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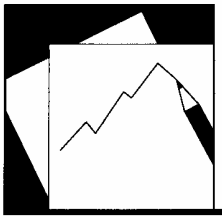

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Outsourcing Tariff Evasion: A New Explanation for Entrepôt Trade

Raymond Fisman, Peter Moustakerski, and Shang-Jin Wei

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Outsourcing Tariff Evasion: A New Explanation for Entrepôt Trade

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Abstract

Traditional explanations for indirect trade carried out through an entrepôt have focused on savings in transport costs and on the role of specialized agents in processing and distribution. We provide an alternative perspective based on the possibility that entrepôts may facilitate tariff evasion. Using data on direct exports to mainland China and indirect exports to it via Hong Kong SAR, we find that the indirect export rate rises with the Chinese tariff rate, even though there is no legal tax advantage to sending goods via Hong Kong SAR. We undertake a number of extensions to rule out plausible alternative hypotheses.

JEL Classification Numbers: H2, F1

Keywords: Tax Evasion, Indirect Trade, Corruption

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Contents Page

I. Introduction 3

II. Empirical Framework....5

III. Data....6

IV. Results....8
A. Benchmark Estimate 8
B. Alternative Explanations and Robustness Checks 9

V. Conclusion 12

References....18

Tables
1. Indirect Export Rates and Tariff Rates, 1996–2001 14
2. Effect of Tariff Rate on Hong Kong Indirect Export Rate 14
3. Aggregating the Indirect Export Rates by Tax Brackets 15
4. Effect of Tariff Rate on Singapore and Hong Kong's Indirect Export Rates....15
5. Tariff-Exempted Versus Non-Exempted Industries 16
6. Homogeneous Versus Differentiated Products....16

Figures
1. Correlation Between Tariffs and Hong Kong's Indirect Export Rates, 1998....13
2. Correlation Between Changes in Tariffs and Changes Hong Kong's Indirect Export Rates, 1996–2001....13

Appendix Tables
1. List of Countries 17

I. INTRODUCTION

Indirect trade carried out through an entrepôt is a common phenomenon in world commerce. For example, for every $100 worth of goods that the United States exports to mainland China, approximately $23 goes through Hong Kong SAR. Furthermore, indirect trade has been growing more than three times faster than world trade as a whole. Its share in global trade is estimated to have increased from 5 percent in the mid-1980s to 17 percent today (Andriamananjara, Arce, and Ferrantino, 2004). There are more than thirty countries that are involved in a significant amount of indirect trade. Macao SAR, Cyprus, Fiji, Senegal, Jordan, Armenia, Seychelles, Honduras, Benin, Montserrat, St. Lucia, and Singapore are some of the other prominent entrepôts through which indirect trade takes place.

Explanations in the literature for this high volume of indirect trade have focused on the presence of specialized agents who match buyers and sellers across markets (Feenstra and Hanson, 2004) and the economization of transport costs, which has a similar rationale to the hub-and-spoke pattern in airline traffic (Andriamananjara, Arce, and Ferrantino, 2004). These factors are undoubtedly responsible, at least in part, for the high rates of indirect trade. However, we propose an additional, previously undocumented explanation in this paper: the use of entrepôt economies to facilitate tariff evasion. As in the traditional argument for indirect trade, the evasion-based explanation also posits a role for specialized agents that are better positioned to transport goods to their final destinations: In our explanation, the agents' advantage is in transporting goods without paying the required tariffs. That is, there may be a darker side to the middleman's role in trade.[2]

We examine this hypothesis in the context of the Hong Kong SAR, the world's largest entrepôt economy, where trade was 259 percent of GDP in 1998 (Feenstra and Hanson, 2004), and a common stopping point for goods both entering and leaving mainland China. Over the last ten years, Chinese tariff rates have been declining steadily, from an average rate of 23.6 percent in 1996 to 15.8 percent by 2001. During the same period, the average fraction of the rest of the world's exports to China that goes through Hong Kong SAR has also been on the decline, from 26 percent in 1996 to 20 percent in 2001 (see Table 1 for details). These aggregate statistics are consistent with the tariff evasion explanation for the indirect trade, though many other explanations are also consistent with this aggregate picture.

This paper builds a case for the evasion hypothesis using disaggregated data on indirect exports to China via Hong Kong SAR. Tariff evasion, by its very nature, is not directly

[2] There are anecdotal accounts of this role of trade intermediaries. For example, a recent report from the United States Department of Agriculture (USDA) describes the "unofficial channels" that are used for the export of food products to China via Hong Kong SAR: "Using unofficial channels, to transport in a 40-foot container of imported fresh fruit from Hong Kong SAR to one of the cities in the Pearl River Delta costs approximately $4,000 to $6,000…; This amount is usually much less than the price paid when using official channels." (USDA, 1997).

observable. We are thus required to take an indirect approach in testing any hypothesis related to evasion. The methodology we use in this paper is straightforward. On a product-by-product basis, we compute indirect trade intensity—the ratio of indirect exports to China going through Hong Kong SAR to total exports to China—and examine whether it has any systematic relationship with product-level tariff rates. The benefit of indirect trade for the purposes of evading tariffs increases with the value of tariffs evaded, and hence with tariff rates.[3] Since there is no preferential tariff treatment for indirect trade via Hong Kong SAR (or elsewhere), this forms the basis for our test of our "outsourcing evasion" hypothesis. With disaggregated data (at Harmonized Commodity Description and Codying System (HS) 6-digit level) for the years 1996–2001, we find a clear positive association between the tariff rate and the intensity of indirect trade. This is consistent with the hypothesis that part of the role of the middleman is to help customers evade tariff payments.

The use of indirect trade may be correlated with the need for trade in a good to be intermediated (for example, products with lower demand elasticity may be more likely to be transshipped). This is problematic if the latter is correlated with the tariff structure, leading to a spurious correlation between indirect trade intensity and the tariff level. We therefore extend the analysis by adding 6-digit HS fixed effects and also by differencing the data. This effectively deals with any characteristics of imports that are not time varying. We find that the results remain statistically significant at the 1 percent level, though the point estimates are somewhat reduced.

We provide several additional robustness tests of our results. First, we compare our baseline results on Hong Kong SAR with the case of Singapore. Since Singapore is physically far away from China, this may be more difficult for the middleman there to develop a relationship with the Chinese customs. We find that there is a high correlation between the types of goods that are shipped via the two entrepôts, suggesting that there are, indeed, commonalities in the types of goods that generally require transshipment. However, we do not find any correlation between tariff rates and indirect trade via Singapore.

We also provide two tests based on sample splits of the data. First, we examine industry classes in a country where the vast majority of incoming goods are tariff-exempt and, hence, there is little evasion-related reason to undertake indirect trade; we do not find any tariff-indirect trade correlation for this set of products in our data.

Second, we examine trade in homogeneous and differentiated products separately, based on the Rauch (1999) classification. This is based on the idea that there may be economic rationales, unrelated to evasion, for trade in differentiated products to go through an entrepôt,

[3] If we assume that the potential punishment does not increase linearly (see, for example, Slemrod and Yitzhaki, 2002), we expect the rate of transshipment (relative to direct shipment) to be increasing as the tariff rate increases—in other words, there is a greater incentive to evade tariffs on high tariff goods.

as a middleman's specialized knowledge of a differentiated product could help him mediate the trade. Indeed, Feenstra and Hanson (2004) suggest that Hong Kong SAR may play an important intermediary role for differentiated products, since such products may require greater quality sorting. In contrast, there may be less specialized product-specific knowledge involved for trade in homogenous products. We find a positive correlation between the tariff rate and indirect trade intensity for both homogenous and differentiated products. This further bolsters our interpretation that tariff evasion is a significant motivation for the observed indirect trade.

We provide an illustrative calculation to get a sense of quantitative importance of evasion-induced indirect trade. According to one specification that we present below, a 10 percent increase in tariff rate would lead to an increase in the indirect trade rate of 2.5 percentage points. Thus, an increase in the tariff rate from 0 to 16 percent (the average statutory tariff rate in China in 2001) would lead to an indirect export rate of about 4 percent, suggesting that about a ⅕ of the indirect exports through Hong Kong SAR may be accounted for by the evasion motivation.

It is important to note that the paper does not call into question the integrity of the Hong Kong SAR customs nor the reliability of Hong Kong SAR statistics. In fact, the paper relies on the accuracy of the Hong Kong SAR customs' statistics to make the analysis meaningful.

In addition to bringing new insights to the literature on indirect trade, we also contribute to the growing empirical literature on tax evasion and smuggling. While the current paper is related to Fisman and Wei (2004), we note that it is fundamentally different in several ways that warrant a brief discussion. The two papers seek to explain very different phenomena. The Fisman-Wei paper estimates the elasticity of tax evasion with respect to tax rates, which is a public finance question. The current paper seeks to establish outsourcing of tariff evasion as an important explanation for the prevalent entrepôt trade phenomenon in the world commerce. The result of the Fisman-Wei paper is not a sufficient condition for the result in this paper: It is logically possible that entrepôt trade is unrelated to evasion even if there is evasion at the Chinese border. The Fisman-Wei paper, however, is a necessary condition: the Chinese border has to be corruptible for Hong Kong SAR to serve as an intermediate step to evade tariffs.

The rest of this paper proceeds as follows. Section II provides a conceptual framework. Section III describes the datasets brought together for this research. Section IV presents our estimation strategy and results. Section V concludes.

II. EMPIRICAL FRAMEWORK

For expositional purposes, we assume in this section that tariffs may only be evaded by routing goods through Hong Kong SAR and that traders are risk-neutral. For simplicity, we assume every trader exports a fixed amount, V. We describe the cost-benefit trade-off associated with evasion for a typical trader k in industry i as being given by:

$\text{Benefit}_{ik} = \tau_i V$

$\text{Cost}_{ik} = C + \gamma\ \tau_i V + \eta_{ik}$

Here, τ_i is the tariff rate for industry i. The cost includes a fixed, a variable and a random component: C is the fixed cost; $\gamma < 1$ describes the variable cost; η_{ik} represents the random component, which is realized before the trade makes the decision. A representative trader (of good i) would choose to evade if and only if the benefit of doing so exceeds the cost, or

$\eta_{ik} \leq (1-\gamma)\ \tau_i V - C$

Assuming that η_{ik} is i.i.d. across all traders and has a cumulative distribution function F, then the fraction of exports in industry i that may be re-routed to Hong Kong SAR to evade tariffs is given by:

$$(\text{Indirect Export Rate})_i = F(\ (1-\gamma)\ \tau_i V - C\ ) \quad (1)$$

If we further assume that F has a uniform distribution, we may express this as a linear regression:

$$(\text{Indirect Export Rate})_i = \alpha + \beta^* \tau_i + \varepsilon_i, \text{ where } \beta > 0 \quad (2)$$

Intuitively, if it is relatively inexpensive to evade tariffs by using Hong Kong SAR as an entrepôt, a larger fraction of trade will be routed through Hong Kong SAR if the tariff rate is higher.[4]

If the random cost, η_{ik}, does not follow a uniform distribution, or if the cost of evasion is non-linear in the tariff rate, then the indirect trade rate may be a non-linear function of the tariff rate.

III. DATA

Three pieces of data are crucial for our empirical tests: (a) Chinese tariffs, (b) direct exports to China at a product level, and (c) indirect exports to China via Hong Kong SAR at a product level.

The data on Chinese tariffs are taken from the World Bank's World Integrated Trade Solution (WITS) database, derived from the UNCTAD TRAINS (Trade Analysis and Information System) database, which gives tariff rates at the 8-digit HS level. Since our import/export

[4] This paper has not formally examined the issue of possible endogeneity of the tariff rate. If the government were to set the tariff rates with revenue maximization in mind, it may set relatively high rates on products that are somehow physically more difficult to evade tariff, then the true effect of tariff on indirect trade would be even bigger than documented here.

data are at the 6-digit level, we need to aggregate tariff rates up to the 6-digit level. As there is relatively little variation in tax rates at the 8-digit level within a 6-digit category, we are able to restrict ourselves to the sample for which there are uniform rates at this level of aggregation.

The earliest year for which we have detailed data on tariffs is 1996, and our data reflect year-end tariff rates. Since the import and export data are cumulated for the entire year, matching imports with the appropriate tax rates is complicated by mid-year changes in the tariff structure. There were no tariff changes in 1996. In 1997, tariffs were changed on October 1 for this year, we take a weighted average of year-end 1996 and 1997 tariffs as our measure of the 1997 tariff rate. Since the tariff changes of 1998–2001 were all implemented on January 1, the tariff rate is uniform throughout those years. We define $Tariff_{it}$ as the tariff rate on incoming goods in industry i in year t.

To calculate our indirect export rate, we require countries' own reports of direct exports to China, as well as Hong Kong SAR's reports of indirect exports. The direct export data come from WITS, which in turn gets its export statistics from the United Nations' Comtrade database. These data are collected by the United Nations Statistical Division from individual countries' trade records, and include information on imports and exports for each country, recorded according to the 6-digit Harmonized Commodity Description and Coding System (HS). For most of our regressions, we focus on countries where export data are available for the entire period, and further omit Africa and the Middle East because of very low export rates. This yields a final set of the 29 countries listed in Appendix Table 1. We define $Direct\_exports_{ict}$ as the value in US dollars of direct exports in industry i from country c to China in year t.

Our indirect export data come from Smartal Solutions, the official provider of Hong Kong SAR export statistics. These data provide Hong Kong SAR's reported indirect exports to China, by country of origin, at the 6-digit HS level for 1996–2001. Since tariff rates vary only at the industry-year level, we generate an aggregate indirect export rate, derived by summing up exports over all countries for a given industry-year:[5]

$$Indirect\_export\_rate_{it} = \frac{\sum_c \text{Indirect\_exports}_{ict}}{\sum_c (\text{Indirect\_exports}_{ict} + \text{Direct\_Exports}_{ict})}$$

where $\text{Indirect\_exports}_{ict}$ are indirect exports from country c in industry i and year t.

Our robustness checks will require several additional datasets; for clarity of presentation, we will describe these additional data items when we discuss these tests.

[5] This is to avoid complications associated with clustering of standard errors across two types of groups, as suggested by Bertrand, Duflo, and Mullainaithan (2004). We obtain virtually identical results if the regressions are done at the exporter-year-product level of aggregation.

In the first two columns of Table 1 we list the Hong Kong SAR indirect export rates and tariff rates, by year, for 1996–2001. Note that there is a high rate of indirect exports on average: 22 percent for the full sample. The average tariff rate, while 18 percent for the full sample, declined throughout the sample period, from approximately 23 percent in 1996 to 15 percent in 2001.

In Figure 1 we show the basic relationship between tariffs and indirect export rates for 1998, where the indirect export rate shown is the average for each integer tariff rate, conditional on having at least 10 observations per tariff rate. The correlation is 0.53, and the graph shows this positive correlation. In Figure 2, we show the relation between the change in tariff rate during 1996–2001 and the change in indirect export rate over the same period. We see a similar pattern in this differenced relation—industries with the largest tariff declines also experienced the largest drops in indirect export rate. We now turn to the results section to examine these relations in a regression framework.

IV. RESULTS

A. Benchmark Estimate

Our basic specification is based on equation (2) above, with a year fixed effect, δ_t, included:

$$Indirect\_export\_rate_{it} = \alpha + \beta * Tariff_{it} + \delta_t + \varepsilon_{it} \quad (3)$$

The results for specification (3) appear in Table 2. In column (1) we present the basic specification (with year fixed effects, but no industry fixed effects), and find a point estimate on *Tariff* of approximately 0.25. In specification (2), we add industry-year fixed effects, with the industry defined at the 3-digit HS level.[6] The slope estimate is now 0.29. This implies that a one percentage point increase in the tariff rate leads to a 0.29 percentage point increase in the indirect export rate. We regard this as our benchmark estimate.

In terms of the economic significance of this effect, an increase in the tariff rate from zero to 19 percent (the mean tariff rate in the entire sample as reported in Table 1) leads to an increase in the indirect export rate by 19*0.29 = 5.5 percent, all else equal. The average indirect export rate in our sample is 0.23 (Table 1). Evasion-motivated entrepôt trade thus explains almost a quarter of total indirect trade.

[6] Similar results are obtained with 2- or 4-digit HS level industry-year fixed effects.

B. Alternative Explanations and Robustness Checks

As a robustness check, we also define an industry fixed effect at the 6-digit level (the most disaggregated level for this data set), a total of approximately 3600 fixed effects. This absorbs all between product variation in tariffs, so that any relation between tariffs and indirect export rates is being identified entirely from within-good variation in tariffs. The result is reported in Column 3 of Table 2. The point estimate on tariffs declines to 0.11, but is still significant at the one percent level.

Finally, in column (4), we consider a differenced version of specification (2), given by:

$$(Indirect\_export\_rate_{i2001} - Indirect\_export\_rate_{i1996}) = \alpha + \beta*(Tariff_{i2001} - Tariff_{i1996}) + \delta_t + \varepsilon_{it} \quad (4)$$

We emphasize that, relative to the fixed-effects approach, this long-differenced approach is less likely to be affected by noise resulting from the timing of tariffs and sluggish responses to tariff changes, while still absorbing all between industry variation. The point estimate is 0.17, and is statistically significantly different zero at the one percent level.

As noted in Section II above, either a non-linear cost of evasion or a non-uniform distribution of firms' costs of evasion will generate a non-linear relationship between tax rates and the extent of indirect trade through Hong Kong SAR. In Table 2, column (5) we include a quadratic term, $Tariff^2$, that allows for a non-linear relationship between tariffs and indirect trade. We find that $Tariff^2$ is highly significant and negative, implying a diminishing effect of increasing tariffs on indirect trade.[7]

Unfortunately, because of noises the fit of the regressions may be considered poor. A common method of dealing with noisy data is aggregation.. We follow this approach, using as the outcome variable the mean value of the indirect trade rate for each tax rate. There are 53 distinct tax rates, thereby yielding a total of 53 observations per year. The result is reported in column (1) of Table 3, which shows that the positive relationship between tariff level and indirect export rate remains, with an increase in the adjusted R-squared to 0.26. In column (2), we report results where observations are weighted by the number of observations per tax bracket. As a final robustness check, in columns (3) and (4), we use the median indirect export rate for each tariff rate as the dependent variable. These additional regressions generate results that are very similar to those reported in column 1 of Table 3.

One possible concern with the above results is that there may be a correlation between the goods for which middlemen have a comparative advantage in legal intermediation and the Chinese government's choice of tariff structure. It is not immediately clear whether this would lead to an overestimate or underestimate of the effect—traditional explanations of optimal tax setting focus on demand elasticities, and it is not obvious that goods routed through Hong Kong SAR would necessarily be low demand elasticity goods. Further, our

[7] We obtain qualitatively very similar results using a spline regression by quartiles.

results above are robust to the inclusion of 6-digit fixed effects and to differencing, which implies that the results may be identified from time variation in tariff rates; this allows us to effectively net out any product characteristics that are not time-varying.

We still present several robustness checks that further address the possibility that an omitted variable may account for the positive correlation between tariff level and indirect trade rate, using two types of 'control' regressions. First, we consider the relationship between tariff rates and indirect exports for Singapore, the other large Asian trade entrepôt but one that is physically far away from China and therefore may be more difficult for its middlemen to develop a relationship with the Chinese customs. We obtain data on Singapore's indirect exports to China through the *Singapore Trade Statistics* CD ROMs for 1999-2001. Unfortunately, earlier years are unavailable, thus limiting our sample to three years. We define indirect export rates for Hong Kong SAR and Singapore as $Indirect\_export\_rate\_HK_{it}$ and $Indirect\_export\_rate\_SGP_{it}$ respectively. Note that $Indirect\_export\_rate\_HK_{it}$ is the same as the indirect export rate defined in the data section above; we add *HK* for clarity in this subsection. The analog to equation (4) is then:

$$Indirect\_export\_rate\_Country_{it} = \alpha + \beta * Tariff_{it} + \delta_{HS3,t} + \varepsilon_{it} \quad (5)$$

where $Country \in \{SGP, HK\}$ and $\delta_{HS3,t}$ is a 3-digit HS industry-year fixed effect.[8] We present the results for Singapore in Table 4, column (1). We find no relation between tariff rates and the fraction of goods routed through Singapore. In column (2), we limit the sample only to products where both rates were positive in at least one year of 1999–2001, and obtain similar results. This could be the result of the different sample and calculations used, due to the limitations imposed by the Singapore trade data. To address this possibility, we report regressions for Hong Kong SAR in columns (3) and (4) using the same years and industries as those in the first two columns; we find coefficients that are virtually identical to those reported in Table 2, so the differential results for Singapore are unlikely to be the results of the sample change. Finally, in columns (5) and (6) we report the results of the regression:

$$Indirect\_export\_rate\_HK_{it} = \alpha + \beta_1 * Tariff_{it} + \beta_2 * Indirect\_export\_rate\_SGP_{it} + \delta_{HS3,t} + \varepsilon_{it} \quad (6)$$

Interestingly, we find that there is a high correlation between goods that are routed through Hong Kong SAR and those that are sent via Singapore, as revealed in the significant coefficient on *Indirect_export_rate_SGP*. This suggests that there are indeed some industry-specific characteristics that lend themselves to indirect export. However, we do not find that the inclusion of *Indirect_export_rate_SGP* as a control affects the relationship between *Tariff* and *Indirect_export_rate_HK*.

[8] We obtain similar results if we only use year effects, although the implied effect is somewhat larger (point estimate of about 0.38) for Hong Kong SAR than the results reported below.

We provide two additional robustness checks based on sample splits of the data. First, we consider the fraction of goods that enter China with tariff exemptions. One explanation for the observed relationship between tariffs and indirect export rates that does not involve any illicit behavior is that it is easier to obtain tariff exemptions by routing goods through Hong Kong, and the incentive to obtain exemptions is increasing in the tariff rate. This would then be a case of using Hong Kong SAR middlemen to acquire legal tariff avoidance rather than illegal tariff evasion. However, if this were the case, then we would expect to see very little effect of the tariff rate on the indirect export rate for industries where very few exemptions are allowed. We use imports broken down by exemption classification taken from *Chinese Customs Statistics 1998* (Economic Information Agency, 2001).[9] These data are at the 8-digit HS level, which we aggregate to the 6-digit level; we then calculate a measure of exemption intensity given by the ratio of the value of imports that enter China tariff-free to the total value of imports for each 6-digit category (*Exemption*). We use cut-offs at the 5th percentile (0.06) and 10th percentile (0.16) of *Exemption* to look at goods for which exemption-seeking is unlikely to be the primary motive for indirect exporting. These results are reported in columns (1) and (2) of Table 5 based on the formulation given in equation (4); in both cases the point estimate is actually higher than for the full sample results. As an additional check on the data, we also report results where we look only at cases where *Exemption* is above the 90th and 95th percentiles (0.996 and 0.999 respectively), where there would clearly be no tariff-based incentive for indirect exporting; we find no relation between tariffs and indirect export rates for these subsamples.

Finally, we test for a differential correlation between tariffs and indirect trade rates for differentiated versus non-differentiated products, as classified by Rauch (1999). Feenstra and Hanson (2004) suggest that Hong Kong SAR may play an important intermediary role for differentiated products, since such products may require quality sorting. This may be of concern if differentiated products have higher tariff rates. Note that our fixed effects and differenced models deal with this to a large extent, since product differentiation is not time-varying. To bolster our case, we further examine whether the basic cross-sectional correlation differs according to whether the incoming good is differentiated.

Rauch's classification is at the 4-digit SITC level, which we match based on the concordance in Feenstra (1996);[10] we also cluster at the 4-digit SITC level to account for the coarser industry classification. In Table 6 we present results with the sample split by Rauch's classification. It turns out that the positive correlation holds for both differentiated and non-differentiated products.[11] The point estimate of the slope is somewhat smaller for the

[9] Unfortunately, due to the very high cost of obtaining these data, we have purchased only a single year of data.

[10] The concordance is available at *http://data.econ.ucdavis.edu/international/usixd/wp5515d.html.*

[11] The sample is smaller because the classifications for some products are ambiguous and therefore excluded.

homogenous products, consistent with the view that some of the indirect trade for differentiated products are not related to tariff evasion. However, if we pool the sample and include an interaction between tariff rates and a dummy variable for product differentiation, this interaction term is not significant.

V. CONCLUSION

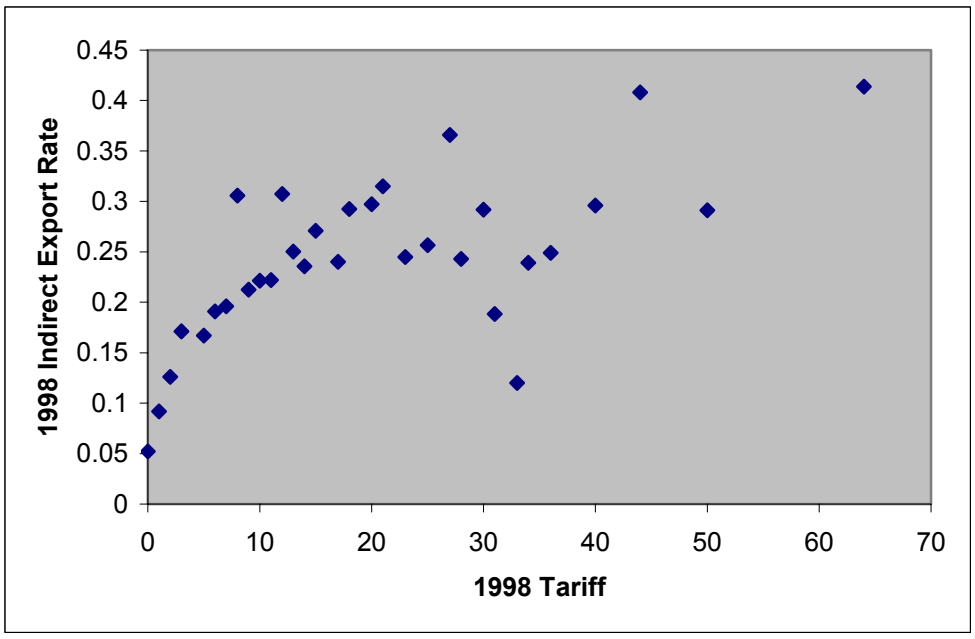
This paper documents that tariff evasion is an important motivation for the widely observed phenomenon of indirect trade in world commerce by studying indirect exports to China via Hong Kong SAR. To build a case for this interpretation, the paper computes a measure of indirect trade intensity—the ratio of indirect trade to total trade—and examines whether it is systematically related to product-level tariff rates. We find clear evidence of a positive, statistically significant relationship, both in levels and differences.

A number of extensions of the basic analysis help to further bolster our interpretation. For example, were it not for tariff evasion, specialized knowledge by middlemen should be much less valuable for homogeneous than for differentiated products. Yet we find a similar positive correlation between indirect trade and tariff rates for the two groups of products. Also, for the subset of products for which tariff exemptions are widely granted (and therefore illegal tariff evasion at the border is less profitable), there is no correlation between tariff rate and indirect trade intensity.

It is important to note that the paper does not call into question the integrity of the Hong Kong SAR customs nor the reliability of Hong Kong SAR statistics. In fact, the paper relies on the accuracy of the Hong Kong SAR customs' statistics to make the analysis meaningful.

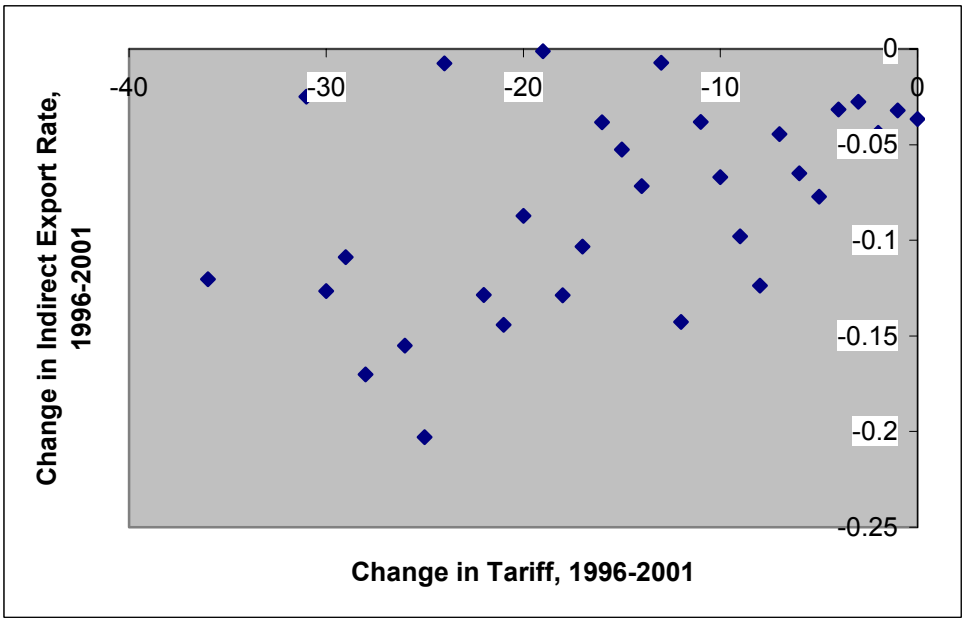
Our paper makes both conceptual and methodological contributions. We highlight the possibility that there may be a darker side to the role of middlemen in international trade that should be taken into account in considering the effects of trade intermediation. Further, our approach could be applied to a variety of other contexts. In addition to the extension to other countries and regions, it may ultimately be possible to evaluate, for example, the extent to which different source countries are prone to tariff evasion by comparing how the relationship between tariffs and indirect trade varies across countries. We leave this for future research.

Figure 1. Correlation Between Tariffs and Hong Kong's Indirect Export Rates, 1998



Source: Authors' calculations.

Figure 2. Correlation Between Changes in Tariffs and Changes Hong Kong's Indirect Export Rates, 1996–2001



Source: Authors' calculations.

Table 1. Indirect Export Rates and Tariff Rates, 1996–2001
(by year)

Year	Hong Kong SAR Indirect export Rate	Tariff Rate	Singapore Indirect export Rate
1996	0.260	0.236	
	(4,502)	(4,502)	
1997	0.229	0.221	
	(4,537)	(4,537)	
1998	0.239	0.175	
	(4,585)	(4,585)	
1999	0.225	0.171	0.052
	(4,624)	(4,624)	(2,161)
2000	0.218	0.169	0.053
	(4,658)	(4,658)	(2,082)
2001	0.202	0.158	0.049
	(4,671)	(4,671)	(2,145)
Total	0.229	0.188	0.051
	(27,577)	(27,577)	(6,388)

Source: Authors' calculations.

Notes: For Singapore, the indirect export rate is for all countries, while for Hong Kong SAR, the values listed are for the sample of 29 countries listed in Appendix Table 1. The Singapore indirect export rates are only for products for which Singapore indirectly exports a positive amount to China. For further details on the construction of these variables, please see the text.

Table 2. Effect of Tariff Rate on Hong Kong Indirect Export Rate

	(1)	(2)	(3)	(4)	(5)
Tariff	0.250***	0.286***	0.113***		0.705***
	(0.027)	(0.044)	(0.040)		(0.100)
ΔTariff				0.169***	
				(0.047)	
$Tariff^2$					-0.616***
					(0.134)
Fixed Effects	Year	Year-Industry (3-digit HS)	Year & Industry (6-digit HS)	None	Year-Industry (3-digit HS)
Observations	27,577	27,577	27,577	4,411	27,577
R-squared	0.02	0.17	0.71	0.00	0.17

Source: Authors' calculations.

Notes: Robust standard errors in parentheses, with clustering at the 6-digit HS level. Dependent variable in specifications (1) - (3) is *Indirect_export_rate.* In specification (4) the dependent variable is the five year difference in *Indirect_export_rate*. For further details, please see the text. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 3. Aggregating the Indirect Export Rates by Tax Brackets

	(1) mean	(2) mean	(3) median	(4) median
Tariff	0.262***	0.267***	0.265***	0.291***
	(0.050)	(0.044)	(0.079)	(0.059)
Observations	313	313	313	313
R-squared	0.26	0.29	0.17	0.20

Source: Authors' calculations.

Notes: Robust standard errors in parentheses, with clustering by tariff rate. All regressions in clued year fixed effects. Dependent variable in specifications (1) and (2) is the average value by year and tariff rate of *Indirect_export_rate*; in specifications (3) and (4) the dependent variable is the median value by year and tariff rate of *Indirect_export_rate*. Regressions (1) and (3) are unweighted, while regressions (2) and (4) are weighted by the number of observations per tariff rate. For further details, please see the text. * significant at 10%; ** significant at 5%; *** significant at 1%.

Table 4. Effect of Tariff Rate on Singapore and Hong Kong's Indirect Export Rates

Country	Indirect Exports via Singapore			Indirect Exports via Hong Kong SAR		
	(1)	(2)	(3)	(4)	(5)	(6)
Tariff	0.003	-0.008	0.276***	0.268***	0.276***	0.270***
	(0.011)	(0.028)	(0.057)	(0.085)	(0.057)	(0.084)
Indirect_export_rate_SGP					0.259***	0.226***
					(0.042)	(0.047)
Observations	14,828	5,994	14,828	5,994	14,828	5,994
R-squared	0.09	0.18	0.22	0.25	0.22	0.26

Source: Authors' calculations.

Notes: Robust standard errors in parentheses, with clustering at the 6-digit HS level. All regressions include industry-year fixed effects, at the 3-digit HS level. Dependent variable in all specifications *Indirect_export_rate*, for the country listed. For further details, please see the text. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5. Tariff-Exempted Versus Non-Exempted Industries

Sample	*Exemption*<5th percentile	*Exemption*<10th percentile	*Exemption*>90th percentile	*Exemption*>95th percentile
	(1)	(2)	(3)	(4)
Tariff	0.384*	0.440***	-0.174	-0.279
	(0.198)	(0.147)	(0.220)	(0.296)
Observations	1,262	2,526	2,526	1,262
R-squared	0.48	0.38	0.36	0.42

Source: Authors' calculations.

Notes: Robust standard errors in parentheses, with clustering at the 6-digit HS level. All regressions include industry-year fixed effects, at the 3-digit HS level. Dependent variable in all specifications *Indirect_export_rate.* For further details, please see the text.
* Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 6. Homogeneous Versus Differentiated Products

Sample	Homogeneous Products	Differentiated Products	All Products
	(1)	(2)	(3)
Tariff	0.173**	0.280***	0.182***
	(0.084)	(0.096)	(0.064)
Differentiated			0.087
*Tariff			(0.073)
Observations	6,375	12,605	18,980
R-squared	0.21	0.19	0.18

Source: Authors' calculations.

Notes: Robust standard errors in parentheses, with clustering at the 4-digit HS level. All regressions include industry-year fixed effects, at the 3-digit HS level. Dependent variable in all specifications *Indirect_export_rate.* The sample is split according to the classification of Rauch (1999). For further details, please see the text. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Appendix Table 1. List of Countries

Country	Annual Observations
Argentina	356
Australia	1,250
Austria	1,789
Canada	1,089
Czech Republic	645
Denmark	797
Finland	961
France	2,209
Germany	2,890
Greece	204
Hungary	290
Indonesia	1,292
Ireland	448
Italy	2,418
Japan	3,649
Korea	3,363
Mexico	257
Netherlands	1,453
New Zealand	426
Norway	564
Poland	107
Portugal	335
Slovenia	135
Spain	1,279
Sweden	1,390
Switzerland	1,791
Turkey	467
United Kingdom	2,246
United States	3,569

Source: Authors' calculations.

REFERENCES

Andriamananjara, Soamiely, Hugh Arce, and Michael J. Ferrantino, 2004, "Transshipment in the United States," Office of Economics Working Paper (Washington: U.S. International Trade Commission).

Bertrand, Marianne, Esther Duflo, and Sendhil Mullainathan, 2004,"How Much Should We Trust Differences-in-Differences Estimates?" *Quarterly Journal of Economics*, Vol. 119, No. 1, pp. 249–75.

Feenstra, Robert, 1996, "U.S. Imports, 1972–1994: Data and Concordances," NBER Working Paper No. 5515 (Cambridge: National Bureau of Economic Research).

———, and Gordon Hanson, 2004, "Intermediaries in Entrepôt Trade: Hong Kong Re-exports of Chinese Goods," *Journal of Economics & Management Strategy*, Vol. 13, No. 1, pp. 3–35.

Fisman, Raymond, and Shang-Jin Wei, 2004, "Tax Rates and Tax Evasion: Evidence from 'Missing Imports' in China," *Journal of Political Economy*, Vol. 112, No. 2, pp. 471–96.

Rauch, James E., 1999, "Networks Versus Markets in International Trade," *Journal of International Economics*, Vol. 48, No. 1, pp. 7–35.

Slemrod, J. und Shlomo Yitzhaki, 2002, "Tax Avoidance, Evasion, and Administration" in *Handbook of Public Economics Volume 3*, ed. by A. Auerbach and M. Feldstein (Amsterdam, Elsevier) pp. 1426–29.

United States Department of Agriculture/Foreign Agricultural Service, 1997, Attaché Report No. CH7610. Available on the web at *http://www.fas.usda.gov/scriptsw/attacherep/default.asp.*