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The Open and Closed Case for Cross-Border Capital Flows

BY J.D. FOSTER, PH.D.
EXECUTIVE DIRECTOR
AND CHIEF ECONOMIST
TAX FOUNDATION

NOVEMBER 1998

BACKGROUND PAPER | NO. 27

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Executive Summary

How freely capital flows across the nation's borders is key to how fundamental tax reform would affect the U.S. economy and therefore federal tax receipts. This is one conclusion from the Joint Tax Committee's examination of economic models of the U.S. economy capable of accurately assessing the effects of tax reform.

International capital flows could play a critical role as the economy reacts to a change in tax policy. If the economy is closed to these flows, then a change in policy increasing the demand for capital or decreasing the net of government receipts over expenditures must be met with an increase in domestic saving. If domestic saving is unresponsive, then interest rates will rise, thereby dampening the stimulative effect of the policy. However, if the economy is open and international capital is plentiful, then the shortfall in domestic saving is made up by imported saving. Interest rates then remain largely unaffected and the economy would enjoy the full stimulative effect of the policy change.

This paper discusses these issues, describing in detail how the economy responds to a change in policy under the three cases of a closed economy, a perfectly open economy, and a partially open economy. The existence of cross-border capital flows is undisputed, even for countries with restrictive capital controls. However, the extent to which capital can flow into or out of a country is contested. Even for the United States, one of the most open economies in the world, there is disagreement regarding the extent to which the economy is open to capital flows and the incentives that drive them.

This paper offers a new possibility that reconciles the champions of perfect capital markets with those who find the notion of infinitely responsive international capital flows implausible. This paper demonstrates that one can posit perfect capital markets and still find significant restraints on the ability of the economy to increase net capital inflows. In this case, the restraining mechanism is the balance of payments. It is a fact that no country can increase its net capital imports faster than it can increase its net deficit in trade of goods and services.

Trade flows respond relatively slowly to changes in the economic environment, such as a change in the real exchange rate. A change in policy encouraging an increase in net capital inflows would likely increase domestic interest rates and, thereby, increase the exchange value of the dollar. This, in turn, would tend to make foreign goods more expensive to U.S. buyers and U.S. goods more expensive to foreign buyers. The resulting increase in the trade deficit would permit an increase in net capital flows. Thus, the economy can be completely open in the sense that capital markets operate perfectly, and yet its ability to import large amounts of saving from abroad in response to a change in tax policy is limited by the speed with which the net trade deficit can increase.

Introduction

How freely capital flows across the nation's borders is key to how fundamental tax reform would affect the U.S. economy and therefore federal tax receipts. This is one conclusion from the Joint Tax Committee's (JTC) examination of economic models of the U.S. economy capable of accurately assessing the effects of tax reform.

Tax reform debate ebbs and flows, never gaining enough momentum to promise action, never fading entirely from the scene. While the debate continues in political circles, economists and other tax policy theorists study issues such as the effects of tax reform on domestic saving and investment. These issues meet uneasily yet essentially in the estimation of economic growth and federal revenues under a new tax system.

Taxes affect taxpayer behavior, sometimes dramatically. The central economic motivation for tax reform is that a simpler, more neutral tax system would leave decision-makers free from undue influence from the tax code and therefore they would make the best use of the nation's resources. By encouraging a better use of resources tax reform promises a higher level of sustainable, non-inflationary economic output.

The basic direction of tax reform is essentially settled. Among tax reform enthusiasts, there is a general consensus that the U.S. should replace its current hybrid income tax with some form of consumption tax. Two expected consequences of tax reform would then be increases in the rate of saving and in the desired stock of plant and equipment. If the U.S. economy is closed to cross-border capital flows, then the rate of investment must equal the rate of saving. However, if the U.S. economy is open to these flows, then an excess of investment over domestic supply would be met with imported saving. Similarly, any excess of domestic saving over domestic investment would result in an export of capital.

Revenue estimates will play a key role in tax reform. They will price out the different perturbations suggested for the tax system. The estimates will tell us how much different transition provisions would cost and allow decision-makers to compare them to the cost of maintaining the charitable deduction, for example. Having established the tax base and federal revenue requirements, the revenue estimates will ultimately determine the new system's tax rate. Forecasting the additional growth from tax reform is essential to forecasting the size and timing of increased revenues, with important consequences for the tax rate if tax reform is to remain revenue neutral.

Given the critical role the estimates will play, the revenue estimates should reflect economists' best judgement as to how much better the economy is likely to perform. Currently, the official scoring by the Department of Treasury and the JTC takes a very limited range of behavioral or microeconomic effects into account while completely ignoring macroeconomic effects. In other words, no matter how wise or foolish the policy, the economy overall is assumed to be impervious to tax policy. In the case of tax reform, the expected increase in output would be ignored, as would the consequent increase in revenues. Thus the tax rate would be greater than necessary for revenue neutrality and the economic benefits of tax reform would be reduced.

Calls for official scorers to apply a more dynamic analysis to major tax proposals have gone out since the mid-1980s when revenue estimates ascended to their current lofty role. The possibility of fundamental tax reform has redoubled these pressures. These two issues — tax reform and dynamic rev-

enue analysis — have come together in the JTC's "Tax Modeling Project." The JTC is exploring how economists model tax policy's effects on economic performance and, therefore, on federal tax receipts. It turns out that most of the estimated effects are dictated by a few central assumptions. Some of these assumptions are common to tax policy discussions, such as taxpayers' responsiveness to savings incentives or the labor supply response to a reduction in the tax on wages and salaries. A key assumption that is fairly removed from most tax policy considerations and about which there is a noted lack of consensus is the extent to which the U.S. economy is open to cross-border capital flows. The presence and extent of these capital flows greatly influences the rate of additional new investment in plant and equipment following tax reform.

The Tax Modeling Project

The Tax Modeling Project was launched in May of 1995 at the initiative of the JTC's then new Chief of Staff, Ken Kies. He took this initiative partly in response to years of complaints by Members of Congress and outside experts that the prevailing "static" methodology was deficient in that it ignored most behavioral effects of tax policy changes. Perhaps a greater motivation, however, was the need of the JTC to prepare to estimate the revenue effects of the additional economic growth expected from tax reform. The JTC needed to be ready to engage in "dynamic" modeling when and if tax reform ever became a likely legislative event.

As part of this project the JTC enlisted the expertise of nine groups of economists with existing models. These models represented the state of the art at that time. Each of the models was used to assess and compare the economy's performance under two scenarios. In the first scenario the federal government was assumed to impose a "unified income tax." The unified income tax differed from current law in that the personal and corporate income taxes were integrated and the individual income tax was greatly simplified. This simpler form of income tax was assumed because of the great variation of models' abilities to capture the complexity of current law. In the second scenario the federal government was assumed to employ a consumption tax other than a European-style Value-Added Tax, or VAT. (One of the models also assumed the adoption of VAT, which will be excluded from further discussion here since it is not under serious consideration in the United States today.)

In November, 1997, the JTC released an interim report on the project.[1] This report brought to light a considerable lack of consensus among economists about fundamental issues in macroeconomic modeling of tax policy. For example, the models considered in the project fall into three distinct structural categories. At this point none of the three types of models is obviously the right choice for the dynamic scoring of tax policies. Some models are particularly adept at addressing short-run changes in aggregate demand, possibly resulting from a change in tax policy, but offer little guidance about the short- or long-run changes in aggregate supply. Others are quite good at long-run supply shifts, but may not do well forecasting the short-run unless the economy is in and remains fairly close to equilibrium. Even among these models, some do better assessing the effects of tax changes on investment while others may do better with the supply of labor or domestic savings.

Beyond model structures, a host of issues exist about which neither the theoretical nor the empirical literature yield conclusive evi-

[1] "Joint Committee on Taxation Tax Modeling Project and 1997 Tax Symposium Papers," November 20, 1997.

Figure 1A
International Capital Flows
Before Tax Reform

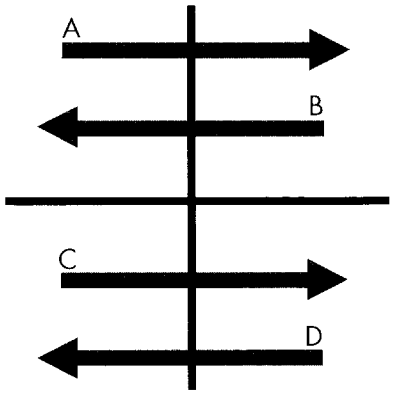
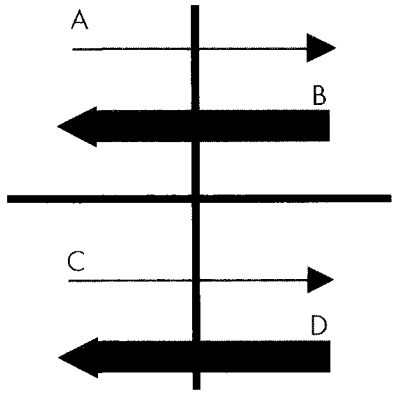


Figure 1B
International Capital Flows
After Tax Reform



dence. One such issue is the extent to which net cross-border capital flows might respond to changes in U.S. interest rates. Seemingly a secondary issue, the responsiveness of net cross-border capital flows is one of the two or three most important factors determining the consequences of tax reform for economic activity and federal revenues.

The Role of International Capital Flows

Economies perform much better if they can import saving from abroad when domestic demands for investment, combined with government budget deficits, exceed domestic saving. This ability allows capital importers to expand their private stock of productive capital far more rapidly than if their economies were closed to international capital flows. These cross-border capital flows also greatly benefit the capital exporters. Investors from capital exporting countries are able to achieve higher rates of return or lower risk than they could if their saving could only be invested at home.

The existence of cross-border capital flows is undisputed, even for countries with restrictive capital controls. However, the extent to which capital can flow into or out of a country is contested. Even for the United States, one of the most open economies in the world, there is disagreement regarding the extent to which the economy is open to capital flows and the incentives that drive them.

International capital flows into the United States are usually assumed to arise when foreign citizens invest in U.S. real property or financial assets such as Treasury Bills or corporate equities. Similarly, capital flows out of the United States are commonly assumed to involve U.S. citizens purchasing similar assets abroad. While each of these flows is important, net cross-border flows involve these and two others that are often forgotten. U.S. citizens have amassed hundreds of billions of dollars of investments and earnings abroad over the years, while foreign citizens have made major investments in the United States. If the investment climate changes for the better in the United States, U.S. citizens may choose to repatriate some of their assets held abroad and reduce their rate of foreign investment, while foreign citizens who planned on repatriating some of their U.S.-based assets may choose to leave them in the United States.

The net effects of these changes in capital flows is portrayed in Figures 1A and 1B. Figure 1A depicts capital flows between the

U.S. and the rest of the world by U.S. and foreign citizens prior to tax reform. The top two arrows represent the flow of investment by U.S. citizens to and from the U.S. Arrow A depicts the investment by U.S. citizens abroad. Arrow B depicts the repatriation of foreign income and capital by U.S. citizens. The bottom two arrows represent the flow of investment by foreign citizens to and from the U.S. Arrow C depicts the repatriation of income and capital by foreign citizens from the U.S. Arrow D depicts the flow of new investment into the U.S. by foreign citizens. The size of the arrows reflects the magnitude of the flows. As drawn in Figure 1A, the various flows offset each other, leaving the U.S. with zero net capital flows.

Now suppose something occurs, possibly tax reform, that would cause a general improvement in the U.S. investment climate relative to the rest of the world. This situation is depicted in Figure 1B. As a result, the outflow of U.S. saving by U.S. citizens shrinks, as indicated by the smaller arrow A, while the flow of foreign saving into the U.S. increases as indicated by the larger arrow D. In addition to these two, more commonly considered flows, the flow of repatriations by U.S. citizens into the U.S. increases (arrow B), and the flow of repatriations out of the U.S. by foreign citizens shrinks (arrow C). Therefore, if there is a change in the relative investment climate, then four distinct investment flows may change in response, which would imply a potentially higher degree of total responsiveness than if only flows A and D were involved.

Investment, Saving, and Trade-Driven Capital Flows

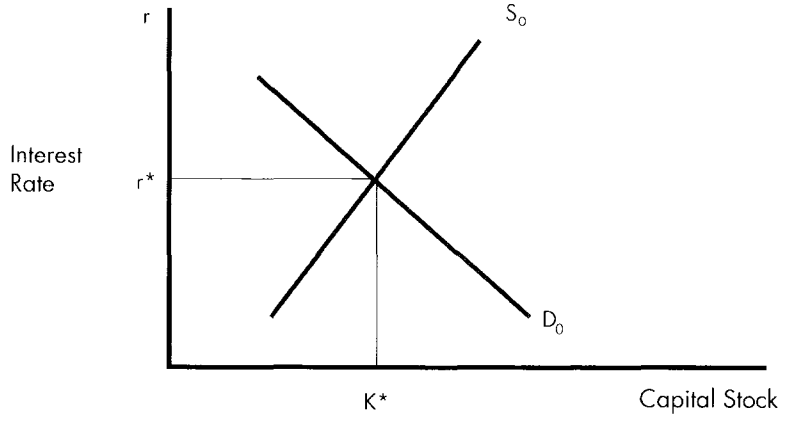
To see why the assumption about cross-border capital flows is so important, suppose capital flows into or out of the U.S. are determined completely and solely by the deficit in the international trading of goods and services.[2] Suppose as well that the rate of development of new technology is independent of all the matters under consideration here. This simplifying assumption eliminates any feedback effects between technological development and the rate of capital formation, and allows us to focus more clearly on capital flow consequences.

Finally, suppose the current income tax is replaced by a pure consumption tax and that the percentage of income saved increases as a result. Adopting a pure consumption tax would also reduce the cost of capital, or the required pre-tax rate of return on investment in new plant and equipment. Reducing the cost of capital would increase the desired capital stock, which would in turn increase the desired flow of new investment in plant and equipment at current after-tax interest rates. Assuming the financing could be found, this increased rate of investment would continue until the actual capital stock reached the desired capital stock. (This latter assumption is key to the results if we assume trade-driven capital flows.)[3]

[2] The balance of payments is an accounting identity in which net trade flows must exactly equal net capital flows. It provides a useful means of characterizing the various influences that must net out to clear the market and set a price for a country's currency vis-à-vis all other currencies. For example, if the U.S. has a net inflow of goods and services, e.g., it is running a trade deficit, then it must have an identical net inflow of capital in order to equate the demand and supply of dollars at the prevailing exchange rate.

Many of the models reviewed in the JTC's Tax Modeling Project assumed a closed economy with respect to net capital flows. This simplifying assumption is clearly counter-factual because it means the U.S. cannot run a trade deficit. The balance of the discussion will proceed with the less extreme assumption, which we refer to as "trade-driven capital flows." The key element of this assumption is that international capital flows occur but they do not respond to changes in the rate of return on investment in the U.S. versus the rest of the world. Even this assumption is obviously unrealistic, but it will help to clarify the issues and it will be relaxed in due course.

Figure 2
The Equilibrium Stock and Interest Rate



An increase in investment following tax reform would accelerate the rate of economic activity. Once the actual and desired capital stocks were equated, and everything else held equal, economic growth would return to its previous rate, but the level of production in the economy would be higher than if tax reform had not been enacted. Thus, tax reform would temporarily produce a higher rate of economic growth and a permanently higher level of production.

Figures 2 through 4 demonstrate these effects. Figure 2 shows the determination of the national capital stock in equilibrium at a point in time prior to tax reform. The vertical axis represents the after-tax rate of return and the horizontal axis represents the size of the capital stock. The figure shows the intersection of standard supply and demand schedules. The supply curve, S_0, and the demand curve, D_0, show the supply of domestic saving net of any government deficit, and the demand for capital, respectively, at each offered after-tax rate of return at a particular point in time.[4] The intersection of these curves provides the equilibrium rate of return, r^*, and desired capital stock, K^*. Over time these curves shift to the right reflecting the growth in the economy.

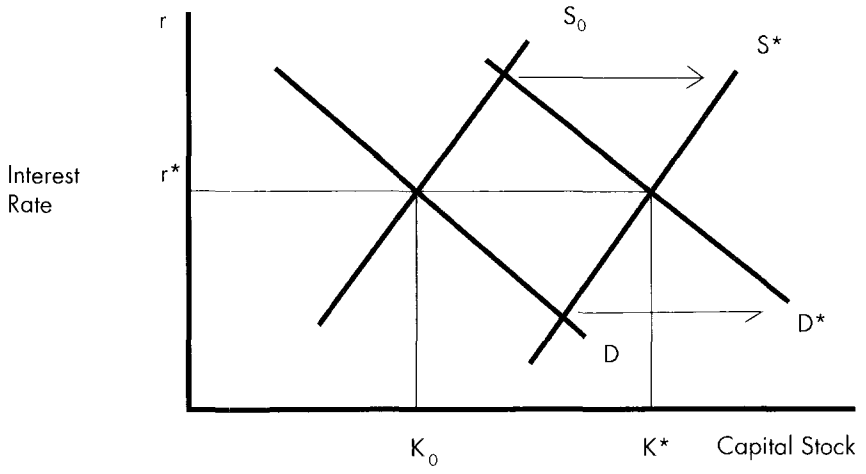
Figure 3 shows tax reform shifting the supply of savings curve from S_0 to S^* and the demand for capital curve from D_0 to D^*.[5] Assuming for the moment there is enough domestic saving to satisfy the increase in the desired stock of capital, the new equilibrium capital stock would be K^* and the rate of return would remain unchanged at r^*.

[3] Sometimes it is as important to highlight areas of agreement as areas of disagreement. In the analysis run for the JTC's project, all of the models reported an increase in saving and investment following the adoption of a consumption tax, irrespective of the model's assumption regarding cross-border capital flows. The range of increases varied greatly, however. The smallest long-run increase in the capital stock was 2.9 percent, for example, while the largest was 42 percent. Similarly, the smallest increase in the saving rate was .2 percentage points and the largest was a 1.8 percentage point increase.

[4] For the balance of this paper, the government is assumed to run a balanced budget. A government deficit would imply a leftward parallel shift in the S curve, a surplus would imply a rightward shift.

[5] The figures have been drawn to demonstrate certain points and so the jumps in the curves and the magnitudes have been exaggerated for clarity.

Figure 3
Closed Economy Case with Perfectly Matching Saving and Investment Shifts



The fourth figure shows the time path of investment, GDP, and the capital stock corresponding to the shifts depicted in Figure 3. For ease of exposition, the figure assumes the ratio of capital to GDP is unchanged by tax reform. (This assumption is relevant only to this figure.) The vertical axis in Figure 4 represents the level of the respective series; the horizontal axis represents time. Each series is moving along its equilibrium path until tax reform is enacted in time t_0. Following tax reform, investment would accelerate as the capital stock increases to its new equilibrium level K* shown in Figure 3.[6] If the economy had untapped resources, particularly labor, then the increase in capital formation would accelerate economic growth by employing some of this available labor. If the economy were truly at full employment prior to tax reform, then the increase in investment would accelerate economic growth by raising productivity.

To recap, we are assuming that tax reform is enacted, the desired savings and investment rates increase at current interest rates, and there are no cross-border capital flows. The central issues are the degree to which the savings rate increases, the desired increase in the stock of capital, and the desired increase in the rate of investment. If the increase in desired saving and desired investment are perfectly matched, the additional investment is met with additional domestic saving and equilibrium after-tax

[6] This increase in the capital stock cannot be instantaneous and may take some years to complete, depending on the size of the increase, because of certain inherent frictions. For example, businesses must plan out the capital expansions, arrange financing, retrain personnel, hire new workers, purchase and install the new plant and equipment, and integrate the whole process into the existing company.

interest rates remain unchanged. This case is shown in Figure 3.

Alternatively, suppose tax reform induces a rightward shift in the equilibrium desired stock of capital to D^* and the desired stock of domestic saving to S_1, as depicted in Figure 5. If net capital flows are determined by trade flows, then the equilibrium capital stock and interest rate will each depend on the relative movements of the desired capital stock and the desired level of saving. Because the businesses face a variety of direct and indirect costs from accelerating their rate of investment, the immediate shift in the desired stock of capital is to some curve, such as D_1. Over time this curve would continue its rightward movement until it reaches D^*.

Immediately after tax reform there could be no change in the actual stock of savings because savings must be accumulated over time, so the rate of interest would jump to r'_0. At this rate of interest and given the new desired saving curve, S_1, there would arise a much larger savings response than would arise from tax reform alone. Over time savings accumulate and the interim desired stock of capital curve continues to shift to the right, the capital stock increases, effectively causing a movement down the D^* curve, and the interest rate declines. The increase in the capital stock would continue until the economy settled at its new desired capital stock, K_1, and new interest rate, r_1.

Figure 6 presents the time path of investment assuming that net investment is constrained by domestic saving. In Figure 6, time is depicted along the horizontal axis and the rate of investment is along the vertical axis. As shown, the rate of investment is steady up to time t_0, at which time tax reform is enacted and the rate of investment increases. If the investment rate were unrestrained by the availability of savings, then the economy would take the upper investment path and the higher rate of investment would continue until some point such as t_1, at which time the economy would have attained the desired capital stock such as K_1

Figure 4
Changes in the Path of Investment, Gross Domestic Product, and the Capital Stock After Tax Reform

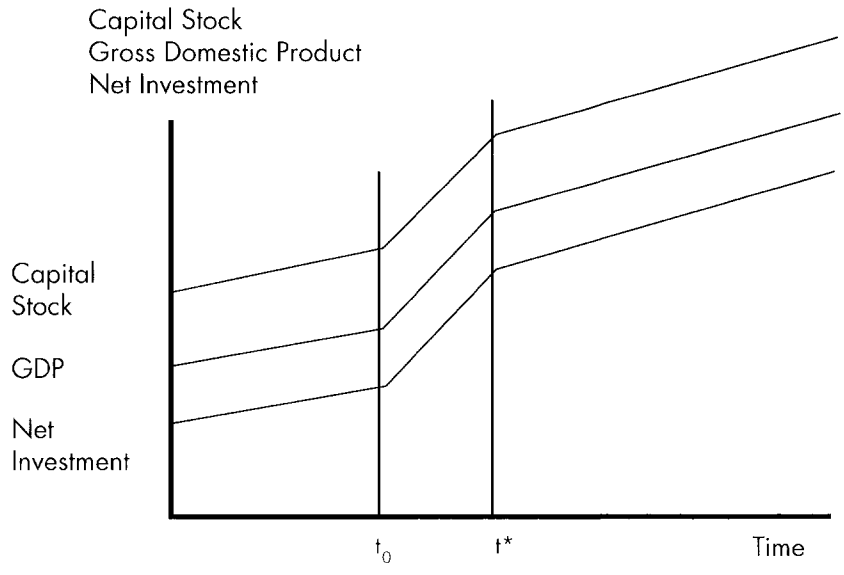
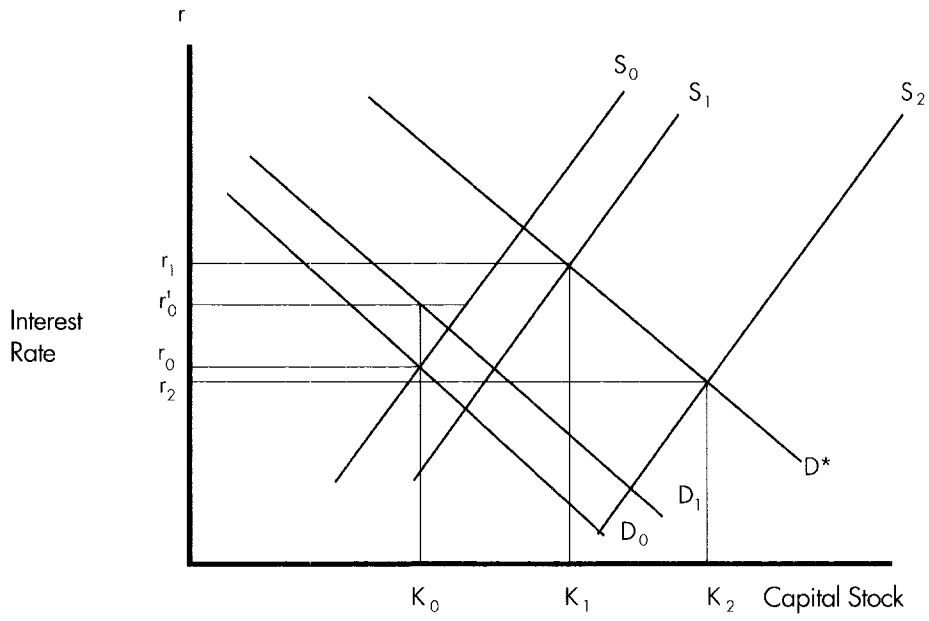


Figure 5
Closed Economy Changes in Investment and Domestic Saving



in Figure 5. If the rate of investment is constrained because of a lack of capital inflows, then the economy would experience a lesser increase in the rate of investment, such as the lower investment path, achieving K_1 at a later date, such as t_2. In each case, once the new desired capital stock is attained, investment returns to its pre-tax reform rate, though at a higher level.

In this example the final equilibrium interest rate exceeded the interest rate prior to tax reform. This results from the assumption that the desired saving curve shifted to a position such as S_1 in Figure 5. It could just as well have shifted to a point to the right of S_1, such as S_2, in which case the desired capital stock would have been larger and the interest rate would have fallen to a level below the pre-tax reform rate, such as K_2 and r_2, respectively.

The Open-Economy Case

Suppose we now change the assumption regarding cross-border capital flows. Instead of assuming no trade-driven flows, let us assume these flows respond instantaneously in virtually unlimited quantities to changes in U.S. interest rates. This is generally known as the small open economy assumption and is depicted in Figure 7. The essential consequence of this assumption is that there is now a domestic supply of saving curve, S_0, and a horizontal world supply of saving curve, S*. This curve represents the sum of domestic saving and net capital inflows.

Suppose prior to tax reform that domestic saving is sufficient to accommodate the desired capital stock, K_0, so that none of K_0 is funded through net capital inflows. Suppose tax reform is enacted, producing equal increases in desired domestic investment and domestic saving rates. In this case there would be no pressure on interest rates to increase and no change in net cross-border capital flows.

Suppose, however, that tax reform shifted the desired domestic saving curve to S_1 and the demand for capital curve to D*. If at

any time tax reform produces an excess in the rate of desired investment over domestic saving, then upward pressure develops on domestic interest rates. With the new assumption regarding capital flows, even a very small rise in interest rates would trigger a sufficient increase in net capital inflows to make up any deficiency between domestic saving and investment. Consequently, accelerated investment and economic growth could both follow their optimal paths to their new equilibrium levels. The effect of the open-economy assumption is to allow the capital stock to adjust to K^* in Figure 7 without restraint from limited domestic savings, and so the economy is able to achieve its higher equilibrium growth path more quickly and most efficiently.

With the domestic desired saving schedule shifting to S_1 as depicted in Figure 7, the additional desired domestic saving would eventually accumulate, leaving the stock of domestic saving at K_1, and the difference $(K^* - K_1)$ would represent the sum of net capital inflows. Alternatively, the domestic desired saving schedule could just as well shift to a position such as S_2 in which case the equilibrium increase in domestic saving would exceed the increase in the capital stock by the difference $(K_2 - K^*)$. Recall that the short-run importance of the open economy assumption is that it allows the rate of additional investment to exceed the rate of additional saving because capital inflows make up the difference. If the economy is open, the rate of investment exceeds the rate of saving, and the domestic desired saving curve shifts to a position such as S_2, then we have the interesting situation where there are short-term net capital inflows and long term net capital outflows.

Figure 8 depicts the rate of investment under the open economy assumption. As in Figure 4, tax reform occurs at time t_0 and causes a jump in the rate of investment. This higher rate of investment continues until t_1, at which time the capital stock achieves its new desired level. Figure 8 also depicts a simplified time path of the rate of saving following tax reform. As depicted the rate of saving prior to tax reform is insufficient to meet the domestic demands for investment and the difference is made up by net capital inflows in the amount indicated by the gap denoted by the letter "a". Because of tax reform, saving is assumed to jump instantly

Figure 6
Actual vs. Desired Investment With Constrained Capital Inflows

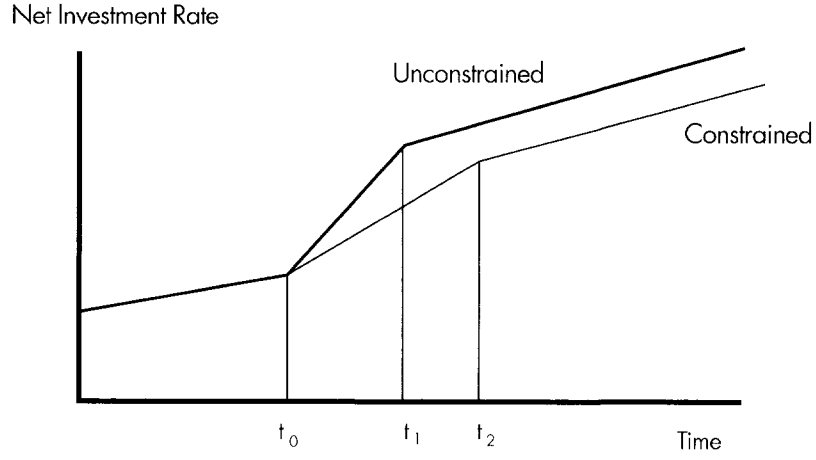
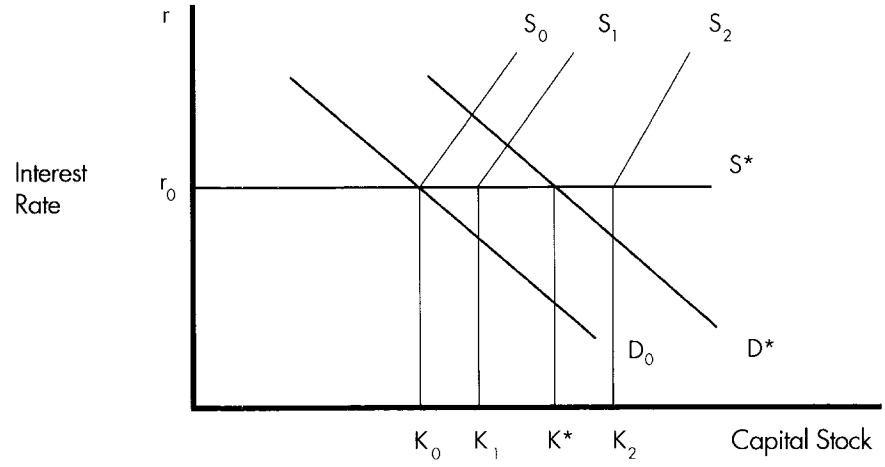


Figure 7
The Case of Instantly Unlimited Capital Inflows



to a new higher rate, which is shown here as being insufficient to satisfy the increased demand for capital created by tax reform. The increase in the rate of net capital inflows is denoted by the letter "b".

The Intermediate Case — A Partially Open Economy

The U.S. economy is obviously not completely closed to cross-border flows, but it may not be completely open, either. This would mean that cross-border flows exist, but they are not completely and instantaneously responsive to upward pressures on U.S. interest rates. This limitation on net capital inflows may reflect a binding absolute limit on the amount foreign citizens are willing to invest in the United States, which might be the case if the domestic demand for foreign capital represented a significant share of world saving. Or the limitation on net capital inflows may reflect a limit on the rate at which they are willing to make additional U.S. investments. In the following discussion we assume the latter because it seems the more likely in the context of tax reform.

The partially open economy case is depicted in Figure 9. The curve S* now represents the long-run supply of domestic saving plus net capital inflows. Suppose the desired domestic supply of saving prior to and after tax reform is given by S_0 and S_1, respectively, and suppose the initial, post-tax reform desired stock of capital curve is given by D_1 and the equilibrium curve is given by D*. Because net capital inflows over any period are assumed to be limited, the increase in the desired flow of investment in new plant and equipment produces a temporary increase in interest rates to r'_0. The increase in the interest rate lessens the increase in the rate of investment, spurs on an even more accelerated rate of additional saving than would tax reform alone, and it creates an incentive for foreign capital inflows.

While the rate of net capital inflows is limited by assumption, these inflows continue as long as the rate of interest remains above r_0. As domestic saving accumulates and net financial capital flows continue, the stock of plant and equipment increases until it reaches its new equilibrium at K*. This is the equilibrium capital stock the economy would attain, though more quickly, if it had the benefit of full and instantaneous cross-border capital flows. Of the increase in the

capital stock, the amount (K_1 - K_0) is made possible by increases in domestic saving and the amount over K_1 is financed through net capital inflows. The essential difference, then, between a partially open and a fully open economy is that a partially open economy will experience a temporary increase in interest rates and a slower rate of adjustment to its new capital stock and new level of economic output. The equilibrium capital stock and level of output are identical under the two assumptions.

How Fast Can Capital Flow?

There are few truisms in economics more true than that the balance of payments must balance. In other words, if a country runs a deficit in its trade of goods and services, then it must run a deficit of identical amount in its capital flows. Intuitively, if a country is not selling enough abroad to cover the cost of what it is importing, then it must be borrowing abroad or selling domestic assets to foreign buyers to cover the shortfall. This net borrowing and selling of assets creates a capital inflow, or capital account deficit.

Financial capital can move from market to market and country to country in enormous magnitudes and in very few seconds unless specific government restrictions are in effect. Given the amount and speed of capital flows into and out of the U.S. every day, casual observers and researchers alike can be forgiven for believing the U.S. is essentially a perfectly open economy and that the net flow of capital can change directions quickly.

In contrast to the movement of capital, changes in the flows of goods and services take time. For the U.S. to increase imports in response to a decline in the exchange value of the dollar, for example, buyers and sellers must come together and contracts must be signed. Then services must be rendered and goods must be produced and transported to the U.S. buyer. A reduction in exports can occur somewhat more quickly if a foreign buyer can find a ready substitute for a U.S. supplier, but even so there can be

Figure 8
Investment and Domestic Saving with Unconstrained Capital Inflows

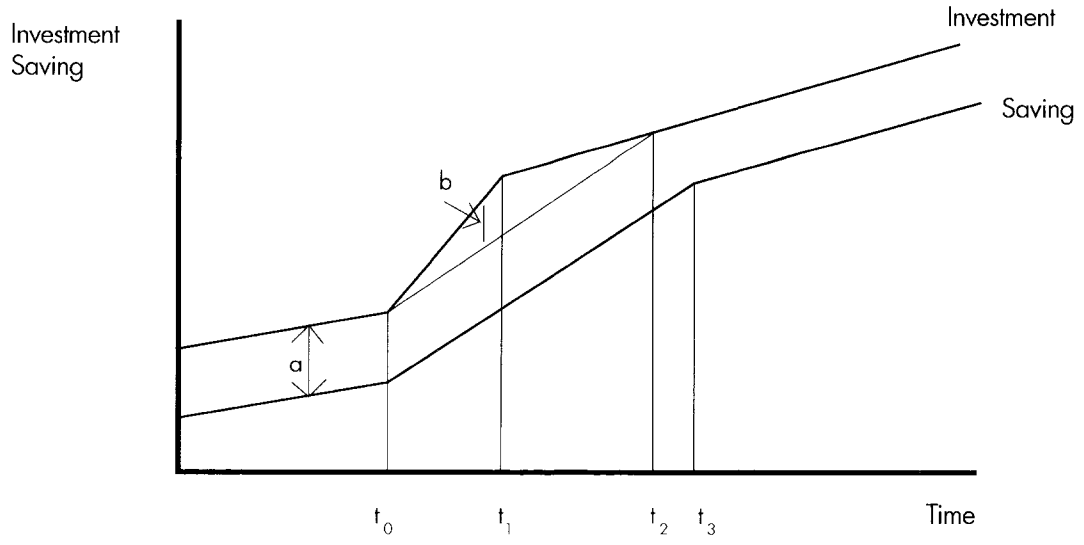
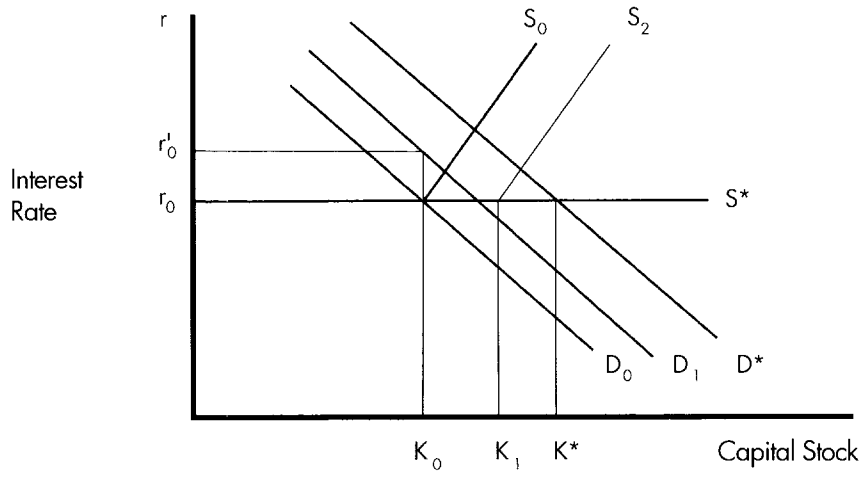


Figure 9
The Case of A Partially Open Economy



a long lead time for an exchange rate change to affect the flow of trade significantly. Since the change in net capital inflows is limited by the pace of change in net trade flows, and since net trade flows typically change slowly, it follows that net capital inflows must also change slowly even if the economy is perfectly open to international flows in both trade and capital.

Exchange Rates and Flows

Exchange rates play a critical short-term role in bringing about the changes in the terms of trade necessary to allow an increase in net capital inflows. Even while increased capital inflows are restrained by the speed with which imports could accelerate and exports slow, the pressure for net capital inflows would increase the worldwide demand for dollars relative to other currencies. This increase in demand would drive up the dollar exchange rate, making imports cheaper for U.S. consumers and U.S. exports dearer to foreign customers. As the U.S. pattern of trade responds to the higher U.S. dollar exchange rate, the U.S. trade deficit would increase, thereby permitting the increase in capital inflows.

The ensuing, temporary increase in the U.S. trade deficit would also mean an increase in the supply of dollars in the foreign exchange markets. Eventually, the need for capital imports would abate as the domestic saving rate increased and as the capital stock approached its equilibrium level. Consequently the trade deficit and the dollar exchange rate would also return to their equilibrium levels. Thus natural market

[7] Figure 8 also highlights an interesting feature of tax reform alluded to above in Figure 7. As depicted the increase in the saving rate following tax reform continues until time t_3, at which time the historical relationship between domestic saving, investment, and trade-driven capital flows is assumed restored. Tax reform may have very different effects on long-run saving and investment, however. If the long-run saving response is sufficiently great, then the U.S. could become a net capital exporter in equilibrium. (In Figure 7, this is depicted by the shift of the desired domestic saving curve to S_2.) In Figure 8, this would be shown by extending the steeper portion of the post-tax reform saving path past where it crosses the investment path as indicated by the dotted line portion of the curve. At some point thereafter the saving path would then level off when saving assumes its new equilibrium rate.

processes would ensure that U.S. net trade flows move in the direction necessary to increase net capital inflows temporarily. Therefore, the economy under tax reform would proceed as depicted in Figure 9 of the partially open economy. The title would change, however, to "The Case of a Trade-Constrained, Perfectly Open Economy."

Conclusion

The results presented here have profound implications for the dynamic economic modeling of tax reform and for tax revenue analysis of tax reform. The move to a consumption tax from the current income tax is sure to yield a higher level of economic activity if for no other reason than that the capital stock available to America's workers would ultimately be much greater. Consequently, employment and productivity would both increase, output would be higher, and tax revenues would be higher. The fact that the U.S. economy is at least partially open to cross-border capital flows is a determining factor as to how beneficial tax reform will really be. The extent of that openness will help determine how rapidly the economy will reap those benefits.

Many of the models considered in the Joint Tax Committee's Tax Modeling Project assume the economy is closed to cross-border net capital flows. The limitations on economic activity from assuming a closed economy, or a trade-driven capital flows economy, can be strict because economic activity would then depend solely on the responsiveness of the domestic savings rate relative to the desired increase in the capital stock at the pre-tax reform interest rate.

The assumption that the U.S. economy is closed to cross-border capital flows, or that these flows are determined solely by the net trade in goods and services, is extraordinarily difficult to maintain. If the economy is at least partially open to cross-border capital flows, which would seem to be the case, then the beneficial effects of tax reform for the economy may be much greater for three reasons. First, the responsiveness of domestic saving to tax reform becomes immaterial to the long-run size of the capital stock. If the long-run increase in domestic saving is less than the increase in

the desired capital stock, then capital will be imported from abroad. If domestic saving exceeds the increase in the desired capital stock, then the excess domestic saving will be invested abroad. Tax reform might even cause the United States to become a net capital importer in the short run and a net capital exporter in the long run. The increase in additional domestic saving would determine how much of the world capital stock is owned by U.S. citizens, but it would not affect the size of the U.S. capital stock.

Second, if some level of cross-border capital flows persists, then after-tax interest rates would eventually return to their pre-tax reform levels. This, in turn, means that the capital stock would eventually increase by the same amount that it would if the economy were fully open to cross-border flows. Abstracting from any relationship between technological development and capital investment, in the long-run the increase in the capital stock, in national output, and in tax revenues would be the same whether the economy is partially or completely open to cross-border capital flows.

However, if the economy is partially open to cross-border capital flows, then the economy would achieve the same equilibrium as though it were perfectly open, but it would attain this higher level more slowly. In effect, restricting the availability of saving for investment lengthens the period of adjustment to the new equilibrium growth path, but it does not affect the equilibrium growth path itself, unlike the assumption where net capital flows respond only to net trade flows.

Finally, because the balance of payments must balance, the rate at which the economy can increase its net imports of capital is limited by the rate at which imports can increase and exports can decline. Exchange rate pressures due to a worldwide increased demand for dollars would cause the dollar to appreciate relative to other currencies, and so net trade flows should adjust so as to allow an increase in net capital inflows, assuming this exchange rate effect is not offset by some other forces. Thus, even if the U.S. economy is perfectly open to cross-border capital flows in the sense that there are no market impediments to these flows, the short-term availability of net capital inflows may be limited. For modeling the effects of tax reform on the economy, therefore, it may be most appropriate to treat the U.S. economy as though it were partially open to these capital flows.

Economists cannot say whether the U.S. economy is perfectly open to cross-border capital flows, though they can say with confidence that these flows are driven by many forces including the net trade deficit. The first step in any attempt to model the effects of tax reform is to determine what change, if any, would occur in the equilibrium growth path. Very little can be said about short- or medium-term effects of tax reform without some clear sense of the long-term effects. The result that the new equilibrium is unaffected by the extent to which net capital flows respond to changes in differential interest rates, so long as there is a response, is therefore crucial to estimating the effects of tax reform.

While the distinction between a partially open economy and a fully open economy is irrelevant to the long-run, it may be very relevant to the short-run performance of the economy and how long it takes the economy to move from its old equilibrium to its new equilibrium growth path. Similarly, even if there are no impediments, per se, to cross-border capital flows, the pace at which the trade deficit adjusts may still constrain the increase in capital flows. Thus these issues are very important to the development of tax reform legislation and to how the Joint Tax Committee and the Department of Treasury score the revenues following tax reform, and it is an issue deserving of a great deal more study.

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