

The Macroeconomic Effects of an Add-on Value Added Tax

**Prepared for the
National Retail Federation**

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The Macroeconomic Effects of an Add-on Value Added Tax

Executive Summary

As U.S. policymakers consider ways to address unsustainably high projected future federal government deficits and debt, significant policy changes to both spending and revenues will be debated. The President's National Commission on Fiscal Responsibility and Reform is charged with making recommendations by December 1, 2010 on how to address near-term as well as long-term projected deficits. The Commission is expected to consider significant changes to federal entitlement programs, defense and non-defense discretionary spending, and the tax system, including the possibility of a new federal value-added tax (VAT).

The National Retail Federation (NRF) engaged Ernst & Young LLP and Tax Policy Advisers LLC to analyze the macroeconomic effects of implementing a VAT to reduce projected federal deficits. Although there have been economic analyses of various policies to reform the existing tax system, a macroeconomic analysis of an "add-on" VAT as a means of reducing the deficit and government debt has not been undertaken.

This report examines the macroeconomic effects of reducing future deficits by two percent of GDP. The report focuses on a narrow-based VAT that is similar to VATs in most other countries. To achieve deficit reduction of two percent of GDP with a narrow-based VAT, a 10.3 percent tax rate would be needed. The report also analyzes the effects of a broad-based VAT with a rebate for tax paid by low-income households, as well as a narrow-based VAT with a rebate. All of the add-on VATs analyzed in this report are similar to those used in other countries or recommended in various proposals currently under discussion. For purposes of the analysis, it is assumed that the VAT is effective January 1, 2012.

The three principal findings of the report are:

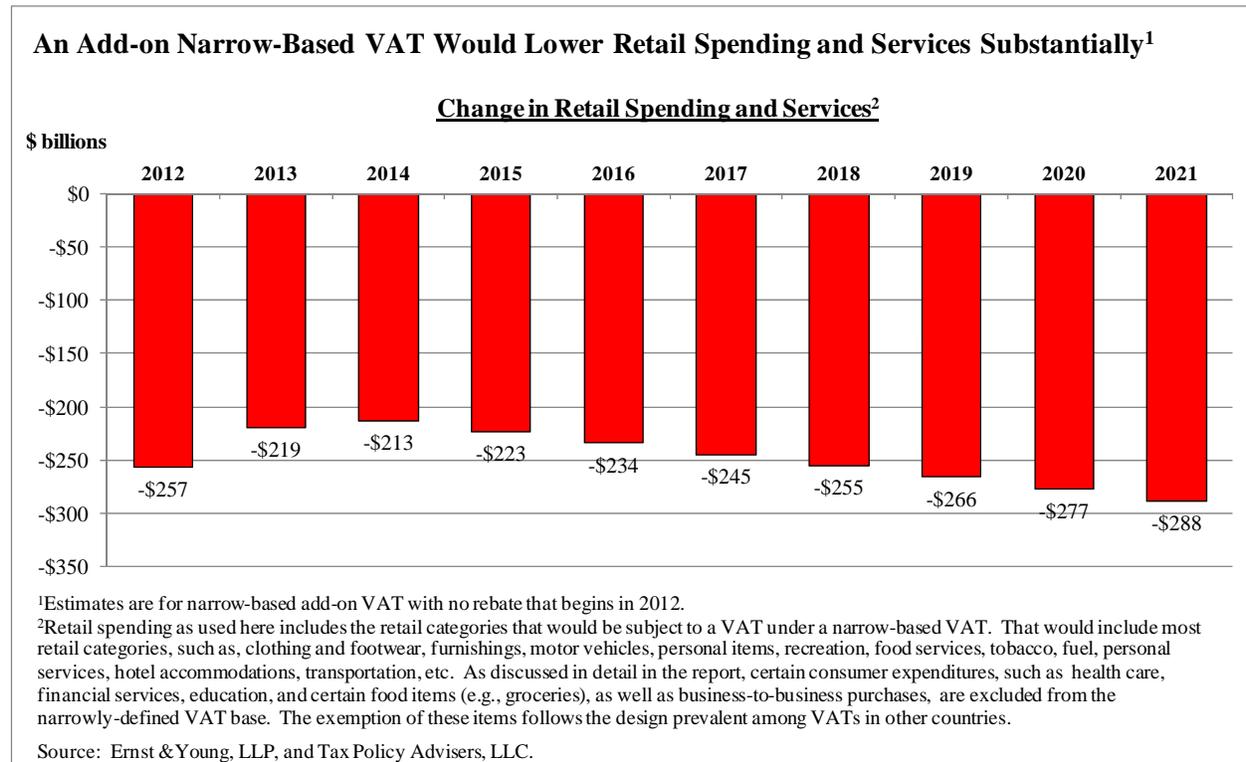
1. An add-on VAT would reduce retail spending by \$2.5 trillion over the next decade. Retail spending would decline by almost \$260 billion or 5.0 percent in the first year after enactment of the VAT.
2. An add-on VAT would cause GDP to fall for several years. The economy would lose 850,000 jobs in the first year, and there would be 700,000 fewer jobs ten years later. By comparison, a comparable reduction in the deficit through reduced government spending would have less adverse effects on the economy, and could have positive effects for economic growth.
3. Although lower deficits and debt would have positive long-run effects for the economy, most Americans over 21 years of age when the VAT is enacted would be worse off due to

enactment of an add-on VAT. A VAT would have significant redistributive effects across generations, reducing real incomes and employment for current workers.

In the face of an economy that continues to struggle, immediate enactment of an add-on VAT would pose serious risks. The drop in retail spending, jobs, and GDP under an add-on VAT has the potential to further weaken the economy in the near term, rather than strengthen it. Other countries have reduced, not increased, their VATs in the face of the recent economic downturn. Reducing the deficit through lower government spending would have much more favorable economic effects – more jobs, higher GDP, a better standard of living for Americans, and a less depressing effect on retail spending – in both the near term and in the longer term.

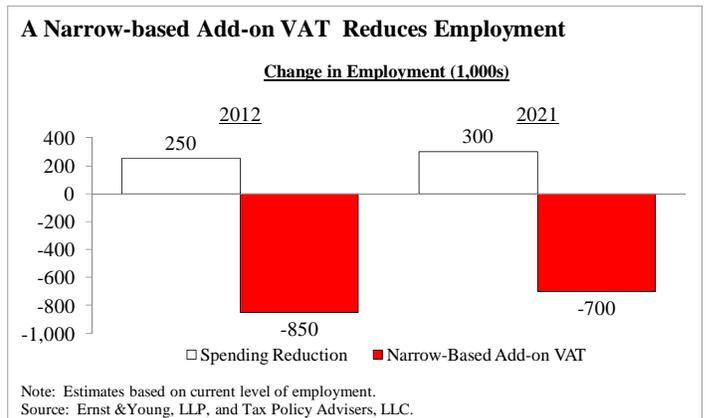
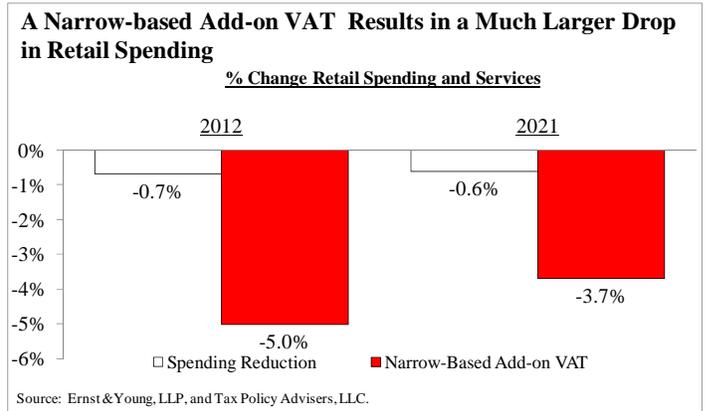
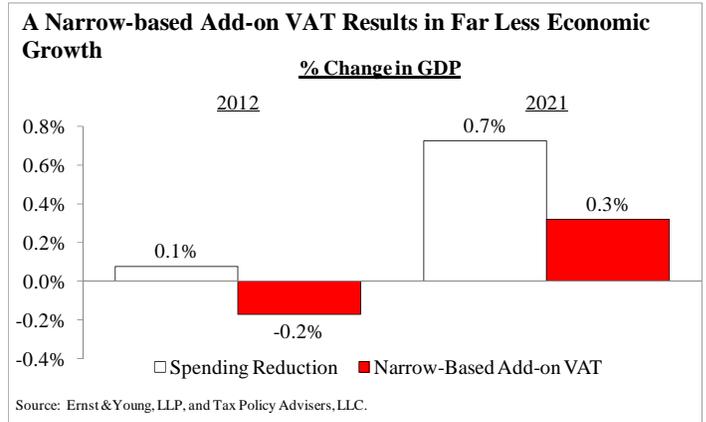
Retail Spending Would Fall Significantly Under a VAT

- A VAT would lower household consumption in the short- and long-runs, and would reduce GDP for the next several years followed by several years of negligible change.
 - Retail spending subject to the VAT would initially fall by 5.0 percent or almost \$260 billion.
 - Retail spending would fall by \$2.5 trillion over the next decade.



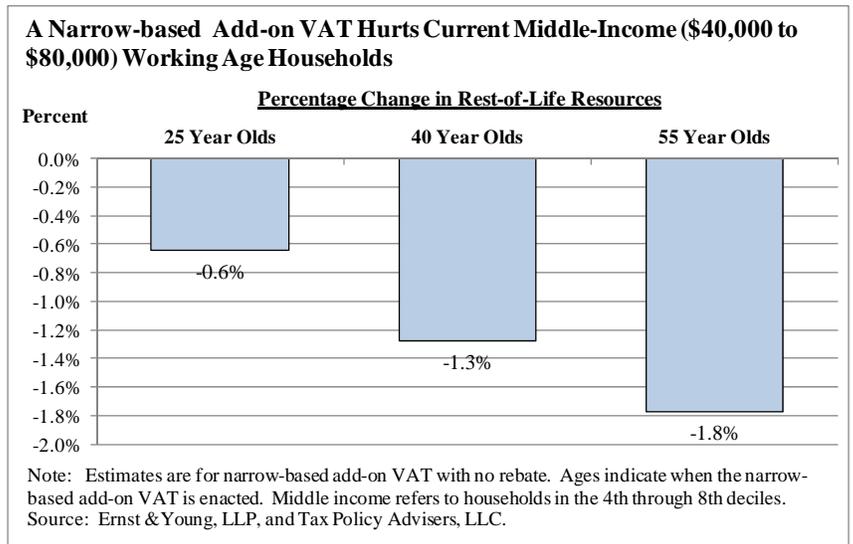
An Add-on VAT Would Have More Adverse Macroeconomic Effects than a Comparable Deficit Reduction through a Reduction in Government Spending

- An add-on VAT would result in less economic growth as compared to a reduction in government spending, when addressing the nation’s long-term fiscal imbalance.
 - The level of GDP initially falls when future deficits are financed with a VAT, but would rise almost immediately when reduced through lower government spending on income transfers.
 - A VAT has more adverse effects after ten years as well – reducing the deficit through a VAT cuts the growth of GDP by more than half as much as a reduction in government spending after ten years.
 - The drop in taxable retail spending and services is initially 7.5 times as large under a VAT (-5.0 percent) than after a reduction in government spending (-0.7 percent). After ten years it remains 6 times as large.
 - A deficit-reducing VAT would result in an initial loss of about 850,000 jobs and a loss of 700,000 jobs for more than a decade. In contrast, reducing the deficit through lower government spending could add 250,000 jobs to the economy.
 - The two policies would have different distributional effects, depending on the distribution of the reduction in transfer payments.



Most Americans Alive Today Would Be Worse Off Under an Add-on VAT

- Most Americans over 21 years of age when the VAT is enacted would be worse off due to a decline in their real wages and their inability to consume as much. Households with incomes above \$40,000 and over the age of 21 at the time of enactment would be worse off.
- These losses reflect the costs current generations would bear from using a VAT to reduce the current unsustainable level of deficits and the debt in the United States.



An Add-on VAT Would Result in a Large Tax Increase for Middle-Income Families

The required tax rate for a narrow-based VAT would initially need to be at least 10.3 percent to reduce federal government debt by two percent of GDP. An add-on VAT would be in addition to all existing taxes, such as individual income taxes, corporate income taxes, and the payroll tax.

- Under a narrow-based 10.3 percent VAT, a middle income family-of-four with the U.S. median income of roughly \$70,000 would pay \$2,400 a year in value added taxes. This would be a 100 percent increase over the federal income taxes currently paid by this family.
- A family earning \$40,000 would pay an additional \$1,800 in VAT. A family at this income level has no federal income tax liability.
- A family earning \$100,000 would pay \$2,800 in value added taxes – a tax increase equal to more than 40 percent of their current federal income tax liability.

Moreover, the VAT rate would likely increase over time due to continued political pressure to further narrow the VAT base and/or add some type of rebate to offset VAT paid by lower-income households. This is in addition to the possible increase in rates that would be needed to finance any increase in government spending due to the availability of the VAT; such increased spending would be consistent with international experience.

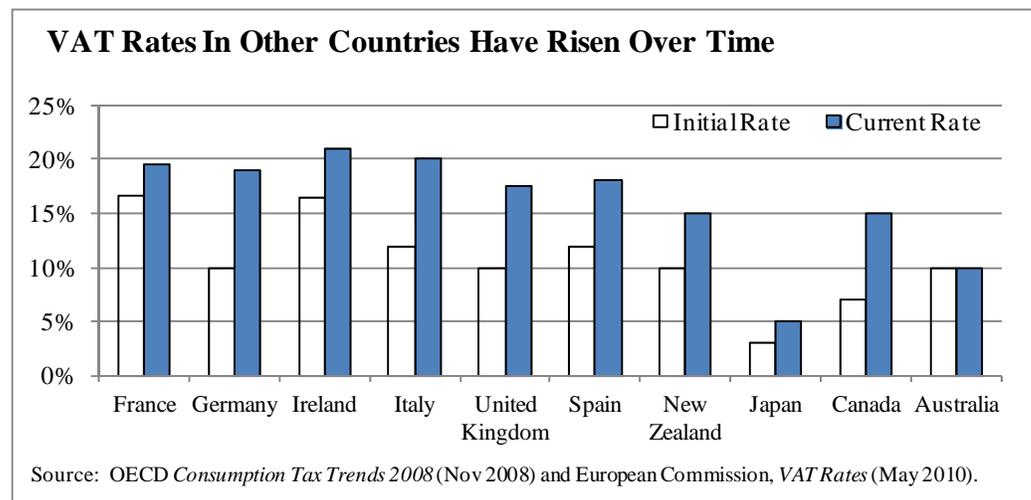
International Experience with VATs

The report examines the experience of ten of the largest countries that have adopted a VAT. All of these countries replaced existing, national consumption-type taxes, such as turnover taxes and manufacturing and wholesale sales taxes, with a VAT.

To address the distributional concerns that VATs are borne disproportionately by lower income households, these VATs have been designed with exemptions and multiple rates. Exemptions and multiple rates increase the administrative and compliance costs of these VATs. Of the ten VATs examined, only Japan imposes a VAT with a single tax rate.

VAT rates in these countries have also increased substantially over time. The average VAT rate has risen from 10.7 percent at the inception of the VATs across all ten countries to 16.0 percent today – a nearly 50 percent increase. The average VAT rate among the 30 member nations of the Organisation for Co-operation and Economic Development (OECD) is 18.0 percent. The United Kingdom will be the first of the ten largest countries analyzed to double its initial VAT rate with its

scheduled increase from 17.5 percent to 20 percent in January 2011. Japan briefly considered raising its VAT rate from 5 percent to 10 percent earlier this year, but has not done so in the face of significant political opposition.



The narrow taxable base for VATs in other countries has resulted in some goods and services being favored relative to other goods and services. This has led to important and sizable sectoral effects favoring tax-preferred sectors. In addition, the enactment of a VAT can have temporary effects on consumption patterns. For example, Australia reduced its excise tax on automobiles and replaced its wholesale sales tax when it enacted its VAT in 2000. Before the effective date, automobile sales fell, but then rose sharply after their excise tax was reduced, while retail spending increased just before the VAT effective date, but fell sharply afterwards.

Modeling the Macroeconomic Effects of an Add-on VAT

In practice, the VATs that have been enacted in other countries are typically not uniform broad-based consumption taxes, but rather “narrow-based” VATs.” Within the OECD, VATs only cover a portion of total consumption due to various exemptions and lower rates for spending on goods such as health care, education, financial services, housing and various “necessities,” and it seems likely that a VAT in the United States would also be less than fully comprehensive.

Accordingly, the analysis considers three different VAT scenarios, where each raises revenue equal to two percent of GDP:

- A narrow-based VAT covering 41 percent of total consumption, which excludes a wide variety of items due to administrative concerns or because they account for a larger share of low-income families’ budgets. This would require a VAT rate of 10.3 percent.
- A broader-based VAT covering 67 percent of total consumption that replaces some of the exemptions under the narrow-based VAT with a cash grant to low-income families to fully offset VAT on families below the federal poverty level. This would require a VAT rate of 8.0 percent.
- A narrow-based VAT that also includes a cash grant to low-income families. This would require a VAT rate of 12.4 percent.

The report relies on the Tax Policy Advisers’ (TPA) dynamic general equilibrium model of the U.S. economy, which is designed to analyze major tax policy changes. The TPA model and similar economic models have been widely used by the U.S. Department of the Treasury, the Joint Committee on Taxation, and the Congressional Budget Office to analyze the macroeconomic effects of broad changes to the tax system. The TPA model captures the macroeconomic effects of a new federal add-on VAT tax; the resulting reduction in the federal deficit and the national debt; the associated changes in prices, wages, and interest rates; the effects on economic growth, aggregate consumption and investment; and the resulting effects on households, categorized by age and income groups. Thus, the model estimates the macroeconomic effects of a VAT as well as its age and income distributional effects. The report does not analyze the effects of alternative ways of reducing federal deficits and the debt, other than differentiating the macroeconomic effects of deficit reduction using a VAT from the effects of a reduction in government spending on income transfers.

Conclusion

As a consumption-based tax, an add-on VAT would be shifted forward to consumers through higher consumer prices. As a result, private consumption would fall. By increasing consumer prices, the VAT also reduces real or inflation-adjusted wages, which would cause labor supply to fall as well.

An add-on VAT would have particularly adverse effects on the retail industry. There would be an especially pronounced reduction in retail spending because nearly all retail goods would be subject to double-digit VAT rates, while many other consumer purchases would be exempt under a narrow-based VAT. In addition, some consumers would evade the tax – experience in other countries suggests 12 percent non-compliance with the VAT – driving up the VAT rate.

Moreover, an add-on VAT leaves the economy considerably worse off than a similarly-sized reduction in government spending on income transfers. With an add-on VAT, GDP would initially be lower and the economy would lose jobs; by comparison, GDP and employment would increase with a reduction in spending. Although lower deficits and debt would have positive long-run economic effects for the economy, most middle income Americans who are working age or older at the time of enactment of the VAT would be worse off.

Perhaps the most troubling aspect of a deficit-reducing VAT is that, if enacted in the near future, its negative effects on GDP, consumer spending, and employment would occur in the face of the current economic climate of weak economic growth, high unemployment, and low consumer confidence. The near-term drop in output, loss of jobs, and sharp decline in consumer spending described by this report would raise additional economic worries, rather than shoring up the weak economy. With the CBO projecting unemployment to not fall below 7 percent until 2013, the initial reduction in employment from a VAT, estimated to be roughly equivalent to 850,000 jobs, would make full economic recovery much more difficult.

The Macroeconomic Effects of an Add-on Value Added Tax

I. The U.S. Fiscal System is at a Crossroads

The U.S. economy is currently on an unsustainable fiscal path. Projections imply increasing federal government deficits and debt relative to GDP that will soon become the largest ever experienced in the United States.¹ Realistic solutions to this long-term problem almost assuredly involve both spending reductions, especially in the Medicare, Medicaid and Social Security programs, and tax increases.

In the vein of raising additional revenue, one often-cited proposal for partially addressing the deficit and debt problems in the United States is the enactment of a new federal value-added tax (VAT), not as a substitute for an existing tax, but as an “add-on” tax designed to reduce the deficit and, over time, the debt. This study examines the effects of such a tax, designed to reduce the deficit by roughly 2 percent of GDP, with a concomitant reduction in the debt.

An add-on VAT seems likely to receive serious consideration in the very near future. President Obama’s deficit reduction commission is widely expected to seriously consider a VAT to address the long-term fiscal imbalance in the United States. On the whole, though, recommendations that a VAT be considered have been more common than actual endorsements of the tax. House Speaker Nancy Pelosi (D-California) has commented that “it’s fair to look at” a VAT, and Senate Budget Committee chair Kent Conrad (D-North Dakota) has stated that a VAT should be “on the table” in future tax policy discussions.² Two former Federal Reserve chairs have made similar statements: Paul Volcker has referred to a VAT as a “possible approach” and Alan Greenspan has stated that it must be considered as a possible way to reduce the deficit.³ In December 2007, the Department of the Treasury issued a report analyzing, along with other proposals, a reform option that would replace the corporate income tax with a type of VAT.⁴ Despite this apparent interest, earlier this year the Senate passed a non-binding resolution by a vote of 83-13 expressing opposition to the adoption of a VAT in United States.

The enactment of a deficit-reducing add-on VAT would have many effects on the economy. VAT-financed reductions in the deficit, and the associated reductions in government interest payments due to the reduction in the size of the federal debt, would free up private saving to finance private investment rather than government spending, and over time would lower interest rates and thus the cost of capital, further stimulating investment (and further reducing interest payments on the debt).⁵ The resulting increases in the capital stock would boost labor productivity and nominal wages. The increase in productivity would act to at least partially offset the negative effects on consumption of the VAT and VAT-induced increases in saving relative to consumption, as well as the negative effects on labor supply due to the VAT-induced

reduction in the purchasing power of after-tax wages. Moreover, as a consumption-based tax, a VAT would encourage saving and investment and thus stimulate long-term economic growth.

However, despite the positive effects of reducing the deficit and ultimately the debt, this report finds that a deficit-reducing add-on VAT would initially reduce GDP for several years with only negligible positive effects over the following several years.

An add-on VAT would have substantial negative effects on consumption and labor supply. Overall, consumption is found to fall initially by as much as 1.8 percent and from 1.1 percent to 1.3 percent ten years after enactment. Under the three VAT proposals modeled, taxable retail spending initially fell 4.5 percent to 5.4 percent, and fell 3.2 percent to 4.1 percent ten years after enactment. The VAT options result in an initial reduction in labor supply equivalent to the loss of 850,000 jobs.⁶ Although the longer term growth effects on GDP would be positive, they would appear only after many years, while the declines in consumption and labor supply would occur immediately and persist in the long-run.

The report also finds that a deficit-reducing add-on VAT is more adverse to economic growth than a comparable reduction in government spending. An add-on VAT results in an immediate reduction in GDP, a decline in employment, and a larger reduction in consumer spending.

Another concern is that a VAT is generally viewed as being borne disproportionately by low- and moderate-income households. The regressivity of a pure flat rate VAT arises because households' consumption tends to comprise a higher fraction of income for low- and moderate-income households than for higher-income households. However, most VAT proposals, including those analyzed in this report, include policies to address their regressivity. These proposals invariably include some mechanism to offset all or a portion of the VAT paid by low- and moderate-income households, and thus require higher VAT rates to raise a given amount of revenue. Although the low-income policies modeled may eliminate the regressive nature of the VAT on low income households, they still would impose a relatively large tax increase on middle income households.

This report finds that an add-on VAT has substantial intergenerational effects. Most Americans alive when the VAT is enacted would be worse off due to its enactment. A VAT would have significant redistributive effects across generations, reducing real incomes and employment for current workers in order to lower the debt passed on to future generations.

Another concern is that reliance on a VAT as a new revenue source might increase over time. VATs abroad have generally grown over time. The average VAT rate among the ten largest economies with VATs has risen from 10.7 percent at the inception of the VATs to 16.0 percent today – a nearly 50 percent increase. The average VAT rate among the 30 member nations of the Organization for Co-operation and Economic Development (OECD) is 18.0 percent. The United Kingdom will be the first of the ten largest countries analyzed to double its initial VAT

rate with its scheduled increase from 17.5 percent to 20 percent in January 2011. Japan briefly considered raising its VAT rate from 5 percent to 10 percent earlier this year, but has not done so in the face of significant political opposition.

Some have also observed that VATs abroad have generally grown over time, possibly enabling or even leading to an increase in the size and scope of government; that is, a VAT may be a “money machine.” One prominent study finds empirical evidence that more efficient tax systems contribute to an expansion of government⁷ and another lends some credence to the idea that reliance on the VAT leads to increased government spending.⁸ Even if a VAT were initially small, it might later expand to finance an expansion in the size of government, although such an expansion might be limited by the current fiscal imbalances in the United States.

This report analyzes the effects of an add-on VAT on the U.S. economy with an emphasis on questions related to the effects of a VAT on consumption, especially in the short run and in the medium term of the decade following its enactment. In addition, both the intragenerational and intergenerational distributional implications of enacting various add-on VATs with different approaches for addressing its regressivity are studied.⁹

The analysis is conducted using the Tax Policy Advisers (TPA) Model, a dynamic, overlapping generations, computable general equilibrium model of the U.S. economy, which has been designed to estimate the effects of reforms of the tax system. The TPA model and other similar models have been used by the U.S. Department of the Treasury, the Joint Committee on Taxation and the Congressional Budget Office to consider and evaluate the macroeconomic effects of broad changes in tax policy.

The report proceeds as follows. In the next section, the basic mechanics and structure of possible VATs are described. Section III then discusses the modeling choices that are needed to analyze an add-on VAT in the United States. Section IV of the study provides a brief overview of the TPA model, followed by the results of the simulations, which focus on the economic and distributional effects of three variants of an add-on VAT. Section V provides a discussion of the macroeconomic issues faced upon enactment of VATs abroad. A final section summarizes the results and their implications, and offers some caveats to the analysis.

II. The Structure of a VAT

Similar to a retail sales tax, a VAT applies to goods and services sold to consumers, and therefore is a tax on consumption. However, unlike a retail sales tax, which is collected once on final sales to consumers, a VAT is imposed and collected at every stage in the production and distribution chain. Rather than requiring collection exclusively at the retail level, this structure spreads collection across all firms, which spreads the compliance costs of the VAT and helps prevent the tax from being entirely evaded at the retail level. Overall compliance and administrative costs, however, would be higher under an add-on VAT since it represents a new revenue source.

Two types of VATs have been discussed in the United States: 1) a subtraction-method VAT, and 2) a credit-method VAT (also known as the credit invoice-method VAT). Although they differ in administration, both are consumption taxes and remove the tax on business inputs or intermediate production. But, as explained below, they do so in somewhat different ways.

The subtraction method VAT has received more attention in the United States, partly due to its similarity in form to the current corporate income tax. The credit-method VAT, however, is the type of VAT used almost exclusively in the nearly 150 countries that rely on a VAT, primarily for administrative and enforcement reasons.

A. Mechanics of Subtraction and Credit Method VATs

Under a subtraction method VAT, the tax base for each firm is receipts from sales of all goods and services minus purchases of goods and services from other businesses. Because all purchases from other businesses are deductible, including purchases of tangible property (i.e., buildings and equipment), all new investment is written off immediately (i.e., expensed). Wages and other forms of employee compensation are not deductible. The base, sales minus purchases, is a measure of a firm's value added – the contribution of the firm to the overall value of output. For the economy as a whole, the base of a VAT is sales of goods and services to final consumers, because sales from one business to another are deducted from the base. Hence, the VAT taxes household consumption.

Under the credit method, the tax on intermediate inputs or production is eliminated differently. Instead of deducting purchases from other firms, each firm is fully taxed on its sales but also receives a credit for the tax paid on its purchases from its suppliers, as shown on the suppliers' invoices. The credit method uses the invoices to show the VAT paid on purchases and charged on sales, which creates a paper trail that helps make the VAT more enforceable. Like the subtraction method, the credit method is also a tax on household consumption.

While the example discussed in Box 1 illustrates¹⁰ that subtraction and credit invoice method VATs are arithmetically equivalent, in practice, there may be significant administrative differences between the two methods. For example, if tax preferences are provided to meet various social, political, or distributional goals by exempting certain transactions or firms or

Box 1: An Illustration of How Different Types of VATs Work

To illustrate how these two methods work, consider the example provided in Table 1 below. A manufacturer purchases nothing from other firms, sells its output (\$300) to a wholesaler, who sells all of its output (\$700) to a retailer, who then sells final products to consumers (\$1,000).

If a 10 percent sales tax were imposed, it would apply to the \$1,000 of final sales to consumers and \$100 in tax would be collected. The sales tax is the most obvious example of a tax on consumption. If the tax rate is 10 percent, \$100 in total tax is collected from the sale of the product under either the subtraction or the credit method. Unlike the sales tax, however, a portion of tax is collected at each stage of the production process.

Under the subtraction method, each firm subtracts its pretax purchases from its pretax sales and pays tax on the difference. The manufacturer pays \$30 (10 percent of the difference between \$300 of sales and \$0 of purchases), the wholesaler pays \$40 (10 percent of the difference between \$700 of sales and \$300 of purchases), and the retailer pays \$30 (10 percent of the difference between \$1,000 of sales and \$700 of purchases).

Under the credit method, each firm subtracts tax previously paid when determining how much tax to remit to the government. The manufacturer pays \$30 in tax (\$30 tax on sales minus \$0 tax on purchases), the wholesaler pays \$40 (\$70 tax on sales minus \$30 tax on purchases), and the retailer pays \$30 (\$100 tax on sales minus \$70 tax on purchases).

In this example, the amount of VAT collected at each stage of production is exactly the same under either the subtraction or credit methods. The difference is that, under the subtraction method, VAT owed at each stage is computed by applying the VAT rate to the difference between sales and purchases, whereas, under the credit method, VAT owed at each stage is the difference between the tax on sales and the tax on purchases.

Table 1. Different Ways of Taxing Consumption

Economic Activity	Manufacturer	Wholesaler	Retailer	Total
1. Sales	\$300	\$700	\$1,000	
2. Purchases	\$0	\$300	\$700	
3. Labor	\$200	\$200	\$200	
4. Value added (sales-purchases)	\$300	\$400	\$300	\$1,000
Retail Sales Tax				
5. Retail Sales Tax (10% of line 1 retail sales)	\$0	\$0	\$100	\$100
Subtraction-Method VAT				
6. Subtraction-Method VAT (10% of line 4)	\$30	\$40	\$30	\$100
Credit-Method VAT				
7. Tax on sales (10% of line 1)	\$30	\$70	\$100	
8. Less: input tax on purchases (10% of line 2)	\$0	\$30	\$70	
9. Net VAT liability	\$30	\$40	\$30	\$100

Source: Robert Carroll and Alan Viard, "Value-Added Taxation: Basic Concepts and Unresolved Issues," *Tax Notes*, March 1, 2010, pp. 1117-1126.

taxing them at reduced rates, the distinctions between the two VAT methods become important.

The credit method, unlike the subtraction method, can result in over taxation or tax cascading if exemptions are provided before the retail stage. In the example shown in Box 1, suppose that the wholesaler is exempt from VAT (perhaps because it is a small firm). The exemption causes no difficulty under the subtraction method beyond the revenue lost. The manufacturer continues to pay \$30 tax, the wholesaler now pays zero tax, and the retailer continues to pay \$30 tax; the wholesaler exemption reduces the overall tax burden on the final consumer good from \$100 to \$60. When computing its VAT, the retailer still subtracts its purchases from the wholesaler, even though the wholesaler is not taxed on those transactions.

In contrast, a wholesaler exemption creates significant problems under the credit method. The manufacturer continues to pay \$30 tax and the wholesaler pays zero tax, but the retailer now pays \$100 in tax. The retailer cannot claim any credit, because the wholesaler, from whom it makes its purchases, does not pay any tax. The retailer cannot claim credit for the taxes paid by the manufacturer because the wholesaler stands between the two firms. The total tax collected rises to \$130 in this example because the exemption, in effect, breaks the VAT chain. Under the credit method, the wholesaler exemption paradoxically increases the total burden on the final consumer good from \$100 to \$130.

On the other hand, this feature is often viewed as an advantage of the credit method VAT, as it creates an incentive for firms that might be exempt to voluntarily enter the system, thus minimizing exemptions from the VAT base. In fact, this often occurs under the credit method VATs in other countries. Exemptions under the subtraction method also make it difficult to enact the border tax adjustments that are needed to assess the VAT on a destination base (with imports taxed and exports tax exempt); that is, with exemptions, it is not clear how much VAT to rebate on exports nor how much VAT to impose on imports.

The subtraction method, unlike the credit method, cannot easily accommodate multiple tax rates on different products. Suppose, for example, that the VAT features a five percent tax rate on TVs and a ten percent tax rate on cars. Under the credit method, the manufacturer and wholesaler can be taxed at some uniform rate that does not depend on whether their inputs will eventually be used to produce TVs or cars. At the retail stage, the appropriate tax rate is applied to the final product; because the retailer claims full credit for the taxes collected at the manufacturing and wholesale stages, those taxes do not impact the total tax burden on the final product.

By comparison, the subtraction method runs into problems under this scenario, because the tax at each stage of production is computed separately, without regard to the tax imposed at other stages. The value added at the retail stage can be taxed at the appropriate rate that applies to the final product, but there is no practical way to vary the tax rate at the earlier stages based on the

final product. The inability of the subtraction method to accommodate the multiple rates used by most countries helps explain the prevalence of the credit method.

B. Issues with VAT Compliance

1. Compliance Costs

The VAT is expected to be paid by the final consumer. However, because the tax is collected and remitted by almost every business along the production and distribution chain, there is a substantial compliance burden on firms.¹¹ In the typical credit-invoice VAT system, these include the costs of:

- Adopting accounting and reporting systems to accurately capture and remit the correct amount of taxes
- Issuing VAT invoices on most transactions
- Administering the tax
- Preparing and filing returns, as well as the costs related to audits and dispute resolution
- Negative cash flows due to differences in the timing of taxes remitted on sales and refunds for taxes paid on purchases, including irrecoverable tax on purchases

VAT-related compliance costs are significant. The World Bank recently published a study looking at taxes paid by a mid-size representative firm in over 180 countries.¹² In addition to calculating the amount of taxes paid, the study estimated the time needed for the taxpayer to comply with corporate profits, labor and consumption taxes in each country. For the nine countries included in the discussion of VATs abroad (see Table 16 below) that use a credit-invoice VAT, the hours needed to comply with consumption taxes, primarily the VAT, were estimated to exceed the hours needed to comply with the corporate income tax by 26 percent. This comparison reinforces the point made earlier that the VAT is not a low compliance cost tax in practice.

2. Non-compliance

Non-compliance is a growing concern in the administration of VATs. This is partly due to the fact that under a credit-invoice tax the gross amount of taxes paid by firms plus refunds returned to firms is so large relative to the net taxes collected by the government. For example, estimates of VAT collected from domestic firms in the United Kingdom indicate that the sum of taxes imposed on outputs and taxes imposed on inputs was almost 10 times the net tax collection.¹³ The VAT is susceptible to fraud in terms of both under reporting of taxes due on sales and over reporting of refunds due on purchases, and the combined effects can be quite large. Based on United Kingdom figures for VAT collections, if tax on outputs is understated by only 3 percent,

while refunds on purchases are overstated by 3 percent, the net tax collections would be reduced by almost 30 percent.

The same presentation also provided estimates of the amount and sources of fraud in the United Kingdom's VAT system. The estimates compared tax on theoretical bases (total expenditures theoretically taxable multiplied by statutory rates on taxable amounts) with actual tax collections. The tax gap is the difference between the two figures.¹⁴ The estimates indicated that the gap in 2004 was equal to almost 13 percent of VAT collections and trending upward over time.

A broader study of VAT compliance in the EU found that, on average, the VAT gap in 2006 was 12 percent of the theoretical liability resulting in a gap equal to 106 billion Euros.¹⁵ The estimated VAT gap ranged from 30 percent in Greece to 2 percent in Ireland; the gap in the United Kingdom was 17 percent. The VAT gap is estimated as the difference between theoretical and actual VAT collections. The theoretical VAT amount is calculated by applying estimated tax parameters (registration exemptions, taxable base definitions and applicable tax rates) to national accounts estimates of value added. The author notes that this is not a measure of fraud because a portion of the gap may represent taxes not paid for "legitimate avoidance measures."

This brief discussion of the limited number of studies focusing on VAT tax gaps and fraud suggests that the credit-invoice VAT system is not a "self-enforcing" tax system where the presence of invoices increases voluntary compliance. It is, in fact, a transaction-based tax system that involves very large gross tax flows to produce much smaller net tax collections. The implication is that significant tax agency resources and compliance costs on the private sector would be required to reduce the estimated tax gaps that are currently present in these VAT systems.

III. Description of the Modeling of an Add-On VAT

Within the context of the TPA modeling of an add-on VAT, three primary details of the structure of the VAT must be specified. The most obvious are the amount of deficit reduction and the VAT rate. In addition, however, the VAT base and the policy to offset the regressivity of the VAT must also be specified. Assumptions regarding these details were made for the purpose of modeling the macroeconomic impacts of an add-on VAT. Obviously, policy makers would debate each of these details, and modifications to any one of these choices would alter the overall economic results of the study. The authors' believe their assumptions with respect to these variables are "middle of the road," so that the reader can estimate very roughly the variations in results that would occur with upward or downward modifications to these variables.

A. The Amount of Deficit Reduction

A VAT is extremely unlikely to solve all of the fiscal problems of the United States, as other policies, including changes in other taxes and especially reforms of the entitlement programs (i.e., Social Security, Medicare and Medicaid), must also be part of the solution. If the deficit reduction commission chooses to recommend a VAT, they would need to determine the amount of deficit reduction that would come from an add-on VAT.

Prior efforts to address the nation's long-term fiscal imbalance do not appear to provide a clear guide for the current effort. In the Deficit Reduction Act of 1984, two-thirds of the deficit reduction came from spending reductions and one-third from tax increases. In the Omnibus Budget Reconciliation Act of 1990, the emphasis was 70 percent spending reduction and 30 percent tax increases, while in the Omnibus Reconciliation Act of 1993 the emphasis was somewhat more evenly split with roughly 55 percent from spending reductions and 45 percent from tax increases.

Looking toward the current effort, the Congressional Budget Office estimates the debt held by the public ("public debt") will rise rapidly over the next several decades. Under the Administration's policy baseline, the public debt is projected to rise from 63 percent in 2010, to 84 percent in 2020 and to 124 percent in 2030. This is clearly unsustainable and defines the long-term fiscal imbalance faced by the nation.

This report analyzes the introduction of an add-on VAT that reduces the deficit by roughly 2.0 percent of GDP annually. Because the current deficit situation is unsustainable with debt-to-GDP ratios growing to 100 percent and higher, macroeconomic models that assume the economy eventually reaches an equilibrium cannot be used to estimate the economic consequences of current policies. An alternative approach is to show the effects of a deficit reducing fiscal policy that reduces the debt-to-GDP ratio from a high level to a sustainable level. For purposes of this study, a relatively large initial level of debt of roughly 90 percent of GDP is superimposed on the

TPA model, which implies a continuing deficit of 3.2 percent of GDP.¹⁶ CBO (2010) predicts this level of debt will be reached by 2020 under the Obama Administration’s policy baseline. This “high debt/high deficit” starting point forms the baseline from which the add-on VAT is analyzed.

The add-on VAT then reduces the deficit from approximately 3.2 percent to 1.9 percent of GDP.¹⁷ This deficit-reducing, add-on VAT lowers the debt-to-GDP ratio by roughly 2 to 3 percentage points of GDP per year, until it falls by roughly half after twenty years (i.e., from roughly 94 percent to about 55 percent of GDP). Because in the TPA model the debt-to-GDP ratio cannot fall indefinitely into the future, a fiscal policy change is needed to stabilize the debt-to-GDP ratio at a continuing sustainable level.¹⁸ Although this could be accomplished in many ways, the stabilizing fiscal policy used in the model is an increase in government transfer payments after 20 years. This moves the model to a sustainable level of debt and deficit in relation to GDP. This policy seems reasonable given the continued projected increases in government transfers through the Medicare, Medicaid, and Social Security programs.¹⁹

These transfers are assumed to be distributed uniformly on a per capita basis, which would correspond roughly to a deficit-financed increase in the Medicare program. Thus, the “add-on VAT” in the model is best interpreted as financing an approximate halving of government debt relative to GDP over a twenty-year period, and then financing an increase in Medicare-type transfer payments.

In summary, the simulation results presented below are intended to show the economic and distributional effects of an add-on VAT that raises roughly two percent of GDP relative to a baseline in which the debt-to-GDP ratio is at 90 percent and the deficit in relation to the size of the economy is 3.2 percent, and after several decades stabilizes the debt-to-GDP ratio at 55 percent and the deficit in relation to the size of the economy at 1.9 percent.

B. The VAT Base

A key factor in determining the effects of an add-on VAT is the size of the VAT base. In principle, the base of a VAT should include all consumption expenditures and exclude all investment purchases, with any distributional concerns related to the taxation of necessities addressed with a VAT rebate or subsidy such as a means-tested income transfer. Such a VAT rebate could, for example, be a refundable tax credit that anticipates VAT to be paid on consumption purchases by the poor.

In practice, even in the presence of such low income subsidies, the VAT base is seldom applied to all consumption expenditures, with a variety of goods excluded from the base or given preferential rates, typically to relieve the tax burden on the poor. In addition, for social reasons, the tax is often reduced or eliminated on goods such as food consumed at home, education or health care services.²⁰ Standard VAT exemptions among OECD countries include health care,

education, and financial services and most VATs could more accurately be termed “partial VATs.”²¹

Experience with both sales and income taxes in the United States also suggests that certain consumption goods would almost certainly be exempt from a new VAT, while the tax treatment of other goods is more uncertain, depending primarily on how the need to maintain a broad base to ensure adequate revenues is weighed against the desire to exempt goods for distributional and social reasons. All states exempt prescription drugs and most do not tax health care. Thirty states exempt food for home consumption or tax it at a lower preferential rate. One study estimated that 38 percent of personal consumption expenditures were subject to state and local sales taxes.²²

This report follows Toder and Rosenberg (2010) in considering two potential VAT bases – a “broader” base that includes all purchases of final goods and services to consumers (i.e., personal consumption) that might reasonably be expected to be subject to tax under a new VAT in the United States, and a “narrow” base or partial VAT that includes several additional exemptions.²³ Specifically, both bases assume that the VAT is not applied to educational expenses, government-financed medical expenses (primarily Medicare and Medicaid), services provided by charitable and religious organizations, and the imputed value of financial services.²⁴ Existing residential housing is also excluded from both VAT bases; that is, the broad-based VAT is assumed to apply only to rental housing and new residential housing. Services provided by state and local governments are not included in either the broad or narrow VAT bases, and it is assumed that the VAT is not applied to state and local taxes.

The narrow VAT base excludes a number of additional consumption items that have traditionally received special treatment in the United States, either under the federal income tax or under state sales taxes. The exclusion of housing is extended to both rental housing and new home purchases in recognition of the special status housing has received under the U.S. tax system. Purchases of groceries and other food items are also excluded, following the practice among most states. Finally, private health care spending is excluded, including both out-of-pocket expenses and health insurance premiums, which follows the special tax treatment health care spending generally receives under the federal income and payroll taxes and under state sales taxes.

As shown in Table 2, in 2009 the broad base includes roughly 67 percent of personal consumption expenditures, while the narrow base includes roughly 41 percent of personal consumption expenditures (i.e., items not checked are taxable).²⁵ Specifically, in 2009, total personal consumption expenditures were \$10.001 trillion, or 70.8 percent of GDP of \$14.1 trillion. The broad VAT base in that year would have been \$6.7 trillion or 67 percent of total personal consumption expenditures, while the narrow VAT base would have been \$4.1 trillion or 41 percent of total personal consumption expenditures.

Table 2. Estimates of Broad and Narrow VAT Bases, 2009

	Amount (\$billions)	Exempt Under:	
		Broad-based VAT	Narrow-based VAT
Personal Consumption Expenditures	\$10,001		
Housing	\$1,581		✓
Existing residential housing	\$1,070	✓	✓
Rental housing	\$369		✓
New home purchases	\$142		✓
"Retail"			
Groceries and other food items	\$778		✓
Clothing & footwear	\$340		
Furnishings	\$420		
Motor vehicles	\$601		
Personal items	\$77		
Recreation (including video, audio, computers, sports and recreational)	\$462		
Food services (including restaurants)	\$528		
Tobacco	\$88		
Total	\$3,293		
"Services"			
Health care	\$2,177		✓
Government financed health care	\$884	✓	✓
Private health care spending	\$1,293		✓
Medical products, appliances, and equipment	\$205		✓
Pharmaceutical products	\$177		✓
Therapeutic appliances, equipment and other medical products	\$27		✓
Outpatient services	\$453		✓
Hospitalization, nursing home services and other medical care	\$636		✓
Transportation	\$290		
Communication	\$235		
Recreation (excluding video, audio, computers, sports and recreational)	\$435		
Education	\$233		
Vocational, primary, secondary and higher education (out-of-pocket expenses)	\$223	✓	✓
Books	\$10		
Finance and Insurance	\$814		
Financial services (non-fee based services)	\$271	✓	✓
Personal care	\$193		
Accommodations (including hotel services)	\$76		
Religious and charitable organizations	\$146	✓	✓
Professional and other services	\$168		
Nonprofit organizations	\$259	✓	✓
Total	\$5,342		
Other			
Net foreign travel	-\$11		
Indirect and excise sales tax	\$470	✓	✓
Total Exempt Goods and Services		\$3,323	\$5,904
Total VAT Base		\$6,679	\$4,097
VAT Base as % of Personal Consumption Expenditures		67%	41%

Source: Department of Commerce, National Income and Products Accounts; based on computations by Ernst & Young, LLP, and Tax Policy Advisers, LLC.

C. Low Income VAT Rebate

As discussed above, distributional concerns about the VAT usually imply the exemption of certain goods consumed disproportionately by the poor, and/or a low income VAT rebate designed to eliminate the burden of the tax on individuals below or at the poverty level and reduce its burden on those whose incomes are only somewhat above the poverty level.²⁶

The two simulations that include a low income VAT rebate set the rebate roughly equal to the VAT that would be paid on consumption at the average poverty level, with a full rebate of tax paid to all joint-filer households with incomes less than \$30,000 (\$15,000 for single filers). The VAT rebate would be phased out between incomes of \$30,000 to \$60,000 for joint filers (\$15,000 to \$30,000 for single filers). This results in a total low income VAT rebate of roughly \$40 billion in 2007, or 0.28 percent of GDP.²⁷

Model simulation results are presented for three scenarios:

1. a narrow-based VAT without a low income VAT rebate (i.e., no low income VAT rebate, so that distributional concerns are addressed only by exemptions from the VAT base [Scenario 1],
2. a broad-based VAT with a low income VAT rebate (i.e., distributional concerns are addressed primarily with the VAT rebate) [Scenario 2], and,
3. a narrow-based VAT with a low income VAT rebate [Scenario 3].

The scenarios with a narrow-based VAT coupled with a low-income VAT rebate might well be viewed as redundant in the sense that it relieves the burden on the poor in two redundant ways; however, this scenario may be a likely outcome of the political process.

Under each of the three scenarios, VAT rates, shown in Table 3, are adjusted to keep the amount of deficit reduction constant at roughly 2 percent of GDP. The VAT rates range from 8.0 percent for the broad-based VAT with a low-income VAT rebate (Scenario 2) to as high as 12.4 percent for the VAT with both exemptions and a low-income VAT rebate to address distributional concerns (Scenario 3). Similar to Toder and Rosenberg (2010), these VAT rates are estimated assuming a 15 percent noncompliance rate under the VAT, which is consistent with estimates of noncompliance for the current U.S. tax system.²⁸ The standard 25 percent revenue offset reflecting the revenue estimating assumption that prices and nominal output remain fixed is also factored into the required VAT rates.²⁹

Table 3. VAT Rates Required to Raise 2 Percent of GDP

Policy Scenario	VAT Rate
1. Narrow-based VAT with Exemption (Policy Scenario 1)	10.3%
2. Broad-based VAT with VAT Rebate (Policy Scenario 2)	8.0%
3. Narrow-based VAT with Exemptions and VAT Rebate (Policy Scenario 3)	12.4%

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

IV. Macroeconomic and Distributional Analysis of an Add-on VAT

This section describes the macroeconomic and distributional effects of several different add-on federal VATs that would reduce the size of the deficit by two percent of GDP. First, a broad overview of the driving forces behind the macroeconomic and distributional effects over the next several decades is provided. Then the effects of the three VAT policy scenarios outlined above are discussed. An overview of the TPA model is provided at the end of this section in Box 4.

A. Overview of Macroeconomic and Distributional Effects

1. Macroeconomic Effects

The macroeconomic effects of reducing the deficit with an add-on VAT can be summarized as follows. Under each of the options, the deficit is reduced by roughly two percent of GDP, which implies that over the ensuing 20-year period, the debt-to-GDP ratio is roughly cut in half. The deficit-reducing effects are magnified over time with the decline of the magnitude of the debt relative to GDP and the associated reduction in government interest payments. Private saving that was formerly used to support government spending through the purchase of government bonds is now used to finance private investment. As a result, investment surges, as the classic “crowding out” effect of government debt is reversed.

These effects are reinforced by several factors. First, interest rates eventually decline because the government’s demand for debt is reduced, which in turn reduces the cost of capital. Second, consumption is discouraged relative to saving. This pattern is also reinforced in the short run to the extent that elderly owners of capital, who have a relatively high propensity to consume in their retirement years, suffer unanticipated losses due to the implementation of the VAT, as the real value of their capital assets declines due to VAT-induced increases in consumer prices.

At the same time, government spending that was formerly financed with debt is now financed with the consumption-based add-on VAT, which is assumed to be shifted forward to consumers through higher consumer prices.³⁰ As a result, private consumption falls. Moreover, by increasing consumer prices, the VAT also reduces real wages, which causes labor supply to fall.

Whether and if these negative effects on consumption and labor supply are eventually offset in the long run depends on the strength of the investment effect under the VAT options. If investment, the capital stock, and GDP increase by enough in the long run as a result of the VAT, consumption could increase. Similarly, nominal wages could increase by enough due to capital accumulation and the commensurate increases in labor productivity that labor supply could also increase. However, the TPA model did not show that this would result within the many decades over which the TPA model was run.

The primary effect of the add-on VAT is to increase private saving and investment at the expense of private consumption. This happens with the substitution of government revenues from a consumption-based tax for funds that were raised with deficit finance. After falling initially, GDP would be expected to increase from the increase in investment - and the resulting increase in productivity - due to the lower interest rates associated with the lower deficit.

Another important effect of the VATs is their effect on the mix of consumption. Because all of the VAT options, whether broad- or narrow-based, are partial in nature, consumption subject to the VAT falls, while consumption excluded from the VAT base rises. The results presented below distinguish between several types of consumption – retail spending, services, and housing – to highlight the importance of these differential effects.

2. Anticipatory Effects: Short-Run Shifts in Consumer Spending

Tax policy changes can have substantial anticipatory effects. An increase in tax rates alters the cost of earning income or of consuming between periods. Consumers respond to the higher cost or price in the future by accelerating their income or consumption into the current period.

One example of such an anticipatory effect is the well-known and often cited acceleration of capital gains realizations in anticipation of the higher effective tax rates enacted as part of the Tax Reform Act of 1986 when capital gains realizations rose by five times their typical level in 1986, and dropped sharply the following year.³¹ Similarly, there was considerable shifting of income and deductions around the 1993 and 1994 tax rate increases, when taxpayers shifted income back and deductions forward to avoid higher tax rates.³²

More recent examples that involve the shifting of consumption are the first-time home buyers' credit and the "Cash for Clunkers" program. In both of these cases, it has been widely reported that consumers accelerated housing and car purchases in anticipation of the benefits provided by these provisions.

The \$3 billion federal "Cash for Clunkers" program provided a strong boost to new car sales in the summer of 2009. Monthly new car sales (seasonally adjusted) were 11 percent higher in August 2009 than in June 2009 before the program began. Sales dropped in September, after the program ended, by almost 16 percent. Given the importance of the auto industry to the U.S. economy, initial estimates suggested that the program increased GDP growth in the third quarter of 2009 by 0.3 percent to 0.4 percent.³³

The experience with the enactment of VATs abroad also suggests substantial anticipatory effects. As discussed in greater detail within, the introduction of VATs in both Australia and Japan resulted in shifts in consumption around their implementation. In the case of Australia, for example, retail sales increased by 3.1 percent relative to trend prior to the implementation of the VAT and it took a full 18 months for total retail sales to return to their pre-VAT levels even

though the VAT replaced existing turnover taxes. In Japan, one study found that the VAT lowered spending growth in the year of its introduction by over 1 percent.³⁴

This report incorporates anticipatory effects by applying estimates of the responsiveness of consumption items included in the VAT base to changes in their price upon enactment of the VAT.³⁵ This approach results in an anticipatory shift of consumption of about 0.8 percent (or roughly \$80 billion) into the year before the narrow-based VAT starts and an offsetting drop in consumption after enactment of the VAT.

3. Distributional Effects

The TPA model considers the effects of policy changes on 12 representative lifetime income groups.³⁶ The distributional analysis considers how a change in policy affects households over their entire remaining lives; that is, it uses what economists term “lifetime incidence” analysis. In the results presented below, select lifetime income groups are considered to provide a sense of the distributional effects of the three policy scenarios: the 2nd (\$20,000 to \$26,000), 5th (\$41,000 to \$48,000) and 8th (\$63,000 to \$74,000) income deciles.

The distributional effects of enacting an add-on VAT can be summarized as follows. As a tax based on consumption, the VAT tends to be regressive relative to households’ annual income since consumption is a larger fraction of annual income for the poor. This effect is mitigated in the simulations either by excluding certain goods from the VAT base (i.e., the narrow-based option), or with a low-income VAT rebate (i.e., the broad-based VAT), or by the combination of both policies.

However, because the TPA model examines households over their entire lives, rather than annually, the lifetime incidence of the three policy scenarios (i.e., lifetime taxes paid relative to a measure of lifetime income) is analyzed. This approach averages the effects of annual taxes paid relative to annual income over the remaining lifetimes of households and is measured as a percentage of the present value of the rest-of-life resources. Details of this approach for distributional analysis are provided in Box 2.

Within this context, the distributional effects of an add-on VAT in the near and medium term are determined primarily by two factors. First, as a consumption-based tax, the burden of the VAT in isolation is slightly regressive in a lifetime context, but this regressivity is largely or fully offset by exemptions (Scenario 1), or the low-income VAT rebate (Scenario 2), and certainly by the combination of exemptions and the low-income VAT rebate (Scenario 3). As a result, the VATs analyzed below tend to have a larger negative impact on households in the middle of the income distribution – households earning between \$34,000 and \$74,000 per year.

Box 2. Lifetime Distribution Analysis and Welfare Calculation under the TPA Model

The gains or losses attributable to the enactment of the specific VAT policy analyzed in this report are calculated for each type of individual, categorized by age and income group. These gains and losses are calculated as the present value of the VAT-induced gains or losses experienced over the rest of an individual's lifetime, expressed as a percentage of the present value of the rest-of-life resources.

The measure of gain or loss is the amount of lifetime income an individual would be willing to pay to avoid the tax change. Economists refer to this gain or loss as the "equivalent variation." This measure captures the total burden associated with a tax; that is, it includes both the revenue losses due to the tax and the efficiency costs of the distortions of economic decisions associated with the tax. Note in particular that this measure of well being includes the effects of both changes in the value of consumption and the value of leisure. A decline in labor supply, for example, would have a cost in the form of reduced income available to fund consumption, but would also have a benefit in the form of increased leisure time.

A household's rest-of-life resources are defined as the present value of consumption and leisure over the remaining years of life (i.e., an individual's remaining "lifetime endowment"). The gains and losses reported thus reflect the percentage gain or loss over the rest of the lifetime experienced by individuals of various ages and income levels due to the enactment of an add-on VAT. These gains and losses are relative to the amount of resources they have at their disposal to finance purchases of both consumption and leisure for the rest of their lives.

With this approach, a consumption-based tax like a VAT appears to be less regressive than under an annual "snapshot" distributional analysis. This is because consumption and thus VAT paid relative to income is higher during youth and in old age when incomes are relatively low, than they are during the prime saving years of middle age when income is relatively high and consumption and VAT paid are relatively low. For a fuller discussion of lifetime versus annual distributional analysis see Don Fullerton and Diane Lim Rogers (1993).

The distributional effects of a narrow-based add-on VAT without a VAT rebate are shown in Table 4. This table indicates that the exemption reduces the tax increase faced by low-income household. Middle income households, however, experience larger percentage increases in their taxes than either the low-income or the high-income.

Table 4. Annual Snapshot of the Distributional Effects for a Narrow-Based Add-on VAT without a VAT Rebate (Policy Scenario 1)

Percentile Group	Lifetime Income Class	Percentage Change in the Average Tax Rate (Tax/Income) ¹
1st Decile	Under \$20,000	1.4%
2nd Decile	\$20,000 to \$26,000	2.0%
3rd Decile	\$26,000 to \$34,000	2.1%
4th Decile	\$34,000 to \$41,000	2.4%
5th Decile	\$41,000 to \$48,000	2.4%
6th Decile	\$48,000 to \$56,000	2.4%
7th Decile	\$56,000 to \$63,000	2.5%
8th Decile	\$63,000 to \$74,000	2.5%
9th Decile	\$74,000 to \$94,000	2.3%
90th to 98th	\$94,000 to \$158,000	2.2%
Top 2%	\$158,000 and Over	2.0%

¹ Each entry shows the percentage change in a taxpayer's effective tax rate measured in the first year of the VAT (annual taxes/annual income). Income includes wages, asset income, and transfers.

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

Second, VAT-induced changes in interest rates have a large effect on the distribution of the burden of the VAT policy. Over time the decline in interest rates due to a reduction in the debt implies a negative effect for the wealthy – an effect that dominates the direct effect of an add-on VAT, since interest rates eventually decline by roughly a quarter. As a result, wealthy individuals who are elderly at the time of enactment of the add-on VAT tend to benefit from the add-on VAT, but wealthy individuals who are younger tend to be hurt.

B. Simulation Results: Deficit Reduction through a Reduction in Government Transfers

The nation's fiscal problems are sufficiently severe that they will likely be addressed in a multitude of ways, including both tax increases and spending reductions. This report focuses on the use of an add-on VAT as a means of reducing the federal deficit and debt. However, to offer a basis of comparison with other deficit reduction measures the TPA model is first used to simulate the effects of a reduction in government transfers equal to 2 percent of GDP.³⁷ Some research has found that spending reductions are much more effective than tax increases in stabilizing the debt and avoiding economic downturns.³⁸ This reduction in government transfers incorporated in the TPA model is large enough to achieve the same reductions in the deficit and ultimately the debt as those achieved by the add-on VATs analyzed below.

This report finds that a deficit-reducing, add-on VAT has more economically adverse economic effects as compared to a reduction in government spending (i.e., transfers). This is primarily because an add-on VAT would have distortionary effects on consumption and labor supply, but a reduction in government transfers would not. The distributional consequences of a reduction in government spending for addressing the deficit, however, could be more regressive, with the extent of regressivity depending on the distribution of the reduction in spending.

Table 5 presents the results for deficit reduction obtained with a reduction in government spending. GDP rises immediately, by 0.1 percent in the first year, by 0.4 percent in year five, and by 0.7 percent in year ten. Consumption falls immediately by 0.7 percent in year one, with the declines decreasing somewhat in absolute value to 0.6 percent in year ten.

Investment initially increases by 3.1 percent, by 4.4 percent in year five, and by 5.8 percent in year ten. Labor supply increases by 0.2 percent in the near and medium terms; that is, reducing the deficit through a reduction in government spending increases employment. Over the first 10 years of the reduction in government spending, government debt falls from 93.8 percent to 74.6 percent of GDP. The decline in debt, coupled with a gradual decline in interest rates, causes interest payments on the debt to fall considerably, enhancing the amount of deficit reduction obtained under the reduction in government transfers.

Table 5. Macroeconomic Effects of a Reduction in Government Transfers that Reduces Deficit by 2 Percent of GDP

	Years After Reduction in Government Transfers		
	1	5	10
Gross Domestic Product (GDP)	0.1%	0.4%	0.7%
Consumption	-0.7%	-0.7%	-0.6%
Investment	3.1%	4.4%	5.8%
Employment/Aggregate Labor	0.2%	0.2%	0.2%
Government Debt-to-GDP	92.4%	84.8%	74.6%

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

C. Simulation Results: A Narrow-Based Add-on VAT without a Low-Income VAT Rebate

The results of the simulation of the enactment of a narrow-based add-on VAT with no low-income VAT rebate, adjusted to include anticipatory effects on consumption in the first year after enactment, are presented in Table 6. The narrow-based VAT without a rebate is the option that is most similar to the VATs in other countries.

After the introduction of the VAT, GDP initially falls by 0.2 percent in year one, and is negative for the next two years. GDP is virtually unchanged for the next several years and takes nearly a decade to begin to rise by a measurable amount (e.g., by 0.3 percent in year ten).

Consumption falls immediately, by 1.6 percent, with the declines in absolute value of 1.1 percent in year five and year ten. The first year effect is larger primarily because it includes the estimate detailed above of the shifting of consumption in anticipation of the VAT.

As discussed above, one important aspect of consumption-based taxes, such as VATs, is that they are seldom comprehensive and exclude significant portions of consumption. Some of the exemptions are for items that are difficult to tax from an administrative perspective and others are for social or distributional reasons. As shown in Table 2 above, the largest exemptions under the narrow-based VAT are for housing services, health care services, and groceries and other food items. The exclusion of residential housing reduces the size of the consumption tax base by nearly 11 percent, with the exclusion of rental housing and new home purchases reducing the VAT base by another 5 percent. These exemptions simply mean that some consumption items are taxed, while others are not and this differential treatment of consumption can be expected to encourage households to consume more of the exempt consumption goods and less of the taxed consumption goods.

Table 6. Macroeconomic Effects of a Narrow-Based Add-on VAT that Reduces Deficit By 2 Percent of GDP (Policy Scenario 1)

	Years After VAT Starts		
	1	5	10
Gross Domestic Product (GDP)	-0.2%	0.1%	0.3%
Consumption:	-1.6%	-1.1%	-1.1%
Retail Spending	-3.6%	-2.6%	-2.6%
Services	-1.5%	-1.0%	-1.0%
Housing	1.8%	1.4%	1.1%
Taxable Retail Spending and Services	-5.0%	-3.7%	-3.7%
Nontaxable Retail Spending and Services	0.8%	0.8%	0.8%
Investment	5.8%	4.3%	5.6%
Employment/Aggregate Labor	-0.6%	-0.5%	-0.5%
Government Debt-to-GDP	92.8%	85.7%	75.6%

Note: The first-year estimate for the change in consumption includes an adjustment for an anticipatory effect with an offsetting positive effect on investment under the assumption that three-quarters of the anticipatory effects on consumption are reflected in exactly offsetting changes in investment in inventories and the other one-quarter decreases GDP.

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

The TPA model allows estimation of the effect of this differential taxation to some extent by distinguishing between retail spending and services (i.e., non-housing) consumption and housing consumption. Additional calculations disaggregate non-housing consumption to estimate the differential effects on retail spending and services, which are also decomposed into their taxable and nontaxable components.³⁹

As shown in Table 6, the initial 3.6 percent fall in retail spending is larger than the 1.6 percent decline in overall consumption because the narrow-based VAT includes most retail spending (the category of groceries and other food items is excluded), but excludes all housing consumption and a substantial portion of services. The initial 3.6 percent decline in retail spending is higher than the 2.6 percent and 2.4 percent decline in years five and ten, respectively, because it includes the anticipatory effects described above. The effects on retail spending and services subject to the VAT (i.e., taxable consumption) is even larger at 5.0 percent initially, followed by declines of 3.7 percent in year five and 3.7 percent in year ten.

The nontaxable components of consumption rise. Housing consumption increases by 1.8 percent initially, by 1.4 percent in year five and by 0.9 percent in year ten. Nontaxable retail spending and services increases by 0.8 percent initially, in year five and in year ten.

These results highlight an important practical aspect of VATs. Because VATs in practice virtually always apply to only a portion of consumption, they can be expected to have substantial differential effects on the taxable and nontaxable components of consumption. These differential effects are also suggestive of the distortionary effects of the partial taxation of consumption under most VATs.

The decline in consumption is accompanied by an increase in investment, as private saving is diverted from purchases of government debt to private investment. Initially, investment increases by 5.8 percent. This initial effect is somewhat larger due to the anticipatory effect, as declines in consumption in the year of enactment of the VAT are largely offset by increases in inventory investment that replace the stock drawn down to accommodate the increase in consumption in the year prior to enactment of the VAT. Investment increases by 4.3 percent in year five, and by 5.6 percent in year ten.⁴⁰ Labor supply, measured as the ratio of employment (hours worked) to aggregate labor supply (total potential hours), falls due to the reduction in the real wage, with declines of 0.6 percent in the short run and 0.5 percent in the medium term.

After 10 years of VAT-financed deficit reduction, the ratio of government debt-to-GDP falls from 93.8 percent to 75.6 percent. Interest rates also fall over time due to the increase in the supply of private saving available for private investment. The decline in interest rates, when coupled with the decline in debt, implies that government interest payments on the debt fall considerably, enhancing the amount of deficit reduction obtained.⁴¹

Comparison of a Narrow-based VAT (with no rebate) to a Reduction in Government Transfers

The next set of results compares the effects for the narrow-based VAT without a rebate (Table 6) to those of a reduction in government transfers that achieves the same amount of deficit reduction (Table 5). Table 7 shows the effect of a narrow-based add-on VAT *relative* to a reduction in government transfers, that is, the difference in the macroeconomic effects between the two policies. This comparison shows that, notwithstanding the different distributional effects, an add-on VAT has more adverse economic effects as compared to a reduction in government spending.

GDP is initially 0.3 percent lower under the narrow-based add-on VAT than under the reduction in government spending. The GDP gap remains at 0.3 percent after five years and rise to 0.4 percent after ten years. This reflects the fact that, after ten years, the increase in GDP is more than twice as large with a reduction in government spending. GDP would rise by nearly 2 percent in the long run as compared to an increase of 1.4 percent to 1.6 percent under the add-on VATs (see the discussion of the long-run effects of add-on VATs in Box 3).

Table 7. Macroeconomic Effects of a Narrow-based VAT Relative to a Reduction in Government Transfers

	Years After VAT Starts		
	1	5	10
Gross Domestic Product (GDP)	-0.3%	-0.3%	-0.4%
Consumption:	-0.9%	-0.4%	-0.5%
Retail Spending	-3.0%	-2.0%	-2.1%
Services	-0.8%	-0.4%	-0.5%
Housing	2.6%	2.3%	2.1%
Taxable Retail Spending and Services	-4.3%	-3.1%	-3.2%
Nontaxable Retail Spending and Services	1.5%	1.4%	1.4%
Investment	2.7%	-0.1%	-0.2%
Employment/Aggregate Labor	-0.8%	-0.7%	-0.7%
Government Debt-to-GDP	0.4%	0.8%	1.0%

Note: The first-year estimate for the change in consumption under the narrow-based VAT includes an adjustment for an anticipatory effect with an offsetting positive effect on investment under the assumption that three-quarters of the anticipatory effects on consumption are reflected in exactly offsetting changes in investment in inventories and the other one-quarter decreases GDP.

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

Although the differences in investment between the two policies are initially large, they are considerably smaller after the anticipatory effects of the VAT subsidy. Investment is just slightly higher under the reduction in government spending in both year five and year ten. The change in labor supply is slightly under 1 percent greater under the reduction in spending, as labor supply increases modestly – instead of falling.

The drop in consumption is initially more than twice as large under a narrow-based VAT – a 1.6 percent decline under the narrow-based VAT as compared to a 0.7 percent decline under the reduction in government spending. After ten years this large difference still persists, with a 1.1 percent reduction in consumption under the narrow-based VAT and only a 0.6 percent reduction in consumption with a reduction in government spending. Aggregate consumption would actually increase in the long run with a reduction in transfers (rather than falling by 0.4 percent to 0.6 percent as under the three add-on VAT options, as discussed in Box 3).

These results are suggestive, but consistent with, the general idea that reductions in government spending must also be considered as a means of deficit reduction. Such reductions are likely to be less costly in terms of economic efficiency, including foregone aggregate consumption in both the short and long runs, but may well be more regressive in their incidence, with the extent of regressivity depending on the exact choice and pattern of spending reductions.

Distributional Effects of the Narrow-Based Add-on VAT with No Rebate

The distributional analysis of the narrow-based add-on VAT without a low-income VAT rebate shows the net effects of the two primary factors determining the distributional effects in the model discussed above (the direct effects of payments of the add-on VAT and the indirect effects of lower interest rates).

For the narrow-based add-on VAT without a low-income rebate (Table 8 and Figure 1), those who are older at the time of reform tend to be worse off, while those who are younger at the time of reform tend to be better off, as measured by the percentage change in rest-of-life resources.⁴²

Table 8. Present Value of Gains or Losses in Terms of Rest-of-life Resources, by Age and Income (Narrow-Based Add-on VAT with No Rebate – Policy Scenario 1

Percentile Group	Lifetime Income Class	Age in Year VAT Starts				
		10	25	40	55	70
		<u>Percentage Change</u>				
1st Decile	Under \$20,000	3.7%	1.3%	0.4%	-0.5%	0.9%
2nd Decile	\$20,000 to \$26,000	2.7%	0.6%	-0.2%	-0.9%	0.2%
3rd Decile	\$26,000 to \$34,000	2.1%	0.2%	-0.5%	-1.2%	-0.1%
4th Decile	\$34,000 to \$41,000	1.7%	-0.2%	-0.9%	-1.6%	-0.5%
5th Decile	\$41,000 to \$48,000	1.4%	-0.4%	-1.1%	-1.6%	-0.6%
6th Decile	\$48,000 to \$56,000	1.0%	-0.7%	-1.3%	-1.8%	-0.9%
7th Decile	\$56,000 to \$63,000	0.7%	-0.9%	-1.5%	-1.9%	-1.0%
8th Decile	\$63,000 to \$74,000	0.4%	-1.0%	-1.6%	-2.0%	-1.2%
9th Decile	\$74,000 to \$94,000	0.1%	-1.3%	-1.8%	-2.1%	-1.2%
90th to 98th	\$94,000 to \$158,000	-0.7%	-1.9%	-2.4%	-2.4%	-1.2%
Top 2 %	\$158,000 and Over	-2.4%	-3.2%	-4.1%	-3.2%	-0.6%

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

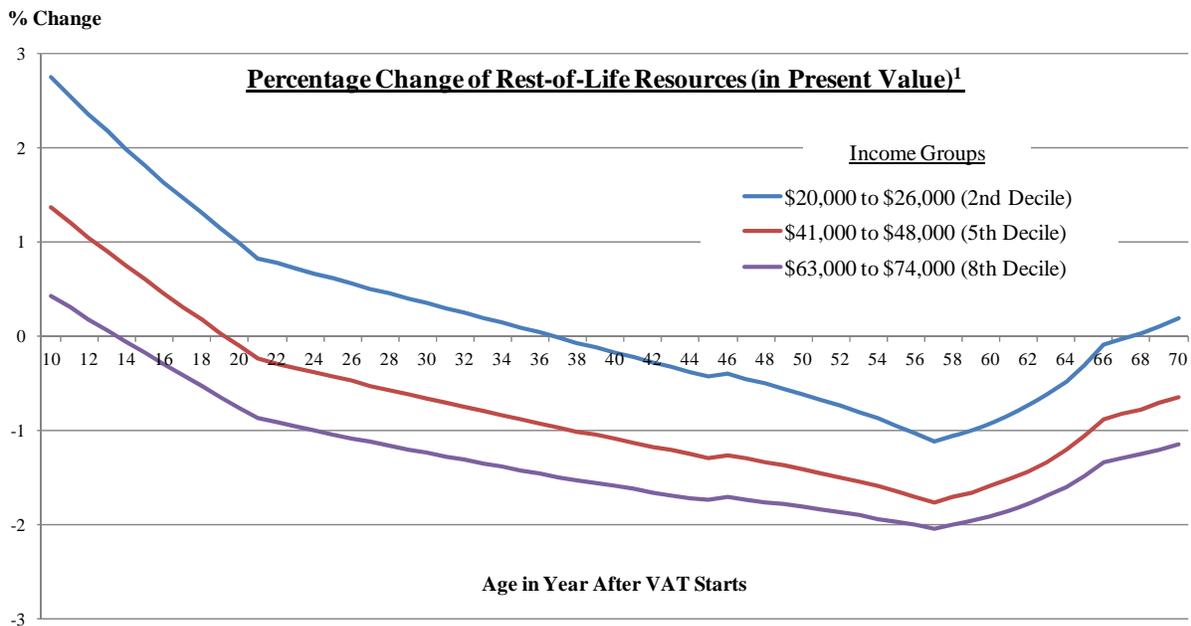
For example, consider those in the middle of the income distribution – the 5th decile. A household at age 70 at the time of reform experiences a reduction of 0.6 percent in rest-of-life resources. In contrast, a household at age 10 at the time of the reform experiences a gain equal to 1.4 percent of rest-of-life resources.⁴³

One pattern that emerges from Table 8 is that most of the groupings are worse off under the reform (i.e., the shaded area dominates the table). Except for the very young, most middle income groupings and all high-income groupings are worse off under the VAT.

Those with existing assets at the time the VAT is enacted, i.e., those who are older at the time the of enactment of VAT, tend to do poorly as interest rates and their investment earnings decline, while those who are younger tend to do better, except for those with very high incomes (e.g., the top 2 percent). This pattern can clearly be seen in Figure 1 as those who are younger tend to be better off while those who are older tend to be worse off. This reflects the intergenerational effects of the add-on VAT: current generations bear the cost of placing the nation back on a sustainable path to the benefit of future generations.

High-income households tend to experience a larger percentage decline in rest-of-life resources than lower income households, particularly within age groups. For example, for households that are 40 years old at the time the VAT is enacted, a household in the top 2 percent experiences a 4.1 percent decline in rest-of-life resources, while a household in the 5th decile experiences only a 1.1 percent decline in rest-of-life resources, and a household in the 1st decile experiences 0.4 percent increase in rest-of-life resources. The same pattern emerges for other age cohorts.

Figure 1. Distributional Effects of Narrow-Based Add-on VAT (Policy Scenario 1)



¹ A point on each line shows the percentage change of a person's remaining lifetime resources (in present value) with the indicated age in the year of the add-on VAT and income grouping.
Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

D. Simulation Results: A Broad-Based Add-on VAT with a Low-Income VAT Rebate

The results of the simulation of the enactment of a broad-based add-on VAT with a low-income VAT rebate (scenario 2), adjusted to include anticipatory effects on consumption in the first year after enactment, are presented in Table 9. After the introduction of the add-on VAT, GDP

initially falls by 0.3 percent in year one, is negative for the next three years, is unchanged in year 5, and is higher by 0.2 percent in year ten.

Table 9. Macroeconomic Effects of a Broad-based Add-on VAT with Low-Income VAT Rebate that Reduces Deficit By 2 Percent of GDP (Policy Scenario 2)

	Years After VAT Starts		
	1	5	10
Gross Domestic Product (GDP)	-0.3%	0.0%	0.2%
Consumption:	-1.8%	-1.2%	-1.2%
Retail Spending	-4.5%	-3.2%	-3.2%
Services	-2.1%	-1.3%	-1.4%
Housing	2.1%	1.6%	1.3%
Taxable Retail Spending and Services	-4.5%	-3.2%	-3.2%
Nontaxable Retail Spending and Services	2.3%	2.3%	2.0%
Investment	6.2%	4.0%	5.3%
Employment/Aggregate Labor	-0.8%	-0.6%	-0.6%
Government Debt-to-GDP	92.9%	85.8%	75.8%

Note: The first-year estimate for the change in consumption includes an adjustment for an anticipatory effect with an offsetting positive effect on investment under the assumption that three-quarters of the anticipatory effects on consumption are reflected in exactly offsetting changes in investment in inventories and the other one-quarter decreases GDP.

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

Consumption falls immediately, by 1.8 percent, with the declines in absolute value of 1.2 percent in year five and year ten. The first year effects are larger primarily because of the shifting of consumption in anticipation of the VAT.

Retail spending falls by 4.5 percent in the first year. Over time the reduction in retail spending falls somewhat, to 3.2 percent after five and ten years. Retail spending and services subject to the VAT also initially falls by 4.5 percent, and 3.2 percent in years five and ten. This simply reflects that all of retail spending, including groceries and other food items, are subject to the broad-based VAT. Housing consumption increases by 2.1 percent in the first year after the VAT starts, by 1.6 percent in year five and by 1.3 percent in year ten.

Investment initially increases by 6.2 percent. Again, the initial effect is somewhat higher due to anticipatory effects. Investment increases by 4.0 percent in year five, and by 5.3 percent in year ten. Labor supply falls due to the reduction in the real wage, with an initial decline of 0.8 percent, and declines of 0.6 percent in year five and year ten. Over the first 10 years of VAT-financed deficit reduction, government debt falls from 93.8 percent to 75.8 percent of GDP. The decline in debt, coupled with a gradual decline in interest rates, causes interest payments on the

debt to fall considerably, enhancing the amount of deficit reduction obtained under the add-on VAT.

Distributional Effects of Broad-Based Add-on VAT with a Rebate

The distributional analysis of the broad-based add-on VAT with a low-income VAT rebate (Table 10 and Figure 2) is somewhat similar to that of the narrow-based VAT with a low-income VAT rebate. The shaded area, which indicates groups that are worse off, is somewhat smaller. Nevertheless, most middle income households, except for the very young, and all high income households are still worse off.

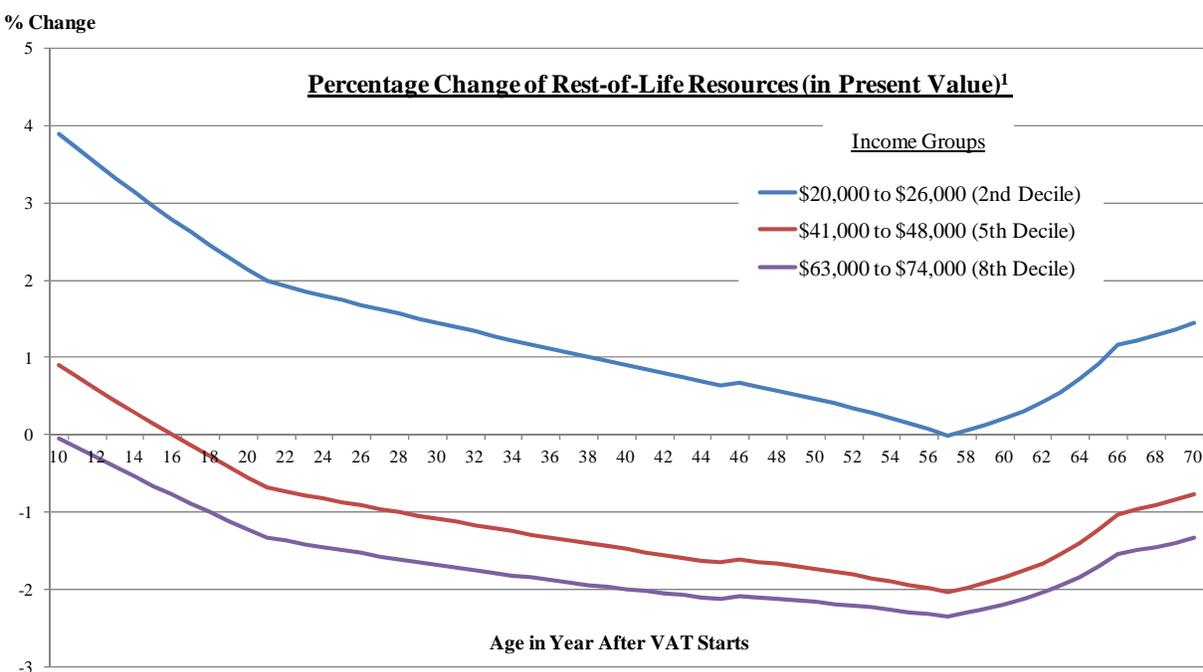
Table 10. Present Value of Gains or Losses in Terms of Rest-of-Life Resources, by Age and Income (Broad-Based Add-on VAT with Rebate – Policy Scenario 2)

Percentile Group	Lifetime Income Class	Age in Year VAT Starts				
		10	25	40	55	70
		<u>Percentage Change</u>				
1st Decile	Under \$20,000	6.1%	3.7%	2.6%	1.7%	3.3%
2nd Decile	\$20,000 to \$26,000	3.9%	1.7%	0.9%	0.1%	1.4%
3rd Decile	\$26,000 to \$34,000	2.5%	0.6%	-0.2%	-0.8%	0.5%
4th Decile	\$34,000 to \$41,000	1.5%	-0.4%	-1.1%	-1.6%	-0.4%
5th Decile	\$41,000 to \$48,000	0.9%	-0.9%	-1.5%	-1.9%	-0.8%
6th Decile	\$48,000 to \$56,000	0.5%	-1.1%	-1.7%	-2.1%	-1.1%
7th Decile	\$56,000 to \$63,000	0.2%	-1.3%	-1.9%	-2.2%	-1.2%
8th Decile	\$63,000 to \$74,000	0.0%	-1.5%	-2.0%	-2.3%	-1.3%
9th Decile	\$74,000 to \$94,000	-0.3%	-1.7%	-2.2%	-2.4%	-1.4%
90th to 98th	\$94,000 to \$158,000	-1.1%	-2.3%	-2.8%	-2.7%	-1.3%
Top 2 %	\$158,000 and Over	-2.9%	-3.6%	-4.4%	-3.4%	-0.6%

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

The effects of the broad-based VAT with a rebate on the lower income groups are more favorable than under the narrow-based VAT because the rebate, as compared to exemptions, is a far more targeted means of relieving the VAT burden on the poor. For the same reason, the losses to the higher-income groups are more substantial. For example, a very low-income household (e.g., in the 1st decile) at age 55 at the time of enactment of the VAT, experiences a gain equal to 1.7 percent of rest-of-life resources with the broad-based add-on VAT, in comparison to a 0.5 percent decline under the narrow-based add-on VAT with no low-income VAT rebate. A median income household (\$70,000) experiences a 2.4 percent decrease in rest-of-life resources, compared to a 2.1 percent decline under the narrow-based VAT with no rebate. The very highest-income group (i.e., in the top 2 percent) at the same age experiences a reduction in rest-of-life resources of 3.4 percent with the broad-based VAT with a low-income VAT rebate, in comparison to a reduction of 3.2 percent under the narrow-based VAT with no rebate.

Figure 2. Distributional Effects of Broad-Based Add-on VAT with Low-Income VAT Rebate (Policy Scenario 2)



¹ A point on each line shows the percentage change of a person's remaining lifetime resources (in present value) with the indicated age in the year of the add-on VAT and income grouping.
Source: Ernst & Young, LLP, and Tax Policy Advisers, LLC.

These results reflect the facts that the targeting of the low-income VAT rebate only advantages low-income households, while the exemption of a substantial fraction of consumption under the narrow-based VAT also benefits middle and higher-income households.

The results, also indicate that under both VATs, higher income households tend to lose more (or gain less) than the lower income households within each age group. This reflects the decline in

interest rates caused by the VATs, which disproportionately affects the wealthy. Also, the young tend to benefit relative to the elderly within any particular income group, as current generations bear the burden of reducing the debt passed on to future generations. Notably, more groups tend to lose with the narrow-based VAT in comparison to the broad-based VAT with the low-income VAT rebate, although the losses are generally smaller. Also, among the very young, only those at the very top of the distribution are losers under both of the VAT scenarios.

E. Simulation Results: A Narrow-Based Add-on VAT with a Low-Income VAT Rebate

The results of the simulation with a narrow-based VAT and a low-income VAT rebate are presented in Table 11. Not surprisingly, given that both the low-income VAT rebate and exemptions are costly and benefit the poor, the results indicate slightly more adverse macroeconomic consequences, but a smaller VAT burden on the lower income groups.

Table 11. Narrow-Based Add-on VAT with Low-Income VAT Rebate that Reduces Deficit By 2 Percent of GDP (Policy Scenario 3)

	Years After VAT Starts		
	1	5	10
Gross Domestic Product (GDP)	-0.2%	0.0%	0.2%
Consumption:	-1.7%	-1.2%	-1.3%
Retail Spending	-3.9%	-2.9%	-2.9%
Services	-1.6%	-1.1%	-1.1%
Housing	2.1%	1.7%	1.3%
Taxable Retail Spending and Services	-5.4%	-4.2%	-4.1%
Nontaxable Retail Spending and Services	1.0%	1.0%	1.0%
Investment	5.8%	4.1%	5.4%
Employment/Aggregate Labor	-0.8%	-0.6%	-0.6%
Government Debt-to-GDP	92.9%	85.9%	76.0%

Note: The first-year estimate for the change in consumption includes an adjustment for an anticipatory effect with an offsetting positive effect on investment under the assumption that three-quarters of the anticipatory effects on consumption are reflected in exactly offsetting changes in investment in inventories and the other one-quarter decreases GDP.

Source: Ernst & Young, LLP, and TaxPolicy Advisers, LLC.

To summarize briefly, consumption falls immediately after the introduction of the VAT by 1.7 percent, with declines of 1.2 percent in year five and 1.3 percent in year ten. Retail spending initially falls by 3.9 percent and by 2.9 percent in years five and ten. Retail spending and services subject to the VAT initially falls by 5.4 percent, by 4.2 percent in year five, and by 4.1 percent in year ten. Housing consumption initially rises by 2.1 percent, by 1.7 percent in year

Box 3. Long-Run Effects of Add-on VAT

This report focuses primarily on the macroeconomic effects of a deficit-financing add-on VAT in the near and medium terms, as well as a comparably sized reduction in government income transfers. The long-term effects of these policies defined as the several decades it takes for the model to stabilize to a new equilibrium, are also of interest and are shown in Table 12.

The add-on VAT is more adverse to economic growth than a reduction in government transfers. GDP is lower and both consumption and employment fall in the long-run rather than rising. The ratio of government debt-to-GDP stabilizes at roughly the same level.

For the VAT options, consumption falls implying that, even in the long run, the higher levels of investment and capital formation and associated growth effects are not sufficiently large to result in an increase in aggregate consumption. Nevertheless, the decline in consumption is roughly one-third of the decline that occurs within the first ten years after enactment.³⁹

The rise in GDP under the VAT options is considerably larger in the long-run. Rather than the 0.2 percent to 0.3 percent increase in year ten, GDP increases by 1.4 percent to 1.6 percent in the long-run. The decline in labor supply is somewhat larger than in year ten, reflecting the decline in hours worked. Government debt continues to fall beyond year ten, eventually stabilizing at roughly 55 percent of GDP. A reduction in interest rates combined with the deficit-reducing add-on VAT contributes to the fall in debt. The TPA model incorporates an increase in government transfer payments beginning after two decades, which stabilizes the model and can be justified as reflecting the continued growth in entitlement spending over the longer-term.

Table 12. Long-Run Macroeconomic Effects of Add-on VATs

	Reduction in Government Transfers	VAT Options		
		Scenario 1	Scenario 2	Scenario 3
		Narrow-base With No VAT Rebate	Broad-base With VAT Rebate	Narrow-base With VAT Rebate
Gross Domestic Product (GDP)	2.0%	1.6%	1.4%	1.4%
Consumption	0.1%	-0.5%	-0.6%	-0.6%
Investment	8.5%	8.5%	8.2%	8.2%
Employment/Aggregate Labor	0.05%	-0.7%	-0.8%	-0.8%
Government Debt-to-GDP	54.0%	54.7%	54.8%	55.2%

Source: Ernst & Young, LLP, and Tax Policy Advisers, LLP.

five, and by 1.3 percent in year ten.

Investment initially increases by 5.8 percent with the first year effect amplified somewhat by the anticipatory effect. Investment increases by 4.1 percent in year five, and by 5.4 percent in year ten. Labor supply falls due to the reduction in the real wage, with an initial decline of 0.8 percent, followed by declines of 0.6 percent in the short and medium terms. GDP initially falls after enactment of the VAT by 0.2 percent, is unchanged in year 5, and increases by 0.2 in year ten. All of these effects are only slightly less favorable than under the narrow-based VAT discussed above.

After the first 10 years of deficit reduction, government debt falls from 93.8 percent to 76.0 percent of GDP. The pattern of interest rates, deficits and interest payments is very similar to those in the other two scenarios discussed above.

The distributional analysis of the narrow-based VAT with a low-income VAT rebate are very similar to those for the broad-based VAT with a low-income VAT rebate (Scenario 2), and thus are not shown here. A comparison of the narrow-based VAT with a low-income VAT rebate to the same VAT without a low-income VAT rebate indicates that the general pattern of gains and losses is similar, but the lower income groups do slightly better, while the higher income groups are slightly worse off under the former policy.

F. Limitations of the TPA Model

Any modeling effort is only a rough approximation to reality, and the modeling in this report is no exception. Although many caveats might be added to the analysis, several are particularly noteworthy.

One limitation of the analysis is that the model used to simulate the effects of a deficit-reducing add-on VAT in this study – primarily for reasons of tractability – assumes a closed economy. Although the U.S. economy is too large to be modeled simply as a small, open economy, it would clearly be more realistic to account for capital flows to and from the United States; that is, it would be desirable to include some international trade in goods and allow for some international capital mobility in the model. Although doing so would have many effects within the general equilibrium context of the model, the primary changes to the analysis would be two-fold.

First, some of the current and projected deficits in the United States are financed with borrowing from abroad, and this foreign borrowing can be associated with a trade deficit – the so-called “twin deficits” problem, under which the U.S. economy in the aggregate is effectively borrowing from abroad to finance its purchase of net imports. Within this context, the introduction of a deficit-financing, add-on VAT would reduce the government deficit, reducing the need to borrow abroad, and some of the reduction in the deficit would be reflected in an improvement in the trade balance; that is, a reduction in net imports rather than an increase in private saving available for domestic investment. Thus, relative to the case of the closed economy, consumption would still decline, but domestic saving and investment would not increase as much, and in the longer run the positive effects on GDP and consumption due to greater capital accumulation would be smaller.

Second, the changes in interest rates induced by the imposition of a deficit-financing add-on VAT would be reflected in changes in international capital flows. In the model, interest rates decline soon after the enactment of the VAT and in the long run. With international capital flows, this decline in interest rates would induce capital outflows from the United States to the

rest of the world. As a result, the longer run benefits of an add-on VAT again would be mitigated because of somewhat smaller positive capital accumulation effects and a commensurate larger decline in consumption (in absolute value).

Thus, in terms of the effects on aggregate consumption that are the focus of this report, one might expect that the main effects of adding open economy features to the model would be somewhat larger long run declines in consumption.

Another limitation is that the model assumes a “target bequest” under which individuals save to finance a fixed bequest. As a result, when interest rates fall, individuals must save more to finance their bequest, further reducing consumption. If an alternative “joy of giving” bequest motive were utilized, the decline in interest rates would increase the price of bequests and the demand for bequests would fall, as would saving, while consumption would be somewhat higher than projected.

Finally, the dynamic general equilibrium model requires moving to a stable equilibrium in the long-run with a constant deficit and constant debt-to-GDP ratio. The method used to “close the model” after the VAT reduces the debt for 20 years is an increase in transfer payments after 20 years. This stabilizes debt-to-GDP at roughly 55 percent. This particular policy implies that (1) the VAT is maintained, which has negative effects on consumption and labor supply, and 2) the transfers also have a negative effect on labor supply, thus reducing the amount of GDP available for both additional consumption and saving. With the projected long-run growth of future entitlements, particularly in health programs, this future change 20 years out to reach a sustainable deficit and debt level would appear realistic.

With any empirical model, many simplifying assumptions and estimates of key parameters are necessary. Nevertheless, the TPA model provides important insights about the macroeconomic effects of an add-on VAT on the U.S. economy, consumption, investment and employment. The magnitude and timing of the effects may be sensitive to the specific modeling assumptions, but the directions of the effects are clear.

Box 4. Overview of the TPA Model

The basic features of the Tax Policy Advisers Model are as follows. Consumers are assumed to make decisions regarding labor supply, consumption and saving to maximize their welfare over a 55-year adult or economic life, which consists of 45 working years followed by a 10-year retirement. There are thus 55 generations alive at any given point in time, and each generation includes 12 lifetime income groups, each characterized by its own lifetime earnings profile, wealth holdings, consumption and saving patterns, etc. (see Diamond and Tung (2006) for further details). Individual consumers are assumed to have perfect foresight, that is, they can accurately predict the effects of government policies on wages, consumer prices, interest rates, etc. There are four consumer goods in the model — a non-housing composite consumption good produced by the corporate sector, a non-housing composite consumption good produced by the non-corporate sector, owner-occupied housing, and rental housing. The model also includes relatively simple representations of bequests/inheritances and tax-advantaged saving under the current income tax.

Business firms are assumed to maximize profits and thus firm value and to operate in perfectly competitive markets. Firm managers calculate explicitly the optimal time path of investment in response to changes in the tax structure, taking into account the costs of adjusting investment from its steady state level. Firm behavior is modeled separately for each of the four production sectors, with individuals who own their own homes treated as private firms who produce housing and then rent it to themselves, taking into consideration the tax advantages of home ownership. The debt-capital ratio is assumed to be fixed in each industry, and the economy is characterized by an equity premium so that returns to equity exceed those to debt, including government debt.

The government must finance an exogenously specified time path of public services, which are assumed to be separable from the individual lifetime utility function, as well as government transfers, which are included in individual income. In the initial equilibrium, the tax instruments available to the federal government include a corporate income tax and a personal income tax with a progressive wage income tax structure and constant rate capital income taxes. In addition, the model allows federal government deficits and debt, and includes a simple representation of the Social Security program.

The model is essentially a closed economy model, but includes a moderate constant elasticity of supply of international capital in response to changes in the rate of return to capture the effects of a policy change on international capital flows. In all applications, the model must eventually arrive at a steady state equilibrium, in which all key macroeconomic variables, including GDP and output in the various sectors, the capital stock, the effective labor force, government debt held by the public, etc., grow at the steady state growth rate, which is defined as the sum of the long run population growth rate and the rate of labor-augmenting technological progress, both of which are specified exogenously and assumed to remain constant.

The model also calculates asset values in all four markets explicitly for each period after the enactment of a policy change, taking into account both the effects of all changes in the tax treatment of existing capital assets, as well as their previous tax treatment under the existing tax system. The model is thus especially well suited to analyzing the transitional effects of a major tax change, including reform-induced changes in asset prices in all four sectors, as well as the associated redistributions across all generations alive at the time of reform. The model also calculates the long run economic effects of reform including the welfare effects of reform on future generations.

The details of the Tax Policy Advisers Model are provided in an appendix available from the authors.

V. Experience in Other Countries

A number of key macroeconomic policy issues have been debated in countries considering the adoption of a VAT. Of major concern is the expected impact of a VAT on the level and composition of consumption. Additional macroeconomic impacts of concern include the effects of a VAT on inflation, changes in relative prices, real output (GDP), employment, and a country's exports and imports. This section focuses on lessons learned from the VAT experience in other countries that may be informative for the VAT debate in the United States. It also includes a discussion of specific VAT policy issues that other countries have dealt with over time.

Studies of the expected macroeconomic impacts of VATs completed prior to their adoption in other countries have been based primarily on partial equilibrium analysis of how prices and economic activity could change for the overall economy. Data and modeling limitations precluded more comprehensive, general equilibrium modeling of the complex impacts on the aggregate economy and on specific industries. There have also been a number of studies completed after the adoption of a VAT that attempt to infer impacts from comparisons of macroeconomic variables, such as inflation rates, before and after the date of adoption.

Because a federal VAT in the United States is likely to be an add-on tax designed to reduce federal deficits and debt, rather than a replacement for other federal taxes, the macroeconomic impact experienced in other countries adopting a VAT may not be directly applicable to the U.S. However, the economic theory used to analyze the impacts of VATs used as a substitute tax should also apply to the analysis of an add-on VAT.

A. Overview of VATs

Table 13 provides a general overview of the VAT system characteristics of ten of the largest countries that have adopted the tax. (Note that the VAT is referred to as a goods and services tax (GST) in Australia, Canada, and New Zealand.) Table 13 shows that:

- Nine of the countries administer the VAT as a credit-invoice tax with multiple rates, while Japan uses the subtraction method with a single tax rate of 5 percent.
- As seen in the next-to-last column, the VAT in all of these countries replaced existing, national consumption taxes ranging from turnover taxes to manufacturing and wholesale sales taxes. As replacement taxes, these VATs were designed with exemptions and multiple rates to mitigate redistributions of tax liabilities across consumer expenditure categories.

Table 13. Value-Added Tax Adoptions and Rates for Selected Countries

	Type of VAT	Date Enacted	Initial General Rate	Current General Rate	Value-Added Taxes as Percentage of GDP	Type of Tax Replaced	Additional Information
France	Credit invoice	1954	16.66%	19.6%	7.2%	Turnover tax	Applied to services in 1968; peak rate of 20.6% in 1999
Germany	Credit invoice	1968	10%	19%	6.3%	Turnover tax	
Ireland	Credit invoice	1972	16.37%	21%	7.9%	Turnover tax	Peak rate of 25% in 1989
Italy	Credit invoice	1973	12%	20%	6.3%	General tax on consumption (IGE)	
United Kingdom	Credit invoice	1973	10%	17.5%	6.7%	Selective employment purchase taxes	Rate was 15% in 2009; increase to 20% on 1/1/2011
Spain	Credit invoice	1986	12%	18%	6.4%	23 indirect taxes	Rate increase from 15% in Jan 2010
New Zealand (GST)	Credit invoice	1986	10%	15%	9.0%	Wholesale sales tax	Rate increased to 15% in Oct. 2010
Japan	Subtraction	1989	3%	5%	2.6%	Selective excise taxes	
Canada (GST)	Credit invoice	1991	7%	5% GST; 12% to 15% HST	3.1%	Federal manufacturers' sales tax	HST is combined federal & provincial tax (6 provinces)
Australia (GST)	Credit invoice	2000	10%	10%	3.9%	Wholesale sales tax	

Source: OECD, *Consumption Tax Trends 2008* (November 2008) and European Commission, *VAT Rates* (May 2010).

- The last column identifies substantial increases in VAT rates over time. With the scheduled increase of the general VAT rate from 17.5 percent to 20 percent next January, the United Kingdom will be the first country shown in the table to have doubled its tax rate since the VAT was adopted; Germany follows closely with a 90 percent rate increase.
- Tax rates will be higher in 2010 and 2011 in the United Kingdom, Spain and New Zealand. Examples of earlier tax decreases include the United Kingdom's temporary reduced standard VAT rate of 15 percent in 2009, and Canada's reduction in the federal GST rate from 7 percent in 2005 to 6 percent in 2007 and 5 percent in 2008. Japan briefly considered raising its VAT rate from 5 percent to 10 percent earlier this year, but faces significant political opposition.
- There is significant variation in how heavily these countries rely on the VAT. Measured by the ratio of value-added taxes to GDP in 2006, reliance on the VAT varies from a high of 9 percent in New Zealand to a low of 2.6 percent of GDP in Japan. The difference in reliance ratios reflects both tax rate and tax base differences. For example, New Zealand's high ratio, despite a below-average tax rate, reflects a very broad base. With a low 5 percent tax rate, Japan generates taxes equal to 2.6 percent of GDP. This information shows that there are significant differences in VAT bases and tax rates among countries.

B. Price Impacts

Adoption of a new VAT or rate changes in an existing VAT will have an impact on both the level of consumer prices and the relative prices of goods and services (unless the VAT is fully comprehensive at a uniform rate). The impact of adopting a VAT on the overall level of prices and relative prices across different categories of goods and services is considered below. Again, it should be kept in mind that VATs in the countries discussed below were adopted as a replacement for other consumption taxes, not as add-on taxes.

1. General Inflation

The possible impact of a VAT on the level of retail prices is an issue heavily debated when a country considers a VAT. The VAT can be expected to lower real incomes by an amount roughly equal to the size of the tax. Economic theory suggests there are two ways for this to occur. First, real incomes could fall through a decline in nominal wages and other factor payments without any change in the price level. Alternatively, real incomes could fall through a one-time increase in the price level while nominal wages and other factor payments are held fixed or unaffected by the tax. In either case, the real incomes of households would fall by the amount of the tax.

It is widely anticipated that, for the United States, the introduction of an add-on VAT would be accompanied by a one-time expansion in the money supply by the Federal Reserve Board and an increase in the price level. It is important to emphasize that this increase in the price level would only occur once, and would not be reflected in a permanent increase in the rate of inflation in future years.⁴⁴

In 1981, the Brookings Institution held a conference to discuss the experience of European countries that were early adopters of VATs between 1967 and 1973. Participants discussed the background, operation and economic impacts of VATs in France, Italy, Germany, Netherlands, United Kingdom and Sweden. The editor of the conference report, Henry Aaron, concluded that the VAT case studies “produced few detectable effects on price levels” when the taxes were adopted.⁴⁵ One reason for the lack of evidence is that the new VATs were replacement taxes that replaced existing turnover or sales taxes and raised roughly the same total amount of tax revenue. In addition, the VATs adopted multiple tax rates (including zero rating and full exemption) to mitigate changes in relative taxes across industries and types of expenditures. This would hopefully be minimized if the U.S. adopts an add-on VAT to reduce federal deficits.

In contrast to finding minimal price increases at the time of adoption, the conference studies found that subsequent increases in tax rates did result in substantial price increases. This is also the expected result if a VAT is substituted for other taxes but there is a net increase in tax collections (as is the case in our analysis). Aaron noted that econometric studies of individual countries found that a one percent increase in VAT rates resulted in less than a one percent increase in the aggregate price level. This responsiveness (or “elasticity”) is expected to be less than one because VATs typically do not apply to all consumption expenditures. He further noted that this one-time increase in the level of prices was made possible, because each country increased the money supply to accommodate the higher spending needed to support the price increases. The higher price levels had the effect of reducing the real income of workers through price increases rather than through lower nominal wages or higher unemployment.

An econometric study of the impact of substituting a VAT for retail sales taxes in four Canadian provinces also found that prices varied in line with the change in effective VAT rates by major consumer expenditure category. In other words, the changes in consumer prices by spending category were proportional to the change in the consumption taxes imposed on each category.⁴⁶

In a recent discussion of issues related to the adoption of a U.S. VAT, Carroll and Viard (2010) note that an add-on VAT is likely to result in pressure on the Federal Reserve Bank to accommodate a higher price level, because workers are expected to resist downward adjustments in nominal wage rates. The higher price level will reduce real disposable incomes and the real quantities of goods and services that consumers can buy. Gale and Harris recently suggested that the Federal Reserve should accommodate the expected one-time price increase from an add-on VAT, if adopted, to avoid labor market disruptions.⁴⁷

It should be noted that this one-time increase in the general price level if an add-on VAT is adopted or if VAT rates are increased occurs if the VAT is passed along in higher prices for goods and services. This is a reasonable assumption if the VAT applies at a standard rate to almost all goods and services supplied by domestic or foreign producers. In actual operation, most VATs apply to only a fraction of consumption due to significant exemptions and reduced tax rates. The OECD estimates that the average coverage ratio (actual VAT collections compared to full taxation of personal consumption expenditures at the standard rate) for OECD countries is 58 percent.⁴⁸ But, as the discussion above notes, one would still expect a one-time increase in the price level, just a smaller one than implied by a comprehensive tax, reflecting the fraction of consumption subject to the tax.

Tait (1990) examined measures of inflation two years before and after the adoption of a VAT in 35 countries.⁴⁹ He found that the VATs in 29 countries (83 percent) could be categorized as having no impact on the consumer price index (CPI) or having only a one-time increase in the CPI. Countries falling into this category included France, Germany, and the United Kingdom. The other six countries were characterized as having some acceleration in the rate of inflation. In most cases, however, the VAT was a substitute for existing “sales” taxes, in which case significant forward shifting would not be expected. He further concluded that in six cases where VAT rates were increased substantially only one country showed accelerating inflation two years after the increase. This experience is more relevant if the U.S. adopts an add-on VAT. A final point made by Tait is that even if the overall inflation rate was not affected by VAT adoptions or rate changes there were important changes in relative prices.

In an earlier discussion of lessons the U.S. may learn from the EU experience in adopting VATs, McLure (1987) concluded that “... introducing an American VAT would probably result in an increase in prices, especially if the VAT were a source of additional revenue, but this could be a one-time event that would not lead to further inflation if the transition were handled properly.”⁵⁰

2. Relative Prices Changes

As noted in the discussion of VAT impacts on overall rates of inflation, the adoption of a VAT may have significant impacts on relative prices, even if there is no on-going inflationary impact. Because VATs provide complete exemption or lower rates to a significant share of consumption, a VAT will increase the prices of some products and services relative to others. This may result in the shifts of purchases, employment and economic activity among firms and industries. For example, sales and employment in the retail industry may decrease as relative prices (including the tax) increase, while economic activity in non-taxed or lower-taxed industries, including perhaps many service industries, may increase as their prices fall relative to heavier-taxed goods.

A study of the macroeconomic impacts of Australia’s substitution of a VAT for a wholesale sales tax found substantial short-run impacts on the retail sector, as the substitution increased taxes on some consumer goods and services and decreased taxes on other categories.⁵¹ The same study

also found large short-run swings in consumer spending before and after adoption of the VAT in 2000.

The substitution of the VAT for the wholesale sales tax in Australia resulted in more than a nine percent increase in consumer spending at department and clothing stores in the quarter before the VAT was imposed, followed by a five percent decline in spending in the following quarter. This shift of sales forward in time was due to the anticipated higher effective tax rates on these categories of spending. It took three full quarters for the level of sales to return to their March 2000 level and longer run growth did not resume until the last quarter of 2001, a full 18 months after the VAT went into effect.

For vehicle sales, the pattern was reversed, as the substitution cut consumption taxes on vehicles by almost 55 percent. Vehicle sales fell by almost 10 percent in the quarter before the tax change and then increased by more than 32 percent in the quarter after the VAT went into effect. However, it was more than 12 months after the VAT was adopted before vehicle sales moved back to the level in the first quarter of 2000.

Australia's empirical results support the conclusion that the VAT is expected to be fully passed forward in higher prices to consumers. As a result, to the extent that there are significant exemptions, rebates or rate reductions for selected expenditures, industries or types of businesses, a VAT will result in significant changes in relative consumer prices. In particular, services are likely to have lower effective tax rates than the sales of tangible property under a VAT, resulting in lower price increases for services compared to sales of tangible property. The result is that the VAT will not be "neutral" in terms of its impact on what consumers purchase.

As discussed in more detail below, VAT rates in most countries are far from uniform. A recent EU study of reduced VAT rates estimates that only two-thirds of total taxable consumption is taxed under the uniform, standard tax rate. The remaining one-third is taxed at widely different lower tax rates or is exempt.⁵² The study identifies statutory VAT rates by industry for different types of goods and services and finds that:

- Due to reduced tax rates, food, medicine, books, culture and entertainment, utilities, financial services, and transportation are taxed at rates between 9 and 11 percent.
- Fully taxable goods and services, such as clothing, are taxed at an average, economy-wide EU VAT rate of 19.1 percent.

These estimates indicate that European VATs impose significantly higher tax rates on the sale of tangible goods than on the sale of services and food. As a result of these tax differentials, non-uniform VAT systems in practice increase the price of the higher taxed products relative to the prices of services and food. This results in a shift of demand away from the more heavily-taxed products toward services and food. Over time, this distortion can be expected to reduce sales and employment in the higher taxed sectors.

It should also be noted that the EU is increasingly concerned about noncompliance in VAT systems, including “underground” economy transactions that are not reported and different types of fraud, particularly fraud related to cross-border transactions that are zero rated under EU VATs.⁵³ Any goods and services that escape taxation can be sold at lower prices to consumers. In effect, noncompliance creates differences in relative prices that put complying taxpayers at a competitive disadvantage and shifts economic activity to the underground economy. This creates the same type of market distortion that reduced tax rates for a portion of consumption creates under VAT systems.

C. Short-Run Shifts in Consumer Spending

The adoption of a VAT can be expected to have significant short-run impacts on the timing of consumer spending. The enactment of a VAT in Australia again provides an illustration of the short-run shifts in consumption with a substantial shift of consumer spending exhibited from the quarter after VAT implementation in July 2000 to the quarter preceding its implementation. Relative to trend, retail sales increased by 3.1 percent in the quarter before the VAT was implemented. It took 18 months for total retail sales to return to the pre-VAT level.

A study of changes in consumer spending in Japan in response to tax changes found that increases in the VAT rate in April of 1997 had a measurable impact on the timing of consumer spending.⁵⁴ The study found that the tax rate increase reduced spending growth in the year of the increase by over one percent. While the magnitude of the shift of spending to months prior to implementation of the rate increase was not reported in the study, the study suggested that a little less than one-third of the reduction was shifted out of 1997. Another finding of the study was that the changes in consumption occurred at the time the VAT was implemented, not when the change was announced. Finally, the study’s empirical results suggested that the tax rate increase resulted in an on-going reduction in the level of total consumption.

D. Government Spending

Although VATs have often been adopted as a replacement for existing sales, excise or turnover taxes, there is evidence that VAT rate increases have resulted in increases in the ratio of government revenue-to-GDP over time. Henry Aaron’s summary of the impacts of early European VAT adoptions for twelve countries concludes that taxes as a percentage of GDP increased significantly after the VAT was adopted.⁵⁵ In addition, OECD data indicate that the European member countries with VATs experienced a 37 percent increase in the ratio of VAT revenues to GDP between 1975 and 2006.⁵⁶ While an increasing ratio of VAT revenue to GDP over time is not necessarily correlated with increases in the ratio of government spending to GDP, critics of the VAT have argued that an indirect, and thus less visible VAT may support higher levels of government spending compared to the use of more visible, direct taxes, such as the income tax. One critical factor affecting the visibility of the VAT would be whether it would

be stated separately on consumer invoices, for example, as is done with the Canadian GST. Experience with the sales tax among the U.S. states suggests that this would be the case, increasing the visibility of the VAT.

E. Saving and Investment

The impact of adopting a VAT on a country's level of saving and investment is usually discussed in the context of substituting a VAT for another major tax source, such as the corporate and/or personal income taxes or other indirect taxes on consumption. Economic theory predicts that the substitution of a VAT for income taxes would stimulate saving and investment. Because income taxes tax the return to savings, they favor current consumption over savings used to fund future consumption. An income tax results in a reduction in the level of saving and investing in the economy.

Because a VAT has been used primarily to substitute for existing indirect taxes, including manufacturing sales taxes or turnover taxes, economists generally conclude that this substitution has had little impact on the aggregate level of saving and investment. However, to the extent that a VAT replaces consumption taxes that apply to business capital investment purchases, the substitution of a VAT that removes the tax on capital purchases would be expected to increase the level of saving and investment.⁵⁷

This positive impact on saving and investment from substituting a VAT for provincial sales taxes in Canada was reported in the empirical study discussed earlier.⁵⁸ The study concluded that this substitution increased capital investment in the provinces adopting the change by an average of 12 percent in the years following the 2007 harmonization of the federal and provincial taxes. The higher investment from the substitution, however, came from eliminating the relatively high taxes on capital under the existing sales tax; the VAT itself should not impose taxes on business input purchases, including capital.

Currently, the possible adoption of a U.S. VAT is being discussed in the context of increasing federal taxes to partly pay for expenditures being financed by federal borrowing. In this case, lower federal borrowing is expected to increase national saving available for private investment and to reduce real interest rates, thus further stimulating capital investment. Because VATs have been adopted primarily as substitutes for existing taxes, the experience in other countries is not directly relevant to the question of what would happen to savings and investment if the U.S. adopts a VAT to reduce the federal deficit. For simulations of the effects of reforms involving such tax substitutions, see Diamond and Zodrow (2007, 2008).

F. Foreign Trade Balances

VATs are constructed as “destination-based” taxes. In other words, the tax is imposed in the country where consumption occurs, not where production occurs. To achieve this result, the

VAT is not imposed on export transactions, and any VAT paid on the inputs used to produce the exports are refunded to exporters; imports are subject to full taxation. These border adjustments convert the VAT into a destination-based tax. The impact that adopting a VAT will have on a country's trade balance (exports minus imports) will depend upon whether the VAT is an add-on tax or a substitute for existing sales (consumption) taxes.

If a VAT is an add-on tax, it should not affect export prices since the VAT would not apply to the sales price of the export. In other words, there would be no net change in taxes on exports. For imports, the VAT would increase the price of imports in step with increased prices for import-competing domestic production. This would, in theory, leave the relative prices between imports and domestic production unchanged. In other words, the border adjustments under an add-on U.S. VAT should have no effect on U.S. international competitiveness.⁵⁹

If a VAT is substituted for other taxes (corporate income taxes or other sales taxes), it could have a short-run impact on prices of exports and imports due to differences in the incidence of the taxes or their border adjustment features. It is generally assumed, however, that in the longer run flexible exchange rates would adjust to offset any changes in relative prices for exports and imports. As a result, in the long run this substitution would not significantly increase exports relative to imports.⁶⁰

Recent empirical analysis of the impact of a VAT on the volume of a country's imports and exports has raised the possibility that VATs, in practice, could have a long-run effect on the level of a country's exports.⁶¹ Desai and Hines (2002) find some empirical evidence that countries relying more heavily on VATs as a revenue source have smaller shares of exports and imports relative to GDP. The authors suggest that this result may be due to the fact that current VAT systems are unable to achieve trade-neutrality for several reasons. First, actual VATs have multiple rates and numerous exemptions that lead to higher effective tax rates on traded goods (tangible products) relative to non-traded goods (primarily services). Countries that rely heavily on VATs, therefore, have smaller trade sectors and foreign trade relative to GDP.

A second reason why VATs could discourage exports is that full VAT rebates are not provided to exporters under some actual VAT systems. If this is the case, exports include some embedded taxes that put a country's exporters at a competitive disadvantage. In fact, the OECD has recently initiated an in-depth study of the possible negative impact of VATs on international trade due to incomplete crediting of VATs on exports of foreign firms operating in another country due to administrative practices and procedures used in different countries or to the fact that a foreign firm is not registered to receive credits.⁶² While the OECD study initially leaves out issues related to removing VATs from exports, one should expect that incomplete VAT crediting on exports may also be occurring in practice. The important point here is that actual VATs may be significantly less neutral in terms of trade than a theoretical VAT. This fact

suggests that a U.S. VAT would have to be carefully constructed and implemented to avoid potential negative impacts on trade.

G. Distributional Impacts

Any discussion of the distributional impact of adopting a VAT must begin with a discussion of the economic incidence of the tax after businesses and consumers have reacted to the imposition of the tax. If the VAT is designed as a comprehensive, destination-based tax, economists generally believe that the tax will be passed forward in higher prices to consumers. This conclusion assumes that the VAT can be effectively collected on imports of goods and services and removed from exports. As a result, domestic consumers will pay the same price (including the tax) whether they purchase from domestic or foreign suppliers.

Given the assumption of forward shifting of the tax, the distribution of the tax by household income levels will be determined by the ratio of taxable sales to income as income increases. Because this ratio generally falls as income increases, the VAT is generally characterized as being “regressive.”⁶³ To overcome or partly offset this regressivity, countries adopting a VAT can 1) provide tax credits or rebates to lower income households that pay the tax, or 2) adopt multiple-rate VATs that remove or reduce the taxes imposed on specific types of goods and services, often referred to as “necessities,” that make up a larger share of the spending of lower income consumers.⁶⁴

Most existing VAT systems use multiple tax rates (including a zero rate) to reduce the regressivity of the VAT. But the use of multiple rates comes at a significant cost in terms of administrative and compliance costs for both tax agencies and taxpayers and in terms of costly economic distortions. Japan is the only example of a major country that uses a single rate. Their single rate makes it possible to administer the tax using the subtraction method that avoids the invoice system needed to claim credits under the credit-invoice system. However, if a single-rate VAT is adopted, tax credits or rebates can be used to offset the regressivity of the tax. This is a classic example of the tradeoff between equity and efficiency in tax policy.

VAT systems generally reduce the regressivity of the tax by using two types of adjustments, zero rating and exemption. If a product or service is zero rated, sellers do not charge VAT on their sales, but get credits for any VAT paid on their purchases. This effectively removes the full VAT from the sale of the product or service.⁶⁵ If the sale is exempt, the seller does not collect tax on the sale, but the seller does not receive any credits for the VAT paid on input purchases. In this case, VAT on earlier stages will be embedded in the sales price of the good or services (assuming full forward shifting). While zero rating can fully remove the VAT from specific goods and services, exemption results in only a partial reduction in the VAT.

It appears that Japan, the only country using a subtraction VAT with a single rate, may be considering a significant increase in the five percent VAT rate. Given the concern over the

increased regressivity of a much higher VAT rate, policymakers in Japan are discussing the possibility of introducing reduced VAT rates on necessities through zero rating and exemptions.⁶⁶ The introduction of multiple VAT rates may require the substitution of a credit invoice VAT for the current subtraction VAT. If Japan moves in this direction it will introduce the administration and compliance complexities and economic distortions associated with credit invoice VATs (and state and local sales taxes in the US).

The OECD has summarized the tax policy issues related to multiple-rate VATs:

In addition, the effectiveness of reduced VAT rates to achieve distributional objectives is questionable in that the wealthier members of the population also benefit from these reduced rates and in terms of expenditure on non-essential goods the wealthier are likely to pay more tax in absolute terms. Using VAT rates to meet social objectives may not always be the most efficient way of ensuring that those who need assistance actually receive it. The availability of more effective redistributive instruments such as progressive income tax rates and targeted expenditure policies (*e.g.*, in the areas of health and education) also weakens the case for rate differentiation. Rate differentiation also increases administrative and compliance costs, legal uncertainty and opportunities for fraud through deliberate misclassification of items.⁶⁷

The general lesson from the experience in other countries is that it may be politically difficult to adopt a single-rate VAT that, in theory, minimizes economic distortions and administrative and compliance costs. Given the political concern over the regressive distribution of VAT liabilities, actual VAT systems include numerous exemptions and multiple tax rates. While these features reduce the regressivity of the tax (while also providing tax relief to middle- and upper-income households), they result in a complex tax that creates variations in effective tax rates among different goods and services, increases tax-related economic distortions and adds substantial costs of administration and compliance.

H. Overall Economic Impacts

As noted, studies of the macroeconomic impacts of adopting VATs in other countries have somewhat limited applicability to the United States because they predominately substituted for national consumption-based taxes. The VAT is generally viewed as being an improvement compared to the replaced inefficient tax systems, such as turnover taxes that affected relative prices and distorted the allocation of resources.

A number of existing studies use general equilibrium modeling to estimate, prior to the adoption of a VAT, the expected long-run impacts on the overall economy. Because most of the studies looked at the net economic effect of adopting a new VAT and simultaneously eliminating existing taxes, the results provide limited insights on the effects of an add-on VAT.

One Canadian study did report the expected negative impacts of adopting the Canadian goods and services tax (national VAT) in isolation.⁶⁸ The study used a general equilibrium model to analyze the economic impact of adopting an add-on VAT. The results were reported in terms of changes in the real standard of living of Canadians per dollar of additional taxes raised. This measure incorporates information about changes in both income and prices that affect the real income of residents. The study found that for each additional dollar of taxes raised by a VAT (modeled as a broad-based sales tax), the welfare or real standard of living of Canadians would be reduced by 7.3 cents.⁶⁹ This was the real burden on households of adopting a VAT.

If the U.S. adopts a VAT to reduce the federal deficit, the net impact of U.S. households will depend upon the relative size of the negative welfare impacts of the VAT compared to the positive benefits of lower interest rates and higher investment. Only if the negative impacts of the VAT are less than the positive impacts of deficit reduction would household welfare and real GDP increase. Regardless of the net impact on overall household welfare, an add-on VAT would have substantial negative impacts on total private-sector consumption.

There is also a lesson to be learned about the timing of increases in consumption taxes over the economic cycle. In reviewing Japan's painful experience with stagnant economic growth – combined with deflation in prices and asset values – over the decade from 1991 to 2001, Makin concluded that: “Japan's biggest policy mistake came in 1997 when the government raised its consumption tax [VAT] from 3 to 5 percent.” He further noted: “Fiscal stringency in the form of a tax on consumption in an economy weakened by massive wealth losses and an erosion of confidence that results in a virtual liquidity trap is an extraordinarily harmful policy.”⁷⁰ The Japanese experience does not suggest that increases in consumption taxes to reduce long-run federal deficits should be avoided. The important lesson is that a consumption tax increase can have significant negative impacts on short-run economic growth and would have even greater adverse economic effects if imposed on an economy in recession or experiencing a weak recovery.

VI. Conclusion

Several lessons can be drawn from this report. Most importantly, the results demonstrate that reducing the deficit and over time the national debt is not an easy task. There are benefits and costs, winners and losers, associated with a deficit reducing add-on VAT.

On the positive side, any deficit reduction measure, such as an add-on VAT, diverts private saving from government debt to private investment and is successful in reducing the deficit and ultimately the level of debt, reducing interest rates and further increasing private investment.

In the case of an add-on VAT, however, these benefits come at the cost of reducing consumption by 1.6 percent in the initial year a narrow-based VAT is in place and by 1.1 percent annually over the subsequent decade. The partial nature of VATs under which substantial portions of consumption are excluded from the tax base means that VATs, in practice, can be expected to have large, differential effects. Retail spending, for example, is expected to fall by 3.6 percent initially and by 2.6 percent over the subsequent decade. Retail spending and services subject to the VAT is estimated to fall by 5.0 percent initially and by 3.7 percent over the next decade.

For the overall economy, this translates into an initial drop in consumer spending of roughly \$180 billion followed by annual reductions that total roughly \$1.6 trillion over the next ten years. Moreover, the effects on retail spending and services subject to the VAT are much more substantial, with an initial decline of nearly \$260 billion and a drop of \$2.5 trillion over the decade.

The narrow-based VAT also reduces labor supply by roughly 0.6 percent in the short-run and by a slightly smaller extent in the long-run. In an economy with roughly 140 million jobs, this translates roughly into an initial loss of about 850,000 jobs.

Both the reductions in consumption and jobs are a direct result of using a consumption-based tax to reduce the deficit. Reducing the deficit through an add-on VAT, as compared to a reduction in government transfers, produces results that are more adverse to the economy: GDP falls immediately, jobs are reduced, and consumption falls by a greater extent. This alternative approach for deficit reduction may well have very different distributional effects.

Flat rate consumption-type taxes, such as a VAT, that are applied to all consumption would be paid disproportionately by low- and moderate-income households, because they consume a higher fraction of their income; that is, such taxes are regressive. However, this report shows that low-income subsidies can address some of the regressivity of a VAT particularly for families near the poverty level, but at the cost of a higher VAT rate and the related economic distortions. Also, as shown by the dynamic general equilibrium model used in this report to analyze an add-on VAT, lower interest rates tend to reduce the income of wealthier households and thus offset

any remaining regressive tendencies of the VAT, effects that are generally not included in other analyses of the distributional effects of the VAT.

The overriding distributional result is intergenerational: future generations benefit at the expense of the current generations, who bear the burden of reducing the deficit and the debt. Even though the economy eventually benefits from a deficit-reducing, add-on VAT, these benefits are long-delayed. Indeed, they accrue primarily to those who are not yet alive at the time of the reform.

The consideration of a VAT in the United States will focus on the short- and long-term macroeconomic effects on U.S. economic activity, investment, saving, consumption and employment. Policy debate on the distributional effects of an add-on VAT, as well as household welfare effects of a VAT, will be important considerations. In addition, a VAT would still have significant compliance and administrative costs that must be considered. Finally, international experience suggests that VAT rates are likely to increase over time.

Perhaps the most pertinent issue in the current economic climate is that an add-on VAT, if enacted in the near future, would occur in the midst of a weak economy that has undergone the most significant economic downturn in nearly a century. Rather than shoring up the weak economy, the near-term drop in output, loss of jobs, and sharp decline in consumer spending described by this report would raise further economic worries and make recovery more difficult.

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¹ For example, see Congressional Budget Office, 2010 and Auerbach and Gale, 2010.

² Speaker Pelosi's October 5, 2009 interview on "The Charlie Rose Show" on PBS, quoted at <http://thehill.com/blogs/blog-briefing-room/news/61783-pelosi-says-new-tax-is-on-the-table>; Senator Conrad's statement quoted in *Washington Post*, May 27, 2009 <http://www.washingtonpost.com/wp-dyn/content/article/2009/05/26/AR2009052602909.html>.

³ Volcker's September 29, 2009 interview on "The Charlie Rose Show," quoted at <http://blogs.wsj.com/economics/2009/09/29/volcker-carbon-tax-vat-should-be-on-the-table/>; Greenspan's statement at October 2, 2009 conference sponsored by *Atlantic* magazine and Aspen Institute, quoted at <http://www.cbsnews.com/blogs/2009/10/02/business/econwatch/entry5358730.shtml>.

⁴ U.S. Department of the Treasury, Office of Tax Policy, *Approaches to Improve the Competitiveness of the U.S. Business Tax System for the 21st Century*, December 20, 2007 (http://www.treas.gov/press/releases/reports/hp749_approachesstudy.pdf), pp. 19-42.

⁵ The TPA model assumes that the economy starts in a steady state equilibrium where all resources are fully employed, and interest rates are at "normal" levels, rather than at the very low levels that characterize the current recessionary economic environment. Thus, interest rates have room to fall in the model, and the results should be viewed as reflective of the U.S. economy after it has fully recovered from the current recession.

⁶ As will be discussed further below, the model used in this analysis assumes full employment, but allows for variations in the number of hours of labor supplied; for illustrative purposes, these changes in hours of labor supplied are converted to equivalent changes in the numbers of jobs.

⁷ Gary S. Becker and Casey B. Mulligan, "Deadweight Costs and the Size of Government," *Journal of Law and Economics*, 46(2), October 2003, pp. 293-340.

⁸ Michael Keen and Ben Lockwood, "Is the VAT a Money Machine?" *National Tax Journal*, 54(4), December 2006, pp. 905-928.

⁹ These includes both exemptions for consumption items often thought to be disproportionately purchased by low-income households and the rebate of VAT paid by households at the poverty line.

¹⁰ For a more detailed discussion of this illustration see Robert Carroll and Alan Viard, "Value Added Tax: Basic Concepts and Unresolved Issues," *Tax Notes*, (March 1, 2010), pp. 1117-1126.

¹¹ For an extensive discussion of compliance issues with VATs, see Ernst & Young, *VAT and GST: Multiple Burdens for Multinational Companies*, July 2010.

¹² World Bank, *Paying Taxes 2010* (November 2009). The compliance hours are presented in Appendix 1.3.

¹³ Richard Summersgill, HM Revenue & Customs, "Improving VAT Compliance in the United Kingdom," presentation to the OECD Forum on Tax Administration (September 2006). The tax data are for fiscal year 2004. The relatively large amount of exports from the United Kingdom, which are not taxable, is one reason for the relatively small net tax amount.

¹⁴ As pointed out in the presentation, the gap is due to any difference between actual collections and the theoretical level of collections including error, non-compliance, avoidance and fraud. Audit and outside information was then used to identify the major sources of the gap, including missing trader fraud (acquisition fraud and carousel fraud) and failure to register.

¹⁵ Reckon LLP, *Study to Quantify and Analyze the VAT Gap in the EU-25 Member States*, prepared for the European Commission (September 21, 2009). Input-output tables are the basis for estimation of the theoretical tax amounts in each country. The authors do suggest that the "top-down" information used for the estimates include some portion of the "shadow" economy. The study does not include tax agency estimates of fraud based on audit experience or other taxpayer information.

¹⁶ Currently, the debt held by the public is forecast by the Congressional Budget Office to rise from about 63 percent of GDP in 2010 to 84 percent by 2020 and to 124 percent by 2030 under the Administration's policy baseline. By

superimposing such a high level of debt, the TPA model is then able to capture the macroeconomic effects of a deficit reducing, add-on VAT that brings down the high level of debt.

¹⁷ This reflects the reduction in the deficit in the first year. The exact amounts of deficit reduction vary over time primarily because interest payments on the debt decline as the reduction in the deficit reduces debt accumulation.

¹⁸ For purposes of the TPA model, this sustainable or equilibrium level of debt is 45 percent of GDP, which results in a continuing deficit of about 1.6 percent of GDP.

¹⁹ These transfers are assumed to be distributed uniformly on a per capita basis, which could be argued to correspond roughly to a deficit-financed increase in the Medicare program. Thus, the “add-on VAT” in the model is best interpreted as financing an approximate halving of government debt relative to GDP, and then financing an increase in transfer payments that are distributed on a lump sum basis.

²⁰ One measure of the extent of coverage of a VAT is its “consumption efficiency” – the ratio of the revenue obtained from the VAT to the revenue that would be obtained from a VAT applied at the standard rate to all domestic consumption. Crawford, Keen and Smith (2008) show that consumption efficiencies among OECD countries range from 105 percent in New Zealand – whose tax is often described as the model VAT – to 41 percent in Italy. Note that consumption efficiencies can exceed 100 percent for numerous reasons, including the taxation of some investment goods, differentially high VAT rates on luxury goods, and double taxation of production inputs when the “chain” of VAT taxation is broken by the presence of exempt firms under the commonly used credit-invoice approach to implementing the VAT (Gillis, Mieszkowski and Zodrow, 1996).

²¹ For example, see Organisation for Economic Co-operation and Development, *Consumption Tax Trends, 2008*, 2008, p. 53.

²² See Robert Cline, John Mikesell, Tom Neubig and Andrew Phillips, “Sales Taxation of Business Inputs: Existing Tax Distortions and the Consequences of Extending the Sales Tax to Business Services,” Council on State Taxation, January 25, 2005, p. 1.

²³ This report effectively assumes that such goods are “zero-rated” under a credit-invoice method VAT, which means that sales to consumers generate no tax, and refunds are provided for VAT paid at earlier stages of production (Gillis, Mieszkowski and Zodrow, 1996).

²⁴ The imputed value of financial services reflects services received by consumers, such a free checking or free online bill payment, that are implicitly paid for with below-market interest rates (often at or near zero) on deposits. Note that interest expense is not deductible under a VAT.

²⁵ Toder and Rosenberg (2010) get somewhat larger figures because they define the potential VAT base to exclude imputed financial services and services provided by religious and charitable organizations, and include their adjustment for owner-occupied housing.

²⁶ The federal poverty level for a family of four in 2010 was \$22,050. The weighted average poverty level for 2010 was \$18,280.

²⁷ The low income subsidy is modeled as a government transfer that is distributed to the first three income groups in each generation and varies according to lifetime income.

²⁸ The 15 percent noncompliance rate was also used by the U.S. Treasury Department in its analysis of VAT proposals on behalf of the 2005 President’s Advisory Panel on Federal Tax Reform.

²⁹ The “revenue offset” in this calculation of the VAT rate reflects the assumption that prices and nominal output remain fixed for purposes of estimating the VAT. With this assumption, the VAT would lower factor incomes, such as wages and returns to capital, which lowers the revenue from the income and payroll taxes. The Congressional Budget Office, the Joint Committee on Taxation, and the U.S. Department of the Treasury all routinely incorporate a 25 percent revenue offset for revenue estimates of indirect taxes. Note, however, that the TPA model instead assumes full forward shifting of the VAT, so that nominal commodity prices and GDP increase by the amount of the tax, and government transfers are adjusted endogenously within the framework of the model so that they remain constant in real terms. Thus, instead of other taxes the “offset” is due to increased government spending.

³⁰ In our view, this is the most reasonable assumption regarding the incidence of the VAT. See Appendix A for

further discussion. Note that transfer payments are adjusted for the VAT so that their real value is held constant; that is, the VAT is increased to both cover this increase in transfer payments and reduce the deficit by 2 percent of GDP.

³¹ See, for example, Leonard E. Burman, Kimberly A. Clausing, John F. O'hare, "Tax Reform and Realizations of Capital Gains in 1986," *National Tax Journal*, 47(1), March 1994, pp. 1-18.

³² Frank Sammartino and David Weiner, "Recent Evidence on Taxpayers' Response to the Rate Increases in the 1990s," *National Tax Journal* 50(3), September 1997, pp. 683-705.

³³ This large acceleration in spending is consistent with the Australian experience of "buying in advance" of the adoption of a VAT as discussed below.

³⁴ K. Watanabe, T. Watanabe, and T. Watanabe, "Tax Policy and Consumer Spending: Evidence from Japanese Fiscal Experiments," National Bureau of Economic Research, Working Paper No. 7252 (July 1999).

³⁵ This report applies price elasticities ranging from 0.66 to 1.82 to a range of commodities. The higher elasticity is applied to durables, such as, new cars and furniture, as well as electronic devices.

³⁶ Lifetime income is comprised of a household's wages over its life. The income levels shown below for each income class are for 2007, the base year of the TPA model.

³⁷ The reduction in federal government transfers refers to both means-tested and non-means-tested transfer programs.

³⁸ See, for example, Alberto Alesina and Silvia Ardagna, "Large Changes in Fiscal Policy: Taxes Versus Spending," NBER Working Paper No. 15438, October 2009; and International Monetary Fund, World Economic Outlook, Chapter 3: Will It Hurt? Macroeconomic Effects of Fiscal Consolidation, October 2010. The IMF analysis states that "A fiscal consolidation equal to 1 percent of GDP typically reduces GDP by about 0.5 percent within two years and raises the unemployment rate by about 0.3 percentage point. Domestic demand - consumption and investment - falls by about 1 percent." "Spending-based deficit cuts, particularly those that rely on cuts to transfers, have smaller contractionary effects, than tax-based adjustments."

³⁹ Retail spending as used here includes most retail categories (e.g., clothing and footwear, furnishings, motor vehicles, personal items, recreation, food services, tobacco). Services includes transportation, communication, utilities and fuel, personal services and hotel accommodations. Spending on health care, financial services, education, and certain food items (e.g., groceries), as well as business-to-business purchases, are excluded from the narrowly-defined VAT base. The exemption of these items follows the design prevalent among VATs in other countries.

⁴⁰ In the long run, the capital stock increases by nearly 10 percent and the nominal wage increases by slightly more than 2 percent.

⁴¹ The fraction of government debt-to-GDP is estimated to fall to 55.2 percent after 20 years.

⁴² Note that in the TPA model, individuals have economic or adult lives of 55 years with 45 years in work force and 10 years in retirement. For presentation purposes, the ages shown in the tables and discussed below have been adjusted by adding 21 years to each person's economic age. See Box 3 for a discussion of the model.

⁴³ The -0.8 percent decline for the 80 year old in the 5th decile translates into a \$3,208 decline in rest-of-life resources, while for the 10 year old in the 5th decile the 0.9 percent increase represents a \$112,310 increase in lifetime resources. In this example, the younger household has a much longer remaining life and so the dollar change is much larger. The percentage decline is the more meaningful concept because it is in relation to a person's remaining lifetime income.

⁴⁴ This general conclusion assumes that the higher price level does not trigger a wage-price spiral with workers successfully bargaining for wage increases to offset the initial price increases.

⁴⁵ Henry Aaron, ed., *The Value-Added Tax: Lessons from Europe*, Brookings Institution (September 1981), p. 12.

⁴⁶ Michael Smart, "The Economic Impacts of Value Added Taxation: Evidence from the HST Provinces," University of Toronto (March 9, 2007).

⁴⁷ William G. Gale and Benjamin H. Harris, "A Value-Added Tax for the United States: Part of the Solution,"

Brookings Institution and the Tax Policy Center (July 2010).

⁴⁸ OECD, *Consumption Tax Trends 2008*, (November 2008), p. 69.

⁴⁹ Alan Tait, "VAT Revenue, Inflation and Foreign Trade Balances," in Malcolm Gillis, *et al.*, *Value Added Taxation in Developing Countries*, International Bank for Reconstruction (1990), p. 17 – 31.

⁵⁰ Charles McLure, Jr., *The Value-Added Tax: Key to Deficit Reduction?* American Enterprise Institute (1987), p. 46.

⁵¹ Commonwealth Treasury of Australia, "Preliminary Assessment of the Impact of the New Tax System," *Economic Roundup*, Autumn 2003.

⁵² Copenhagen Economics, *Study on Reduced VAT Applied to Goods and Services in the Member States of the European Union* (June 2007), Chapter 3.

⁵³ For a discussion of issues related to fraud in the EU VAT systems, see International VAT Association, "Combating VAT Fraud in the EU: The Way Forward (March 2007).

⁵⁴ K. Watanabe, T. Watanabe, and T. Watanabe, "Tax Policy and Consumer Spending: Evidence from Japanese Fiscal Experiments," National Bureau of Economic Research, Working Paper No. 7252 (July 1999).

⁵⁵ Henry Aaron, ed., *The Value-Added Tax*, p. 15.

⁵⁶ OECD, *Consumption Tax Trends 2008*, Table 3.5, p. 45.

⁵⁷ This point is made by Alan Tait, *Value Added Tax: International Practice and Problems*, International Monetary Fund (1988), p.222.

⁵⁸ Michael Smart, "The Economic Impacts of Value Added Taxation: Evidence from the HST Provinces."

⁵⁹ It should be noted that the retail sales tax used by state and local governments is, in theory, designed to be a destination tax that does not put in-state businesses at a competitive disadvantage compared to out-of-state businesses.

⁶⁰ See Robert Carroll and Alan Viard, "Value Added Tax: Basic Concepts and Unresolved Issues," *Tax Notes* (March 1, 2010), p. 1123 – 1124 for a discussion of the trade impacts of adopting a VAT.

⁶¹ Mihir Desai and James Hines, Jr., "Value-Added Taxes and International Trade," Harvard University Working Paper (November 2002).

⁶² The OECD project has produced an initial report of a survey of business taxpayers on the degree to which there is incomplete crediting of VATs on input purchases made by foreign companies. See OECD, "VAT/GST Relief for Foreign Businesses: The State of Play," (February 2010).

⁶³ This conclusion holds for the observed relationship between consumption and income at a point in time. There are economists, however, who argue that a broad-based consumption tax is closer to being proportional to income if measured over a household's life span. While this may be the true if one takes a longer-run view of tax incidence, legislators will focus on the shorter-run incidence perspective that assumes that a VAT is regressive.

⁶⁴ In some cases, countries have addressed the regressivity issue by also imposing higher VAT rates (compared to the standard rate) on selected luxury items, such as automobiles, furniture and appliances, and jewelry.

⁶⁵ A recent EU publication, *VAT Rates Applied to the Member States of the European Union* (DGTAXUD, May 2010), lists 20 major categories of goods and services that are zero rated in the United Kingdom., including food, medicines, health care, and sales to charitable organizations.

⁶⁶ For a discussion of the VAT changes being debated in Japan, see Martin A. Sullivan, "Economic Analysis: VAT Increase for Japan No Longer Taboo," *Tax Analysts, Tax Notes Today* (TNT, 132-4, July 12, 2010).

⁶⁷ OECD, *Consumption Tax Trends 2008*, p. 51.

⁶⁸ Bob Hamilton and John Walley, "Reforming Indirect Taxes in Canada," *The Canadian Journal of Economics* (August 1989), p. 561 – 575.

⁶⁹ In technical terms, the change in welfare was estimated as the sum of Hicksian equivalent variations for the representative households included in the model.

⁷⁰ John H. Makin, “Japan’s Lost Decade: Lessons for the United States in 2008,” American Enterprise Institute for Public Policy Research, Economic Outlook, March 2008, p. 3.

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