,206.76	386

Figure 2: Monthly Average Spot Price per Metric Ton for Copper and Nickel, January 1980-September 2011



In the United States Mint's 2006 Annual Report, director Edmund Moy noted that, "...by the fourth quarter, steeply rising metal prices had pushed the cost of manufacturing the one-cent and 5-cent coins above face value."[27] In its 2011 Annual Report the United States Mint stated, "The unit cost for...[the] nickel denomination[] remained above face value for the sixth consecutive fiscal year."[28] Financial data from the United States Mint supporting these observations for the five-cent coin are provided in Figure 3 below.[29]

Figure 3: Unit Cost of Producing and Distributing Circulating Five-Cent Coins, Fiscal Years 2006-2011 (in dollars)

	2006	2007	2008	2009	2010	2011
Cost of Goods Sold	$0.0592	$0.0949	$0.0877	$0.0579	$ 0.0916	$0.0938
Sales, General & Administrative	0.0001	-	-	0.0014	-	0.0176
Distribution to Federal Reserve Banks	0.0004	0.0004	0.0006	0.0010	0.0006	0.0004
Total Expenses	$0.0597	$0.0953	$0.0883	$0.0603	$ 0.0922	$0.1118

On a gross shipment basis, the United States Mint has lost more than $171 million over the past six years producing the five-cent coin. (See Figure 4)[30]

Figure 4: Losses from Circulating Five-Cent Coins, Fiscal Years 2006-2011 (in millions of dollars)

	2006	2007	2008	2009	2010	2011	Total
Value of Shipments	$ 72.6	$ 64.4	$ 32.3	$ 10.3	$ 17.9	$ 45.7	$ 243.2
Cost of Goods Sold	(87.1)	(122.9)	(57.1)	(12.2)	(33.1)	(86.1)	(398.5)
Sales, General & Administrative	(0.1)	-	-	(0.3)	-	(16.1)	(16.5)
Seigniorage	$ (14.6)	$ (58.5)	$ (24.8)	$ (2.2)	$ (15.2)	$ (56.5)	$ (171.8)

Rising material prices have also negatively impacted the seigniorage the United States Mint earns on its shipments of dime and quarter-dollar coins to the Federal Reserve Banks. Between 2003 and 2011 such seigniorage has been reduced by more than $577 million. This is shown in Figure 5 (dime) and Figure 6 (quarter-dollar).[31]

Figure 5: Reduction in Seigniorage from Circulating Dimes, Fiscal Years 2003-2011

Fiscal Year	Raw Material Cost per Coin (spot price basis) Actual	2002 Level	Difference	Coins Shipped (millions)	Reduction in Seigniorage
			(A) - (B)		(C) × (D)
	(A)	(B)	(C)	(D)	(E)
2003	$ 0.0050	$ 0.0044	$ 0.0006	1,888	$ 1,207,576
2004	0.0080	0.0044	0.0036	2,570	9,213,771
2005	0.0099	0.0044	0.0055	2,748	15,130,759
2006	0.0162	0.0044	0.0118	3,023	35,658,531
2007	0.0220	0.0044	0.0176	2,247	39,515,263
2008	0.0210	0.0044	0.0167	1,070	17,852,460
2009	0.0118	0.0044	0.0074	358	2,652,197
2010	0.0185	0.0044	0.0141	887	12,519,056
2011	0.0235	0.0044	0.0191	1,403	26,849,267
Total					$ 160,598,880

Figure 6: Reduction in Seigniorage from Circulating Quarter-Dollars, Fiscal Years 2003-2011

Fiscal Year	Raw Material Cost per Coin (spot price basis) Actual	2002 Level	Difference	Coins Shipped (millions)	Reduction in Seigniorage
			(A) - (B)		(C) × (D)
	(A)	(B)	(C)	(D)	(E)
2003	$ 0.0125	$ 0.0109	$ 0.0016	2,442	$ 3,902,473
2004	0.0199	0.0109	0.0090	2,244	20,105,759
2005	0.0247	0.0109	0.0138	2,743	37,748,478
2006	0.0404	0.0109	0.0295	3,007	88,662,051
2007	0.0549	0.0109	0.0440	2,711	119,152,135
2008	0.0526	0.0109	0.0417	2,510	104,678,954
2009	0.0294	0.0109	0.0185	965	17,870,863
2010	0.0462	0.0109	0.0353	252	8,890,705
2011	0.0587	0.0109	0.0478	323	15,451,488
Total					$ 416,462,905

As depicted in Figure 2, prices of both metals declined between mid-2007 and late 2008. However, since then copper prices have surged once more – exceeding the 2007 peak in seven of the past 10 months (as of September 2011).[32] With copper currently serving as the primary material in five-cent (75.00%), dime (91.67%) and quarter-dollar (91.67%) coins,[33] its procurement has become a significant non-controllable cost for the United States Mint. This was recognized by the United States Mint in 2005, when it commenced a comprehensive coinage material study of "cost effective alternative materials for circulating…coin denominations."[34] By 2010, the United States Mint was calling for Congressional action to address this issue:

> "Changing the composition of coins to less expensive alternative materials could generate significant cost savings and mitigate further reductions in seigniorage should metal market prices escalate…. The compositions of five-cent, dime, quarter-dollar and half-dollar coins are codified by statute. Any authority to change the composition of these denominations requires [Congressional action]."[35]

D. Congressional Consideration of Alternative Metal Compositions for Circulating Coins

The United States Mint had been calling for legislative relief well before the release of its 2010 Annual Report. On July 19, 2006, Acting Director David Lebryk testified before the House Subcommittee on Domestic and International Monetary Policy Trade and Technology. In his opening address Lebryk stated that the United States Mint "look[ed] forward to working with Congress on this issue [coin costs]."[36] On July 30, 2007, the Secretary of the Treasury wrote a letter to Congress seeking legislation to be enacted authorizing the Secretary of the Treasury to make changes to the composition of circulating coins.[37]

Congress considered three bills to address the Secretary of the Treasury's request. The first two bills – the *Coinage Materials Modernization Act of 2007* and the *Coin Modernization and Taxpayer Savings Act of 2007* – proposed granting the Secretary of the Treasury broad authority to determine the weight and composition of all circulating coinage.[38] Neither bill made it out of committee.[39] The third bill, the *Coin Modernization and Taxpayer Savings Act of 2008*, directed the United States Mint to adopt plated steel compositions for the one-cent and five-cent coins but granted the Secretary of the Treasury the authority to modify such compositions under certain conditions.[40] Although passed by the House on May 8, 2008, no major action was taken by the Senate.[41]

On September 22, 2010, The *Coin Modernization, Oversight, and Continuity Act of 2010* was introduced.[42] This bill would authorize the Secretary of the Treasury to conduct research and development on alternative metallic compositions for United States circulating coinage but would not authorize the Secretary of the Treasury to make any changes.[43] The Secretary of the Treasury would also be required to report to Congress on the United States Mint's production costs, cost trends and possible new metallic materials or technologies for the production of circulating coins, as well as provide detailed recommendations for any proposed content changes.[44] The bill passed both houses of Congress and was signed into law by President Barack Obama on December 14, 2010.[45]

Section II – The Royal Canadian Mint's Experience with Transitioning from Alloy-based Coins to Multi-Ply Plated Steel Coins

In its 2005 Annual Report, the United States Mint noted that it was planning to invest in a research and development program that would "explore new manufacturing, metal fabrication and finishing techniques that will improve its manufacturing operations...."[46] As part of that effort, the United States Mint would "explore what other mints are doing around the world."[47] In Section II we examine the experience of the Royal Canadian Mint ("RCM").

A. Material Cost Savings Achieved by Changing Coin Compositions

Prior to 2000 the RCM's coin compositions were comparable to current United States coin compositions in that they were made from copper and nickel (see Figure 7 below). However, Canadian circulation coins now employ a less costly primary material. The composition changes made by the RCM, including financing costs related to new fabrication techniques, have resulted in significantly lower unit production costs across all denominations.

Figure 7: Base Metal Content of Circulating Coins in Canada (1982-1999) and the United States (current) [48]

Canada (1982-1999)	Five-Cent	Dime	Quarter-Dollar
Copper	75.00%	0.00%	0.00%
Nickel	25.00%	99.90%	99.90%
Total	100.00%	99.90%	99.90%

United States (current)	Five-Cent	Dime	Quarter-Dollar
Copper	75.00%	91.67%	91.67%
Nickel	25.00%	8.33%	8.33%
Total	100.00%	100.00%	100.00%

In 2000, the RCM made a significant change to its circulating coinage, replacing most of the copper and nickel with a low-carbon steel alloy.[49] Only 6% of each coin's composition is now comprised of semi-precious metals – applied in a 3-ply layered fashion to the outside of an all-steel core using an electroplating process.[50] The RCM can alter the order and "recipe" of each layer of copper, nickel, bronze or brass to

adjust the coin's color and Electronic Magnetic Signal (used by coin acceptors to discriminate coins inserted into their machines).[51] Testing performed on the coins and reported by the RCM has found them to exhibit other desirable characteristics with regard to wear, durability and appearance.[52]

According to the RCM, the changes made to the production of its circulating coinage saves Canadians $10 million per year. A press release issued in October 2001 by the RCM quantified annual production cost savings under an assumed average volume of each denomination.[53] In its 2000 Annual Report, the RCM disclosed annual debt service payments related to its construction of a plating facility, which had a total construction cost of $30.3 million.[54] Using these sources we calculated a Net Annual Savings of $10,575,602 (see Figure 8), consistent with the RCM's claims.

Figure 8: Cost Comparison: Nickel Alloy vs. Multi-ply Plated Steel, Canadian Circulating Coins

Coin	Projected Annual Production	Nickel Alloy		Multi-ply Plated Steel		Cost Savings	
		Unit Cost	Annual Cost	Unit Cost	Annual Cost	Dollars	Percent
			(A) × (B)		(A) × (D)	(C) - (E)	(F) ÷ (C)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
5-cent	95,660,000	$ 0.0360	$ 3,443,760	$ 0.0113	$ 1,080,958	$ 2,362,802	69%
10-cent	141,800,000	$ 0.0350	$ 4,963,000	$ 0.0070	$ 992,600	$ 3,970,400	80%
25-cent	112,400,000	$ 0.0910	$ 10,228,400	$ 0.0150	$ 1,686,000	$ 8,542,400	84%
Total	349,860,000		$ 18,635,160		$ 3,759,558	$ 14,875,602	80%
Annual financing costs for plating facility:							
Principal						$ (3,100,000)	
Interest						$ (1,200,000)	
Net Annual Savings						$10,575,602	

In addition to producing circulating coins for Canada, the RCM sells circulating coins and blanks utilizing its multi-ply plating process to foreign countries. Since its introduction, 27 countries in addition to Canada have accepted this technology for their coinage needs.[55] With sales of 1.1 billion coins and blanks in 2010, the RCM had a 9.5% share of the foreign circulation coinage market.[56]

B. Additional Revenues from Reclaiming Old-Composition Coins

Beginning in 2003, the RCM launched an Alloy Recovery Program ("ARP"). Under the program, old-composition coins are reclaimed from circulation and melted, with the recovered alloy material sold to metal dealers at market prices. The RCM replaces the reclaimed coins with new-composition coins so that day-to-day commercial transactions continue uninterrupted.[57] Through 2010, the RCM has received over $200 million in revenue from the ARP, as shown in Figure 9 below.[58] While the profit from such operations is not reported by the RCM, it has been characterized as a "high-margin" business.[59]

Figure 9: Revenue Earned by the Royal Canadian Mint from its Alloy Recovery Program, 2004 – 2010

Year	Revenue
2004	$ 8.0
2005	11.2
2006	19.4
2007	35.8
2008	55.4
2009	51.4
2010	22.6
Total	$ 203.8

Section III – Raw Material Cost Savings from Converting United States Vended Coinage to Multi-ply Plated Steel

In this section we calculate the current raw material costs and the alternative raw material costs associated with having the United States Mint adopt the RCM's coin compositions for the circulating five-cent, dime and quarter-dollar denominations. We have examined the costs of each metal on a spot market basis; that is, the price from the mine as recorded by a trading market such as the London Metal Exchange. As such, the price does not include costs associated with processing, fabrication, packaging and transport that would be performed by a vendor prior to the material being received by the United States Mint. The time frame for our analysis is the United States Mint's most recently-completed fiscal year, which ended on September 30, 2011.

As shown in Figure 7, the United States Mint currently uses copper and nickel for its five-cent, dime and quarter-dollar coins. Using weight and composition data published by the United States Mint, it is possible to determine, for each denomination, the amount of each metal used to make a single coin. This is shown in Figure 10.[60]

Figure 10: Material Inputs for United States Vended Coins on a Per-Unit Basis (Current Composition)

	Five-Cent		Dime		Quarter-Dollar	
Metal	Percent of Total	Quantity (grams)	Percent of Total	Quantity (grams)	Percent of Total	Quantity (grams)
		(A) x 5.000		(C) x 2.268		(E) x 5.670
	(A)	(B)	(C)	(D)	(E)	(F)
Copper	75.00%	3.750	91.67%	2.079	91.67%	5.198
Nickel	25.00%	1.250	8.33%	0.189	8.33%	0.472
Total		5.000		2.268		5.670

The United States Mint does not disclose the contract prices it pays for the flat rolled coils of base metals used in the minting of its circulating coinage. However, in recent Annual Reports the United States Mint has published charts that show spot prices for copper and nickel over time and uses these charts to explain changes in its production costs vis-à-vis prior years.[61] Therefore, for purposes of our study, which seeks to estimate potential material cost savings to the United States Mint through the substitution of lower cost metals relative to its current costs, we believe spot prices serve as a reliable proxy measure.

Spot prices are published daily on a "per metric-ton" (or 1,000 kilogram) basis;[62] market analysts also publish average prices on a weekly and monthly basis.[63] The United States Mint purchases material as needed throughout the year to satisfy demand for circulating coins by the Federal Reserve Banks.[64] Assuming that purchases occur in a uniform manner throughout the year, we have calculated, for copper and nickel, the average spot market price during fiscal year 2011 as the average of the monthly-average prices for October 2010 through September 2011. These averages ($9,104 for copper; $24,207 for nickel) are shown in Figure 1.

In order to place the quantity and price data on the same scale, we divided the quantities shown in Figure 9 by one million to obtain a per-metric ton equivalent. The product of quantity and price, summed across the two base metals, yields the raw material cost, on a per-unit basis, for each denomination. This is shown in Figure 11.[65] We note that the raw material cost for the five-cent coin, $0.0644, exceeds its face value.

Figure 11: Raw Material Cost for United States Vended Coins on a Per-Unit Basis, Fiscal Year 2011 (Current Composition)

	Five-Cent	Dime	Quarter-Dollar
Copper:			
Weight (Metric Tons)	0.000003750	0.000002079	0.000005198
Price per Metric Ton	$ 9,104.04	$ 9,104.04	$ 9,104.04
Total Copper Cost	$ 0.0341	$ 0.0189	$ 0.0473
Nickel:			
Weight (Metric Tons)	0.000001250	0.000000189	0.000000472
Price per Metric Ton	$ 24,206.76	$ 24,206.76	$ 24,206.76
Total Nickel Cost	$ 0.0303	$ 0.0046	$ 0.0114
Total Material Cost	$ 0.0644	$ 0.0235	$ 0.0587

Having determined the per-unit raw material costs under the United States Mint's current coinage compositions, we turn to the calculation of per-unit raw material costs under an alternative composition based on the RCM's multi-ply plated steel compositions. In Figure 10 we determined the amount of copper and nickel required to make a single unit of each denomination by multiplying the coin's total weight by each metal's composition percentage – information published by the United States Mint. However, while the composition percentages under the RCM's multi-ply plated formulation are known, the total weights of the modified coins are not known and must be calculated.

Substituting steel for copper and nickel while maintaining each coin's current diameter and thickness will result in a lower weight, as steel is less dense than copper and nickel. In order to determine how much lighter each RCM-composition United States coin will be, the volume of raw material used in each coin must be calculated. The United States Mint's published coin specifications do not include volumes. However, given the total weight and metal composition of the current coins, as well as the densities of each metal, the volume of each coin can be estimated. This is shown in Figure 12.

Figure 12: Volume (in cubic centimeters) of United States Vended Coins [66]

	Material	Five-Cent		Dime		Quarter-Dollar	
Metal	Density	Weight	Volume	Weight	Volume	Weight	Volume
	(grams/cc)	(grams)	(cc)	(grams)	(cc)	(grams)	(cc)
			(B) ÷ (A)		(D) ÷ (A)		(F) ÷ (A)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Copper	8.930	3.750	0.420	2.079	0.233	5.198	0.582
Nickel	8.880	1.250	0.141	0.189	0.021	0.472	0.053
Total		5.000	**0.561**	2.268	**0.254**	5.670	**0.635**

Once the volumes of each coin are known, the weights of the RCM-composition United States coins can be determined. The calculations are shown in Figure 13 (five-cent), Figure 14 (dime) and Figure 15 (quarter-dollar). Note that for each denomination the shares of the coin's total weight (shown in column B) are per the RCM's specifications.

Figure 13: Weight of United States Circulating Five-Cent Coin Using RCM Composition [67]

Material	Density	Share of Weight	Average Density	Volume	Total Weight
	(grams/cc)	(percent)	(grams/cc)	(cc)	(grams)
			(A) x (B)		(C) x (D)
	(A)	(B)	(C)	(D)	(E)
Steel	7.872	94.50%	7.439		
Copper	8.930	3.50%	0.313		
Nickel	8.880	2.00%	0.178		
		100.00%	7.930	0.561	4.449

Figure 14: Weight of United States Circulating Dime Using RCM Composition [68]

Material	Density (grams/cc)	Share of Weight (percent)	Average Density (grams/cc)	Volume (cc)	Total Weight (grams)
	(A)	(B)	(A) x (B) (C)	(D)	(C) x (D) (E)
Steel	7.872	92.00%	7.242		
Copper	8.930	5.50%	0.491		
Nickel	8.880	2.50%	0.222		
		100.00%	7.955	0.254	2.021

Figure 15: Weight of United States Circulating Quarter-Dollar Using RCM Composition [69]

Material	Density (grams/cc)	Share of Weight (percent)	Average Density (grams/cc)	Volume (cc)	Total Weight (grams)
	(A)	(B)	(A) x (B) (C)	(D)	(C) x (D) (E)
Steel	7.872	94.00%	7.400		
Copper	8.930	3.80%	0.339		
Nickel	8.880	2.20%	0.195		
		100.00%	7.934	0.635	5.038

Having determined the weights of the RCM-Composition United States vended coins, the amount of each metal that would be used to produce a single five-cent coin, dime and quarter-dollar can be determined. This is shown in Figure 16.

Figure 16: Material Inputs for United States Vended Coins on a Per-Unit Basis (RCM Composition) [70]

	Five-Cent		Dime		Quarter-Dollar	
Metal	Percent of Total	Quantity (grams)	Percent of Total	Quantity (grams)	Percent of Total	Quantity (grams)
	(A)	(A) x 4.449 (B)	(C)	(C) x 2.021 (D)	(E)	(E) x 5.038 (F)
Copper	3.50%	0.156	5.50%	0.111	3.80%	0.191
Nickel	2.00%	0.089	2.50%	0.051	2.20%	0.111
Steel	94.50%	4.204	92.00%	1.859	94.00%	4.736
Total		4.449		2.021		5.038

Likewise, after converting the gram-denominated material weights to their metric ton equivalents, the cost associated with each material in each coin can be calculated as the product of quantity and price. This is shown in Figure 17.

Figure 17: Raw Material Cost for United States Vended Coins on a Per-Unit Basis, Fiscal Year 2011 (RCM Composition) [71]

	Five-Cent	Dime	Quarter-Dollar
Copper:			
Weight (Metric Tons)	0.000000156	0.000000111	0.000000191
Price per Metric Ton	$ 9,104.04	$ 9,104.04	$ 9,104.04
Total Copper Cost	$ 0.0014	$ 0.0010	$ 0.0017
Nickel:			
Weight (Metric Tons)	0.000000089	0.000000051	0.000000111
Price per Metric Ton	$ 24,206.76	$ 24,206.76	$ 24,206.76
Total Nickel Cost	$ 0.0022	$ 0.0012	$ 0.0027
Steel:			
Weight (Metric Tons)	0.000004204	0.000001859	0.000004736
Price per Metric Ton	$ 774.00	$ 774.00	$ 774.00
Total Steel Cost	$ 0.0033	$ 0.0014	$ 0.0037
Total Material Cost	$ 0.0068	$ 0.0037	$ 0.0081

Figure 18 compares the per-unit raw material costs of producing each United States vended coin using the United States Mint's current composition and using the RCM's multi-ply plated steel compositions. The potential savings, represented as the difference between the two sets of figures, are substantial — at least 84% for each denomination. Additionally, the percentage figures are of the same order of magnitude as those experienced by the RCM in 2000.[72]

Figure 18: Potential Per-Unit Raw Material Cost Savings from Converting United States Circulating Coins to Multi-ply Plated Steel, Fiscal Year 2011 [73]

	Five-Cent	Dime	Quarter-Dollar
Current Composition	$0.0644	$0.0235	$0.0587
RCM Composition	0.0068	0.0037	0.0081
Savings (dollars)	$0.0576	$0.0198	$0.0506
Savings (percent)	89%	84%	86%

As noted above, the RCM claims that the adoption of its multi-ply plated steel technology saves Canadians $10 million each year, based on a projected level of domestic circulating coin production. The analysis set forth in Figure 8 provides an overall savings estimate (including incremental capital costs) that is consistent with the RCM's claims. While we discuss certain "all in" net savings scenarios in Section IV of this report, we conclude this section by examining, at a high level, the potential raw material cost savings the United States Mint could earn each year by substituting multi-ply plated steel compositions for its current compositions.

Production levels of the five-cent coin, dime and quarter-dollar vary widely from year to year. Between 1982 and 2011 production levels changed by less than 10% six times, while changes of 20% or more occurred 19 times.[74] From 1997 to 2000 production more than tripled to an all-time high, followed by declines of 20-29% in each of the following three years.[75] In 2009, production of five-cent coins and dimes fell to their lowest levels since 1955.[76] Thus, our estimate of raw material cost savings has been calculated, and should be viewed, as a long-term average.

We used the 30-year period 1982-2011 as the benchmark for our calculation of average production levels. Applying the per-unit cost savings under the alternative composition scenario (as set forth in Figure 18) to each coin's average production level, we calculate the aggregate dollar value of raw material cost savings on an annual basis, which is equal to $207.5 million. This is shown in Figure 19 below.

Figure 19: Potential Annual Raw Material Cost Savings from Converting United States Vended Coins to Multi-ply Plated Steel [77]

	Average Production	Cost Savings Per Unit	Cost Savings Total
			(A) × (B)
	(A)	(B)	(C)
Mean:			
Five-Cent	1,194,895,000	$0.0576	$ 68,825,952
Dime	1,962,359,000	$0.0198	$ 38,854,708
Quarter-Dollar	1,972,734,000	$0.0506	$ 99,820,340
Total	5,129,988,000		$ 207,501,001
Median:			
Five-Cent	1,214,160,000	$0.0576	$ 69,935,616
Dime	1,982,193,000	$0.0198	$ 39,247,421
Quarter-Dollar	1,475,417,000	$0.0506	$ 74,656,100
Total	4,671,770,000		$ 183,839,138

To assess the sensitivity of the cost savings calculation (Figure 19), we prepared the analysis in Figure 20 to show the material costs savings under several different price change assumptions for both copper/nickel and steel. For purposes of this analysis we used the mean production level over the past 30 years.

Figure 20: Sensitivity of Annual Raw Material Cost Savings to Movements in Metal Prices [78]

		Prices of Copper and Nickel				
		Decrease 20%	Decrease 10%	No Change	Increase 10%	Increase 20%
Price of Steel	Decrease 20%	$166.1	$188.2	$210.4	$232.6	$254.7
	Decrease 10%	$164.7	$186.9	$209.0	$231.2	$253.3
	No change	$163.3	$185.5	$207.5	$229.8	$251.9
	Increase 10%	$161.9	$184.1	$206.2	$228.4	$250.5
	Increase 20%	$160.5	$182.7	$204.8	$227.0	$249.1

To assess the sensitivity of the average (mean) production level to the inclusion of particular years we also calculated the median production level of each coin during the benchmark period. The mean and median production levels for the five-cent coin and dime were not significantly different.[79] However, median production for the quarter-dollar over the 30-year benchmark period was significantly less than mean production.[80]

The difference between the two measures of average for the quarter-dollar is attributable to the United States Mint's successful quarter-dollar rotating design series. Beginning with the 50 State Quarters Program (1999-2008) and followed by the District of Columbia and U.S. Territories Program (2009) and the America the Beautiful Quarters Program (2010-present), the United States Mint has issued five or six versions of the quarter-dollar each year, differentiated by their reverse image.[81] The interest these Programs have generated – the United States Mint estimates that 147 million Americans collected coins under the 50 State Quarters Program – has led to significantly greater annual production relative to the pre-1999 period.[82] The current Program, which will honor 56 national parks and sites, is scheduled to run through 2021.[83]

By providing both mean and median measures of long-term "average" production it is possible to assess the impact of the United States Mint's rotating design programs on the potential raw material cost savings opportunity. The $207.5 million figure portends continued administration of rotating design programs by the United States Mint, while the $183.8 million figure is more consistent with an eventual return to a single issue set of circulating coins each year.

Section IV – Options for the United States Mint to Consider in Changing its Vended Coins to Multi-ply Plated Steel Compositions

As discussed in Section III, the United States Mint can achieve significant cost savings related to its production of vended coins by changing each coin's composition from copper-nickel alloys to multi-ply plated steel. While base metal costs make up the largest portion of production costs,[84] the United States Mint would incur new or additional costs in other parts of its production process in order to implement this change. Notably, each of the United States Mint's plants would need to be modified to accept and integrate a coin plating facility. With the exception of the one-cent coin, we understand the United States Mint operates as a fully-integrated manufacturing operation, handling all aspects of the production process from receiving raw material through the coining of the final product.

After consulting with industry experts, we have identified three production options for the United States Mint to consider if it were to change its coin compositions from the current clad- and alloy-based compositions to multi-ply plated steel coins:

Option 1 – Continue to perform all production operations in-house;

Option 2 – Purchase "ready-to-strike" blanks of plated steel coins, similar to the process currently employed with the copper-plated zinc penny; or

Option 3 – Outsource the plating function but keep all other operations in-house.

Given the lack of publicly available data on the detailed operating costs of the United States Mint's operations in general, and coin plating facility operations specifically, we did not evaluate the relative merits of the options based on expected costs. Rather, we include herein a discussion of the issues that would need to be addressed by the United States Mint in evaluating each option. Given its extensive institutional knowledge of its operational capabilities, along with its legacy of designing and testing well over a thousand patterns and experimental and trial pieces[85] over the past two centuries, the United States Mint is in the best position to determine cost estimates for each of the options and issues that we raise for consideration.

A. Option 1 – Continue to Perform all Production Operations In-house

Currently, the United States Mint handles the production of its copper-nickel alloy based vended coins – from the receipt of flat rolled coils of metal through coining – within its Philadelphia and Denver plants. If the United States Mint were to move to producing multi-ply plated steel coins, it would need to consider a number of cost issues – including machinery and equipment, facilities, employees, and technology licensing – as well as potential short-term production disruptions. Each of these issues is discussed below.

1. Machinery and equipment – The United States Mint would need to evaluate what new and/or additional production capabilities would be needed. Coins made from a steel core need to be plated after the blanking and plancheting process, a task that is not currently performed by the United States Mint for any of its vended coins. Additionally, the United States Mint would need to evaluate which of its current production machinery and equipment (blanking presses, annealers, upsetting mills, stamping presses, dies, etc.) could be retooled to accept the new metallic compositions (and, if so, the implications for each component's useful life, run rate, and downtime for scheduled maintenance) and which would need to be retired and replaced with new equipment employing compliant technology.

2. Facilities – Once the machinery and equipment issues have been resolved, the United States Mint would need to turn its attention to the adequacy of its current facilities. Specifically, could the changes required to accommodate the fully-integrated production of multi-ply plated steel coins be accomplished within the current space and layout of the United States Mint's Philadelphia and Denver plants? In addition, modifying the existing facilities to accommodate plating work stations or the handling of steel may require capital outlays to comply with environmental and safety regulations including permitting, waste treatment, utilities and power distribution.

3. Employees – Process changes brought on by the adoption of multi-ply plated steel coining technology would require a workforce re-assessment by the United States Mint's facilities managers. Some workers may need to be redeployed from their current duties, necessitating time and expense for training. New skill competencies may be required (particularly with respect to the new plating process), which would result in the United States Mint incurring costs related to hiring and training new personnel. Finally, certain positions could be eliminated, either through the obsolescence of skill sets or reduced headcount needs, resulting in additional severance costs in the short run, to be followed by reduced payroll costs in the long-term.

4. Technology License – As discussed in Section II, the RCM has issued multi-ply plated steel coins since 2000 using a proprietary, patented process. While non-infringing alternatives for manufacturing multi-ply plated steel coins may exist from other sources, adoption of the RCM's technology provides an expedient, proven solution. We are not aware of any reluctance on the part of the RCM to license its technology to the United States Mint, although the costs of acquiring such a license would need to be considered in any cost-benefit analysis under this option.

5. Production Disruptions – Potentially as important as the cost-based issues raised above is the timing associated with transitioning to a new coin production process. Should the United States Mint decide to proceed with a change to its operations, the logistics of such a transition would need to be managed, particularly with regard to the suspension of production lines. In order to reduce the risk of supply shortages, the United States Mint would want to explore the feasibility of shifting production between its two facilities (subject to capacity and conversion constraints) and/or introduce the new alternative metal coins at appropriate intervals during the transition period.

B. Option 2 – Purchase Ready-to-Strike Blanks of Plated Steel Coins

As discussed in the previous section, by changing United States vended coins to plated steel compositions the United States Mint would be faced with the challenge of how to plate the coins prior to the striking process – as it does not currently possess such equipment or expertise in plated coins in its facilities. The current one-cent coin has a copper plated zinc composition, which the United States Mint purchases in ready-to-strike form from an outside supplier. Thus, the United States Mint could contract with one or more suppliers to purchase ready-to-strike blanks of plated steel coins for its vended denominations.

By choosing this option the United States Mint would be able to avoid a number of the transition-related issues discussed above. Machines utilized through the plancheting stage would not need to be retooled or replaced, and its facilities would not need to be expanded or reconfigured to accommodate plating or other new equipment.[86] The United States Mint would not have to acquire a license to utilize the RCM's patented technology. Finally, should the United States Mint choose to retain its existing operations, it would be able to return to the production of alloy- or clad-based circulating coins should the need arise (due to, say, a shortage of coin-grade steel) or should prices of copper and nickel fall to the point where it becomes economically viable once more.

However, with this option there would still be important issues for the United States Mint to address. These include the following:

1. Equipment – By purchasing ready-to-strike blanks, much of the equipment currently used by the United States Mint would no longer be needed. Such equipment could be decommissioned or placed on stand-by status. Costs associated with decommissioning would include removal of the equipment from the premises, performing cleanup of hazards and contaminants, closing utility lines, and storing or dismantling the equipment. If placed on stand-by status, the United States Mint would incur costs related to periodic inspections, maintenance, and operational testing.

2. Employees – Just as equipment would be shuttered pursuant to moving to a partial outsource option, the work force dedicated to or supporting the operation of such equipment would no longer be needed. While this would save payroll related costs in the future, the United States Mint would need to assess any current period severance payments that may be incurred.

3. Supply – We are aware of three producers of multi-ply plated steel coins: the RCM (Canada), Jarden Zinc Products LLC (United States), and Sunshine Minting, Inc. (United States).[87] All three of these companies are suppliers to the United States Mint. The United States Mint would have to assess the current and planned capacity of these suppliers against the current and projected demands of the United States Mint and of those countries that are currently purchasing or contemplating the purchase of plated steel coins from these suppliers.

4. Timing of Transition – While the purchasing of ready-to-strike coins may seem less complex relative to developing the new process in-house, there are still transition issues that the United States Mint would need to address. First, as mentioned above, when would a provider be ready to start to handle the process for the United States Mint? How should the United States Mint sequence the transition – all denominations at the same time or a gradual transition over time? The answer to this last question could be influenced by several of the aforementioned issues, such as employee transition plans and the downsizing of the current facilities.

C. Option 3 – Outsource Plating but Keep all Other Operations In-house

For strategic reasons, the United States Mint may place a high value on maintaining as much of its existing machinery and work force as possible while still wishing to transition to producing multi-ply plated steel coins. One way to achieve that

objective would be for the United States Mint to receive flat rolled coils of steel (as it currently does for its alloy- and clad-based production) and perform all manufacturing steps through creation of the planchets, or rimmed blanks. The United States Mint would then package the planchets and securely transport them to an outside facility that would perform the plating process and subsequently return the planchets to the United States Mint for striking.

The attractiveness of this option relative to the other two alternatives would depend on the findings from the various issue assessments that were discussed above. For example, should it be determined that one or both of the United States Mint's existing facilities cannot accommodate plating equipment without substantial new infrastructure investments, outsourcing the plating function may prove to be economical. Likewise, if it is determined that current suppliers do not have sufficient capacity to manufacture plated steel planchets but they do have sufficient capacity to plate planchets manufactured elsewhere, then the potential additional cost of Option 3 relative to Option 2 may be justified on the basis of the United States Mint being able to ensure an adequate supply of coins to meet expected demand from the Federal Reserve Banks.

Of course, a mid-stream outsourcing of the plating function would entail additional expenses not presently incurred by the United States Mint in its full in-house operation. The planchets would need to be inventoried prior to being released and re-inventoried (including quality inspections) upon their return, with systems designed to handle discrepancies and rejects. Transportation costs would be dependent on the distance travelled, the volume of planchets included in each shipment and fees for insurance. There would also be handling costs associated with the loading and unloading of the planchets at the United States Mint and at the plating facility.

D. Assessment of Options

Given that detailed cost data for the United States Mint's current operations and for the operation of a coin plating facility are not available for public inspection and analysis, we have not evaluated the relative merits of the three options based on expected net cost impacts. However, whichever approach the United States Mint determines is best for the manufacture of vended coins, the decision to use multi-ply plated steel compositions like Canada and other countries will yield significant raw material cost savings. Based on average historical production levels, substitution of multi-ply plated steel compositions for copper-nickel alloys is likely to save the United States Mint approximately $200 million per year in raw material costs.

Section V – Potential Additional Revenue to the United States Mint from Implementing an Alloy Recovery Program

As noted in Section II.B, since its issuance of circulation coins using multi-ply plated steel compositions, the RCM has implemented an alloy recovery program that has generated more than $200 million in additional revenue between 2004 and 2010. Assuming enabling legislation is enacted by Congress, the United States Mint could execute a similar program for its current copper and nickel-based five-cent, dime and quarter-dollar coins. It is beyond the scope of our study to estimate with precision the amount of revenue the United States Mint could expect to receive from launching such a program. However, for the purpose of providing insight into the potential revenue opportunity of such a program, we present a scenario based on publicly available information and reasonable assumptions.

In Figure 11 we calculate the raw material cost associated with the five-cent ($0.0644), dime ($0.0235) and quarter-dollar ($0.0587) coins during fiscal year 2011. The average annual production of each coin over the period 1982 through 2011 is presented in Figure 19. Combining these two sets of information results in a reasonable measure of the revenue, on a per-coin basis, that the United States Mint could receive from retrieving, extracting and selling the copper and nickel material through an alloy recovery program ($0.0466). This calculation is set forth in Figure 21. The calculation assumes that the distribution of coins retrieved through an alloy recovery program will mirror their relative unit production quantities over the past 30 years.

Figure 21: Average Per-Coin Raw Material Cost of Producing Five-Cent, Dime and Quarter-Dollar Coins, Based on Fiscal Year 2011 Spot Prices [88]

	Average Production	Material Cost Per Unit	Material Cost Total
			(A) × (B)
	(A)	(B)	(C)
Five-Cent	1,194,895,000	$0.0644	$ 76,949,541
Dime	1,962,359,000	$0.0235	$ 46,120,080
Quarter-Dollar	1,972,734,000	$0.0587	$ 115,894,896
Total	5,129,988,000		$ 238,964,517
Average material cost per coin minted			**$ 0.0466**

The number of coins reclaimed through an alloy recovery program will be dependent on the United States Mint's ability to access inventories of circulating coins under the control of (a) the Federal Reserve Banks and (b) private coin recycling companies, as well as the effectiveness of campaigns designed to encourage the redemption of coin holdings removed from circulation. Between 1982 and 2011, 153.9 billion five-cent, dime and quarter-dollar coins were produced (equal to average annual unit coin production of 5.130 billion, as shown in Figure 19, multiplied by 30 years). If one-third of these coins were recovered through an alloy recovery program, the United States Mint's additional revenue could be $2.4 billion (equal to 51.3 billion coins multiplied by $0.0466). This calculation assumes that current material prices do not significantly change.

We note that the United States Mint would incur costs to implement and run an alloy recovery program, including the possible production of replacement coins out of multi-ply plated steel. Consistent with our assessment of the costs to change from the current composition of vended coins to multi-ply plated steel composition, the United States Mint would be in the best position to determine the costs to implement such a program. Assuming it is patterned after the RCM's program, one would expect that the United States Mint would also earn high margins.

Section VI – Summary of Potential Benefits to the United States Mint from Changing the Compositions of its Vended Coins to Multi-ply Plated Steel

Key findings of this study, based upon analyses conducted to date, include the following:

- By changing the compositions of U.S. nickel, dime and quarter-dollar coins from copper-nickel alloys to multi-ply plated steel, the United States Mint would incur significantly lower raw materials costs – approximately $200 million per year based on average historical production levels. Multi-ply plated steel compositions have been successfully used by the Royal Canadian Mint to manufacture circulating coinage for Canada, as well as for more than two dozen nations, for over a decade.

- By implementing a parallel alloy recovery program that collects and replaces copper-nickel alloy coins in circulation with multi-ply plated steel coins and salvages the copper and nickel material from the retired coins, the United States Mint could earn over $2 billion in additional revenue based on modest recovery levels.

[1] *Coinage laws of the United States, 1792 to 1893*, Third Edition – Revised and Corrected to October 17, 1893. Prepared Under the Direction of the Committee of Finance, U.S. Senate, 1893, pp. 1-6, "Act of April 2, 1792, Establishing a mint and regulating the coins of the United States."

[2] <http://www.usmint.gov/about_the_mint/historianscorner/?action=history>. "Under Rittenhouse, the Mint produced its first circulating coins -- 11,178 copper cents, which were delivered in March 1793."

[3] <http://www.treasury.gov/about/organizational-structure/bureaus>. The Mint was placed under the jurisdiction of the Treasury Department pursuant to the Coinage Act of 1873.

[4] "The Constitution of the United States," Article 1, Section 8, Clause 5.

[5] *Coinage laws of the United States, 1792 to 1893*, pp. 1-6, "Act of April 2, 1792. Establishing a mint and regulating the coins of the United States," Section 9. "Dollar" was defined to be "of the value of a Spanish milled dollar as the same is now current, and to contain three hundred and seventy-one grains and four sixteenth parts of a grain of pure, or four hundred and sixteen grains of standard silver."

[6] Ibid, Section 9. The specifications also provided for different weights depending on whether "pure" or "standard" (i.e., alloy) metals were used.

[7] Ibid, Section 9.

[8] Ibid, Section 9.

[9] Ibid, Section 11.

[10] *Coinage laws of the United States, 1792 to 1893*, pp. 15-16, "Act of June 28, 1834. Concerning gold coins of the United States, and for other purposes." The Act directed the United States Mint to reduce the gold content in gold coins by a uniform 6%, relative to earlier compositions, while the content of silver in silver coins remained constant. This change translated to a revised legal exchange ratio of silver to gold equal to 16:1.

[11] *Coinage laws of the United States, 1792 to 1893*, pp. 25-26, "Act of March 3, 1849. Authorizing the coinage of gold dollars and double eagles."

[12] *Coinage laws of the United States, 1792 to 1893*, pp. 27-28, "Act of February 21, 1853. An act amendatory of existing laws relative to the half dollar, quarter dollar, dime and half dime," Sections 1-2.

[13] *Coinage laws of the United States, 1792 to 1893*, pp. 34-35, "Act of May 16, 1866. An Act authorizing the coinage of five-cent pieces," Section 1; and R.S. Yeoman, *A Guide Book of United States Coins*, 65th ed., Whitman, Atlanta, 2011, p. 126-131. Except for 1942-1945, the composition of the five-cent coin has not changed.

[14] *Coinage laws of the United States, 1792 to 1893*, pp. 36-43, "Act of February 12, 1873. An act revising and amending the laws relative to the Mint, assay offices, and coinage of the United States," Sections 15-17 and 21. Only the silver Trade Dollar (used for international commerce) is mentioned in the legislation, not the domestic silver dollar coin, suggesting the latter has been discontinued.

[15] *Coinage laws of the United States, 1792 to 1893*, p. 59, "Act of June 22, 1874," Section 3586. The generic term "silver coins" is used, which would include the domestic silver dollar coin. The silver dollar was reauthorized and granted full legal tender status pursuant to the Act of February 28, 1878 (p. 64) and discontinued after July 1, 1891 pursuant to the Act of July 14, 1890 (p. 71).

[16] Emergency Banking Relief Act of 1933, Title I, Section 2.

[17] <http://www.usmint.gov/about_the_mint/historianscorner/?action=timeline&century=1900>.

[18] Coinage Act of 1965, Hearings Before the Committee on Banking and Currency, House of Representatives, Eighty-Ninth Congress, First Session on H. R. 8746 (Superseded by H.R. 8926), "A Bill to Provide for the Coinage of the United States," June 4,7, and 8, 1965.

[19] <http://coinhistory.info/usa/usa1965.htm>.

[20] <http://www.presidency.ucsb.edu/ws/?pid=27108>.

[21] Yeoman (p. 204) states that through 1964 the half-dollar coin contained 90% silver by weight. Per the Coinage Act of 1965 (Title I, Section 101(a)), "The half dollar shall have…a core of an alloy of silver and copper such that the whole coin weighs 11.5 grams and contains 4.6 grams of silver…"; i.e., 40% silver.

[22] Yeoman, p. 205.

[23] Seigniorage derived from specie, or metal coins, is defined by the Mint as "the difference between the face value and cost of producing coinage." (2010 Annual Report, p. 2).

[24] "Coins and Currency: How the Costs and Earnings Associated with Producing Coins and Currency Are Budgeted and Accounted For," United States General Accounting Office, GAO-04-283, April 2004, p. 12.

[25] <http://www.imf.org/external/np/res/commod/index.aspx>.

[26] Ibid.

[27] United States Mint, 2006 Annual Report, p. 5.

[28] United States Mint, 2011 Annual Report, p. 10.

[29] Source: unit cost data reported in the United States Mint's Annual Reports for fiscal years 2006-2011.

[30] Source: seigniorage data reported in the United States Mint's Annual Reports for fiscal years 2006-2011.

[31] Source: unit cost data reported in the United States Mint's Annual Reports for fiscal years 2006-2011.

[32] <http://www.ifg.org/external/np/res/commod/index.aspx>.

[33] <http://www.usmint.gov/about_the_mint/?action=coin_specifications>.

[34] United States Mint, 2005 Annual Report, p. 10. See, also, Testimony of David A. Lebryk, Acting Director, United States Mint, Before the House Financial Services Subcommittee on Domestic and International Monetary Policy, Trade and Technology, General Coin Issues and H.R. 5077, "Numismatic Rarities Certainty Act of 2006", July 19, 2006, p. 3: "The ability to keep conversion costs down is critical to our success because of the rising cost of metal and fabrication – costs we cannot control."

[35] United States Mint, 2010 Annual Report, p. 28.

[36] Lebryk, p. 3.

[37] 110th Congress, 2nd Session, H.R. 5512, "Coin Modernization and Taxpayer Savings Act of 2008", Section 2(2).

[38] 110th Congress, 1st Session, H.R. 3330, "Coinage Materials Modernization Act of 2007", Section 2(a); and 110th Congress, 1st Session, H.R. 3956, "Coin Modernization and Taxpayer Savings Act of 2007", Section 2(a).

[39] <http://www.govtrack.us/congress/bill.xpd?bill=h110-3330> and <http://www.govtrack.us/congress /bill.xpd?bill=h110-3956>.

[40] 110th Congress, 2nd Session, H.R. 5512, "Coin Modernization and Taxpayer Savings Act of 2008", Sections 3 and 4.

[41] <http://www.govtrack.us/congress/bill.xpd?bill=h110-5512>.

[42] <http://www.govtrack.us/congress/bill.xpd?bill=h111-6162>.

[43] 111th Congress, 2nd Session, H.R. 6162, "Coin Modernization, Oversight and Continuity Act of 2010", Section 2.

[44] Ibid, Section 3.

[45] <http://www.govtrack.us/congress/bill.xpd?bill=h111-6162>.

[46] United States Mint, 2005 Annual Report, p. 10.

[47] Ibid.

[48] <http://www.mint.ca/store/mint/learn/5-cents-5300006>; <http://www.mint.ca/store/mint/learn/10-cents-5300008>; <http://www.mint.ca/store/mint /learn/25-cents-5300010>; and <http://www.usmint.gov /about_the_mint/?action=coin_specifications>.

[49] "Technical Proposal on Multi-ply Technology by the Royal Canadian Mint," Royal Canadian Mint, pp. 3, 9.

[50] Ibid, pp. 4-5.

[51] Ibid, pp. 4 and 7.

[52] Ibid, pp. 5-6.

[53] "New coins to save Canadians $10 million per year," Canada NewsWire, October 16, 2001. The release also reported production cost savings of $42,157 per year (based on 453,300 coins) for its 50-cent coin.

[54] Royal Canadian Mint, 2000 Annual Report, pp. 27, 31. The plating facility has an annual capacity of 1.2 billion pieces.

[55] Royal Canadian Mint, Annual Report 2010, p. 14.

[56] Ibid, pp. 39-40.

[57] Royal Canadian Mint, 2004 Annual Report, p. 22.

[58] Royal Canadian Mint, Annual Report: 2004 through 2010.

[59] Royal Canadian Mint, 2007 Annual Report, p. 30.

[60] Source: <http://www.usmint.gov/about_the_mint/?action=coin_specifications>.

[61] See United States Mint, Annual Report for 2008 (p. 29), 2009 (p. 29), 2010 (p. 27) and 2011 (p. 10).

[62] See, for example, <http://www.lme.com>. One thousand kilograms is equal to 2,204.62 pounds.

[63] For example, see <http://www.crugroup.com>.

[64] One of the Mint's key performance measures is "cycle time", or the time it takes material to flow through the Mint's processes from receipt of raw material to Federal Reserve Bank order fulfillment. As discussed on page 26 of its 2006 Annual Report, the Mint seeks to "minimize the amount of time required to process raw materials into finished goods by eliminating non-value added steps from the processes and reducing the amount of raw material in inventory."

[65] Source: Figure 8 (Weight) and Figure 1 (Price per Metric Ton).

[66] Source: <http://www.matweb.com> (Material Density); Figure 8 (Weight).

[67] Source: <http://www.matweb.com> (Material Density); <http://www.mint.ca/store/mint/learn/5-cents-5300006> (Share of Weight); Figure 10 (Volume).

[68] Source: <http://www.matweb.com> (Material Density); <http://www.mint.ca/store/mint/learn/10-cents-5300008> (Share of Weight); Figure 10 (Volume).

[69] Source: <http://www.matweb.com> (Material Density); <http://www.mint.ca/store/mint/learn/25-cents-5300010> (Share of Weight); Figure 10 (Volume).

[70] Source: Figure 11 (Five-Cent: Percent of Total, Total Quantity); Figure 12 (Dime: Percent of Total, Total Quantity); and Figure 13 (Quarter-Dollar: Percent of Total, Total Quantity).

[71] Source: Figure 14 (Weight); Figure 1 (Price per Metric Ton – Copper and Nickel); and <http://www.crumonitor.com> (Price per Metric Ton – Steel). The prices shown reflect the average during the Mint's 2011 fiscal year. The quoted steel price (hot-rolled coil, f.o.b. Midwest U.S. local mills) has been increased by $55 per ton to reflect the additional cost associated with the ultra-low carbon IF grade material used for minting coins.

[72] The figures reported in Figure 7 for the RCM reflect all cost impacts, both material (cost savings) and non-material (additional costs).

[73] Source: Figure 9 (Current Composition Material Cost) and Figure 15 (RCM Composition Material Cost).

[74] Yeoman, pp. 134-136, 157-158, 174-185; and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere>

[75] Yeoman, pp. 134-135, 158, 175-178.

[76] Yeoman, pp. 133-136, 156-158.

[77] Yeoman, pp. 134-136, 157-158, 174-185 and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere> (Average Production); and Figure 18 (Per-unit Cost Savings).

[78] Yeoman, pp. 134-136, 157-158, 174-185 and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere> (Average Production); and Figure 18 (Per-unit Cost Savings). The prices of copper, nickel and steel were adjusted from their fiscal year 2011 averages ("No Change") by 10% or 20%, as noted in the column and row headings, for purposes of this sensitivity analysis.

[79] Per Figure 19, the mean and median values for the nickel and the dime differed by less than 2.0%.

[80] Per Figure 19, median production for the quarter was 25.2% less than mean production.

[81] "50 State Quarters® Program Concludes as the Most Successful Coin Initiative in U.S. History," United States Mint, press release, dated December 8, 2008; and <http://www.usmint.gov/mint_programs/atb /?action=factSheet&pf>.

[82] "50 State Quarters® Program Concludes as the Most Successful Coin Initiative in U.S. History," United States Mint, press release, dated December 8, 2008.

[83] <http://www.usmint.gov/mint_programs/atb/?action=factSheet&pf>.

[84] United States Mint, 2011 Annual Report, p. 10.

[85] <http://uspatterns.com>.

[86] The assessment costs associated with these issues would also be eliminated.

[87] "SM&RT Ideas from the Royal Canadian Mint," Currency News, Volume 9, Number 5 (May 2011), p. 4.

[88] Yeoman, pp. 134-136, 157-158, 174-185 and <http://www.usmint.gov/about_the_mint/coin_production /index.cfm?action=production_figures&allCoinsYear=2011#starthere> (Average Production); and Figure 18 (Per-unit Cost Savings).

NAVIGANT

IMPACT OF ELIMINATING THE PENNY ON THE UNITED STATES MINT'S COSTS AND PROFIT IN FISCAL YEAR 2011

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Navigant Consulting, Inc. ("Navigant") was asked to estimate the impact of eliminating production of circulating pennies on costs incurred by the United States Mint (the "Mint").[1] The Mint shipped 4.29 billion pennies (valued at $42.9 million) during fiscal year 2011 at a reported cost of $103.1 million (2.4 cents per coin), resulting in a net loss of $60.2 million. However, eliminating production of the penny would not eliminate this loss, and could increase the overall loss to the Mint if production of the nickel was increased to substitute for no production of the penny.

We analyzed publicly available information on the Mint's past and projected operations to identify patterns in costs related to its product offerings. We observed the following:

- Cost reductions from eliminating the purchase of penny blanks will be largely offset by the loss of revenue from shipments to the Federal Reserve Banks (FRB). In other words, the payments received from the FRB ($42.9 million), which offset all but $4.3 million of the cost of penny blanks ($47.2 million), would not be received if the Mint eliminated production of the penny.

- The Mint's fabrication and distribution costs include fixed components that will continue to be incurred if the Mint eliminated the penny. Using FY 2011 balances and prior Mint disclosures, we have estimated this fixed component to be approximately $13 million.

- The Mint's total Selling, General & Administrative ("SG&A") expense is not sensitive to circulating coin demand or total sales. Thus, the $17.7 million in SG&A assigned to the circulating penny in FY 2011would have been reallocated to other products.

- Substitution of loss-generating nickels will offset potential cost reductions from eliminating the penny.

Without the penny, only $4.3 million in net cost reductions would have been likely in 2011, while an additional $25.2 million in cost reductions would have been possible, based on 2006 comments by the Mint regarding the amount of fixed production costs. However, the substitution of nickels for pennies would have resulted in an increased net loss to the Mint of as much as $10.9 million if penny production were not maintained. Our findings are summarized in Figure 1.

[1] This report was commissioned by Jarden Zinc Products, North America's leading plated coin blank producer and licensee of the Royal Canadian Mint's multi-ply plated steel technology.

Figure 1: Impact of Eliminating the Penny on Mint Costs and Profit in FY 2011 (millions)

	Penny produced?	
	Yes (Actual)	No (Estimate)
Value of Shipments	$ 42.9	$ -
Gross Cost		
Cost of Goods Sold (purchase of penny blanks)	$ (47.2)	$ -
Cost of Goods Sold (fabrication and distribution)	$ (38.2)	$ (13.0)
Sales, General and Administrative (SG&A)	$ (17.7)	$ (17.7)
Profit (loss) before substitution effect	**$ (60.2)**	**$ (30.7)**
Substitution of 914 million Nickels for 4.3 billion Pennies		$ (40.4)
Profit (loss) after substitution effect		**$ (71.1)**

I. Cost Reductions from Eliminating the Purchase of Penny Blanks Will be Largely Offset by Revenue Losses from Shipments to the Federal Reserve Banks

The Mint purchases ready-to-strike penny blanks from an outside supplier. In fiscal year (FY) 2011, the average price paid was 1.1 cents per blank, according to one press report.[2] The Mint shipped 4.29 billion pennies to the FRB in FY 2011,[3] resulting in a cost of $47.2 million. Had the penny not been produced, those costs would not have been incurred.

The value of coins shipped to the FRB is revenue to the Mint. Thus, the value of the 4.29 billion pennies shipped to the FRB in FY 2011 was $42.9 million.[4] Had the penny not been produced, those revenues would not have been received.

The net reduction in cost had the penny not been produced in FY 2011 is equal to $47.2 million in cost less $42.9 million in revenue, or $4.3 million.

II. The Mint's Fabrication and Distribution Costs Include Fixed Components that Will Continue to be Incurred if the Mint Eliminated the Penny

Cost of Goods Sold, which comprise costs to fabricate and distribute coins, include outlays that do not decrease with reductions in production volume. In fact, the Mint itself has described in past Annual Reports how "fixed production costs" are spread over units produced:

[2] Chris Isidore, "Obama wants cheaper pennies and nickels," CNNMoney.com, February 15, 2012.
[3] United States Mint, 2011 Annual Report, page 11.
[4] Id.

- "When production volumes decline because of lower demand, fixed production costs are spread over fewer units. This offsets any per-unit gains from lower base metal costs. For example, the per-unit metal cost of a nickel fell about $0.0154 from $0.0815 in FY 2007 to $0.0661 in FY 2008. However, the per-unit fixed production costs increased $0.0082, resulting in only a small decline in the nickel overall unit cost. Similarly, the penny unit cost fell slightly from FY 2007 because of higher per-unit vendor fabrication costs offset lower per-unit metal costs. The unit costs for dime and quarter denominations increased in FY 2008 because of higher per-unit fixed production costs."[5]

- "When production volumes decline because of lower demand, production costs are spread over fewer units....The dime coin unit cost increased about 1.3 cents in FY 2009 largely because the 1.8 cent increase in per-unit production cost offset the 1.0 cent reduction in per-unit metal cost....Slight increases in per-unit production and SG&A costs did not offset the 3.1 cent decline in the five-cent coin's per-unit metal cost."[6]

The Mint has acknowledged that a portion of penny production costs are also fixed. In response to a question posed in a 2006 Congressional hearing, the Mint responded as follows:

> "**Question**: Do you have the ability to calculate how much the Mint would lose if we were to eliminate the penny and make more nickels?
>
> **Answer**: ...the fixed costs associated with production of the penny would have to be absorbed by the remaining denominations of circulating coins. The total amount of fixed costs to be absorbed would be approximately $10.1 million over a fiscal year of production."[7]

The Mint's commentary can be seen graphically in Figure 2 (for the penny) and Figure 3 (for the nickel, dime and quarter), which compares shipments and per-unit non-raw material costs from FY 2002 through FY 2011. The lines cross at FY 2007, the year before the onset of the demand declines discussed by the Mint.[8] Shipments and per-unit costs diverge after FY 2007,[9] confirming the existence of fixed costs in the production process.

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[5] United States Mint, 2008 Annual Report, page 29.
[6] United States Mint, 2009 Annual Report, page 30.
[7] Coin and Currency Issues Before Congress: Can We Still Afford Money?, Hearing Before the Subcommittee on Domestic and International Monetary Policy, Trade and Technology of the Committee on Financial Services, U.S. House of Representatives, One Hundred Ninth Congress, Second Session, July 19, 2006.
[8] Shipments in FY 2007 were lower than in FY 2006, but within the range of prior years.
[9] The same pattern was observed, separately, for the nickel, the dime, and the quarter.

Figure 2: Coins Shipped and Per-Unit Non-Raw Material Cost of Goods Sold, Fiscal Years 2002-2011 (Penny) [10]

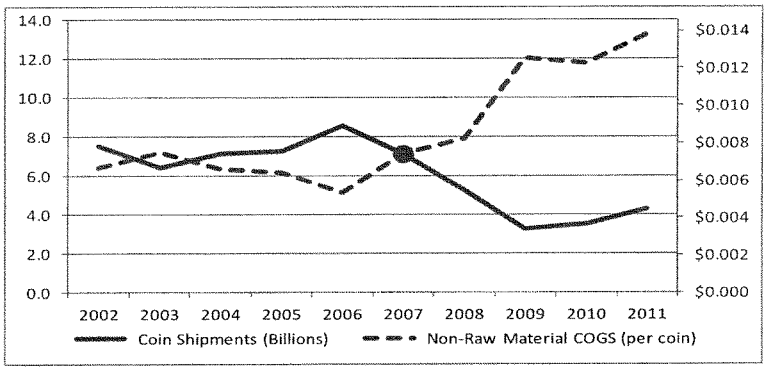
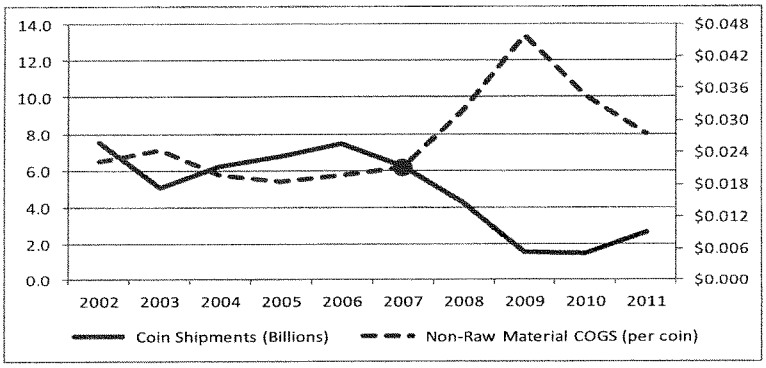


Figure 3: Coins Shipped and Per-Unit Non-Raw Material Cost of Goods Sold, Fiscal Years 2002-2011 (Nickel, Dime and Quarter) [11]



The Mint has not reported the fixed costs incurred in FY 2011 to produce the penny. However, insight may be gleaned by linking Mr. Lebryk's statement above to the Mint's costs at that time. In FY 2005 and FY 2006, non-raw material costs associated with the penny were $46.5 million and $45.2 million, respectively.[12] The $10.1 million in fixed costs cited by Mr. Lebryk represent 21.7% (FY 2005) and 22.3% (FY 2006) of the non-raw material

[10] Source: Appendix A-1.
[11] Source: Appendix A-2.
[12] Source: Appendix A-1. FY 2005 was the last full fiscal year prior to Mr. Lebryk's July 2006 testimony, which occurred during FY 2006.

costs, resulting in average fixed costs of 22% over the two years. We applied this average to the non-raw material costs of penny shipments incurred by the Mint in FY 2011 ($59.3 million)[13] and estimated fixed costs of $13.0 million for FY 2011 in the production of the penny. As production of the penny in FY 2011 was significantly less than in either FY 2005 or FY 2006, it is possible that fixed costs as a percent of total non-raw material costs in FY 2011 could be higher than we have calculated.

Cost of Goods Sold for penny shipments during FY 2011 was $85.4 million. Purchases of ready-to-strike blanks totaled $47.2 million (see Section I), leaving $38.2 million as the amount attributable to fabrication and distribution operations executed by the Mint. The fixed cost analysis performed above suggests that potential fabrication and distribution cost reductions from the Mint eliminating the penny would have been $25.2 million ($38.2 million less $13.0 million) in FY 2011.

III. The Mint's Total SG&A Expense Is Not Sensitive to Circulating Coin Demand or Total Sales

For FY 2011, the Mint assigned $17.7 million of SG&A expense to circulating pennies, equal to 0.41 cents for each penny shipped.[14] This was in stark contrast to prior years – a total of $5.1 million in SG&A had been assigned to circulating penny production for the nine-year period FY 2002 through FY 2010.[15]

Since FY 2004, the Mint's published financial statements do not report the individual expense items and amounts included in SG&A. However, we examined historical financial information reported by the Mint over the past decade (FY 2002 through FY 2011) and found that total SG&A expense is not sensitive to either the amount of total sales or the relative contributions of circulating and numismatic products.

Our findings are graphically depicted in Figures 4 and 5. In Figure 4 we compare SG&A to total sales from all products – annual sales grew by more than 170 percent while SG&A expense stayed relatively constant. In Figure 5 we compare SG&A to the distribution of total sales among circulating coins (lower bars) and numismatic products (upper bars) – circulating coins fell from 76% of total sales in 2002 to 16% in 2011 while SG&A stayed relatively constant.

[13] Source: Appendix A-1.
[14] United States Mint, 2011 Annual Report, page 11.
[15] United States Mint, Annual Report, 2002 through 2011. In FY 2011 the Mint changed the method it uses to allocate SG&A expense among its products from a gross margin basis to a gross cost basis. (United States Mint, 2011 Annual Report, page 10)

Figure 4: Total SG&A Expense and Total Sales, Fiscal Years 2002-2011 [16]

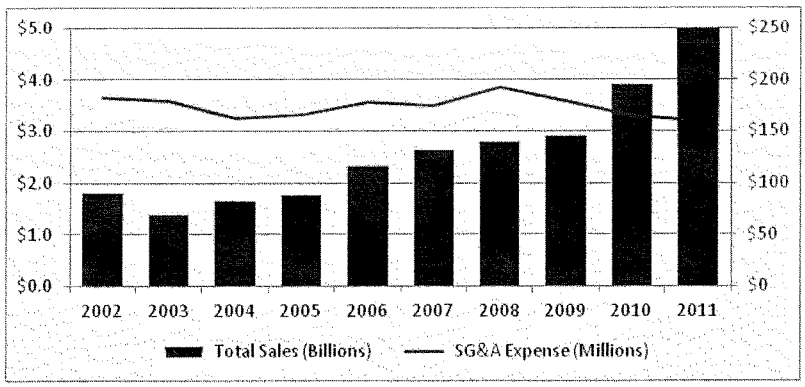
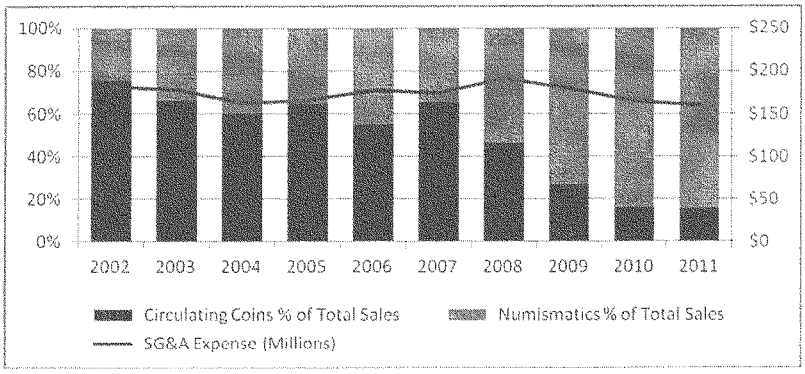


Figure 5: Total SG&A Expense and Composition of Sales, Fiscal Years 2002-2011 [17]

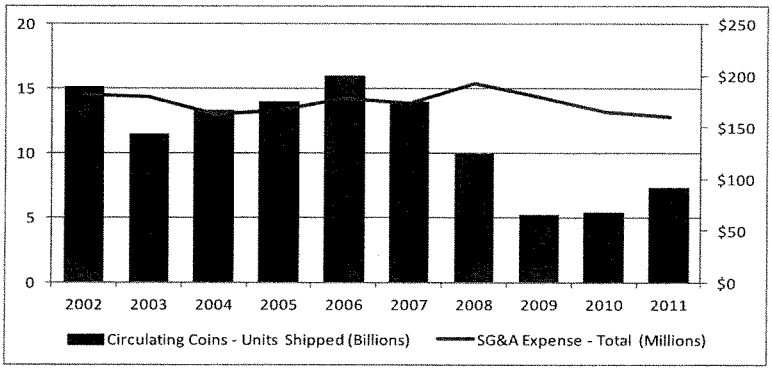


[16] Sources: Appendix B-1 (total sales) and Appendix B-2 (total SG&A expense).
[17] Sources: Appendix B-1 (shares of total sales) and Appendix B-2 (total SG&A expense).

In Figure 6 we compare total SG&A to the number of circulating coins shipped. While total SG&A stayed relatively constant throughout the period, there were three years in which circulating coin shipments fell by an amount comparable to the Mint's current (FY 2011) volume of penny shipments (4.3 billion coins):

- In FY 2003, relative to FY 2002, SG&A fell 2% while circulating coin shipments fell by 3.6 billion coins or 24%
- In FY 2008, relative to FY 2007, SG&A rose 10% while circulating coin shipments fell by 4.0 billion coins or 29%
- In FY 2009, relative to FY 2008, SG&A fell 7% while circulating coin shipments fell by 4.8 billion coins or 48%

Figure 6: Total SG&A Expense and Circulating Shipments, Fiscal Years 2002-2011 [18]



We conclude that eliminating the penny would not generate significant reductions in the Mint's SG&A expenses. Instead, it would simply result in the Mint reallocating SG&A expenses to other circulating coins and numismatic products.

IV. Substitution of Nickels for Pennies Would Offset Potential Cost Reductions

In a House Subcommittee hearing held in July 2006, acting Mint director David Lebryk was asked about the potential substitution effects that may occur if the penny were eliminated – specifically, what additional losses would the Mint incur if more nickels were demanded.[19] The question was likely prompted by Mr. Lebryk's statement that current

[18] Sources: Appendix B-1 (circulating coin shipments) and Appendix B-2 (total SG&A expense).
[19] Coin and Currency Issues Before Congress: Can We Still Afford Money?

production costs for the nickel exceeded the coin's face value.[20] Mr. Lebryk responded that the Mint was unable to model the potential substitution effect but acknowledged the potential for such substitutions by presenting a graph displaying "estimates of potential costs based on various scenarios."[21]

A scenario posed by Mr. Lebryk in his response envisioned nickel production doubling.[22] In FY 2011, the Mint shipped 914 million circulating nickels at an average Cost of Goods Sold of $0.0942,[23] resulting in a loss of $0.0442 ($0.0942 less $0.05) for each nickel shipped.[24] If Mr. Lebryk's scenario were applied to FY 2011 cost and shipment data, the Mint would have incurred a substitution-related loss of $40.4 million (914 million × $0.0442). In contrast, we have identified $4.3 million in net cost reductions in Section I, along with $25.2 million in non-raw material related Cost of Goods Sold net reductions in Section II, for a total of $29.5 million in possible net cost reductions if penny production had been eliminated. Thus, if Mr. Lebryk's substitution scenario were to occur, eliminating the penny would likely have resulted in increased net costs to the Mint, relative to the current state, of $10.9 million.

[20] Testimony of David A. Lebryk, July 19, 2006.
[21] Coin and Currency Issues Before Congress: Can We Still Afford Money?
[22] Coin and Currency Issues Before Congress: Can We Still Afford Money?
[23] United States Mint, 2011 Annual Report, page 11.
[24] The Mint also assigned SG&A of $16.1 million, or $0.0176 per coin shipped, to the nickel. For the reasons set forth in Section III, we have assumed that increased demand for nickels will not result in additional SG&A expense.

Appendix A-1

Non-Raw Material Cost of Goods Sold - Penny

Fiscal Year	Coins Shipped (millions) (A)	Non-Raw Material Cost Per Coin (B)	Non-Raw Material Cost Total (million $) (A) × (B) (C)
2002	7,520	$ 0.0067	$ 50.5
2003	6,430	$ 0.0075	$ 48.1
2004	7,130	$ 0.0066	$ 47.0
2005	7,220	$ 0.0064	$ 46.5
2006	8,500	$ 0.0053	$ 45.2
2007	7,084	$ 0.0074	$ 52.3
2008	5,272	$ 0.0082	$ 43.4
2009	3,218	$ 0.0125	$ 40.2
2010	3,487	$ 0.0123	$ 42.7
2011	4,289	$ 0.0138	$ 59.3

Source: Coins shipped: United States Mint, Annual Report, 2002-2011.
Non-Raw Material Cost (per coin): Appendix A-3.

Non-Raw Material Cost of Goods Sold per Coin - Nickel, Dime and Quarter

Fiscal Year	Coins Shipped				Non-Raw Material COGS							Per Coin (Nickel, Dime & Quarter)
					Per Coin			Total				
	Nickel	Dime	Quarter	Sum	Nickel	Dime	Quarter	Nickel	Dime	Quarter	Sum	
	(millions)				(dollars)			($ millions)				(dollars)
				(A)+(B)+(C)				(A) × (E)	(B) × (F)	(C) × (G)	(H)+(I)+(J)	(K) ÷ (D)
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)
2002	1,302	2,633	3,616	7,551	$ 0.0173	$ 0.0145	$ 0.0299	$ 22.55	$ 38.27	$ 108.08	$ 168.90	$ 0.0224
2003	744	1,884	2,418	5,046	$ 0.0184	$ 0.0149	$ 0.0335	$ 13.71	$ 28.06	$ 80.98	$ 122.75	$ 0.0243
2004	1,392	2,569	2,242	6,203	$ 0.0185	$ 0.0134	$ 0.0277	$ 25.71	$ 34.55	$ 62.16	$ 122.42	$ 0.0197
2005	1,418	2,669	2,656	6,743	$ 0.0167	$ 0.0123	$ 0.0258	$ 23.61	$ 32.90	$ 68.59	$ 125.10	$ 0.0186
2006	1,452	3,019	3,004	7,475	$ 0.0131	$ 0.0135	$ 0.0292	$ 19.04	$ 40.87	$ 87.74	$ 147.66	$ 0.0198
2007	1,289	2,247	2,711	6,247	$ 0.0211	$ 0.0141	$ 0.0304	$ 27.20	$ 31.79	$ 82.52	$ 141.51	$ 0.0227
2008	647	1,070	2,510	4,227	$ 0.0269	$ 0.0167	$ 0.0411	$ 17.44	$ 17.82	$ 103.12	$ 138.37	$ 0.0327
2009	207	358	965	1,530	$ 0.0258	$ 0.0346	$ 0.0539	$ 5.34	$ 12.40	$ 51.98	$ 69.73	$ 0.0456
2010	359	887	252	1,498	$ 0.0404	$ 0.0274	$ 0.0514	$ 14.51	$ 24.32	$ 12.95	$ 51.79	$ 0.0346
2011	914	1,403	323	2,640	$ 0.0298	$ 0.0243	$ 0.0351	$ 27.24	$ 34.09	$ 11.32	$ 72.65	$ 0.0275

Source: Coins Shipped: United States Mint, Annual Report, 2002-2011.
Non-Raw material COGS (per coin): Appendix A-3.

Appendix A-3

Non-Raw Material Cost of Goods Sold per Coin
By Denomination and Fiscal Year

Fiscal Year	Penny Cost of Goods Sold [1]	Penny Raw Material	Penny Non-Raw Material	Nickel Cost of Goods Sold [1]	Nickel Raw Material	Nickel Non-Raw Material
	(A)	(B)	(A) - (B) (C)	(D)	(E)	(D) - (E) (F)
2002	$ 0.0087	$ 0.0020	$ 0.0067	$ 0.0309	$ 0.0136	$ 0.0173
2003	$ 0.0095	$ 0.0020	$ 0.0075	$ 0.0350	$ 0.0166	$ 0.0184
2004	$ 0.0092	$ 0.0026	$ 0.0066	$ 0.0450	$ 0.0265	$ 0.0185
2005	$ 0.0097	$ 0.0033	$ 0.0064	$ 0.0482	$ 0.0315	$ 0.0167
2006	$ 0.0121	$ 0.0068	$ 0.0053	$ 0.0596	$ 0.0465	$ 0.0131
2007	$ 0.0167	$ 0.0093	$ 0.0074	$ 0.0953	$ 0.0742	$ 0.0211
2008	$ 0.0142	$ 0.0060	$ 0.0082	$ 0.0883	$ 0.0614	$ 0.0269
2009	$ 0.0162	$ 0.0037	$ 0.0125	$ 0.0589	$ 0.0331	$ 0.0258
2010	$ 0.0179	$ 0.0056	$ 0.0123	$ 0.0922	$ 0.0518	$ 0.0404
2011	$ 0.0200	$ 0.0062	$ 0.0138	$ 0.0942	$ 0.0644	$ 0.0298

Fiscal Year	Dime Cost of Goods Sold [1]	Dime Raw Material	Dime Non-Raw Material	Quarter Cost of Goods Sold [1]	Quarter Raw Material	Quarter Non-Raw Material
	(G)	(H)	(G) - (H) (I)	(J)	(K)	(J) - (K) (L)
2002	$ 0.0189	$ 0.0044	$ 0.0145	$ 0.0408	$ 0.0109	$ 0.0299
2003	$ 0.0199	$ 0.0050	$ 0.0149	$ 0.0460	$ 0.0125	$ 0.0335
2004	$ 0.0214	$ 0.0080	$ 0.0134	$ 0.0476	$ 0.0199	$ 0.0277
2005	$ 0.0222	$ 0.0099	$ 0.0123	$ 0.0505	$ 0.0247	$ 0.0258
2006	$ 0.0297	$ 0.0162	$ 0.0135	$ 0.0696	$ 0.0404	$ 0.0292
2007	$ 0.0361	$ 0.0220	$ 0.0141	$ 0.0853	$ 0.0549	$ 0.0304
2008	$ 0.0377	$ 0.0210	$ 0.0167	$ 0.0937	$ 0.0526	$ 0.0411
2009	$ 0.0464	$ 0.0118	$ 0.0346	$ 0.0833	$ 0.0294	$ 0.0539
2010	$ 0.0459	$ 0.0185	$ 0.0274	$ 0.0976	$ 0.0462	$ 0.0514
2011	$ 0.0478	$ 0.0235	$ 0.0243	$ 0.0938	$ 0.0587	$ 0.0351

[1] Includes Distribution to Federal Reserve Banks.

Source: Cost of Goods Sold: United States Mint, Annual Report, 2002-2011.
Raw Material: Appendices A-4 through A-7.

Appendix A-4

Material Cost of U.S. Circulating Coins - Penny

Fiscal Year		Copper	Zinc	Total
2011:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 9,104.04	$ 2,297.80	
	Material cost per coin	$ 0.0006	$ 0.0056	$ 0.0062
2010:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 7,043.74	$ 2,135.13	
	Material cost per coin	$ 0.0004	$ 0.0052	$ 0.0056
2009:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 4,478.95	$ 1,403.71	
	Material cost per coin	$ 0.0003	$ 0.0034	$ 0.0037
2008:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 7,786.78	$ 2,245.49	
	Material cost per coin	$ 0.0005	$ 0.0055	$ 0.0060
2007:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 7,098.21	$ 3,639.43	
	Material cost per coin	$ 0.0004	$ 0.0089	$ 0.0093
2006:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 6,039.99	$ 2,626.48	
	Material cost per coin	$ 0.0004	$ 0.0064	$ 0.0068
2005:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 3,373.84	$ 1,250.22	
	Material cost per coin	$ 0.0002	$ 0.0030	$ 0.0033
2004:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 2,605.25	$ 1,001.52	
	Material cost per coin	$ 0.0002	$ 0.0024	$ 0.0026
2003:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 1,652.64	$ 788.20	
	Material cost per coin	$ 0.0001	$ 0.0019	$ 0.0020
2002:	Amount of material (MT)	0.0000000625	0.0000024375	
	Average cost per MT	$ 1,528.99	$ 777.25	
	Material cost per coin	$ 0.0001	$ 0.0019	$ 0.0020

Note: Material specifications are listed in grams. A metric ton (MT) equals 1,000,000 grams.

Source: <http://www.usmint.gov/about_the_mint/?action=coin_specifications>; and <http://www.imf.org/external/np/res/commod/index.aspx>.

Appendix A-5

Material Cost of U.S. Circulating Coins - Nickel

Fiscal Year		Copper	Nickel	Total
2011:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 9,104.04	$ 24,206.76	
	Material cost per coin	$ 0.0341	$ 0.0303	$ 0.0644
2010:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 7,043.74	$ 20,292.75	
	Material cost per coin	$ 0.0264	$ 0.0254	$ 0.0518
2009:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 4,478.95	$ 13,026.23	
	Material cost per coin	$ 0.0168	$ 0.0163	$ 0.0331
2008:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 7,786.78	$ 25,720.37	
	Material cost per coin	$ 0.0292	$ 0.0322	$ 0.0614
2007:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 7,098.21	$ 38,063.18	
	Material cost per coin	$ 0.0266	$ 0.0476	$ 0.0742
2006:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 6,039.99	$ 19,068.39	
	Material cost per coin	$ 0.0226	$ 0.0238	$ 0.0465
2005:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 3,373.84	$ 15,117.51	
	Material cost per coin	$ 0.0127	$ 0.0189	$ 0.0315
2004:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 2,605.25	$ 13,408.09	
	Material cost per coin	$ 0.0098	$ 0.0168	$ 0.0265
2003:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 1,652.64	$ 8,302.13	
	Material cost per coin	$ 0.0062	$ 0.0104	$ 0.0166
2002:	Amount of material (MT)	0.0000037500	0.0000012500	
	Average cost per MT	$ 1,528.99	$ 6,278.13	
	Material cost per coin	$ 0.0057	$ 0.0078	$ 0.0136

Note: Material specifications are listed in grams. A metric ton (MT) equals 1,000,000 grams.

Source: <http://www.usmint.gov/about_the_mint/?action=coin_specifications>; and <http://www.imf.org/external/np/res/commod/index.aspx>.

Appendix A-6

Material Cost of U.S. Circulating Coins - Dime

Fiscal Year		Copper	Nickel	Total
2011:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 9,104.04	$ 24,206.76	
	Material cost per coin	$ 0.0189	$ 0.0046	$ 0.0235
2010:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 7,043.74	$ 20,292.75	
	Material cost per coin	$ 0.0146	$ 0.0038	$ 0.0185
2009:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 4,478.95	$ 13,026.23	
	Material cost per coin	$ 0.0093	$ 0.0025	$ 0.0118
2008:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 7,786.78	$ 25,720.37	
	Material cost per coin	$ 0.0162	$ 0.0049	$ 0.0210
2007:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 7,098.21	$ 38,063.18	
	Material cost per coin	$ 0.0148	$ 0.0072	$ 0.0220
2006:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 6,039.99	$ 19,068.39	
	Material cost per coin	$ 0.0126	$ 0.0036	$ 0.0162
2005:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 3,373.84	$ 15,117.51	
	Material cost per coin	$ 0.0070	$ 0.0029	$ 0.0099
2004:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 2,605.25	$ 13,408.09	
	Material cost per coin	$ 0.0054	$ 0.0025	$ 0.0080
2003:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 1,652.64	$ 8,302.13	
	Material cost per coin	$ 0.0034	$ 0.0016	$ 0.0050
2002:	Amount of material (MT)	0.0000020790	0.0000001890	
	Average cost per MT	$ 1,528.99	$ 6,278.13	
	Material cost per coin	$ 0.0032	$ 0.0012	$ 0.0044

Note: Material specifications are listed in grams. A metric ton (MT) equals 1,000,000 grams.

Source: <http://www.usmint.gov/about_the_mint/?action=coin_specifications>; and <http://www.imf.org/external/np/res/commod/index.aspx>.

Appendix A-7

Material Cost of U.S. Circulating Coins - Quarter

Fiscal Year		Copper	Nickel	Total
2011:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 9,104.04	$ 24,206.76	
	Material cost per coin	$ 0.0473	$ 0.0114	$ 0.0587
2010:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 7,043.74	$ 20,292.75	
	Material cost per coin	$ 0.0366	$ 0.0096	$ 0.0462
2009:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 4,478.95	$ 13,026.23	
	Material cost per coin	$ 0.0233	$ 0.0061	$ 0.0294
2008:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 7,786.78	$ 25,720.37	
	Material cost per coin	$ 0.0405	$ 0.0121	$ 0.0526
2007:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 7,098.21	$ 38,063.18	
	Material cost per coin	$ 0.0369	$ 0.0180	$ 0.0549
2006:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 6,039.99	$ 19,068.39	
	Material cost per coin	$ 0.0314	$ 0.0090	$ 0.0404
2005:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 3,373.84	$ 15,117.51	
	Material cost per coin	$ 0.0175	$ 0.0071	$ 0.0247
2004:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 2,605.25	$ 13,408.09	
	Material cost per coin	$ 0.0135	$ 0.0063	$ 0.0199
2003:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 1,652.64	$ 8,302.13	
	Material cost per coin	$ 0.0086	$ 0.0039	$ 0.0125
2002:	Amount of material (MT)	0.0000051980	0.0000004720	
	Average cost per MT	$ 1,528.99	$ 6,278.13	
	Material cost per coin	$ 0.0079	$ 0.0030	$ 0.0109

Note: Material specifications are listed in grams. A metric ton (MT) equals 1,000,000 grams.

Source: <http://www.usmint.gov/about_the_mint/?action=coin_specifications>; and <http://www.imf.org/external/np/res/commod/index.aspx>.

Appendix B-1

Revenue by Line of Business
(Millions of Dollars)

Fiscal Year	Numismatic Products			Circulating Coins	Total	Circulating Share of Total
	Bullion	Other [1]	Sum			
			(A) + (B)		(C) + (D)	(D) ÷ (E)
	(A)	(B)	(C)	(D)	(E)	(F)
2002	$ 186.7	$ 253.3	$ 440.0	$ 1,364.2	$ 1,804.2	76%
2003	$ 235.4	$ 234.9	$ 470.3	$ 916.1	$ 1,386.4	66%
2004	$ 315.7	$ 341.2	$ 656.9	$ 993.5	$ 1,650.4	60%
2005	$ 270.7	$ 355.4	$ 626.1	$ 1,144.8	$ 1,770.9	65%
2006	$ 536.6	$ 514.9	$ 1,051.5	$ 1,271.9	$ 2,323.4	55%
2007	$ 356.1	$ 551.5	$ 907.6	$ 1,727.8	$ 2,635.4	66%
2008	$ 948.8	$ 557.2	$ 1,506.0	$ 1,294.5	$ 2,800.5	46%
2009	$ 1,694.8	$ 440.0	$ 2,134.8	$ 777.6	$ 2,912.4	27%
2010	$ 2,855.4	$ 413.1	$ 3,268.5	$ 618.2	$ 3,886.7	16%
2011	$ 3,471.4	$ 721.7	$ 4,193.1	$ 776.9	$ 4,970.0	16%

[1] Includes collectible coins and national medals.

Source: United States Mint, Annual Report, 2002-2011.

Appendix B-2

SG&A Expense by Line of Business
(Millions of Dollars)

Fiscal Year	Numismatic Products			Circulating Coins	Total
	Bullion	Other [1]	Sum		
			(A) + (B)		(C) + (D)
	(A)	(B)	(C)	(D)	(E)
2002	$ 1.6	$ 58.1	$ 59.7	$ 122.4	$ 182.1
2003	$ 1.4	$ 69.6	$ 71.0	$ 107.9	$ 178.9
2004	$ 0.6	$ 73.1	$ 73.7	$ 88.9	$ 162.6
2005	$ 0.8	$ 78.8	$ 79.6	$ 85.9	$ 165.5
2006	$ 1.4	$ 81.5	$ 82.9	$ 94.6	$ 177.5
2007	$ 1.6	$ 78.9	$ 80.5	$ 93.5	$ 174.0
2008	$ 8.4	$ 86.7	$ 95.1	$ 97.0	$ 192.1
2009	$ 12.1	$ 69.2	$ 81.3	$ 98.1	$ 179.4
2010	$ 21.8	$ 64.7	$ 86.5	$ 78.2	$ 164.7
2011	$ 26.8	$ 64.7	$ 91.5	$ 63.4	$ 154.9

[1] Includes collectible coins and national medals.

Source: United States Mint, Annual Report, 2002-2011.

Dennis H. Weber
House Finance Committee Hearing
April 17th, 2012

For nearly 3000 years, mankind has used coins to facilitate commercial transactions. One would think in that amount of time every possible combination of materials, shapes and designs would have been used. But societies change, technologies change and the demands of the marketplace necessitate the continuous evolution of coinage systems. On April 10th, the Royal Canadian Mint completed a process that was initiated in 1996. Last week, the Canadian One Dollar and Two Dollar coins were converted from nickel and copper based alloy to the modern, safe and secure Multi-ply technology.

Multi-ply is a proprietary process developed in Canada that applies electroplated layers of nickel and copper to an inexpensive steel core to create circulating coins that are both attractive and affordable. In an age of escalating global metal costs, governments need to produce coins more cost effectively without compromising quality. Canada has been using the Multi-ply process for circulating coins since 2001 when the 5-cent, 10-cent, 25-cent and 50-cent denominations were converted from expensive, nickel based alloys to the more affordable steel coins. Because the Multi-ply steel coins are nearly identical in size, weight and appearance to the nickel alloy coins they replaced, the transition went almost unnoticed by the general population in Canada.

The major reason the transition from pure nickel and nickel alloy coins to Multi-ply electroplated steel coins went so smoothly was the commitment by the Royal Canadian Mint to involve the major stakeholders early an continuously throughout the process. The national banks of Canada, charitable organizations, coin handling and transportation companies and the vending industries were personally and continuously updated during the conversion. Particular attention was given to the vending industry as their support was critical for a seamless changeover. Despite the fact that the vending industry represented a fractional percentage of retail transactions, nevertheless every reasonable effort was made to address their concerns. The annual production volume of Canadian circulation coins has traditionally been only about one-tenth the volume of circulating coins produced by the US Mint. Nevertheless the transformation from nickel and nickel alloy coins to Multi-ply has saved Canadian tax payers over $250 million.

The older pure nickel and nickel alloy coins have successfully co-circulated in Canada with the new Multi-ply coins for over a decade. The Royal Canadian Mint has for the last six years maintained an active program of removing the older nickel and nickel alloy coins from circulation. With the escalating global prices for commodity metals, the older coins are eventually defaced and sold for their metal content. The profits from these sales are returned to the Canadian taxpayer.

Canada is not alone in enjoying the cost saving benefits of Multi-ply technology. Since its introduction, Multi-ply technology has been adopted internationally by 28 different countries

representing over 60 denominations. The New Zealand experience is a good illustration of this process.

In 2004, The Reserve Bank of New Zealand sought public input on a proposal to reduce the size of the 10-cent, 20-cent and 50-cent coins while concurrently changing the composition from expensive alloy to electroplated steel. The Reserve Bank wanted to reduce the size of the coins to make coin usage more convenient for the public and for cash handling businesses. The conversion to electroplated steel was motivated by the desire to maintain positive seigniorage well into the future. The Reserve Bank also recognized that to be accepted by the public, the new coins had to be durable, and they needed to function in vending machines. After extensive independent testing, the Reserve Bank of New Zealand selected Multi-ply as the only process that met their criteria for public acceptance. Multi-ply coins have been in circulation in New Zealand since 2006.

The reserve Bank of New Zealand took a very aggressive approach with the introduction of their new Multi-ply coins. Rather than co-circulate coins of different sizes and compositions, the Reserve Bank elected to completely replace the old coins and over a period of six months, old coins were removed from circulation as the new coins were introduced. The old coins were then altered to prevent their re-introduction to the market, and the demonetized coins were sold to recoup their metal content value. The profit generated from the sale of the demonetized coins was sufficient to cover the cost of the new Multi-ply coins and to generate additional revenue for the Taxpayers of New Zealand.

You have in front of you examples of newly minted Canadian 5-cent and 25-cent coins. The 5-cent coins have the same look and feel as the US Nickel. The major difference is that the Canadian coin costs less than 3-cents to produce while the US coin is reported to cost more than 11-cents to manufacture. With the US Mint producing nearly one billion 5-cent coins every year, this represents a potential cost savings to the American taxpayer of $80 million annually. I believe the cost savings potential of the Multi-ply process for US circulation coins warrants serious consideration.

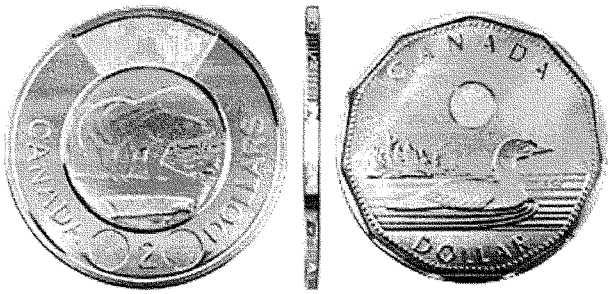
Next Generation of High Value Coins Issued in Canada

April 10, 2012 by Michael Alexander – Coin Update News

In an effort to reduce the escalating costs of both manufacture and materials, the Royal Canadian Mint have released (10th April) the next generation of their two highest denomination coins, the one & two dollar values, or more commonly and affectionately known as "Loonies and Toonies". The change also comes on the 25th anniversary of the issue of current one dollar coin first released for circulation in 1987.

The new coins, which begin circulating today, incorporate advanced security features and are manufactured with the Mint's patented multi-ply plated steel technology. More cost-effective than their predecessors and unprecedented in their security, these new coins retain the "Common Loon" and "Polar Bear" designs and physical appearance familiar to millions of Canadian consumers, businesses, and avid coin collectors.

The one dollar coin, first issued in 1987 was produced out of an aureate-bronze material plated onto nickel which gave the coins a bright golden color thus singling it out from all other circulating Canadian coinage and enabling the Bank of Canada to successfully transition the Canadian population from the paper one dollar banknote to the coin denomination. In 1990, the RCM introduced Canada's first bi-metallic coin for general circulation comprised of an aluminium-bronze center disc and an outer nickel ring. The addition of the $2 coin denomination once again successfully replaced the paper note of the same value.



The new one-dollar and two-dollar coins are manufactured at the Mint's facility in Winnipeg, Manitoba using the same patented multi-ply plated steel (MPPS) technology from which Canada's lower denomination circulation coins have been made since 2001. This proven technology, by which a steel core is plated with alternating layers of different metals such as copper, nickel and brass, employs far less metals than alloy coins and produces highly cost-effective circulation coins.

The next generation of one-dollar and two-dollar circulation coins also incorporates new, visible security features which further enhance the security and integrity of Canada's coinage system. The reverse side of both coins features laser mark micro-engraving, and the two-dollar coin also contains a virtual image and edge-lettering. With the exception of these additional security features, the new coins will have the same diameter and thickness as the current coins. These

changes to the one-dollar and two-dollar circulation coins, which support the effort to modernize Canada's currency system, are permanent.

The new coins will soon appear in general circulation and will be available through daily business transactions across Canada. All previous versions of the one-dollar and two-dollar circulation coins issued since 1987 and 1996, respectively, remain legal tender and will continue to circulate as usual. The release of the latest changes to Canadian coinage comes close on the heels of the recent announcement by the Ministry of Finance that after a 154 year run, The Royal Canadian Mint will discontinue the production of the one cent coin due to its lack of purchasing power and their overall cost to manufacture. The history of the Canadian cent actually pre-dates that of the actual year of Canadian Confederation by 9 years.

For more information on the latest circulation coins from the Royal Canadian Mint, please visit their website at: http://www.mint.ca/store/template/home.jsp

Richard A. Peterson
Deputy Director, United States Mint
Statement for the Record
Committee on Financial Services
Subcommittee on Domestic Monetary Policy and Technology
U.S. House of Representatives
April 17, 2012

Thank you for giving the United States Mint the opportunity to submit a statement for the record for the April 17, 2012, House Financial Services Subcommittee on Monetary Policy and Technology hearing entitled, "The Future of Money: Coinage Production."

The United States Mint and the Department of the Treasury share Congress's objective of improving government efficiency, and are working to manufacture circulating coinage at the lowest possible cost to the American taxpayer. Under the authority provided by the Coin Modernization, Oversight, and Continuity Act of 2010 (Pub. L. 111-302) (Act), we are currently conducting an extensive research and development (R&D) effort to determine the most cost-effective and fully functional metallic coin composition for each circulating coin. As required by the Act, we will transmit our first biennial report to Congress later this year.

The United States Mint and the Department of the Treasury support the legislative proposal contained in the FY 2013 President's Budget allowing the Secretary of the Treasury flexibility to determine the composition of coinage. The proposal is the optimal method for addressing the current and future challenges related to the costs of coin materials and production, and would reduce costs of circulating coins by millions of dollars annually. We urge the Committee to support this proposal.

Budget Proposal

Raw materials represent a significant part of the cost to manufacture circulating coins. Currently, the alloys for all circulating coins, except for the $1 coin,[1] are controlled by law (31 U.S.C. § 5112). To reduce costs to the United States Mint, the FY 2013 President's Budget proposes legislation to allow the Secretary flexibility to specify the coinage materials for the one-cent, 5-cent, dime, quarter-dollar, half-dollar, and $1 coins.[2]

The most efficient and comprehensive way to reduce circulating costs is to grant to the Secretary the authority to prescribe the weights and compositions for all circulating coins so the Secretary has the flexibility to change the composition of coins to more cost-effective materials. This would allow Treasury to adjust to changes in material prices

[1] The composition of the $1 coin may be prescribed by the Secretary of the Treasury in accordance with the United States $1 Coin Act of 1997, Public Law 105-124 (Dec. 1, 1997).
[2] Although United States $1 Coin Act of 1997 affords the Secretary discretion on the composition of the $1 coin, it nevertheless requires the coin to have "similar, metallic anti-counterfeiting properties as" previously issued $1 coins. The proposed legislation in the President's Budget for FY 2013 would allow the Secretary to consider coinage materials that are nonmetallic.

over time while taking into account the impact of alternative materials on manufacturing processes and equipment. Changes would be made through an objective and open process that considers the public interest and is responsive to future technological developments.

Research and Development

To date, through the R&D process, the United States Mint has identified a number of issues related to future costs of materials, production methods, and emerging technologies that will be reflected in the first biennial report. We are progressing well with our R&D efforts, and will transmit our report to Congress later this year.

The Mint appreciates this Committee's and Congress's continued support. Please let us know if we can be of further assistance.

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