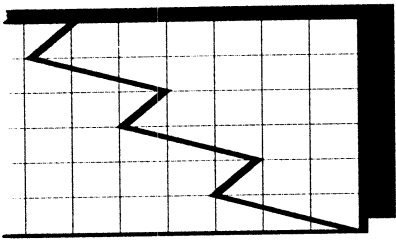


# POLICY AND ECONOMIC GROWTH



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Chapter 2  
The ABCs of  
Corporation Tax Incidence:  
Insights into the Open-Economy Case

Arnold C. Harberger

Distribution  
Making Tax  
Taxation."  
Washington,

This paper explores the principles that govern the incidence of the corporation income tax (CIT). It begins with a review of an analysis of this tax in a closed-economy setting. Although this is familiar territory to public finance economists, it is a useful introduction for nonprofessionals. The closed-economy case also carries over to an international economy, in the sense that the world itself is a closed economy; thus, the closed-economy case can be used to analyze a situation in which the major trading nations of the world have adopted CITs at similar rates.

CORPORATION TAX INCIDENCE IN A CLOSED ECONOMY

The key to CIT analysis is the realization that this is a tax on the income from capital—but not a general tax on such income. There are at least two senses in which it is a partial tax: (1) it strikes the income from capital in the corporate sector of the economy, but not in the noncorporate sector; and (2) within the corporate sector itself, it strikes the income from corporate equity but not that from corporate debt. (There are some who think the junk-bond frenzy of the early 1980s represented a belated “discovery” by U.S. corporations of the full possibilities of tax saving by changing a firm’s financial structure away from equity and toward debt.)

Most of the by-now traditional analysis of CIT incidence focuses on this tax as striking the income from capital in the corporate sector. In the empirical analyses that have been done, differences in debt-equity ratios, as between industries and sectors, are taken into account by the use of an effective rate of corporate tax. This effective rate is simply the ratio of actual CIT payments to the total income (gross of tax) accruing to both equity and debt capital. For example, a firm with total income from capital of \$1,200, with \$600 being interest payments and \$600 being gross-of-tax profits, with, say, half the profits being paid in corporation income taxes (reflecting a legal tax rate of 50 percent) would be treated as being subject to a 25 percent effective tax rate, because that is the fraction that tax payments bear to the total income from capital. This type of treatment does not cause much difficulty in the study of incidence, though it does lead to an underestimate of the efficiency costs associated with the CIT.

Now, treating the CIT as a tax on the income from capital in the corporate (but not in the noncorporate sector) modern incidence analysis has concluded that any fall in the net-of-tax rate of return would have to be general throughout the economy. If returns in the corporate sector fell, while those in the noncorporate sector did not, there would ensue a flow of capital out of the corporate and into the noncorporate sector, driving up the rate of return in the former and drawing down the rate of return in the latter. Thus, a picture such as that shown in Tables 1 and 2 emerges.

Tables 1 and 2 both start with a capital stock of \$12,000, equally divided between the corporate and noncorporate sectors (in the real world, housing and agriculture are important parts of the noncorporate sector). In both cases, the tax results in the movement of 2,000 units of capital from the former to the latter sector. This movement is sufficient, in both cases, to bring about the equalization of net-of-tax rates of return in the two sectors. What is different is that in the case of Table 1, this equalization takes place at a rate of return (6 percent) that is two-thirds of the initial rate (9 percent), while in the case of Table 2, the post-tax equalization takes place at a rate of return (8 percent) that is four-fifths of the initial rate of 10 percent.

It is easy to see that the incidence of the tax is very different in the two cases. In Table 1, the income accruing to owners of capital falls by \$360, while tax revenues are only \$240. In Table 2 the owners of capital suffer a loss of only \$240, while tax revenues equal \$320. At the bottom of each of the tables is an accounting of the rest of the incidence picture. When the gross-of-tax rate of return to capital rises (as it does in the corporate sector in both Tables 1 and 2), the increment of rate of return, multiplied by

Table 1 Closed Economy: Heavy Incidence of CIT on Capital

	Corporate sector	Noncorporate sector	Total
<b>No-tax case</b>			
Capital stock	\$6,000	\$6,000	\$12,000
Rate of return	9%	9%	—
After-tax earnings of capital	\$540	\$540	\$1,080
<b>With corporation income tax at a 50% rate</b>			
Capital stock	\$4,000	\$8,000	\$12,000
Gross of tax rate return	12%	6%	—
Net of tax rate of return	6%	6%	—
Tax revenues	\$240	—	\$240
After-tax earnings of capital	\$240	\$480	\$720

Fall in earnings of capital:  $1,080 - 720 = \$360$   
Tax revenue:  $\$240$

Note: Capital bears much more than the full burden of the tax (by 120)  
Consumers of corporate sector products bear  $(12\% - 9\%) \times 4,000 = \$120$   
Consumers of noncorporate products bear  $(6\% - 9\%) \times 8,000 = -240$   
Consumers as a whole bear a negative burden  $= -120$

This is exactly equal to the excess of capital's loss over the government's gain.

the ending supply of capital in the corporate sector, is reflected in increased product prices in that sector and is borne by consumers to the extent they consume corporate sector products. This burden amounts to 120 in Table 1 and to 240 in Table 2. Likewise, when the rate of return to capital in the noncorporate sector falls (as it does in both Tables 1 and 2) the drop in the rate of return, multiplied by the ending supply of capital in the noncorporate sector, is reflected in decreased prices in that sector and is a benefit to consumers to the extent they consume the products of the noncorporate sector. This benefit amounts to 240 in Table 1 and 160 in Table 2.

When the burdens borne by consumers of corporate sector products are combined with the benefits accruing to consumers of noncorporate products, the end result is a net effect on consumers. This net effect is a benefit of 120 in Table 1 (a negative burden) and a positive burden of 80 in Table 2. When these effects on consumers are combined with the burdens on capital described earlier, they end up accounting for the full tax revenue received by the government.

(The above analysis assumes that the wages of labor do not change or, perhaps more accurately, that the providers of labor lose or gain in their role as consumers of corporate and noncorporate products. So, too, the providers of capital have their burden made heavier to the extent they consume corporate sector products, whose real price has risen, and have it eased to the extent they consume noncorporate products, whose real price has fallen. The “assumption” that wages do not change is simply a technical device, saying that we are “normalizing” on the wages of labor. In technical terms, the wage of labor is treated as the *numeraire*.)

Table 2    Closed Economy: Light Incidence of CIT on Capital

	Corporate sector	Noncorporate sector	Total
<b>No-Tax case</b>			
Capital stock	\$6,000	\$6,000	\$12,000
Rate of return	10%	10%	—
After-tax earnings of capital	\$600	\$600	\$1,200
<b>With corporation income tax at a 50% rate</b>			
Capital stock	\$4,000	\$8,000	\$12,000
Gross of tax rate return	16%	8%	—
Net of tax rate of return	8%	8%	—
Tax revenues	\$320	—	\$320
After-tax earnings of capital	\$320	\$640	\$960

Fall in earnings of capital: 1,200 - 960 =   \$240  
Tax revenue:                                       \$320

Note: Capital bears much less (-80) than the full burden of the tax  
Consumers of corporate sector products bear   (16% - 10%) x 4,000 =   \$240  
Consumers of noncorporate products bear       (8% - 10%) x 8,000 =   -160  
Consumers as a whole bear a positive burden                                       =       80

This is exactly the amount by which capital's burden (240) falls short of the tax proceeds (320).

# CORPORATION TAX INCIDENCE IN AN OPEN ECONOMY: THE BASIC ANALYSIS FOR A SMALL DEVELOPING ECONOMY

Corporation tax incidence in an open economy considers two major links between this economy (the one where the tax change is taking place) and the rest of the world (ROW). The first is the capital market, linking the rates of return to capital here and in the ROW. The second is the market for tradable goods, linking their prices in this market with those that prevail abroad for the same goods. In this section of the paper, we "normalize" on the prices of corporate sector tradable goods and the assumption is made that the rates of return to capital are governed by a worldwide market wherein the after-tax rates of return to capital in the principal world centers tend to be brought to equality.

To begin, four sectors are defined: (1) corporate tradable (manufacturing), (2) corporate nontradable (transport and public utilities), (3) noncorporate tradable (agriculture), and (4) noncorporate nontradable (services and housing). This analysis will specify only two foreign sectors: (1) the corporate tradable sector and (2) the rest. It will become clear from what follows that this analysis does not require a further breakdown on the foreign side, but it would cause no change in the basic analysis or conclusions to provide such a breakdown.

As an introduction to open-economy incidence analysis the case of a small developing country is considered. The assumption that distinguishes this case is that the world rate of return on capital is something that simply lies beyond the influence of that small country. Putting a tax on the income from corporate capital would simply lead to adjustments whereby less capital would be at work in that country. If the rate of return is 10 percent (with no tax), and then a tax with a 50 percent rate is imposed, the rate of return becomes 10 percent in the untaxed (noncorporate) sectors, with a gross-of-tax rate of return of 20 percent in the taxed (corporate) sectors. Moving from the first equilibrium to the second requires setting aside all corporate-sector projects with prospective yields of 10, 12, 14, 16, 18, etc. percent and sticking only with those projects yielding 20 percent or more. This would clearly mean a substantial reduction in the amount of capital in these sectors. Where would the capital go? It would go abroad, where it would earn a 10 percent after-tax return in virtually any application.

In realizing that the presence of the tax implies that significantly less capital will be combining with the same amount of total labor (in the small developing country), it should not come as a surprise that the equilibrium real wage has to be lower. But there is an additional and more critical reason (above and beyond simple capital-labor substitution) why labor's wage must fall: the need to compete with the ROW in the production of manufactures (corporate tradables). The tax is a wedge that has been inserted into the pre-existing cost structure. The prices of corporate tradable products cannot go up because they are set in the world marketplace; the net-of-tax return to capital cannot go down (except transitorily), because capital will not be content to earn less here (in the small developing country) than abroad. Some element of cost has to be squeezed in order to fit the new tax wedge into a cost structure with a rigid product price at one end and a rigid net-of-tax rate of return to capital on the other. The only soft point in this cost structure is wages. If they do not yield, the country may simply stop producing corporate tradables. Or, if the country continues to produce such goods, then

wages must have yielded—by just enough to absorb the extra taxes that have to be paid (see Table 3, panel A).

If the after-tax rate of return to capital does not change and the price of the product does not change, and wage costs per unit of product are reduced by exactly enough to pay the newly inserted tax, then the activity will be able to survive, even in the presence of the tax.

But it is not consistent with market processes for wages (of any given kind of labor) to go drastically down in one sector and yet stay the same in the rest of the economy. The post-tax equilibrium will not come about instantaneously, but when it does finally emerge it should be characterized by equal pay for equal work, for each type of labor, no matter in what industry that work is performed.

Thus, the fall in wages essential to the survival of manufacturing activity will apply across the board, affecting all industries and activities in the economy. In an activity like services, which are in the noncorporate sector and therefore do not pay the corporate tax, this will result in a reduction of the final price to consumers. In an activity like agriculture (the noncorporate tradable sector), the price of the product is determined internationally, no tax is paid, and wages fall. What is the result? The economic rent of land will rise to reflect the fall in wages. (So developing country farmers should secretly applaud when a CIT is imposed.) The corporate nontradables sector (public utilities and transport) pays CIT just as does manufacturing. If it had the same degree of capital intensity as manufacturing, it could pay the same tax and have its product price stay stable, mimicking the result in manufacturing. But here there is no need for the price to stay stable, for we are talking about nontradable goods and services. Thus, in a highly capital-intensive portion of the sector (such as electricity), product prices would rise, while in a more labor-intensive portion (such as taxi or bus transport) product prices would probably fall.

Table 3 presents a visual picture of price formation in the four sectors, before and after the tax is imposed. The significant story here is that labor in manufacturing bears exactly the full burden of the tax in manufacturing. If this means a fall of 10 percent in real wages, so be it. That fall, however, extends to the entire labor force. In the public utilities and transportation sector, this fall in wages is matched (or more than matched if Sector B is more capital intensive than Sector A) by tax payments to the government. (The more-than-matching part is passed on to consumers of the sector's product.)

In agriculture, labor suffers just as much (on a per worker basis) as in manufacturing, but here the burden borne by labor is matched by a rise in land rents. In the services and housing sector it is similar, except that labor's loss here is reflected in a benefit to consumers.

Put another way—labor's loss in manufacturing is exactly equal to CIT collections from manufacturing. All other labor bears losses that match those of labor occupied in manufacturing. The only thing left to put against the losses of all the workers occupied outside of manufacturing are the tax collections from the corporate nontradable sector (identified as public utilities and transport).

The tax receipts are  $(K_a + K_b)T$ , where  $K_a$  is the capital occupied in the corporate tradables sector,  $K_b$  is the capital occupied in the corporate nontradable sector, and  $T$  is the tax, expressed per unit of capital, in the post-tax situation.

Table 3    Tax Incidence in a Small Developing Country

# Price Formation Before and After Corporation Tax Is Imposed

Before

Net return

Wages

After

Net return

Taxes

Wages

Before

Net return

Wages

After  
Price Up

Net return

Taxes

Wages

A. Corporate Tradable Sector  
(Manufacturing)

Taxes inserted; Rate of return to capital unchanged; Wage rates must fall to absorb the full tax. Tax paid by manufacturing is fully borne by those workers who continue to work in manufacturing.

B. Corporate Nontradable Sector  
(Public Utilities and Transportation)

This is assumed more capital-intensive than manufacturing. Wages fall by the percentage determined in manufacturing. Taxes are inserted. Because capital intensity is greater than manufacturing, tax wedge is greater, and prices paid by consumers rise. Between Sectors A and B as shown, labor in the two sectors absorbs all of the burden of the tax, except the part represented by the price rise.

The burden on labor is  $-\Delta w(L_a+L_b+L_c+L_d)$ ; that is, it is equal to the fall in wages per worker multiplied by the entire labor force.

Linking these two magnitudes we have that  $TK_a = -L_a\Delta w$ ; that is, labor's loss in manufacturing just matches the wedge introduced by tax collections in manufacturing.

The total tax burden is  $(K_a+K_b)/K_a$  times  $TK_a$ .

Labor's loss is  $(L_a+L_b+L_c+L_d)/L_a \times (-L_a\Delta w)$ .

Hence labor will "overbear" the tax to the extent that the fraction of corporate capital in manufacturing exceeds the fraction of the total labor force in manufacturing. (Here, as before, manufacturing stands for the corporate tradable sector.)

The manufacturing sector is invariably much larger relative to the total corporate sector than is the manufacturing labor force relative to the total labor force. Plausible

(Table 3 continued)

Before	After	Before	After Price Down ▼▼										
<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr><tr><td>Land rent</td></tr></table>	Net return	Wages	Land rent	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr><tr><td>Land rent</td></tr></table>	Net return	Wages	Land rent	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages
Net return													
Wages													
Land rent													
Net return													
Wages													
Land rent													
Net return													
Wages													
Net return													
Wages													

C. Noncorporate Tradable Sector  
(Agriculture)

Uses relatively small amount of reproducible capital. Net return to same unchanged. Wages go down as general wages fall. Since product price is determined in world market, it does not change. Hence land rent (the residual share in agriculture) goes up.

Labor here bears the same fall in wages as in Sectors A and B. But benefit goes not to government but to landowners.

D. Noncorporate Nontradable Sector  
(Services and Housing)

Here depicted as of same labor intensity as manufacturing. Actually, services are much more, and housing is much less labor-intensive than manufacturing. It matters little. In every case the net return should stay the same and the wages component of price should fall. Labor here bears the same fall in wages as in Sectors A and B. But benefit goes to consumers of services, not to government.

orders of magnitude are 1/2 for the former fraction and 1/5 to 1/4 for the latter one. Using these numbers, labor would bear 2 to 2 1/2 times the burden of the CIT in a typical developing country.

Relaxing the Link between Corporate Tradables Prices and World Prices

There can be no doubt that the assumptions made in the above analysis are rigid, but I believe they capture the essence of open-economy incidence analysis (for the CIT). In what follows the analysis takes an important step toward relaxing these assumptions, and in the next section (which is aimed at covering the United States case) some further relaxation will take place.

Here is introduced the notion that only some tradable goods have their prices fixed in world markets, while for others even small developing countries face downward sloping demand curves. In the latter category I would place tradable goods such as wines



and cheeses, which have distinctive properties among countries of origin, to be contrasted with items such as powdered milk, electrical wiring, and copper ingots, which are substantially homogeneous across countries.

The present analysis divides Sector A into two parts—Sector  $A_f$  where international prices are fixed, and sector  $A_v$  where they can vary. This changes the story, but not very much. The role previously played by Sector A taken as a whole is now played by Sector  $A_f$ . This is where the tax wedge has to be inserted between a world price whose variations are beyond the control of the country in question and a rate of return to capital that is also beyond its control. The only way for this activity to survive is for the wages of labor to go down sufficiently to absorb the full tax paid in Sector  $A_f$ .

Thus we have  $K_{af}T = -L_{af}\Delta w$ .

The total tax is again  $(K_a+K_b)T$  where  $K_a$  now covers capital in  $A_f + A_{v1} + A_{v2} + A_{v3}$ .

Labor's burden is again  $-(L_a+L_b+L_c+L_d)\Delta w$ .

Now labor's total burden is  $(L_a+L_b+L_c+L_d)/L_{af} \times -L_{af}\Delta w$ , while the full burden of the tax is  $(K_a+K_b)/K_{af} \times K_{af}T$ .

Table 4    Small Developing Country with Downward Sloping Demand for

Price Formation Before and After Corporation Tax Is Imposed

Before	After	Before	After										
<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Taxes</td></tr><tr><td>Wages</td></tr></table>	Net return	Taxes	Wages	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Taxes</td></tr><tr><td>Wages</td></tr></table>	Net return	Taxes	Wages
Net return													
Wages													
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$A_f$     Corporate Tradable Sector  
          (World prices fixed for the country)

$A_{v1}$     Corporate Tradable Sector  
          (World prices can vary but initial  
          shares of labor and capital are the  
          same as  $A_f$ )

So labor will bear more than the full burden of the tax so long as the fraction of the corporate capital stock in the “competitive tradable” sector  $[K_{af}/(K_a+K_b)]$  is greater than the fraction of the *entire* labor force in the “competitive tradable” sector  $[L_{af}/(L_a+L_b+L_c+L_d)]$ .

Table 4 displays the essential relationships in this case. The first panel of this table deals with sector  $A_f$ —where the world prices of the product are given by the world market, and the country in question has no influence over the prices. It is here that the main action takes place in the corporate tax incidence because this sector determines what will happen to wages. Wages must fall as shown, except if the  $A_f$  sector ceases to exist—that is, gets driven out of business.

Once the course of wages is determined, as shown in the first panel of Table 4, the remaining scenarios follow quite logically. Panel  $A_{v1}$  shows the case of a part of the corporate tradable sector where the world prices of the country’s goods (say, certain export goods) can vary (because the goods face downward sloping demand curves, like wine and cheese), but in fact do not because the factor proportions are the same as in the  $A_f$  sector.

The other two panels of Table 4 show the  $A_{v2}$  sector where prices can vary and move upward because this sector is more capital-intensive than sector  $A_f$ , and the  $A_{v3}$  sector where prices can vary but move downward because this sector is less capital-intensive than sector  $A_f$ . The movement of prices upward and downward produces

Some Tradable Goods													
(Table 4 continued)													
Before	After Price Up ▲ ▲	Before	After Price Down ▼ ▼										
<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Taxes</td></tr><tr><td>Wages</td></tr></table>	Net return	Taxes	Wages	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Taxes</td></tr><tr><td>Wages</td></tr></table>	Net return	Taxes	Wages
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Taxes													
Wages													
<b>A<sub>v2</sub></b> Corporate Tradable Sector (World prices can vary but initial share of capital is larger than in $A_f$ )		<b>A<sub>v3</sub></b> Corporate Tradable Sector (World prices can vary but initial share of capital is smaller than $A_f$ )											
Wages go down in same proportion as $A_f$ . Tax wedge is larger than that in $A_f$ , hence prices of these tradables rise, shifting part of burden to consumers here and (if an export good) abroad.		Wages go down in same proportion as $A_f$ . Tax wedge is smaller than that in $A_f$ , hence prices of these tradables fall, producing a benefit to consumers here and (if an export good) abroad.											

additional burdens or benefits for consumers, but it does not modify the determination of the burden borne by labor as such, which is determined directly in panel  $A_7$ . Thus the presumption remains that labor will more than fully bear the tax, since it is overwhelmingly likely that the fraction of the *corporate* capital stock occupied in the  $A_7$  sector will exceed the fraction of the total labor force occupied in that sector.

### AN EXPLORATION OF THE UNITED STATES CASE

The most significant feature that distinguishes the case of the United States from the case of a small developing country (as presented above) is the relative importance of the United States in the world capital market. There was a time, during the years following World War II, when the United States may have accounted for more than half of the total capital stock in the non-Communist part of the world. Today the fraction is considerably less, probably more like 30 to 40 percent. But this is still a large fraction, and it signifies that disturbances originating in the United States will almost automatically affect the equilibrium of the world capital market.

Table 5 is built on the same principles as Tables 1 and 2, but now includes corporate and noncorporate sectors—both here and abroad. The tax being considered, however, is just the U.S. CIT. In the table this is the only tax, but it is important to remember the analysis of the table shows the effects of changing the U.S. tax in the presence of any given level of foreign taxation of capital income.

Table 5 is deliberately constructed to have capital bear exactly the full burden of the tax. This fits with much of the literature on the taxation of corporation income in

Table 5 Possible Tax Incidence in the United States Case

	U.S. corp. sector	U.S. noncorp. sector	Foreign corp. sector	Foreign noncorp. sector
<b>No-tax case</b>				
Capital stock	8,000	8,000	10,000	10,000
Rate of return	9%	9%	9%	9%
After-tax earnings of capital	720	720	900	900
<b>With corporation income tax at a 50% rate</b>				
Capital stock	4,500	9,000	11,250	11,250
Gross of tax rate return	16%	8%	8%	8%
Net of tax rate of return	8%	8%	8%	8%
Tax revenue	360	—	—	—
After-tax earnings of capital	360	720	900	900

Note: Fall in net earnings of capital, worldwide =  $3240 - 2880 = 360$

This is exactly equal to the tax revenue, so in a sense the owners of capital (worldwide) bear exactly the full burden of the tax. But see Table 6 before jumping to conclusions.

a general equilibrium setting, in the sense that it is quite easy for capital to bear either more than or less than the full burden in such a setting, making the case of its just bearing the full burden a sort of plausible center of gravity among the many possible outcomes.

But the important thing to note is that  $5/8$  of the final burden shown in Table 5 falls on the income from capital located in foreign countries. Only  $3/8$  of the burden falls on capital that is in the United States in the final equilibrium. I will not elaborate here on the facts that some of the capital held abroad is owned by U.S. companies or citizens, and that some of the capital held in the United States is owned by foreign companies or nationals. The table directly shows how the burden falls on capital *located* in the United States and abroad. Since the rate of return to capital has fallen by one percentage point everywhere, when this burden is distributed according to ownership, then all owners of capital worldwide also will be sharing the full burden of the tax in proportion to their holdings. Thus if U.S. entities own a third of the world's capital stock, they will, in their role as owners of capital, bear just one-third of the burden of the U.S. CIT. Foreign owners of capital will in this case bear  $2/3$  of the burden.

But this is not the end of the story. An analysis similar to that in Tables 3 and 4 must still be performed. The key point is that in the overall tax incidence there can be important effects on consumers of the output of different sectors, and *extremely* important effects on the wages of labor.

To see the latter point with clarity, let us focus on the corporate tradables sector, and within it on the subsector denoted as  $A_f$  in Table 4. This is the sector that drives the whole analysis, insofar as wages are concerned. The effects on wages (here and abroad) are determined in the  $A_f$  sector, as long as production in this sector is not driven out of existence by the insertion of the corporation tax into its price structure (in the United States).

For this analysis, the most convenient choice of *numeraire* is without doubt the price of the product of the  $A_f$  sector. This is the only product price that tends to be equalized, here and abroad. This price and the net-of-tax rate of return on capital are the links that strongly connect the domestic and foreign markets.

Table 6 shows what happens in the  $A_f$  sector, here and abroad, as a consequence of the insertion of the tax wedge in the United States. Clearly, wages must go down in the United States by a significant amount ( $7/8$  of the tax burden in the  $A_f$  industry). And this reduction in wages must consequently be transmitted to all other U.S. labor.

At the same time, in the ROW wages must go up in this sector to compensate the fall in the rate of return from 9 to 8 percent. This rise is very modest compared to the U.S. fall in wages, but it is nonetheless present, and must be noted.

Tables 6, 7, and 8 try to summarize the effects of the U.S. CIT on prices and factor incomes both in the United States and abroad. The centerpiece of the story follows closely upon the scenario of Table 4. The link takes place through the prices of undifferentiated, relatively homogeneous tradables, whose world market prices are independent of their countries of origin. In this analysis the world price of such goods is the *numeraire*; it thus is held constant throughout the analysis.

The key place where this link has its effect is in the  $A_f$  part of the corporate tradables sector—the part whose product price is equalized in world markets. Here the insertion of the tax wedge has to be substantially absorbed by labor, if the activity is going to survive at all. In the example of Table 6, it turns out that one-eighth of the tax

Table 6    The United States Case (Tax Imposed Only in the U.S.)

Price Formation Before and After Corporation Tax Is Imposed												
Before	After	Before	After									
<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Taxes</td></tr><tr><td>Wages</td></tr></table>	Net return	Taxes	Wages	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages	<table><tr><td>Net return</td></tr><tr><td>Wages</td></tr></table>	Net return	Wages
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**A<sub>f</sub>** U.S. Corporate Tradable Sector  
(World prices fixed)

The net rate of return goes down from 9% to 8%, "absorbing" 1/8 of the tax imposed upon this sector. The other 7/8 is absorbed by labor in this sector, as wages are pushed down to accommodate the insertion of the tax wedge.

**A<sub>f</sub>** Corporate Tradable Sectors in  
Other Countries  
(World prices fixed for each country)

The net rate of return goes down abroad, just as in the United States. But there is no tax wedge abroad (or more realistically, whatever wedge there is remains in place), so wages go up to reflect the one percentage point fall in the net rate of return.

wedge is absorbed by the worldwide fall in rates of return (itself induced by the tax). The rest of the tax wedge is reflected in a fall in the wage rate in the United States (in the exercise of Table 6). All that happens in the other sectors in the United States is simply the reflection of this fall in the wage rate, plus the drop from 9 to 8 percent in the net rate of return on capital. In the corporate nontradable sector, the gross-of-tax rate of return to capital rises to 16 percent, while the wage rate falls. So, its product prices will go up or down or stay the same, depending on the capital intensity of each particular corporate nontradable activity. Almost certainly, public utility rates will rise (because their activities are highly capital-intensive) and taxi and bus fares will fall (because these activities are labor-intensive).

In the noncorporate tradable sector, which has been identified with agriculture, the cushion that absorbs the changes in wages and in the net rate of return is the residual share of income flowing to land. This share (the economic rent of land) must rise, because both of the other key factor prices have gone down.

The noncorporate, nontradable sector is similar to the agriculture sector in that both the cost of capital and the cost of labor go down, but here the cushion that absorbs these factor price changes is product prices rather than land rents. (Recall that in the case of agriculture, product prices are assumed to be fixed in world markets. Any

Table 7 Consequences for Other Sectors in the United States

A <sub>V</sub> Corporate Tradables Sector (Where world prices can vary)	World price stays the same if capital intensity the same as $A_f(A_{V1})$ . World price rises if capital intensity greater than $A_f(A_{V2})$ and falls if capital intensity less than $A_f(A_{V3})$ . In all cases labor's wage falls as determined in the $A_f$ sector, and capital's rate of return goes down (as shown in Table 5).
B Corporate Nontradable Sector (Public Utilities and Transport)	Results similar to those of Table 3. If capital intensity is the same as $A_f$ , product price stays the same. Product price rises for parts of this sector with capital intensity higher than $A_f$ ; product price falls in those parts with lower capital intensity.
C Noncorporate Tradable Sector (Agriculture)	Result is similar to that of Table 3. For products with world prices fixed, land rent must go up, as both the wage rate and the net return to capital are falling.
D Noncorporate Nontradable Sector (Services and Housing)	Results similar to those of Table 3. Both the rate of return and the wage rate go down, so the relative prices of all of these items should fall, benefiting consumers of such items.

agricultural activities whose prices are basically determined within the U.S. market should be thought of as part of the noncorporate nontradable sector.) Once again the precise outcome depends on factor proportions—prices will fall more in labor-intensive services than in capital-intensive activities.

We now turn to the consequences in the ROW, following upon the imposition of a CIT by the United States alone. The driving force here, as shown in Table 5, is what happens in the  $A_f$  sector—that part of the corporate sector producing substantially homogeneous products whose prices are fixed in the world marketplace. It is here that a rise in wages is determined, which absorbs the drop from 9 to 8 percent in the net rate of return on capital. This wage rise extends to all sectors of the ROW economy.

Indeed, if the average capital intensity of the other sectors—the  $A_V$ , B, C, and D sectors—in the ROW economy happens to be the same as that in its  $A_f$  sector, then the overall gain of labor in the ROW just matches what capital located there loses through the fall from 9 to 8 percent in its net rate of return. In such a case there would be movements of product prices as well, reflecting different capital and labor intensities in different activities in all those places where product price is not determined in the world marketplace.

Table 8 Consequences for Other Sectors in the Rest of the World

A <sub>V</sub> Corporate Tradables Sector (Where world prices can vary)	World price stays the same if capital intensity the same as $A_f(A_{V1})$ . World price falls if capital intensity greater than $A_f(A_{V2})$ and rises if capital intensity less than $A_f(A_{V3})$ . In all cases labor's wage rises and capital's return goes down (as shown in Table 5).
B Corporate Nontradable Sector (Public Utilities and Transport)	Results follow by analogy from the above. If a part of this sector (electricity) is highly capital-intensive, its price will fall. If another part is highly labor-intensive (taxis and buses), its price will rise. In between, at some critical degree of capital intensity, there might be activities whose price stays the same.
C Noncorporate Tradable Sector (Agriculture)	The rate of return falls and the wages of labor rises, with product price determined in the world market. The residual share accruing to land may fall or rise. (Landowners can perceive a capital gain, even if the residual share falls, as a consequence of a lower [now 8%] capitalization rate.)
D Noncorporate Nontradable Sector (Services and Housing)	In foreign countries (where no tax change is taking place) the prices of a capital-intensive sector like the provision of housing services will tend to fall, while those of highly labor-intensive services will tend to rise.

In agriculture, where it is assumed that prices are determined in the world market, it is the economic rent of land that moves up and down to absorb the net effect of the fall in net return plus the rise in wages. Land rents would go down in areas where the main crops were highly labor-intensive, and would go up in areas (like dairy farming) where they were highly capital-intensive.

However, if the sum total of sectors A<sub>V</sub>, B, C, and D in the ROW is exactly as capital-intensive as the A<sub>f</sub> sector in the ROW, then the fall in the rate of return there is exactly matched by labor's gain. All the other effects—some products rising in price, others falling; some land rents rising, others falling—still would exist, but their effects would offset each other. That is, the gains of the lucky consumers plus those of the lucky farmers would exactly offset the losses of the unlucky consumers plus those of the unlucky farmers.

Where the overall capital intensity of A<sub>V</sub> + B + C + D differs from that of A<sub>f</sub>, labor's gain in the ROW would be either greater than or less than capital's loss there. If greater,

then ROW farmers plus consumers of ROW products would be net losers; if less, they would be net gainers.

Virtually nothing that happens in the ROW economy can help to offset the large losses that are sustained by labor in the United States. The only way a small offsetting benefit could sneak through to U.S. labor is in its role as consumers of corporate tradables produced abroad and whose prices have flexed downward (the ROW's  $A_{V3}$  sector) or in its role as consumers of noncorporate tradables (agricultural products) from the ROW where, because of product differentiation, some price flexibility was possible and where factor proportions were such that the actual price movement was downward. Obviously, these price effects must be small even in any one product, since they come from the difference between the effects of a small (one percentage point in the example) decline in the net return to capital plus a small rise in ROW wages. And if there are some ROW products for which the net effect of these two forces is negative, there surely will be others for which it is positive. One cannot plausibly think that U.S. workers only consume the products whose prices slightly fall in consequence of the imposition of a corporation income tax in the United States.

So we are left with the main conclusion, in spite of having designed the example so that capital bears precisely the full burden of the U.S. corporation tax, thinking of capital in a worldwide sense (capital in the United States bears only  $3/8$  of the burden), labor in the United States nonetheless will bear significantly more than the full burden. The  $5/8$  of the burden borne by capital located abroad will be offset mainly by a modest rise in wages abroad. If this more than offsets the losses of capital abroad, then foreign farmers plus consumers of ROW products will together bear the difference.

Turning now to the United States, labor's wage must fall very sharply in order to absorb the tax wedge being inserted into the price structure of that part of the corporate tradables sector ( $A_f$ ) where final products are substantially homogeneous and whose prices are basically set in the world market. This wage fall is likely to mean that labor will bear 2 to  $2\frac{1}{2}$  times the full burden of the U.S. CIT. Who benefits as a consequence of this huge burden on labor plus the additional amount ( $3/8$  of the total burden) borne by capital located in the United States? Mainly it is consumers of the products of the noncorporate, nontradable sector (whose prices unequivocally fall as both wages and net returns decline), and the owners of agricultural land whose economic rents rise to reflect both the fall in wages and the fall in the net rate of return.

This simple exercise shows how complicated the incidence picture can get, but I hope to have made its overall structure sufficiently clear so that readers can see that no smoke and mirrors are involved. I have worked throughout with simple, basic, and easily understandable concepts (in the end), with markets that are assumed to work, and with basic elements of cost (wages, the return to capital, and taxes that somehow have to be covered by the price of the product in any sustainable equilibrium of the economy).

The complexity arises from there being both negative and positive effects of the insertion of the U.S. CIT as a wedge into the tax structure of corporations located here. This means that the unlucky parties, here or elsewhere, end up bearing perhaps three to four times the burden of the tax (2 to  $2\frac{1}{2}$  times for U.S. labor, one time for capital), worldwide, plus something additional for consumers of products whose prices rise as a result of the tax. Offsetting this are substantial benefits to U.S. farmers (landowners) and to the consumers of U.S. housing services and the products of the U.S. noncorpo-



rate, nontradable sector in general. In the ROW it is mainly workers who perceive a benefit, much more modest than the U.S. workers' loss, but a benefit nonetheless. This benefit basically offsets the burden borne by capital in the ROW.

### ADDING ELEMENTS OF REALISM

I have tried to make the exposition of this paper as simple as possible—something I feel is essential when dealing with an intrinsically complex reality. I believe that the simplifications I have made retain all the essential elements—the skeleton, as it were, of the analysis. In this section I will append a series of brief notes, each of which deals with an aspect of the bare structure presented earlier—in the spirit of adding flesh to the skeleton.

#### Depreciation

The analysis neglected depreciation, in effect, assuming that capital assets live forever. In the real world they do not; the user cost of capital includes the net return plus depreciation. I dealt with net returns because it is the element that tends to be equalized across all the different uses of capital. By contrast, there is no tendency for the rate of depreciation on buildings to be brought into line with the rate of depreciation on machines. It is a simple step, then, to add to the structure of price formation in each sector, industry, or activity a component that reflects its own element of depreciation cost per unit of final product. Nothing in the structure of the analysis changes, nor do any of the conclusions.

#### Counting Value Added as the Product of Each Activity

Anybody who has tried to struggle through the thicket of input-output relations knows the complexity of these relationships among real-world industries. Also, that same experience reveals the fact that no known input-output matrix ever captures the real truth. Every "sector" can be broken into many "industries", every "industry" into many "activities", etc. The sensible path, then, is not through the thicket but around it, and the key to this path is a conceptual leap that takes the place of infinite amounts of data-grubbing. This conceptual leap focuses on value added as the product of each activity, leaving only the basic inputs of human agents plus reproducible capital plus land. For example, when we buy a car, using this conceptualization, we are buying in part the output of the automobile industry, in part that of the rubber industry, in part that of the glass industry, etc. No generality is lost by taking this conceptual leap, which is what has been done in this paper.

### The Rest of the World as Consisting of Many Countries

In the analysis above, the ROW is treated as a single entity. But, in fact it consists of many different countries, each with its own labor market, corporate tradables sector, corporate nontradables sector, etc. Nothing in this analysis changes in recognizing that there are dozens of foreign countries. Each will link to the world market through its own  $A_f$  sector. Each will have its consequent change in wages. The whole analysis that is applied above to the ROW will then be applicable to each separate country of those which together constitute the ROW.

### Existing Corporation Income Taxes

I framed the analysis as if there were no existing CIT anywhere, and then suddenly, a 50 percent CIT was inserted into the picture in one country (either a small developing country or the United States). This brings out the essence of the equilibrating process very sharply but it is not an experiment likely to be conducted in the real world. In the real world changes in tax rates occur in one or several countries. This analysis applies essentially intact when corporation income taxes are changed in any one country. The small developing country analysis applies to a small country, or even to a group of several countries adding up to a small part of the world economy. The analysis for the United States applies to the United States itself, or to another large entity like the European Union, big enough to have a significant effect on the net rate of return to capital worldwide. The important things to distinguish are: (1) the entity where the tax rate is being changed, and (2) all the rest of the world where, however many countries there are, the tax rates remain the same. Whereas in this text the whole wedge of a 50 percent tax is inserted, a real-world case might see a tax change from, say, 35 to 45 percent, which represents the insertion of an incremental wedge of 10 percentage points. All the analysis flows in this case, exactly as presented in the text, except that the consequent changes would be one-fifth as large.

The major point to bear in mind, in thinking of taxes here and abroad, is that the results are very different between the case where the United States, the European Union, or Japan operates alone in changing its CIT, and the case where all of them move their tax rates more or less in unison. This latter is the case where the traditional closed-economy analysis applies. It is here, then, where some plausibility can be attached to the idea of capital bearing the full burden of the tax, without great impact on the wages of labor.

### Putting the Analysis in Reverse

Obviously, if U.S. labor bears a burden equal to 2 or  $2\frac{1}{2}$  times the revenue proceeds of the U.S. CIT, one might find it attractive to consider a unilateral reduction of the

U.S. CIT with the aim of generating a positive impact on U.S. wages. This is a thoroughly legitimate thought in the sense that as long as the rest of the world does not follow the United States in its reduction of the CIT the contemplated benefits to labor will ensue. The tantalizing truth, however, is that the ultimate incidence effects of, say, a 10 percentage point reduction in the U.S. CIT will not be determined in Washington but in the other major capitals of the world, as they decide whether or not to follow Washington's initiative in reducing this tax.

### COMPARISON WITH A VALUE-ADDED TAX

In modern policy discussions, the value-added tax (VAT) is frequently treated as a plausible alternative to the CIT. This makes sense in that both taxes strike at the earnings of factors of production, and hit them in the economic activities where they are occupied. It is probably also true that, as the VAT has become one of the world's two most important revenue collectors over the period from the mid-1950s to the present, the relative contribution of the CIT has declined.

Table 9 shows price formation (in the levying country) before and after a VAT is imposed. Three cases are treated: one where wages and the rate of return stay the same, one where wages fall relative to the rate of return, and one where wages rise in relation to the rate of return. In the first of these cases the value-added tax is being introduced as an additional element of cost; prices thus rise, relative to factor rewards, to reflect the tax.

It is correct to say that in this case it is consumers who bear the tax. For although the value-added tax could equally well be said to lower real wages (if nominal wages are constant and prices rise), the fact remains that no real-world VAT is even close to being a fully general tax. Medical bills, educational costs, personal services, and housing costs

Table 9    The Case of a Value-Added Tax			
Price Formation Before and After a VAT Is Imposed			
Before	After	After	After
	Value-added tax	Value-added tax	Value-added tax
Net return	Net return	Net return	Net return
Wages	Wages	Wages	Wages
	If factor prices do not change	If factor prices change favoring capital	If factor prices change favoring labor

(at least on owner-occupied housing, but usually on nearly all) are typically exempt. Hence, individual workers with the same wage may nonetheless end up bearing quite different burdens, even with a tax at a uniform rate, simply because their consumption is allocated quite differently, as between goods and services that are covered and those that are not covered by the tax.

The first-order impact of a VAT, then, is to raise the prices of covered goods and services, relative to their factors' rewards, while leaving unchanged the prices of noncovered goods and services, relative to the earnings of the factors that enter in their production.

The important message here is that typically this impact will fall on imported products of each type, in exactly the same way as it hits those that are domestically produced. This is because value-added taxes are invariably (to my knowledge) administered with border tax adjustments (BTAs). These adjustments simply levy the VAT on all imports of any covered item, and rebate the VAT embodied in the exports of any covered item. (The credit method of administration makes it easy to know how much VAT is embodied in any export item, at its point of export). The exporting firm receives credit for such "embodied" tax, regardless of whether the item is sold at home or abroad; it simply does not pay tax on its export sales [usually through a procedure known as "zero-rating" of exports], while it does pay tax at the VAT rate on its sales in the domestic market.)

I have long used the analogy of an above-the-ground swimming pool to describe how BTAs work for value-added taxes (as well as other indirect taxes). The ground level is the level of world prices, expressed in pounds sterling, say, but out in the Atlantic or Pacific Ocean. The water level in the pool is the level of prices inside, say, the United Kingdom. When items enter the U.K., the border tax adjustment lifts their prices to the level of the pool; when items are exported, the tax credit that accrues upon export lowers their prices to the world level.

This example makes it easy to see how a VAT could be introduced into an economy, in principle, without giving rise to any change in factor prices. The internal price of each covered item would rise to reflect the tax, independently of whether it was produced at home or abroad. Each noncovered item would remain free of tax except to the extent that it had covered inputs.

There is, however, no reason why a VAT should leave factor prices precisely as they would be in its absence. As long as there are covered and noncovered sectors of significant size, we should expect a shift of demand, and hence of resources, out of the former and into the latter (more medical care, education, housing, etc.) This shift of demand might cause the bidding up or down of wages relative to the return to capital.

The last two illustrations in Table 9 show how changes in relative factor rewards could come into play. Here I have kept the net-of-tax price of the product constant, perhaps thinking of "covered tradables" by analogy to the  $A_f$  sector in the case of a CIT. It is easy to see how the idea of consumers bearing the tax carries through in all three "after" cases in Table 9.

It remains for consideration what happens in the event factor prices change, and the prices of nontradable covered commodities or covered tradables (like the  $A_v$  sectors treated earlier) can vary. Here it is obvious that benefits will accrue to the consumers of items whose net-of-tax prices fall. These will be outright benefits in the

noncovered sectors, and benefits helping to offset the tax in the covered sectors. Items whose net-of-tax prices rise will have additional burdens, to be borne by the consumers of those items.

There can be little doubt, then, that the incidence of a VAT is a vastly simpler analytical problem than that of the CIT. The complicated problems that arise with the CIT are essentially absent with the VAT.

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## Appendix 1

### For Economists: The Case of Several Activities in the $A_f$ Sector

The most troublesome point in the stated analysis is that the  $A_f$  sector ends up determining the effect of the CIT on wages. This occurs both in the United States and in the ROW. The embarrassing question is, what if there are two or more  $A_f$  sectors? The problem is a common one in international trade analysis. It shows up whenever there are more traded products than the number of relevant factors of production.

But the fact we are dealing with a common problem (for economic analysts) does not mean that this gives us the solution. I believe that to find the solution we have to recognize that reality contains subtler shades of variation than the simple models we economists create. In this case I want to blur the sharp edges of the  $A_f$  category. Consider a class of corporate-sector tradable goods in which the United States faces demand curves for its exports which slope downward, but very gently (i.e., have a high elasticity). When we insert the corporate tax wedge into these activities' cost structure, it will lead to different changes in product prices among the different  $A_f$  commodities, depending on their relative capital intensities. The highly capital-intensive ones may require price rises so substantial that the United States ceases to export those commodities. In the extreme, imports from abroad could totally supplant U.S. production of them. But if we think of a whole continuum of  $A_f$  commodities, there will probably be many that stay in existence (do not forget we have an  $A_f$  sector in the real world, and its commodities clearly have survived in the presence of the tax structure that exists). My vision is of such a sector with its prices rising as a consequence of the tax for its most capital-intensive products and falling as a result of the tax for its most labor-intensive products, but "on the average" staying constant. This means treating an average of  $A_f$  sector prices as the *numeraire*, rather than any particular one.

If we follow the above line, the basic incidence analysis presented above remains intact, with the added fillip of  $A_f$  prices that spread out in a relative narrow fan, some rising, some falling, but with their average remaining unchanged.

## VIEWING THE MOVEMENTS OF CAPITAL FROM HERE TO ABROAD

The easiest way to think about the adjustment process is to divide it into two hypothetical components. At the first step the CIT is imposed and the capital stock in the country in question (the small developing country or the United States) simply is reshuffled away from the corporate sector and toward the noncorporate sector. Suppose that here an equilibrium net rate of return of 6 percent is reached, compared with 9 percent initially. But now the rate of return abroad is still 9 percent. In the developing country case, capital flows abroad to bring all the net rates of return (in the different sectors) back up to 9 percent. In the United States case (in this example), the flow of capital at this step operates to bring the net rate of return down to 8 percent in the ROW, and to pull it up to 8 percent in the United States. It is important to realize that at this second step capital is flowing out of all the sectors in the United States, and into all the sectors in the ROW.

## ON THE EQUALIZATION OF RATES OF RETURN TO CAPITAL

In the case of a small developing country, it is unlikely that net rates of return will be the same as those prevailing in the main international centers. It is much more likely that some sort of differential will exist, so that in the developing country a net rate of 12 percent might occur side-by-side with a net rate of 9 percent in the industrial countries—call the difference a country risk premium. The analysis can proceed without modification in the presence of such a country risk premium. Simply assume that this risk premium is essentially the same in the presence of the tax as in its absence, or that if it changes as a consequence of the imposition of the tax, the change will be small in comparison to the size of the tax wedge.

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## Appendix 2

### An Analysis of Jane Gravelle's Paper\*

My main quarrel with Jane G. Gravelle's paper centers on the single word "corporate" in its title. The paper itself would be better described as concerning the incidence of a general tax on *all* income from capital. And, indeed, that is what is described and analyzed in the model presented in the paper.

That model postulates two countries, each producing a single good, and each starting out with a given amount of labor and capital. The tax that is introduced is assumed to fall on all the income generated by capital in the taxing country.

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\*Jane G. Gravelle, "Corporate Tax Incidence in an Open Economy," *Proceedings of the National Tax Association 1994*, forthcoming.

In the exercise leading up to Dr. Gravelle's equation (6, in her paper), capital redistributes itself away from the taxing country ("here") up to the point where rates of return here and abroad are again equalized. Under these assumptions capital (world-wide) ends up bearing precisely the full burden of the tax (just as was assumed in the example presented in my paper for the U.S. case). This burden is divided in the same fractions as the capital stock, the fraction  $g$  being borne by capital "here" and the fraction  $(1-g)$  of capital "there."

With further simplifying assumptions, Dr. Gravelle proceeds to determine, in equation (10) that the burden on labor income "here" will be the fraction  $(1-g)$  of the tax. All of this is in the spirit of my own paper, but analyzes a different tax. Recall that I dealt with the tax as a "wedge" inserted between the world price and the remuneration of factors of production. Dr. Gravelle's model works in exactly the same way. A wedge is introduced "here"; capital income falls "here" to absorb part of the that wedge; therefore, if product prices do not change, labor income "here" must fall to absorb the rest of the wedge. Thus labor and capital "here," taken together, bear the full burden of the tax. But also, capital here plus capital abroad bear the full burden. What makes these effects compatible is a rise in the earnings of labor abroad.

All of this is practically the mirror image of my own exposition. The key difference is that since Dr. Gravelle does not have corporate and noncorporate sectors, her tax falls on all capital, and when the wedge is introduced labor in all sectors and this economy that helps to absorb it. In my model the heart of the action takes place in manufacturing (the corporate tradable sector). When the tax wedge is introduced in manufacturing, wage rates in manufacturing must fall by enough to absorb any part of the wedge that has not already been absorbed by reduced rates of return in that sector.

One way to think of the difference is to consider Dr. Gravelle's tax as striking the income from all capital at a 25 percent rate, while my tax falls at a 50 percent rate, but just on the income from corporate capital. Think of imposing Dr. Gravelle's tax, and getting her result [capital "here" bears  $g$  percent of the tax, labor "here" bears  $(1-g)$  percent—plus the effects abroad listed above]. Now exempt capital in agriculture and in services from Dr. Gravelle's tax, and make up the lost revenue by doubling the tax rate on manufacturing (corporate tradables) and on public utilities and transport (corporate nontradables). This converts Dr. Gravelle's tax into the one I analyze.

Here is where the other effects dealt with in my paper come into play. Manufacturing has to absorb a doubled tax without raising its prices (because its goods are tradable). So wages have to go down much more than in Dr. Gravelle's model, if manufacturing activity is to survive. This further fall in wages must be economy-wide, for there is just one labor market. Hence, agriculture benefits, by having Dr. Gravelle's 25 percent tax lifted from it and by having much lower wage rates than in her case. Moreover, agricultural prices do not change because the goods in question are tradable. Lower wages, lower taxes, prices staying the same—this is how the rise in land rents that emerges from my model is brought about.

Turning to the services sector (making the switch from Dr. Gravelle's tax to mine) the tax on income from capital in services goes from 25 percent to zero, and wages go down as a consequence of the bigger wedge in manufacturing. Sellers of services ought to be happy, but remember, it is a competitive activity, so prices go down (relative to a general index); hence, the real beneficiaries are the consumers of services.

Finally, competing forces are at work in the corporate nontradable sector (public utilities and transport) as we move from Dr. Gravelle's uniform 25 percent tax to my 50 percent tax applied to the corporate sector alone. This sector must now pay a doubled tax, but is the beneficiary of low wages. This sector is in a similar situation to the manufacturing sector, except that since it produces nontradables it does not have to face world market prices. Thus, the prices charged by this sector are the cushioning variable. If public utilities and transport (or subsectors thereof) are just as capital-intensive as manufacturing, their price will stay the same as they: (a) absorb the extra tax as the rate goes up from 25 to 50 percent, and (b) benefit from the lowered wage rates that resulted from the manufacturing sector's having to absorb this same tax while facing prices that are determined in world markets. Otherwise their prices will rise or fall depending on which effect—(a) or (b)—is stronger.

I hope this example makes clear the relationship between Dr. Gravelle's model and my own, and at the same time shows why my analysis leads to a much greater burden on labor than hers. The short explanation of the difference is that she analyzes a tax on all income from capital, while I analyze a tax only on the income from capital in the corporate sector. She later modifies her analysis to allow for debt as well as equity capital, and has the tax fall just on equity. Once again her analysis applies to capital in the whole economy (including, very importantly, owner-occupied housing, other services, and agriculture), while mine applies specifically to the corporate sector. My analysis could easily be modified to take the existence of debt capital into account. But this would lead to no major modification of my conclusions. The main impact of introducing debt in an analysis of the incidence (as distinct from the efficiency costs) of taxation is to create a situation where effective tax rates on capital will differ by sector, depending on the importance of debt capital in each sector. The tax wedges are still there, and their impact will still be reflected in part by a general reduction in the return to capital ("here" and in the rest of the world), but very importantly by a reduction in the general level of wages "here." So long as the tax wedge is large in manufacturing (as it actually is), the fall in wages needed to permit the survival of this sector will lead to a burden on labor that is well in excess of total tax receipts.



# Commentary

Thomas A. Barthold\*

Thirty-two years ago this month, in June 1962, the *Journal of Political Economy* published a paper by a professor at the University of Chicago that looked at the incidence of the corporate income tax (CIT). That paper became one of the most influential papers in the economics profession. It presented a model that simplified the United States' economy by looking at two sectors, labeled "the corporate sector" and "the noncorporate sector." The paper argued that the CIT was borne not just by owners of capital in the corporate sector, but by all owners of capital throughout the economy. It explored the possibility that tax could be shifted onto labor and it explored the effects on the product prices of the two sectors. The paper concluded that to determine the potential shifting to labor or to other sectors one must first examine the capital-labor ratio, the degree of substitutability between capital and labor in production, and the elasticity of demand for output of the two sectors. But the basic story of that model, indeed the basic story of any economic incidence analysis, is that one must look at what things are fixed, what things are relatively immobile, and what things are more mobile, whether they be consumers or factors of production.

Of course, that paper has been known and cited by economic students for the past thirty-two years as the "Harberger Model." With that as background, the one thing that can be said upon reading the current paper is, "He's back." This paper is an elegant exposition of how one might go from that model, which assumed a closed economy, to an open economy and try to account for when prices might be fixed in some sectors but flexible in other sectors, where some sectors are more capital-intensive than other sectors, and when there is a domestic market for some goods and a foreign market for other goods. The paper contains a sophisticated economic model, presented in a very readable form.

By prior collusion with David Bradford and Mark Weinberger, I am not going to comment directly on the economics of the model, but, rather, I will discuss the model and the analysis in light of what might be called Capitol Hill's view of incidence analysis or, more generally, policymakers' view of economic incidence analysis. I will try to accomplish this by telling three short stories. They are related and involve the Congress' consideration of the energy tax that was proposed by the Clinton administration in 1993. In deliberation over the energy tax, members of Congress, our staff, and members of the administration met with many people, congressional representatives, industry representatives, and academics. Everyone was trying to figure out what the economic effect of this tax would be.

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\*These comments do not represent the views of the staff of the Joint Committee on Taxation or any member of the United States Congress....

My first energy story involves the meetings the Joint Committee on Taxation had with, in the oil industry alone, wellhead producers, pipeline people, refiners, retailers, labor groups, and consumer groups. The wellhead producers would say, "You know, we're going to bear this tax, the whole thing. Whatever percentage rate it is going to be, that is going to be borne by us." The next day, we would meet with the pipeline people, who would say, "You know, we are going to bear that tax; the whole thing is going to fall on us." The refiners came in the next week. The refiners said, "We're going to bear that tax, the whole thing on us." The retailers, they were going to bear the tax, the whole thing. Labor groups, the same. Consumer groups came in and said, "You know, in the end, the consumer is going to be paying this tax."

My conclusion was there was quite an excess burden to the proposed energy tax. A burden that most analysts thought was way out of line with any estimates of the elasticities of demand and supply of energy for either the short run or the long run.

What does this story tell us about the kind of analysis that Professor Harberger has presented? The story tells us some good things and some bad things. One good thing is there is an appreciation of the notion of tax shifting, the notion of economic incidence. So at the most basic level at which Professor Harberger starts by thinking in terms of markets and distortions in market prices, industry, members of Congress, and policy-makers recognize that there is shifting—economic analysis and incidence does matter. One does not want to think of a legislative proposal just in terms of its pure statutory terms.

The negative aspect of the story is everyone thought the shifting was ultimately on them. Another negative aspect is the story does not indicate a very sophisticated understanding of incidence, certainly not at the level of the sophisticated model Professor Harberger presents here.

Energy tax story number two is from the House Ways and Means Committee and the House of Representatives deliberation of the energy tax. When it came to passing this tax out of the House of Representatives, there was much discussion about what to do about so-called "energy-intensive" industries. In the end, there was relief for energy-intensive industries and proposed border taxes on imports of foreign-produced energy-intensive products.

What was the rationale behind it? The rationale was that a lot of manufacturing produces some very basic world commodities such as steel, aluminum, glass, and chemicals. These commodities trade at world prices and if these commodities had to carry a tax abroad, U.S. industry would not be able to compete. Or if there was a tax imposed on the domestic market with no border adjustment on foreign sales in the domestic market, domestic industry would not be able to compete on price. Prices were fixed. In that sense, we were looking at a fixed factor in a competitive market, and that fixed factor was world prices.

What factors were not fixed? Profits were not fixed. Wages were not fixed. The argument was that there would be a loss of production facilities, a reduced return to capital, or a loss of jobs in the United States. That is what motivated a lot of the House of Representatives deliberation on whether there should be some sort of relief or some sort of adjustment in energy-intensive industries.

This is a very similar analysis to Professor Harberger's analysis. He states that when you think about the CIT, you want to think of the world similarly to the way Congress

does. That is, there are certain sectors of the economy where prices are fixed in world markets. When those prices are fixed, if we impose a tax then other aspects of those industries have to give, whether in wages or in profits. I see a very positive sign in energy story number two in the sense that law makers have an appreciation of what seems to determine shifting, even if they are not using the sophisticated analysis Professor Harberger presents. They have an understanding that when prices or production factors are fixed this helps determine the economic outcome.

How broad is that understanding? I offer energy tax story number three. Many of the industry representations to Congress, and some of the congressional debate in the Ways and Means Committee, were that jobs would be lost or industries would close down due to European or Asian competition. The Clinton administration, in supporting their energy tax proposal, countered that after-tax energy prices in the United States would still be lower than average energy prices throughout Europe or Asia and we should not expect massive dislocation. Industry would adjust.

Were either of these claims wrong? Really, neither of the arguments were wrong. The difference in the arguments is the difference between the short run and the long run. The argument of industry representatives was a short-run analysis. The administration's position was a long-run analysis, that this will work itself out as prices, wages, and returns to capital adjust. Put another way, one argument was a disequilibrium analysis and the other was an equilibrium analysis.

Professor Harberger presented the long-run equilibrium analysis, what happens when things adjust. Many in Congress were interested in the short-run analysis, the disequilibrium analysis. There is a very keen interest on Capitol Hill and in the administration in the short run, in the dynamics of how to move from where we are today to, when we impose taxes, where we will be when we get to the long run. If there is one deficiency in the Harberger Model, and in the economics profession in general, it is that we have not really spelled out the dynamics. How do we move from the short run to the long run?

What sort of conclusions can be drawn about policymakers, their view of incidence analysis, and a Harberger-type model? There is good news and bad news. The good news is the notion of economic incidence is in the policy debate. Policymakers recognize that mobility of factors of production does matter. Policymakers know there is a difference between factors that are fixed and factors that are mobile. The bad news is a lot of the subtlety is often left out. It does not strike me, in listening to the debate, that the subtleties are fully appreciated.

From the economic side, the good news is that part of the message is getting out there. The bad news is that the economics profession still has a way to go to bring effective incidence analysis into the policy-making process. Professor Harberger has made a contribution in moving us in that direction.

## REFERENCE

- Arnold C. Harberger. 1962. The Incidence of the Corporation Income Tax. *Journal of Political Economy*, 70 (June): 215-240.

# Commentary

*David F. Bradford*

As one who has recently been attempting to promote improved information about the incidence of tax and other policies, I particularly welcome Professor Arnold Harberger's contribution to this symposium. The paper bears unmistakable hallmarks of the Harberger genius: An artful selection of just the right simple model, or rather family of models, with the right (i.e., minimal) number of sectors to derive the needed results, his "signature" general equilibrium reasoning, and a shrewd feel for empirically important distinctions and rough magnitudes.

A good example is his rather breathtaking conclusion that U.S. labor sacrifices in real wage income about two to two-and-one-half times the revenue proceeds of the U.S. corporation income tax (CIT), particularly since this conclusion is set against assumptions under which capital owners as a whole pay 100 percent of that tax. The U.S. labor burden is thus spread around as gains to foreign workers, landowners, and consumers of noncorporate, nontradable goods. This extraordinary pattern of incidence is levered mainly upon two assumptions: (1) the rate of return on investment, after taxes, tends to uniformity around the world, and (2) tradable goods have the same prices everywhere.

But as Professor Harberger says, and I would emphasize, the importance of his paper lies less in the particular rough estimates he develops than in the possibility so clearly articulated that the CIT may induce burdens that are radically different from the popularly imagined imposition on "business." Even the well-bred economist is likely to be surprised by the implications of taking into account the openness of the economy to international competition.

I quote the paper itself on its achievements:

This simple exercise shows how complicated the incidence picture can get, but I hope to have made its overall structure sufficiently clear so that readers can see that no smoke and mirrors are involved. I have worked throughout with simple, basic, and easily understandable concepts (in the end), with markets that are assumed to work, and with basic elements of cost (wages, the return to capital, and taxes that somehow have to be covered by the price of the product in any sustainable equilibrium of the economy). (p. 65)

Professor Harberger has, indeed, made the overall structure very clear, so that we can all learn from working through the story for ourselves. A careful study of Tables 1 and 2 alone yields a semester's worth of insight for the student. It is characteristic of the phenomenon, but not well understood, that small differences in underlying supply-and-demand conditions can make for very large differences in incidence.

A discussant is not just to praise a paper but also to offer some critical or at least extending thoughts. Here, then, are some issues that occurred to me as I read the paper.

The corporate tax is here modeled as a tax on capital employed in the corporate sector. It is not wholly clear whether this is a good model of the way the CIT works. Those who have followed the tax policy debates will know, for example, that there is an argument that a tax on corporations, something like what we have, is a reasonable and even essential piece of a system designed to implement a full-fledged Haig-Simons income tax on individuals. Given a decision not to estimate the annual change in value of corporate stock in the hands of individual owners, one needs a corporation tax to prevent the corporate sector from becoming a giant tax shelter. To the extent the actual tax performs this function, it is not introducing a distortion to the disadvantage of corporate investment but rather evening the playing field between corporate and noncorporate investment.

Furthermore, we know that the CIT is contingent on the choice of financial structure by the owners of the firms. Most obviously, debt interest is deductible and can avoid the corporate tax. So the endogeneity of the corporation's financial structure must be considered in thinking about whether the corporate tax effects an extra burden on capital employed in the corporate sector.

Corporate tax revenue may be a bad basis for drawing conclusions about the burden of the tax. There are at least three distinct reasons for this. The first is a generalization of the point made above about the corporation tax as a component of an individual Haig-Simons tax system. Companies may just be tax collectors, as in the case of a sales or value-added tax. A corporation tax with investment outlays expensed is a kind of consumption tax. Second, the Harberger analysis leaves out dynamic considerations. An influence of the tax on capital accumulation could also have major implications for incidence. Most generally, tax revenue needs to be distinguished from tax burdens, which incorporate the deadweight losses imposed by inefficiency. A familiar context in which the practical importance of this point is clear is the taxation of capital gains. Arguably, an increase in the rate of tax on capital gains results in a fall in revenue, but it would be incorrect to draw the implication that it results in a decrease in the burden of the tax.

Another factor to consider is that capital may not be internationally mobile or, at least, not internationally mobile to the degree that Professor Harberger's analysis assumes. There is an active debate in the academic literature on this question. Evidence from national income statistics seems to suggest that national saving and investment are more highly correlated than would be implied by the assumption that capital flows to equalize rates of return at all margins around the world. I am somewhat skeptical of this view, but it would be interesting to see Professor Harberger's analysis extended to accommodate it.

Finally, the implicit experiment that is carried out in the Harberger analysis may not be the right one for thinking about actual policy choices. This is a point clearly recognized by Professor Harberger. The thought experiment involves a change in the U.S. CIT and no changes in tax systems in the rest of the world. But, as he acknowledges, other countries might respond to changes in U.S. tax policy, and taking into account their reactions could radically alter the conclusions about the burdens of the U.S. changes. The experience of the 1980s suggests that interdependence of policy choices

is the better assumption, but we are at the early stages of modeling such a system and its practical implications.

Such considerations might well be taken into account in further exploration of the incidence of the corporation tax, or more precisely, about the incidence of particular feasible policy alternatives. But perhaps the most important lessons are already contained in this paper. For if you ask, "What is the poor policymaker to do?" I would reply, try to absorb the lessons of the Harberger analysis, which clearly shows how wrong naive thinking about incidence may be; speak frankly to yourselves and to constituents about these complexities; and look for simply designed tax systems that do not require quite so much ingenuity to understand.