Trade Policy Uncertainty and Exports: Evidence from China's WTO Accession

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Abstract

To understand the effects of trade policy uncertainty on firm-level export decisions, we study firm-product data on Chinese exports to the U.S. in the years surrounding China's 2001 WTO accession. Following predictions based on a model of heterogeneous firms, we provide empirical evidence that product-level tariff uncertainty reduction spurred a notable reallocation of export activities across firms, largely due to extensive margin entries and exits. In addition we document accompanying changes in prices and quality that coincided with this reallocation: firms that provided higher quality products at lower prices entered the U.S. export market, while firms that had higher prices and provided lower quality products exited.

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1 Introduction

It is widely believed that China's WTO entry spurred the exceptional growth in China's exports to the United States. Indeed, as shown in Figure 1, the accelerated growth of China's U.S.-bound exports coincides almost exactly with China's WTO entry. While it is often assumed that this growth in trade was facilitated by access to lower tariffs, it is important to note that China's WTO accession had almost no effect on US tariffs applied to China's exports. However, China's WTO entry provided exporters with a dramatic reduction in trade policy uncertainty, since China's WTO membership obligates China's trade partners to extend Most Favored Nation (MFN) treatment to China's exports. This removed the threat that the U.S. might at some future time revoke its Most Favored Nation treatment of China's exports, reverting instead to the much higher general tariff rates levied by the U.S. on non-MFN countries (Such as Cuba and North Korea).[1]

While the US tariffs applied to China's exports have changed little following China's WTO accession, the rapid growth of China's exports to the U.S. raises a number of important questions. First, was the trade policy uncertainty reduction associated with China's WTO entry responsible for the acceleration of China's export growth? At a deeper level, what were the micro firm-level response margins which shaped firm export changes following the reduction in uncertainty? Did new entrants, exiters and the incumbents respond similarly? Second, were the effects of trade policy uncertainty changes universal, or were they concentrated in particular sectors, or related to firm ownership?

Many studies have emphasized the effects of exchange rate uncertainty on firm entry and exit decisions.[2] However, study of the effects of trade policy uncertainty on trade (such as the threat of revoking MFN treatment) has received much less attention. In contrast with exchange rate uncertainty and firm decisions, changes in trade policies tend to involve large and persistent shocks to applied policies. Handley (2012) applies Dixit's (1992) option value theory to analyze the impact of trade policy uncertainty, and provides empirical evidence based on product-level data on Australian imports. An important finding in his work is the discovery that product exports

[1] Prior to China's WTO entry each of its trade partners was free to decide whether to provide China access to their most-favorable MFN tariff schedule. From 1980 until China's WTO entry, the US Congress provided China with provisional access to MFN treatment, allowing Chinese exports to the US under the same tariffs as all other WTO members. However, this access to MFN tariffs was subject to annual renewal.

[2] Baldwin (1988) suggests that an asymmetry (hysteresis) exists between the exchange rates that trigger entry and exit into the export market. Dixit (1989) studies firm entry and exit under uncertainty, showing that when sunk market entry costs are combined with uncertainty over future conditions there may be an option value of waiting to invest. Dixit (1992) applies the option value to exchange rate uncertainty and shows that the size of the interval between the exchange rates that trigger entry and exit is an increasing function of the uncertainty around current exchange rates.

are increased by reductions in trade policy uncertainty. However, since product-level export data report activities that are aggregated across firms, they do not provide insight into the underlying microeconomic export responses at the firm-level.[3]

To study the effect of trade policy uncertainty on firm-level exports, we track the activities of Chinese firms that exported to the U.S. between 2000 and 2006. This setting is especially useful for addressing this question, since the interval encompasses the trade policy changes that stemmed from China's December 2001 WTO entry. China's new WTO membership provided Chinese firms with guaranteed future access to export markets, including those of the United States, under preferential WTO-member terms, replacing any uncertainty about the future status of their tariff treatment.

We use this dramatic change in trade policy uncertainty to examine the importance of uncertainty reductions for trade. To inform our analysis, we develop a heterogeneous firm model of trade. The model allows us to form predictions about the relationship between new exports, uncertainty reduction, fixed costs of export, and the distribution of industry productivity. Using customs data on firm exports to the U.S., we are able to test and confirm the model's predictions.

Analysis of China's exports to the U.S. reveals a number of robust links between trade policy uncertainty reduction and firm exports. First, we find that trade volume growth associated with new export entrants was positively related to the uncertainty reduction following from China's WTO accession. These product level responses to uncertainty reduction were apparent by 2002 and grew in magnitude over time. We also find a positive relationship between the degree of trade policy uncertainty reduction and exits by some incumbent firms that exported to the U.S. in earlier years. When we decompose extensive margin responses by component - the changes in the number of firm-product combinations and differences in scale - we find that the extensive margin response is driven by changes in the number of exporting firms rather than individual firm scale differences.

Second, to understand why trade policy uncertainty reduction induced entry by one group of firms while forcing another group of firms to exit, we compare the export characteristics of new exporters with the characteristics of exiters.[4] We find strong evidence that new exporters charged

[3] To explain the connection between reductions in trade policy uncertainty, and changes in the U.S. labor market, Pierce and Schott (2013) provide product level evidence that the number of exporters, importers, and unique exporter-importer pairs involved in China's U.S.-destined exports rose more rapidly in product-sectors that experienced larger reductions in trade policy uncertainty.

[4] When we use the terms "new exporters" and "new entrants" we are referring to two different groups of firms. Through this paper, we define four margins of adjustment. For each year t after WTO accession (2002 through 2006), the "new entrant" margin is defined as firm*product combinations that were exported to the US in year t but not in year 2000. The new entrant margin is further divided into "new exporter" and "adder" margins. The "new exporter" margin refers to exports of a good by a firm that was not involved in export in 2000, while the "adder" margin is defined as exports shipped by firms that exported other goods, but not the good in question, in 2000. The incumbent margin involves firm*product combinations that were exported to the US both in 2000 and in year t. The exiter margin captures firm*product combinations that were exported to the US in 2000 but not in year t.

lower prices while continuing to produce higher quality exported goods than did exiting firms. More important, we find that the advantages of new exporters relative to exiting exporters were larger for products that experienced larger reductions in trade policy uncertainty.

Third, we find that the benefits of uncertainty reduction were stronger for private Chinese firms and foreign-invested firms (FIEs), which suggests that reductions in trade policy uncertainty contributed to the aggregate reallocation of China's exports away from state-owned enterprises (SOEs) towards domestic private firms and FIEs. Products that experienced a greater degree of uncertainty reduction faced a greater degree of churning, as these sectors faced higher levels of export entry and of export exit. However, within products, the potency of firm export responses to uncertainty reduction differed by firm ownership. In the case of export entry, higher levels of uncertainty reduction triggered a stronger entry response for private Chinese and FIE exporters, at the same time that the uncertainty reduction promoted the heaviest export exit response among SOE exporters.

By tracking the margins of China's export changes, including shifts in export activity from low-quality high-price exiters to high-quality low-price new exporters, shifts from SOEs to private and foreign firms, and elevated churning of activities due to firm entry and exit, we are able to document the form of reallocation effects that followed from uncertainty reduction. In addition, by providing evidence of the reallocation, and its likely effects on market competition, our results may help explain the potency of the effects China's increased exports on U.S. market outcomes. In particular, the unusually strong downturn in the U.S. manufacturing labor market noted by Pierce and Schott (2013) may have been due not only to the growth in overall exports that followed the trade policy uncertainty reduction, but also due to the intensification of product market competition in the U.S. as the strong reallocation effects facilitated exit by less capable firms and the entry of higher-quality and higher capability exporting firms. Our main finding – that Chinese firm export responses involve net exporter entry, and reallocation through simultaneous entry and exit – also supports recent work in international trade that shows the effects of trade policy changes are often observed on the extensive margin.[5]

By demonstrating a connection between reductions in trade policy uncertainty and firm export activities, our work adds to the recent literature on trade policy uncertainty and international trade, e.g. Handley (2012) and Handley and Limao (2012). The advantage of our customs dataset is its

[5] Khandelwal, Schott and Wei (2013) show that the surge in export value and decrease in export prices following the removal of MFA quotas on Chinese textile and apparel products was driven by net entry, while Debaere and Mostashari (2010) provide evidence that extensive margin responses to U.S. tariff policy changes had an effect on U.S. country-product imports.

provision of firm identifiers which allow us to gain insights into the margins of firm-level decisions. In particular, firm identifiers allow us to observe how changes in aggregate exports were related to firm export margins (incumbents, exporters who add new product exports, new exporters, and exiters) and by firm ownership (SOEs, FIEs and private Chinese firms).

Our paper also contributes to the literature that seeks to understand how changes in trade have influenced U.S. economic outcomes. The relevance of this issue is made apparent by the work of Autor, Dorn and Hanson (2012), and Autor, Dorn, Hanson and Song (2013), both of which show how the increased imports from China affected U.S. labor markets. Since the literature has noted the importance of China for US economic outcomes, it is important to learn how the WTO accession affected the changes in China's trade. To this end, Pierce and Schott (2012) find that the uncertainty reduction associated with China's WTO accession can help explain changes in U.S. manufacturing employment and wages. Our paper shows the mechanism through which this may take effects. Our work is also consistent with the observations of Chinese export prices in Mandel (2013) which studies how competition from Chinese exporters affected the mark-ups and marginal costs of other exporters who shipped their products to the U.S.

The rest of this paper is organized as follows. Section 2 provides a theoretical framework which we use to guide our empirical investigation. Section 3 introduces the data and provides a discussion of the relevant trade policy changes that occurred as part of China's accession to WTO membership. Section 4 describes our empirical strategy and summarizes our regression results. Section 5 concludes.

2 Theory

In this section we develop a heterogeneous firm model, which studies the impact of trade policy uncertainty reduction on exports. We find that uncertainty reduction induces new export entry but has no impact on the export value of incumbent firms. We use the model to derive estimating equations that predict the total export value of new entrants and the number of firms entering the market. These equations are used in the later sections of our paper, which estimate the effects of trade policy uncertainty on these export margins.

2.1 The Model

Suppose there are two countries, home and foreign. We focus on the decision of home firms to export to the foreign market and ignore firm sales in the home country. Thus all variables in our theory, aside from firm productivity, are variables in the foreign country. We adopt the common

Melitz (2003) framework, assuming that firms produce a continuum of differentiated goods, and that the economy is characterized by monopolistic competition.

2.1.1 Demand and Supply

Following Melitz (2003), the demand of each variety of the differentiated good, indexed by ω, follows

$$q(\omega) = YP^{\sigma-1}\left(p^{-\sigma}(\omega)\right),$$

where Y is the total expenditure, $P \equiv \left(\int_{\omega\in\Omega} p^{1-\sigma}(\omega)\, d\omega\right)^{\frac{1}{1-\sigma}}$ is the aggregate price, and $p(\omega)$ is the price of the variety ω.

In order to export to the foreign market, the firm must pay a one-time fixed cost, f. The productivity of the firm follows a distribution $G(\varphi)$, from which each firm randomly draws its productivity. Firms also face an applied tariff, $\tau_a > 1$, charged by the foreign country when firms export their products. The variable cost for a firm with productivity φ serving quantity $q(\omega)$ to the foreign market is $\tau_a q(\omega)/\varphi$. Since firms maximize their profits by charging a constant markup, $\sigma/(\sigma-1)$, over its variable cost, the price of each variety is $\frac{\sigma\tau_a}{(\sigma-1)\varphi}$.

2.2 Uncertainty and Entry Decisions

We assume that policy uncertainty involves applied tariff rate. In describing the policy environment that faced Chinese firms exporting to the United States prior to China's WTO accession we assume that as firms make their export decisions the contemporaneous applied tariff rate is relatively low. However, absent the protections of WTO membership, the foreign country may at any time decide to charge a higher tariff. We model this uncertainty as a Possion process with arrival rate, λ, which characterizes the risk that the foreign country will choose to replace its current low tariff schedule with an alternative higher tariff schedule. If the foreign country decides to adjust its tariffs, the new tariff will be drawn from a distribution $H(\tau)$ with support $[1, \bar{\tau}]$, where $\bar{\tau} > \tau_a$ is the highest possible tariff levied by the foreign country. In our setting, this is equivalent to the U.S. removing China's provisional MFN treatment, and applying the higher non-MFN tariffs on Chinese imports instead.

Firm value depends not only on current profit, but also on future variable profits, which are discounted at rate, ρ. Thus, the expected value of exporting can be calculated as the difference between the present value of expected export variable profits, $\Pi(\tau_a)$, and the one-time fixed cost of export, f, i.e. $V(\tau_a) = \Pi(\tau_a) - f$.

Given the Poisson uncertainty process described above, the present value of expected export variable profits is

$$\Pi(\tau_t) = \pi(\tau_t) + \rho\left((1-\lambda)\Pi(\tau_t) + \lambda E\Pi(\tau_{t+1})\right), \tag{1}$$

where $\pi(\tau_t) = \frac{r(\omega)}{\sigma}$ is the variable profit in period t. In period $t+1$ the applied tariff remains at τ_t with probability $(1-\lambda)$. However, with probability λ the applied tariff changes and expected variable profits, conditional on the policy shock, become $E\Pi(\tau_{t+1})$, where τ_{t+1} is drawn from the distribution $H(\tau)$.

Closer inspection of expected variable profits, conditional on the policy shock, reveals that

$$\begin{aligned} E\Pi(\tau_{t+1}) &= E\left[\pi(\tau_{t+1}) + \rho\left((1-\lambda)\Pi(\tau_{t+1}) + \lambda E\Pi(\tau_{t+2})\right)\right] \\ &= E\pi(\tau_{t+1}) + \rho E\Pi(\tau_{t+1}). \end{aligned}$$

Ignoring period subscripts, we get $E\Pi(\tau) = \frac{1}{1-\rho}E\pi(\tau)$. Substituting this expression into (1), the present value of variable export profit is given by

$$\Pi(\tau_a) = \frac{1}{1-\rho}\left(\delta_a\pi(\tau_a) + \delta_E E\pi(\tau)\right),$$

where $\delta_a = \frac{1-\rho}{1-\rho(1-\lambda)}$, $\delta_E = \frac{\rho\lambda}{1-\rho(1-\lambda)}$ and $\delta_E + \delta_a = 1$. It is obvious that terms in the right-hand brackets represent a weighted average of current variable profits based on the current tariff τ_a and the unconditional expected variable profit which accounts for the risk of future tariff changes. If the risk of a policy change increases, as shown by a larger arrival rate, λ, the firm will increase the weight on the term for the expected variable profit, while decreasing the weight it places on its current profit which reflects current applied tariffs.

We assume that when firms make their entry decisions, if the expected value of exporting $V(\tau_a)$ is greater than zero, the firm will enter the market; otherwise it exits the market.[6] Substituting the expression for variable profits into the value function, we get

$$V(\tau_a) = BT\varphi^{\sigma-1} - f, \tag{2}$$

where $B \equiv \frac{Y}{(1-\rho)\sigma}\left(\frac{P(\sigma-1)}{\sigma}\right)^{\sigma-1}$ and $T \equiv \delta_a\tau_a^{1-\sigma} + \delta_E E\left(\tau^{1-\sigma}\right)$.

To gain further intuition about the term T, that summarizes the tariff conditions that influence firm decisions, note that this term depends on the current applied tariff, as well as an expected

[6] In Handley and Limao (2012)firms make entry decisions by comparing the value of entering now with the value of waiting. The decision rule in our model has two advantages. First, with our simplified decision rule, we get simpler entry conditions that remain qualitatively similar to those of Handley and Limao (2012). Second, the decision rule in our model more closely resembles the situation that confronted Chinese firms prior to China's WTO accession. Since the applied tariffs were already low prior to China's WTO entry, and because U.S. applied tariffs changed only slightly in subsequent years, there was little reason for firms to "wait" for even lower tariffs.

term related to the tariff distribution and the weights. We assume that the applied tariff τ_a is relatively low, close to the lower bound of the distribution $H(\tau)$, so that $\tau_a^{1-\sigma}$ is relatively high and $\tau_a^{1-\sigma} > E\left(\tau^{1-\sigma}\right)$.

The uncertainty facing exporting firms can now be summarized by two terms. The first term is the expectation term, $E\left(\tau^{1-\sigma}\right)$. If the unconditional distribution of tariff is further away from the applied tariff, τ_a, then this expectation term is smaller. For example, if the tariff distribution follows a uniform distribution, then the larger is the upper bound of the tariff distribution, the smaller is this expectation term. In practice, considering that the worst case senerio tariffs faced by Chinese firms in the US are the non-normal trade relation tariffs (non-NTR tariff) before WTO accession and a much lower *WTO bound tariff* after WTO accession, there is then a shift for the tariff distribution toward the applied low tariffs and thus the expectation term, $E\left(\tau^{1-\sigma}\right)$, increases.[7] In our empirical application, since the reduction of the worst case senerio tariff differs across products, the variation in the expecation term is our main source of identification.

The second factor characterizing the level of trade policy uncertainty are the weights, δ_a and δ_E, which in turn depend on the arrival rate, λ, of a trade policy shock. Since we assume $\tau_a^{1-\sigma} > E\left(\tau^{1-\sigma}\right)$, a larger arrival rate λ indicates a larger probability that tariffs will be increased relative to the current low applied rate. Thus, T is increasing in the arrival rate. In practice, China's WTO accession reduced the arrival rate characterizing the possibility of tariff increases, thus WTO accession implied a decrease in the level of T. However, since the reduction in the arrival rate is the same for all products, we do not make use of this term when we estimate the effects of changes in trade policy uncertainty on firm export decisions.

Equation (2) and the entry decision rule pin down the cutoff productivity level which characterizes the firm that is indifferent between entry and exit. Setting $V(\tau_a) = 0$, we derive the cutoff productivity level as

$$\varphi^{*\sigma-1} = \frac{f}{BT}. \tag{3}$$

Three conclusions follow from our model.

Lemma 1 *Uncertainty reduction due to a decrease in the expected potential tariff or due to a reduction in the possibility to that the applied tariff will be adjusted upward, lowers the cutoff productivity which governs firm export decisions and encourages firm entry into the export market.*

This Lemma follows directly from Equation (3). It predicts that we will observe new entry into the export market if measured uncertainty decreases. This is the main implication we will test in

[7] See policy details in Section 3.

our empirical section. We will formally derive the estimation equation later.

Lemma 2 *Conditional on a given tariff level and degree of trade policy uncertainty, the higher is the fixed cost of export the higher is the cutoff productivity.*

This Lemma also directly follows Equation (3), and is standard result in the Melitz (2003) framework. When firms face higher fixed export entry costs, they require the expectation of larger revenues as a precondition for entry into the export market. Only firms with high productivity will earn revenue that is sufficient to cover the fixed costs of export entry.

We emphasize this standard conclusion here, because we want to clarify one possible misinterpretation in the empirical exercise. Note, since Equation (3) can be used to show $\frac{\partial^2(\varphi^{*\sigma-1})}{\partial T \partial f} < 0$, we can see that in industries with higher fixed costs, the reduction of cutoff productivity is larger due to uncertainty reduction. However, this result does not imply that uncertainty reduction will provide a greater stimulus to new export entry (measured by total export value or total number of new entrants) in industries with higher fixed costs. In fact, our empirical results show the opposite.

The explanation for this outcome is related to the distribution of firm productivity. It is typical that the lower end of the productivity distribution is more densely populated with firms. Thus the number of new firms entering the market may be larger in low fixed cost industries than in high fixed cost industries. Thus, depending on the distribution of the productivity, it is possible that the total export value of new entrants will be higher in industries with lower fixed costs, conditional on similar levels of trade policy uncertainty reduction in the two sectors. We shall formally show that it is the case with Pareto distribution.

Lemma 3 *The export value of incumbent exporters is not affected by uncertainty reduction, conditional on a given aggregate price level in the export market.*

Firm export value, conditional on entry, is $r(\varphi) = Y\left(\frac{(\sigma-1)}{\sigma}\frac{P\varphi}{\tau_a}\right)^{\sigma-1}$. Since export value only depends on the current applied tariff, and not the tariff distribution, we expect the export value of incumbents will not be affected by reductions in trade policy uncertainty.

2.3 Estimation Framework

We now derive the main estimation equation, which relates the export value of new entrants to uncertainty reduction. Assume that trade policy uncertainty changes while all other environmental factors remain unchanged. In this setting, the term T in Equation (3) increases from T_b to T_a, where the subscripts refer to the time "before" and "after" the uncertanty reduction. The immediate effect of the reduction in trade policy uncertainty is a decline in the productivity cutoff from $\varphi_b^{*\sigma-1}$ to $\varphi_a^{*\sigma-1}$. The export value for new entrants is then

$$EX_{new} = \int_{\varphi_a^*}^{\varphi_b^*} r(\varphi)\, dG(\varphi) = Y \left(\frac{(\sigma-1)}{\sigma} \frac{P}{\tau_a} \right)^{\sigma-1} \int_{\varphi_a^*}^{\varphi_b^*} \varphi^{\sigma-1} dG(\varphi). \tag{4}$$

Following Helpman, Melitz and Yeaple (2004), we assume the productivity follows a Pareto distribution with shape parameter, k. Specifically, we assume the cumulative distribution function follows, $G(\varphi) = 1 - (b/\varphi)^k$, for $\varphi \geq b > 0$, where b is the lower bound of the productivity draw. As noted in Helpman, Melitz and Yeaple (2004), the distribution of firm sales, $r(\varphi)$, is also Pareto, with the shape parameter, $k - (\sigma - 1)$. A higher dispersion of firm productivity draws (lower k) or a higher elasticity of substitution σ, raises the dispersion of firm sales. Since the shape parameter is required to be greater than 2 such that the distribution has finite variance, we assume $k-(\sigma-1) > 2$ or $k > \sigma + 1$.

Substituting the distribution function for $G(\varphi)$ into Equation (4), we get

$$\begin{aligned} EX_{new} &= Y \left(\frac{(\sigma-1)}{\sigma} \frac{P}{\tau_a} \right)^{\sigma-1} \frac{kb^k}{-(k-(\sigma-1))} \left(\varphi_b^{*-(k-(\sigma-1))} - \varphi_a^{*-(k-(\sigma-1))} \right). \\ &= (1-\rho)\, \sigma B^{\frac{k}{\sigma-1}} \frac{kb^k}{k-(\sigma-1)} \tau_a^{1-\sigma} f^{\frac{-(k-(\sigma-1))}{\sigma-1}} \left(T_a^{\frac{k-(\sigma-1)}{\sigma-1}} - T_b^{\frac{k-(\sigma-1)}{\sigma-1}} \right), \end{aligned} \tag{5}$$

where the second equality is obtained by substituting T_b and T_a using Equation (3).

Notice that, the power on fixed cost is negative and related to the shape parameter, k. The larger is the shape parameter, k, (higher concentration) the larger is the absolute value of the power. This confirms our discussion of Lemma 2. In this context, uncertainty reduction induces a larger number of new entrants in industries that have smaller fixed export costs. Further, the impact of the fixed cost is larger the higher the level of concentration (higher k).

Taking logs of both sides of Equation (5), we get

$$\log EX_{new} = \gamma(k) - (\sigma-1)\log \tau_a - \frac{k-(\sigma-1)}{\sigma-1} \log f + \log \left(T_a^{\frac{k-(\sigma-1)}{\sigma-1}} - T_b^{\frac{k-(\sigma-1)}{\sigma-1}} \right), \tag{6}$$

where $\gamma(k) \equiv \log \left((1-\rho)\, \sigma B^{\frac{k}{\sigma-1}} \frac{kb^k}{k-(\sigma-1)} \right)$ and which may increase or decrease in k depending on the value of B.

Equation (6) reveals factors that affect the log level of the total export value by new entrants. The dispersion parameter, k, matters but its sign is ambigous depending on the aggregate variables such as total expenditure, the aggregate price and the elasticity of subsitution, σ. The level of the applied tariff has a negative effect on the export values of new entrants since a higher applied tariff results in lower sales for each firm. Fixed exports costs reduce firm export values further, since higher fixed costs induce higher productivity cutoffs and firms are populated less densely at the higher end of the productivity distribution, when productivities are distributed Pareto.

Finally, uncertainty reduction increases the export value of new entrants. This is because uncertainty reduction lowers the cutoff productivity and encourages entry. Since we do not have good measures for the distribution of potential tariffs, $H(\tau)$, we take the difference of the gap between the worst case senerio tariff and the applied tariff before and after policy change as the measure of uncertainty reduction. Specifically, the uncertainty change is measured by $dGAP = \left(Col2t - \tau_a^b\right) - \left(Boundt - \tau_a^a\right) > 0$, where $Boundt$ is the bound tariff after WTO accession, $Col2t$ is the non-NTR (*column 2*) tariff before WTO accession and τ_a^a and τ_a^b are applied tariffs after and before WTO accession, respectively. Notice that the variable $dGAP$ directly measures the *reduction* in trade policy uncertainty.

Cutoff productivities will also change if applied tariffs change, although we do not explicitly consider this in Equation (5). Since there are some, though not many, changes in applied tariffs, we take them into account in our empirical specification. The effects of applied tariff changes on the cutoff productivities are similar to the effects of uncertainty reduction. Thus, we include an applied tariff reduction measure, $d\tau = \tau_a^b - \tau_a^a > 0$, in the estimation equation in the same fashion as our inclusion of uncertainty reduction. Note, $d\tau$ measures the *reduction* in the applied tariff. We now have the following estimating equation

$$\log EX_{newh} = \alpha + \beta_1 k_h + \beta_2 \tilde{\tau}_{ah} + \beta_3 f_h + \beta_4 dGAP_h + \beta_5 d\tau_h + \alpha_{HS2} + \varepsilon_h, \tag{7}$$

where the subscripts h denote products at HS 6-digit level, k is the shape parameter of the Pareto distribution, $\tilde{\tau}_a = \left(\tau_a^a + \tau_a^b\right)/2$ is the applied tariff averaged before and after policy change. To control for the industry level heterogeneity in new entry, we also include HS 2-digit fixed effects. When we estimate this equation, we expect the coefficients β_2 and β_3 will have negative values while β_4 and β_5 will have positive values.

We are also interested in the influence of uncertainty reduction on the number of new entrants. We can easily derive the mass of new entrants who enter due to uncertainty reduction as follows:

$$Num_{new} = \int_{\varphi_a^*}^{\varphi_b^*} dG(\varphi) = b^k B^{\frac{k}{\sigma-1}} f^{\frac{-k}{\sigma-1}} \left(T_a^{*\frac{k}{\sigma-1}} - T_b^{*\frac{k}{\sigma-1}} \right). \tag{8}$$

Taking logs, we get

$$\log Num_{new} = \tilde{\gamma}(k) - \frac{k}{\sigma-1} \log f + \log\left(T_a^{\frac{k}{\sigma-1}} - T_b^{\frac{k}{\sigma-1}} \right), \tag{9}$$

where $\tilde{\gamma}(k) \equiv k \log b + \frac{k}{\sigma-1} \log B$. This equation is close to the form of Equation (6), except for the absence of the applied tariff term. For simplicity, in estimations for the number of new entrants, we take a specificiation similar to Equation (7), or:

$$\log Num_{newh} = \alpha + \beta_1 k_h + \beta_2 \tilde{\tau}_{ah} + \beta_3 f_h + \beta_4 dGAP_h + \beta_5 d\tau_h + \alpha_{HS2} + \varepsilon_h. \tag{10}$$

3 Policy Background and Data

3.1 Policy Background

As an outsider to the GATT and the successor WTO framework, China missed out on participating in the multiple rounds of tariff negotiations and reductions that occurred through international agreements concluded by the GATT/WTO process. Although the U.S. agreed to allow China to benefit from the same tariff concessions that were offered to GATT/WTO members who received MFN treatment, such treatment was extended on a provisional basis which was subject to annual renewal.

Pregelj (2005) details the politically controversial annual renewals of MFN tariff treatment to China prior to China's WTO accession. Since continued access to MFN treatment was not assured, any exporters had to consider the real possibility of sharp tariff increases on their exports to the United States. Indeed, the possibility of trade action has not disappeared entirely following China's WTO accession, as there has been political pressure for U.S. trade action against China, to pressure China to increase the value its currency "in accordance with accepted market-based trading policies".

Nonetheless, China's WTO accession lowered the possibility for tariff adjustment via the loss of MFN treatment, and thereby, mitigated the worst case tariffs, and the risk of change, that Chinese exporters needed to consider. The worst case tariff before China's WTO accession, if China lost its MFN tariff treatment, was the United States' special rate of duty assigned to trade restricted countries (such as Cuba and North Korea).[8] After China's WTO accession the worst case tariff became the much lower schedule of WTO bound tariffs.[9] As Figure 2 shows, the reduction in the worst case tariff was substantial. The mean non-MFN tariff was roughly 32 percent while the mean bound tariff was only 3.6 percent. Moreover, the non-MFN tariff varied widely across product lines.

[8] These tariffs are also interchangeably referred to as "non-most favored nation treatment" tariffs (non-MFN), "non-normal trade relation" tariffs (non-NTR) or "Column 2" tariffs (Feenstra, Romalis & Schott, 2002). They were originally set in the Smoot-Hawley Tariff Act of 1930.

[9] The United States granted permanent MFN tariffs to China in October 2000. Negotiations on China's terms of membership in the WTO concluded in September 2001. Permanent MFN tariff treatment for China by the U.S. became effective on Jan 1, 2002. See http://www.wto.org/english/news_e/pres01_e/pr243_e.htm.

Figure 3 provides more detail on the distribution of non-MFN tariffs by sector. Two patterns are obvious. First, all U.S. sectors had worst-case tariffs that applied to non-MFN countries, and the worst case tariff rates were very high. No sector was immune from this threat. Second, within each sector, the non-MFN tariff varied dramatically across products. Since non-MFN tariffs were not uniform even within sectors, we can exploit this tariff variation to identify the exporters' responses to changes in trade policy uncertainty.

Finally, these worst case tariffs were arguably exogenous. Pierece and Schott (2012) argue that, non-MFN tariffs were set decades ago and have been very stable over recent decades. Similarly, the U.S. bound tariffs were also set in advance and were applied to all countries in the world.

3.2 Data

3.2.1 Export Data

Our empirical study relies on China's transaction-level customs data, which track the universe of exports by Chinese firms for years 2000-2006. The dataset provides detailed information including firm identifiers, product codes (8-digit codes which we aggregate to the internationally comparable 6-digit HS codes), destination country (we only make use of the exports to the United States), transaction value and quantity, and the customs regime (e.g., processing trade or ordinary trade).[10]

3.2.2 Tariff Uncertainty and the Tariff Environment

We obtain non-MFN tariffs from Feenstra, Romalis and Schott (2002) while we collect the bound tariff data from the WTO website. The WTO website also provides the applied tariffs which we use in our study as well.

We measure the trade policy environment using three variables that are tied to our model. These variables are the average across years of U.S. import tariffs on products ($\tilde{\tau}_{ah}$, or Avt), the change in applied U.S. import tariffs at the product level ($d\tau_h$, or Dat), and the change in tariff uncertainty ($dGAP$). Tariffs are measured at the HS 6-digit product level. Specifically, the variable, $\tilde{\tau}_{ah}$, measures the U.S. tariff rates averaged over the years 2000 and 2002. The variable, $d\tau_h$, is constructed by subtracting the year 2002 (after WTO accession) applied tariff from the year 2000 (before WTO accession) applied tariff. Positive values of this measure imply that there was a reduction in applied tariffs. We define "GAP" as the difference between the worst-case tariff and the

[10] We restrict our attention to China-US trade because the worst-case tariff before China's WTO accession is only readily available for the US. In the dataset, processing export involves Chinese firms which assemble intermediate inputs (some of which are imported at zero duty) under the requirement that the totality of final production is exported. Ordinary exporters, who do not receive tariff priveleges for the use of intermediate inputs that are re-exported in final goods, are free to sell their final output in China as well as in export markets.

applied tariff. The reduction in uncertainty "dGAP" is then defined as $dGAP \equiv (GAP_{2000}, before\ WTO\ accession) - (GAP_{2002}, after\ WTO\ accession)$, with positive values implying reduced uncertainty.[11]

As Table 1 shows, US tariffs on imports were low, averaging 3.65%. Further, U.S. MFN tariffs only declined by a tiny amount over our sample period, 0.16 percentage point. However, exporting firms benefited from a considerable change in the size of the potential threat. Across all products, the average reduction in "GAP", the difference between the worst-case tariff and the applied tariff, was around 30 percentage points. It is dramatically larger in magnitude than the change in the U.S. applied tariffs and implies a substantial degree of uncertainty reduction.

Before we turn to estimation, we check whether the changes in China's U.S.-destined exports were consistent with an explanation based on uncertainty reduction. To this end, we assign each product to one of four uncertainty groups based on the degree of uncertainty reduction. Products that had no change in uncertainty were assigned to the group one (Duncert1). This group accounts for about 15% of all HS 6-digit products. All remaining products are assigned to three groups, Duncert2 to Duncert4. Of the products with non-zero changes in trade policy uncertainty, the 1/3rd of goods that had the smallest reductions in uncertainty were assigned to the group Duncert2. Similarly, the middle 1/3rd of goods with somewhat larger reductions in uncertainty were assigned to group Duncert3, while the 1/3rd of goods with the largest reductions in tariff uncertainty were assigned to the group Duncert4.[12]

If uncertainty reduction was a relevant factor in export decisions, we should observe that export growth was most pronounced for products in the groups that experienced the greatest uncertainty reduction. Consistent with this prediction, Figure 4 shows that, the largest growth in trade and the highest growth in exporting firm numbers were observed in the group (Duncert4) which benefited from the greatest decline in tariff uncertainty. Further, whether we examine the export growth rates of processing or ordinary trade, the export growth was, with only one excpetion, progressively smaller as one compares the products that benefited from smaller uncertainty reduction with the product groups that benefited from a larger magnitude reductions in unceratinty.[13]

[11] If we construct our tariff measures replacing t with another year in the 2002-2006 interval the tariff measures would change only slightly, as U.S. tariffs were stable during this period.

[12] Specifically, group one includes all products with zero dGAP. Group 2 products have dGAP reductions that ranged from 2.2 to 29.5 percentage points, Group 3 from 29.5 to 40.1 and group 4 above 40.1.

[13] The one reversal in the ordering is in the comparison of firms engaged in processing trade. Here, the strongest trade growth was for the group Duncert3.

3.2.3 Measures of Fixed Export Costs and Industry Productivity Dispersion

We construct two measures of fixed export costs. The first is constructed based on the China's manufacturing survey data, and is given as the fixed assets of exporting firms.[14] In particular, it is the weighted average of total fixed assets per 1000 RMB sales across firms exporting the good, with each firms' share in the exports of the good as weights. While this measure does not directly measure fixed export costs, Castro, Li, Maskus and Xie's (2013) work on the fixed cost of exporting indicates that fixed costs of exporting are correlated with such firm characteristics.

For a second measure of fixed export costs, we construct the intermediary share of exports as a proxy for fixed costs of exporting.[15] The intermediary share of exports, "imshare", is calculated as the intermediary export value as a share of the total export value for each product in 2006. Our use of "imshare"is motivated by the work of Ahn, Khandelwal and Wei (2011) and Bernard, Grazzi and Tomasi (2012), which show that the intermediary share of trade is higher for markets that are more costly to enter. To avoid endogeneity while ensuring that the market conditions are similar to those of the U.S., we use China's exports to non-US G7 countries to construct our product-level measures of the intermediary share.

We also generate two measures of industry productivity dispersion, following Helpman, Melitz and Yeaple (2004). The first is generated by regressing the logarithm of an individual firm's rank on the logarithm of the firm's export value for each product. The second measure is the standard deviation of the logarithm of firm sales, by product. However, including the dispersion measures significantly reduces the sample size, from about 3254 HS 6-digit products to about 1606 HS 6-digit products. For this reason we focus our discussion on regression results based on specifications that do not include the dispersion measures. However, as we show in Appendix A1 the estimation results for our variables of interest do not change much if the dispersion measures are included or excluded.[16]

[14] For details about this dataset, see Feng, Li and Swenson (2012).

[15] We define a firm as an intermediary firm if it falls into one of the following two cases: first, if its Chinese name includes characters such as "international trade", "import", "export", "shopping mall", "supermarket", "commercial", etc, as in Ahn, Kandwall and Wei(2011), and second, if the firm can be matched with a firm in the China's 2008 enterprise census and in the census data it is categorized as a wholesaler or retailer.

[16] Since our regressions include HS 2digit fixed effects, these controls may partially control for the effects of dispersion which are similar within sector.

4 Empirical Results

4.1 Baseline Results: Impacts and Reallocation

Our baseline regression based on Equation. (7) estimates:

$$\log EX_{newh} = \alpha + \beta_1 k_h + \beta_2 \tilde{\tau}_{ah} + \beta_3 f_h + \beta_4 dGAP_h + \beta_5 d\tau_h + \alpha_{HS2} + \varepsilon_h.$$

Trade policy variables were constructed following the definitions introduced in Section 3. Our main variable of interest is dGAP, which measures the trade policy uncertainty reduction for each product. Since positive values of dGAP measure indicate that firms faced reduced uncertainty following China's WTO accession, we expect $\beta_4 > 0$. That is, we expect that reductions in trade policy uncertainty stimulated exports by new entrants. Next, any changes in applied tariffs are captured by the variable, $d\tau_h$, whose positive values measure the magnitude of decreases in applied tariffs. Thus, since the applied tariff reductions have similar effects as decreases in trade policy uncertainty, we also expect $\beta_5 > 0$. Finally, we include the average tariff level, $\tilde{\tau}_{ah}$, since the applied tariff level affects the export value for each new entrant.

Since our model suggests that products with higher fixed costs will have smaller new export volumes, our regressions include at least one of two measures of fixed export costs: the average fixed asset to sales ratio for exporting firms, and/or the product-level intermediary share of exports. We expect a negative coefficient on this variable, i.e., $\beta_3 < 0$. To control for industry-level economic factors that affect the level of new exports, we include HS 2-digit fixed effects. Finally, although we do not include the industry productivity dispersion measures in our baseline regression, since we prefer to work with the full export sample, we provide further estimation results in Appendix A1, which illustrate the insensitivity of our key results to its inclusion.

To generate the measure of new export value, EX_{newh}, we define new exports using two definitions. The first definition includes any exports that are exported by a new firm that did not export in 2000 ("new exporters"), while the second definition includes exports of goods by firms that existed in 2000 but did not export good h in 2000 ("adders"). While our baseline estimation aggregates both forms of new exports and labels them "new entrants", we later decompose these two types of new exports to evaluate how firms react differently by margin of response.

Table 2 reports the first set of results. Beginning with column 1 we regress the log export value of new entrants in 2006 on our trade policy variables: uncertainty reduction, applied tariff reduction and the average tariff. All standard errors are clustered at HS 2-digit level in column 1 and in all subsequent regressions. We find that uncertainty reduction had a positive and significant effect on the growth of exports by new entrants, while the average tariff and reductions in the applied tariff did not have a significant effect on new exports at this time.

In column 2, we add our measure of export fixed costs, average fixed assets to sales ratio for exporters, to the regression. Consistent with the predictions of the theoretical model, we find that the coefficient on the fixed cost measure is negative and highly significant. However, the inclusion of fixed cost measure does not affect the sign or the significance of the coefficient on our uncertainty reduction measure, although the magnitude is slightly smaller. In column 3, we add the second fixed cost measure, the intermediary share of exports. Now both measures of export costs have the expected negative coefficients, while our estimated effect of uncertainty reduction continues to indicate that declines in trade policy uncertainty contributed to the growth of new exports.

In columns 4-6 of Table 2 we move to the full estimation equation which includes HS 2-digit fixed effects in the specification. The inclusion of these fixed effects is warranted first, if there is any concern that the fixed asset and intermediary share variables are imperfect measures of the fixed costs of exporting. The inclusion of HS 2-digit fixed effects is also desirable if there are sector-specific unobserved factors or trends that affected the extent of new entries by sector. In addition, since we are interested in checking whether our estimated coefficient magnitudes are sensitive to our choice of time frame, we examine three time periods: 2000 to 2002, to 2004 and to 2006, respectively. As we move across time horizons, our dependent variable (but not our independent variables) are updated accordingly.[17]

Comparison of columns 3 and 6, both of which reflect the 2000 to 2006 time horizon, shows that the inclusion of HS 2-digit fixed effects causes the estimated coefficient on uncertainty reduction to decline in magnitude. However, both estimates remain highly significant. In addition, if we compare the coefficient magnitudes across different time horizons (comparison across columns 4 to 6), we find that the estimated coefficient on uncertainty reduction grow more than 25% in magnitude as we move from the two year window to the six year interval. Thus, it appears that the full response to trade policy uncertainty reduction took a number of years to be completed.

While Table 2 confirms our prediction, that uncertainty reduction would stimulate new export entry, our theory also predicted that uncertainty reduction would not have an effect on incumbent exports. Thus, to investigate whether trade policy uncertainty reduction induced new entries but not expansion of incumbents, we re-run our original regression, replacing the dependent variable with the product level total export value and the exports of the net entries (new entrants minus

[17] Updating independent variables would not affect the results since the applied tariffs and the worst case tariffs did not change meaningfully in the period following China's WTO accession.

exiters). The results are reported in Table 3.

To our surprise, we do not find evidence that uncertainty reduction provided a statistically significant increase in log export values (columns 1-3 of Table 3). One might guess that this lack of sensitivity was driven by the lack of a response of incumbent firms to uncertainty reductions. However, when we restrict our attention to net extensive margin changes (columns 4-6 of Table 3), we still unable to identify a significant effect tied to reductions in trade policy uncertainty.

The contrast in our results - insensitivity at the aggregate level and at the net extensive margin as compared with the significantly positive effects on the new entrant margin reported in Table 2 - suggests that some margins we have ignored may be important. To search for the overlooked margin, we run our regressions separately for the incumbents and for the exiters in turn, reporting our results in Table 4.

The first three columns of Table 4 evaluate how uncertainty reduction affected the U.S. exports of incumbent firms. In line with our theory, the results show that uncertainty reduction had no significant effect on the log export value of incumbents. In contrast, when we turn to exiters, our results displayed in columns 4-6 show that larger uncertainty reduction was positively correlated with the extent of export destruction through the disappearance of Chinese exporters who had formerly been active in the U.S. market in 2000.

We can observe our full set of results to draw inferences about firm adjustments. All else equal, our regressors in Equation (7) imply that the effect of changes in trade policy uncertainty can be measured using, $dEX_{new} = EX_{new} * \beta_4 d\,(dGAP)$. If the coefficient on uncertainty reduction is positive, reductions in trade policy uncertainty lead to increases in the export value. However, the coefficient on uncertainty reduction itself is not sufficient for us to evaluate the impact of uncertainty reduction on export values. This is because the export value change, dEX_{new}, also depends on the level of average export value, EX_{new}. One rough way to capture the level of average export value is to make use of the coefficient on the constant, α, so that $dEX_{new} = e^{\alpha} * \beta_4 d\,(dGAP)$. Conditional on the same coefficient on uncertainty reduction, the larger is the constant coefficient, the larger is the impact of uncertainty reduction.

Table 2 and Table 4 suggest that, on the one hand, the trade volumes by new entrants were positively related to the uncertainty reduction and the impacts grew in magnitude over time. On the other hand, uncertainty reductions also induced exits of some incumbent firms. However, results in Table 3 do not suggest that these two effects cancel each other such that uncertainty reduction failed to influence aggregate export value. To see this, notice that the coefficients on uncertainty reduction in columns 4-6 of Table 4 and columns 4-6 of Table 2 have opposite signs but are similar in magnitude. Moreover, the regression constants in Table 2 are much larger than those in Table 4. Thus the overall impact of uncertainty reduction on the aggregate export value can be expressed as:

$$
\begin{aligned}
dEX_{new} - dEX_{exit} &= e^{\alpha_{new}} * \beta_{4new} d\left(dGAP\right) - e^{\alpha_{exit}} * \beta_{4exit} d\left(dGAP\right) \\
&\approx \left(e^{\alpha_{new}} - e^{\alpha_{exit}}\right) * \beta_{4new} d\left(dGAP\right).
\end{aligned}
$$

Given the estimated coefficients, this should be positive.[18] Thus, while we observe that uncertainty reduction simultaneously spurs new exports by new entrants and export reductions by exiters, we can conclude that the overall effect on trade was positive since the increases associated with new exports exceeded the value lost due to export exit. In other words, account for the economic magnitudes for each response margin, our message about the effects of uncertainty reduction on product level trade changes is consistent with initial export graphs in Figure 4 which show that export value grew more dramatically for products that experienced larger trade policy uncertainty reduction than did products which experienced small or zero uncertainty reduction.

These findings are novel and interesting for three reasons. First, our empirical results show that trade uncertainty not only affects the entry decision, but also the exit decision. However, the current trade theories are typically silent about how trade uncertainty affects firms' exit decisions, assuming instead an exogenous death shock that is common for all firms.

Second, the result that larger uncertainty reductions are associated with larger trade reductions by exiters may seem counter-intuitive. A common assumption would be that with lower tariff uncertainty, incumbents in the export market should gain, or at least not be adversely affected by the uncertainty reduction, and therefore there shouldn't be any increase in firms' exit probability following a reduction in uncertainty. However, our results suggest that uncertainty reduction is actually harmful to some incumbents. One possible story is that the new entries spurred by uncertainty reduction may intensify market competition thereby hastening the exit of some incumbents.

Third, our results suggest uncertainty reduction brings about strong reallocation effects in the market as new entrants replace exiters, along with expanded total export values. Pierce and Schott (2013) find that the U.S. employment declined more in industries where export uncertainty declined the most for Chinese firms. Our finding provides further information which can help explain the strong job market effects uncovered in their work. If uncertainty reduction caused more competitive firms to enter while the least competitive firms exited the US export market, then uncertainty reduction may have had an amplified effect on the US labor market through

[18] Note, when we regress $(\log EX_{new} - \log EX_{exit})$ on uncertainty reduction as in Table 3, we approximately get $(\log EX_{new} - \log EX_{exit}) = (\alpha_{new} - \alpha_{exit}) + (\beta_{new} - \beta_{exit})\, dGAP \approx \alpha_{new} - \alpha_{exit}$.

the indirect connection of uncertainty reduction on the degree of product market competition in the U.S. The next section examines additional evidence on product prices and quality, which are consistent with this conjecture.

4.2 Uncertainty Reduction and Market Competition

Section 4.1 provides evidence of strong reallocation effects associated with uncertainty reduction, rendered by the combined effects of export entry and exit. Due to this combination of responses, it is important to ask whether the aggregate reallocations during this period shifted activity across firms in a fashion that intensified market competition.

4.2.1 Aggregate Reallocation

In this section, we find that the dynamics in the net entry, driven by the reallocations between the exiters and the new exporters, were of greater economic importance than the dynamics driven by the changes attributable to incumbent activities and adders. Moreover, the uncertainty effects on the extensive margin help account for these reallocations.

To analyze the underlying dynamics, we decompose changes in China's 2000 to 2006 U.S. exports according to the margins of adjustment. First, we calculate the market share for each margin m (including the incumbents, exiters, new exporters, and adders) for each HS 6-digit product h in each year t, $EXShare_{mht} = \left(EX_{mht} / \sum_{m} EX_{mht} \right)$. Next, we take the difference in the market share between 2000 and 2006 for each product and then calculate the average difference for each margin. We apply this decomposition approach to overall exports as well as firm groups classified by their form of ownership.

Table 5 shows the decomposition of changes in exporter market shares disaggregated by response margin and ownership form.[19] Column 1 provides the decomposition according to export response margin for China's exports overall, while columns 2 to 4 provide the decomposition across response margins for each type of firm ownership. In each row, the market share changes reported in the final three columns, which represent changes by ownership type, sum to the overall margin share change by margin reported in the first column.

The results shown in Table 5 reveal three notable patterns. First, export growth was disproportionately driven by changes along the extensive margin, with the largest reallocation occurring due

[19] Differences in the table are marked with stars if they are statistically significant. Triple stars, *** , represent a significance level 1%. We obtain the statistics by running regressions of the changes in market shares on a constant. For comparison, we also examined the decomposition based on changes in market shares between 2000 and 2002. Since the results are very similar, they are reported in Appendix Table 1.

to exit (a decline in share of 76 percentage points) and the new exporter activity (an increase in share of 67 percentage points). This is consistent with the results in Tables 2 and 4, which suggest that uncertainty reduction during this period contributed to aggregate reallocation by encouraging new entrants and driving out exiters.

Second, on the extensive margin firm responses along the different margins differed by ownership. Market share reductions due to exit were most heavily concentrated among SOEs, followed by foreign invested enterprises (FIEs). Gains due to adders followed this same ranking in terms of market share changes, although the change magnitudes were smaller. In contrast to these changes, market share increases on the new exporter margin, involved substantial market share gains for domestic private firms and FIEs, with much more modest gains due to new exporters of SOE firms. Aggregating across margins, China's total exports involved a net reallocation of export activities away from SOE firms, whose overall market share declined by 36 percentage points, towards domestic private firms and FIEs, who increased their market shares by 27 and 8 percentage points, respectively.

Among new entrant activity, the market share growth generated by adders was dwarfed by the magnitude of activities associated with new exporters. To determine whether the differences in the strength of changes on the new exporter and the adder margins were related to uncertainty reduction, we decompose our original measure of new entrant export into the parts due to new exporters and adders, and apply our basic estimation equation to these two margins separately. The results are reported in Table 6. We find that the coefficients on uncertainty reduction are larger for new exporters than for adders. Thus, since it appears that new exporters responded more vigorously to uncertainty reduction than did adders, the results suggest that the aggregate trends based on the relatively fast growth of new exporters relative to adders during the 2000-2006 period was related to uncertainty reduction.

4.2.2 Reallocation and Market Competition

The strength of market reallocations associated with uncertainty reduction raises an important question: did market share reallocations intensify market competition? To search for evidence on this question, we begin by testing whether the degree of uncertainty reduction had an influence on aggregate product prices. If the reallocations due to uncertainty reduction intensified competition, we expect smaller aggregate price increases in products that faced larger declines in trade policy uncertainty. In this exercise we first calculate the weighted average price for each HS 6-digit product h in each year t across all firms exporting the product, using each firm's export quantity share θ_{fht}

as weights,

$$\bar{P}_{ht} = \sum_f \theta_{fht} p_{fht}.$$

In this expression firm export quantity shares are given by $\theta_{fht} \equiv q_{fht} / \sum_f q_{fht}$, where the quantity of product h exported by firm f in year t is q_{fht}. To compute the percentage change in average product price for each product h between year t and 2000, we use the formula $\Delta \bar{P}_{ht} = \left(\bar{P}_{ht} - \bar{P}_{h2000}\right) / \bar{P}_{h2000}$. In the final step we regress the product price change measures on the product-level measures of uncertainty and applied tariff reduction.[20]

Table 7 displays the results for regressions of product level price changes between 2000 to year t (t=2002, 2004 and 2006) on the magnitude of trade policy uncertainty reduction. For reference, column 1 of Table 7 regresses our measures of product price changes on a constant only, to uncover the average change in unit export prices for all products. We find that average product prices increased by roughly 29% between 2000 and 2002. When we add the trade policy measures to the regression, our results in column 2 reveal a negative and significant coefficient on uncertainty reduction, which shows that products that experienced larger uncertainty reduction where characterized by smaller price increases. If we apply this regression framework to the longer time spans running to 2004 or 2006, the data reveal the same dampening effect of uncertainty reduction on export product prices.

One explanation for the results in Table 7 is that products that experienced larger uncertainty reductions had smaller unit export price increases, because the uncertainty reduction simultaneously encouraged export entry for firms that were more productive, and capable of exporting products at lower prices than were the firms that decided to exit. To evaluate this story, we search for evidence that is consistent with this mechanism. First, remember that the data on market share reallocation shown in Table 5 shows that export market share expansion was primarily driven by the dynamics in the net entry, particularly the reallocation between exiters and new exporters, rather than expansion by incumbent exporters. To show how the composition of exporters could have influenced average export prices we compare the prices charged by new exporters with the price charged by exiters. While we choose this comparison for expositional simplicity, we also provide a comparison of adder firms and exiters in Appendix A2, which highlights similar reallocation effects on average prices.

To understand the effects of reallocation of prices, we take Khandelwal, Schott and Wei's (2013) framework, which allows us to determine whether new exporters exported goods at lower prices

[20] We drop products whose prices change measures were either below the first or above the ninety-ninth percentile.

than did the firms that exited from the export market.[21] Since Khandelwal, Schott and Wei's (2013) technique involves a comparison of exporter entrants with export exiters, the prices are taken from different years. Thus, there involves a comparison of new exporter prices after entry using the post-policy year t (t=2002, 2004 and 2006) with the prices of exiters in year 2000, just prior to their exit.

After new exporters and exiters are pooled in a single sample, for each firm, f, of ownership, o, and export product, h, we calculate the log level of their unit price. We then run the following regression:

$$\ln p_{foh} = \gamma + \gamma_1 1\left\{new \exp\right\}_f + \gamma_2 1\left\{new \exp\right\}_f * dGAP_h + \gamma_3 1\left\{new \exp\right\}_f * d\tau_h + \gamma_h + \gamma_o + \zeta_{foh}, \quad (11)$$

where $\ln p_{foh}$ is the log price in year t for new exporters, while it represents the log export price in 2000 for exiting firms. The dummy variable, $1\left\{new \exp\right\}_f$, is an indicator variable which denotes whether the firm is a new exporter, rather than an exiter. The interaction terms interact the new exporter indicator variables with the product's policy variables capturing reductions in uncertainty and the applied tariff. To account for product-specific variation in prices we include 6-digit HS product fixed effects, γ_h. In addition, to capture any systematic price variation that is due to the form of firm ownerchip, we also include fixed effects for the different forms of ownership, γ_o.

Our new regressions, which are reported in Table 8, test whether new exporters' products have lower prices than the products previously exported by exiters and whether any differences are related to products-level reductions in uncertainty. The first set of results, included in columns 1 and 2, are based on comparison of new exporters who did not export in 2000 but appeared by 2002, with exiters who exported in 2000 but ceased export by 2002. The coefficient on the new exporter indicator variable in column 1 is negative and highly significant, which demonstrates that controlling for product fixed effects, new exporters' prices in *2002* were lower than the exiters' export prices in *2000*.

This result is strong and surprising since we would generally expect to see some price inflation over the two year interval. Indeed, as shown by column 1 of Table 7, average export prices rose between 2000 and 2002. Thus, the negative coefficient in column 1 of Table 8 suggests that, the average new exporter charged lower prices in 2002 than did the average exiters in 2000. Taken together, the relatiely low prices offered by new exporters reflect an even larger price gap if one accounts for the inflation that took place over the two year interval.

[21] Khandelwal, Schott and Wei (2013) show that following the removal of quotas on Chinese textile and clothing exports in 2005, high-productivity new entrants entered the export market with relatively low prices as they replaced low-productivity firms who exported high-priced exports.

Column 2 of Table 8 augments the regression with policy interaction terms. Further, since firms of different ownership may charge different prices, we also add firm ownership fixed effects to the regression. The coefficient of the regressor which interacts the new exporter dummy with uncertainty reduction is negative and highly significant. This suggests that new exporters charge lower prices than exiters especially for products that experienced larger uncertainty reduction.[22] To check the robustness of our results, we perform a second set of comparisons, which define new entry and exit using changes between 2000, and the later years 2004 and 2006. Since the comparisons extend across a larger number of years, it is not surprising that columns 3 and 5 now suggest that new exporter unit values, controlling for HS6 product effects, were higher on average than the export prices charged in 2000 by firms that exited from export. Nonetheless, the relative price premium relative to exiters' 2000 prices (4.2% in 2004 and 18% in 2006) is much smaller than the export price inflation that was revealed in Table 7. More important, if we add interactions between the policy uncertainy reduction and the new exporter dummy, our result show that products which experienced larger policy uncertainty reduction had lower relative prices charged by new entrants when compared with exiter prices than products that experienced smaller changes in policy uncertainty. Thus, our results suggest that, due to entry by new exporters who charged relatively lower prices, uncertainty reduction increased market competition.

Although the evidence from 2004 and 2006 (columns 3 and 5) does not show that new exporters charged lower prices in 2004 or 2006 than did exiters in 2000, we believe that our results for 2002 (column 2) are the most informative. First, regressions for years 2004 and 2006 are more likely to be affected by common price inflation trends since we are comparing the prices that are separated by a much longer time interval. Second, we think that the 2002 data give a fairly comprehensive view of the exiting firm sample, because the overwhelming majority (79%) of the ultimate 2000-2006 exiters exited prior to 2002. So we are not comparing a small group of exiters in 2000 with the new exporters in year 2002.[23]

Although we conjecture that the lower price of new entrants relative to exiters is driven by competition, it is also possible that the lower price for new exporters arose since new exporters chose to produce and sell lower quality products. To investigate whether this alternative is consistent with the data, we use the approach of Khandelwal, Schott and Wei (2013) to gain evidence regarding the relative quality of exports that were sold by new exporters compared with the quality provided

[22] An additional explanation for low new exporter prices of new exporters compared with exiters is the removal of some inefficient institutional arrangements following China's WTO accession. However, this mechanism which is studied by Khandelwal, Schott and Wei (2013), features the subset of exports that were previously subject to quota limits, while our results extend to other industries that did not experience similar changes in quota treatment.

[23] Appendix Table 4 reports the fraction of 2000-2006 exiters who exited by year.

by firms that exited from export.

To measure quality levels, we incorporate the quality level in the utility function and use data on sales to estimate quality levels. We assume a CES utility function as $U = \left(\int (\eta q)^{\frac{\sigma-1}{\sigma}} d\omega\right)^{\frac{\sigma}{\sigma-1}}$, where η represents the quality of the variety. The demand function for each variety is then $q = \eta^{\sigma-1} p^{-\sigma} P^{\sigma-1} Y$, where p is the variety's price, P is the aggregate price level and Y is the aggregate expenditure on the good. Taking logs of the demand equation, we obtain $lnq = -\sigma \ln p + (\sigma - 1)\ln \eta + \ln\left(P^{\sigma-1}Y\right)$. We then perform the regression,

$$\ln q_{fht} = -\sigma_h \ln p_{fht} + \alpha_{ht} + \mu_{fht}, \tag{12}$$

for firms exporting each HS 6-digit product, h. In this regression equation, α_{ht} summarizes the effects of aggregate price (P), aggregate expenditure (Y) and other year specific unobservables which may affect the export quantity.

We could potentially back out the quality level using the estimated residual term,

$$\eta_{fht} = e^{\frac{\hat{\mu}_{fht}}{\sigma-1}}.$$

However, since we are going to compare quality difference for firms *within* the same HS 6-digit product and the estimation for quality is performed for *each* HS 6-digit product, we could simply use the estimated residual term as the measure of quality. That is, for a pooled sample of new exporters and exiters, we regress the estimated residual term, which we call "quality", on the new exporter dummy and its interactions with our measure of uncertainty reduction and/or with the applied tariff reduction. The specification for this regression is identical to Equation (11), but with the dependent variable replaced by the quality measure.

Table 9 displays the quality regression results. columns 1, 3 and 5 show that the quality of products exported by new exporters exceeded the quality of exports shipped by exiters, regardless of the time horizon of comparison. However, in columns 2, 4 and 6 we do not find that magnitude of the quality premium provided by new exporters was related to the magnitude of the trade policy uncertainty reduction. Nonetheless, since our evidence suggests that new exporters provided higher, not lower, quality exports, we do not believe the lower prices of new firm exports were attributable to a choice to provide new exports of inferior quality. Instead, our results suggest that new exporters were more productive, produced higher quality goods and charged lower prices than exiters. In turn, this trend may explain Mandel's (2013) observation that U.S. exports from other countries responded to Chinese competition by reducing mark-ups by a magnitude of 30%, and increasing marginal costs by 50% (presumably in a move to provide distinctly higher quality products compared with China).

Combining the results in Table 8 and Table 9 with the fact that market share reallocations associated with the activites of new exporters and exiters were the most important driver of changes in extensive margin market share reallocation, we find that the reallocation of export market share from high-price low-quality exiters to low-price high-quality new exporters was related to uncertainty reductions. Taken together these elements of reallocation may have intensified product market competition.

4.3 Uncertainty Reduction: Firm Response Margins

4.3.1 Firm Size versus Firm Counts

We have observed the aggregate impact of uncertainty reduction on the extensive margin. Next we explore whether these effects were driven by new entrants (or exiters) whose export value was positively related to the degree of uncertainty reduction, or by greater firm entry (and/or exit) numbers in products that experienced larger drops in trade policy uncertainty.

To investigate this question, we first check whether firms that were new entrants had larger export values if their product benefitted from a larger uncertainty reduction. For the sample of new entrants, we run the following regression,

$$\log EX_{fh}^{t} = \kappa + \kappa_1 dGAP_h + \kappa_2 d\tau_h + \kappa_3 \tilde{\tau}_{ah} + \kappa_4 1\left\{EX_{fh\_G7}^{2000} > 0\right\} \\ + \kappa_5 1\left\{EX_{fh\_ROW}^{2000} > 0\right\} + \kappa_6 1\left\{EX_{f\_US}^{2000} > 0\right\} + \kappa_{HS2} + \kappa_f + \xi_{fh} \tag{13}$$

where the dependent variable, $\log EX_{fh}^{t}$, is the log export value for product h exported to the U.S. in year t by firm f. The main regressors are the uncertainty reduction, the applied tariff reduction and the applied tariff averaged across 2000 and 2002. The indicator variables, $1\left\{EX_{fh\_G7}^{2000} > 0\right\}$ and $1\left\{EX_{fh\_ROW}^{2000} > 0\right\}$, indicate whether firm f exported product h in year 2000 to non-US G7 countries or to non-G7 countries, respectively. The indicator variable, $1\left\{EX_{f\_US}^{2000} > 0\right\}$, takes a value of one if firm f exported products to the U.S. in 2000, other than good h. Since our regressors, including the measure of uncertainty reduction, are defined at the HS 6-digit level, we control for differences in industry trends through the inclusion of HS 2-digit fixed effects.

Notice that our dependent variable is firm*product specific and around 60 percent of firms exported more than one HS 6-digit products to the U.S. in any given year.[24] Due to the large share of export activity attributable to multi-product firms we can include firm fixed effects in the regression. However, including firm fixed effects forces us to drop any firms that export a single

[24] For new entrants, about 40% of firms export one HS 6-digit product line, 18% export two, 10% export three and the remaining 32% export more than three.

product. Thus, since we also want to examine responses for the full sample, including single-product firms, we also run regression specifications that have coarse controls, but no firm fixed effects.

Our results are reported in Table 10. The first three columns study new entrants who appeared by 2002. In column 1, firm fixed effects are included. column 2 excludes firm fixed effects to expand the sample to the universe of firms, including the single-product exporting firms. column 3 also excludes firm fixed effects but adds the indicator variable, $1\left\{EX^{2000}_{f\_US} > 0\right\}$, which allows us to test whether firm responses were influenced by the firms' previous experience in exporting other goods to the US. Regardless of specification, the results in columns 1 through 3 show that, the product-level value of products exported by new entrants did not have a positive correlation with uncertainty reduction. As similar result is noted in columns 4 through 9 if we study the new entrants who emerged between 2000 and 2004 or 2006. Apparently, the new entrant margin changes that we observed in the aggregate regressions did not emerge as a consequence of firms benefiting from the largest uncertainy reductions deciding to provide the largest new export transactions.[25] Instead, the aggregate correlation between the aggregate export value offered by new entrants and product-level uncertainty reduction may be caused by changes in the number of new entrants. A conjecture that we will confirm soon.

We also run similar regressions for the exiter margin. For our sample of exiters, the dependent variable in Equation (13) is replaced with the log U.S. export value for product h exported in 2000 by all firms f who subsequently exited. In contrast with the new entrant margin, our regression specification no longer includes the indicator variable, $1\left\{EX^{2000}_{f\_US} > 0\right\}$, since by definition exiters all exported to the U.S. in 2000. The regression results for exiters are reported in Table 11. Columns 1 and 2 are for exiters who exited by 2002, columns 3 and 4 for exiters who exited by 2004 and the last two columns for exiters who exited by 2006. For each year, the first regression includes firm fixed effects so that only multi-product firms are included in the regression while the second regression excludes firm fixed effects so we can include single-product firms in our sample as well.[26] Regardless of time frame, each regression shows that the log value of exports by exiter firms was smaller in product-categories that had larger reductions in trade policy uncertainty. Thus, it again appears that the aggregate changes in product-level exports were driven by changes in the number of active firms, rather than differences in transaction values.

To evaluate the importance of changes due to the number of firms operating on each of the

[25] Since our earlier regressions demonstrated that new exporter prices were lower in the cases of larger uncertainty reduction, the responses on the price margin may explain the absence of an uncertainty related response on the value dimension.

[26] In our sample of exiters, roughly 41% of firms dropped one product, 18% dropped two, 10% dropped three and the remaining 31% dropped more than three products.

response margins, we regress product level measures of the log number of new exporters, adders or exiters for each product and run a regression equation based on Equation (10) which includes regressors for changes in trade policy, as well as measures reflecting the fixed costs of export.

The estimates reported in Table 12 uniformly show that the intensity of new entrant activity, whether due to the activities of new exporters (columns 1-3) or adders (columns 4-6), was greatest for products which experienced larger reductions in trade uncertainty. These results, in combination with the results from Tables 10 and 11, show that the influence of uncertainty reduction on overall product export volume was due to firm responses on the extensive margin. In other words, uncertainty reduction affected the growth of new trade by afffecting the number of active exporting firms, rather than changing individual firm export transaction values. Thus, our empirical results confirm our model prediction that uncertainty will not affect firms' export values, conditional on the firms' decisions regarding export market participation.

4.3.2 Responses by Firm Ownership

Since our market share decomposition highlighted dramatic differences by firm ownership, we are interested in learning whether firm extensive margin responses to uncertainty reduction differed according to the form of firm ownership. To analyze this question, we form product level counts for each of our response margins (incumbents, new exporters, adders and exiters) by firm ownership and then estimate a slightly modified version of Equation (10). In our new specification, we use the log firm number for each margin by ownership type as the dependent variable, and we add terms interacting firm ownership type and the uncertainty reduction as regressors. In addition, we include firm ownership dummies along with the industry fixed effects in the regression.[27]

The results in Table 13 reveal notable differences in the reactions to uncertainty reduction by ownership type. For example, on the new exporter margin, shown in column 3 of Table 13, the coefficients on uncertainty reduction interacted with indicator variables for FIE and domestic private firms are positive and highly significant. This suggests that uncertainty reduction caused entry on the new exporter margin, and that this effect was stronger for domestic private firms and FIEs than it was for SOEs. However, we find this response difference only for firm export counts in 2006 and not for the earlier years 2002 and 2004.

We also find strong and persistent response differences by firm ownership on the activity counts which represent the deicisions of adders and exiters. On the adder margin, as shown in columns 4 to 6 of Table 13, we observe that the responses of domestic private firms and FIEs were smaller

[27] In these regressions, SOEs are the base group.

than those of SOEs, since the coefficients on uncertainty reduction interacted with domestic private firm dummy and FIE dummy are negative and highly significant. On the exit margin, columns 7 to 9 of Table 13 show that while uncertainty reduction spurred exits by all firms, the exit sensitivity to uncertainty reduction was most pronounced for SOE firms.

Our results confirming differences in extensive margin responses to uncertainty reduction by ownership type helps explain the aggregate shifts we noted in Table 5. Compared with SOEs, FIEs and domestic private firms responded more to uncertainty reductions along the new exporter margin. In contrast, SOEs responded more vigorously on the adder and exiter margin than did FIEs or domestic private firms. Overall, these results support the observation that domestic firms and FIEs gained trade share through their activity as new exporters, while SOEs made small market share additions through their activity as adders while they lost a more substantial market shares driven by exit from export.

4.4 Robustness Checks

In this section we run a number of robustness checks to assess the strength of our results.

4.4.1 Non-linear Measures of Uncertainty Reduction

Motivated by the arguments and issues raised in Lileeva and Trefler (2010), we examine whether firm responses to uncertainty reduction are non-linear, and whether the changes in the functional form of the uncertainty measure will cause us to revise our understanding of effects of uncertainy reduction on firm export decisions. To do so, the actual measures of uncertainty reductions are replaced with a set of categorical variables (Duncert1 to Duncert4 which were introduced in Section 3) which assign firms to four groups, depending on the magnitude of uncertainty reduction experienced by each group. Since the dummy variables running from Duncert1 to Duncert4 are ordered from the group with the least uncertainty reduction, to those with the most trade policy uncertainty reduction, we predict that the coefficients on Duncert4 should be the largest, while the coefficients on the dummies, Duncert3 and Duncert2, should be progressively smaller. Indeed, all regressions in Table 14a match this hypothesis, as the results show that firm export participation was most changed for the products that benefited from the largest uncertainty reductions. More important, the ascending responsiveness related to the increase in uncertainty reductions was apparent on each of the extensive margins.

To further test for the relevance of non-linearity in firm responses to uncertainty reduction, we estimate another regression specification that includes our original uncertainty reduction measure and its squared term. As shown in Table 14b, the coefficients on uncertainty reduction are positive, while the coefficient on its squared term are almost all negative and significant. Thus it appears that the effects of uncertainty reduction are increasing but concave in the level of uncertainty reduction.

4.4.2 Special Product Categories: High-tech and MFA Quota Products

Amiti and Freund (2010) suggests that between 2000 and 2006 Chinese exports shifted substantially away from low-tech products towards high-tech products. Further, Khandelwal, Schott and Wei (2013) shows how MFA quota removal and related institutional changes in China caused China's textile and apparel exports to grow at a higher pace. Thus, one might be concerned that our results are driven by changes in the rapidly expanding sectors, such as the high-tech machinery and instrument sector and previously quota-restricted textile and apparel sector. To check for the validity of this concern, we run the regressions for all sectors excluding any exports from these rapidly growing groups. However, the results, shown in Table 15, based on this subsample indicate that even in China's slower growth export sectors, differences in firm responses on each of the margins (new exporter, adder and exiter margins) are similar and consistent with the full sample results.

5 Conclusion

Our paper uses firm-level Chinese customs data to test how trade policy uncertainty reduction following from China's WTO accession contributed to firm export activities. To inform our analysis, we develop a heterogeneous firm model which incorporates firm responses to changes in trade policy uncertainty. The model allows us to form predictions about the relationship between new exports, uncertainty reduction, export fixed costs and industry productivity dispersion.

We use the dramatic change in worst-case tariffs before and after China's WTO accession to capture product level variation in trade policy uncertainty reduction. While we find that larger uncertainty reduction was associated with stronger firm responses on the entry and exit margin we do not find a similar positive effect on the intensive margin. We also find that the benefits of uncertainty reduction were stronger for private Chinese firms and foreign-invested firms, which suggests that uncertainty reduction helped shape the aggregate reallocation of China's exports away from SOEs towards domestic private firms and FIEs. When we compare the price and quality of exported products for new exporters versus exiters, we find strong evidence that the new exporters charged lower prices even though they exported higher quality goods than did exiting exporters. More important, the degree to which new exporter prices were lower than those of exiters was larger for products that experienced larger uncertainty reduction.

These findings suggest that uncertainty reduction contributed to the aggregate reallocation of Chinese exports. Uncertainty reduction increased churning in firm entry and exit, induced shifts from SOEs to domestic private firms and FIEs, and caused the entry of high-productivity low-price new exporters at the expense of low-productivity high-price exiting exporters. Overall, trade policy uncertainty reduction for Chinese exporters may have intensified the competitive pressures related to China's U.S. exports, and may help explain the potency of the effect of China's increased exports to the U.S. on the US manufacturing sector performance and labor market.

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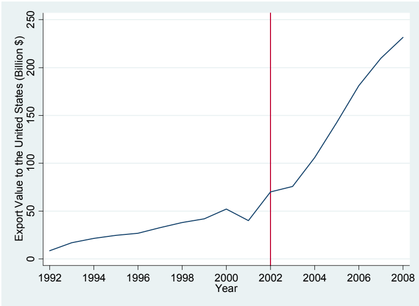
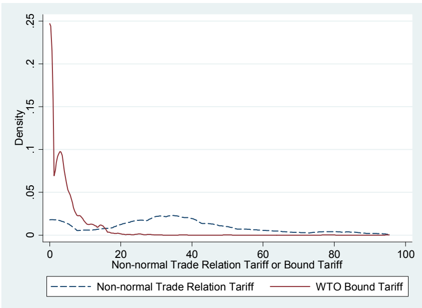
Figure 1: China's Exports to the United States, 1992-2008



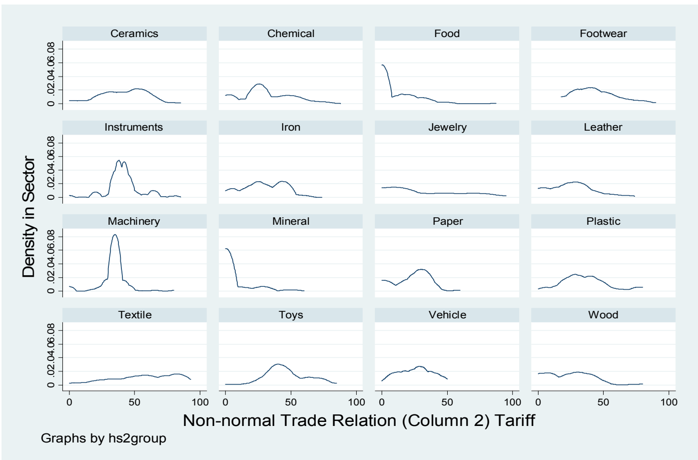
Data source: Chinese customs data at product level obtained from UC Davis CID.

Figure 2: Distribution of Worst-case Tariffs across Tariff Lines before and after WTO Accession



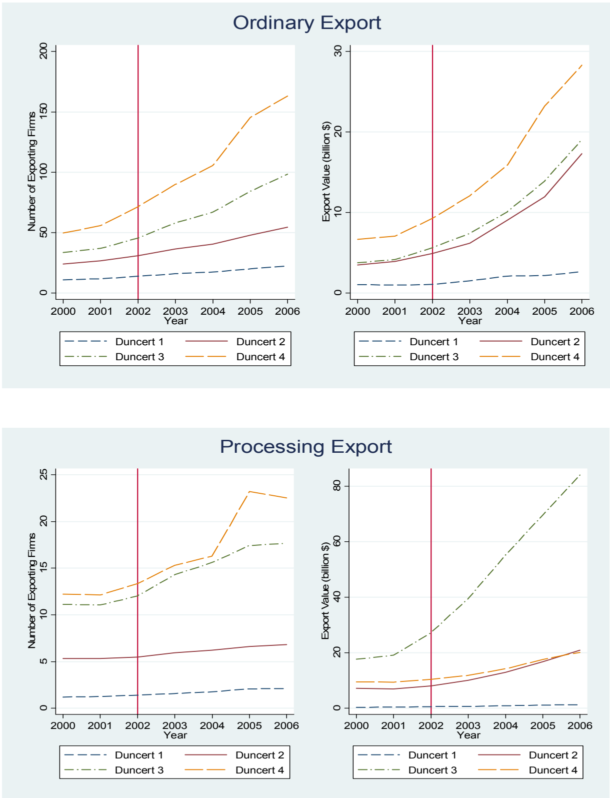
Note: This figure shows the kernel density of non-normal trade relation tariffs (the worst-case tariff for China before its WTO accession) and the bound tariffs (the worst-case tariff after China's WTO accession) imposed by the United States across HS 6-digit tariff lines.

Figure 3: Distribution of Worst-case U.S. Tariffs before WTO Accession, by Sector



Note: Figures show the kernel density of non-normal trade relation tariffs across HS 6 digit product lines by sectors. Sectors are defined as the sections in the HS classification, see Appendix Table 2. Some sectors, such as art products and ammunition, are dropped due to small export values.

Figure 4: Uncertainty Reduction and Export Growth: Export Firm Numbers and Export Value



Notes: Each figure is based on China's exports to the U.S. The number of exporting firms is the number of exporting firms averaged across HS 6-digit products within each group. The export value is the total export value for products in each group. Products were assigned to the four groups, based on the degree of trade policy uncertainty reduction for China's U.S. exports following China's WTO accession. At the one end of the spectrum, products in Duncert1 experienced zero uncertainty reduction. In contrast, products in the group Duncert4 benefited from the largest reduction in U.S. trade policy uncertainty. Processing export involves the assembly of products that include imported intermediate inputs which are exempt from Chinese tariff charges, since all final outputs are exported. Ordinary exports are the exports of China-based firms that do not utilize the processing trade program.

TABLE 1: Tariff Measures' Summary Statistics

Variable	Obs. #	Mean	Std. Dev.	Min	Max
dGAP (percentage point)	4721	29.99	20.37	-56.56	145.5
Dat (percentage point)	4721	0.16	7.10	-262.5	35
Avt (%)	4721	3.65	7.39	0	218.75

Notes: Tariffs are measured at the HS 6-digit product level. The variable "Avt" measures U.S. tariff rates averaged over the years 2000 and 2002. The definition for the variable measuring changes in applied tariffs, or "Dat", is Dat = the year 2000 (before WTO accession) applied tariff - the year 2002 (after WTO accession) applied tariff. Positive values reflecting the reductions in applied tariffs. We define "GAP" as the difference between the worst-case tariff and the applied tariff. The reduction in uncertainty "dGAP" is then defined as dGAP=(GAP_2000, before WTO accession)-(GAP_2002, after WTO accession). Positive values of the variable dGAP imply that tariff uncertainty fell after China's WTO accession.

Table 2: Trade Policy and New Export Value by Product: Main Specification

Dependent	Log export value in year t (for new exporter and adders in year t)					
		T=2006		T=2002	T=2004	T=2006
	(1)	(2)	(3)	(4)	(5)	(6)
dGAP	0.067***	0.059***	0.051***	0.025***	0.030***	0.032***
	(0.009)	(0.008)	(0.007)	(0.006)	(0.006)	(0.007)
dat	-0.076	-0.076	-0.060	0.053	0.033	0.083**
	(0.077)	(0.076)	(0.070)	(0.034)	(0.036)	(0.034)
avt	-0.036	-0.026	-0.007	0.032	0.018	0.062**
	(0.070)	(0.063)	(0.058)	(0.030)	(0.029)	(0.031)
fixed_ass		-3.020***	-3.013***	-1.788***	-1.662***	-1.491**
		(0.608)	(0.610)	(0.591)	(0.500)	(0.618)
imshare			-2.573***	-1.370***	-1.356**	-1.780***
			(0.462)	(0.414)	(0.545)	(0.477)
Constant	10.498***	12.110***	13.597***	12.158***	12.785***	13.195***
	(0.439)	(0.533)	(0.564)	(0.350)	(0.371)	(0.442)
HS 2d FE	No	No	No	Yes	Yes	Yes
N	3976	3600	3474	3254	3350	3474
R^2	0.044	0.054	0.066	0.203	0.204	0.205
adj. R^2	0.043	0.053	0.064	0.178	0.180	0.182
Log lik.	-1.26e+04	-1.12e+04	-1.06e+04	-9130.903	-9672.729	-1.03e+04
F	19.076	25.676	20.579	6.280	8.255	8.834

Note: Standard errors are clustered at HS 2digit level.

Table 3: Trade Policy and Aggregate Export Volume by Product

Dependent	Change of log export value (t-2000)					
	Product Aggregate			Net Entry (New exporter + adder - exiter)		
	t=2002	t=2004	t=2006	t=2002	t=2004	t=2006
	(1)	(2)	(3)	(4)	(5)	(6)
dGAP	0.002	0.002	-0.001	0.000	0.001	-0.000
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)
dat	-0.001	-0.003	0.027*	0.002	-0.008	0.021
	(0.007)	(0.013)	(0.014)	(0.014)	(0.018)	(0.019)
avt	-0.005	-0.013	0.018	-0.004	-0.021	0.009
	(0.006)	(0.010)	(0.013)	(0.012)	(0.014)	(0.016)
fixed_ass	-0.253*	-0.489**	-0.158	-0.009	-0.511*	-0.122
	(0.139)	(0.188)	(0.187)	(0.276)	(0.276)	(0.232)
imshare	-0.303***	-0.669***	-0.887***	-0.441**	-0.946***	-1.272***
	(0.096)	(0.118)	(0.148)	(0.190)	(0.168)	(0.173)
Constant	0.514***	1.278***	1.879***	0.890***	1.769***	2.329***
	(0.074)	(0.103)	(0.125)	(0.150)	(0.154)	(0.160)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3254	3350	3474	3254	3350	3474
R^2	0.056	0.068	0.082	0.043	0.061	0.078
adj. R^2	0.026	0.040	0.056	0.013	0.033	0.051
Log lik.	-6093.013	-6699.820	-7250.481	-7740.964	-7577.172	-7844.626
F	3.284	9.585	8.976	1.149	8.388	11.650

Note: Standard errors are clustered at HS 2digit level.

Table 4: Product level Changes in Export Value: Incumbents and Exiters

Dependent	Change of log export value (t-2000) Incumbents			Log export value (in year 2000) Exiters (exit by year t)		
	t=2002	t=2004	t=2006	t=2002	t=2004	t=2006
	(1)	(2)	(3)	(4)	(5)	(6)
dGAP	-0.001	-0.001	-0.001	0.025***	0.029***	0.032***
	(0.001)	(0.002)	(0.002)	(0.006)	(0.006)	(0.008)
dat	0.004	-0.001	0.022*	0.052	0.040	0.062
	(0.006)	(0.010)	(0.012)	(0.038)	(0.045)	(0.045)
avt	0.003	-0.010	0.015	0.037	0.040	0.053
	(0.006)	(0.007)	(0.011)	(0.032)	(0.035)	(0.036)
fixed_ass	-0.248	-0.137	-0.242	-1.779***	-1.152*	-1.369**
	(0.152)	(0.162)	(0.166)	(0.614)	(0.589)	(0.616)
imshare	-0.059	-0.338***	-0.348***	-0.929**	-0.410	-0.508
	(0.078)	(0.115)	(0.128)	(0.429)	(0.552)	(0.479)
Constant	0.159**	0.433***	0.458***	11.267***	11.016***	10.865***
	(0.075)	(0.122)	(0.094)	(0.380)	(0.426)	(0.460)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3254	3350	3474	3254	3350	3474
R^2	0.031	0.044	0.041	0.194	0.192	0.209
adj. R^2	0.001	0.015	0.013	0.168	0.168	0.186
Log lik.	-5002.451	-5567.818	-6051.822	-9176.733	-9605.817	-1.01e+04
F	0.635	2.036	2.831	5.516	5.289	5.608

Note: Standard errors are clustered at HS 2digit level.

Table 5: Market Share Changes 2000-2006, Overall and by Firm Ownership

Margin	All	SOE	FIE	Dom
	(1)	(2)	(3)	(4)
(1) Incumbents	-10.484***	-5.484***	-4.663***	-0.336***
Net entry				
(2) Exiters	-75.995***	-52.107***	-19.761***	-4.127***
(3) New Exporters	67.144***	9.906***	26.836***	30.402***
(4) Adders	19.335***	11.468***	5.989***	1.879***
(5) Total Net Entry	10.484***	-30.734***	13.064***	28.154***
(6) Total	0	-36.218***	8.401***	27.817***

Note: This table reports the average market share changes for different margins for the period from 2000 to 2006. The data are averaged across HS 6-digit products, according to the margins of adjustment and the form of firm ownership. In each column, the contributions due to exiters, new exporters, and adders (displayed in rows 2 to 4) sum up to the values reported in row 5 (total net entry). Similarly, the market share changes due to incumbents (row 1) can be summed with the market share changes caused by total net entry (row 5) to compute the value displayed in row 6. Since the data are also disaggregated to show changes by ownership (SOE, FIE and Domestic), the values in the associated rows for columns 2 to 4, can be summed to arrive at the overall change by margin, displayed in column 1. Results are generated by regressing the changes in market shares for HS 6-digit products on a constant. Estimated coefficients are triple-stared if they are statistically significant at 1% level.

Table 6: Product Level New Export Value: New Exporters versus Adders

Dependent	Log export value (year t) New exporters			Log export value (year t) Adders		
	t=2002	t=2004	t=2006	t=2002	t=2004	t=2006
	(1)	(2)	(3)	(4)	(5)	(6)
dGAP	0.032***	0.038***	0.035***	0.029***	0.033***	0.033***
	(0.007)	(0.006)	(0.007)	(0.007)	(0.006)	(0.008)
dat	-0.000	0.018	0.067**	0.115***	0.112**	0.142***
	(0.042)	(0.041)	(0.032)	(0.040)	(0.043)	(0.037)
avt	0.009	0.014	0.058*	0.032	0.036	0.060*
	(0.036)	(0.031)	(0.030)	(0.028)	(0.032)	(0.032)
fixed_ass	-2.403***	-1.737***	-1.586**	-1.937***	-1.881***	-2.008***
	(0.668)	(0.572)	(0.657)	(0.589)	(0.532)	(0.727)
imshare	-1.703***	-1.529***	-2.013***	-1.185***	-1.015*	-1.516***
	(0.518)	(0.563)	(0.451)	(0.382)	(0.540)	(0.530)
Constant	10.597***	11.932***	12.833***	10.832***	10.561***	10.608***
	(0.408)	(0.376)	(0.456)	(0.350)	(0.358)	(0.441)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes
N	3254	3350	3474	3254	3350	3474
R^2	0.199	0.210	0.210	0.206	0.216	0.225
adj. R^2	0.174	0.186	0.187	0.181	0.192	0.202
Log lik.	-9752.815	-9862.041	-1.04e+04	-9324.797	-9922.711	-1.05e+04
F	9.263	10.750	12.706	8.330	8.926	7.974

Note: Standard errors are clustered at HS 2digit level.

Table 7: Product Aggregate Price Changes

Dependent	Percentage change of aggregate unit price (from year 2000 to year t) for HS 6-digit products					
	T=2002	T=2002	T=2004	T=2004	T=2006	T=2006
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.291***	0.422***	0.485***	0.712***	0.720***	0.967***
	(0.049)	(0.078)	(0.0603)	(0.080)	(0.098)	(0.130)
dGAP		-0.004***		-0.007***		-0.007***
		(0.001)		(0.002)		(0.002)
dat		0.002		-0.003		-0.009
		(0.002)		(0.006)		(0.011)
N	3244	3244	3255	3255	3290	3290
R2	0.000	0.002	0.000	0.005	0.000	0.005
adj. R2	0.000	0.002	0.000	0.005	0.000	0.004

Note: Standard errors are clustered at HS 2digit level.

Table 8: Price Difference between New Exporters and Exiters

Dependent	Ln (Unit price) in year t (for new exporters) or in year 2000 (for exiters)					
	T=2002		T=2004		T=2006	
	(1)	(2)	(3)	(4)	(5)	(6)
Newdummy	-0.107***	0.114***	0.042***	0.346***	0.180***	0.584***
	(0.006)	(0.016)	(0.005)	(0.013)	(0.004)	(0.012)
New*dGAP		-0.002***		-0.003***		-0.005***
		(0.000)		(0.000)		(0.000)
New*dat		0.004		-0.004		-0.017***
		(0.004)		(0.004)		(0.004)
Constant	0.946***	0.911***	0.972***	0.943***	1.012***	0.994***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
HS 6-digit FE	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	No	Yes	No	Yes	No	Yes
N	149561	149561	274347	274347	448174	448174
R2	0.572	0.583	0.565	0.576	0.551	0.563
adj. R2	0.561	0.573	0.559	0.570	0.547	0.559
Log lik.	-2.38e+05	-2.36e+05	-4.44e+05	-4.41e+05	-7.35e+05	-7.29e+05
F	271.740	528.810	68.491	780.646	1611.411	1494.362

Table 9: Quality Difference between New Exporters and Exiters

Dependent	Quality in year t (for new exporters) or in year 2000 (for exiters)					
	T=2002		T=2004		T=2006	
	(1)	(2)	(3)	(4)	(5)	(6)
Newdummy	0.261***	0.369***	0.161***	0.383***	0.087***	0.432***
	(0.012)	(0.030)	(0.009)	(0.024)	(0.008)	(0.022)
New*dGAP		-0.000		-0.000		0.000
		(0.001)		(0.001)		(0.000)
New*dat		-0.001		-0.008		-0.014**
		(0.009)		(0.007)		(0.007)
Constant	-0.569***	-0.640***	-0.348***	-0.437***	-0.232***	-0.315***
	(0.008)	(0.009)	(0.007)	(0.008)	(0.007)	(0.008)
HS 6digit FE	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	No	Yes	No	Yes	No	Yes
N	147640	147640	271508	271508	443497	443497
R2	0.024	0.033	0.009	0.027	0.004	0.028
adj. R2	0.005	0.015	-0.002	0.017	-0.003	0.022
Log lik.	-3.22e+05	-3.22e+05	-6.08e+05	-6.05e+05	-9.99e+05	-9.94e+05
F	496.831	240.543	290.948	589.570	108.331	1234.143

Table 10: Firm*Product Regressions: Export Value of New Entrants and Uncertainty Reduction

Dependent	Log export value of new entrants (new exporters and adders) in year t								
	T=2002			T=2004			T=2006		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dGAP	-0.000	-0.002***	-0.003***	-0.000	-0.003***	-0.003***	-0.002***	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
dat	0.008	0.009*	0.009*	-0.005	-0.006	-0.005	0.008**	0.011***	0.010***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
avt	0.011***	0.017***	0.016***	0.009***	0.011***	0.011***	0.016***	0.019***	0.019***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)
G72000	0.362***	0.330***	0.389***	0.440***	0.402***	0.448***	0.457***	0.497***	0.454***
	(0.029)	(0.025)	(0.025)	(0.033)	(0.029)	(0.029)	(0.036)	(0.031)	(0.031)
ROW2000	0.297***	0.151***	0.248***	0.391***	0.345***	0.418***	0.406***	0.564***	0.502***
	(0.025)	(0.024)	(0.023)	(0.028)	(0.028)	(0.027)	(0.031)	(0.029)	(0.028)
USexpo2000			-0.324***			-0.166***			0.128***
			(0.027)			(0.025)			(0.021)
Constant	6.953***	8.954***	9.117***	8.718***	9.206***	9.253***	10.592***	9.376***	9.355***
	(0.913)	(0.027)	(0.031)	(0.516)	(0.023)	(0.024)	(0.657)	(0.019)	(0.019)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	No	No	Yes	No	No	Yes	No	No
N	146199	146199	146199	249002	249002	249002	400691	400691	400691
R2	0.395	0.079	0.083	0.420	0.080	0.080	0.443	0.082	0.082
adj. R2	0.265	0.079	0.083	0.291	0.079	0.080	0.321	0.081	0.082
Log lik.	-3.01e+05	-3.32e+05	-3.32e+05	-5.25e+05	-5.82e+05	-5.82e+05	-8.39e+05	-9.39e+05	-9.39e+05
F	156.575	84.239	122.215	61.168	130.315	144.345	79.995	281.828	234.215

Note: Standard errors are clustered at firm level.

Table 11: Firm*Product Regressions: Export Value of Exiters and Uncertainty Reduction

Dependent	Log export value of exiters who exited by year t					
Exiting year	T=2002		T=2004		T=2006	
	(1)	(2)	(3)	(4)	(5)	(6)
dGAP	-0.002**	-0.004***	-0.002***	-0.004***	-0.002***	-0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
dat	-0.004	-0.001	-0.003	-0.005	-0.002	-0.010*
	(0.008)	(0.005)	(0.007)	(0.005)	(0.006)	(0.006)
avt	0.006**	0.007***	0.006***	0.006**	0.006***	0.004*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
G7before	0.847***	0.902***	0.951***	1.011***	1.004***	1.053***
	(0.026)	(0.023)	(0.023)	(0.022)	(0.021)	(0.020)
ROWbefore	0.619***	0.533***	0.709***	0.569***	0.755***	0.579***
	(0.023)	(0.022)	(0.021)	(0.021)	(0.021)	(0.020)
Constant	6.481***	8.576***	6.882***	8.738***	6.874***	8.828***
	(1.572)	(0.033)	(1.254)	(0.031)	(1.251)	(0.029)
Firm FE	Yes	No	Yes	No	Yes	No
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes
N	81280	81280	102335	102335	117195	117195
R2	0.443	0.148	0.433	0.158	0.428	0.162
adj. R2	0.308	0.147	0.310	0.157	0.311	0.161
Log lik.	-1.64e+05	-1.82e+05	-2.10e+05	-2.31e+05	-2.43e+05	-2.65e+05
F	.	545.086	.	765.444	.	980.895

Note: Standard errors are clustered at firm level.

TABLE 12: Firm Counts and Uncertainty Reduction

Dependent	Log firm number (year t) new exporters			Log firm number (year t) adders			Log firm number at year 2000 Exiters (exited by year t)		
	t=2002	t=2004	t=2006	t=2002	t=2004	t=2006	t=2002	t=2004	t=2006
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dGAP	0.014***	0.018***	0.018***	0.014***	0.015***	0.014***	0.013***	0.014***	0.015***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
dat	0.005	0.010	0.026*	0.013	0.014	0.026**	0.009	0.008	0.008
	(0.017)	(0.018)	(0.015)	(0.016)	(0.014)	(0.012)	(0.017)	(0.019)	(0.018)
avt	-0.000	-0.001	0.017	0.001	0.003	0.016*	0.005	0.007	0.006
	(0.011)	(0.012)	(0.011)	(0.010)	(0.010)	(0.009)	(0.012)	(0.013)	(0.012)
fixed_ass	-0.818***	-0.872***	-0.944***	-0.811***	-0.771***	-0.800***	-0.755***	-0.658***	-0.810***
	(0.155)	(0.160)	(0.170)	(0.143)	(0.128)	(0.154)	(0.148)	(0.148)	(0.156)
imshare	-0.190	-0.181	-0.391**	-0.113	-0.064	-0.160	-0.026	0.095	0.018
	(0.128)	(0.161)	(0.152)	(0.115)	(0.143)	(0.110)	(0.137)	(0.155)	(0.126)
Constant	1.535***	2.137***	2.679***	1.796***	1.635***	1.549***	1.868***	1.809***	1.849***
	(0.134)	(0.136)	(0.152)	(0.127)	(0.124)	(0.128)	(0.125)	(0.128)	(0.127)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3254	3350	3474	3254	3350	3474	3254	3350	3474
R^2	0.301	0.322	0.342	0.327	0.336	0.354	0.309	0.308	0.321
adj. R^2	0.279	0.302	0.323	0.306	0.316	0.335	0.287	0.287	0.301
Log lik.	-5383.72	-5941.62	-6381.91	-5349.44	-5516.71	-5641.60	-5423.14	-5703.70	-5966.79
F	12.716	13.781	15.261	14.061	13.071	16.026	9.986	8.425	11.046

Note: Standard errors are clustered at HS 2 digit level.

Table 13: Uncertainty Reduction and Firm Counts: Estimates by Firm Ownership and Margin

dependent	Log firm number (year t) new exporters			Log firm number (year t) adders			Log firm number at year 2000 Exiters (exited by year t)		
	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dGAP	0.010***	0.013***	0.010***	0.015***	0.016***	0.016***	0.015***	0.015***	0.016***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
FIE*dGAP	-0.001	-0.000	0.006***	-0.009***	-0.009***	-0.010***	-0.008***	-0.009***	-0.009***
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Dom*dGAP	-0.000	0.001	0.007***	-0.008***	-0.009***	-0.011***	-0.010***	-0.010***	-0.011***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
FIE	-0.073	0.131	0.319***	-0.735***	-0.575***	-0.396***	0.002	0.002	0.002
	(0.066)	(0.097)	(0.104)	(0.075)	(0.076)	(0.073)	(0.012)	(0.012)	(0.013)
Dom	0.221***	0.770***	1.120***	-1.000***	-0.837***	-0.687***	0.002	0.002	0.002
	(0.066)	(0.082)	(0.090)	(0.078)	(0.075)	(0.071)	(0.008)	(0.008)	(0.008)
dat	0.003	0.005	0.016	0.004	0.006	0.013	-0.661***	-0.676***	-0.671***
	(0.014)	(0.015)	(0.014)	(0.012)	(0.011)	(0.009)	(0.081)	(0.092)	(0.094)
avt	0.003	-0.001	0.015*	0.000	0.002	0.011	-1.067***	-1.131***	-1.108***
	(0.008)	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)	(0.080)	(0.082)	(0.088)
fixed_ass	-0.686***	-0.733***	-0.766***	-0.657***	-0.646***	-0.556***	-0.631***	-0.619***	-0.598***
	(0.118)	(0.131)	(0.141)	(0.107)	(0.099)	(0.099)	(0.111)	(0.114)	(0.112)
imshare	0.015	-0.081	-0.240**	0.034	-0.002	-0.030	0.071	0.090	0.056
	(0.101)	(0.104)	(0.102)	(0.088)	(0.096)	(0.078)	(0.098)	(0.093)	(0.084)
Constant	0.834***	1.092***	1.271***	1.464***	1.321***	1.133***	1.520***	1.559***	1.539***
	(0.118)	(0.126)	(0.127)	(0.120)	(0.113)	(0.108)	(0.117)	(0.115)	(0.117)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	8562	9191	9816	8562	9191	9816	8562	9191	9816
R^2	0.257	0.320	0.396	0.392	0.378	0.394	0.381	0.396	0.405
adj. R^2	0.248	0.313	0.389	0.384	0.371	0.387	0.373	0.389	0.398
Log lik.	-1.2e+04	-1.4e+04	-1.6e+04	-1.2e+04	-1.3e+04	-1.3e+04	-1.2e+04	-1.3e+04	-1.4e+04
F	27.135	71.127	139.388	164.242	143.056	227.308	157.915	149.495	132.816

Note: Standard errors are clustered at HS 2 digit level.

Table 14a: Uncertainty Reduction and Firm Counts: Categorical Uncertainty Measures

Dependent	Log firm number (year t) new exporters			Log firm number (year t) adders			Log firm number (year 2000) Exiter (exited by year t)		
	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
duncert2	0.681***	0.882***	0.812***	0.660***	0.772***	0.647***	0.846***	0.865***	0.857***
	(0.256)	(0.235)	(0.217)	(0.205)	(0.195)	(0.219)	(0.215)	(0.205)	(0.221)
duncert3	0.924***	1.149***	1.123***	0.852***	1.023***	0.875***	0.918***	0.967***	0.993***
	(0.233)	(0.210)	(0.197)	(0.174)	(0.180)	(0.187)	(0.187)	(0.172)	(0.184)
duncert4	1.077***	1.333***	1.248***	1.041***	1.154***	0.935***	1.093***	1.162***	1.191***
	(0.244)	(0.233)	(0.220)	(0.199)	(0.195)	(0.206)	(0.205)	(0.197)	(0.209)
dat	-0.041*	-0.038	-0.028	-0.027	-0.022	-0.005	-0.037	-0.046*	-0.043*
	(0.022)	(0.025)	(0.018)	(0.023)	(0.018)	(0.018)	(0.024)	(0.023)	(0.024)
avt	0.008	0.006	0.028**	0.004	0.006	0.019**	0.008	0.013	0.011
	(0.012)	(0.013)	(0.011)	(0.011)	(0.011)	(0.009)	(0.012)	(0.013)	(0.013)
fixed_ass	-0.208	0.185	0.446	-0.012	0.200	0.360	0.034	0.217	0.221
	(0.384)	(0.411)	(0.415)	(0.351)	(0.325)	(0.306)	(0.417)	(0.434)	(0.455)
imshare	0.016	0.143	0.032	0.090	0.220	0.079	0.214	0.339*	0.322**
	(0.194)	(0.218)	(0.186)	(0.156)	(0.167)	(0.132)	(0.176)	(0.192)	(0.161)
Constant	1.343***	1.795***	2.316***	1.654***	1.336***	1.336***	1.576***	1.503***	1.509***
	(0.235)	(0.207)	(0.191)	(0.189)	(0.178)	(0.186)	(0.208)	(0.196)	(0.212)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1727	1767	1804	1727	1767	1804	1727	1767	1804
R^2	0.342	0.378	0.406	0.379	0.401	0.419	0.370	0.380	0.385
adj. R^2	0.304	0.341	0.372	0.342	0.366	0.386	0.333	0.343	0.350
Log lik.	-2920.71	-3125.79	-3250.02	-2819.99	-2881.65	-2907.69	-2876.73	-2997.02	-3090.15
F	3.879	5.893	8.372	5.003	6.598	4.639	5.595	8.082	6.584

Table 14b: Uncertainty Reduction and Firm Counts: Tests for Non-linear Response

Dependent	Log firm number (year t) new exporters			Log firm number (year t) adders			Log firm number (year 2000) Exiter (exited by year t)		
	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dGAP	0.032***	0.037***	0.036***	0.029***	0.036***	0.030***	0.030***	0.033***	0.034***
	(0.008)	(0.009)	(0.009)	(0.007)	(0.007)	(0.008)	(0.006)	(0.007)	(0.007)
$dGAP^2/100$	-0.023**	-0.026**	-0.024**	-0.020**	-0.028***	-0.022**	-0.022***	-0.025***	-0.025***
	(0.009)	(0.010)	(0.010)	(0.008)	(0.009)	(0.009)	(0.007)	(0.007)	(0.007)
dat	-0.031	-0.026	-0.016	-0.016	-0.011	0.002	-0.028	-0.036	-0.033
	(0.021)	(0.026)	(0.017)	(0.024)	(0.019)	(0.016)	(0.025)	(0.025)	(0.026)
avt	0.007	0.005	0.026**	0.004	0.005	0.017**	0.008	0.013	0.011
	(0.012)	(0.013)	(0.011)	(0.011)	(0.011)	(0.008)	(0.013)	(0.013)	(0.013)
fixed_ass	-0.216	0.177	0.444	-0.019	0.199	0.361	0.031	0.217	0.226
	(0.380)	(0.408)	(0.411)	(0.350)	(0.319)	(0.301)	(0.419)	(0.434)	(0.454)
imshare	0.018	0.139	0.020	0.091	0.224	0.073	0.205	0.339*	0.321*
	(0.200)	(0.221)	(0.188)	(0.159)	(0.170)	(0.134)	(0.177)	(0.193)	(0.162)
Constant	1.415***	1.941***	2.434***	1.761***	1.445***	1.408***	1.757***	1.672***	1.649***
	(0.180)	(0.199)	(0.194)	(0.172)	(0.166)	(0.171)	(0.167)	(0.164)	(0.175)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1727	1767	1804	1727	1767	1804	1727	1767	1804
R^2	0.344	0.378	0.407	0.378	0.401	0.420	0.368	0.378	0.384
adj. R^2	0.305	0.342	0.374	0.342	0.366	0.388	0.332	0.343	0.350
Log lik.	-2919.1	-3124.8	-3247.8	-2820.6	-2881.5	-2905.2	-2878.6	-2998.5	-3090.2
F	5.824	6.741	9.264	6.075	7.354	5.800	7.560	9.746	8.671

Table 15: Industries Excluding Textile, Machinery and Instruments

Dependent	Log firm number (year t) new exporters			Log firm number (year t) adders			Log firm number (year 2000) Exiter (exited by year t)		
	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006	T=2002	T=2004	T=2006
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
dGAP	0.016***	0.019***	0.019***	0.017***	0.017***	0.016***	0.016***	0.018***	0.019***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
dat	0.003	0.009	0.017	0.004	0.012	0.017	-0.002	-0.004	-0.003
	(0.024)	(0.025)	(0.022)	(0.023)	(0.021)	(0.018)	(0.022)	(0.025)	(0.025)
avt	-0.005	-0.002	0.004	-0.008	0.002	0.002	-0.007	-0.006	-0.007
	(0.019)	(0.018)	(0.018)	(0.018)	(0.017)	(0.015)	(0.018)	(0.018)	(0.019)
fixed_ass	-0.70***	-0.83***	-0.93***	-0.74***	-0.74***	-0.72***	-0.72***	-0.65***	-0.806***
	(0.151)	(0.168)	(0.176)	(0.172)	(0.136)	(0.154)	(0.183)	(0.175)	(0.176)
imshare	-0.001	0.003	-0.265	-0.015	0.110	-0.025	0.061	0.222	0.076
	(0.151)	(0.194)	(0.171)	(0.156)	(0.165)	(0.127)	(0.167)	(0.190)	(0.161)
Constant	1.469***	2.086***	2.614***	1.712***	1.504***	1.395***	1.857***	1.776***	1.833***
	(0.166)	(0.167)	(0.173)	(0.151)	(0.153)	(0.144)	(0.150)	(0.153)	(0.147)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	1904	1974	2043	1904	1974	2043	1904	1974	2043
R2	0.344	0.355	0.360	0.364	0.373	0.375	0.355	0.354	0.361
adj. R2	0.315	0.328	0.334	0.336	0.346	0.350	0.327	0.327	0.336
Log lik.	-3184.98	-3537.43	-3775.52	-3149.14	-3248.63	-3299.33	-3201.33	-3383.54	-3533.97
F	8.420	8.929	11.096	8.100	9.517	12.217	6.367	5.865	8.071

Note: This table reports regression results based on the subsample excluding all products in the textile, apparel, machinery and instrument sectors.

Appendix

A.1 Dispersion measures

As noted by Helpman, Melitz and Yeaple (2004), the dispersion of intra-industry productivity levels cannot be measured directly. However, if firm productivity follows the Pareto distribution, the dispersion of firm size within a sector captures the joint effect of firm-level productivity dispersion and the elasticity of substitution. Since the size distribution of firms is observable, we can use information on the size distribution to generate measures of heterogeneity.

Following Helpman, Melitz and Yeaple (2004) (HMY), we created two measures. The first is generated by regressing the logarithm of an individual firm's rank within the firm distribution on the logarithm of the firm's export value. We expect the coefficient on log value to be negative. A larger coefficient (in absolute value) indicates that the distribution is characterized by lower dispersion and larger shape parameter k (higher dispersion implies lower k). Such products are populated with a larger number of small firms. We take the absolute value of the coefficient and call it "concentration". A higher level of "concentration" is equivalent to a higher concentration, higher shape parameter k and less dispersion in productivity distribution.

To implement HMY's technique, we began by matching firms in the manufacturing survey data and the custom data. We then ran the regression using the sample of matched manufacturing firms involved in ordinary exports to the US in year 2006. [1] Since there are many products with few exporting firms, we had to drop products that had too few exporting firms. We drop products with less than 15 exporting firms. Under this restriction, we obtained estimates for *1606* HS 6-digit products.

We also tried to measure the dispersion at a coarser level (HS 4 digit level). At this level we obtained the concentration measures for 1702 HS 6-digit products, after matching the HS 4digit measures to HS 6-digit products. The measures generated at HS 4digit level and those at HS 6-digit level have a strong correlation, around 0.7. Since the sample size is not improved much for measures at HS 4-digit level, we mainly use the measure constructed at HS 6-digit level. Note that do not attempt to use dispersion measures at the highly aggregate HS 2-digit level, since HS 2-digit fixed effects are included in all regressions to capture any underlying industry factors or trends.

We also applied a second method to measure dispersion, which computes the standard deviation of the logarithm of firm sales, by product. When we check the correlation between this measure and the measure based on the first measure of dispersion, we find that the correlation is -0.9037. For this reason, we do not expect our regression results to be influenced by our choice of dispersion measure.

We add our proxy for the productivity distribution shape parameter, k, in our baseline regression, similar to those reported in Table 2. The new results with dispersion measures are reported in Appendix Table 3. As shown in Column 6 of Appendix Table 3, the coefficient on uncertainty reduction drops in magnitude, when compared to that in Column 6 of Table 2. However, since we can only include the concentration measure for products that have sufficient numbers of exporters, the column 6 estimates in the Appendix Table 3 are based on a much smaller sample. [2] Thus, we need to test whether the drop in the uncertainty coefficient is due to the inclusion of our concentration measure, or whether the drop is due to the use of the data subsample, rather than the full data set.

We find that the coefficient on the uncertainty reduction is still positive and significant at 5% level, indicating that even after controlling concentration, uncertainty reduction still found to induce more new exports.

[1] For details about the matching, see Feng, Li and Swenson (2012).

[2] The sample size drops, since our measure of concentration is generated by regressing firm rank (log) on firm export value (log). This forces us to drop any products that had too few firms. Since we dropped products that have only less than 15 exporters we obtained the estimates for only 1541 products, which is roughly half of the full sample.

However, the coefficient is about only a half in magnitude compared to the coefficient in Column 6 in Table 2.

In order to check whether the smaller magnitude is due to the inclusion of concentration variable or the sample difference, we compare the results of the same specification but restricting the sample to products with non-missing concentration measures. For comparison, in Appendix Table 3, Columns 1-3 use a limited subsample that have measures of concentration and report the results of applying the estimating equation, exclusive of the concentration measure, to the successive time intervals of 2000 to 2002, 2004, and 2006. Columns 4-6 present regressions for the same set of products, but add the concentration variables to the specification. This approach allows us to estimate the regression for products with non-missing concentration measures. For each of the time frames, the estimated coefficient on the uncertainty reduction variables are the same, whether the concentration measure is included in the specification or not. Thus, direct comparison of the results shows that the drop in the estimated coefficient on the uncertainty term is due to the choice of subsample, rather than the inclusion of the concentration measure. For this reason, for the main results reported in the paper, we do not include the concentration measure directly since we prefer to maintain the full sample of products and firms in our analysis.[3]

A.2 Adders vs Exiters

In this section, we compare prices and qualities of adders against those of exiters. The estimation equation and approach are similar to those in text when we compare new exporters and exiters.

Appendix Table 5 reports the results comparing adders price with exiters price. As shown by Columns 1, unlike new exporters do in year 2002, adders on average charge higher prices in 2002 than exiters price in 2000. For years 2004 and 2006, we also find adders charge higher prices in these years than the exiters price in 2000. More importantly, for year 2002 and 2004 (columns 2 and 4), we do not find that the price difference between adders and exiters is significantly correlated with uncertainty reduction, though we find significant correlation in the regression for year 2006.

Appendix Table 6 reports the quality results comparing adders against exiters. As shown by Columns 1, 3 and 5, we find that adders on average have higher quality than exiters in all years. Moreover, for year 2004 and 2006 (columns 4 and 6), we find that the quality difference between adders and exiters are significantly larger if the product experienced higher uncertainty reduction.

Overall, although we do not find strong evidence that adders charge lower prices than exiters, we do find that they export goods with higher qualities than the exiters. Moreover, we find some weak evidence that the price and quality differences may be related to the products' uncertainty reduction.

[3] The HS 2digit fixed effect should be able to capture some of the variation related to concentration.

APPENDIX TABLES

Appendix Table 1: Market Share Changes 2000-2002, Overall and by Firm Ownership

Margin	All	SOE	FIE	Dom
	(1)	(2)	(3)	(4)
(1) Incumbents	-6.479***	-3.808***	-2.677***	0.006
Net entry				
(2) Exiters	-53.489***	-38.069***	-12.418***	-3.002***
(3) New Exporters	25.845***	8.826***	10.196***	6.824***
(4) Adders	34.123***	24.756***	6.812***	2.555***
(5) Total Net Entry	6.479***	-4.487***	4.589***	6.377***
(6) Total	0	-8.295***	1.912***	6.383***

Note: This table reports the average market share changes for different margins for the period from 2000 to 2002, similarly to Table 5.

Appendix Table 2: Sections in HS Classification

Sector Name	HS 2 digit	Sector Name	HS 2 digit	Sector Name	HS 2 digit
Food	1-24	Paper	47-49	Machinery	84-85
Minerals	25-27	Textiles	50-63	Vehicles	86-89
Chemicals	28-38	Footwear	64-67	Instruments	90-92
Plastics	39-40	Ceramics	68-70	Arms	93
Leather	41-43	Jewelry	71	Toys	94-96
Wood	44-46	Iron	72-83	Arts	97

Appendix Table 3: The Effects of Sample Restriction: Estimation on Products That Have Concentration Measure

Dependent	dlnvalue_new					
	Without "concentration", restricted sample			With "concentration"		
	2002-2000	2004-2000	2006-2000	2002-2000	2004-2000	2006-2000
	(1)	(2)	(3)	(4)	(5)	(6)
Dgap	0.016*	0.019**	0.017**	0.016*	0.019**	0.017**
	(0.009)	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)
Dat	0.046	0.042	0.075	0.045	0.044	0.076
	(0.109)	(0.083)	(0.076)	(0.109)	(0.080)	(0.078)
Avt	-0.029	-0.026	0.002	-0.034	-0.034	-0.005
	(0.027)	(0.025)	(0.027)	(0.027)	(0.025)	(0.028)
plnpsfixed_ass	-3.029***	-3.036***	-3.110***	-2.984***	-2.957***	-3.041***
	(0.829)	(0.884)	(0.879)	(0.794)	(0.835)	(0.841)
Imshare	1.173*	1.054	0.527	1.203*	1.086	0.564
	(0.668)	(0.752)	(0.807)	(0.679)	(0.782)	(0.830)
Concentration				-4.539***	-6.196***	-5.919***
				(1.536)	(1.317)	(1.365)
Constant	14.048***	15.051***	16.047***	15.558***	17.122***	18.015***
	(0.481)	(0.554)	(0.534)	(0.684)	(0.678)	(0.535)
HS 2d FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1528	1537	1541	1528	1537	1541
R^2	0.262	0.264	0.251	0.271	0.281	0.265
adj. R^2	0.220	0.223	0.209	0.229	0.240	0.224
Log lik.	-3601.014	-3668.512	-3744.324	-3591.027	-3650.535	-3729.366
F	7.487	9.384	7.679	12.574	21.592	17.993

Note: Standard errors are clustered at HS 2digit level.

Appendix Table 4: Exiters Number in each Year

Year	*2002*	*2003*	*2004*	*2005*	*2006*
Number of exited firms by the year	*84582*	*96330*	*106291*	*114386*	*121638*
As a share of total exited firms during 2000-2006	*69.5%*	*79.1%*	*87.4%*	*94.0%*	*100%*

Appendix Table 5: Price Difference between Adders and Exiters

Dependent	Ln (Unit price) in year t (for adders) or in year 2000 (for exiters)					
	T=2002		T=2004		T=2006	
	(1)	(2)	(3)	(4)	(5)	(6)
adderdummy	0.055***	0.053***	0.191***	0.212***	0.385***	0.488***
	(0.006)	(0.016)	(0.006)	(0.015)	(0.006)	(0.015)
Adder*dgap		0.000		-0.000		-0.002***
		(0.000)		(0.000)		(0.000)
Adder*dat		-0.001		-0.011**		-0.038***
		(0.004)		(0.005)		(0.006)
Constant	0.983***	0.946***	1.002***	0.964***	1.027***	0.988***
	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)
HS 6d FE	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	Yes	Yes	Yes	Yes	Yes	Yes
N	158373	158373	177996	177996	186350	186350
R2	0.556	0.558	0.566	0.569	0.575	0.578
adj. R2	0.545	0.548	0.557	0.559	0.566	0.569
Log lik.	-2.54e+05	-2.53e+05	-2.83e+05	-2.82e+05	-2.94e+05	-2.93e+05
F	74.823	117.890	985.947	260.973	3961.344	653.784

Appendix Table 6: Quality Difference between Adders and Exiters

Dependent Variable	Quality in year t (for adders) or in year 2000 (for exiters)					
	T=2002		T=2004		T=2006	
	(1)	(2)	(3)	(4)	(5)	(6)
adderdummy	0.052***	0.048*	0.112***	0.063**	0.298***	0.238***
	(0.011)	(0.028)	(0.012)	(0.029)	(0.012)	(0.030)
Adder*dgap		0.000		0.001*		0.001**
		(0.001)		(0.001)		(0.001)
Adder*dat		-0.007		-0.012		-0.015
		(0.008)		(0.009)		(0.012)
Constant	-0.543***	-0.572***	-0.333***	-0.386***	-0.232***	-0.291***
	(0.008)	(0.009)	(0.007)	(0.008)	(0.007)	(0.008)
HS 6d FE	Yes	Yes	Yes	Yes	Yes	Yes
Ownership FE	Yes	Yes	Yes	Yes	Yes	Yes
N	156070	156070	175676	175676	183805	183805
R2	0.024	0.024	0.015	0.017	0.016	0.018
adj. R2	0.006	0.007	-0.001	0.001	0.000	0.002
Log lik.	-3.41e+05	-3.41e+05	-3.91e+05	-3.91e+05	-4.11e+05	-4.11e+05
F	20.788	15.632	94.202	48.849	631.678	125.782