THE INTERNATIONAL CONSEQUENCES OF THE LEADING CONSUMPTION TAX PROPOSALS

Robert E. Hall
Stanford University

December 1, 1995

1. INTRODUCTION

Economists have long advocated that the general revenue requirements of the federal government should be met through a national consumption tax. Recently, consumption taxes have begun

Prepared for the CEPR Conference on Fundamental Tax Reform, Stanford, December 1, 1995. I am grateful to E. Cary Brown for early counseling in these matters, to David Bradford for helpful discussions over the past two decades, and to James Poterba and Dale Jorgenson for comments on a related paper. All remaining errors are mine.

to receive serious consideration in Washington. As we move toward a major tax reform based on the consumption tax principle, economists need to pay more attention to practical issues of the reform. Some important issues relate to the relation of the U.S. and world economies, some relate to the transition from the current tax system to a consumption tax, and in fact there is a good deal of overlap—the international issues are largely transitional issues.

I start by describing the various consumption tax systems that are under consideration. These are three variants of the value-added tax (including the Hall-Rabushka flat tax), the sales tax, and the personal consumption tax. Then I lay out the basic effects of the taxes in an open economy and draw certain conclusions about the transition, including the effects on the real exchange rate and trade deficit. Finally, I consider the implications of nominal wage rigidity in order to describe the effects of tax reform on nominal prices and the nominal exchange rate.

2. TAXES CONSIDERED

A central topic in the design of taxes in open economies is border adjustment. Under GATT, it is permissible to rebate some taxes for exports and impose taxes on imports. These border adjustments are seen as aspects of the tax system and not as barriers to trade. Border adjustment is immensely popular among lawmakers because

they are thought to convey an advantage to domestic producers. I will discuss the substance of border adjustments in a later section.

The taxes I will consider are all equivalent or close to equivalent. They take a number of different approaches to measuring consumption and taxing it. All the taxes drive a wedge between work effort and consumption. None drives a wedge between current consumption and later consumption. The latter wedge is the harmful aspect of an income tax.

A *value-added tax* (VAT) is a tax on firms on the difference between total revenue and purchases of intermediate products from other firms. Purchases of capital goods are counted as intermediate products. The VAT is a consumption tax because it is imposed, in effect, as an excise tax on consumption goods. I will assume that firms quote their prices inclusive of the VAT. With respect to foreign trade, the VAT may include border adjustments. The *VAT without border adjustments* includes revenue from foreign sales in the base and permits deductions for purchases of intermediate products from foreign sources. The *VAT with border adjustments* excludes exports and imports, or, equivalently, imposes an import duty at the VAT rate and pays a rebate on exports. Finally, the *Hall-Rabushka VAT*[1] is a variant of the VAT without border adjustments in which the firm deducts the wages it pays and there is

a personal wage tax at the VAT rate. The motivation for this complication is that it permits easy administration of an exemption, in order to make the VAT progressive. The Hall-Rabushka proposal is usually called the "flat tax," although it really has two brackets, one at zero and the other at a single positive rate. Many popular discussions of the flat tax do not refer to the Hall-Rabushka proposal and may not even refer to consumption taxes.

A *consumption sales tax* is a tax imposed on sellers of consumption goods at the point where they go into the hands of final consumers. Again, I assume that firms quote prices inclusive of tax. I will also assume that the tax is adjusted at the border—it is imposed on imported consumption goods and all exported goods are free from tax.

A *personal consumption tax* measures consumption at the household level on a cash-flow basis. It is a personal income tax with an unlimited deduction for saving. The Nunn-Domenici USA tax includes a personal consumption tax as well as an 11 percent VAT.

The tax base for the VAT with border adjustment, the consumption sales tax, and the personal consumption tax is literally consumption as measured in the national income accounts, except that housing is treated as a consumer durable. The tax base for the

---

[1] Hall and Rabushka (1995).

VAT without border adjustment and the Hall-Rabushka tax differs by the amount of the trade surplus. But, since the present discounted value of the trade surplus must be the net indebtedness of the U.S. to the rest of the world, which was determined by history, the VAT without border adjustment differs from a consumption tax only by a lump sum.

3. BASIC EFFECTS

To explain the basic effects, I will make the simplifying assumption that there is only one kind of output. As numeraire, I will take the consumption good after VAT or sales tax but before personal tax. I assume competition in all markets. I denote the marginal product of labor by λ. The prices I will consider are:

1. The wage paid by the firm,
2. The wage received by the worker,
3. The price of traded goods paid by the export customer or received by the import supplier,

Table 1 shows the effects on these relative prices of the various taxes.

TABLE 1.

Prices Relative to Domestic Consumption Goods

	VAT with border adjustment	*VAT without border adjustment*	*Consumption sales tax*	*Hall-Rabushka*	*Personal consumption tax*	*Personal income tax*
Cost of labor to firm	$(1-t)\lambda$	$(1-t)\lambda$	$(1-t)\lambda$	λ	λ	λ
note	a	a	a	b	b	b
Benefit of work to worker	$(1-t)\lambda$	$(1-t)\lambda$	$(1-t)\lambda$	$(1-t)\lambda$	$(1-t)\lambda$	$(1-t)\lambda$
note	c, e	c, e	c, e	d, e	d, e	d, e
Traded goods	$1-t$	1	$1-t$	1	1	1
note	f	g	f	g	g	g

Explanations of the entries in the Table 1:

a. For the two VATs and the sales tax, the goods-work wedge occurs within the firm. The equilibrium wage at zero profit is equal to the net after-tax selling price, $1-t$, multiplied by the marginal product of labor, λ.

b. For the three taxes where the wage component is collected at the personal level, there is no tax wedge at the firm level.

c. For the two VATs and the sales tax, the wage paid and the wage received are the same.

d. For the three taxes where the wage component is collected at the personal level, there is no tax wedge at that level.

e. Hence all six taxes drive the same wedge between the benefit of working and the price of consumption goods. The wedge is the inescapable inefficiency of taxation when it is impossible to tax the consumption of time at home.

f. The VAT with border adjustment and the sales tax raise the price of consumption goods above traded goods, because the tax is levied on imports and rebated on exports.

g. Consumption goods and traded goods have the same price for taxes without border adjustments.

As I noted in the introduction, the immediate effects of a move to a consumption tax involve not only the relative price effects displayed in Table 1, but also issues of wage rigidity and changes in interest rates. Still, some important inferences follow from the table.

First, under either the standard VAT (with or without border adjustment) or under the sales tax, the real product wage must fall by the amount of the tax. Under the existing income tax, wages are set on a pre-tax basis, whereas under the VATs or sales tax, wages are set on an after-tax basis. Wages would remain on a pretax basis under Hall-Rabushka or the personal consumption tax. Most of the issues associated with the lowering of the real product wage have

to do with wage rigidity, so I will defer further discussion of this point until the next section.

Second, under the VAT with border adjustment or under the sales tax, the price of traded goods falls below the price of consumption goods by the amount of the tax. These taxes are hugely attractive to politicians because the export subsidy and import tax are thought to improve something called "competitiveness." This idea receives no support from economics. Real exchange rates will change to offset the tax change. Whether this occurs as a change in the nominal rate as well depends on the behavior of the price level, a topic deferred to the next section.

3.1 Stock Prices

As a simplification, think of equity as direct ownership of capital goods. The consumption tax depresses the purchasing power of the existing capital stock.[2] Domestic equity holders suffer capital losses from consumption tax reform. The VAT with border adjustment and the sales tax keep foreign equity holders whole because these taxes lower the price of traded goods in terms of domestic consumption goods by the same amount.[3] The origin VAT and

[2] See Hall (1995).

[3]This point may be easier to see if one supposes that the price of domestic consumption goods rises by the amount of the tax. Neither the price of equity nor the price of traded goods changes at all. Domestic shareholders suffer a loss

Hall-Rabushka impose the same loss on foreign equity holders as on domestic ones.

4. NOMINAL PRICES AND PRICE MEASUREMENT

Prediction of the effects on nominal prices as the result of the transition to a consumption tax enters the tricky territory of price-level economics. Under monetary neutrality, the price level is chosen unilaterally by the central bank. An event such as tax reform affects the price level only to the extent that it makes the central bank choose a different target.

With monetary non-neutrality, there is more to say, though of course the central bank unambiguously chooses the price level in the longer run. The biggest issue is how nominal prices and wages achieve the decline in the real product wage required under a VAT or sales tax. Either the price level must rise or the wage level must fall. If the latter is ruled out as impractical, then the economy needs a quick burst of inflation. If the inflation triggers indexation, there may be further problems. British adoption of the VAT in 1979 put the economy through this type of cycle.

---

of purchasing power, but foreign equity holders can still buy the same volume of goods with their shares as they could before tax reform.

The central problem is the wage contract. Under the income tax, wages are set on a pre-tax basis. Workers pay taxes out of their earnings. The taxes that put wages on an after-tax basis—the VATs and the sales tax—call for either a price change or a wage change to accommodate the switch. One way is for wages to fall by the amount of the tax. Except for effects caused by changes in tax rates, there would then by no change in after-tax wages, and prices would not have to change. Evidence on the nature of the wage contract suggests it would be difficult to bring about the immediate wage cut. The other way to accommodate the change is for prices to rise. Then the wage contract is honored in nominal terms, but real after-tax earnings are kept stable in the face of tax reform by the price increase. In order for a price increase to work, it is essential that there be no feedback from prices to wages. In an economy with full cost-of-living escalation of wages, no price increase would be large enough to get the real after-tax wage back down to its appropriate level.

The best answer would appear to be to encourage firms to reset prices on the day the tax become effective by the amount of the tax, and then to define the cost of living index to exclude the VAT or sales tax. The goal is to get the price level to rise immediately but not to develop any momentum, and to prevent wages from changing at all.

The taxes that leave wages on a pre-tax basis—Hall-Rabushka and the personal consumption tax—do not encounter this problem at all. The existing wage and price levels remain the appropriate levels after tax reform.

The assumption I will make in the remainder of the paper is that the standard VATs (but not Hall-Rabushka) and the sales tax cause a one-time increase in the prices of consumption goods and the other taxes leave the price level unchanged. This assumption is stated in the first line of Table 2.

4.2 Nominal Exchange Rates

As I noted in the previous section, the destination VAT and the sales tax drive wedges between domestic consumption goods prices and the prices of traded goods. As a result, they affect real exchange rates in the same way. If, as suggested above, the right accommodation to a VAT or sales tax is an immediate jump in the nominal price level, then nominal exchange rates need not change. However, it will not be possible to introduce a VAT as a complete surprise and raise the price level by 20 percent in the same millisecond. The foreign exchange market will be perturbed by expectations, as I discuss in the next section.

These conclusions are summarized in the second and third lines of Table 2.

4.3 Value of Debt Claims

With respect to debt, the issue is the change in the price level. It is both realistic and desirable for the domestic price of consumption goods to rise by the amount of a VAT or sales tax. Thus, debt holders suffer a loss of purchasing power over domestic consumption goods equal to the amount of the tax, for the these taxes. Foreign debt holders come out even in relation to traded goods for the destination-basis VAT and the sales tax and lose under the origin-basis VAT. No changes in any of these nominal variables or in the purchasing power of debt would need to occur under Hall-Rabushka or a personal consumption tax.

The conclusions about the purchasing power of debt are summarized in the fourth and fifth lines of Table 2.

TABLE 2.

Effects on Nominal Measures

	VAT with border adjustment	*VAT without border adjustment*	*Con-sumption sales tax*	*Hall-Rabushka*	*Personal con-sumption tax*
Nominal price of consumption goods	↑	↑	↑	0	0
Nominal price of traded goods	0	↑	0	0	0
Nominal exchange rate	0	↓	0	0	0
Value of dollar debt in relation to consumption goods	↓	↓	↓	0	0
Value of dollar debt in relation to traded goods	0	↓	0	0	0

Notes: ↑ means rise by the amount of the tax; ↓ means fall by the amount of the tax, and 0 means no change.

5. EFFECTS OF THE ANTICIPATION OF TAX REFORM

The effects of a switch to a consumption tax in a closed economy, announced in advance, are discussed in detail in Hall

(1971). At the moment of the switch, there is a discontinuous drop in consumption. Prior to the switch, consumption gradually rises. After the drop caused by the new tax, consumption gradually rises again until it reaches its new steady state. Investment does the opposite—it declines in anticipation of the tax change, jumps upward at the time of the change, and then gradually declines.

There is an incentive for consumers to hoard consumption goods before the consumption tax and then to consume them later. If the consumption tax cannot be imposed on hoarded goods and hoarding is technologically feasible, the equilibrium will be quite different

For a brief instant surrounding the switch date, the real interest rate stated in terms of consumption goods after tax, is infinitely negative.[4] That is why consumption falls by a discrete amount. Alternatively, if the interest rate is stated in terms of investment goods (or consumption goods before tax), nothing exciting happens to the interest rate on the switch date. The interest rate gradually rises during the consumption bubble before the switch date and then gradually falls during the investment boom that follows the tax reform.

These conclusions about the interest rate can be restated in nominal terms under the assumptions given earlier. For the VATs

and the sales tax, where there is a discontinuous increase in the nominal price of consumption goods, the nominal interest rate will be stable during the period of the switch. There will be an incentive to hoard consumer goods. For Hall-Rabushka and the personal consumption tax, where nominal consumption goods prices do not jump and so the nominal interest rate is stated in terms of after-tax consumption, there will be a brief period of infinitely negative nominal interest rates. A different way to think about the same point is that these two taxes depress the nominal value of existing capital goods. In order to prevent businesses from selling their capital just before tax reform and buying it back just after, the opportunity cost of funds needs to be negative over that brief period.

Note that the incentive to hoard consumer goods is just as strong, in principle, under Hall-Rabushka and the personal consumption tax as under the taxes that cause discontinuous increases in the price of consumer goods. Consumers can take advantage of infinitely negative interest rates to hoard beneficially, even though the price of consumer goods does not go up.

In the real world, these effects between announcement and implementation would not be nearly as dramatic as theory suggests. By making the effect of the tax immediate or even retroactive, most

[4] See Hall (1971), p. 235.

of the shocks can be limited. Under the VATs or sales tax, the public will try to beat the tax-induced price increase as soon it appears likely that the tax reform will occur. Under Hall-Rabushka or the personal consumption tax, businesses will defer investment in order to take advantage of the tax incentives for investment that will be part of the reform. In the resulting weak economy, the interest rate will be low and used capital goods prices will be soft. Consumer hoarding will take the form of borrowing at low rates to purchase consumer goods and also the purchase of used capital goods for consumption purposes.

The extension to an open economy can be divided into three cases:

1. *VAT (with border adjustment) and sales tax.* With these taxes, as shown in Table 2, the dollar price of tradable goods and the exchange rate do not change as the tax goes into effect. The only potential source of dislocation in the world economy would be the effects from anticipatory hoarding by U.S. consumers. A boom before the tax change followed by a contraction in consumer goods sales would cause an immediate appreciation of the dollar followed by a gradual depreciation.
2. *VAT without border adjustment.* In this case, Table 2 shows that the dollar price of tradable goods will rise after tax

reform and the dollar will depreciate to offset that rise, leaving the foreign-currency price of U.S. goods unchanged. The depreciation will occur upon announcement of the tax reform. From announcement to implementation, the foreign prices of U.S. goods will be unusually low. Foreign demand for U.S. goods will swell at the same time that U.S. consumers are hoarding goods to beat the forthcoming consumption tax. The U.S. interest rate will rise, which will limit the amount of the anticipatory depreciation.

3. *Hall-Rabushka and personal consumption tax.* Table 2 shows no effects from these taxes on domestic prices, traded goods prices, or the exchange rate. To the extent that weak investment brings a lower interest rate in the period between announcement and implementation, the dollar will depreciate at the time of announcement and then gradually appreciate. Exports would be stimulated to make up some of the slack in the economy.

6. INTERACTION OF THE U.S. ECONOMY AND THE REST OF THE WORLD

U.S. capital markets are tightly integrated with those of other major industrial countries, notably Japan, Britain, and Germany. Those countries rely on a mixture of consumption and income taxation

and presumably would not change their tax systems upon U.S. tax reform. The analysis of tax reform in the open U.S. economy has to consider the general equilibrium in a world economy with heterogeneous tax systems.

The general equilibrium analysis encounters a basic problem, as a number of earlier authors have observed. High-growth countries like Japan should have chronically higher interest rates, according to the life-cycle theory of consumption. In fact, real interest rates seem to be roughly equal among the major countries with open capital markets. Although expected changes in real exchange rates can support differences in real interest rates in the short run, neither theory nor actual experience suggests that this mechanism works in the long run.

Tax reform in the United States would encounter the same paradox. How can the U.S. interest rate fall if interest rates in Japan and elsewhere remain locked in place by the life-cycle principle? The answer to both the growth and tax paradoxes appears to be that real interest rates for equivalent traded securities are equalized in world markets but households see rewards for saving that are sufficiently different to satisfy the life-cycle model separately for each country's parameters.

Differences in internal capital markets among countries may be an important part of the resolution of the paradox. For example,

direct controls on borrowing may prevent Japanese households from the high levels of debt that would be needed to satisfy the life-cycle model's prescription for scheduling consumption in a high-growth, low-interest economy. On the other hand, the U.S. consumer is in fairly direct contact with world capital markets. Interest rates in the most important credit market for households, the mortgage market, are tightly linked to world rates.

In world equilibrium, firms and intermediaries in countries with naturally high interest rates (with high growth rates and high income tax rates) will be net suppliers of bonds in world markets. Equilibrium occurs where the marginal cost of issuing more bonds is equated, after risk adjustment, to the costs of other sources of funds and to the marginal benefit from investing the funds. Patterns of specialization in the issuance of securities should track differences in fundamental interest.

In the resulting equilibrium, there may be scope for a considerable effect of tax reform on U.S. interest rates. In the first place, the United States is about a third of the total world capital market. Second, relatively modest changes in the pattern of specialization in world securities markets may be enough to reach the new equilibrium in which the world interest rates have moved most of the way to the point predicted by the life-cycle model for the United States.

REFERENCES

Gordon, Roger H., and Joel Slemrod (1988) "Do We Collect Any Revenue from Taxing Capital Income?" *Tax Policy and the Economy* vol. 2.

Hall, Robert E. (1971). "The Dynamic Effects of Fiscal Policy in an Economy with Foresight" *Review of Economic Studies* 38:229-244, April.

Hall, Robert E. (1988) "Intertemporal Substitution in Consumption" *Journal of Political Economy* 96:339-357, April

Hall, Robert E. (1995) "The Effects of Tax Reform on Prices and Asset Values" in James Poterba (ed.) *Tax Policy and the Economy*, National Bureau of Economic Research (forthcoming)

Hall, Robert E. and Alvin Rabushka (1995). *The Flat Tax.* Hoover Institution Press.