Tariffs, Enforcement, and Customs Evasion: Evidence from India

Prachi Mishra, International Monetary Fund
Arvind Subramanian, Peterson Institute for International Economics
Petia Topalova, International Monetary Fund

March 2008

This paper is forthcoming in the *Journal of Public Economics.*

Abstract

We examine the effect of tariff policies on evasion of customs duties, in the context of the trade reform in India of the 1990s. By exploiting the variation in tariff rates across time and products, we identify a robust positive elasticity of evasion with respect to tariffs. A second contribution of the paper is to provide some evidence on the impact of enforcement. While we cannot identify the direct impact of enforcement on evasion, we can establish the extent to which enforcement-related factors, such as product characteristics that determine the ease of detection of evasion, affect the evasion elasticity. The results render support to the hypothesis that improvements in enforcement can reduce the responsiveness of evasion to tariffs.

JEL Classification Numbers: F13, H26, K42
Keywords: Evasion, tariffs, enforcement

Authors' Note: We thank Jagdish Bhagwati, Bob Flood, Caroline Freund, Bernard Hoekman, Beata Javorcik, Charles Kramer, Nuno Limao, Aaditya Mattoo, Enrique Mendoza, Catriona Purfield, Antonio Spilimbergo, Shang-Jin Wei, and colleagues at the IMF for helpful discussions as well as participants at the Indian Statistical Institute's Growth and Development Conference in Delhi, the South Asia Econometric Society Meetings in Chennai and the International Trade Seminar at the World Bank. We are especially grateful to Joel Slemrod, Wojciech Kopczuk, and three anonymous referees for helping to improve considerably this paper. Email: pmishra@imf.org; asubramanian@petersoninstitute.org; ptopalova@imf.org. The views expressed here are personal and do not implicate the International Monetary Fund, its management, or Executive Board.

I. INTRODUCTION

The effect of policies, specifically tax policies, on evasion is a subject of considerable policy interest and has been studied extensively. An early theoretical treatment is due to Allingham and Sandmo (1972), who show that the sign of the elasticity of tax evasion with respect to tax rates is ambiguous, depending on taxpayers' risk aversion and the punishment for evasion: increases in tax rates make evasion more attractive (substitution effect) but also reduce taxpayers' wealth (income effect).[1] Empirical results have also varied considerably because of the difficulty of disentangling substitution and income effects and the difficulty of measuring evasion. One setting in which it is possible to observe and measure evasion of taxes is in the case of customs duties.[2] Bhagwati (1964) in an early innovative contribution suggests that the discrepancies between a country's reported imports and the corresponding exports reported by its trading partners may be explained by undervaluing or misclassifying imports at the border in order to reduce the tariff burden. A noteworthy recent empirical study by Fisman and Wei (2004) measures evasion of import taxes by these reporting discrepancies to examine the impact of tariff rates on duty evasion in the context of imports from Hong Kong to China.

Relatively less attention, however, has been paid in the empirical literature to the effect of, what might be called enforcement on evasion[3] and especially on the elasticity of evasion with respect to tax rates.[4] This is not surprising because it is much more difficult to quantify and isolate the enforcement effect. An outcome such as evasion or corruption can be thought of as resulting from the interaction of demand and supply factors. The demand for evasion is linked to tax policies: higher the tax rate, larger is the benefit that economic agents can derive from evasion and hence greater the demand for it. But agents' willingness to engage in evasion also depends on how likely it is that evasion will be detected and/or the ease with which customs officials can be bribed. These latter, can be thought of as the supply or enforcement side, which too have a bearing on evasion.[5] Besides the *level* effect that the enforcement regime can have on evasion, Slemrod (1994) and Slemrod and Kopczuk (2002) point to a conceptually separate impact that enforcement improvements may have on the

---

[1] See Allingham and Sandmo (1972) for the workhorse model of income tax evasion. See also Slemrod and Yitzhaki (2000) for a review of the literature on income tax evasion.

[2] A related literature (see Bartlesman and Beetsma, 2003) examines profit shifting in response to differences in corporate tax rates across countries.

[3] See Andreoni, Erard and Feinstein (1998) for a survey of the literature on personal income tax compliance. In the case of India, Das-Gupta, Lahiri and Mookherjee (1995) (see also Dasgupta and Mookherjee, 1998) examine the effect of enforcement tools (like searches, penalties and prosecution activity) on income tax revenues collected and on tax compliance. Yang (2008a, 2008b) examines the impact of customs reform on crime displacement, including in the Philippines.

[4] To the best of our knowledge, only a few papers in the literature on *income* tax evasion have addressed this question. Slemrod (2003) examines the effect of a change in enforcement regime (due to introduction of a cigarette stamping program) on the elasticity of cigarette sales with respect to tax rates in Michigan. Kopczuk (2005) establishes that the elasticity of reported income varies systematically with the tax base. For theoretical contributions see Mayshar (1991), Slemrod (1994), Cowell (1990), Kopczuk (2001) and Slemrod and Kopczuk (2002).

[5] The supply factors that affect evasion also include the magnitude of punishment and how it is designed. However, we do not focus on these factors in this paper and leave it for further research.

slope of evasion. They argue that the enforcement regime can shape the behavioral response of agents to changes in tax rates and thus may be an important policy tool.[6] But isolating the enforcement effect and measuring its contribution to evasion and the elasticity of evasion with respect to taxes is a challenge as we will discuss below.

This paper is a modest attempt at taking on this challenge. The opportunity to do so is afforded by the Indian tariff reform of the 1990s. In August 1991, in the aftermath of a balance-of-payments crisis, India launched a dramatic unilateral trade liberalization as part of an IMF adjustment program. As Panels A and B in Figure 1 show, there was a decline in the level and the variation of tariffs beginning in the late 1980s, a process that was accelerated after the macroeconomic crisis of 1991 (see Topalova, 2004 for details). Average tariffs declined from nearly 100 percent in 1987 to 80 percent in 1991 followed by a further decline to about 25 percent at the turn of the century. Similarly, the standard deviation of tariffs declined from 50 percent to 40 percent and to about 10 percent over the same period. This rich variation in tariffs over time and across product groups offers a crucible for evaluating the impact of tax rates on evasion.

That these changes may have had a role to play in evasion, is graphically illustrated in Figure 2, which shows that despite the surge in India's imports after the trade reform, seizures made by Indian Customs declined dramatically from nearly 70,000 cases in 1990 to about 45,000 in 2004 (Figure 2a). Relatedly, so did the magnitude of evasion (Figures 2b, 2c, 2d and 2e). For example, in Figure 2c, evasion hovers around 120 percent for the late 1980s and early 1990s, but starts declining consistently, reaching about 85 percent in 2002-2003. Thus, there seems to be a declining trend in both tariffs and evasion. Whether the developments in Figures 1 and 2 can be formally shown to be related and how forms the core of the paper.

This paper makes two contributions. First, it builds on the existing literature in testing the impact of tariff *policies* on evasion and, arguably, refining the estimated effects. Fisman and Wei (2004) quantify this effect for trade between China and Hong Kong by examining whether variation in tariffs across 1600 imported goods at 6-digit level was systematically correlated with the evasion across these products. Their main finding is that there is such a correlation, with a one percentage point increase in the tax (sum of the tariff and VAT on imports) rate associated with a two-three percent increase in evasion.

In this paper, we exploit two sources of variation to identify the effect of tariffs on evasion: variation across products (as in Fisman and Wei, 2004) but also across time.[7] Using both sources of variation confers some important advantages over a strategy that exploits across-product variation alone. If tariffs are systematically correlated with some other aspect of the product (say ease of enforcement) that also affects evasion, then the latter approach would conflate both these effects. Because we exploit variation over time, we are able to control for such product-specific or other characteristics, and hence isolate better the impact of tariffs on evasion. Indeed, our identification will rely on exploiting the variation in tariffs within 6-digit products over time and is hence a very demanding and general specification.

---

[6] For example, the Tax Reform Act in 1986 in the U.S., which improved tax enforcement by broadening the tax base and restricting the use of tax shelters, has been pointed as a reason for the substantially lower elasticity of taxable income with respect to tax rates in the U.S. in the 1990s relative to the 1980s (Kopczuk, 2005).

[7] Nearly all the results in Fisman and Wei (2004) rely on exploiting the variation across products (defined at the HS 6-digit level).

We also compare our estimates for India with those of Fisman and Wei (2004) for China and identify the source of the differences between them

Our second contribution is to show how enforcement-related characteristics affect the responsiveness of evasion with respect to tariffs. For example, this elasticity[8] is affected by certain product-related characteristics that determine how easy it is to detect evasion, namely the extent to which a product is differentiated or the extent of difficulty there is in ascertaining its price.[9]

Our main findings can be summarized as follows. First, we find a significant and robust impact of tariffs on evasion, though of a relatively small magnitude. Specifically, a one percentage point increase in tariffs increases evasion by about 0.1 percent.

Second, we find strong and robust evidence that the evasion elasticity is affected by product-related characteristics that potentially capture the ease of enforcement. For differentiated products and products that exhibit a high variance of unit price, we find that the elasticity of evasion is substantially higher. In other words, a unit increase in tariffs leads to higher evasion the more difficult it is for customs officials to discern the true worth of the product. We also find that the evasion elasticity varies by the mode of entry of goods. Goods that come through air appear to have a lower evasion elasticity compared with those that come through seaports, a result that is stronger for differentiated products. This is consistent with the fact that computerization has been far less advanced at seaports especially during the second half of the sample period.

Finally, we are able to reconcile the large difference (nearly thirty-fold) between our evasion elasticity estimate for India and that of Fisman and Wei (2004) for China. We find that their higher estimate reflects in large part their product sample which is biased in favor of more differentiated goods and hence higher evasion elasticity. Once we control for this and other factors, the difference between the two estimates is a factor of two.

II. THEORETICAL FRAMEWORK

This section presents a simple framework of the relationship between evasion, tariff rates and enforcement, in order to motivate our empirical analysis. The framework is especially important to interpret our estimates relating to the impact of enforcement on the elasticity of evasion. The framework draws largely upon the literature on income tax evasion (Slemrod (1994, 2001), Mayshar (1991), Cowell (1990), Kopzuck (2001), Slemrod and Kopczuk (2004)) and Yang (2007) who examines the impact of customs reform in the Philippines on crime displacement.

We assume a representative firm that imports inelastically a fixed amount, M.[10] The firm can smuggle a fraction γ of the total imports, and thus evade customs duties on the smuggled imports. Assume that the cost of evasion is specified as

---

[8] Strictly speaking, it is a semi-elasticity because our left hand side variable is in log terms while the tariff variable is not.

[9] In concurrent work, Javorcik and Narciso (2006) independently have examined the relation between product differentiation and evasion elasticity.

[10] The latter assumption is made for simplicity. As long as the absolute value of the elasticity of imports with respect to tariffs is less than one, and the cost of evasion depends on the fraction of imports smuggled, the results presented in this section are unchanged.

$C = C(\gamma, E)$ (1)

where E is a measure of the quality of customs enforcement by the government.

We make the following assumptions on the cost function:

(A1) $C = C(\gamma, E) > 0$ i.e. there is a positive cost of smuggling or evading customs duties (if there were no cost to smuggling, the entire tax liability could be evaded). For simplicity, we also assume $0 \leq \gamma \leq 1$ and $E \in (0, \infty)$.

(A2) $C_1(\gamma, E) = \frac{\partial C}{\partial \gamma} > 0$ i.e. cost of smuggling is increasing in the fraction of imports smuggled.

(A3) $C_2(\gamma, E) = \frac{\partial C}{\partial E} > 0$ i.e. cost of smuggling is increasing in the quality of enforcement by the government.

(A4) $C_{11}(\gamma, E) = \frac{\partial^2 C}{\partial \gamma^2} > 0$ i.e. the marginal cost of smuggling is increasing in the fraction smuggled.[11]

(A5) $C_{12}(\gamma, E) = \frac{\partial^2 C}{\partial \gamma \partial E} > 0$ i.e. the marginal cost of smuggling is increasing in the quality of enforcement. In other words, the better the customs enforcement, each additional unit of smuggling costs more.[12]

The representative firm chooses the fraction of imports smuggled to maximize its profits. The firms' after-tax profits are given by

$\Pi = M - (1 - \gamma)M * T - C(\gamma, E)$ (2)

Where T is the ad valorem tariff rate.

The first order condition (FOC) for the firm's problem is given by

$M * T = \frac{\partial C}{\partial \gamma} = C_1(\gamma, E)$ (3)

---

[11] Convex smuggling costs have been assumed commonly in the prior literature (e.g. see Slemrod, 2001, Cowell, 1990, and Yang, 2008b). As noted by Yang (2008b), convex smuggling costs could arise if authorities devoted more effort to detecting larger smugglers.

[12] See Slemrod (1994), Cowell (1990) and Yang (2008b) for similar assumptions.

Equation (3) has the simple interpretation that smuggling should be increased until its marginal cost C_1 equals its marginal return of M*T. This equation implicitly defines evasion as a function of the tax rate and enforcement. Equation (3) will form the basis for our empirical exercise, where we will try to identify the responsiveness of evasion to taxes; and the responsiveness of the evasion elasticity to enforcement (under assumption of optimizing behavior of importers).

The first parameter that we will be estimating is the response or elasticity of optimal evasion to tariffs. Differentiating the FOC (equation (3) above) with respect to T, we can sign the evasion elasticity with respect to customs duties:

$$\frac{\partial \gamma}{\partial T} = \frac{M}{C_{11}(\gamma, E)} \tag{4}$$

(A4) implies that $\frac{\partial \gamma}{\partial T} > 0$.

Thus, the assumption of increasing marginal costs of smuggling is sufficient for the elasticity of evasion with respect to tariffs to be positive.

We turn next to the response of evasion to changes in enforcement. Differentiating the FOC with respect to E, we can derive the elasticity of evasion with respect to the quality of enforcement, which is given by

$$\frac{\partial \gamma}{\partial E} = \frac{-C_{12}(\gamma, E)}{C_{11}(\gamma, E)} \tag{5}$$

(A4) and (A5) imply that $\frac{\partial \gamma}{\partial E} < 0$.

Thus as long as the quality of enforcement raises the marginal cost of smuggling, better enforcement will reduce the fraction smuggled and the evasion of customs duties.

The theoretical framework can also generate predictions on how enforcement shapes the elasticity of evasion with respect to the tax rate.

Taking the derivative of equation (4) with respect to E implies that

$$\frac{\partial}{\partial E}\frac{\partial \gamma}{\partial T} = -\frac{M}{C_{11}(\gamma, E) * C_{11}(\gamma, E)}\frac{\partial C_{11}(\gamma, E)}{\partial E} \tag{6}$$

If, the higher the level of enforcement, the more rapidly the marginal cost of concealing a unit of imports rises with the amount concealed, i.e. $\frac{\partial C_{11}(\gamma, E)}{\partial E} > 0$ (7) and (A4), $\frac{\partial}{\partial E}\frac{\partial \gamma}{\partial T}$<0. In other words, the better the quality of customs enforcement, a given increase in tariffs has a lower impact on evasion.

Thus (7) is a sufficient condition for $\frac{\partial}{\partial E}\frac{\partial \gamma}{\partial T} < 0$.

We show in the Appendix that for three general classes of cost functions used in the literature, the set of *sufficient* conditions for the elasticity of evasion with respect to tariffs to be a decreasing function of enforcement are as follows:

(A1) Positive cost of evasion and positive values of enforcement and fraction of goods smuggled
(A2) Cost of evasion is increasing in the fraction of goods smuggled
(A3) Cost of evasion increasing in the quality of enforcement and
(A4) Convexity of cost of evasion in the fraction of goods smuggled.

These are reasonable conditions which have also been assumed in the prior literature. In fact (A4) is also a necessary condition for evasion to increase with taxes (see equation (4) above).Thus, the simple framework predicts that under a reasonable set of assumptions, an improvement in customs enforcement should not only lower evasion but also the responsiveness of evasion with respect to tariffs.

There are, however, two related questions, that need to be addressed. First, does our cost of evasion (formalized in equation (1)) adequately capture the Indian situation? And second, if not, would any consequential modification—especially if the cost of enforcement depended on the tariff itself (e.g. in Yitzhaki, 1974) —affect our theoretical finding that an improvement in customs enforcement should not only lower evasion but also the responsiveness of evasion with respect to tariffs.

On the first, the Indian law and practice of enforcement is ambiguous on whether the cost of evasion depends on tariff rate.[13] If an importer undervalues an imported good (i.e. γ <1), the penalty faced depends on the amount by which the good is undervalued, as we assume in the theoretical framework. However, if evasion takes place through other means, say through misclassification or through complete smuggling of the good (i.e. γ =1), the law seems to be ambiguous. Since our empirical analysis of the elasticity of evasion with respect to tariffs includes both cases of undervaluation and complete smuggling, we consider the setting in which the cost of evasion is a function of both the amount evaded, the level of tariffs and enforcement in the Appendix. The neat predictions of our original framework can not be obtained unless a particular functional form for the cost function is specified. However, we show that for a reasonably general functional form, positive cost of evasion and declining marginal cost of evasion with respect to tariffs (implying concavity with respect to

[13] The Customs Act of 1962, along with its subsequent amendments, sets the framework of for customs administration and enforcement. The key provisions (Chapter XIV, Section. 112) on penalties state that an importer who tries to import prohibited goods could face a penalty equal to the value of the goods or Rs. 5000 (approximately $100) (whichever is greater); who tries to evade duty a penalty of the duty evaded or Rs. 5000 (whichever is greater); and who tries to undervalue a good, a penalty equal to the difference between the true and declared value or Rs. 5000, whichever is greater. The fines and penalties described above have not changed significantly over time.

tariffs) are sufficient for evasion to be increasing in tariffs and for the evasion elasticity to be decreasing in enforcement.

III. DEFINING EVASION

Before we describe the setting, we define how we measure our key variable, evasion, in the data. Throughout this paper, we will report results for four different measures of evasion: two for evasion in import values and two for evasion in import quantities. The first follows Fisman and Wei (2004). Take the evasion in values, which we define as:

$$EvV_{ptc} = \log(XV_{ptc}) - \log(MV_{ptc}) \tag{8}$$

Where EvV refers to evasion values, XV to export value as recorded by the partner country, MV to import value as recorded by the Indian authorities. The sub-scripts *p, t* and *c* refer respectively to product (at the HS-6 digit level), year (varying between 1988 and 2003), and partner country. It should be noted that for this measure of evasion, the sample is restricted to those transactions for which there are matched exports and imports — that is, for every export transaction there is a corresponding import one — at 6-digit level.

For our second measure of evasion, we make an extreme assumption of complete smuggling. We assume that, if an export transaction is recorded by the partner country but not by the Indian authorities, these exports are smuggled into the country, and we code the import value as zero. Thus we define our second measure of evasion, $EvV2_{ptc}$

$$EvV2_{ptc} = \log(1 + XV_{ptc}) - \log(1 + MV_{ptc}) \tag{9}$$

For obvious reasons, this measure requires the one plus log transformation.[14] Thus, our sample includes those items for which exports are recorded but for which no counterpart import transaction is recorded. Consequently, the sample for this second measure is substantially larger (by over 100,000 observations relative to the first).[15] In the paper, we provide evidence that is consistent with making this extreme smuggling assumption; we find that tariffs for those exports for which there are no corresponding imports, are indeed higher on average, which could create the incentive for smuggling.

Corresponding to these two value-based evasion measures are similarly defined quantity-based measures, yielding in all four measures of evasion.

One issue that arises is whether our measures of evasion merely reflect random measurement errors: in other words, we are not capturing a "bad", namely, evasion, so much as a neutral outcome, namely, mis-measurement. But the key point of the analysis below is that, even if we cannot distinguish the two outcomes, the fact is that our measures are *systematically* correlated with tariffs: more "value" is missing or lost, when tariffs are higher.

---

[14] The results in the paper are qualitatively unchanged if we use alternative transformations for the second measure of evasion e.g. if we define evasion as log (5+XV) – log (5+MV) or log (10+XV) – log (10+MV).

[15] The sample size in Fisman and Wei (1994) is at most about 1,700 observations compared with our sample of between 41,000 and 55,000 observations stemming from our exploiting the variation across time and including imports from all major trading partners.

IV. DATA

Our main sources of data are twofold. The World Trade Solution (WITS) database, derived from UN COMTRADE data, provides us with data on the value and quantity of exports to India from partner countries as recorded by the latter (hereafter referred to as "exports") as well as on the value and quantity of imports in India from partner countries as recorded by the Indian authorities (referred to as "imports"). These data are available on an annual basis from 1987 to 2003. The data are at HS 6-digit level, yielding information on about 5,000 products. In addition, data are available for about 120-150 of India's trading partners, but the partner coverage varies with time. The match rate between exports and imports—i.e. the number of cases for any particular year for which the data on exports at HS-6 digit level has a counterpart entry at the import end—varies by partner country and year.[16] Appendix Table 1 provides summary indicators of match rates for the top 40 trading partners. In general, match rates are higher for the more advanced trading partners. In the empirical analysis, we restrict the data to India's 40 top trading partners in terms of number of products imported, accounting for about 92 percent of total trade, and for which the match rate varies between 23 and 82 percent. The average match rate (weighted by the number of products from each partner country) for our sample is 65 percent.

For most of the analysis in the paper, the measures of evasion are averaged across partner countries since the key variable of interest—Indian import tariffs—varies only by product and time.[17, 18] Even after applying these filters, the sample in the "extreme smuggling" specification has about 55,000 observations. In the alternative specification, the sample size reduces to about 41,600 observations.

Data on disaggregated tariffs have been compiled in Topalova (2004). In the robustness checks and alternative formulations, we will also use data on excise tariffs on imports (which we obtained from annual publications of the Customs department); and on the distribution of imports across different ports in India from Tips Software Services.

V. EMPIRICAL STRATEGY

Our main specification takes the following form:

$$EvV_{pt} = \beta T_{pt} + D_p + D_t + \varepsilon_{pt} \tag{10}$$

where the left hand side variable is evasion as described earlier averaged across trading partners; T refers to the tariff and varies by product and time, and the D's are vectors of product and year fixed effects. The key parameter that we are interested in is β, the semi-

[16] The match rate is defined as the number of products in both imports and exports data divided by the universe of potential transactions, which we define as the products reported by the partner country (i.e exports).

[17] The tariff, T, is the Most Favored Nation (MFN) tariff and hence does not vary by partner country. India did not have any major Free Trade Agreements during the period under study

[18] In the previous (working paper) version available at http://www.imf.org/external/pubs/cat/longres.cfm?sk=20471.0, the analysis was at the product, time, *and* partner country, which gave us more than 220,000 observations.

elasticity of evasion with respect to tariffs. It is important to note that given the fixed effects, our identification will rely on within-product (at the 6-digit level) over-time variation alone and will thus not be affected by product or partner country characteristics.[19] In all our specifications, we cluster the standard errors at the 6-digit product level, to account for potential serial correlation of evasion for a particular product. We also weight each regression by the number of transactions/partner countries from which the left hand side variables was calculated.

Within this empirical framework, in order to identify the direct effect of enforcement quality on the level of evasion, we need measures or proxies that vary by product and time (else the enforcement variable would be absorbed by one of the fixed effects in (10)). However, it is unlikely that there are significant differences in customs administration of different products over time and it is certainly not easy to measure product-specific time-varying enforcement. We therefore do not attempt to rigorously estimate the effect of enforcement on the level of evasion, but instead focus on trying to measure how proxies of enforcement that vary by product and by the product's provenance affect the evasion elasticity, a potentially important parameter for policy makers (Slemrod and Kopczuk, 2002). Equation 11 illustrates our empirical strategy for doing so with E_p referring to some characteristic relating to enforcement, that varies by product.

$$EvV_{pt} = \beta T_{pt} + \gamma (T_{pt} * E_p) + D_p + D_t + \varepsilon_{pt} \qquad (11)$$

We also identify another possible measure of enforcement which varies by partner-country and product, which allows us to use the partner country variation in evasion as well. Equation (12) illustrates our strategy for doing so.

$$EvV_{ptc} = \beta T_{pt} + \gamma (T_{pt} * E_{pc}) + D_p + D_t + D_c + D_{pc} + D_{tc} + \varepsilon_{ptc} \qquad (12)$$

In both equations (11) and (12), we will be interested in the coefficient γ and interpret this as the marginal impact of some product-varying measure of enforcement quality on the evasion elasticity. According to the theoretical framework discussed in Section II above, the sign of γ should be negative: i.e., improvements in enforcement should lead to a reduction in the evasion elasticity. The purpose of the empirical exercise is to examine if this holds in the data.

What about endogeneity-related problems? In principle, tariffs could be correlated with the unobserved component of evasion, leading to inconsistent estimates of the parameters of interest to us. A number of arguments, however, suggest, that endogeneity is less of an issue. First, as Topalova (2004) argues the timing of Indian tariff reform could be viewed as exogenous. Second, because of the generality of our estimation framework, and in particular the fact that we have product fixed effects, our identification relies on exploiting the variation within 6-digit categories. For endogeneity to be an issue, it must be the case that

[19] Time-related fixed effects also address problems that might arise because of the differences in timing in data recording between exports and imports, as well as common shocks such as technological changes, generalized improvements in enforcement etc.

policy makers reduced tariffs of goods bearing in mind the trends in the evasion for these goods, which is not very likely. Moreover, even if there were such a correlation, the question is its likely direction. For our estimates to be biased upwards, increases in tariffs would have to be *positively* correlated with the error term. In other words, 6-digit products with the largest reduction in tariffs should also be the ones with the largest non-tariff related decline in evasion, which may not necessarily be true.

VI. Results

A. Elasticity of Evasion with Respect to Tariff Rates

Table 1 provides summary statistics of the evasion measures used in the paper. A first point of note is that the evasion gap in values has a mean of 23 percent in the first definition and a mean of well over 100 percent under the assumption of extreme smuggling.[20] A second point to note is that the average evasion gap is smaller for basic, capital and intermediate goods than for consumer and consumer durables, which have faced consistently higher trade restrictions than the former. Finally, evasion is substantially higher for differentiated goods relative to non-differentiated products, even though the tariffs and tariff changes across these two broad categories are virtually identical.

Table 2 presents our first set of results. We estimate equation (10) above with increasing level of generality of specification as we move across the four columns. We present the results for the four measures of evasion that we have already described, introducing different types of fixed effects as we move from columns 1 to 4. In column 1, we include just year fixed effects. Column 2 includes product fixed effects, while column 3 includes both of these fixed effects. In column 4, we show results from a specification which does not aggregate the evasion measure across partner countries. In this specification, we control for country-year and country-product fixed effects and is hence the counterpart of column (3) in terms of generality.

It is clear from columns (3) and (4) that the estimate does depend upon the inclusion of fixed effects. In column 1 of Panel A, which does not control for product effects, the elasticity is more than twice as large as in column (3) (0.23 versus 0.1). Time fixed effects reduce the estimate some but not by as much as product effects. The fact that the inclusion of product fixed effects significantly reduces the magnitude of the estimated evasion elasticity suggests that there is a systematic correlation between tariffs and product characteristics relevant to evasion so that identifying the evasion elasticity based on exploiting product level variation alone (as in Fisman and Wei, 2004) can lead to inconsistent estimates.[21]

Column 3 will be the core specification in the rest of the paper. The magnitude of the coefficient on import tariffs suggests that a one percentage point increase in tariffs increases evasion by about 0.1 percent—this effect is about one-thirtieth the magnitude obtained by

---

[20] This large difference in magnitude stems mechanically from the assumption that the import value of all goods which are reported by exporting countries but not by Indian customs is zero.

[21] What is striking about our results is that we still get a strong measured effect with the inclusion of product fixed effects; that is, even when we wash away all cross-sectional variation, a strong effect remains.

Fisman and Wei (2004).[22, 23] We get similar results for evasion in quantities (see Panels C and D in Table 2).[24] Surprisingly, and unlike in Fisman and Wei (2004), we find only weak evidence for non-linear effects of tariffs on evasion (Appendix Tables A3 and A4). In other words, the evasion elasticity does not appear to depend robustly on the level of tariffs.

How valid is the assumption of complete smuggling underlying our second measure of evasion? Recall that in this case, we recorded all imports that did not have matching exports as essentially smuggled; that is, the value of these imports was coded as zero. One way of checking this is to see if an import was more likely to appear in the Indian customs data when the tariff of the product declines. The results are shown in panel E of Table 2. Here the dependent variable is a dummy that takes on a value of one if there are exports for which there are no corresponding imports. The coefficient on tariffs is consistently positive and significant across all specifications. The magnitude of the coefficient (column 3) suggests that a ten percentage point increase in tariffs is associated with about 0.17 percentage points higher probability that there is no corresponding import for an export. This finding at least partially validates our assumption that these products were smuggled.

Evasion can take place through under recording of import values but also by misclassifying products, and specifically by classifying high-tariff products as lower-tariff ones. To examine if there is evidence of misclassification, we add to the core specification a variable representing the average tariff rate on similar products, where similarity is defined as being under the same 4-digit product classification. The expectation is that, holding the tariff on a product constant, the lower the tariff on similar products, the greater is the incentive to misclassify imports.

The results of adding this misclassification effect is reported in Table 3 (see also Yang, 2006). As expected, the coefficient on the "tariff-on-similar-products" is negative and significant. Holding the own tariff constant, a one percentage point decrease in the tariff on similar products leads to about a 0.18 percent (column 2) increase in evasion as the incentive to misclassify the import rises (again this is lower than the magnitudes obtained by Fisman

---

[22] In Appendix Table A2 we establish the robustness of this basic result in a number of ways. In Panel A, we test the sensitivity of the results to using the median rather than the mean value of evasion. In Panels B, C, and D, we consider alternative weighting schemes, and the results remain broadly similar. We estimate the core equation by making the sample balanced in terms of the products included (Panel E). We present the results from long differences, by using only a subset of the years of data available (Panel F). Panel G shows that the results hold when we include data for all countries, regardless of the match rate between export and import data. In Panel H, we exclude products with additional duties. We do two additional robustness checks (results available upon request): (i) introduce two alternative definitions of evasion2= log (5+X) – log (5+M), log (10+X) – log (10+M), (ii) trim the top and bottom 5 percentiles of evasion and evasion2. The coefficient on tariffs is consistently positive and significant in these specifications.

[23] Note that the analysis is based on ad-valorem tariffs. There are some products in which in addition to the ad valorem tariff there is a specific floor and for a few products the duties are related to quantity. We have not attempted to convert the quantity-related duties to ad valorem because of lack of relevant data. In Appendix Table A2, Panel F, we present the results from a sample, which drops all broad categories of products for which duties in addition to ad-valorem duties were present at some point. The restricted sample delivers roughly the same estimates of the evasion elasticity.

[24] While we get similar results for quantity-based evasion measures, we should note that the data on quantity are less reliable, thus we focus the analysis mostly on evasion in values.

and Wei (2004)).[25] Interestingly, with the inclusion of this extra tariff term, the coefficient on the "own tariff" term increases by nearly two and a half times, from about 0.1 (column 3, Table 2) to 0.21 (column 1, Table 3).

Tariffs are not the only tax levied on imports in India. Other taxes include the surcharge, additional duty of customs (ADCs), special additional duty, anti-dumping duties, and safeguard duties (the latter two being contingent actions). However, by far the most important of these is the ADCs, which is the counterpart on imports of the equivalent excise duty that is imposed on goods produced in India. This duty is also sometimes known as the countervailing duty. In order to check that our core results are robust if we include other duties, we collected data on the ADCs for nine years—1988, 1989, 1990, 1993, 1994, 1996, 1999, 2000, and 2001. We estimate equation 10, this time adding the excise tax (Table 4). The coefficient on the excise tariff is of roughly similar magnitude as the coefficient on customs tariffs, though less precisely estimated. We cannot reject in any of the specifications the test that the coefficients on the tariff and excise are the same. As a further test, we use a measure of taxes that is the sum of the customs duty and the additional customs duty. The results, reported in Table 4 (Panel B), indicate that the coefficient on this measure of aggregate taxes continues to be positive and statistically significant, and roughly the same magnitude as in the core specification (0.1 in column 3, Table 2 versus 0.12 in column 1, Table 4).[26]

There is one reason to believe that our estimate of the evasion elasticity might be biased downward. Recall that the policy measure that we use is tariffs. Yet, as Figure 1, Panel D shows, imports during the period of our analysis were subject not just to tariffs but also to quantitative restrictions (QRs). QRs were largely eliminated for basic, capital and intermediate goods early on in the liberalization process (early 1990s) but were removed on consumer and consumer durables relatively late, beginning in 1999, when the WTO ruled that India's import restrictions were not justified on balance-of-payments grounds and had to be eliminated. Thus, our measure of trade restrictions—tariffs—could be mismeasured, especially for consumer goods.

To check if this is indeed the case, we classify products into two broad industry types based on the extent to which these groups would be plagued by measurement error. The two groups are: basic, intermediate and capital on the one hand and consumer goods on the other. The results are reported in Table 5. We see that the evasion elasticity for the first category of products increases by roughly 40 percent, from 0.1 (Table 2, panel A, column 3) to 0.14, while for the second category, the coefficient on tariffs is not statistically different from zero (columns 3 and 4).[27] [28]

---

[25] We should note that when we estimate the equation with the extra tariff term, our fixed effects are at the 4-digit rather than at the 6-digit level that we used in the core specification because of serious multicollinearity between own tariffs and the tariffs of similar products at the 6 digit level.

[26] One reason for the larger standard error of the coefficient on excise tariffs is the potentially higher measurement error in excise tariffs, due to imperfect concordance to product definitions in trade data and the larger prevalence of minimum, in addition to ad-valorem duties.

[27] For presentational simplicity, for Tables 5 and later we report only the value measures for evasion (results on the quantity measures are available from the authors upon request).

[28] The omission of QRs in our basic regression could also lead to a potential omitted variable bias. It is likely that the variation in QRs is correlated with the changes in tariffs. In particular, declines in tariffs could also be associated with declines in QRs if authorities were determined to reduce trade barriers, or increases in QRs to

(continued…)

To summarize, the findings suggest a robust relationship between customs duty evasion and tariffs. The estimated elasticity can be used to calculate what fraction of the decline in evasion is explained by the decline in tariffs. The average evasion declined by 0.06 (or 6 percentage points) between 1988 and 2001, whereas the average tariffs declined by 0.66 (or 66 percentage points). Using the estimated elasticity of 0.1 from Table 2, the change in evasion explained by the change in tariffs is equal to 0.066 (=0.1*0.66); in other words, all the decline in evasion could be a result of the tariff cuts.

B. Enforcement and the Elasticity of Evasion with Respect to Tariff Rates

Having estimated the elasticity of evasion with respect to tariff rates, we can now proceed to examine how enforcement shapes the behavioral response to tariffs by estimating variants of equation 11.

Ease of enforcement: Product characteristics

First, there are some intrinsic characteristics of products that may affect the ease of enforcement. The most obvious case relates to commodities whose prices are widely known and publicized. In this case, it is difficult for an importer to under-value or misclassify the product; and in case the customs inspector is colluding with the importer, it is more likely that his superiors can in turn detect that he is engaging in such collusion. There are many ways in which this intrinsic characteristic of products can be proxied. We identify three such proxies. First, we use the Rauch classification (Rauch, 1999), which distinguishes goods by whether they are homogenous goods (whose prices are widely known or quoted in exchanges) or differentiated goods (whose prices are less well known and determined more by specific transactions). We create a dummy that takes on a value of 1 when goods are characterized by Rauch as differentiated goods.

For our second proxy, we calculate the standard deviation of the log of unit values at the 6-digit level, where the variation is calculated across partner countries as well as across products and partners within each 6-digit category (based on Indian customs data which is at the HS8-digit level). We then create a dummy which takes on a value of 1 for products whose standard deviation is above the 75th percentile and zero otherwise.[29] Again, the logic is that the more dispersion there is, the easier for an importer to "fool" customs authorities, or customs officers in turn to "fool" their superiors.[30]

---

compensate for the declining tariffs if concerns about domestic competitiveness prevailed. If so, then the estimated impact of tariffs would also reflect the impact of correlated (but unobserved) QR changes. While comprehensive data on QRs at a disaggregated enough level is not available, the inclusion of some very rough measures of QR at the three-digit level (based on Aksoy, 1992 and Export-Import Policy of India publications) in our main specification, has no impact on the estimated elasticity of evasion with respect to tariffs. Alternatively, the results are robust to including the interaction between product and year fixed effects at an aggregate (HS1) level to capture time-varying and industry-specific factors like NTBs (available from the authors upon request).

[29] We get similar results when we use a continuous measure of price dispersion, namely, the standard deviation of the log of unit values.

[30] The assumption that enforcement is easier for undifferentiated products is consistent with a recent paper by Bernard et. al. (2007). They find that the prices that U.S. exporters set for their arm's-length customers are

(continued…)

Our third measure relates to bulkiness. This measure is calculated as the cost-insurance-freight as a share of the value of a product (Giuliano, Spilimbergo and Tonon, 2006).[31] Thus, goods like oil, wheat and coal will be classified as very bulky. Being a differentiated good (according to the Rauch classification or our second measure) is negatively correlated with bulkiness.

While our empirical framework, which controls for time-invariant product characteristics, can not deliver a reliable estimate of the effect of these enforcement related product characteristics on the level of evasion, the summary statistics in Table 1 do provide some suggestive evidence that the level of evasion was indeed higher for differentiated products (0.33 versus 0.04 for undifferentiated products). A slightly more rigorous approach which regresses measures of evasion on tariffs, year dummies and differentiation measures, suggests that differentiated goods have substantially higher level of evasion, conditional on year and tax rates. This is precisely the level effect that the theoretical framework would predict lower quality of enforcement (embodied in the product characteristic) to have on customs duty evasion.

To test the importance of such innate “ease-of-enforcement” characteristics on the evasion elasticity, we estimate equation 11 above, interacting successively each of these proxies with the tariff term. The results are reported in Table 6. In every case, the sign of the coefficient on the interaction is as expected and significant. For example, in the second row, which uses the standard deviation of the log of the unit price as the enforcement characteristic, we find that products which are in the top quartile in terms of variation in unit values have much higher evasion elasticities: that is, an increase in tariffs is more likely to increase evasion, the more the variation in unit prices. In fact, the estimates in column 2 suggest that for products with lower price variation, there is no statistical impact of tariffs on evasion; whereas for products relative high variation, the effect is strong, with a coefficient value of about 0.24, nearly two and a half times as large as in the core specification.

If we can interpret these intrinsic product characteristics as capturing the ease of enforcement, these results suggest that better the enforcement or greater is the likelihood of detection, a given increase in tariffs has a lower impact on evasion. This evidence is consistent with the predictions of our simple theoretical framework.

Enforcement: Institutional quality at destination (mode of entry)

Does the mode of entry systematically affect the elasticity of evasion? We obtained data, from a private vendor (Tips Software Services), for the period 2003-2004 on the imports entering 12 different customs destinations, including both dryports/airports and seaports within India. We calculate the share of transactions for a country-product going through seaports versus airports, assuming that this share is representative for the entire period of our analysis. We then estimate equation 12, with the interaction between the tariff and the share of transactions going airport, representing the additional term. Note that the share of transactions is a time-invariant country-product characteristic and the analysis is performed at the country, product, year level, hence the larger sample size.

---

substantially larger than the prices recorded for related-parties, and that this price wedge is smaller for commodities than for differentiated goods.

[31] We thank Antonio Spilimbergo for providing us with this data.

The elasticity of evasion with respect to tariffs varies depending on whether a product enters India through a seaport or an airport (Table 7). The coefficient on the interaction of the tariff and the share of the total number of transactions going through airports is negative in all cases and significant in (3 out of 4 cases), suggesting that enforcement may be better at airports than at seaports; that is, the response of evasion to tariff increases is lower, the more transactions go through airports. This finding is consistent with the fact that at least one aspect of enforcement—computerization—was significantly more advanced in airports rather than seaports especially during the second half of the period of our analysis.[32]

Thus far, we have been presenting each of the pieces of our analysis individually. In Table 8, we present results where we include all the explanatory variables that we have considered so far. In addition to tariffs, we add the excise duty, and we interact each of these with the product-related enforcement variable and destination related enforcement variable. The general pattern of results that we have described holds broadly true for this general specification as well. In particular, the tax variables are significant and positive, and their interaction with enforcement negative and significant in a majority of cases.

We report a final robustness check in Appendix Table A5. One concern with our empirical estimates relates to our neglect of factors in the source country. We could either be mismeasuring our evasion variable, especially if reporting at the exporting end of the transaction was related to the tax regime for exports in the source country, or we could be omitting partner country variables on the right hand side. If there is (random) measurement error of our left hand side variable, we would expect the standard errors to be greater where there is greater likelihood of mismeasurement. The latter is more likely to be true in countries with weaker institutions. We thus split the sample into the top 15 countries in terms of their institutional quality and the remaining 25 countries. In Panel A, we do find evidence that the coefficients are indeed more tightly estimated for trade with the former set of countries. One possible omitted variable could be export taxes in the source country. In our core specification, it is really difficult to come up with product-specific and time-varying export or export-related taxes that apply on average to all partner countries.[33] Even if we could, there would be a problem in our estimating strategy only if these variables are systematically correlated with our explanatory variables (tariffs in India). This is certainly possible but not necessary: in Europe, for example, there were not many product-specific changes over time in the VAT regime for exports for trade with non-EU countries.

VII. COMPARISON WITH FISMAN AND WEI (2004)

[32] See Report No. 10 of 2002 (Indirect taxes—Customs, page 5). http://www.nao.org.uk/intosai/edp/India_Customsaudit.pdf). There might be a potential endogeneity problem because traders chose to import goods through ports with worse enforcement. But since we are exploiting the variation across products, there would have to be a systematic correlation between products and importer-type for our estimates to be affected.

[33] Note that to the extent these omitted variables are product or time-related they will be captured in the fixed effects.

As noted earlier, our estimates of the evasion elasticity of tariffs for India are significantly lower (in fact about one-thirtieth) than the estimates that Fisman and Wei (2004) obtain for China (we will refer to these estimates as FW for brevity). Can these estimates be reconciled?

There are two differences between the FW estimates and ours: FW adopt a cross-sectional framework while ours is a panel one; and the FW sample includes only a subset of commodities while our sample includes all commodities. To locate the source of the difference, we re-do our estimates trying to conform as far as possible to the FW choices on the above two scores. The results are presented in Table 9 with the pure cross-section results presented in Panel A, and the first difference variant in Panel B. In the first column, we re-estimate the FW evasion elasticity for the FW sample of Chinese imports from Hong Kong and obtain a coefficient of 2.637 which is close to their estimate.[34]

Next we re-estimate our core result with Indian data for the same year as FW (1998) and using the average evasion for a particular product across all of India's trading partners. These results are presented in columns 3 and 5, respectively for our two measures of evasion. The coefficients are 0.913 and 0.51, respectively. Note that these estimates are higher than our core estimate of about 0.1 (in table 2, panel A, column 3) for two reasons: it is for a different time period and it is a cross-section estimate without controlling for product fixed effects. Thus, our own estimates increase about 5-9 times compared to Table 2. Even so, the FW estimates for China remain 3-5 times as large.

Next, in columns 4 and 6, we restrict the sample of commodities to that in FW. Our coefficients, go up, and by nearly one and a half times, for our second measure of evasion, which now reaches about 1.2. This coefficient is comparable to the FW estimate of 2.6. The reason for this jump in the coefficient is because the FW sample of goods is biased toward differentiated goods (this is shown more formally in Appendix Table A6, where the FW sample is related to a number of product characteristics—capital goods, differentiated, bulkiness etc.). And we know from the results in Section VI above, that customs duty for such goods is more difficult to enforce and hence these goods have a higher evasion elasticity. Having eliminated all the differences between the FW estimates and ours, we are left with the finding that India's evasion elasticity is less than half of China's.[35]

VIII. Concluding Remarks

In this paper, we use the Indian tariff reform of the 1980s and 1990s, to examine the effect of tariff policies on evasion. The two contributions of the paper have been to better identify the effect of tariffs on evasion, and to show empirically how enforcement-related factors could affect evasion elasticity. Our empirical strategy is based on a simple theoretical framework that provided guidance especially in establishing the relationship between the enforcement factors and the evasion elasticity of tariffs.

Our main findings are as follows. First, we find a significant and robust impact of tariffs on evasion. Indeed, our calculations suggest that nearly all the decline in average

---

[34] The FW sample is slightly different, comprising 1663 observations but the results are close enough. Also, we do these estimations for 1998 as that is the date of the Fisman and Wei (2004) analysis for China.

[35] Ideally, given the more general specification that we use, we should compare the evasion elasticities by using our methodology on the Chinese data, but this is more difficult to do given the problem of compiling time-series data and purging these of the "re-export" problem that is acute for China.

evasion witnessed over the sample period (1988-2001) was due to the 67 percentage points reduction in average tariffs. We find strong evidence that the evasion elasticity is affected by product-related characteristics that potentially capture the ease of enforcement. For differentiated products and products that exhibit a high variance of unit price, we find that the elasticity of evasion is substantially higher. We also find that the evasion elasticity varies by the mode of entry of goods. Goods, especially differentiated goods, that come through air have a lower evasion elasticity compared with those that come through seaports, which is consistent with the fact that computerization in India has been far less advanced at seaports.

Appendix: Conditions Determining the Effect of Enforcement on the Evasion Elasticity

In Section II of the main text we show that the response of the evasion elasticity with respect to enforcement depends on the sign of the term: $\frac{\partial C_{11}(\gamma, E)}{\partial E}$

In what follows, we assume several classes of cost functions, which have been used in the literature (see Slemrod, 1994, 2001) and Yang (2008b) to help sign this term.

Case I

Assume a cost of evasion function which takes the form:

$$C = f(\gamma) * g(E) \qquad (1)$$

A simple cost function which is quadratic in evasion is a specific case of (1) and is commonly used in the literature (see Yang (2008b), and Slemrod (1994)). The assumptions A1-A5 below correspond to those in the text.

(A1) --- we assume positive costs of evasion. In particular,

$$f(\gamma) > 0$$
$$g(E) > 0$$

$$\frac{\partial C}{\partial \gamma} = f'(\gamma) * g(E)$$

$$\frac{\partial C}{\partial E} = f(\gamma) * g'(E)$$

(A1) and (A3) $\Rightarrow$ $g'(E) > 0$

$$C_{11}(\gamma, E) = \frac{\partial^2 C}{\partial \gamma^2} = f''(\gamma) * g(E) \qquad (2)$$

(A1) and (A4) $\Rightarrow$ $f''(\gamma) > 0$

$$\frac{\partial C_{11}(\gamma, E)}{\partial E} = f''(\gamma) * g'(E)$$

(A1), (A3) and (A4) $\Rightarrow \dfrac{\partial C_{11}(\gamma, E)}{\partial E} > 0$

Thus, in the case where the cost of evasion function takes the multiplicatively separable form as in (1)

(i) Positive cost of evasion --- (A1)
(ii) Cost of evasion increasing in the quality of enforcement -- (A3)
(iii) Marginal cost of evasion increasing in the fraction smuggled (or convexity of cost) -- (A4)

are *sufficient* conditions for $\dfrac{\partial C_{11}(\gamma, E)}{\partial E} > 0$ and hence for $\dfrac{\partial}{\partial E}\dfrac{\partial \gamma}{\partial T} < 0$ (the elasticity of evasion wrt tariffs to be a declining function of the quality of enforcement).

Case II

Now, let us consider a different functional form for the cost of evasion function.
A similar functional form is discussed in Slemrod (2001; p. 125).[36]

$$C = (\gamma M)^E \qquad (3)$$

$\gamma > 0, M > 0, \gamma M > 0, E > 0 \Rightarrow C > 0$ ---- (A1)

$\dfrac{\partial C}{\partial \gamma} = EM(\gamma M)^{E-1} > 0$ --- from (A2)

$\dfrac{\partial C}{\partial E} = (\gamma M)^E \ln(\gamma M) > 0$ --- from (A3)

$C_{11}(\gamma, E) = \dfrac{\partial^2 C}{\partial \gamma^2} = E(E-1)M^2(\gamma M)^{E-2} > 0$ ----- from (A4) $\qquad$ (4)

$$\frac{\partial C_{11}(\gamma, E)}{\partial E} = (2E-1)M^2(\gamma M)^{E-2} + \mathrm{E(E-1)M}^2(\gamma M)^{E-2}\ln(\gamma M) \qquad (5)$$

(A1) and (A4) $\Rightarrow E > 1 \Rightarrow$ the second term of (5) > 0

---

[36] Slemrod (2001) does not explicitly assume the cost of evasion to vary with enforcement, though the parameter δ could be interpreted as the quality of enforcement.

$E > 1 \Rightarrow E > \frac{1}{2} \Rightarrow$ the first term of (5) >0

Therefore, in this case, (A1) and (A4) are *sufficient* conditions for $\frac{\partial C_{11}(\gamma, E)}{\partial E} > 0$ and hence for the elasticity of evasion with respect to tariffs to be a decreasing function of enforcement.[37]

Case III

Finally, for the case of completeness, we consider a third functional form of the cost of evasion function.

$$C = E^{\gamma} \qquad (6)$$

$\gamma > 0, E > 0 \Rightarrow C > 0$ ---- (A1)

$$\frac{\partial C}{\partial \gamma} = E^{\gamma} \ln E > 0 \text{ (from A1)}$$

$$\frac{\partial C}{\partial E} = \gamma E^{\gamma - 1} > 0 \qquad \text{(from A1)}$$

$$C_{11}(\gamma, E) = \frac{\partial^2 C}{\partial \gamma^2} = \ln E * \ln E * E^{\gamma} > 0 \text{ (from A1)} \qquad (7)$$

$$\frac{\partial C_{11}(\gamma, E)}{\partial E} = \frac{2 \ln E}{E} E^{\gamma} + \gamma E^{\gamma - 1} (\ln E)^2 > 0 \qquad \text{(from A1)}$$

Thus, in this case, A1 is a *sufficient* condition for $\frac{\partial C_{11}(\gamma, E)}{\partial E} > 0$ and hence for the elasticity of evasion with respect to tariffs to be a decreasing function of enforcement.

To summarize, in general, the set of *sufficient* conditions for the elasticity of evasion wrt tariffs to be a decreasing function of enforcement are as follows:

---

[37] Note that convexity of the cost function may not be a necessary condition for $\frac{\partial C_{11}(\gamma, E)}{\partial E} > 0$ (this could possibly be the case when $\frac{1}{2} < E < 1$)

(A1) Positive cost of evasion, and positive values of enforcement and fraction of goods smuggled

(A3) Cost of evasion increasing in the quality of enforcement and

(A4) Convexity of cost of evasion in the fraction of goods smuggled

Case IV

Let us consider a simple cost function similar to Yang (2007) which is quadratic in evasion and linear in enforcement. The only modification is that we include an additional argument, which is tariffs.

$$C = \gamma^2 ET^\alpha$$

From, (A1) --- we assume positive costs of evasion. In particular,
$\gamma > 0, E > 0, T > 0 \Rightarrow C > 0$
The firms' after-tax profits are given by

$$\Pi = M - (1-\gamma)M * T - \gamma^2 E(T^\alpha)$$

The first order condition (FOC) for the firm's problem is given by

$$\frac{\partial \Pi}{\partial \gamma} = M * T = 2\gamma E(T^\alpha)$$

Differentiating the FOC wrt T and simplifying,

$$\frac{\partial \gamma}{\partial T} = \frac{M(1-\alpha)}{2ET^\alpha}$$

Thus, (A1) and $\alpha < 1 \Rightarrow \frac{\partial \gamma}{\partial T} > 0$

How does the elasticity of evasion wrt tariffs vary with the quality of enforcement?

$$\frac{\partial}{\partial E}\left(\frac{\partial \gamma}{\partial T}\right) = -\frac{M(1-\alpha)}{2E^2T^\alpha}$$

Thus, assuming (A1) and

$$\alpha < 1 \Rightarrow \frac{\partial}{\partial E}(\frac{\partial \gamma}{\partial T}) < 0$$

Thus, in this simple class of cost functions positive costs of evasion and declining marginal cost of evasion wrt tariffs are sufficient for the elasticity to be positive and decreasing in enforcement.

REFERENCES

Allingham, Michael G., and Agnar Sandmo, 1972, "Income Tax Evasion: A Theoretical Analysis," *Journal of Public Economic*s, Vol. 1, pp. 323-38.

Andreoni, James, Brian Erard and Jonathan Feinstein, 1998, "Tax Compliance," *Journal of Economic Literature* Vol 36, No. 2, pp. 818-860.

Bartelsman, Eric .J. and Roel, 2003, "Why Pay More? Tax Avoidance through Transfer Pricing in OECD Countries," *Journal of Public Economics*, Vol. 87, No.9/10, pp. 2225-2252.

Bernard, Andrew, J. Brad Jensen, and Peter Schott, 2007, "Transfer Pricing by U.S.-Based Multinational Firms. " mimeo.

Bhagwati, Jagdish, 1964, "On the Underinvoicing of Imports," *Bulletin of the Oxford University Institute of Economics and Statistics*, 26 (November), pp. 389-397.

Cowell, F.A., 1991, "Tax Sheltering and the Cost of Evasion," Oxford Economic Papers, Vol. 42, No. 1, pp. 231-243.

Das-Gupta, Arindam, Radhika Lahiri and Dilip Mookherjee, 1995, "Income tax compliance in India: An empirical analysis", *World Development*, Vol. 12, pp. 2051-2064.

Das-Gupta, Arindam and Dilip Mookherjee, 1998, *Incentives and Institutional Reform in Tax Enforcement*, Oxford University Press, New Delhi.

Fisman, Raymond and Shang-Jin Wei, 2004, "Tax Rates and Tax Evasion: Evidence from 'Missing Imports' in China," *Journal of Political Economy*, No. 112 Vol. 2, pp. 471-496.

Giuliano, Paola, Antonio Spilimbergo, and Giovanni Tonon, 2006, "Genetic, Geographical, and Cultural Distances," CEPR Discussion Paper No. 5807, (September).

Javorcik, Beata, S., and Gaia Narciso, 2006, "Differentiated Products and Evasion of Import Tariffs," mimeo, World Bank, Washington D.C.

Kopczuk, Wojciech, 2005, "Tax Bases, Tax Rates and the Elasticity of Reported Income," *Journal of Public Economics,* Vol. 89, pp. 2093-2119.

Kopczuk, Wojciech, 2001, "Redistribution when avoidance behavior is heterogenous," *Journal of Public Economics,* Vol. 81, pp. 51-71.

Mayshar, Joram, 1991, "Taxation with Costly Administration," *The Scandinavian Journal of Economics*, Vol. 93, No. 1, pp. 75-88.

Rauch, James E., 1999, “Networks Versus Markets in International Trade,” *Journal of International Economics,* Vol. 48, pp. 7-35.

Slemrod, Joel, 1994, “Fixing the leak in Okun’s Bucket: Optimal tax progressivity when avoidance can be controlled,” *Journal of Public Economics,* Vol. 55, pp. 41-51.

Slemrod, Joel, 2001, “A general model of the behavioral response to taxation,” *International Tax and Public Finance,* Vol. 8, pp. 119-128.

Slemrod, Joel, 2003, “The System-Dependent Tax responsiveness of Cigarette Purchases: Evidence from Michigan,” Mimeo, University of Michigan.

Slemrod, Joel, and Shlomo Yitzhaki, 2000, “Tax Avoidance, Evasion, and Administration,” *Handbook of Public Economics,* Vol. 3, pp 1423-1470.

Slemrod, Joel and Wojciech Kopczuk, 2002, “The Optimal Elasticity of Taxable Income,” *Journal of Public Economics,* Vol. 84, pp. 91-112.

Topalova, Petia, 2004, “Trade Liberalization and Firm Productivity: the Case of India,” IMF Working Paper No. 04/28, (Washington: International Monetary Fund).

Yang, Dean, 2006, "The Economics of Anti-Corruption: Lessons from a Widespread Customs Reform," in Susan Rose-Ackerman, ed., International Handbook of the Economics of Corruption, Edward Elgar.

Yang, Dean, 2008a,. "Integrity for Hire: An Analysis of a Widespread Customs Reform." *Journal of Law and Economics*, Vol. 51, No. 1, February.

Yang, Dean, 2008b, “Can Enforcement Backfire? Crime Displacement in the Context of Customs Reform in the Philippines,” *Review of Economics and Statistics*, Vol. 90, No. 1, February.

Yitzhaki, Shlomo, 1974, “A Note on Income Tax Evasion: A Theoretical Analysis,” *Journal of Public Economics*, Vol. 3, pp. 201-202.

Figure 1. Evolution of Tariffs in India

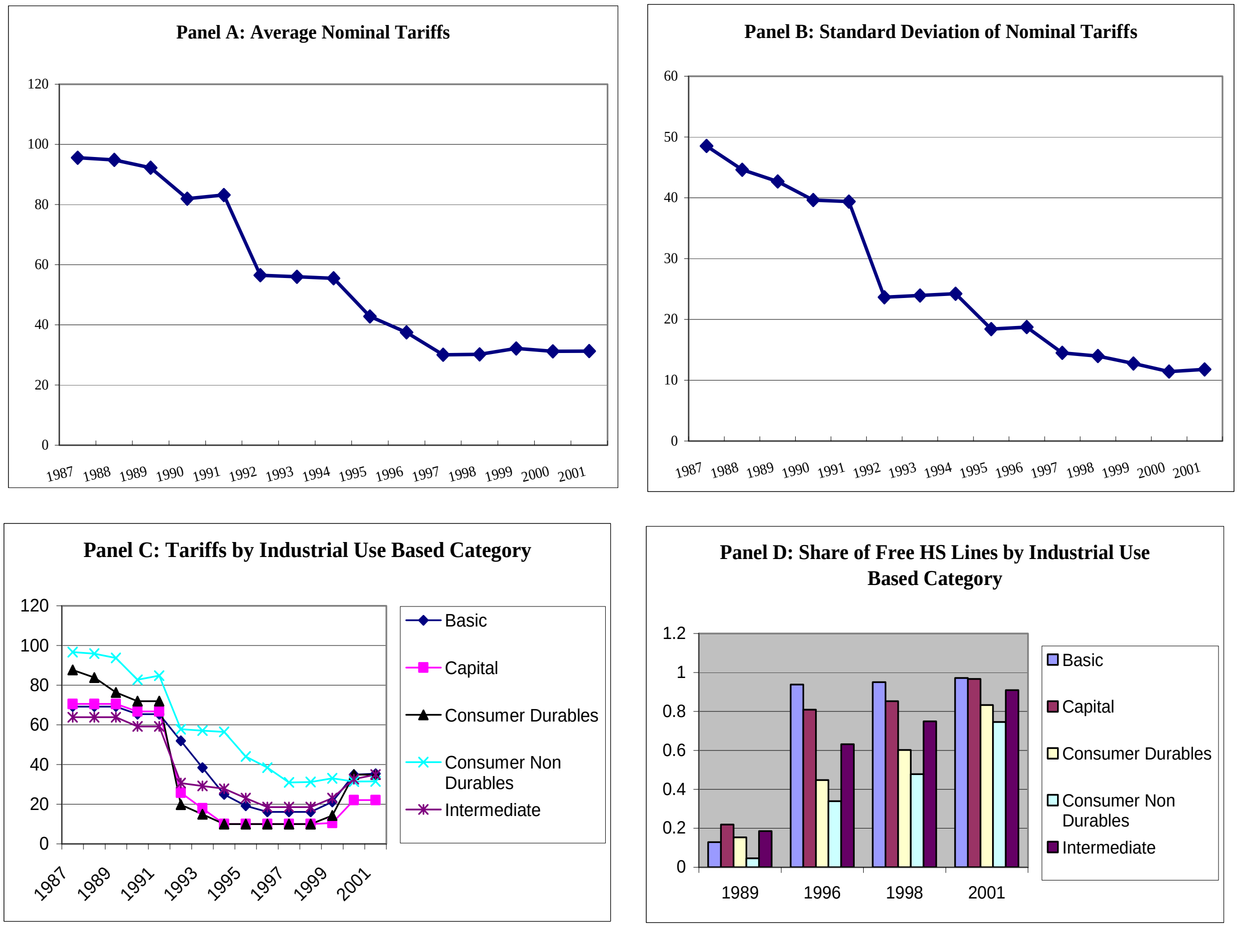

Figure 2. Customs Seizures and Evasion Over Time, 1988-2004

Figure 2a. Number of Seizures Made by Indian Customs Under the Customs Act

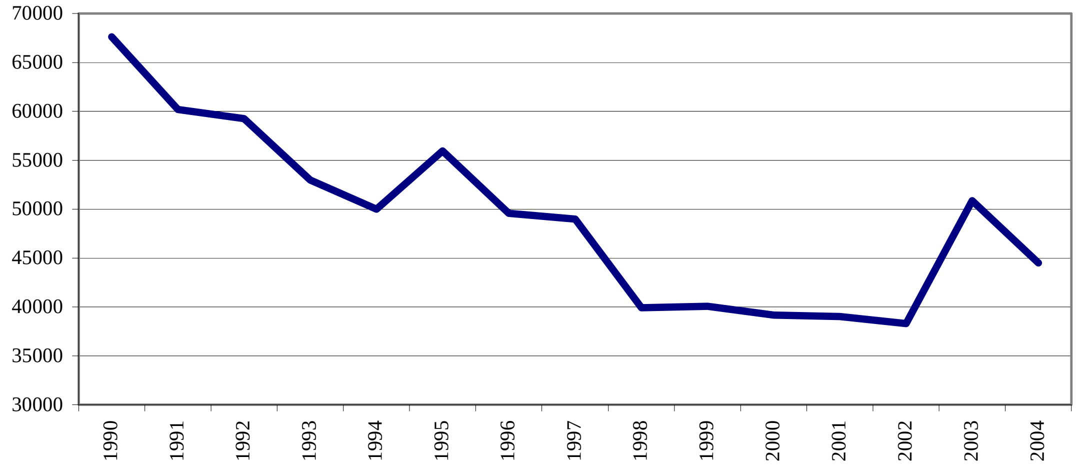

Figure 2b. Average Evasion Gap Over Time (log export value - log import value)

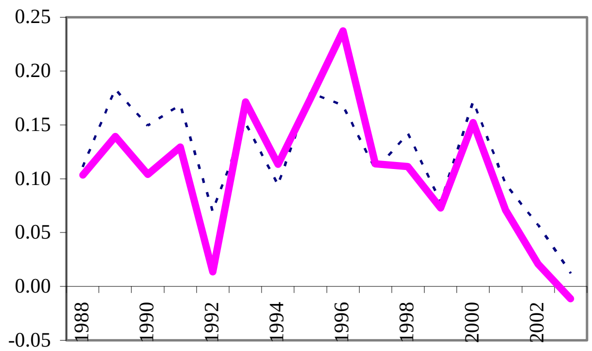

Figure2c. Average Evasion Gap Over Time: log (1+export value) - log (1+ log import value)

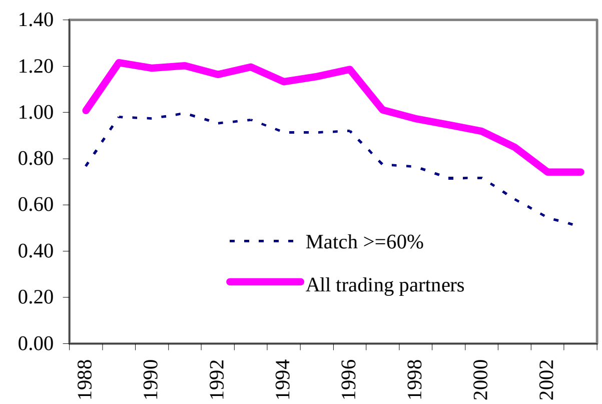

Figure 2d. Average Quantity Evasion Gap Over Time (log export quantity - log import quantity)

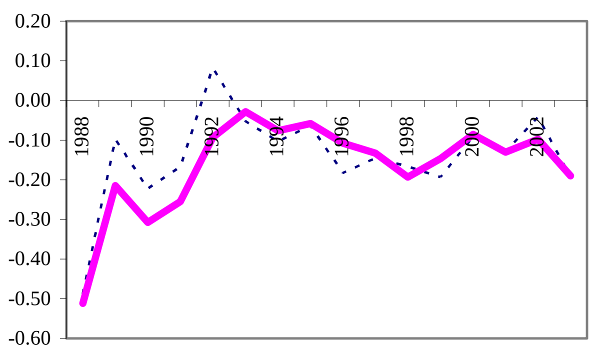

Figure2e. Average Quantity Evasion Gap Over Time: log (1+export quantity) - log (1+ log import quantity)

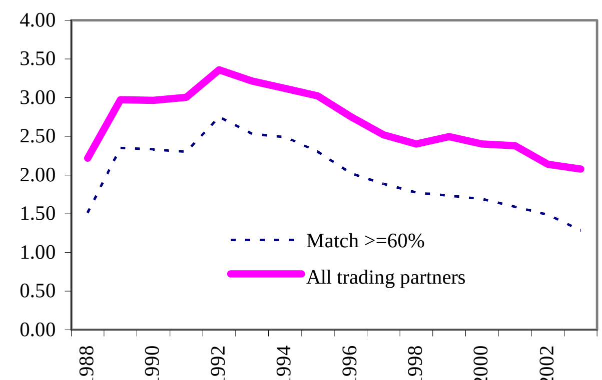

Table 1. Summary Statistics (Product, Year level)

	Entire Sample			Capital, Intermediate and Basic Goods			Consumer and Consumer Durable Goods			Differentiated Goods			Non-Differentiated Goods		
	Mean	Std Dev	Obs	Mean	Std Dev	Obs	Mean	Std Dev	Obs	Mean	Std Dev	Obs	Mean	Std Dev	Obs
Log(Value of Exports)	6.63	2.17	42209	6.85	2.12	24362	6.35	2.18	13432	6.66	2.10	25817	6.47	2.24	14284
Log(Value of Imports)	6.40	2.23	42209	6.69	2.10	24362	5.94	2.28	13432	6.29	2.20	25817	6.53	2.23	14284
Evasion Gap (Value)	0.23	1.41	42209	0.17	1.34	24362	0.39	1.49	13432	0.33	1.38	25817	0.04	1.43	14284
Log(Quantity of Exports)	11.77	2.93	36483	11.95	2.78	21541	11.12	3.02	10785	11.25	2.75	20951	12.59	2.97	13753
Log(Quantity of Imports)	11.09	3.43	36483	11.13	3.48	21541	10.49	3.26	10785	10.05	3.40	20951	12.64	2.81	13753
Evasion Gap (Quantity)	0.07	1.90	36483	-0.01	1.84	21541	0.24	2.03	10785	0.18	1.98	20951	-0.07	1.77	13753
Log(Value of Exports)-Extreme Smuggling	5.86	2.52	56297	6.47	2.33	28241	5.34	2.50	20443	5.90	2.46	34235	5.67	2.56	19385
Log(Value of Imports)-Extreme Smuggling	5.10	3.12	56297	6.03	2.70	28241	4.26	3.14	20443	5.02	3.08	34235	5.18	3.16	19385
Evasion Gap (Value)-Extreme Smuggling	1.39	1.63	56297	1.21	1.64	28241	1.59	1.56	20443	1.41	1.54	34235	1.32	1.72	19385
Log(Quantity of Exports)-Extreme Smuggling	10.82	3.32	52875	11.45	3.10	26966	9.87	3.26	18705	10.29	3.16	31738	11.69	3.36	18827
Log(Quantity of Imports)-Extreme Smuggling	8.69	5.18	52875	9.73	4.64	26966	7.42	5.16	18705	7.71	4.88	31738	10.26	5.28	18827
Evasion Gap (Quantity)-Extreme Smuggling	3.67	3.56	52875	3.03	3.44	26966	4.18	3.35	18705	3.63	3.30	31738	3.79	3.93	18827
Share of Products reported only by Exporting country	0.46	0.37	56297	0.37	0.33	28241	0.55	0.38	20443	0.47	0.37	34235	0.46	0.38	19385

Table 2. Evasion and Tariffs

	(1)	(2)	(3)	(4)
Panel A: Dependent variable: evasion				
Tariff	0.228***	0.116***	0.100***	0.080**
	[0.057]	[0.025]	[0.039]	[0.037]
N	41585	41585	41585	220685
Panel B: Dependent variable: evasion2				
Tariff	0.154***	0.331***	0.126***	0.110***
	[0.058]	[0.024]	[0.038]	[0.040]
N	54979	54979	54979	327684
Panel C: Dependent variable: evq				
Tariff	0.190**	0.185***	0.151**	0.083*
	[0.085]	[0.043]	[0.065]	[0.050]
N	35892	35892	35892	151871
Panel D: Dependent variable: evq2				
Tariff	0.236*	0.945***	0.222***	0.139*
	[0.122]	[0.057]	[0.079]	[0.075]
N	51661	51661	51661	246933
Panel E: Dependent variable: exportsonly				
Tariff	0.079***	0.101***	0.017**	0.139*
	[0.011]	[0.005]	[0.006]	[0.075]
N	54979	54979	54979	246933
Year FE	Y		Y	
Product FE		Y	Y	
Country X Year FE				Y
Country X Product FE				Y

Note: Standard errors are clustered at the product level.
Evasion = log(export value) - log (import value)
reported by exporting countries but missing in Indian imports are smuggled completely.
Evq stands for evasion in quantities, and evq2 assumes extreme smuggling for missing imports.

Table 3. Evasion, Tariffs and Tariffs on Similar Products

	evasion	evasion2	evq	evq2	exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff	0.210***	0.318***	0.376***	0.720***	0.063***
	[0.070]	[0.076]	[0.132]	[0.184]	[0.018]
Average tariff on similar products	-0.092	-0.183**	-0.234*	-0.479***	-0.046**
	[0.071]	[0.077]	[0.130]	[0.183]	[0.018]
N	38055	48232	32846	45434	48232

Table 4. Evasion, Customs and Excise Tariffs

	evasion	evasion2	evq	evq2	exportsonly
	(1)	(2)	(3)	(4)	(5)
Panel A					
Tariff	0.109**	0.144***	0.190*	0.419***	0.017**
	[0.050]	[0.048]	[0.099]	[0.107]	[0.008]
Excise	0.144	0.257**	-0.012	0.318	0.089***
	[0.128]	[0.104]	[0.200]	[0.232]	[0.025]
N	22016	27038	18966	25514	27038
Test for equality of coeff on tariff and excise (p-value)	0.808	0.339	0.397	0.705	0.007
Panel B					
Customs+Excise Tariff	0.115***	0.164***	0.144*	0.399***	0.030***
	[0.044]	[0.042]	[0.082]	[0.093]	[0.008]
N	22016	27038	18966	25514	27038

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects. Years included: 1988, 1989, 1990, 1993, 1994, 1996, 1999, 2000, 2001.

Evasion = log(export value) - log (import value)

Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Evq stands for evasion in quantities, and evq2 assumes extreme smuggling for missing imports.

Table 5. Evasion, Tariffs and Industry Use-Type

	Basic, capital and intermediate		**Consumer goods**	
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
Tariff	0.135***	0.157***	0.004	0.069
	[0.046]	[0.047]	[0.087]	[0.081]
N	24352	28230	13410	20421

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects.

Evasion = log(export value) - log (import value)

Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Table 6. Evasion, Tariffs and Differentiated Goods

	evasion			evasion2		
Panel A. All Goods	(1)	(2)	(3)	(4)	(5)	(6)
Tariff	0.195***	0.003	0.142***	0.229***	0.070*	0.137***
	[0.043]	[0.042]	[0.046]	[0.041]	[0.041]	[0.046]
Tariff X Non-Differentiated	-0.220***			-0.205***		
	[0.052]			[0.049]		
Tariff X Above 75th Percentile in StDevLogPrice		0.235***			0.141***	
		[0.051]			[0.050]	
Tariff X Bulkiness			-2.209*			-0.638
			[1.291]			[1.344]
N	39502	41591	41530	52339	54988	54925

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects.
Evasion = log(export value) - log (import value)
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Table 7. Evasion and Tariffs: Share of Transactions, Sea vs Air

	All products		Differentiated	
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
tariff	0.105***	0.222***	0.218***	0.397***
	[0.041]	[0.046]	0.053	0.057
Tariff*Air	-0.052	-0.210***	-0.146*	-0.349***
	[0.072]	[0.073]	0.086	0.085
N	190328	241948	132897	169886

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X year fixed effects. Tariffs are interacted with the share of transactions for a country-product going via air or sea. Excluded category is share of transactions through sea.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Table 8. Evasion: Including All Explanatory Variables

	All products			
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
tariff	0.190***	0.369***		
	[0.048]	[0.052]		
Tariff*Air	-0.090	-0.285***		
	[0.074]	[0.073]		
Tariff X Non-Differentiated	-0.175***	-0.299***		
	[0.053]	[0.055]		
Customs+Excise Tariff			0.168***	0.315***
			[0.052]	[0.057]
(Customs+Excise) Tariff*Air			-0.093	-0.273***
			[0.078]	[0.078]
(Customs+Excise)Tariff X Non-Differentiated			-0.138**	-0.288***
			[0.060]	[0.062]
N	178477	227364	104158	129627

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X year fixed effects. Tariffs are interacted with the share of transactions for a country-product going via air and a dummy for non-differentiated good by Rauch's classification. Excluded category is share of transactions through sea for differentiated goods.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Table 9. Evasion and Tariffs: China and India

	CHINA	INDIA			
	Evasion	Evasion		Evasion2	
	FW	All	FW	All	FW
	(1)	(2)	(3)	(4)	(5)
Panel A: Cross Section 1998					
Tariff	2.637***	0.913***	0.974***	0.509**	1.189**
	[0.658]	[0.174]	[0.354]	[0.212]	[0.484]
N	1837	3472	1479	4316	1736
Panel B: First Difference 1997, 1998					
Change in Tariff	1.71**	0.307	0.972**	0.23	0.525
	[0.85]	[0.330]	[0.485]	[0.413]	[0.692]
N	1617	3159	1361	4075	1680

Note: Standard errors are clustered at the product (HS4) level. All regressions in Panel B include product (HS6) fixed effects and year fixed effects. In Column (1), we replicate the main specifications in Fisman Wei (2004). Columns (2) and (4) replicate their specification with data from India from 1997 and 1998. Column (3) and (5) replicate Fisman and Wei's specification with data from India from 1997 and 1998 restricting the sample to the same products used in the Fisman and Wei study of China.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Table A1. Match Rates of Products and Values Across Different Trading Partners

Countryname	Share of HS6 codes that were in both datasets	Number of HS 6 products	Share of Value represented by HS6 in both datasets	N Years Data available for Partner
United Kingdom	76.0%	2509	94.1%	9
United States	82.2%	2394	89.5%	11
Germany	80.6%	2250	94.5%	14
Singapore	62.2%	2113	89.7%	12
Italy	74.0%	1930	91.6%	8
Japan	82.4%	1901	93.9%	13
France	72.5%	1680	87.1%	8
China	66.4%	1494	84.6%	10
Switzerland	67.1%	1209	86.2%	14
Netherlands	64.3%	1168	84.7%	10
Hong Kong, China	64.0%	1134	86.2%	9
Belgium	66.7%	1074	98.3%	7
Korea, Rep.	66.7%	1045	75.6%	14
Sweden	65.1%	765	82.8%	10
Australia	53.3%	717	59.7%	14
Russian Federation	33.6%	696	55.9%	5
Malaysia	47.5%	695	90.8%	12
Austria	52.6%	692	73.6%	8
Thailand	46.9%	638	80.7%	10
Spain	55.7%	629	66.6%	13
Canada	59.4%	478	86.6%	13
Denmark	58.7%	400	76.8%	12
South Africa	37.3%	374	62.8%	9
Indonesia	46.7%	356	84.1%	13
Finland	54.5%	306	78.5%	14
Czech Republic	44.9%	301	67.7%	8
Israel	50.3%	301	91.9%	7
Brazil	56.2%	272	81.1%	12
Norway	44.7%	252	55.3%	9
Ireland	41.0%	246	66.0%	10
Nepal	47.8%	246	71.0%	4
Saudi Arabia	23.4%	202	70.8%	6
Sri Lanka	33.4%	170	61.4%	7
New Zealand	36.7%	159	65.5%	13
Turkey	43.5%	155	77.5%	13
Hungary	37.3%	119	52.6%	10
Portugal	40.7%	107	53.6%	14
Argentina	41.8%	107	88.6%	9
Mexico	37.5%	103	67.7%	12
Iran, Islamic Rep.	52.9%	99	80.8%	5

Table A2. Evasion and Tariffs: Robustness

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
Panel A: Aggregating across partner countries: median evasion					
Tariff	0.103***	0.154***	0.154**	0.263***	0.033***
	[0.039]	[0.039]	[0.068]	[0.087]	[0.010]
N	41585	54979	35892	51661	54979
Panel B: Aggregating across partner countries: median evasion, unweighted					
Tariff	0.069*	0.093**	0.101	0.207**	0.023**
	[0.040]	[0.041]	[0.063]	[0.088]	[0.009]
N	41585	54979	35892	51661	54979
Panel C: Mean Evasion: Weighting by Value of Imports					
Tariff	0.068*	0.088**	0.095	0.183**	0.006
	[0.039]	[0.043]	[0.063]	[0.088]	[0.007]
N	41585	46495	35892	43842	46495
Panel D: Mean Evasion: Unweighted					
Tariff	0.069*	0.069*	0.104*	0.158*	0.007
	[0.040]	[0.041]	[0.062]	[0.084]	[0.008]
N	41585	54979	35892	51661	54979
Panel E: Same set of products over time					
Tariff	0.101**	0.126***	0.159**	0.219***	0.013*
	[0.039]	[0.040]	[0.065]	[0.082]	[0.007]
N	34791	39049	30512	36996	39049
Panel F: Long differences, 1988, 1992, 1996, 2000					
Tariff	0.251***	0.239***	0.396***	0.309**	0.034***
	[0.064]	[0.060]	[0.103]	[0.138]	[0.011]
N	11338	14955	9726	13962	14955
Panel G: All countries, All products					
Tariff	0.102***	0.150***	0.153**	0.249***	0.022***
	[0.039]	[0.038]	[0.066]	[0.079]	[0.006]
N	41690	55264	35996	52027	55264
Panel H: Excluding products with additional duties					
Tariff	0.123***	0.153***	0.211***	0.261***	0.017**
	[0.042]	[0.042]	[0.074]	[0.087]	[0.007]
N	37356	50100	31848	46877	50100

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.
Evq stands for evasion in quantities, and evq2 assumes extreme smuggling for missing imports.

Table A3. Evasion, Tariff and Squared Tariff

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff	0.114	0.096	0.295**	0.414**	0.058***
	[0.096]	[0.086]	[0.150]	[0.178]	[0.014]
Tariff^2	-0.005	0.012	-0.059	-0.078	-0.017***
	[0.034]	[0.029]	[0.051]	[0.060]	[0.005]
N	41591	54993	35896	51672	54993

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.
Evq stands for evasion in quantities, and evq2 assumes extreme smuggling for missing imports.

Table A4. Evasion and Tariffs: Flexible Functional Form

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff in first quintile	0.047	0.07	-0.013	0.019	0.015
	[0.110]	[0.101]	[0.185]	[0.213]	[0.017]
Tariff in second quintile	0.026	0.027	0.087	0.209	0.020*
	[0.076]	[0.072]	[0.131]	[0.155]	[0.011]
Tariff in third quintile	0.039	0.085	0.089	0.361***	0.057***
	[0.071]	[0.065]	[0.118]	[0.138]	[0.011]
Tariff in fourth quintile	0.087	0.095	-0.042	0.026	0.008
	[0.086]	[0.078]	[0.143]	[0.173]	[0.014]
Tariff in fifth quintile	0.103**	0.128***	0.133*	0.157*	0.01
	[0.043]	[0.042]	[0.070]	[0.085]	[0.007]
N	41585	54979	35892	51661	54979

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.
Evq stands for evasion in quantities, and evq2 assumes extreme smuggling for missing imports.

Table A5. Evasion and Tariffs- Sample Split by Institutional Quality of Partner

	All goods	
	evasion	evasion2
	(1)	(2)
Panel A: Top 15 countries - ICRG		
tariff	0.114***	0.127***
	[0.039]	[0.041]
N	38081	50579
Panel B: Other countries		
tariff	-0.033	0.025
	[0.076]	[0.063]
N	27419	40776

Note: Standard errors are clustered at the product level. All regressions include product (HS6) and year fixed effects. Countries are selected based on the composite ICRG index.
Evasion = log(export value) - log (import value).
Evasion2 = log (1+ export value) - log (1+ import value), evasion2 assumes that products reported by exporting countries but missing in Indian imports are smuggled completely.

Table A6. Characteristics of Products Included in Fisman-Wei Sample

Dependent Variable:	Capital, Basic & Intermediate	Non-Differentiated	StdLog Price	Above Median in StdLogPrice	Bulkiness
	(1)	(2)	(3)	(4)	(5)
fwsample	-0.132***	-0.318***	0.119***	0.049***	-0.011***
	[0.016]	[0.014]	[0.012]	[0.015]	[0.001]
N	4062	4661	4710	4887	4880

Note: Robust standard errors in parentheses.