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Policies, Enforcement, and Customs Evasion: Evidence from India

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Policies, Enforcement, and Customs Evasion: Evidence from India

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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. We exploit the variation in tariff rates across time and products to identify the evasion elasticity, namely, the effect of tariffs on evasion, and relate this elasticity to factors related to customs enforcement or the quality of customs institutions. We find a positive and robust effect of tariffs on import tax evasion. We then show that the evasion elasticity is influenced by certain product characteristics that determine how easy it is to detect evasion (with more differentiated products exhibiting a higher evasion elasticity). This evasion elasticity, which we broadly interpret as reflecting the quality of customs administration, has not improved over the 1990s. Finally, our results suggest that the effectiveness of customs in addressing evasion may be better in India than China, although China appears to be catching up over time.

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Keywords: Customs evasion; tariffs; enforcement; institutions

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Contents Page

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).[2] 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. 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 SAR to China.

Relatively less attention, however, has been paid to the effect of, what might be called enforcement, on evasion.[3, 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] Slemrod and Kopczuk (2002) also argue that the enforcement regime can shape the behavioral response of agents to

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[2] 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.

[3] The term "enforcement" can be understood more broadly as reflecting the quality of institutions, in this case of customs.

[4] To the best of our knowledge, only few papers in the literature on 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.

[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.

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.

This paper is a modest and preliminary 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 and 2c). 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 2002-03. 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 three 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 SAR by checking 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

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[6] For example, the Tax Reform Act in 1986 in the United States, 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 United States in the 1990s relative to the 1980s (Kopczuk, 2005).

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

Figure 1. Evolution of Tariffs in India

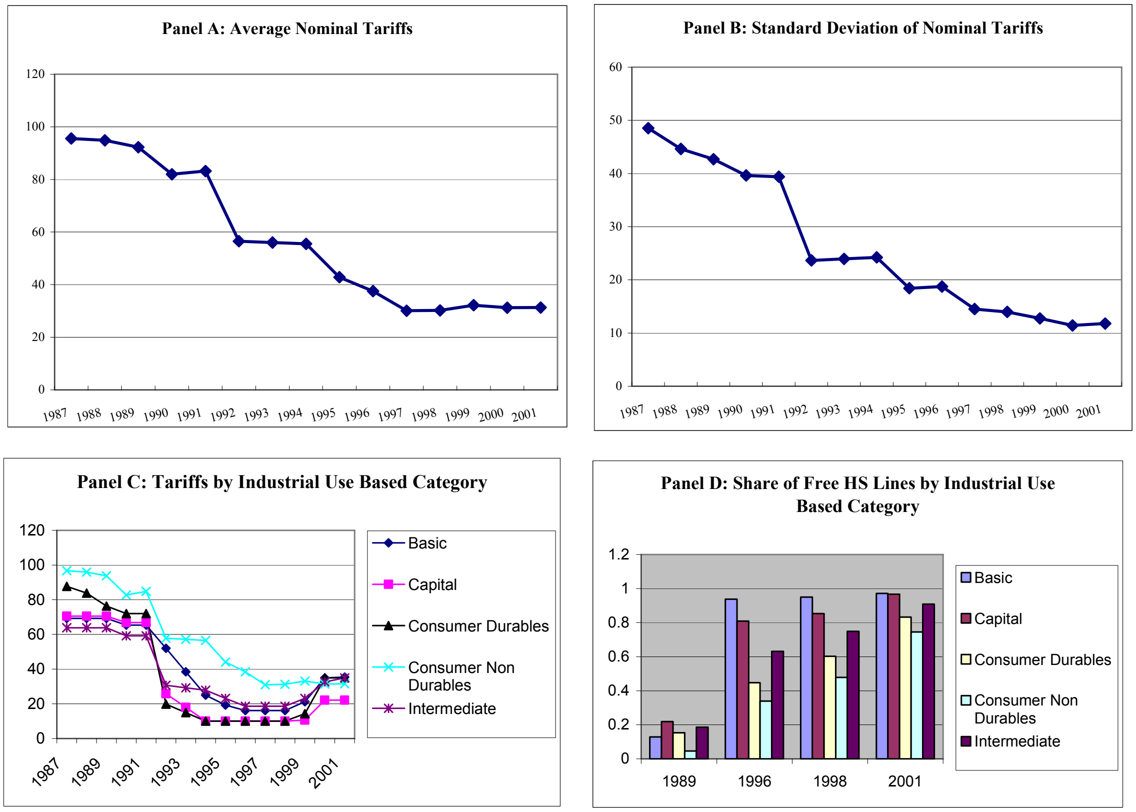


Figure 2. Customs Seizures and Evasion Over Time, 1988-2004

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

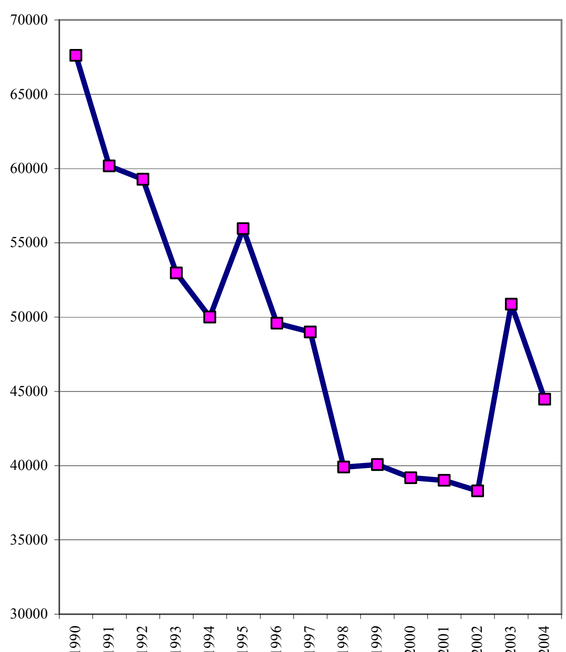


Figure 2b. Average Evasion Gap Over Time (log export value - log import value)

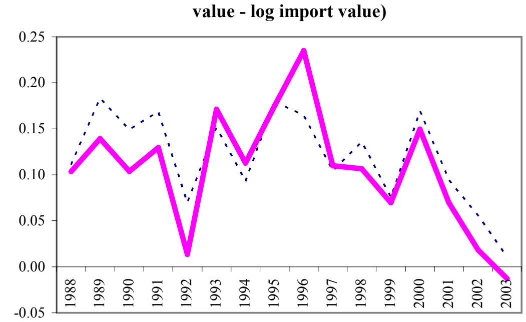
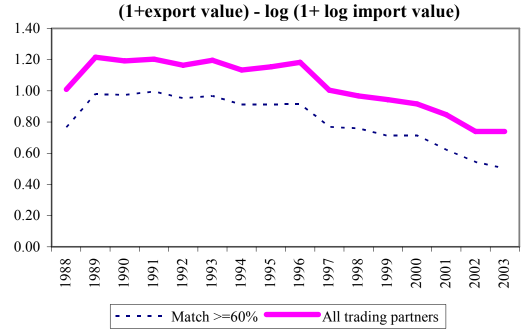


Figure2c. Average Evasion Gap Over Time: log (1+export value) - log (1+ log import value)



Source: In Figures2b, we assume that products reported by exporting countries but missing in Indian imports are smuggled completely. The countries with match rate greater than 60 percent are from Table A1. The source of the data on customs seizures is the Ministry of Home Affairs, Govt of India.

product (say ease of enforcement) that also affects evasion, as we show to be the case below, 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 within 6-digit tariffs over time and is hence a very demanding and general specification.

Fisman and Wei (2004) suggest that the elasticity of evasion with respect to tariff policies (hereafter referred to as the evasion elasticity) can be seen as a more objective measure of the "laxity of rule of law" and hence of potential use in cross-country comparisons of institutional quality.[8] But if this elasticity is identified for each country on a cross-product basis (as in Fisman and Wei, 2004), cross-country comparisons, are less defensible: if Singapore's imports are predominantly differentiated goods while Burkina Faso's are homogenous goods, would the evasion elasticity simply reflect enforcement quality or also the different import composition? On the other hand, we are able to control for the product specific factors that might possibly affect evasion—our identification strategy relies on exploiting the variation within 6-digit products across time.[9]

Our second and main contribution is to show how enforcement-related characteristics affect the evasion elasticity. For example, this elasticity 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.[10] However, we find little evidence that the elasticity is determined significantly by other factors e.g. tax rates or by salaries of customs officials. The latter is a surprising finding; one possible explanation could be that at the margin, salaries seem to have little effect on corruption, because they are very low relative to the "opportunity costs," as measured by the value of transactions handled by a typical customs officer.

The third contribution is to provide an illustration of and a methodology for—which could in principle be replicated in other countries—quantifying institutional quality over time. The well-known problems with perception-based measures has led to the search for more objective or quantifiable measures of institutional quality. If the evasion elasticity is a reasonable reflection of the customs enforcement regime as also suggested by Slemrod and Kopczuk (2002) and there are no substantial changes in other factors affecting this elasticity e.g. the agents' risk aversion or punishment for evasion, then the evolution of the elasticity

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[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] As discussed below, we need to impose additional assumptions (e.g. that the agents' risk aversion parameters and punishment for evasion do not change over time) in order to interpret evasion elasticity as a measure of enforcement quality in customs.

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

over time could be interpreted as tracking the evolution in the quality of customs enforcement—one of the key bureaucratic institutions—over time. We track the evolution of this measure since the late 1980s for India, which also helps shed light on a debate within India on the quality of public institutions and how they have evolved over time.

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. This allows us to compare the quality of customs enforcement in the two countries, a comparison that is of some interest because of their impressive and contrasting growth performances as well as their growing importance in the world economy.

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.

Third, and significantly for Indian policy makers, we do not find evidence that the evasion elasticity has improved over time: indeed, this measure or proxy for enforcement shows no statistically significant change over the 1990s. This finding is consistent with subjective and perceptions-based measures of bureaucratic quality identified by other sources like the International Country Risk Guide's Economic Rating (ICRGE) and Kaufmann, Kraay and Zoido-Lobaton (2006). It is important to stress that average evasion (as opposed to the evasion elasticity) did decline significantly between 1988 and 2001 but most of this (about 90 percent) is explained by the policy change, that is by the 66 percentage point reduction in average tariffs (rather than improvements in customs administration)—a clear illustration of reduction of the rent-seeking effect described by Krueger (1974).

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, suggesting that India's customs enforcement may be potentially twice as effective as that of China. Other macro measures of customs enforcement for the two countries e.g. the difference between statutory and effective tariff rates are consistent with this estimate.[11]

[11] Pritchett and Sethi (1994) and Zee (2005) have used similar measures.

An overall assessment that should be of interest to Indian policy makers is that while India's customs may have been more efficient than China's around 1998, the disparity is being reduced over time because of lack of improvements in India's customs enforcement.

II. Defining Evasion

Before we describe the setting, we need to define our key variable—evasion. 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:

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

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 subscripts *p*, *t*, and *c* refer respectively to product (at the HS-6 digit level), *t* to year (varying between 1988 and 2003), and *c* to the partner country with which Indian trade is carried out. 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, described below, we make an extreme assumption of complete smuggling. We assume that, if at 6-digit level 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 imports as zero. Thus we define our second measure of evasion,

$$EvV2_{ptc} = \log(1 + XV2_{ptc}) - \log(1 + MV2_{ptc}) \tag{2}$$

The 2 in all the variables denotes that this is our second measure of evasion, for which imports take on a value of zero for those cases where there is no match for exports. For obvious reasons, this measure requires the one plus log transformation.[12] 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).[13] 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 in principle create the incentive for smuggling.

[12] The results in the paper are qualitatively unchanged if we use alternative transformations for the second measure of evasion e.g. if we define evasion2 = log (5+X) – log (5+M).

[13] The sample size in Fisman and Wei (1994) is at most about 1700 observations compared with our sample of between 222,000 and 320,000 observations stemming from our exploiting the variation across time and partner countries.

Corresponding to these two value-based evasion measures are corresponding 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, mismeasurement. 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.

III. 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 1987-2003. The data are at HS 6-digit level, yielding information on about 5000 products. In addition, data are available for about 120-50 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.[14] Appendix Table 12 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.

Even after applying these filters, the sample in our "extreme smuggling" specification exceeds 325,000 observations. In the alternative specification, the sample size reduces to about 222,000 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 the annual publications of the Customs department); on the distribution of imports across different ports in India from Tips Software Services, and on salaries of customs inspectors and the number of computers used in different customs destinations from the Ministry of Finance, Government of India.

[14] 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).

IV. EMPIRICAL STRATEGY

Our main specification takes the following form:

$$EvV_{ptc} = \beta T_{pt} + D_p + D_t + D_c + D_{pc} + D_{tc} + \varepsilon_{ptc} \quad (3)$$

where the left hand side variable is evasion as described earlier; T refers to the tariff and varies by product and time, and the D's are vectors of fixed effects.[15] The key parameter that we are interested in is, β, the semi-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. 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.[16]

While equation (3) allows us to identify the effects of tariff policies on evasion, how do we isolate or identify the effects of enforcement? 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 equation (3)). But it is unlikely that there are significant differences in customs administration of different products over time. It is relatively easier to find measures of enforcement quality that vary either by time *or* by product characteristic. The most obvious measures of enforcement such as the number of staff, their quality, their salaries etc. vary only over time. Other measures affecting enforcement can vary by product (e.g. product characteristics that affect the ease of enforcement). If the variation is only along one dimension, it is difficult to identify the average effect of enforcement on evasion because it gets absorbed in the time/product fixed effects.

We therefore focus our attention on trying to measure how various proxies of enforcement affect the evasion elasticity (rather than average evasion), a potentially important parameter for policy makers (Slemrod and Kopczuk, 2002). Equation (4) illustrates our strategy for doing so.

$$EvV_{ptc} = \beta T_{pt} + \gamma (T_{pt} * E_X) + D_p + D_t + D_c + D_{pc} + D_{tc} + \varepsilon_{ptc} \quad (4)$$

In this specification, E_x refers to some characteristic x relating to enforcement, that varies by product, by country-product, or by time. Here we will be interested in the coefficient γ and interpret this as the marginal impact of some broad measure of enforcement quality on the

[15] 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.

[16] 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.

evasion elasticity. Take the case, where *E* is just a vector of year dummies. In this case, β and γ can be used to measure how the evasion elasticity has changed over time. If we were to compare the elasticity across time, we would be measuring the effect of unit changes in tariffs on evasion, controlling for product and other characteristics that conceivably affect evasion.

The elasticity could change over time due to changes in tariff policies, due to enforcement quality, or other factors e.g. agents' risk aversion or punishment for evasion. We show later in the paper that tariff policy is not a significant determinant of the evasion elasticity. Moreover, there have been no significant changes in the punishment for evasion over the last two decades in India. Now, assuming that the importers' preferences are similar across time, —then changes in the evasion elasticity over time would primarily reflect changes in enforcement quality.

In what follows, we try and get at this impact of enforcement in a number of independent, if indirect, ways.

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 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.

V. RESULTS

A. Elasticity of Evasion with Respect to Tariff Rates

Table 1 provides summary statistics of all the variables used in the paper. A first point of note is that the evasion gap in values has a mean of 12 percent in the first definition and a mean of over 100 percent under the assumption of extreme smuggling.[17] 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.

[17] 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.

Table 2 presents our first set of core results. We estimate equation (3) above, but with increasing level of generality of specification as we move across the seven 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 7. In Column 1, we include just country fixed effects. Column 2 includes country and product fixed effects, while Column 3 includes country and year fixed effects. In Column 4, we introduce country, year and product fixed effects and find that the effect of tariffs on evasion drops by about half from 0.19 (in Column 3) to about 0.11 (Panel B). The fact that the inclusion of product fixed effect 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 can lead to inconsistent estimates. Columns 5-7 include the possible two-way interactions of fixed effects, though the coefficient on the tariff term remains broadly unchanged from Column 4.

Column 7, the core specification in the rest of the paper, is the most general specification with both country-product and country-year fixed effects. The magnitude of the coefficient on import tariffs suggests that a one percentage point increase in tariffs increases evasion by about 0.12 percent—this effect is about one-thirtieth the magnitude obtained by Fisman and Wei (2004).[18] We get similar results also for evasion in quantities (see the third and fourth panels in Table 2).[19] Surprisingly, and unlike in Fisman and Wei (2004), we did not find any nonlinear effects of tariffs on evasion (Appendix Tables 15 and 16). In other words, evasion elasticity does not appear to depend significantly 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 imports recorded as zero faced substantially higher tariffs after controlling for country and product characteristics. The results are shown in the panel *E*

[18] In Appendix Tables 13 and 14, we establish the robustness of this basic result in two other ways. First, given that measurement error can to some extent be mitigated by aggregation, we collapse the country and product dimensions into just a product dimension (i.e. we measured evasion as the average across partner countries for any given product) and estimated the equation by weighting the regressions by the number of countries from which a product is imported. In Appendix Table 14, we estimate the core equation by making the sample balanced in terms of the products included. The core results remain broadly unchanged. We do two additional robustness checks: (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 (results are available from authors upon request).

[19] Endogeneity is not a serious concern for reasons discussed earlier. But if tariff changes across products could have been determined by evasion, one way to address this would be to introduce product-time fixed effects. Obviously, we cannot introduce such fixed effects at 6-digit level because that is the basis for our identification, but we can do so for higher levels of product aggregation. When we add such fixed effects at the HS 1-digit level, our results remain unchanged (available from the authors upon request).

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 7) suggests that a ten percentage point increase in tariffs is associated with about 0.24 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.[20]

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 at the 4-digit level. 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. 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 0.26 percent (Column 2) increase in evasion (again this is lower than the magnitudes obtained by Fisman and Wei (2004)) as the incentive to misclassify the import rises.[21] 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 0.12 to 0.38 (Column 2).

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 (3), this time using 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 tariff coefficient continues to be positive and statistically significant, and roughly the same magnitude as in the core specification.

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

[20] We estimated our core equations for a third measure of evasion. In this measure, if exports at 6-digit did not have a counterpart import recorded, we aggregated these products up to 4-digit level and then matched them with imports at the 4-digit level. And if there were no matches at the 4-digit level, we aggregated up to 2-digit to match exports and imports. Thus, only unmatched exports at 2-digit were excluded from the analysis. For this measure of evasion too, the results remained unchanged (available from the authors upon request).

[21] 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.

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 carry out two exercises. 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 and consumer durables on the other. In the first exercise, in addition to the tariff variable, we interact the tariff with a dummy for the second group. The results are reported in Table 5. We see that the coefficient on the first category increases by roughly 50 percent, from 0.12 (Table 2, panel B, Column 7) to 0.17. We also see that the coefficient on the second category is not statistically different from zero (for evasion2, it is the sum of 0.167 and -0.158). The latter result is indeed what we would expect if there were measurement error in the trade restriction variable. In a second exercise, we reestimate equation (3), restricting the sample to basic, capital and intermediate goods instead of interacting tariffs with a dummy for the type of good (Table 5, Columns 3 and 4). Once again, we find that the point estimates on the effect of tariffs are more than 50 percent higher than the specification that uses all products (Table 2, Panel B, Column 7), confirming that measurement error might be a problem. For these reasons, throughout the paper we report results both for the full sample as well as for the category of basic, capital and intermediate goods.[22]

Another concern with our estimation relates to the recording of certain kinds of imports. One of the main differences between the Balance of Payments data on imports and customs data (which we use in the paper) is that the latter do not record defense related imports, such as some military and aircraft imports.[23] If recording of these data varies over time, and is in some way correlated with tariff changes, the estimated key coefficient of interest could be biased. As a robustness check, we exclude two tariff chapters (about 1100 observations) where this problem is likely to be particularly acute—aircraft and military goods. The results (available from the authors upon request) remain unchanged and the standard errors are even more precisely estimated.

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

[23] See EPW Research Foundation (2005), for details.

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 0.081 from Table 2, the change in evasion explained by the change in tariffs is equal to 0.053 (=0.081*0.66), more than 90 percent of the change in evasion. Similarly, if we use our second measure of evasion, more than three-quarters of the change during 1988 and 2001 is explained by the change in tariffs. Thus, though import tax evasion has declined significantly over the last two decades in India, a large fraction is explained by tariff changes, and other factors like changes in enforcement quality or customs administration do not seem to have contributed significantly.

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 the effects of enforcement based on estimating variants of equation (4).

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 more difficult for an importer to undervalue 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 (to do this, we used data from Indian customs 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 median and zero otherwise. 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.

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).[24] 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.

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

So, to test the importance of such innate "ease-of-enforcement" characteristics, we estimated equation (4) above, interacting successively each of these proxies with the tariff term. The results are reported in Table 6 (Panels A and B). 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 have above median variation in unit value have much higher evasion elasticities: that is, a 1 percentage point 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 where there is below median variation, there is no statistical impact of tariffs on evasion; whereas for products with above median variation, the effect is strong, with a coefficient value of about 0.26, more than twice 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 suggests, albeit indirectly, that enforcement has an important effect on evasion.

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 2003-04 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 (4), 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.

The elasticity of evasion with respect to tariffs seems to vary depending on whether a product enters India through a seaport or an airport. In Table 7, we report the estimates of equation (4), where the additional interaction term represents the tariff times the share of the total number of transactions going through airports. The coefficient on this term is negative (in 5 out of 6 cases, and significant in three of them), 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 during the period of our analysis.[25]

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[25] See Report No. 10 of 2002 (Indirect taxes—Customs, page 5). http://www.nao.org.uk/intosai/edp/India_Customsaudit.pdf)

Our results provide another piece of indirect evidence that the evasion elasticity relates to enforcement and enforcement-related characteristics. Recall that in India, the excise tariff levied on imports is administered by the same bureaucratic system (i.e. the Department of Customs and Central Excise) that administers excise. We would expect therefore that the enforcement of these two taxes on imports would be similar (if not identical), resulting in similar evasion responses. Indeed, this is what we find. In Panel A of Table 4, when we introduce the tariff and excise terms separately, the corresponding coefficients have similar magnitudes. Thus, evasion outcomes with respect to customs and excise tariffs appear to be the same.

Enforcement: Effect of salaries of customs inspectors and commissioners

There is an extensive literature that has examined the effects of public sector wages on corruption. More recently, a number of micro-studies based on randomized evaluations have also addressed the related question of the effects of monetary incentives on some measure of public sector delivery. For example, Muralidharan and Sundararaman (2006) show that such incentives have a significant effect on educational and learning outcomes in primary schools.

Our framework allows us to examine the question of whether the remuneration of customs staff has an effect on the evasion elasticity. In 1994, the Government of India set up the Fifth Pay Commission to recommend the revised pay scales for the civil service. In 1995, the commission recommended an increase in salaries, which was implemented beginning in 1997 for national (federal) civil servants. Different states revised the pay scales for state civil servants later. The customs department in India is part of the national bureaucracy, so that beginning in 1997 customs inspectors received a wage hike, retroactively from 1995. The real monthly salaries of customs inspectors and higher ranked officers increased by 80-100 percent in 1997. As the customs administration constitutes only a miniscule portion of the overall bureaucracy and the wage increases were awarded on a national basis, it is reasonable to assume that the change in remuneration was random from the point of view of India's customs employees.

Simple theory would suggest that increases in pay should reduce the incentives for corruption, so that in our framework this should manifest itself as having an effect on both the level of evasion and the elasticity of tax evasion. To analyze this question, we take the data on wages of customs inspectors and customs officers and then calculate a series of relative wages which involves deflating these wages by a measure of salaries in comparable occupations. From the Freeman and Oostendorp database of Occupational Wages around the World, we choose semiskilled occupations like clerical jobs as the appropriate comparator group for inspectors and relatively skilled occupations as the comparator group for officers (Appendix Table 19).[26] We then interact this relative wage series with the tariff term.[27] Results are presented in Table 8.

In Columns 1 and 2, we present results for inspectors and for officers in Columns 3 and 4. The interactions between salaries and tariffs are generally not statistically different from zero. We tested a number of alternative formulations—using different measures for wages in comparable occupations (from the National Sample Survey and the Annual Survey of Industries), using real wages (without deflating for comparable occupations etc.), all producing very imprecise estimates. Our negative results could either be a result of just not having the right experiment, the right estimation framework, or the right data, or all of the above. It could also be due to the fact that the estimated evasion elasticity is already small enough, and there is not much scope for its reduction. Or, the negative results could in fact be revealing. One piece of evidence suggests that it could be the latter, namely that the increase in compensation had no effect on evasion elasticity. Data for 2003-04 suggest that average value of customs transactions handled by the typical customs officer in India is about Rs. 29 million per month. The monthly salary, on the other hand, for a customs inspector is Rs. 9000 per month.[28] In other words, even if, on average, corruption amounted to 0.1 percent of the value of transactions, the customs official would make an amount that is more than thrice his monthly salary. In other words, these stylized facts suggest that, at the margin, salaries seem to have little effect on corruption, because they are very low relative to the "opportunity costs." One policy implication is that, salaries may have to rise significantly if there is to be any effect on customs officials' behavior.[29]

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[26] Customs inspectors in India typically have an undergraduate degree and their grading is below the "officer" class, who comprise the cream of the bureaucracy. Officers (or commissioners), typically have graduate education and more. We used the Freeman occupational database to identify comparators in order to construct relative wages of inspectors and commissioners.

[27] As previously mentioned, our empirical framework does not allow us to estimate the effect of the change in compensation on the level of evasion as it is collinear with the year fixed effects.

[28] This is the average salary of customs inspectors in 2003.

[29] We also investigate whether there is systematic variation in the evasion elasticities depending upon the region from where the goods are imported and do not find any. We also check whether our results are affected by systematic differences in the quality of data between exporting countries. If better (worse) institutions in results in more (less) reliable data, our left hand side variable will be less prone to measurement error in relation to trade with countries with worse institutions. If this is indeed true, and assuming that such error is random, we should expect to see coefficients that are more (less) tightly estimated for higher (lower) institutional quality countries. To test this, we re-estimated our core equation first for the sample restricted to India's trade with the 15 partner countries with the best institutional quality (on the composite ICRGE measure of institutions) and then for the sample comprising India's trade with the remaining 25 partner countries. In both cases, the magnitudes of the coefficient estimates for the evasion elasticities are not statistically different, but the standard error is higher for the sample of countries with worse data (Appendix Table 17).

VI. Enforcement Quality Over Time

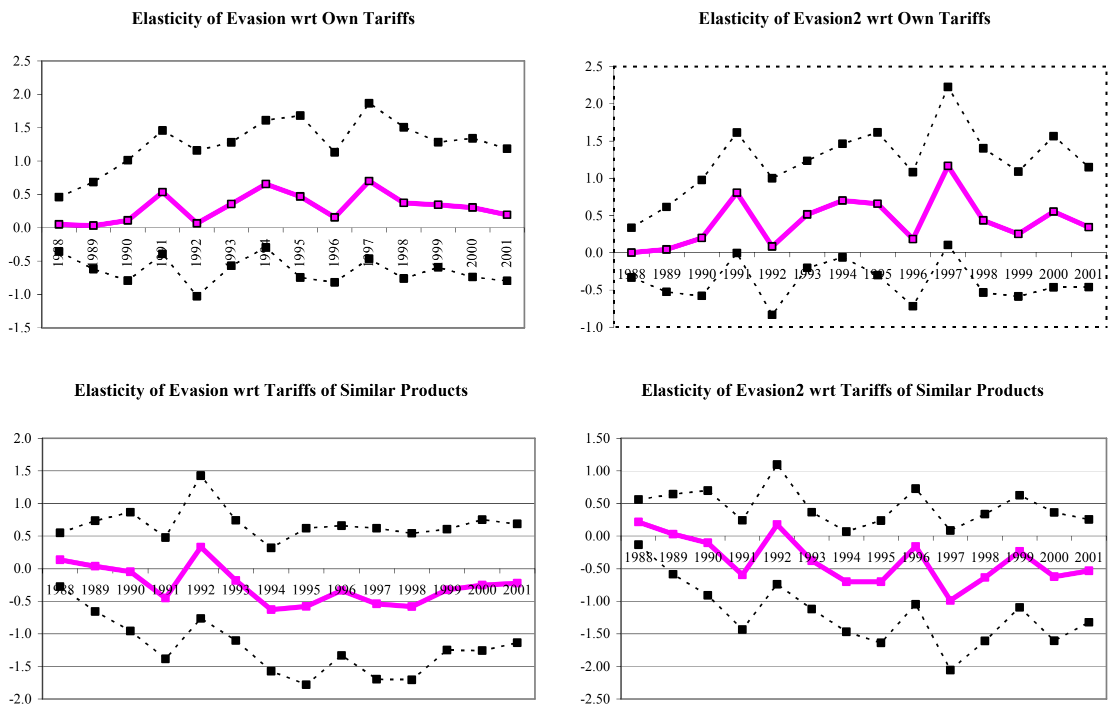
The burgeoning interest in institutions has led to various approaches to measuring institutional quality. First, there are perception-based measures of institutions such as the indices compiled by the International Country Risk Guide's Economic Rating (ICRGE) and Kaufmann, Kraay, and Zoido-Lobaton (2006). Both of these report measures of bureaucratic quality/government effectiveness/corruption, which are based on investors' perceptions of how effective certain governmental institutions, including customs, are in discharging their functions.

The well-known problems with perception-based measures has led to the search for more objective or quantifiable measures of institutional quality. The World Bank's cost of doing business survey is one recent and notable example. In fact, in relation to measuring the efficiency of customs, this survey compiles cross-country data on the number of signatures required for import and export, the time and costs involved in exporting etc. Unfortunately, this measure is available only for the past few years.

As discussed earlier, the evasion elasticity can, under certain assumptions, be interpreted as a measure of enforcement quality. Thus, our framework offers a way of evaluating and quantifying how enforcement has evolved over time. In contrast to the perception-based measures of the World Bank, we can calculate more objective measures of the evolution in institutional quality over time. In Tables 9a and 9b, we report the results of interacting the customs tariffs with period dummies. In Table 9a, the core specification is augmented by interacting the tariff term with two time dummies, respectively for the period, 1993-97 and 1998-2001 respectively. And in Table 9b, there are additional interactions, in this case between the "tariff-on-similar-products" term with the period dummies. Results from interacting the own tariff and tariff on similar products measure with the full set of year dummies are illustrated in Figure 3. As argued earlier, both evasion elasticities (with respect to the own and similar tariffs) reflect enforcement efficiency.

While the results are rather noisy, there is no evidence of statistically significant decline in the elasticity of evasion with respect to own tariffs. In fact, there is some suggestive evidence of a deterioration of the own tariff elasticity over time (top panels of Figure 3). That is, in response to a reduction in tariffs, the decline in evasion is less in the second half of the 1990s than before. The magnitude of the elasticity with respect to the similar tariff increases sharply in the latter two periods compared to the initial period (1988-92) as the bottom panels in the Figure show, and this decline is statistically significant (see Table 9b). Thus, the same change in tariffs on similar products is associated with a larger change in evasion in the latter half of the 1990s (after a number of reforms in customs administration) than in the earlier period. All of these results point to enforcement not improving, but possibly declining over time. This is indeed a surprising finding.

Figure 3. Elasticity of Evasion wrt Tariffs Over Time, 1988-2001
95 Percent Confidence Bands



Notes: The figures shows the estimated elasticities in a regression where own tariffs and tariffs of similar products are interacted with years.

Is this trend corroborated by other indicators? We compute an alternative measure of customs effectiveness suggested by Pritchett and Sethi (1994) and Zee (2005). This measure (call it collection efficiency) is the ratio of the average duty collection rate (or the effective tariff rate i.e the ratio of collected import duties to the value of imports) to the average statutory rate. If there are no leakages through evasion, misclassification and outright corruption, the ratio should be one: what is collected in duties is equal to what ought to be. Since evasion and misclassification tend to rise with tariffs (as our results suggest), the collection efficiency measure tends to decline as tariffs increase and tends to increase as enforcement quality improves.

In Column 6 of Table 10, we show this measure for India for the period 1990-2001. The collection efficiency measure rises sharply in the early part of the 1990s and then declines in the late 1990s, and in 2001 the collection efficiency is lower than at the start of the reform process. What is especially noteworthy is the decline in this measure since 1997: over this period, average tariffs were declining, which should have tended to raise the collection efficiency ratio. The fact that this ratio actually declined despite declining tariffs is consistent with a decline in enforcement quality.[30]

Is this stagnation or even possible decline in customs enforcement consistent with developments or reforms in customs administration? First, what are the basic rules of customs enforcement and how did they change during the 1990s?

The Customs Act of 1962, along with its subsequent amendments, sets the framework of for customs administration and enforcement.[31] 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 (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. For goods that exceed a certain value, any offence committed by an importer can lead to penalties of up to seven years in prison (Chapter XVI, Section 135). For a customs officer, involved in a punishable offence, the penalty could be a maximum prison sentence of three years (Chapter XVI, Section 136). Interestingly, customs officials could also face penalties (a maximum prison sentence of 6 months) for wrongly indicting importers (Chapter XVI, Section 136). The fines and penalties described above have not changed significantly over time.[32]

While the Customs Act of 1962 remained largely unchanged, there were substantial changes in the technology of customs administration in India. Most importantly, the Indian Customs Electronic Data Interchange System (ICES), an attempt to move toward an electronic basis for handling customs and exchanging information within and outside customs, was initiated in 1992 on a pilot basis. One of the objectives is to minimize interface between traders and customs so as to reduce the scope of corruption and rent-seeking. It took four years to complete the project and another 5 years to bring all the major ports under this scheme.[33] Even as of 2002, not all types of transactions were covered under the ICES. As of March 2001 (the last year in our study) only half the customs revenues were covered by the ICES.

[30] In computing the collection efficiency ratio, we used import data from the IMF's Direction of Trade Statistics. It could be argued that the correct measure should be dutiable imports not total imports. When we redo the calculation for India using the customs data on imports (rather than from the Direction of Trade Statistics which is derived from the Balance of Payments), which primarily covers dutiable imports (we are not able to do the same for China because dutiable imports are difficult to obtain), there is a level improvement in the measure of collection efficiency but the trend over time remains virtually unchanged: that is the collection efficiency improves until 1997 and starts declining thereafter as in Table 10.

[31] See http://www.cbec.gov.in/cae/customs/cs-act/cs-act-idx.htm for the Customs Act.

[32] To ensure due process, there is an elaborate system for importers to appeal actions of customs authorities: appeals can first be made to the customs department itself, but can then be taken to the Customs, Excise and Service Tax Appellate Tribunal (CESTAT, formerly known as CEGAT), and then to the judiciary.

[33] See http://www.nao.org.uk/intosai/edp/India_Customsaudit.pdf for details.

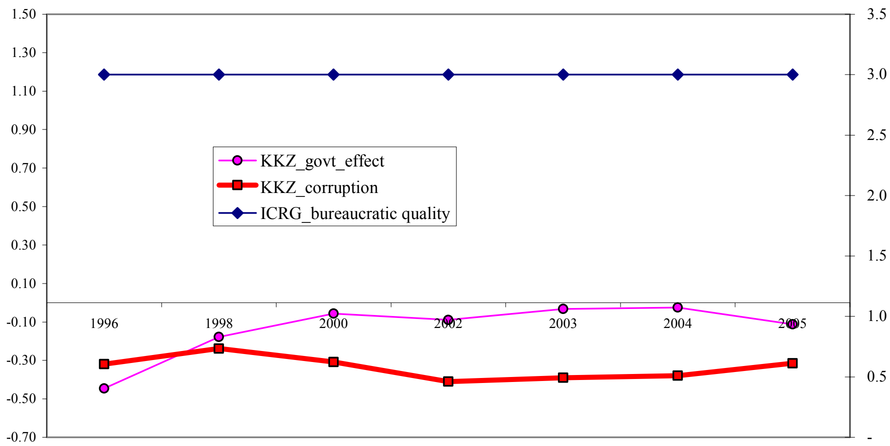
One potentially important reform in customs administration that could have affected evasion relates to the procedures for customs valuation. In the case of India, however, the major change in valuation—in moving toward a system of valuation based on the value of transactions declared by the importer—happened in 1988, when India implemented the GATT's Customs Valuation Code. Since then, various changes have been made in valuation, especially in 1995 and 2001, that gave *greater* rather than less discretion to customs officials. That this discretion may have been excessive is reflected in the fact that judicial verdicts on valuation cases have tended to call upon the Customs department not to depart from the transaction value method for valuation (see Chaturvedi, 2006).

The fourth set of changes relate to salaries of customs officials. Data suggest that the real wages of inspectors and commissioners grew on average by about 3 percent and 5 percent, respectively between 1990 and 2001, despite the recommendations of the Fifth Pay Commission. With the economy growing at 6 percent over this period and the services sector growing even more rapidly, customs officials salaries have lagged behind those in comparative occupations.

Putting all this together, the overall impression is that neither the incentives for enforcement (as reflected in salaries of customs officials) nor the penalties for tax evasion behavior by importers and corruption by customs officials were improved during this period. Computerization was introduced, albeit incompletely, and valuation methods have tended to become more, rather than less, discretionary, despite the fact that the underlying environment—the sharp decline in tariffs—may have made importers less likely to attempt evasion. It is therefore not surprising, and indeed entirely consistent with our findings, that overall enforcement has not improved.

If stagnation or even possible decline in customs enforcement is consistent with developments or reforms in customs administration itself, is it consistent with other indicators of institutional quality in India? We plot two such measures for the period 1988-2004 in Figure 4. These are: the ICRGE measure of bureaucratic quality and the World Bank's measures of government effectiveness and corruption. All these measures broadly portray a picture of institutional stagnation which is consistent with our measure of evasion elasticity. The fact that enforcement quality in customs may not have improved is consistent with a broader tendency for institutional stagnation (for example, the judiciary, police, and state electricity boards) discussed in Subramanian (2006) and should give pause to policy makers whose ambitions for future performance need to be checked against potential bottlenecks, especially those arising from institutional quality.

Figure 4. Alternative Indices of Institutions, India



Notes.
ICRG index measures the quality of the bureaucracy (maximum 4 points). High points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. KKZ Control of corruption index measures the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. KKZ government effectiveness measures the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The scores of KKZ indices lie between -2.5 and 2.5, with higher scores corresponding to better outcomes.

VII. Babu Versus Mandarin: Comparing Chinese and Indian Customs Enforcement[34]

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 three differences between the FW estimates and ours: FW consider trade with one partner while we consider trade with all partners; FW adopt a cross-sectional framework while ours is a panel one; and finally, 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 three scores. The results are presented in Table 11 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 SAR and obtain a coefficient of 2.637 which is close to their estimate.[35]

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[34] The term "babu" means a clerk and was often used to describe low-ranking officers like customs inspectors during the British rule in India.

[35] 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.

Next we reestimate our core result with Indian data for the same year as FW (1998) and eliminating the partner dimension to conform to FW (i.e. we compute the average evasion for a particular product across all of India's trading partners, which we then correlate with the product's tariff rate in 1998). These results are presented in Columns 2 and 4, 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 0.12 (in Table 2, panel B, Column 7) 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 3 and 5, 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 18, 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 V 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.[36] With all the caveats, and assuming that there are no substantial differences in the risk aversion of Chinese and Indian importers, this suggests that in 1998, India's customs was more than twice as effective in combating evasion than China's. To check whether this difference was plausible, we computed the alternative collection efficiency measure also for China for the period 1996-2001 (see Table 10). For the year 1998, this efficiency ratio was five times higher for India than China. Although the actual numbers might be fragile, qualitatively this measure portrays the same picture as our evasion elasticity estimates.

The second interesting point to note is that since 1998, India's customs performance relative to China is worsening, from a factor of 5 to a factor of 2 in 2001. This relative performance is more due to India's performance deteriorating, a point noted in the previous section. The babu might have been more efficient and less corruptible than the mandarin, but the mandarin is catching up fast.

[36] 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.

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 three contributions of the paper are to better identify the effect of tariffs on evasion, to show how enforcement-related factors could affect evasion elasticity, and to illustrate the computation of objective and quantitative indicators of enforcement over time.

Our main findings are as follows. First, we find a significant and robust impact of tariffs on evasion. Indeed, our calculations suggest that nearly 90 percent of the decline in average evasion witnessed over the sample period (1988-2001) was due to the nearly 67 percentage points reduction in average tariffs. We find strong evidence that the evasion elasticity is affected by a product-related characteristic that potentially captures 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 has been far less advanced at seaports.

Third, and significantly for Indian policy makers, there is no evidence that the evasion elasticity has improved over time, a finding which is consistent both with the actual reforms in customs administration (which saw little changes to the incentives for enforcement and penalties for non-compliance) and also consistent with other subjective and perceptions-based measures of bureaucratic quality identified by other sources. The lack of enforcement improvement is entirely consistent with our finding of a large decrease in evasion: evasion has come down but nearly all of it is due to the decline in tariffs and very little, if anything at all, due to an improvement in customs administration or enforcement.

Finally, we compare India and China and find that that India's customs enforcement is potentially twice as effective as that of China's. An overall assessment that should be of interest to Indian policy makers is that while India's customs may have been more efficient than China's around 1998, the disparity is being reduced over time because of lack of sufficient improvements in India's customs enforcement and substantial increase in collection efficiency in China over time

Table 1. Summary Statistics

	Entire Sample			Capital, Intermediate and Basic Goods			Consumer and Consumer Durable Goods		
	Mean	Std Dev	Obs	Mean	Std Dev	Obs	Mean	Std Dev	Obs
Log(Value of Exports)	4.43	2.26	223924	4.54	2.25	136306	4.25	2.25	69856
Log(Value of Imports)	4.31	2.21	223924	4.45	2.17	136306	4.02	2.23	69856
Evasion Gap (Value)	0.12	1.93	223924	0.09	1.92	136306	0.23	1.96	69856
Log(Quantity of Exports)	8.92	3.41	154304	8.93	3.40	96823	8.39	3.33	41380
Log(Quantity of Imports)	9.05	3.18	154304	9.11	3.16	96823	8.45	3.13	41380
Evasion Gap (Quantity)	-0.14	2.43	154304	-0.18	2.42	96823	-0.06	2.47	41380
Log(Value of Exports)-Extreme Smuggling	3.99	2.18	333557	4.19	2.18	189409	3.72	2.12	113231
Log(Value of Imports)-Extreme Smuggling	2.95	2.68	333557	3.25	2.68	189409	2.54	2.59	113231
Evasion Gap (Value)-Extreme Smuggling	1.04	2.24	333557	0.94	2.28	189409	1.18	2.16	113231
Log(Quantity of Exports)-Extreme Smuggling	8.25	3.42	251589	8.39	3.46	144707	7.60	3.23	79134
Log(Quantity of Imports)-Extreme Smuggling	5.56	5.06	251589	6.10	5.00	144707	4.42	4.78	79134
Evasion Gap (Quantity)-Extreme Smuggling	2.69	4.49	251589	2.29	4.45	144707	3.18	4.31	79134
Share of Products reported only by Exporting country	0.33	0.47	333557	0.28	0.45	189409	0.38	0.49	113231

Table 2. Evasion and Tariffs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Dependent variable: evasion							
Tariff	0.123***	0.176***	0.169***	0.103***	0.083**	0.101***	0.081**
	[0.034]	[0.024]	[0.052]	[0.037]	[0.041]	[0.037]	[0.041]
N	221077	221077	221077	221077	221077	221077	221077
Panel B: Dependent variable: evasion2							
Tariff	0.433***	0.550***	0.185***	0.114***	0.116**	0.116**	0.116**
	[0.034]	[0.026]	[0.055]	[0.038]	[0.045]	[0.045]	[0.045]
N	328090	328090	328090	328090	328090	328090	328090
Panel C: Dependent variable: evq							
Tariff	0.199***	0.226***	0.231***	0.136**	0.106*	0.116**	0.081
	[0.049]	[0.035]	[0.076]	[0.053]	[0.057]	[0.053]	[0.057]
N	152024	152024	152024	152024	152024	152024	152024
Panel D: Dependent variable: evq2							
Tariff	1.080***	1.285***	0.432***	0.220***	0.162*	0.193***	0.137
	[0.089]	[0.060]	[0.127]	[0.076]	[0.087]	[0.075]	[0.086]
N	247095	247095	247095	247095	247095	247095	247095
Panel E: Dependent variable: exportsonly							
Tariff	0.146***	0.160***	0.098***	0.018**	0.024***	0.024***	0.024***
	[0.009]	[0.006]	[0.013]	[0.007]	[0.008]	[0.008]	[0.008]
N	328090	328090	328090	328090	328090	328090	328090
Year FE			Y	Y	Y		
Country FE	Y	Y	Y	Y			
Product FE		Y		Y		Y	
Country X Year FE						Y	Y
Country X Product FE					Y		Y

Note: Standard errors are clustered at the product level.
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 3. Evasion, Tariffs and Tariffs on Similar Products

	evasion	evasion2	evq	evq2	exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff	0.251***	0.383***	0.229**	0.727***	0.061***
	[0.078]	[0.081]	[0.114]	[0.171]	[0.016]
Average tariff on similar products	-0.164**	-0.256***	-0.191*	-0.564***	-0.038**
	[0.076]	[0.077]	[0.107]	[0.161]	[0.016]
N	183223	252327	122534	184672	252327

Note: Standard errors are clustered at the product level. All regressions include country X product (HS4) fixed
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 4. Evasion, Customs and Excise Tariffs

	evasion	evasion2	evq	evq2	exportsonly
	(1)	(2)	(3)	(4)	(5)
Panel A					
Tariff	0.102**	0.129**	0.135*	0.244***	0.024***
	[0.048]	[0.053]	[0.080]	[0.094]	[0.008]
Excise	0.104	0.210*	0.151	0.592**	0.111***
	[0.121]	[0.110]	[0.172]	[0.233]	[0.024]
N	126748	179728	86792	134445	179728
Panel B					
Customs+Excise Tariff	0.102**	0.143***	0.139*	0.318***	0.039***
	[0.049]	[0.053]	[0.078]	[0.102]	[0.009]
N	126748	179728	86792	134445	179728

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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	
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
Tariff	0.128***	0.167***	0.134***	0.184***
	[0.047]	[0.050]	[0.048]	[0.054]
Tariff X Consumer Goods	-0.140**	-0.158**		
	[0.069]	[0.065]		
N	206065	302514	136274	189363

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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	0.163***	-0.041	0.142***	0.249***	-0.068	0.201***
	[0.046]	[0.044]	[0.052]	[0.049]	[0.045]	[0.054]
Tariff X Non-Differentiated	-0.177***			-0.266***		
	[0.056]			[0.057]		
Tariff X Above Median in StDevLogPrice		0.260***			0.388***	
		[0.054]			[0.054]	
Tariff X Bulkiness			-2.916**			-4.068***
			[1.422]			[1.395]
N	181989	193781	193666	272795	289699	289556
Panel B. Basic, Capital and Intermediate Goods						
Tariff	0.189***	-0.004	0.204***	0.296***	-0.038	0.328***
	[0.053]	[0.056]	[0.069]	[0.058]	[0.059]	[0.073]
Tariff X Non-Differentiated	-0.141**			-0.232***		
	[0.067]			[0.069]		
Tariff X Above Median in StDevLogPrice		0.233***			0.387***	
		[0.065]			[0.066]	
Tariff X Bulkiness			-4.120*			-7.901***
			[2.235]			[2.369]
N	113415	120278	120212	158069	167920	167840

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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		**Basic, capital and intermediate**		**Differentiated**	
	evasion	evasion2	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)	(5)	(6)
tariff	0.105***	0.214***	0.121***	0.254***	0.218***	0.380***
	[0.041]	[0.045]	[0.045]	[0.053]	[0.053]	[0.055]
Tariff*Air	-0.053	-0.202***	0.077	-0.084	-0.146*	-0.330***
	[0.072]	[0.072]	[0.094]	[0.098]	[0.086]	[0.083]
N	190297	241912	119246	146657	133000	170000

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 trasnactions 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, Tariffs and Wages of Customs Inspectors and Commissioners

	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
tariff	0.313	0.178	-1.460**	-0.611
	[0.411]	[0.384]	[0.677]	[0.686]
tariff*ln(salaries of inspectors)	-0.045	-0.013		
	[0.079]	[0.074]		
tariff*ln(salaries of commissioners)			0.346**	0.162
			[0.152]	[0.153]
N	221077	328090	221077	328090
Country X Product FE	Y	Y	Y	Y
Country X Year FE	Y	Y	Y	Y

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects. Columns (1) and (2) country X 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 9a. Evasion and Tariffs: Period Interactions

	All products		**Basic, capital and intermediate**	
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
Tariff	0.090**	0.129***	0.124**	0.168***
	[0.042]	[0.046]	[0.049]	[0.056]
Tariff*Period2	-0.046	-0.078	0.066	0.11
	[0.073]	[0.073]	[0.092]	[0.096]
Tariff*period 3	0.011	-0.201	0.075	0.173
	[0.212]	[0.182]	[0.213]	[0.228]
N	221077	328090	136274	189363

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X year fixed effects. Period 1= 1988-1992, 2= 1993-1997, 3 = 1998-2001.
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.

Table 9b. Evasion and Tariffs, Controlling for Tariffs of Similar Products: Period Interactions

	All products		**Basic, capital and intermediate**	
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
Tariff	0.147	0.214**	0.141	0.216*
	[0.100]	[0.099]	[0.116]	[0.121]
Tariff*Period2	-0.040	-0.071	-0.009	-0.027
	[0.096]	[0.099]	[0.111]	[0.123]
Tariff*period 3	0.269*	0.368**	0.236	0.386**
	[0.142]	[0.146]	[0.179]	[0.186]
Average tariff of similar products	0.122	0.157	0.744	1.099*
(excl own)	[0.179]	[0.200]	[0.486]	[0.569]
Average tariff of similar * period 2	-0.367***	-0.472***	-0.232	-0.296
	[0.136]	[0.136]	[0.171]	[0.187]
Average tariff of similar * period 3	-0.286*	-0.427**	-0.546	-0.722
	[0.150]	[0.185]	[0.426]	[0.546]
N	182766	251847	114239	149360

Note: Standard errors are clustered at the product (HS4) level. All regressions include country X product (HS4) fixed effects, and country X year fixed effects. Period 1= 1988-1992, 2= 1993-1997, 3 = 1998-2001. Similar products are defined as the products in the same 4-digit category excluding the own product.
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 10. Average Statutory and Effective Tariff Rates (China and India), 1990-2001

	Effective Tariff Rate (In Percent)		**Avg Statutory Tariff Rate (In Percent)**		**Effective / Statutory**		**Relative Effectiveness of Customs**
	China	India	China	India	China	India	India/China
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1990	6.3	49		82		60	
1991	5.7	50		83		60	
1992	4.8	39		56		69	
1993	4.4	34		56		60	
1994	2.7	33		56		59	
1995	2.6	31		43		73	
1996	2.6	33	24	38	11	89	8
1997	2.7	27	18	30	15	89	6
1998	2.7	23	18	30	15	77	5
1999	4.1	23	17	32	24	72	3
2000	4.0	21	17	31	24	67	3
2001	4.2	14	16	31	26	46	2

Source: Government Finance Statistics, Direction of Trade Statistics IMF; WITS

Table 11. 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 12. 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 13. Evasion and Tariffs at the Product Level

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff	0.101**	0.126***	0.150**	0.222***	0.017**
	[0.041]	[0.040]	[0.069]	[0.082]	[0.007]
N	41586	54980	35895	51661	54980

Note: Standard errors are clustered at the product level. All regressions include product (HS6) fixed effects, and year fixed effects. All regressions are weighted by the number of countries from which a product is imported.
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 14. Evasion and Tariffs: Same Set of Products Over Time

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff	0.090**	0.124***	0.074	0.100	0.012*
	[0.042]	[0.048]	[0.057]	[0.089]	[0.007]
N	140391	156319	95073	109187	156319

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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 15. Evasion, Tariff and Squared Tariff

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff	0.064	0.083	0.112	0.485***	0.059***
	[0.092]	[0.089]	[0.128]	[0.165]	[0.016]
Tariff^2	0.007	0.011	-0.012	-0.136**	-0.015**
	[0.031]	[0.032]	[0.043]	[0.064]	[0.007]
N	221,077	328,090	152,024	247,095	328,090

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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 16. Evasion and Tariffs: Flexible Functional Form

	Evasion	Evasion 2	Evq	Evq2	Exportsonly
	(1)	(2)	(3)	(4)	(5)
Tariff in first quartile (0<=tariff rate<25)	-0.101	-0.101	-0.372*	-0.235	-0.235
	[0.146]	[0.146]	[0.216]	[0.308]	[0.308]
Tariff in second quartile (25<=tariff rate<35)	-0.046	-0.046	-0.183	-0.806***	-0.806***
	[0.088]	[0.088]	[0.123]	[0.180]	[0.180]
Tariff in third quartile (35<=tariff rate<50)	-0.019	-0.019	-0.134	-0.472***	-0.472***
	[0.071]	[0.071]	[0.094]	[0.140]	[0.140]
Tariff in fourth quartile (50<tariff rate)	0.062	0.062	0.046	0.036	0.036
	[0.038]	[0.038]	[0.051]	[0.076]	[0.076]
N	220648	220648	151836	246892	246892

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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 17. Evasion and Tariffs-Sample Split by Institutional Quality of Partner

	All goods		**Basic, capital, intermediate**	
	evasion	evasion2	evasion	evasion2
	(1)	(2)	(3)	(4)
Panel A: Top 15 countries - ICRG				
tariff	0.084**	0.105***	0.128***	0.171***
	[0.037]	[0.039]	[0.042]	[0.048]
N	136399	188692	87129	112797
Panel B: Other countries				
tariff	0.063	0.113	0.162	0.208**
	[0.073]	[0.071]	[0.104]	[0.093]
N	84249	138947	48928	76334

Note: Standard errors are clustered at the product level. All regressions include country X product (HS6) fixed effects, and country X 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 18. 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
Sample of Capital, Basic and Intermediate Goods					
fwsample		-0.323***	0.103***	0.02	-0.009***
		[0.021]	[0.017]	[0.022]	[0.001]
N		2093	2206	2210	2207

Note: Robust standard errors in parentheses.

Table 19. Freeman and Oostendorp Occupational Database, Comparator Groups

Customs inspectors		Customs commissioners	
code	occupation	code	occupation
3	Plantation supervisor	11	Coalmining engineer
5	Forest supervisor	14	Petroleum and natural gas engineer
15	Petroleum and natural gas extraction technician	44	Journalist
16	Supervisor or general foreman	52	Chemical engineer
22	Dairy product processor	61	Occupational health nurse
45	Stenographer-typist	76	Power distribution and transmission engineer
46	Office clerk	114	Ship's chief engineer
53	Chemistry technician	129	Accountant
54	Supervisor or general foreman	133	Computer programmer
72	Electronics engineering technician	138	Computer programmer
91	Stenographer-typist	145	Mathematics teacher (third level)
92	Stock records clerk	146	Teacher in languages and literature (third level)
93	Salesperson	147	Teacher in languages and literature (second level)
94	Book-keeper	148	Mathematics teacher (second level)
95	Cash desk cashier	149	Technical education teacher (second level)
96	Salesperson	150	First-level education teacher
97	Hotel receptionist	151	Kindergarten teacher
101	Ticket seller (cash desk cashier)	152	General physician
102	Railway services supervisor	153	Dentist (general)
108	Road transport services supervisor	154	Professional nurse (general)
118	Air transport pilot	155	Auxiliary nurse
119	Flight operations officer	156	Physiotherapist
120	Airline ground receptionist		
124	Air traffic controller		
130	Stenographer-typist		
131	Bank teller		
132	Book-keeping machine operator		
134	Stenographer-typist		
136	Insurance agent		
137	Clerk of works		
140	Stenographer-typist		
142	Office clerk		
157	Medical X-ray technician		

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