Who Benefits from Tax Evasion?[1]

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Abstract: In this paper, we examine the distributional effects of tax evasion, using results from theoretical, experimental, empirical, and especially the general equilibrium literatures on tax evasion. Much – if not all – of this evidence concludes that the main beneficiaries of successful tax evasion are the tax evaders themselves, with distributional effects that largely favor higher income individuals. However, when general equilibrium adjustments in commodity and factor prices are considered, the distributional effects become considerably more complicated. The work on tax compliance is also put in the broader context of the distributional effects of other types of criminal activities, where similar forces seem to be at work. We conclude with some suggestions for future research.

I. INTRODUCTION

Who benefits from tax evasion? Answering this question may seem obvious: the evader (if successful of course) would seem to keep the evaded income in its entirety and so would seem to be the beneficiary of tax evasion. Indeed, the standard Allingham and Sandmo (1972) approach to the analysis of tax evasion is based on this implicit assumption, and much of the analysis of tax evasion, whether theoretical, experimental, or empirical, relies upon it. However, this assumption is likely to be incorrect, or least incomplete. The act of tax evasion sets in motion a range of adjustments, as individuals and firms react to the changes in incentives created by evasion. These adjustments lead in turn to factor and commodity price changes, which generate subsequent factor and commodity movements in a full general equilibrium setting. All of these adjustments affect the final prices of factors and commodities that determine the true distributional effects of evasion, and a full analysis of the distributional effects must recognize and incorporate these general equilibrium adjustments.

In this paper we examine previous efforts to analyze the distributional effects of taxation, focusing on studies that fail to consider these various general equilibrium adjustments and, especially, those that do. We argue that, once these general equilibrium adjustments are

[1] This paper is based on a keynote address at the conference "The Shadow Economy, Tax Evasion and Money Laundering" held in Münster, Germany at the University of Münster in July 2011.

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recognized, it is no longer obvious that those who benefit from tax evasion are the individuals actually engaging in evasion; indeed, these participants may not benefit at all. Because successful tax evasion generates immediate winners, comparable to a "tax advantage" (Martinez-Vazquez 1996) generated by the tax laws, replication and competition via the mobility of factors and products should work toward the elimination of this advantage. This general equilibrium process of adjustment should in turn affect the relative prices of factors and commodities as resources move into and out of the relevant activities, and these changes should tend to eliminate, or at least to reduce, the initial tax advantage of tax evasion.

These types of general equilibrium effects are not typically considered in the standard approach to tax evasion. This omission considerably weakens the overall relevance of the standard approach, at least in its conclusions about the distributional effects of tax evasion. Consider as one example tax evasion by domestic help, such as house cleaners, baby sitters, and yard care workers. Tax evasion here may actually benefit the higher-income households hiring these services because these households can pay lower prices for the services. However, these (and other) types of adjustments are often ignored.

Even so, it is noteworthy that these types of adjustments have often been recognized in the more general crime literature, of which tax evasion is a direct offshoot. For example, there is considerable empirical work that demonstrates the impact of crime on the price of housing. Similarly, the effects of crime on the prices of consumer goods or on job opportunities in high-crime urban areas are well-recognized, as is the impact of greater police enforcement efforts on these neighborhoods. This research on criminal activities broadly has to date had little impact on the narrower work on tax evasion.

In this paper we analyze the distributional effects of crime generally and of tax evasion specifically, focusing on the price effects of the general equilibrium adjustments that are set in motion by these activities. In the following sections, we discuss significant previous research on the incidence of crime and of tax evasion, highlighting especially some of the errors that researchers – including us – can commit when they fail to consider general equilibrium adjustments and indicating what "essential elements" are needed in an appropriate model. We then present some of our own work that demonstrates how some of these "essential elements" can be introduced and what these different approaches can illuminate. We finish with some suggestions for ways to extend even further these general equilibrium models.

II. SOME RELATED WORK

2.1 The Basic Portfolio Model of Tax Evasion

In their original work, Allingham and Sandmo (1972) applied the Becker (1968) economics-of-crime model directly to tax evasion.[3] Their basic model is essentially a "portfolio" approach to income tax evasion, in which a rational individual compares the expected utility of being detected and paying a penalty on tax evasion to the expected utility from being able to keep the evaded income. The incidence of tax evasion in this formulation is simple: the successful

[3] See Cowell (1990), Andreoni, Erard, and Feinstein (1998), Slemrod and Yitzhaki (2002), and Torgler (2007) for comprehensive surveys of the evasion literature. See especially Alm (2012) and Sandmo (2012) for recent discussions and assessments.

evader benefits exclusively by keeping the evaded income in its entirety. However, this approach ignores market forces that work toward the elimination of the tax advantage created by evasion opportunities, as products and resources flow into and out of affected activities and thereby change both commodity and factor prices. Our central theme is that these forces can only be analyzed in a general equilibrium framework.

However, this portfolio model and its many extensions assume that the underlying "prices" (or income in the simplest form of the model) are fixed and exogenous. This model also does not consider the broader economic context in which the individual makes the evasion decisions, including the ways in which the individual may spend his or her (evaded) income. A general equilibrium framework is needed to consider these essential elements.

2.2 Some Extensions

Several studies have in fact examined tax evasion (and closely related issues like the so-called "underground economy") with such a general equilibrium approach, building upon the model originally pioneered by Harberger (1962). In perhaps the most complete analysis of general equilibrium effects of income tax evasion, Kesselman (1989) develops a multi-consumer, multi-sector general equilibrium model, which allows him to make qualitative and quantitative assessments of the effects of tax rate changes on evasion activity, relative output prices, and real tax revenues. Despite the many insights from this work, including the analysis of the distributional effects of taxes via the introduction of individual heterogeneity with multiple consumers, Kesselman (1989) does not allow for uncertainty in individual evasion decisions.

Some other work allows for such uncertainty. For example, Watson (1985) analyzes a model with two labor markets that offer differing evasion possibilities, in order to examine the effects of changes in tax, penalty, and audit rates on the allocation of labor across labor markets. However, Watson (1985) models only labor (and not capital) markets, which means that he cannot examine the full range of general equilibrium price and incidence effects that evasion may create. Indeed, Watson (1985, 243) himself writes that "…we have not discussed the potential inequities produced by evasion".

Like Watson (1985), Thalmann (1992) introduces uncertainty into the individual evasion decision. In his general equilibrium framework, taxes are evaded when resources relocate from the "reported" sector to the "unreported" sector. Of some relevance to some of our later discussion, Thalmann (1992) uses a novel approach that relegates the uncertainty of returns associated with tax evasion to the budget constraint rather than following the usual expected utility approach. However, Thalmann (1992) assumes a single "representative" agent, and so he is not able to examine the distributional effects of evasion.[4]

2.3. Instructive Work from the Crime Literature

To illustrate in theory the effects of crime in a general equilibrium setting, consider a simple metropolitan spatial economy with two cities, populated with residents of similar preferences

[4] See also Jung, Snow, and Trandel (1993) and Davidson, Martin, and Wilson (2007).

but divided into two income groups that segregate through Tiebout (1956) mobility.[5] In this setting, crime can be seen as similar to many other urban amenities. Now suppose that there is an exogenous, across-the-board increase in crime. The Tiebout segregation will be associated with a differential willingness-to-pay (WTP) to reduce the increase in crime. For example, suppose that residents of the rich city have a greater WTP to reduce crime. As a result, the rich city will invest relatively more in additional police (paid for by a property tax) to combat the crime rise, and so there will be a relatively greater reduction in crime in the rich city.

Heterogeneity in WTP will then create a crime differential, the size of which will be affected by the marginal productivity of police and the magnitude of crime chasing and crime capturing externalities. The differential will cause some residents of the poor city to move to the rich city. This migration will increase demand for housing in the rich city, causing rents to rise in the rich city and to fall in the poor city. The rent differential will further cause some housing capital to move from the poor to the rich city until housing rents are back in equilibrium. This general equilibrium response will increase rents in the poor city, and will exacerbate the utility reduction associated with the relative crime increase in the poor city. Finally, although property taxes will have risen in both cities to pay for the increase in police, the increase will be greater in the rich city given its residents' higher WTP for reduced crime.

These general equilibrium responses have important distributional implications. Given a uniform increase in crime, richer residents will be better able to respond given their higher WTP. However, by spending more on police, they will nonetheless bear a cost. Thus, as crime-avoiding activities vary across income groups, less crime against one group may reflect greater avoidance behavior, rather than a lower burden of crime.

The general equilibration of rents in the metropolitan area will further exacerbate the utility decline in the poor city. As in any similar model, owners of immobile assets will bear the full burden of the crime increase if all other factors are mobile, and so landowners in the poor city will lose relatively more wealth. Insofar as property ownership is evenly distributed throughout the metropolitan area, this will further burden (land-owning) residents in the poor city. If local residents do not own the land in the poor city, then the distributional impact is less clear (i.e., it could shift some of the burden to the rich). The more mobile are housing capital and residents, the less utility loss will be experienced by the marginal renters in the economy.[6]

All of these general equilibrium responses clearly depend on the specific model structure. Even so, the broader point is that these adjustments affect the distribution of income in ways that the crime literature has considered and analyzed theoretically using a general equilibrium framework.

The crime literature has also considered and analyzed empirically these distributional effects. Indeed, a large literature considers the local effect of crime (or the perception of crime risk) on housing prices. The empirical challenge here is to identify the causal effect of crime

5 For general equilibrium treatments of crime, see Furlong (1987), Imrohorogolu, Merlo, and Rupert (2000,and Burdett, Lagos, and Wright (2003).

6 There are other factors that may affect the distributional effects, such as interjurisdictional spillovers of police investment, more general externalities of crime that may affect the movements of people and capital in the metropolitan area (e.g., the spatial mismatch of Wilson (1987), and the "broken windows" theory of Wilson and Kelling (1982)).

on prices without the confounding effects of other neighborhood characteristics that correlate with crime. Recent strategies use panel data on crime and prices (Ihlanfeldt and Mayock 2010) or plausibly exogenous variation in crime risk perception generated by sex offender registries (Linden and Rockoff 2008). This work finds very localized and short-run price effects, and it is not clear how much general equilibrium content is contained in the reduced-form and particularly the short-run price measures.

A less common empirical approach to the economic burden of crime is the "contingent-valuation" approach. For example, Cohen et al. (2004) conduct a survey to measure willingness-to-pay to reduce crime, and they find estimates of WTP that are much larger than in more conventional approaches that measure the social costs of crime. Insofar as we believe agents can estimate their WTP, these estimates should include general equilibrium adjustments.

Again, the essential point here is that the potential role of general equilibrium adjustments has been examined in many parts of the crime literature. As we discuss next, a complete analysis of these factors requires some "essential elements".

3. WHAT IS NEEDED: "ESSENTIAL ELEMENTS" OF A MODEL OF TAX EVASION INCIDENCE

These studies have added considerably to our understanding of the general equilibrium adjustments that occur in the presence of tax evasion and of crime. Even so, these studies do not address fully the main issues surrounding distributional effects. There is no single study that has explicitly incorporated all of the "essential elements" that we believe a model must have in order to capture these distributional effects.

Focusing mainly on tax evasion, what are these features?

First, and most obviously, the model should be able to capture the potential general equilibrium effects of tax evasion. These general equilibrium effects induce changes in the relative prices both of factors of production and of goods and services, brought about by market equilibrium forces. If there is a tax advantage that will be reflected in expected factor income or firms' expected profits, the potential mobility of resources will lead to the necessary price adjustments until this advantage is eliminated. Relatedly, this general equilibrium model should allow for differences in endowments and/or in preferences among individuals so that different groups may benefit differently from changes in relative prices. A general equilibrium model with a single representative agent cannot of course adequately examine the distribution of economic gains and losses across income groups.

Second, the model should incorporate the element of uncertainty in an individual's or a firm's decision to evade in at least one sector of the economy. This uncertainty may reflect simply the element of tax evasion as an opportunity facing the agent, as in the Allingham and Sandmo (1972) approach. More broadly, it may reflect the possibility that at some point the agent may be subject to taxation.

Third, the model should allow for varying degrees of competition or entry across sectors in the economy, including those in which tax evasion is prevalent. This includes mobility of factors, such as labor in the case of income tax evasion; it also includes firm entry in several sectors, as in the case of sales tax or corporate income tax evasion. The element of mobility is critical to an understanding of how much of the tax advantage may be retained by the initial evaders and how much is shifted elsewhere via factor and commodity price changes.

A complete analysis of the incidence of tax evasion therefore requires the consideration of general equilibrium effects, in a setting in which agents can differ in preferences and endowments, in which uncertainty is present, and in which mobility across sectors can vary. At one extreme, with no entry or competition, those participating in evasion activities are the final beneficiaries, as the standard approach predicts. At the other extreme, with perfect competition and completely free entry, tax evaders (even if successful) may hardly benefit at all because any initial benefit from the absence of taxation is eroded via entry and competition. All of these considerations – plus some additional ones discussed in the conclusions – argue for a general equilibrium computational approach to tax evasion.

The failure to consider these adjustments can lead to a variety of mistakes, or at least omissions, all of which we illustrate with examples from our own work in order to demonstrate that we are not without sin.

Theoretical Studies. As noted, most theoretical analyses of tax evasion focus on the individual compliance decision, and so necessarily ignore any general equilibrium impacts of these individual tax compliance choices. For a typical example, see Alm (1988), who extends the standard Allingham and Sandmo (1972) model but who retains its emphasis on a single representative agent facing fixed “prices”.

Experimental Studies. Much recent analysis of tax compliance has utilized laboratory experiments. In a typical experiment, human subjects in a controlled laboratory setting are asked to decide how much income to report, where taxes are paid at some rate on all reported, no taxes are paid on underreported income, and underreporting is discovered and penalized with some probability. Into this microeconomic system, various policy changes can be introduced, such as changes in audit probabilities or audit rules, in penalty rates, in tax rates, in public good provision, and in any other relevant institutions. Virtually all aspects of compliance have been examined in some way in experimental work.

Now there are some obvious limitations of experimental methods, including especially the somewhat artificial nature of the laboratory. However, of most relevance here is the partial equilibrium nature of all experimental studies of tax compliance. These studies typically examine individual compliance choices in isolation from the choices of other participants, and the possible impact of one’s compliance decisions on the returns to other participants’ decisions is seldom considered. Even when some interactions are considered via, say, a public good financed by all subjects’ contributions, an endogenous audit selection rule determined by all subjects’ choices, or information exchange among the subjects, the ways in which the “prices” facing subjects may be affected by compliance are never considered. This does not mean that the results from these many experimental studies are of no use. It does mean that the results are of limited relevance for settings in which compliance choices have a noticeable impact on these prices.

For example, in a typical experimental study Alm, Jackson, and McKee (2009) examine the compliance impact of types of information dissemination regarding audit frequency, comparing the effects of “official” information disseminated by the tax authority, and “unofficial”, or informal, communications among taxpayers. They find that the tax authority can improve compliance by pre-announcing audit rates credibly and by emphasizing the previous period audit frequency in annual reporting of enforcement effort. However, the basic parameters facing subjects are fixed and exogenous to the decisions of the subjects, so that there are no adjustments that might alter the tax advantage of evasion. Even when the choice of a subject affects the payoffs to other participants through information exchange, there are still no "price" adjustments in the experimental design.

Empirical Studies. Of perhaps most relevance, empirical studies of tax compliance typically take the economic environment as fixed and unaffected by individual compliance decisions. This implicit assumption leads to a variety of "mistakes".

Most obvious is the traditional exercise in public finance that examines the progressivity or regressivity of a particular tax or of the entire tax system. Frequently, findings of vertical and horizontal incidence are adjusted to take into account the impact of existing evasion, such as in the case of professionals or unskilled workers employed in the informal sector of the economy. These adjustments are made under the assumption that the evading groups benefit exclusively and in full from the assumed tax evasion. Indeed, Alm, Bahl, and Murray (1991) conduct this type of analysis for Jamaica, in which they generate estimates of the amount of tax evasion that occurs via both the underreporting of income on filed returns and the nonfiling of income tax returns. However, they assume that tax evaders retain all benefits from their evasion. In many cases this implicit assumption is no doubt incorrect, and the resulting estimates of the "true" burden of taxation are therefore misleading. Similarly, Alm and Wallace (2007) argue that, if labor income is more likely to be generated in the untaxed or informal sector than is capital income, then the existence of tax evasion makes the tax system more progressive. However, if the advantages realized by workers get capitalized or competed away by market processes, then this conclusion is incorrect.

We utilize these guidelines to illustrate several different approaches that analyze the incidence of tax evasion, as discussed next.

IV. APPROACHES TO GENERAL EQUILIBRIUM MODELING[7]

Here we present three models that incorporate many of the "essential elements" needed for analyzing the general equilibrium effects of tax evasion. These models are progressively more complicated. Even so, they maintain the basic features of the simplest Harberger (1962) model: "factor substitution effects" (e.g., the taxed factor bears more of the burden), "factor intensity effects" (e.g., the factor used intensively in the taxed sector bears more of the burden), and "demand effects" (e.g., consumers who purchase more of the taxed product bear more of the burden). All of these basic features determine the final pattern of the incidence of tax evasion.

4.1. The General Equilibrium Model of Alm (1985)

Alm (1985) examines the impact of taxes that create an incentive for resources to flow from the "official" (or taxed) sector to "underground" (or untaxed) sectors, defined as all economic activities that contribute to output but that are not included in official statistics. In his model, a stylized economy is divided into three sectors: a fully taxed above-ground sector that produces

7 In all cases, see the original paper (Alm 1985; Alm and Sennoga 2010; Alm and Turner 2012) for a complete discussion of the model, its calibration, its solution, and its results.

output X, an underground sector Y whose activities are substitutes for those of the taxed sector, and an underground sector Z in which traditionally criminal activities such as prostitution, gambling, and drug dealing take place. Both underground sectors are assumed to be untaxed. Demand for each output is assumed to be a function of relative prices, and all agents (including government) are assumed for simplicity to have the same average and marginal propensity to consume each commodity. Each good is produced under competitive conditions with a linearly homogeneous production function that depends upon the amount of capital (K) and labor (L). Capital and labor are assumed to be fixed in supply in total; they are also assumed to be perfectly mobile among sectors. Since capital and labor in sectors Y and Z are assumed to be untaxed, there are only two relevant taxes: a tax on capital (T_K) and a tax on labor (T_L) in the taxed sector X. The taxation of capital and labor in only some their uses creates an incentive for resources to flow from the taxed sector (X) to the untaxed sectors (Y and Z). This movement has both allocative and distributional effects; the allocative effects are the focus of Alm (1985), but the distributional effects are the focus here.

Alm (1985) calibrates the model using U.S. data for the separate years 1950, 1960, 1970, and 1980. He also makes various assumptions about the relevant parameters, such as the elasticities of substitution between capital and labor and the compensated elasticities of demand. It turns out that the crucial element affecting the distributional effects is the factor intensities in the underground sectors, and Alm (1985) assumes that the two untaxed sectors are labor-intensive. As a result, the taxation of labor and capital in the above-ground sector generates general equilibrium adjustments that always impose a greater burden on the factor used intensively in sector X (e.g., the factor intensity effect), or capital. His calibration also demonstrates that the tax rate on capital is typically greater than that on labor, so that the higher relative tax on capital in sector X versus labor in the sector further generates general equilibrium adjustments that always reduce the relative price of capital (e.g., the factor substitution effect). Finally, these factor and goods movements always increase the price of the product of sector X relative to the prices of the two underground sectors, thereby imposing a higher burden on consumers of sector X (e.g., the demand effect).

Overall, the burden of taxation of labor and capital in the above-ground sector are clearly shifted both to capital and to consumers of the above-ground product. For example, in a typical simulation, Alm (1985) estimates that mobility decreases the price of capital relative to labor in 1980 by 41 to 55 percent compared to its initial price, depending on the various elasticities. Similarly, the price of X increases by roughly 50 percent and the price of Y declines by about 2 percent, both relative to the price of Z. These results are largely robust to different model assumptions.

However, Alm (1985) assumes a single representative agent, mainly to focus on the allocative effects of taxes. As a result, he cannot fully examine the distributional effects of these general equilibrium adjustments. He also does not allow for uncertainty in the agent's decisions, so that he cannot examine the underlying tax evasion choices of the agent.

4.2. The General Equilibrium Model of Alm and Sennoga (2010)

Alm and Sennoga (2010) address at least some of these limitations. They construct a general equilibrium model of a stylized small static closed economy with two consumers, two factors, and two broadly defined sectors composed of an above-ground or taxed sector that produces output X and an underground, informal, or tax-evading sector whose output Y is a substitute for the taxed output. They incorporate the individual's decision to evade, and they also allow for varying degrees of mobility via competition and/or entry across sectors in the economy. Their focus is on measuring how much of the initial tax advantage of evasion is retained by income tax evaders and how much is shifted via factor and commodity price changes stemming from mobility.

Specifically, Alm and Sennoga (2010) make several main assumptions:

- There are two consumers, a POOR household working entirely in the informal sector and a RICH household working only in the formal sector; the POOR household's consumption is relatively Y-intensive, and the RICH household's consumption is relatively X-intensive.
- Labor is variable in supply, with a standard labor-leisure choice, and is imperfectly mobile across sectors.
- Capital is fixed in total supply, imperfectly homogenous, imperfectly mobile across sectors, and fully taxed.
- Labor income generated in the above-ground sector (sector X) is fully taxed at rate t.
- Labor income generated in the underground sector (sector Y) is hidden from the authorities and may escape taxation; however, this income may be detected and penalized.
- Consumption of both sectors is subject to an indirect tax at rate τ.
- Sector X consumption is fully taxed; sector Y consumption may escape taxation, but this indirect tax evasion may be detected and penalized.
- The above-ground sector (sector X) is relatively capital-intensive, and sector Y is labor-intensive.
- Spending and income of the government (GOVT) are disaggregated from that of the consumers, so that the government is treated as a separate consumer that collects taxes in order to provide a public good called "public administration".

Also, producers are assumed to maximize profits taking prices as given, and consumers are assumed to maximize utility subject to a budget constraint that depends upon the value of their endowments. These assumptions imply that producers earn only normal profits and that consumers cannot increase consumption of all goods.

Alm and Sennoga (2010) calibrate their model with data that do not represent any particular country, and are chosen somewhat arbitrarily to reflect sectoral compositions in a "typical" developing country. They start with a Social Accounting Matrix (SAM), constructed under the assumption that the consumers and/or producers in the formal sector fully meet their tax obligations while their counterparts in the informal sector fully evade taxes (i.e., full compliance in the formal sector and tax evasion in the informal sector). They construct their model so that its initial equilibrium replicates the relevant benchmark data, before introducing a policy innovation (e.g., a change in a tax rate, a change in an expected penalty rate) and examining its distributional effects.

Table 1 presents some typical results from Alm and Sennoga (2010). The top part of *Table 1* indicates that the POOR household initially benefits from evasion but only somewhat. This initial gain is computed using the default elasticity of substitution between leisure and consumption, or 2; to simulate long-run entry (i.e., mobility) into the informal sector, this

Table 1: General Equilibrium Effects in Alm and Sennoga (2010)

	POOR Household		RICH Household	
	Magnitude (%)	Percent Change (%)	Magnitude (%)	Percent Change (%)
Statutory ad valorem commodity tax = 0.1, Statutory proportional income tax rate = 0.25 Expected penalty rate (commodity taxes) = 0.07, Expected penalty rate (income taxes) = 0.2				
Initial Post-Evasion Welfare	2.43	-21.8	-0.64	96.9
Final Post-Evasion Welfare	1.90		-0.02	
Initial Price of Good X	5.99	-8.6	5.99	-8.6
Final Price of Good X	5.47		5.47	
Initial Price of Good Y	-6.30	9.8	-6.30	9.8
Final Price of Good Y	-5.68		-5.68	
Initial Post-Evasion Rental Rate	-0.89	365.1	-0.89	365.1
Final Post-Evasion Rental Rate	2.36		2.36	
Initial Post-Evasion Net Wage	-4.02	-13.4	0.50	-184.0
Final Post-Evasion Net Wage	-4.56		-0.87	
Initial Post-Evasion Labor Supply	6.43	59.8	-2.74	122.6
Final Post-Evasion Labor Supply	10.28		0.62	
Statutory ad valorem commodity tax = 0.1, Statutory proportional income tax rate = 0.25 Expected penalty rate (commodity taxes) = 0.095, Expected penalty rate (income taxes) = 0.225				
Initial Post-Evasion Welfare	1.08	-23.2	-0.25	112.0
Final Post-Evasion Welfare	0.83		0.03	
Initial Price of Good X	2.56	-9.4	2.56	-9.4
Final Price of Good X	2.32		2.32	
Initial Price of Good Y	-2.79	10.8	-2.79	10.8
Final Price of Good Y	-2.49		-2.49	
Initial Post-Evasion Rental Rate	-0.37	405.4	-0.37	405.4
Final Post-Evasion Rental Rate	1.13		1.13	
Initial Post-Evasion Net Wage	-0.99	-25.2	0.60	-160.0
Final Post-Evasion Net Wage	-1.24		-0.36	
Initial Post-Evasion Labor Supply	2.80	59.6	-1.18	130.5
Final Post-Evasion Labor Supply	4.47		0.36	

Notes: “Initial” refers to the outcome with limited competition and/or entry in the informal sector. “Final” refers to the outcome with increased competition and/or entry in the informal sector. “Magnitude” is the percentage difference between the post-evasion and post-tax outcome if both POOR and RICH households complied with taxes. “Percent change” refers to the percentage change between the magnitude for the “initial” and “final” outcome. These simulations are for the case where the RICH household works only in the formal sector and the POOR household endowment is 33 percent of the RICH household endowment.

Source: Alm and Sennoga (2010).

elasticity in increased to 8.[8] They find that the initial benefit of evasion for the POOR household dissipates as entry into the informal sector expands. Specifically, Table 1 shows that the POOR household retains 78.2 percent of the initial 2.4 percent increase in its welfare, while 21.8 percent of this initial gain in welfare is eliminated as a result of entry into the informal sector.[9] The RICH household's welfare initially falls by 0.64 percent, but mobility reduces this loss to only -0.02 percent, which represents a 96.9 percent increase in welfare for the RICH household arising from mobility into the informal sector. The increase in the RICH household's commodity X-intensive welfare is mainly attributed to a reduction in the tax-inclusive price of commodity X as mobility into the informal sector occurs.

Table 1 also shows that the tax-inclusive price of commodity X falls by 8.6 percent with mobility into the informal sector, while the price of good Y increases by 9.8 percent. Because the POOR household's welfare is assumed to be intensive in commodity Y, an increase in the commodity price of good Y reduces the POOR household's welfare. Further, mobility increases the amount of labor supplied by the POOR and RICH households by 59.8 percent and 122.6 percent, respectively, leading to a reduction in their net-of-tax wages by 13.4 percent and 184.0 percent, respectively.

Increasing the expected penalty rate only alters the size of these changes and not their direction, as shown in the lower part of Table 1. Perhaps surprisingly, the increased penalty rate leads to a final level of welfare that is actually higher for both RICH and POOR households than the level of welfare achieved in the absence of tax evasion. This result illustrates that evasion can alleviate some of the labor market distortions associated with taxation, especially when a high expected penalty rate generates large distortions. Other (unreported) counterfactual experiments reinforce these results.

Across all experiments, Alm and Sennoga (2010) find that a household that successfully evades its income tax liabilities has a post-evasion welfare that is only 1.1 to 3.4 percent higher than its post-tax welfare if it had fully complied with the income tax. Further, this household keeps only 75.3 to 78.2 percent of its initial increase in welfare, while 21.8 to 24.7 percent of its initial gain is competed away as a result of mobility that reflects competition and entry into the informal sector. Although the initial post-evasion welfare effect is negative for the household that complies with income taxes, its welfare increases by 87.5 to 142.3 percent with competition and entry in the informal sector.

More broadly, the counterfactual experiments of Alm and Sennoga (2010) indicate that the tax evader does not benefit exclusively from evasion. Indeed, their results indicate that any "tax advantage" from evasion diminishes with mobility into the informal sector, as well as with an increase in the expected penalty associated with tax evasion; that is, the evading household benefits but only somewhat from tax evasion, and this advantage shrinks significantly with mobility. Their results also suggest that there are some circumstances under which tax evasion actually increases the welfare of all households, as evasion reduces some of the distorting effects of taxation.

While representing an advance over the simple model of Alm (1985), Alm and Sennoga (2010) still do not incorporate all "essential elements". They do not fully allow for mobility,

[8] "Initial" refers to the outcome with limited competition and/or entry in the informal sector. "Final" refers to the outcome with increased competition and/or entry in the informal sector.

[9] The "initial" gain or loss refers to the percentage change between the post-evasion and post-tax welfare.

especially mobility that can be affected by the degree of competition in the production sectors. They also do not consider the potential for firm-level tax evasion. These limitations are addressed by Alm and Turner (2012).

4.3. The General Equilibrium Model of Alm and Turner (2012)

Alm and Turner (2012) assume a stylized small static closed economy with two broadly defined sectors, composed of an above-ground or taxed sector and an underground, informal, or tax-evading sector whose output is a substitute for taxed output; they also incorporate uncertainty and varying degrees of mobility across sectors in the economy. However, unlike Alm and Sennoga (2010), Alm and Turner (2012) model *firm* evasion, rather than *individual* evasion. They also incorporate more explicitly different degrees of competition by analyzing separately a perfect competition model of firm decisions and a monopoly mark-up model. Their focus is on measuring how much of the initial tax advantage of evasion is retained by income tax evaders and how much is shifted via factor and commodity price changes stemming from mobility.

Specifically, Alm and Turner (2012) make several main assumptions:

- There are two consumers, consumer 1 and 2, with consumer 1's consumption relatively X-intensive.
- There are two goods.
- There are two producers (or production sectors): a non-evader (or compliant) firm with output *X*, and an evader firm with output *Y*, with the evading sector relatively labor-intensive.
- Individuals/households maximize utility subject to a budget constraint, earning income from endowments of labor and capital.
- Producers maximize profits (or expected profits).
- There are two taxes, an ad valorem labor tax and an ad valorem sales tax.
- Two market cases are modeled: perfect competition and monopoly.

They conduct two main counterfactuals, one when there is perfect competition and a second when there is monopoly. For each of these counterfactuals, they make two different comparisons: between a general equilibrium with full compliance with the relevant tax ("*Non-Evasion*") and an equilibrium with evasion ("$Evasion_1$"), and between the previous evasion equilibrium ("$Evasion_1$") and one in which the elasticity of substitution between production inputs is increased causing capital and labor to flow more easily between producers in sectors ("$Evasion_2$"). The counterfactuals also allow for increases in the probability of detection, the fine rate, and the labor or sales tax rate.

We present in *Table 2* some summary results only from the perfect competition simulations and only for the labor tax scenarios. The results for the sales tax scenarios, as well as for the monopoly markup case, are qualitatively the same.

Consider the perfect competition simulations in *Table 2* for the ad valorem labor tax. The labor tax without any evasion (*Non-Evasion*) lowers the price of labor by 44 percent, and consumer 2's welfare decreases relative to that of consumer 1 due to consumer 2's relatively large labor endowment. When evasion occurs ($Evasion_1$) in sector 2 with a low probability of detection (0.1) and a low fine rate (1.1) on evaded labor taxes, the price of labor increases by 67.9 percent (%ΔPre). The price of capital decreases by 20.1 percent, and thus the relative price of labor to capital increases and labor flows from sector *X* to sector *Y*. This movement increases evader sector *Y* output, which leads to a decrease in its price. The welfare of consumer 2 increases (7.5 percent) because consumer 2 consumes a larger share of the sector *Y* good. The reallocation of capital and labor also reduces *X* output by 31.5 percent, and increases its price by 11 percent. The welfare of consumer 1 decreases (12.9 percent) because consumption is *X*-intensive.

Table 2: General Equilibrium Effects in Alm and Turner (2012)

	Competition			Increased Competition	
	Non-Evasion	$Evasion_1$	% Δ Pre	$Evasion_2$	% Δ Post
Welfare 1	1.07	0.93	-12.9%	0.96	3.4%
Welfare 2	0.93	1.00	7.5%	0.95	-5.3%
X Output	1.02	0.70	-31.5%	0.81	15.8%
Y Output	0.98	1.28	30.8%	1.11	-12.8%
Price X	1.69	1.87	11.0%	1.50	-20.1%
Price Y	1.68	1.34	-20.5%	1.24	-7.4%
Capital Price	1.70	1.36	-20.1%	1.40	3.4%
Labor Price (Net)	0.56	0.93	67.9%	0.84	-10.4%
Consumer 1 Income	179.71	155.08	-13.7%	135.20	-12.8%
Consumer 2 Income	156.84	146.56	-6.6%	123.82	-15.5%

Notes: % Δ Pre refers to the percent change of evasion over non-evasion before increasing competition, and % Δ Post refers to the percent change of evasion over evasion after increasing competition. An increase in competition is adjusted by increasing the elasticity of substitution in production inputs. These simulations are for the case where there is a partial factor tax on labor under perfect competition.

Source: Alm and Turner (2012).

When the elasticity of substitution between capital and labor is increased ($Evasion_2$), labor flows into the evader sector *Y*, which reduces the price of labor by 10.4 percent; that is, replication and competition have reduced some of the benefits of evasion compared to $Evasion_1$. The price of capital increases by 3.4 percent, and the relative price of labor decreases, causing a reallocation of capital and labor towards sector *X*. The non-evader sector output *X* increases by 15.8 percent, and its price decreases by 20.1 percent. Consumer 1's welfare increases by 3.4 percent as a result of the increase in *X* output and the large share of *X* in utility. Output in sector *Y* decreases by 12.8 percent, and its price decreases by 7.4 percent. The increase in the substitutability of labor and capital between the two sectors leads to greater replication and competition among labor and capital, and transfers the benefits of evasion via an increased net wage of labor away from labor in sector *Y* to consumers in the form of lower prices of sector *Y* output. Labor entering the evader sector *Y* competes with each other and bids down the net wage with evasion, thus transferring the benefits of evasion to the sector *Y* producer. Sector *Y* firm's cost of production decreases as a result of the decrease in the price of labor, resulting in the transfer of benefits to consumers in the form of lower prices (e.g., the price of *Y* decreases by 7.4 percent).

In other simulations, increases in the probability of detection, the fine rate, and the labor tax rate confirm these results. In particular, the benefits of evasion remain with the evading sector and benefit the factor used more intensely there (e.g., labor), but when the elasticity of substitution is increased to make factor inputs more like perfect substitutes, the benefits of evasion are competed away through replication and competition.

Overall, Alm and Turner (2012) find that the benefits of evasion may be replicated and competed away through entry or through reallocation of factor inputs, depending on the relative competitiveness of the market. Further, industries in which one factor input is used more intensively than the other or in which there is market power will be able to retain these benefits.

Like Alm and Sennoga (2010, this approach is an advance over the simple model of Alm (1985). Even so, Alm and Turner (2012) still do not incorporate all "essential elements". For example, while allowing for firm evasion, they do not consider individual evasion. There is still work to be done.

V. CONCLUSIONS

Distributional conclusions drawn from the standard approach to tax evasion are unsatisfactory because this approach ignores the fact that tax evasion is much like a "tax advantage" in the law, so that replication and competition should work toward the elimination of this advantage. This process of adjustment takes place through changes in the relative prices of both commodities and factors of production, as mobility occurs into and out of the relevant sectors. The standard approach takes only a partial equilibrium perspective, and does not capture these general equilibrium mobility effects. The failure to consider these effects leads to a wide variety of "errors" in the standard analysis of tax evasion.

Once these general equilibrium effects are appropriately modeled, it is typically found that the tax evader does not benefit exclusively from evasion. Indeed, these analyses indicate that any tax advantage from evasion diminishes with mobility into the informal sector, with greater substitution possibilities in production, and with greater degrees of sectoral competition. In fact, there are some circumstances under which tax evasion actually increases the welfare of all households, as evasion reduces some of the distorting effects of taxation. In short, the gains from evasion are shifted at least in part from the evaders to the consumers of their output via lower prices, as general equilibrium mobility effects work via relative price and productivity changes to eliminate the incentive for workers to enter the informal sector beyond some margin.

There are many possible extensions to this work, even aside from the usual sensitivity analyses. The underlying framework could be generalized to consider greater taxpayer heterogeneity, a broader range of government activities, the impact of open economy considerations, the potential for government corruption, and dynamic incidence factors. An important extension here is to incorporate more fully models of expected utility, and of non-expected utility. It would be interesting to examine whether traditional tax equivalence results still hold in the presence of tax evasion, such as the presumed equivalence between a proportional income tax and a proportional consumption tax (with an equal rate on all commodities).

Of perhaps most importance, even these general equilibrium models do not incorporate some other essential elements of the fiscal architecture, notably the administrative costs of taxation and the compliance costs of taxation.

There is little doubt that there are significant costs for government in collecting taxes (or the “administrative costs” of taxation). The available evidence from government budgetary information clearly indicates that the budget cost of collecting individual income, business income, and sales taxes is generally in excess of one percent of the revenues from these taxes and can sometimes be substantially higher. Similarly, implicit in much of the evasion literature is the assumption that it is costless for individuals and firms to pay their taxes. There is little question that this is simply wrong. There are now a number of estimates, derived from a variety of methodologies, of the actual magnitudes of the individual and firm compliance costs in the United States and elsewhere (Slemrod and Sorum 1984; Blumenthal and Slemrod 1996; Sandford 1995). These estimates vary, but often suggest that compliance costs can range from 2 to 24 percent of revenues for selected taxes. In total, these studies clearly indicate that the compliance costs of taxation are significant, often of comparable or even larger values than the more traditional calculations of the excess burden of taxation.

Analysis of who benefits from evasion requires recognition of the distributional effects of these administrative and compliance costs, especially of the price effects that emerge as individuals and firms attempt to reduce and/or avoid these costs. In conducting these analyses, we think it unavoidable that rigorous analysis will require the use of a computable general equilibrium framework, in which the different considerations are sequentially layered, one atop another, until the full model captures all of the relevant factors. Computable general equilibrium computations can quantify with a standard measure the trade-offs that taxes necessarily create; they can indicate the areas in which our knowledge is incomplete; they can provide specific guidelines in specific country circumstances; and they can provide essential information on who actually benefits from tax evasion.

Ultimately, we are hopeful that the general equilibrium analysis of tax evasion can be extended to the analysis of criminal activities more broadly, of which tax evasion is only one small part. These many extensions await future work.

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