What Determines Capital Structure? Evidence from Import Competition

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Abstract

In this paper, I use the exogenous shock of greater import competition to study the effect of product market competition on corporate capital structure in the U.S. domestic textile and apparel sector. Theoretically, when import competition increases, expected domestic profitability drops, increasing the probability of bankruptcy and reducing the tax benefit of debt. According to the trade-off theory, optimal financial leverage should go down. I find that after a quota-eliminating trade law took effect, firms in the sector significantly delevered by reducing debt and increasing outside equity. The average textile and apparel firm reduced its leverage by 0.10, a 30% reduction while the rest of the manufacturing sector barely delevered. I extend the analysis by looking at the relation of capital structure to industry level import penetration in a large sample of all U.S. manufacturing industries. Financial leverage is strongly negatively correlated with industry level import penetration, controlling for documented determinants of leverage. Economically, one standard deviation increase in import penetration corresponds to about 20% standard deviation decrease in leverage. Since import penetration could be endogenous to capital structure due to strategic behaviors of firms, I use the industry tariff as an instrumental variable for import penetration. The IV result is consistent with the OLS result. Robustness checks with alternative leverage measures confirm the basic result. The results can be best explained by the trade-off theory. I also find some evidence consistent with the disciplinary role of debt hypothesis, but it only accounts for a small portion of the competition-leverage effect.

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A simple version of the trade-off theory of capital structure predicts that increased product market competition will reduce the optimal amount of debt a company should employ. While there is a large capital structure literature that studies how capital structure affects product market competition (See Chevalier (1995a, 1995b), Phillips (1995), Zingales (1998)), there is relatively little, if any work that tests whether and how product market competition affects capital structure. The difficulty in conducting such a test is that product market competition and capital structure are endogenously determined.

Not incidentally, most empirical tests of capital structure determinants in general and the trade-off theory in particular are hampered by the endogeneity of profitability and capital structure, i.e., highly levered firms tend to have low profitability. In fact, capital structure research often finds that leverage declines with profitability, a result opposite to that predicted by the trade-off theory. Examples are Long and Malitz (1985), Titman and Wessels (1988), and Rajan and Zingales (1995), among others.

In this paper, I use exogenous variation in import competition as a shock to product market competition and consider how import competition affects capital structure. Theoretically, when import competition hits harder, expected domestic profitability drops, increasing the probability of bankruptcy and reducing the tax benefit of debt. According to the trade-off theory, optimal financial leverage should go down. For example, consider the case when import quota for a certain product is revoked. The product supply increases from imports and the product price becomes lower. If the marginal cost function of firms remains the same, optimal production for domestic firms is lower, too. As such, profits are reduced. This exogenous shock to profits makes possible a test of the trade-off theory of capital structure. I present two sets of empirical tests that explore import competition shocks to the domestic product markets.

First, I utilize the January 1995 Agreement on Textiles and Clothing that greatly increased the level of import competition in the U.S. domestic textile and apparel sector. Second, I extend the analysis by looking at the relation of capital structure to industry level import penetration in a large sample of all U.S. manufacturing industries.

Since January 1995 the U.S. textile and apparel sector has lost a substantial amount of business to its foreign competitors. Domestic production and employment went down greatly (Figure 1a and 1b). The shift has occurred in the trend of global trade

liberalization and is due in large part to the U.S. enactment and implementation of the WTO Agreement on Textiles and Clothing (ATC). This relatively exogenous shock to product market competition provides a natural experiment to study the effect of product market competition on corporate capital structure.

I choose the textile and apparel subsector for three reasons. First, I can unambiguously point to the time when import competition started to change and tract the timing of the effect. Second, the change in quota policy is reasonably exogenous to the financial decisions of domestic firms, which makes the study of the causal relation plausible. Third, compared with other manufacturing industries, the textile and apparel subsector experienced quite large increases in import competition. Therefore, the effect of competition is more likely to be economically significant.

The empirical results on listed textile and apparel firms support the prediction that import competition reduces financial leverage. I find that during the transition period, textile and apparel firms greatly reduced their financial leverage. The average firm reduced its leverage by 0.10, a 30% reduction, while the rest of the manufacturing sector barely delevered (-0.02). Consistent with the phase-out schedule of the ATC, leverage decreased the most in the later years of the ten-year transitional period. The result is not caused by a composition effect of less highly levered firms being more likely to survive. When I separate surviving firms, I find they reduced their leverage by substantial amounts, too.

The single finding that increased import competition coincides with decreased financial leverage does not guarantee a causal relation because industry-specific factors may have led to the observed relation. Therefore, I extend the sample to include all U.S. manufacturing industries. I use import penetration, i.e., a ratio of imports and domestic production, as the measure of the level of import competition. As a quick preview of the main result, Figure 2 draws the cumulative import penetration change from 1989 to 2003 and the book debt-to-asset ratio change in the same period for different industries. It is interesting to see that the two change variables are strongly negatively correlated.

I conduct large sample regressions and find that financial leverage is negatively correlated with import competition. Economically, one standard deviation increase in import penetration corresponds to 17% standard deviation decrease in leverage,

controlling for the composition effect. This result is robust to controlling for previously documented capital structure determinant variables and alternative measures of financial leverage.

Arguably, import penetration may be endogenous to capital structure determination. Reverse causation may exist. According to the literature, a domestic firm's financing choice could affect its product market strategy. [1] If the product market is oligopolistic, or if all firms in the market behave the same way, changes in domestic corporate financial leverage could lead to changes in import penetration. Especially, if high leverage makes domestic firms compete more aggressively and discourages imports, a negative effect of leverage on import penetration may exist. I can study this possibility by finding a source of variation in imports that is independent of domestic product market strategies.

To this end, I use the industry-level tariff rate as an instrumental variable for import penetration. The industry tariff can be a reasonable instrument for import penetration because it fulfills both the relevance and the exclusion requirements. First, the tariff negatively affects imports. Consistent with prior literature, the first stage results of the instrumental variable regression in the current paper confirms this correlation. Second, similar to quotas, tariffs are determined by federal level legislation on which the strategic market behavior of domestic firms unlikely has an impact. Therefore, it is plausible that the tariff is exogenous to capital structure determination and hence can be a reasonable instrumental variable (IV). [2]

The IV result is consistent with the OLS result. When I apply the IV technique, the coefficient on import penetration is no less in the absolute value than that from the OLS regression. In fact, the IV coefficient exceeds the OLS coefficient in the absolute value by 20 to 80 percent, depending on the instrument used. In addition, the difference in coefficient between the IV and the OLS is economically small. These facts essentially suggest that the endogeneity of import penetration is not consequential.

I then study how firms adjust their capital structure by separately looking at outside equity as well as retained earnings. I find that firms increase outside equity while

[1] See Brander and Lewis (1986), Maksimovic (1988) and Bolton and Scharfstein (1990) for two different theoretical views about the interactions between the product market competition and capital structure, and Chevalier (1995a, 1995b), Phillips (1995), Zingales (1998) and Campello (2006) for empirical evidence.

[2] No instrument is perfect. Industry lobbying activities may interfere with the trade policy legislation, which I will discuss in Section I when I talk about my empirical strategies in detail.

retained earnings are reduced by greater import competition. I also find that firm assets decrease insignificantly with import competition. These results suggest that firms reduce financial leverage by issuing outside equity and retiring debt. These and the basic results are confirmed in regressions with industry level variables as well.

Finally, I examine the mediating role of profitability as predicted by the trade-off theory. The theory predicts that import competition reduces expected profitability and increases profit volatility, which leads to a downward shift of optimal leverage. I present two pieces of evidence in line with this prediction. First, I find that realized profitability is reduced by import competition while profit volatility remains relatively stable. Second, I use ex ante market concentration as a proxy for the change in expected profitability because highly concentrated industries have high economic rents. I find industries that are more concentrated in 1989 have stronger competition-leverage effects.

Aside from the tax benefit and the expected bankruptcy cost, the incentive benefit of debt could change when import competition rises, which also affects the optimal capital structure. For example, if the market for corporate control is effective, firms lever up to reduce free cash managers can use (Jensen 1986). When competition is intensified, shareholders need less debt for the disciplinary function because the product market works as an outside control mechanism. This mechanism also generates a negative effect of competition on leverage. I try to test this hypothesis by looking at how the effect varies across firms. The effect should be stronger for firms with low investment opportunities because they likely have ample free cash flows (Jensen 1986). Arguably, the effect will be stronger for better-governed firms. I find no evidence for the former prediction, and some weak evidence for the latter.

The paper makes at least two contributions to the existing literature. First, it suggests a causal relation between product market competition and firms' capital structure. My paper adds into the growing literature on the interaction between corporate financing decisions and product market conditions. Second, by identifying import competition as an exogenous source of variation in profitability, I am able to test the prediction of the trade-off theory about the effect of profitability on leverage.

The rest of the paper is organized as follows. Section I discusses the theoretical framework as well as empirical strategies for the effect of import competition on capital

structure. Section II provides evidence in the textile and apparel sample. In section III I conduct tests in the manufacturing sample. Section IV discusses alternative hypotheses and provides tentative tests. Section V concludes.

I. Import Competition and Capital Structure

A. Import competition and domestic profits

It is perhaps the oldest insight in the area of trade policy and imperfect competition that international trade increases domestic competition (Helpman and Krugman (1989)). The argument is as follows. Suppose a trade liberalizing policy is applied to a certain industry that increases import competition. Increases in import competition means increases in foreign supply, which tend to reduce the market product price. If, under protection, domestic firms have oligopolistic power and charge a product price higher than their marginal production costs, they are now forced to behave more competitively and their profits are expected to drop. Even if domestic firms are price takers who produce at a marginal cost equal to the market price under protection, they tend to reduce their production when the prevailing market price is lower as long as the price is above the average cost. [3] As such, the expected profits of domestic firms decline as well. As an example of this mechanism in the second case, I analyze the impact of quota elimination on expected domestic profits by a simple illustrative model in Appendix A.

Profit uncertainty may increase as imports penetrate into the domestic product market. For one thing, import competition subjects domestic firms to greater uncertainty about the prospects of their products. For another, adjusting to increased competition by initiating new efficiency projects may incur additional business risks. In fact, it is often observed in competition-intensified markets that the profitability dispersion across firms becomes wider.

B. The trade-off theory of capital structure and its prediction

Import competition reduces domestic profitability and probably increases profit volatility. According to the trade-off theory of capital structure, the optimal financial

[3]Strategic quantity increases to win market shares may occur, but it is unlikely to happen where the product market is not oligopolistic, and where foreign producers almost surely have low marginal costs.

leverage should go down. In the trade-off framework, the optimal leverage is determined by trade-offs between the tax benefit of debt and the expected cost of financial distress. The expected cost of financial distress is higher when expected profitability is lower or when profit volatility is higher, *ceteris paribus*. Consider the distribution of a firm's random cash flows. When expected profitability is lower while profit volatility remains unchanged, the distribution shifts to the left. Alternatively, when profit volatility is higher while expected profitability remains the same, the distribution becomes fatter in the two tails. In both cases, the probability is higher that cash flows will not suffice for a certain debt interest payment. To mitigate the negative impact of product market competition on its solvency, a firm should lower its financial leverage.

Increased import competition may also reduce the tax benefit of debt. There are two reasons. First, corporate earnings may be too low to need much tax shield from debt. In the extreme case, if earnings are so low that earnings before interest and taxes are zero or negative, a firm does not need any debt for the tax deduction purpose. Second, the personal income of shareholders may drop to lower tax brackets. A lower personal tax rate on the dividend income results in a lower tax benefit of debt as well. The downward shift in tax benefit also pushes the optimal capital structure toward less debt.

In short, when product market competition increases, optimal capital structure may change because expected profitability drops and volatility increases, which (1) increase the probability of financial distress increases; and (2) the tax benefit of debt decreases. The optimal financial leverage should be lower when competition is greater.

C. Endogeneity between product market competition, profitability and capital structure and empirical strategies

C1. Endogenous product market competition and profitability

The negative effect of product market competition on financial leverage may not be easily observed empirically for the reason that these two variables are endogenously determined. The recent literature on the interaction between capital markets and product markets implies that reverse causation could be an issue.

Two contrasting views exist about the sign of the effect of leverage on competition. On the one hand, as Brander and Lewis (1986) and Maksimovic (1988) argue, high financial leverage makes firms compete more aggressively in the product market due to

the manager-debt holder agency problem. Consequently, product market competition is tougher. On the other hand, as Poitevin (1989) and Bolton and Scharfstein (1990) suggest, high financial leverage makes new entrant firms vulnerable in competition because of financial constraints. As a result, product market competition is softer.

Import competition generates a source of variation in product market competition that is less subject to the endogeneity discussed above. This is because the import quantity is not directly affected by the financial situation and consequent agency problems within domestic firms. Therefore, I focus on import competition in this paper to study the effect of product market competition on capital structure. In the first part of the paper, I study a quota-eliminating international trade agreement in the textile and apparel industry sector. When quota is eliminated, imports surge and squeeze out much domestic production. In the second part of the paper, I use import penetration as a direct measure of import competition.

Import competition also generates exogenous variation in industry profitability. Profitability and capital structure is endogenously determined. Specifically, high financial leverage may lead to low profitability. This is because highly levered firms may suffer from inefficient investments due to debt overhang (e.g. Myers 1977). This reverse causation could obscure the empirically observed relation between profitability and financial leverage. Since import competition reduces domestic profitability and, as discussed above, is not directly affected by agency problems within domestic firms, it provides a relatively exogenous measure of expected profitability.

C2. Potential endogeneity of import penetration

However, import penetration may still be endogenous to domestic firm capital structure because the product market strategies of domestic firms may have an indirect effect on imports. Consider the above two contrasting views about how product market strategies are related to capital structure. One view is that high financial leverage makes a firm compete more aggressively (e.g. Brander and Lewis (1986)). In a Cournot competition setup, this means a high product quantity. As a mechanical outcome, import penetration is lower. Also, the product price is lower when the quantity is higher, which discourages imports and reduces import penetration. The other view is that high financial leverage makes a firm compete less aggressively (e.g. Bolton and Scharfstein (1990)). If

so, financial leverage would attract imports and increase import penetration. Another example of endogeneity is that leverage may hurt a firm's product market competitiveness due to consumer preference for less debt (Titman 1984, Maksimovic and Titman 1991). This example suggests that debt may lead to an increase in import penetration.

Therefore, I also look for relatively exogenous variation in import penetration that is not affected by the product market strategies or the competitive position of domestic firms. Trade policies are able to generate such variation. The quota elimination in textile and apparel provides a natural experiment that is exogenous by itself. But the import penetration in all manufacturing industries needs an instrumental variable to control for endogeneity. Industry tariffs are used for this purpose.

C3. Instrumental variable technique

Like quotas, tariffs are not affected by domestic firms' product market strategies, but rather are established by federal level legislation. Trade laws are made by Congress through the same legislative process as any other U.S. law, which involves discussions in the House of Representatives, the Senate, and consent from the U.S. President. New trade policies may be launched when the federal government wants to conform to free trade agreements with foreign countries or when government policies change toward specific industries. According to the established tariff literature, the reasons for the government to increase tariff include revenue raising, inefficiency correction and social welfare.[4] The capital structure of domestic industries does not appear to be an important parameter.

Admittedly, industry lobbyists can influence the government to enact for higher protection of their industries when investment opportunities dry up and when they are experiencing difficulties to profit. Specifically, if debt financing hurts firms' performance, highly-levered industries may be more willing to lobby for tariff protection than low leverage industries. However, evidence about whether leverage hurts or boosts firms' performance in the product market is mixed.[5] More importantly, the influence of lobbying in federal level law making is not likely to be large. Besides, it is possible but

[4] The references include but are not limited to Hansen (1990) and Lee and Swagel (1997).
[5] Chevalier (1995b), Borenstein and Rose (1995), Chevalier and Scharfstein (1996), Zingales (1998) and Campello (2005).

not likely that all manufacturing industries have powerful lobbying groups. Overall, industry lobbying may have some influence on tariff law making, but the impact is not likely to be large. It is reasonable to assume that tariffs are relatively exogenous to domestic firms' financial conditions.

Tariffs negatively affect imports. Theoretically, as tariffs increase, imported products become relatively more expensive, which reduces the domestic demand for these products.[6] Empirically, the literature seems to support the claim that the tariff reduces imports (Roorbach (1929), Kraus (1959), Clausing (2001) and Romalis (2005)). The first stage results of the instrumental variable regression in the current paper also show a significant negative correlation between import penetration and tariff. Since tariffs fulfill both the relevance requirement and the exclusion restriction, I consider the industry-level tariff a reasonable instrumental variable for import penetration and apply the IV technique in the manufacturing sample regressions in Section III.

II. The Quota Agreement and the U.S. Textile and Apparel subsector

A. The Agreement on Textiles and Clothing and its impacts

Since January 1st 1995, international textiles and clothing trade has been going through a fundamental change under the 10-year transitional program of the WTO's Agreement on Textiles and Clothing (ATC). Under the Agreement, WTO Members commit themselves to remove textile and clothing quotas by January 1st 2005 by integrating the sector fully into the General Agreement on Tariffs and Trade (GATT) rules. Up to the end of the Uruguay Round, textile and clothing quotas were negotiated bilaterally and governed by the rules of the Multifiber Arrangement (MFA). The MFA provided for the application of selective quantitative restrictions when surges in imports of particular products caused, or threatened to cause, serious damage to the industry of the importing country.

The ATC is progressive in nature. Member countries may choose which products to be integrated to GATT during each stage of the transition under the ATC guidelines. The guidelines specify that on the first day of 1995, 1998 and 2002, integrated products

[6] The effect of tariffs on imports may be large or small depending on many industry factors such as the elasticity of demand, the comparative advantage of production, etc.

should account for at least 16%, 33% and 51% as of the 1990 total volume of trade, respectively. By the first day of 2005, all products should have been integrated. Therefore, more than 60% of the products were scheduled to be integrated in the later years of the transition period.

Evidence on whether the passage of this trade agreement was anticipated is mixed. On one hand, the Uruguay round of GATT talks was opened in 1986. Speculation about the outcome of the negotiations had been made by news observers since then. On the other hand, the talks lasted eight years due to conflicts of interest between participating countries, which was twice the planned time. The negotiation on textiles and apparel was especially difficult, according to the press. It was not until December 1993 that the negotiations produced any fruitful results.

[TABLE I]

The shift from MFA to ATC certainly exposed U.S. domestic textile and apparel firms to greater product market competition. With diminishing protection by quota limits, domestic textile and apparel firms were losing a great deal of business to their international competitors who had lower costs due to cheap labor. Domestic production shrank and workers lost their jobs as many textile and apparel firms went out of business during the transition period. As Panel 1 in Table I shows, the value-added production of the textile and apparel subsector, including both public and private firms, fell from 72.0 billion U.S. Dollars in 1995 to 48.5 billion dollars in 2004. During the same period, overall employment in this industry sector fell by over a half, from 1,502 thousand employees in 1995 to 701 thousands in 2004. The Producer Price Index (PPI) barely increased, from 98 in 1995 to 100 in 2003, with 2002 as the base year. The industry markup did not decline until 2000 due to cyclical variation. Panel 2 of Table I presents statistics for COMPUSTAT listed firms. The number of listed firms decreased greatly during the transition period, too.

It is also important to notice that the economic decline in this sector was almost non-existent before 1995. From 1990 to 1995, the value-added production increased slightly from 65.5 billion dollars to 72.0 billion dollars, by a 9.8% increase, which is in strong contrast to the -32.6% change from 1995 to 2004. The employment numbers confirm this trend: the total employment decreased by merely 161 thousands from 1990 to 1995, a

1.3% annual decrease, which is incomparable to the 5.3% annual decrease during the transition period. The Producer Price Index increased from 92 in 1990 to 96 in 1994, a 0.9% annual increase, while the annual percentage increase from 1995 to 2004 is only 0.2% (from 98 to 100). There was a similar pattern in the number of listed firms, which even increased slightly in the ten years before the quota change. The general information conveyed here is that the new trade agreement increased the level of import competition in the textile and apparel subsector by a significant degree.

The last five years of transition appear to be special as production declined more rapidly and markup started to decrease, which is consistent with the phase-out schedule of the ATC. Several other factors could also have contributed to the greater impact since 2000. First, the federal government enacted the Trade and Development Act of 2000 that extended preferential tariff treatment on textile products to Caribbean Basin countries. Second, China entered the WTO at the end of 2001, which greatly boosted textile and apparel imports from China.

Panel 2 of Table I also presents the operating profitability statistics. The textile and apparel profitability decreased in 1995 by about 3% of total assets, but rebounded a little later. Overall there seems to be some slight decline in leverage in the transitional period, especially after 2000. The cross-firm variation in profitability seems to have increased after 1995. These observations are consistent with the theoretical framework discussed earlier about the effect of import competition on domestic profits.

B. Financial Leverage before and during the transition

I explore whether textile and apparel firms adjusted their financial leverage during the transition in this subsection. I study textile and apparel firms listed in the COMPUSTAT industrial annual database from 1990 to 2004. Textile firms are those with 3-digit NAICS codes 313 and 314. Apparel firms are those with 3-digit NAICS code 315. Non-U.S. firms are excluded. If for a certain firm-year total assets (data 6) is non-positive or long-term debt (data 9) plus debt in short-term liabilities (data 34) is negative, then I delete this observation from the sample. This process yields an average of 103 firms in sample years, with a range from 127 to 60 depending on the year (Table I, Panel 2). The over-time variation in the number of firms is primarily due to entry-and-exit activities, but sometimes also caused by missing data in COMPUSTAT.

There are a large number of small textile and apparel firms that are not listed. It is therefore useful to see how representative the listed firms are of the whole subsector. Appendix B compares the listed textile and apparel firms with the subsector aggregates in terms of number of companies, number of employees and total capital expenditures. It is interesting to see that although only fewer than 1% firms are listed, they employ more than 20% of the workers and make more than a half of the subsector total investments. [7] Over time, the percentage of the number of listed firms and capital expenditures in the whole subsector decreased while the percentage of employees increased, providing mixed information about whether the listed firms were affected more or less than the whole subsector.

The primary measure of financial leverage in the paper is the book debt-to-asset ratio, i.e., the sum of total long-term debt (COMPUSTAT data 9) and debt in short-term liabilities (data 34) divided by total assets (data 6). The alternative financial leverage measures include the interest coverage ratio and the market debt-to-capital ratio. Throughout the paper, I define interest coverage as the earnings before interest and tax and depreciation and amortization (COMPUSTAT data 170 plus data 15 and data 14) divided by interest expense (data 15) and the market debt-to-capital ratio as the sum of total long-term debt (data 9) and debt in short-term liabilities (data 34) divided by the sum of debt (data 9 plus data 34) and market equity (data 199*data 25).

Figure 1d shows the time series pattern of the textile and apparel average book debt-to-asset in contrast to the rest of the manufacturing sector. Despite the fact that both groups display a cyclical pattern of financial leverage, the textile and apparel subsector reduced its leverage more. Figure 1e plots the group difference of debt-to-asset and shows that the textile and apparel subsector reduced leverage relative to the rest of the manufacturing sector especially after 2000.

[TABLE II]

In Table II I examine the statistical significance of financial leverage changes in the textile and apparel subsector. I compare the textile and apparel subsector with the manufacturing sector in Panel 1. Two notable patterns are here. First, the textile and

[7] The number of domestic employees in listed firms should be less than in Appendix A because the employment numbers from COMPUSTAT include foreign employees.

apparel subsector had higher financial leverage than the rest of the manufacturing world before the transition. This difference suggests that there is an industry-specific component in capital structure in textile and apparel. Second, the textile and apparel subsector delevered more compared with the manufacturing sector.

If we ignore the common time trend, the textile and apparel subsector delevered from 1990 to 1995 and from 2000 to 2004 but increased slightly in between. However, financial leverage may be influenced by macroeconomic conditions (Fama (1986) or Duffie and Singleton (2003)), so it is important to account for time trends in leverage. Therefore, I subtract the average debt-to-asset of the rest of the manufacturing sector and present the access leverage numbers in panel 2. It seems that the average textile and apparel firm reduced leverage more than the rest of the manufacturing world in the second five years of transition by 0.08. The relative leverage decline was much less in the first five years of transition (-0.02). This is consistent with the previous observation that the second half part of the transition period experienced greater increases in import competition.

The leverage decline in the textile and apparel subsector from 1995 to 2004 (-0.10) is economically significant. Consider the average ex ante debt-to-asset ratio of 0.35 for textiles and apparel. Assuming a constant assets level, a decrease of 0.10 in debt-to-asset would mean a reduction of 30% debt, which is quite substantial for a firm. Moreover, the cross-industry standard deviation of industry average debt-to-asset ratio is about 0.05 in the first half of the 1990s (computed from my sample). Since 0.10 is twice of 0.05, the decrease is very significant for an industry group.

Panel 2 and 3 of Table II look at alternative measures of financial leverage for textile and apparel firms. Panel 2 corresponds to market debt-to-capital and Panel 3 corresponds to interest coverage. Both measures of leverage display some cyclical variation and after adjusting for the common time trend by subtracting manufacturing sector average, both measures show consistent results with the book debt-to-asset measure of leverage. The common result is, financial leverage became lower during the transitional period from 1995 to 2004 for the textile and apparel subsector.

C. Surviving versus non-surviving firms: the composition effect

The increase in product market competition has substantially changed the composition of the industry sector. Some firms survive increased competition but many fail and drop out of the sample. Of the 100 firms that are in the sample during 1985 to 1989, only 26 firms remain as of 2005.

Since many firms exit during the period, survivorship bias may be a concern. If, on average, firms that survive have lower financial leverage than firms that do not survive, then a composition effect could be driving the results, i.e., high leverage firms leave and low leverage firms remain, dragging the average leverage down. To explore this possibility, I separately look at firms that survive and firms that exit the sample early.

[TABLE III]

In Table III, I look at book debt-to-asset of firms grouped by their survivorship status. I keep firms that are in the sample in years 1985-1989 and discard those that enter the sample after 1989. This procedure drops about 30 firms in the later years of the sample, but is useful to compare across periods. Within this new sample, I define firms that are in the sample in 2005 as surviving firms, and those that are not in 2005 as non-surviving firms. I further divide non-surviving firms into four subgroups according to the delisting code (data dlstcd) provided in the CRSP database. The four subgroups are bankrupt firms, firms delisted by exchange for financial reasons, firms merged by other firms and all other delisted firms. Table III contains a description of how I make the classification.

The first two rows of Table III report the leverage of the reduced sample. It is interesting that the leverage reduction is greater in magnitude compared with Table II, where new entrants are included. This difference suggests that new entrants have higher leverage or do not delever as much. Looking across firm groups, I find it true that non-surviving firms had higher leverage than surviving firms. This observation is consistent with the Zingales (1998) finding that low leverage firms survive increased competition. Looking over time at the last two rows, we can see that surviving firms reduced their leverage by 0.11, which is also substantial. This observation suggests that the compositional effect, although present, does not subsume the effect that import competition increases have on leverage reduction.

Interestingly, firms that go bankrupt or delisted for financial reasons increase their leverage. If their assets decrease during the same time, the result could be merely a mechanical effect. However, if assets remain the same or increase, this result suggests either these firms are financially constrained or they choose to default strategically. Firms that drop out of the sample because of merger or other reasons reduce their leverage significantly.

In summary, the composition effect does make the main result stronger to some extent, but it is not the primary driving force. Surviving textile and apparel firms reduced their financial leverage as well. Within the sector, there seems to be variation in terms of the response to increases in import competition, which could potentially reduce the observed average effect of competition on leverage.

D. Section summary

As a concluding remark for this section, it seems true that when import competition becomes more intense due to quota elimination, the textile and apparel subsector has reduced its financial leverage compared with the rest of the manufacturing sector. The observed deleveraging in the average textile and apparel firm is not driven by the composition effect that non-surviving firms are more highly levered, since the average surviving firm reduced leverage by about the same amount.

III. Empirical Evidence in the U.S. Manufacturing Industries

In the previous section I show that the textile and apparel subsector reduces its financial leverage during the ten-year transition period when quotas are phased out. The observation is consistent with the prediction that increased product market competition reduces corporate financial leverage. However, since only one industry sector and one event is studied, the interpretation of the results can be subject to a criticism, i.e., maybe there are industry-specific factors unrelated to import competition that contribute to the capital structure changes. To make sure that it is import competition rather than something else that leads to the observed effect, I expand my sample to include all other manufacturing firms. By studying multiple industries I obtain cross-sectional variation in import competition, which makes the test of the causal effect possible. I consider only

manufacturing industries because measures of import competition are more readily available and because trade policies are more comparable among manufacturing than non-manufacturing industries.

A. Data description

I follow Bertrand (2004) to use import penetration as a measure of the level of import competition in different industries. I obtain the U.S. import data from the TradeStats Express National Trade Data maintained by the U.S. Government Export Portal and the U.S. domestic production data from the Industry Annual Accounts data section in the Bureau of Economic Analysis of the U.S. Department of Commerce. Both data are organized by the North American Industry Classification System (NAICS) codes. I choose data series at the 3-digit NAICS level for all manufacturing industries, i.e., industries with NAICS that start with numbers 311 to 399. A total of 21 industries result from this procedure. Import data are available for years 1989 to 2003.

In each year, I compute import penetration for each industry. For each industry, import penetration is defined as

Import Penetration Index (IPI) = import / (import + domestic production)

The instrumental variable, industry tariffs, are also at the 3-digit NAICS industry level. To construct the industry tariff variable, I first find the estimated ad valorem equivalent of complete Most Favored Nations (MFN) rate from the John Romalis U.S. Tariff Database 1989-2001 files, which is organized in the 8-digit Harmonized Tariff Schedule (HTS) level. A detailed description of this database can be found in Feenstra, Romalis and Schott (2002) and Romalis (2005). Then I download the industry and product concordance from the U.S. Census Bureau and transform the 10-digit HTS to 8 digits before I apply the concordance to the tariff file. The concordance matches the HTS codes to NAICS codes for the tariff file. Finally I average the tariff rates at the 3-digit NAICS level to obtain industry level tariff rates. Products within the same industry are equally weighted during the aggregation.

The industry tariff rates may vary when new tariff laws are made. It may also move in small amounts from year to year because tariff legislation often allows grace periods for gradual rather than momentary changes to existing tariffs. Lastly, since the ad velorem equivalent MFN tariff rates are sometimes transformed from specific tariffs

based on the value of the merchandise, the tariff variable may move around when the value of the merchandise fluctuates. To show the variation in industry tariffs and import penetration, Appendix C tabulates the tariff and import penetration variables by 3-digits industry NAICS codes and year. The appendix also contains a scatter plot of the cumulative change in import penetration and tariffs in 1989 to 2001. The graph shows that import competition increases more in industries where tariffs decrease more.

Some firm level financial variables are used as control variables in the regression analysis. As Harris and Raviv (1991) summarize, the market-to-book ratio, profitability, asset tangibility and firm size are firm characteristic variables that correlate with financial leverage empirically. Rajan and Zingales (1995) also confirm the correlation of these variables with leverage in international data. It is possible that firm characteristics are affected by import competition so I control for these variables in the regression analysis.

I obtain accounting data from the COMPUSTAT North American Industry Annual file to construct these variables. The market-to-book ratio may be related to investment opportunities. Market-to-book may be negatively correlated with leverage because investment opportunities make debt overhang problems worse (Jensen and Meckling 1976 and Myers 1977). Market-to-book is defined as book assets (COMPUSTAT data 6) plus market equity (data 199 times data 25) minus book equity (data 216), all divided by book assets. Profitability may negatively correlate with leverage because highly levered firms are less profitable. The negative correlation may also be due to information asymmetry between managers and investors as argued by Myers and Majluf (1984). Profitability is defined as operating income before depreciation (data 13) divided by total assets. Asset tangibility may positively correlate with leverage because tangible assets more likely serve as collaterals for debt. Asset tangibility is defined as the net property, plant and equipment (PP&E, data 8) divided by total assets. Firm size may positively correlate with leverage because larger firms have better access to the credit market including both bank loans and public debt. I use the logarithm of net sales (data 12) to measure firm size.

Other variables used in the regression analysis include outside equity (data 85 plus data 210), retained earnings (data 36), both scaled by total assets, and the logarithm of total assets.

[TABLE IV]

I choose all manufacturing firms in the COMPUSTAT file that has positive total assets and nonnegative debt and shareholders' equity. Manufacturing firms are those with 2-digit NAICS 31, 32 and 33. I delete firm-years with missing data for the book debt-to-asset ratio data. I also delete firm-years with missing data for the control variables. Table IV provides summary statistics of the variables that are used in the regression analysis. [8]

B. Univariate Analysis

[TABLE V]

To get a rough idea of the relation between import penetration and financial leverage, I first perform a simple correlation analysis. I calculate the cumulative change of import penetration and the change of book debt-to-asset ratio for each industry from 1989 to 2003. I sort industries by the import penetration change in Panel 1 of Table V and look at the debt-to-asset change. There seems to be a clear pattern that greater leverage reduction occurred for industries with larger import penetration increase.

[FIGURE 2]

More intuitively, I draw import penetration change and debt-to-asset change in the same graph with industry NAICS as the horizontal axis and find a very interesting pattern. There is a highly negative correlation between these two variables (Figure 2). For example, the apparel manufacturing industry (with 3-digit NAICS 315), whose import penetration increased the most in the 14 years, experienced the greatest decreases in industry average financial leverage. On the other hand, the food manufacturing industry(with 3-digit NAICS 311) and the paper manufacturing industry (with 3-digit NAICS 322), whose import penetration increased the least in the 14 years, hardly experienced any decrease in industry average financial leverage. I also draw the same graph with the change variables calculated over shortened periods, and the pattern persists.

I then divide industries into three groups by import penetration changes and look at the statistical significance of the debt-to-asset change. The mean comparison test results

[8]Since the market-to-book ratio and profitability sometimes have extremely large absolute values that unnecessarily increase the estimation error, I winsorized these variables at the 1st and 99th percentiles.

are in Panel 2 of Table V. The industry group with the biggest import penetration change experienced a decline of 0.10 in group average debt-to-asset, while industry groups with medium and the smallest import penetration changes experienced a decline of only 0.02 and an increase of 0.03 in group average debt-to-asset, respectively. The negative changes in leverage are significant across groups. However, this result could be driven by variables other than import penetration. For example, if import competition reduces firm size or asset tangibility, leverage could also go down. Therefore, I conduct regression analysis that controls for documented determinants of capital structure in the following subsections.

C. The effect of import competition on financial leverage

I use firm level regressions to test the relationship between import competition and corporate financial leverage more rigorously. The main regression model used is

$$leverage_{it} = a_i + a_t + g\, IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it} \qquad (1)$$

where a_i is the firm fixed-effects coefficient, a_t is the year fixed-effects coefficient, IPI_{jt} is import penetration for industry j at time t-1, and MtB_{it-1}, $Prof_{it-1}$, $Tang_{it-1}$ and $Size_{it-1}$ are one-period lagged firm-level control variables, which denotes market-to-book, profitability, asset tangibility and firm size, respectively, as defined in the previous subsection. γ is the coefficient this paper focuses on. A negative γ means more intense import competition accompanies lower financial leverage, which is predicted by the trade-off theory.

I include firm fixed-effects in the regressions to control for industry-specific variation not captured by the import competition variable. The firm fixed-effects variables can also eliminate the composition effect I discuss earlier in the textile and apparel sample analysis. Specifically, some firms exit their product markets when competition gets more intense. If surviving firms are less levered than non-surviving firms, the regression coefficient on import competition can be exaggerated. Including firm fixed-effects prevents this bias.

I also include time fixed-effects to get rid of common trends in financial leverage across all industries. Macro-economic conditions may lead to common changes in financial leverage of all industries. For example, there may be cyclical variation in

default premium that affects the debt usage of all firms (Fama 1986). Therefore, year fixed-effects are included to capture the common time trend in leverage.

Finally, I cluster the data by industry because leverage is a firm-level variable while import penetration and tariffs are industry-level variables. Therefore, the standard errors of the regression coefficients need to be corrected.

[TABLE VI]

Table VI displays the regression results. Columns (1) to (6) are the OLS regression results. Column (1) summarizes the regression with all control variables. In this regression, γ is -0.318 and statistically significant at the 1% level. The sign of the coefficient is as predicted, i.e., competition reduces leverage. γ is economically significant, too. A one standard deviation (0.107) increase in import penetration corresponds to a decrease of 0.034 in debt-to-asset, which is 17% of a standard deviation of debt-to-asset.[9]

In columns (2) to (6) I summarize results from OLS regressions that drop some or all of the control variables. Clearly adding any control variable hardly reduces the coefficient on IPI_{jt}. I also do the same regressions with industry fixed-effects instead of firm fixed-effects.[10] The results are very similar except that the magnitude of γ is even greater, suggesting that the composition effect would have made my result stronger.

The estimated coefficients on the firm characteristic variables are as we would expect. Market-to-book and profitability show up negatively and asset tangibility and firm size show up positively. A one standard deviation increase in market-to-book, profitability, asset tangibility and firm size change book debt-to-asset by -6, -7, 16 and 27 percent of its standard deviation, respectively. The economic magnitude of the regression coefficients of these variables is comparable to Rajan and Zingales (1995) except that the effects of market-to-book and profitability are smaller due to different sample periods.

Columns (7) and (8) summarize the IV regression results. In column (7) the IV is one year lagged industry tariff and in column (8) the IV is a moving average of past eight year tariffs. Using the average tariff from past years captures the idea that some international trade contract may have been negotiated in the past so that past prices affect

[9] -0.034 = 0.107*(-0.318) and -17% = -0.034/0.199.
[10] The results are not reported to save space.

current imports as well. I summarize the first stage regression results in Appendix D. The table shows that import penetration is negatively significantly correlated with tariffs, as is required for using tariffs as an IV. The moving average tariff variable affects import penetration by a larger magnitude (-1.092) than the contemporaneous tariff variable (-0.366).

The IV results are highly consistent with the OLS results. The coefficient γ is -0.567 in column (7) and -0.378 in (8). Both estimates bear the same negative sign as the OLS estimate, suggesting that the OLS result is not harmed by the endogeneity of import competition. The fact that the IV estimates are even greater than the OLS estimate suggests that the reverse causality, if any, has reduced the effect in the OLS. Naturally, the standard errors of the estimated γ are greater in the IV regressions, because tariffs only capture part of the variation in import penetration. Since the IV estimates are about 20% (column 8) to 80% (column 7) greater than the OLS estimate, the economic significance of the effect could in fact be 20 to 80 percent larger. Therefore, a one standard deviation increase in import penetration may actually lead to a decrease of 20% to 31% of a standard deviation of debt-to-asset.

I also do a Hausman test on whether the import penetration is exogenous and fail to reject the null hypothesis. Assuming the eligibility of the tariff as an IV, this test result suggests that the endogeneity of import penetration may be inconsequential. This result is not surprising because the possible reverse causation is based on the indirect effect of domestic product market strategies on imports, which is not likely to be consequential.

Besides the OLS and IV regressions on the panel data, I also conduct a cross-sectional test of the leverage change in 1995-2001 on the import penetration change in 1989-1995. The regression model is

$$(D/A)_{i2001} - (D/A)_{i1995} = g\,(IPI_{j1995} - IPI_{j1989}) + e_i \qquad (2)$$

This test eliminates the need for firm fixed-effects controls and is free from time series autocorrelation. The test specification requires that a sample firm has debt-to-asset data in both 1995 and 2001. This requirement narrows the number of sample firms down to 938, which is the sample size in the cross-sectional regression. The regression result is reported in column (9) of Table VI. I also include the change in the control variables in 1989-1995 in column (10). It turns out that the import penetration change variable is

negative and statistically significant. The magnitude of the effect is in line with the panel data regression results.

D. How do firms adjust capital structure

When competition reduces corporate profits, firms become less able to retain earnings. As a direct effect, financial leverage should go up. However, since optimal leverage is now lower, according to the trade-off theory, firms should issue more outside equity to offset the direct effect and further adjust to the new optimal capital structure. Therefore, it is useful to separately look at the effects of import competition on outside equity and retained earnings.

Firms can also reduce leverage by simply selling off assets and using the proceeds to retire debt. This could be true if financing constraints are binding or investment opportunities dry up. So I also want to study how total assets change with import competition.

I run regression model (1) with asset-adjusted outside equity and retained earnings as dependent variables.[11] Given the main result that leverage goes down, a positive coefficient of outside equity on import competition means firms adjust by issuing more outside equity, and a non-positive coefficient of retained earnings on import competition means the observed competition-leverage effect has not been caused by increasing internal financing. I also look at total assets to study if firms reduce assets when competition increases. I take the logarithm of the total assets variable to obtain a stationary variable. A negative coefficient on import competition means firms possibly dispose assets and use the proceeds to retire debt.

Table VII summarizes the regression results. Most importantly, import penetration positively correlates with outside equity and slightly negatively correlates with retained earnings. These results are consistent with the adjusting mechanism that firms issue more outside equity to undo the direct effect that decreasing retained earnings lead to higher leverage. The logarithmic assets variable is not significantly affected by import

[11] Since the outside equity variable sometimes runs extremely large on the positive side and retained earnings extremely negative, I winsorize the former at the value of 12, which is its 99th percentile and the latter at the value of -12, its 1st percentile, to reduce the impact of outliers and data errors. I also winsorize the data at both tails and vary the cutoff percentile. The result does not change quantitatively.

penetration. This result suggests that even if some firms sell off assets, it is not prevalent in the sample.

The coefficients on the control variables are not completely consistent with the prior literature. Market-to-book negatively affects outside equity and positively affects retained earnings, which is not consistent with the market timing hypothesis. Profitability insignificantly positively affects outside equity and retained earnings. Asset tangibility correlates negatively with retained earnings and assets, as larger firms and more profitable firms accumulate more intangible assets. Large firms tend to rely more on retained earnings and less on outside equity than small firms. [12]

E. Robustness Checks

In this subsection, I use interest coverage and market debt-to-capital ratio as alternative measures of financial leverage and study if the main result still holds. I also collapse the data to the industry level and run the main regression at the industry average level.

E1. Alternative measures of financial leverage

As in the textile and apparel sector analysis, I use two other measures of financial leverage besides the debt-to-asset ratio. As Rajan and Zingales (1995) remark, the interest coverage measure is appropriate if we want leverage to reveal whether a firm can meet its fixed interest payments. I use interest coverage as one alternative measure of financial leverage. Firms may adjust to market fluctuations of equity prices since they affect the repurchase or issue prices. I use the market debt-to-equity ratio as the second alternative measure of leverage.

I define interest coverage as earnings before interest and tax (COMPUSTAT data 170 plus data 15) divided by interest expense (data 15)[13]. One problem with this measure is that it is very sensitive to income fluctuations. Indeed, some interest coverage figures can be as large as thousands, which unnecessarily increases the standard errors of the test coefficients. I therefore winsorize the variable at the value of 50. The Market debt-to-

[12] I also do the same regressions for outside equity and retained earnings with industry fixed effects and the coefficients on market-to-book flip signs and those on profitability increases in magnitudes and significance. Since outside equity, retained earnings and assets are not subject to the survivorship bias, the coefficients on import penetration do not change qualitatively.

[13] I also use EBITDA instead of EBIT in the numerator to compute interest coverage. The result does not change at all.

capital ratio is defined as the sum of total long-term debt (data 9) and debt in short-term liabilities (data 34) divided by the sum of debt (data 9 plus data 34) and market equity (data 199*data 25). The summary statistics of these two variables are also included in Table IV.

I rerun the large sample regressions for these alternative leverage measures. The results are summarized in Table VIII. Consistent with the debt-to-asset results, import penetration significantly increases interest coverage and reduces market debt-to-capital. The magnitude of the effect for the market debt-to-capital is similar to the book leverage I consider previously. A one standard deviation increase in import penetration reduces market debt-to-capital by 21 and 29 percent of its standard deviation based on the OLS and IV results, respectively. The coefficients on the control variables are similar, too. The coefficients on the interest coverage regressions are quite large, due to the large dispersion of the variable, but they are still both statistically and economically significant. One standard deviation in import penetration leads to about 40% standard deviation increase in interest coverage.

E2. Industry level variables regression

My main regression setup involves explanatory variables both at the firm level and at the industry level. Some industries have more firms (large industry) than others (small industry). In regression (1) one firm accounts for one observation in the estimation, which essentially use information in large industries more heavily than that in small industries. If the competition-leverage effect is only present in one or more large industries, the previous regression specification may yield biased results. Therefore, I collapse data to the industry level by computing industry average values for the relevant variables and rerun the basic regression. I derive the industry level data from surviving firms only to rule out the compositional effect ex ante. The regression model is:

$$\sum_{i=1}^{n_j} Dependent_{it} = a_j + a_t + g\,IPI_{jt-1} + b_1 \sum_{i=1}^{n_j} MtB_{it-1} + b_2 \sum_{i=1}^{n_j} Prof_{it-1} + b_3 \sum_{i=1}^{n_j} Tang_{it-1} + b_4 \sum_{i=1}^{n_j} Size_{it-1} + u_{jt} \quad (3)$$

[TABLE IX]

The regression results are summarized in Table IX. The first three columns report industry-level regressions of the three financial leverage measures. We can see that the effect of import competition here is consistent with the firm-level results in both the sign

and the magnitude of the coefficient γ. The last three columns are industry-level counterparts of the regressions in Table VII that explore how capital structure is adjusted. The results do not differ qualitatively that retained earnings decrease with import competition while outside equity increases more.

F. Further testing the trade-off theory

According to the trade-off theory, one important reason why firms reduce financial leverage when import competition increases is that expected profitability is lower and profit volatility is not lower, resulting in increased probability of bankruptcy. I try to examine this mediating step in this subsection by two approaches. First, I look at realized profitability to see if it is affected by import competition. Nevertheless, the effect should be difficult to find because profitability is endogenous. When import competition increases, profitability becomes lower. However, firms adjust over time to the shock by improving economic efficiency or financial structure, which may counteract on the initial effect. So I also take a second approach, i.e., I explore the ex ante domestic market concentration that generates exogenous cross-sectional variation in the change of profitability. Since ex ante highly concentrated markets likely have more oligopolistic profits to be competed away, the effect of competition on leverage would be greater in these industries. Note that, as Appendix A shows, domestic profitability is reduced even if the market is not oligopolistic. The interaction effect may not be large or dominant.

[TABLE X]

Table X summarizes the tests on realized profitability. Current profitability and future profitability are regressed on import penetration as well as market-to-book and firm size. I compute future profitability and profit volatility as the mean and the standard deviation of profitability over the future five years including the current year, respectively. The table shows that future profitability is reduced by import competition. Economically, one standard deviation increase in import penetration (0.107) corresponds to a decrease of 0.044 in future profitability, which is 17% of its standard deviation. Profit volatility does not change significantly. Taken together, the evidence is consistent with the mechanism of the trade-off theory.

[TABLE XI]

Table XI explores the interaction between market concentration and import competition. I use Herfindahl Index (HI) to measure the level of market concentration. HI is computed based on net sales of firms in each industry. Specifically, HI for industry j in year t is defined as $\frac{\sum_{i=1}^{n_{jt}} sales_{it}^{2}}{\left(\sum_{i=1}^{n_{jt}} sales_{it}\right)^{2}}$ where n_{jt} is the number of firms for industry j in year t. Column (1) includes the interaction of 1989 HI and import penetration in the leverage regression and columns (2) to (6) reports results for industry groups sorted by 1989 HI quintiles. Column (1) shows a marginally significant cross effect with the expected negative sign. The quintile regressions show this pattern as well. Expectedly, the interaction term does not account for an exclusive fraction of the competition-leverage effect. From Table VI we know that for an industry with the average HI, the competition-leverage effect is -0.318. One standard deviation increase in HI (0.05) changes the competition-leverage effect by -0.11, which is only about 35% of the average effect. The quintile regressions also reveal that even the industries that are the least concentrated ex ante reduce their leverage significantly when import penetration increases (with an economically large coefficient of -0.256).

G. Section summary

In summary of my empirical analysis, the evidence in the U.S. manufacturing industries strongly supports the story that import competition leads to reduced financial leverage. The effect of import penetration on leverage is economically big: one standard deviation change in import penetration leads to at least 25% standard deviation change in leverage. Firms seem to be using outside equity rather than retained earnings to adjust capital structure. Realized profitability is reduced by import competition and more concentrated domestic industries are affected more, which are most consistent with the trade-off theory of capital structure.

IV. Alternative hypotheses and a tentative test

A. The disciplinary role of debt hypothesis

Product market competition may also affect managerial incentives and reduce the usage of debt. Agency theories predict that the incongruity between corporate managers' gains and costs motivates them to deviate from optimal effort exertion and to capture private benefits. Debt could mitigate the inefficient managerial behavior by forcing managers to make timely interest payment and therefore reducing free cash flows they can expropriate (Jensen 1986 and Stulz 1990), or by retaining more entrepreneurial equity to motivate managers (Jensen and Meckling 1976). When the market for corporate control is effective and managers act in shareholders' interest, firms tend to undertake more debt for its control benefit.

Managerial slack and expropriation may be reduced when firms are exposed to the discipline of a competitive product market because managers must maximize profits so their firms can survive.[14] The substitution between product market competition and debt therefore also predicts a negative effect of competition on optimal leverage.

I try to test the disciplinary role of debt hypothesis. I take it as an assumption that the product market competition has a disciplinary function and focus on the role of debt as a control instrument. Two firm characteristics may help testing the hypothesis. One is corporate investment opportunities. As Jensen (1986) remarks, the control benefit of debt is most useful in firms with few investment opportunities and hence ample free cash flows. Therefore, firms with high investment opportunities may use little debt for control purposes and do not reduce leverage much when competition intensifies. I use market-to-book to proxy for investment opportunities and expect a positive sign on the interaction of market-to-book and import penetration. The regression model is:

$$(D/A)_{it} = a_i + a_t + g\,IPI_{jt-1} + h\,MtB_{it-1} * IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it} \quad (4)$$

Ex ante corporate governance provides the basis for another tentative test. Specifically, the control debt hypothesis predicts that import competition reduces optimal financial leverage. This is likely to be observed in firms where corporate governance is strong. However, managers may deviate from optimal leverage if governance is weak.

[14] See Leibenstein (1966), Machlup (1967), Hart (1983) for theoretical discussions and Aggarwal and Samwick (1999), Jaganathan and Srinivasan (1999) and Fee and Hadlock (2000) for empirical evidence.

As Berger, Ofek and Yermack (1997) summarize, managers may prefer less leverage than optimal because of a desire to reduce firm risk to protect undiversified human capital (Fama 1980) or to retain free cash for discretionary use. They find that this hypothesis true in their sample of 452 largest industrial companies.[15] If the result is general that entrenched managers tend to choose low leverage, they may increase leverage when product market competition intensifies because it reduces their incentive to exploit private benefit.

I measure corporate governance by the governance index developed in Gompers, Ishii and Metrick (2003), which summarizes the number of takeover defense measures firms undertake during the 1990s. G negatively represents corporate governance and is available in selective years and for 1500 large firms only. I study the interaction of ex ante corporate governance and import competition. If the import competition-leverage effect is stronger in good governance firms, I expect a positive coefficient on the interaction term. The regression model is:

$$(D/A)_{it} = a_i + a_t + g\,IPI_{jt-1} + hG_{i90} * IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it} \quad (5)$$

[TABLE XII]

In columns (1) and (2) of Table XII I conduct OLS regressions with the interaction terms. Column (1) shows market-to-book strengthens the competition-leverage effect, opposite to the prediction. Column (2) shows that 1990 G positively affects the competition-leverage effect, which means that lower ex ante governance corresponds to smaller leverage adjustment when competition increases, consistent with the prediction. However, the cross effect is only marginally significant. Its magnitude is small compared with the main effect, too. In addition, I sort firms with governance index G data into quintiles by 1990 G and run the basic regression model (1). The results are in columns (3) to (7). I find the coefficient of import penetration does not vary monotonically across the G quintile groups. In particular, firms with the best governance (the first G quintile) do not have the most negative effect and firms with the worst governance (the 5th G quintile) still have a large negative effect. Column (8) finds weak support for the assumption that entrenched managers choose low leverage. I conclude that there is only weak evidence

[15] It is also possible that managers prefer a higher leverage according to Harris and Raviv (1988) and Stulz (1988) but the empirical evidence is rare.

that import competition reduces leverage due to its substitution of debt as a control mechanism.

B. The strategic use of debt hypothesis

Another alternative hypothesis comes from the literature on capital structure theories featured by the theory of industrial organization. If capital structure choices have an impact on product market competitiveness, firms may adjust capital structure as a strategic response. For example, debt may reduce product market competitiveness because leverage makes a firm vulnerable to predatory threat (Poitevin 1989, Bolton and Scharfstein 1990), or because consumers have a negative attitude towards indebted firms' products due to switching costs (Titman 1984, Maksimovic and Titman 1991, Chevalier and Scharfstein 1996, and Campello and Fluck 2004). Therefore, a firm will adjust its capital structure toward less debt when the product market competition increases. Unfortunately the current paper does not provide evidence about this hypothesis.

V. Conclusion

Using data of U.S. manufacturing industries, this paper finds that import competition reduces financial leverage. Since import competition generates exogenous variation in expected profitability, the paper provides the first evidence that expected profitability increases leverage, as predicted by the traditional trade-off theory of capital structure.

The study of a causal relation between profitability and capital structure is made difficult by the endogeneity that highly levered firms are less profitable. At the same time, the empirical effect of product market competition on capital structure is also obscured due to endogeneity. I use import competition as an exogenous shock to profitability and further use industry tariffs to generate variation in import competition that is independent of domestic product market strategies and competitive position.

I start from exploring a quota-eliminating trade agreement in the textile and apparel sector that greatly increased the level of competition in the domestic market. I find that the average textile and apparel firm reduced its book debt-to-asset ratio by 0.10, a significant change compared with the rest of the manufacturing sector. I also find that

surviving firms reduced their leverage in the same degree, ruling out the possibility that the compositional effect accounts for the whole effect.

I then study the effect in a large sample of all manufacturing industries from 1989 to 2001. Both the OLS regressions and the instrumental variable regressions confirm that import competition reduces leverage. One standard deviation increase in import penetration leads to over 20% of a standard deviation decrease in financial leverage. I also find that firms become less profitable and reduce their retained earnings when competition increases. Consequently, they increase outside equity and reduce debt to achieve low financial leverage. The effect is more substantial in industries with higher market concentration in 1989.

The evidence is most consistent with the trade-off theory. Specifically, import competition reduces expected profitability and thus increases the probability of bankruptcy and reduces the tax benefit of debt, resulting in lower optimal leverage.

Table I: Economic and financial situation of the textile and apparel subsector from 1990 to 2004

The real value-added production, employment, producer price index and industry markups of the textile and apparel subsector are presented from 1990 to 2004 in Panel 1. The production numbers are from the Federal Reserve Statistical Release: G.17. Industrial Production by Market, Industry Groups. Production is in 2002 U.S. dollars. The employment data are from the Bureau of Labor Statistics, U.S. Department of Labor. The producer price index data are from the Bureau of Labor Statistics, too. The markup is defined as (value added - payroll)/(value added + cost of materials), following Allayannis and Ihrig (2001). The data come from the Annual Survey of Manufacturers. In Panel 2, firm-level statistics of total assets adjusted profitability (EBITDA/A) and book debt-to-asset are presented for COMPUSTAT listed textile and apparel firms. Textile and apparel firms are firms with NAICS code 313, 314 and 315 or SIC code 22 and 23.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Panel 1. Industry aggregate data, including both public and private firms															
Value-added production ($bil)	65.5	65.2	67.6	69.7	72.3	72.0	70.2	71.7	69.5	68.2	66.0	58.0	53.4	50.3	48.5
Employment (1000s)	1,630	1,582	1,586	1,569	1,553	1,502	1,403	1,353	1,280	1,170	1,092	966	845	753	701
Producer Price Index (2002 price as 100)	92	94	96	96	96	98	99	100	101	100	101	101	100	100	
Markup	25.9%	26.5%	27.0%	26.7%	27.2%	27.2%	27.2%	27.4%	27.3%	27.8%	26.1%	26.0%			
Panel 2. Firm level data, COMPUSTAT listed firms only															
Number of firms	109	108	119	114	114	124	127	125	115	106	95	83	75	69	60
Operating profitability: mean	11.2%	12.4%	14.6%	14.5%	15.8%	12.5%	8.6%	12.7%	13.1%	10.9%	11.5%	-9.4%	13.1%	4.2%	11.7%
std	18.1%	19.5%	16.0%	14.6%	17.6%	16.6%	58.4%	19.5%	20.0%	26.0%	18.8%	219.7%	25.3%	62.9%	27.1%
median	12.5%	12.1%	15.2%	15.4%	16.1%	13.0%	14.1%	13.5%	13.9%	12.9%	12.5%	10.6%	13.3%	13.6%	14.9%
Debt-to-asset ratio: mean	0.41	0.36	0.36	0.32	0.31	0.34	0.30	0.34	0.35	0.37	0.35	0.33	0.28	0.28	0.24
std	0.26	0.25	0.25	0.23	0.23	0.25	0.24	0.27	0.26	0.29	0.29	0.29	0.27	0.29	0.27
median	0.39	0.35	0.35	0.29	0.27	0.33	0.30	0.32	0.31	0.34	0.28	0.29	0.23	0.21	0.19

Table II: Leverage changes in textile and apparel industry from 1990 to 2004

The average book debt-to-asset ratio, market debt-to-capital ratio and interest coverage ratio of the textile and apparel sample firms are presented in contrast to that of the rest of the manufacturing sector. The debt-to-Asset Ratio is the sum of Long-term Debt (data 9) and Debt in Current Liabilities (data 34) divided by Total Assets (data 6). Interest Coverage equals earnings before interest and tax and depreciation and amortization (COMPUSTAT data 170 plus data 15 and data 14) divided by interest expense (data 15). Market debt-to-capital ratio equals the sum of total long-term debt (data 9) and debt in short-term liabilities (data 34) divided by the sum of debt (data 9 plus data 34) and market equity (data 199*data 25). Other manufacturing firms are manufacturing firms in the COMPUSTAT North American Industry Annual file excluding textile and apparel firms. Manufacturing firms have NAICS codes starting with 31, 32 or 33. The numbers below the average leverage statistics are the cross-sectional standard errors in corresponding years.

	Leverage				Change		
	1990	1995	2000	2004	1995 minus 1990	2000 minus 1995	2004 minus 2000
Panel 1. Book debt-to-asset ratio							
Other manufacturing	0.29	0.24	0.27	0.24	-0.05	0.03	-0.03
s.e.	0.005	0.004	0.005	0.006	0.007	0.007	0.008
Number of firms	[2600]	[3342]	[3034]	[2538]			
Textiles & Apparel	0.41	0.34	0.35	0.24	-0.07	0.01	-0.11
s.e.	0.02	0.02	0.03	0.04	0.03	0.04	0.05
Number of firms	[109]	[124]	[95]	[60]			
Textiles & Apparel minus manufacturing	0.12	0.10	0.08	0.00	-0.02	-0.02	-0.08
s.e.	0.03	0.02	0.03	0.04	0.03	0.04	0.05
Panel 2. Market debt-to-capital ratio							
Other manufacturing	0.22	0.14	0.17	0.12	-0.08	0.04	-0.06
s.e.	0.004	0.003	0.004	0.003	0.005	0.005	0.005
Number of firms	[2600]	[3342]	[3034]	[2538]			
Textiles & Apparel	0.33	0.27	0.32	0.16	-0.07	0.05	-0.16
s.e.	0.02	0.02	0.03	0.03	0.02	0.03	0.02
Number of firms	[77]	[104]	[85]	[55]			
Textiles & Apparel minus manufacturing	0.11	0.13	0.15	0.05	0.02	0.02	-0.10
s.e.	0.02	0.02	0.03	0.03	0.02	0.03	0.02
Panel 3. Interest coverage ratio							
Other manufacturing	7.74	10.32	7.00	10.00	2.57	-3.32	3.00
s.e.	0.25	0.27	0.24	0.34	0.37	0.36	0.42
Number of firms	[2600]	[3342]	[3034]	[2538]			
Textiles & Apparel	6.12	7.73	7.72	14.02	1.61	-0.02	6.31
s.e.	1.09	1.19	1.24	2.41	1.62	1.72	2.58
Number of firms	[108]	[115]	[90]	[55]			
Textiles & Apparel minus manufacturing	-1.62	-2.59	0.72	4.03	-0.96	3.31	3.31
s.e.	1.12	1.22	1.27	2.44	1.66	1.76	2.61

Table III: Leverage in the textile and apparel sector by survivorship.
Textile and apparel firms are sorted by survivorship and average debt-to-asset ratios are presented and compared across time. Firms that appear in the COMPUSTAT database in any one year of 1985-1989 and in 2005 are defined as surviving firms, and those that are in years 1985-1989 but not in 2005 are non-surviving firms. Non-surviving firms are further divided into four sub-groups according to the delisting code (data dlstcd) provided in the CRSP database. Specifically, if the delisting code is 574, the firm is classified as "bankrupt"; if the delisting code is otherwise between 400 and 799, the firm is classified as "other delisted"; if the delisting code is between 200 and 299, the firm is classified as "merged"; finally if the delisting code is none of the above or missing, the firm is classified as "other". Integers in the square brackets below D/A values are the number of firms in the corresponding year.

	Book debt-to-asset ratio					Change		
Firm Group	1990	1995	2000	2004		1995-1990	2000-1990	2004-1990
All	0.40	0.33	0.29	0.19		-0.08	-0.12	-0.21
Number of firms	[100]	[68]	[43]	[32]	t-stat	(-2.57)	(-3.36)	(-5.95)
Non-surviving								
Bankrupt	0.55	0.44	0.55			-0.12	-0.01	
Number of firms	[6]	[3]	[2]	[0]	t-stat	(-1.27)	(-0.03)	
Other Delisted	0.41	0.41	0.53			0.00	0.12	
Number of firms	[19]	[10]	[2]	[0]	t-stat	(0.01)	(1.78)	
Merged	0.40	0.29	0.07			-0.10	-0.33	
Number of firms	[22]	[15]	[4]	[0]	t-stat	(-1.55)	(-4.79)	
Other	0.43	0.27	0.14	0.13		-0.17	-0.30	-0.31
Number of firms	[27]	[14]	[9]	[6]	t-stat	(-2.24)	(-3.80)	(-3.72)
Surviving	0.33	0.34	0.33	0.21		0.01	0.01	-0.12
Number of firms	[26]	[26]	[26]	[26]	t-stat	(0.18)	(0.10)	(-2.20)

Table IV: Summary statistics of the manufacturing sample.
This table reports the means and standard deviations of variables in the panel data which contains all manufacturing firms from 1989 to 2001.

variable	mean	s.d.
book debt-to-asset ratio	0.215	0.199
interest coverage	2.76	18.9
market debt-to-capital ratio	0.165	0.173
log asset	4.57	2.14
outside equity	1.018	1.860
retained earnings	-0.476	1.937
Lagged import penetration	0.196	0.107
Lagged tariff rate	0.044	0.025
Past 8-year moving average tariff	0.047	0.022
Lagged market-to-book ratio	2.199	2.108
Lagged operating profitability	0.051	0.339
Lagged asset tangibility	0.249	0.173
Lagged log sales	4.394	2.421

Variable definitions:
Book debt-to-asset ratio equals the sum of total long-term debt (data 9) plus debt in short-term liabilities (data 34) divided by total assets (data 6).
Interest Coverage equals earnings before interest and tax (COMPUSTAT data 170 plus data 15) divided by interest expense (data 15). Interest coverage is winsorized at the value of zero and 50.
Market debt-to-capital ratio equals the sum of total long-term debt (data 9) and debt in short-term liabilities (data 34) divided by the sum of debt (data 9 plus data 34) and market equity (data 199*data 25).
Outside equity is defined as the common stock (data 85) plus capital surplus (data 210) divided by total assets. Outside equity is winsorized at the value of 12.
Retained earnings is data 36 divided by total assets. Retained earnings is winsorized at the value of -12.
Log asset is the logarithm of Total Assets (data 6).
Import penetration index equals import divided by the sum of import and domestic production.
Industry tariff is the equal-weighted ad valorem MFN rates of all 10-digit HTS imported products in an industry.
Past 8-year moving average tariff is the average tariff in the past eight years for each industry-year when eight past years data are available. When less than eight years data are available, the average of all previous years is used.
Market-to-book equals total assets (data 6) plus market equity (the product of data 199 and data 25) minus book equity (data 216), all divided by total assets. Market-to-book is winsorized at the 1st and 99st percentiles.
Operating profitability is Operating Income (data 13) divided by previous year Total Assets (data 6). Operating profitability is winsorized at the 1 and 99 percentiles.
Asset Tangibility is defined as net PP&E (data 8) divided by total assets (data 6).
Log sales is the log of Net Sales. Net Sales is COMPUSTAT data 12.
All lagged variables are of one-year lags.

Table V: Capital structure changes of manufacturing industries sorted by Import Penetration Index (IPI) changes

Industry names, import penetration and book debt-to-asset in 1989, as well as 1989-2003 cumulative changes in import penetration and debt-to-asset are listed below for 3-digit NAICS industries. Industries are sorted by the import penetration change. The average number of firms is computed over the twenty years from 1990 to 2004. I divide industries into 3 groups by the change of import penetration and perform statistical tests of the debt-to-asset ratio change in Panel 2. Import penetration and debt-to-asset are defined in Table IV.

Panel 1

IPI Change group	3-digit naics	industry name	Avg # firms	import penetration in 1989	Debt-to-asset in 1989	import penetration Change	Debt-to-asset Change
H	315	Apparel Manufacturing	73	30.4%	0.40	26.7%	-0.154
H	316	Leather and Allied Product Manufacturing	28	52.5%	0.29	21.0%	-0.156
H	335	Electrical Equipment, Appliance, and Component Manufacturing	118	13.9%	0.36	16.5%	-0.100
H	314	Textile Product Mills	10	8.3%	0.42	15.4%	-0.165
H	337	Furniture and Related Product Manufacturing	39	8.4%	0.35	14.0%	-0.051
H	334	Computer and Electronic Product Manufacturing	884	22.3%	0.25	12.0%	-0.067
H	325	Chemical Manufacturing	548	6.7%	0.28	11.3%	-0.016
M	336	Transportation Equipment Manufacturing	165	18.3%	0.34	8.9%	0.017
M	339	Miscellaneous Manufacturing	231	25.2%	0.29	8.0%	-0.049
M	333	Machinery Manufacturing	290	16.9%	0.30	7.4%	-0.017
M	313	Textile Mills	28	7.3%	0.38	6.6%	-0.012
M	331	Primary Metal Manufacturing	88	14.8%	0.29	6.1%	0.049
M	321	Wood Product Manufacturing	32	9.2%	0.35	6.0%	-0.053
M	327	Nonmetallic Mineral Product Manufacturing	43	8.5%	0.35	5.9%	-0.078
L	312	Beverage and Tobacco Product Manufacturing	38	3.4%	0.42	5.5%	-0.031
L	332	Fabricated Metal Product Manufacturing	115	6.4%	0.33	4.8%	0.024
L	326	Plastics and Rubber Products Manufacturing	82	6.5%	0.35	3.7%	0.063
L	324	Petroleum and Coal Products Manufacturing	37	7.8%	0.31	2.6%	-0.005
L	323	Printing and Related Support Activities	40	2.4%	0.27	2.3%	0.038
L	322	Paper Manufacturing	61	8.5%	0.30	2.0%	0.097
L	311	Food Manufacturing	118	3.6%	0.31	1.4%	-0.003

Panel 2: statistical significance

Change in import penetration from 1989 to 2003	Number of industries	Average # of firms	Change in D/A from 1989 to 2003	t-value* of D/A change	p-value of ANOVA
Big	7	1701	-0.10	-4.56	0.0003
Medium	7	878	-0.02	-1.23	
Small	7	491	0.03	1.58	

* t-value of D/A change is based on industry level standard deviations.

* ANOVA tests the hypothesis that the mean D/A change is the same in three groups.

Table VI: The effect of import competition on financial leverage

Columns (1) to (6) report results from the following OLS regression model for all manufacturing firms from 1989 to 2001:

$$(D/A)_{it} = a_i + a_t + g\,IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it}$$

Columns (7) and (8) report the IV regression result, where IV is the 1-year lagged industry average tariff rate in column (7) and the past 8-year moving average tariff in column (8). In column (9) and (10) the following regression is run for firms that have D/A data in 1995 and 2004 except that (9) does not have the control variables:

$$(D/A)_{i2001} - (D/A)_{i1995} = g(IPI_{j1995} - IPI_{j1989}) + b_1(MtB_{i1995} - MtB_{i1989}) + b_2(Prof_{i1995} - Prof_{i1989})$$
$$+ b_3(Tang_{i1995} - Tang_{i1989}) + b_4(Size_{i1995} - Size_{i1989}) + e_i$$

Observations are clustered by industry and robust standard errors are reported in the parentheses below the coefficients. For definitions of variables used in this table, please refer to Table IV.

Dependent	$(D/A)_{it}$									$(D/A)_{i2001}$-$(D/A)_{i1995}$	
	OLS	OLS	OLS	OLS	OLS	OLS	IV	IV		OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		(9)	(10)
Import Penetration	-0.318***	-0.329***	-0.313***	-0.333***	-0.315***	-0.336***	-0.567	-0.378	IPI_{j1995} - IPI_{j1989}	-0.575***	-0.528**
(IPI_{jt-1})	(0.102)	(0.097)	(0.092)	(0.094)	(0.096)	(0.112)	(0.531)	(0.244)		(0.199)	(0.212)
Market-to-Book	-0.006***		-0.007***				-0.005***	-0.006***	MtB_{i1995} – MtB_{i1989}		0.003***
(MtB_{it-1})	(0.0011)		(0.0016)				(0.0011)	(0.0011)			(0.0033)
Profitability	-0.045***			-0.026*			-0.045***	-0.045***	$Prof_{i1995}$ – $Prof_{i1989}$		0.037***
($Prof_{it-1}$)	(0.013)			(0.013)			(0.013)	(0.013)			(0.025)
Asset Tangibility	0.188***				0.21***		0.187***	0.188***	$Tang_{i1995}$ – $Tang_{i1989}$		0.064***
($Tang_{it-1}$)	(0.026)				(0.028)		(0.024)	(0.025)			(0.066)
Firm Size ($Size_{it-1}$)	0.022***					0.019**	0.022***	0.022***	$Size_{i1995}$ – $Size_{i1989}$		-0.017***
	(0.005)					(0.004)	(0.005)	(0.005)			(0.012)
firm fixed-effects	yes	yes	yes	yes	yes	yes	yes	yes			
year fixed-effects	yes	yes	yes	yes	yes	yes	yes	yes			
# clusters	21	21	21	21	21	21	21	21	# clusters	21	21
Adjusted R^2	0.68	0.67	0.67	0.67	0.67	0.67	-	-	Adjusted R^2	0.006	0.013
Sample Size	29595	29595	29595	29595	29595	29595	29595	29595	Sample Size	938	938

Note: *, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table VII: Import competition and outside equity, retained earnings and assets

Asset adjusted outside equity, retained earnings, as well as the logarithm of total assets are studied in the following OLS regression for all manufacturing firms in 1989-2001: One pooled regression with firm and year fixed-effects

$$Dependent_{it} = a_i + a_t + g\,IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it}$$

Observations are clustered by industry and robust standard errors are reported in the parentheses below the coefficients. Outside equity is defined as the common stock (data 85) plus capital surplus (data 210), retained earnings is data 36, and log assets is the logarithm of Total Assets (data 6). For definitions of other variables used in this table, please refer to Table IV.

Dependent:	Asset-adjusted Outside equity	Asset-adjusted Retained earnings	Asset-adjusted log assets
Import Penetration (IPI_{jt-1})	3.31**	-2.99*	-0.38
	(1.61)	(1.69)	(0.53)
Market-to-Book (MtB_{it-1})	-0.046***	0.060***	0.045***
	(0.009)	(0.012)	(0.011)
Profitability ($Prof_{it-1}$)	0.016	0.061	-0.132**
	(0.094)	(0.112)	(0.054)
Asset Tangibility ($Tang_{it-1}$)	0.526	-0.777**	-0.507***
	(0.332)	(0.325)	(0.102)
Firm Size ($Size_{it-1}$)	-0.252***	0.228***	0.418***
	(0.053)	(0.056)	(0.085)
firm fixed-effects	yes	yes	yes
year fixed-effects	yes	yes	yes
# clusters	21	21	21
Adjusted R^2	0.77	0.75	0.97
Sample Size	29499	29490	29595

Note:

*, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table VIII: alternative measures of financial leverage

The interest coverage and market debt-to-capital are studied in the following OLS regression for all manufacturing firms in 1989-2001:

One pooled regression with firm and year fixed-effects

$$Dependent_{it} = a_i + a_t + g\,IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it}$$

Observations are clustered by industry and robust standard errors are reported in the parentheses below the coefficients. Interest coverage is defined as EBIT (COMPUSTAT data 170 plus data 15) divided by interest expense (data 15). The variable is winsorized at the value of 50. IV is the 1-year lagged industry average tariff rate. For definitions of other variables used in this table, please refer to Table IV.

Dependent	Interest Coverage		Market D/A	
	OLS	IV	OLS	IV
Import Penetration (IPI_{jt-1})	25.6***	68.3**	-0.337**	-0.465
	(6.1)	(27.7)	(0.148)	(0.786)
Market-to-Book (MtB_{it-1})	0.583***	0.577***	-0.009***	-0.009***
	(0.037)	(0.037)	(0.001)	(0.001)
Profitability ($Prof_{it-1}$)	7.33***	7.38***	-0.049***	-0.053**
	(0.50)	(0.51)	(0.013)	(0.013)
Asset Tangibility ($Tang_{it-1}$)	-25.2***	-25.0***	0.140***	0.140***
	(1.2)	(1.2)	(0.022)	(0.022)
Firm Size ($Size_{it-1}$)	-1.52***	-1.53***	0.024***	0.025***
	(0.14)	(0.14)	(0.007)	(0.007)
firm fixed-effects	yes	yes	yes	yes
year fixed-effects	yes	yes	yes	yes
Number of clusters	21	21	21	21
Adjusted R^2	0.43	-	0.72	-
Sample Size	29405	29405	29447	29447

Note:

*, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table IX: Industry-level variables regression

This table summarizes the regressions based on industry level variables. To construct an industry-level variable, in each year for an industry, the equal-weighted average value of the firm-level variable is computed for all surviving firms in the industry. Surviving firms are defined as firms that are in the COMPUSTAT database in both years 1985-1989 and 2005.

Regression model:

$$\sum_{i=1}^{n_j} Dependent_{it} = a_j + a_t + g\, IPI_{jt-1} + b_1 \sum_{i=1}^{n_j} MtB_{it-1} + b_2 \sum_{i=1}^{n_j} Prof_{it-1} + b_3 \sum_{i=1}^{n_j} Tang_{it-1} + b_4 \sum_{i=1}^{n_j} Size_{it-1} + u_{jt}$$

where n_j is the number of firms in industry j.

Dependent	Leverage					
	Book D/A	Market D/A	Interest Coverage	Outside equity	Retained earnings	Log assets
Import Penetration (IPI_{jt-1})	-0.457***	-0.341***	9.20	1.18*	-0.62	-0.325
	(0.099)	(0.091)	(8.35)	(0.69)	(0.777)	(0.297)
Market-to-Book (MtB_{jt-1})	-0.0100	-0.033***	2.27***	0.042	-0.0140	0.025
	(0.0082)	(0.0075)	(0.69)	(0.057)	(0.0641)	(0.025)
Profitability ($Prof_{jt-1}$)	-0.364***	-0.336***	33.5***	0.177	0.230	-0.102
	(0.063)	(0.057)	(5.3)	(0.431)	(0.489)	(0.187)
Asset Tangibility ($Tang_{jt-1}$)	-0.140	0.050	25.9***	-1.28*	1.485*	0.092
	(0.101)	(0.092)	(8.4)	(0.69)	(0.786)	(0.300)
Firm Size ($Size_{jt-1}$)	0.036***	0.039***	-2.25***	-0.601***	0.569***	0.818***
	(0.009)	(0.008)	(0.76)	(0.063)	(0.071)	(0.027)
industry fixed-effects	yes	yes	yes	yes	yes	yes
year fixed-effects	yes	yes	yes	yes	yes	yes
Adjusted R^2	0.76	0.82	0.65	0.77	0.73	0.99
Sample Size	273	273	273	273	273	273

Note:

*, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table X: Realized profitability and import competition

This table studies how realized profitability is affected by import competition. Profitability is defined in Table IV. For firm i in year t, future profitability is the average of future five year profitability including the current year t. Profit volatility is the standard deviation of the future five years' profitability (t ~ t+4).

Dependent	(1) Current profitability	(2) Future profitability	(3) Future profitability	(4) Profit volatility
Import Penetration (IPI_{jt-}	-0.217	-0.352***	-0.406***	0.024
	(0.139)	(0.121)	(0.119)	(0.080)
Market-to-Book (MtB_{it})	0.0050		-0.001***	
	(0.0065)		(0.0007)	
Firm Size ($Size_{it}$)	0.1092**		0.032**	
	(0.0096)		(0.005)	
firm fixed-effects	yes	yes	yes	yes
year fixed-effects	yes	yes	yes	yes
# clusters	21	21	21	21
Adjusted R^2	0.74	0.92	0.92	0.81
Sample Size	29595	15982	15982	15982

Note:
*, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table XI: Ex ante market concentration and the effect of import competition on financial leverage

This table reports tests on the mediating role of profitability in the competition-leverage effect. Market concentration is measured by the Herfindahl Index (HI) based on net sales. Specifically, HI for industry j in year t is defined as $\frac{\sum_{i=1}^{n_{jt}} sales_{it}^{2}}{\left(\sum_{i=1}^{n_{jt}} sales_{it}\right)^{2}}$, where n_{jt} is the number of firms for industry j in year t. Ex ante market concentration is the 1989 value of HI, i.e., HI_{j89}.

Regression model in column (2):

$$(D/A)_{it} = a_i + a_t + g\,IPI_{jt-1} + h\,HI_{j89} * IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it}$$

Columns (2) to (6) are regressions using the data of firms in industries that are in different quintiles of the 1989 HI. Data are clustered by industry and robust standard errors are reported in the parentheses below the estimated coefficients. Firm and year fixed-effects are included in the regressions. For definitions of variables used in this table, please refer to Table IV.

Dependent = $(D/A)_{it}$	(1)	(2) Quintile 1 $HI_{j,89}$ <0.05	(3) Quintile 2 0.05<$HI_{j,89}$< 0.07	(4) Quintile 3 0.07<$HI_{j,89}$< 0.10	(5) Quintile 4 0.10<$HI_{j,89}$ <0.18	(6) Quintile 5 $HI_{j,89}$ >0.18
Import Penetration (IPI_{jt-1})	-0.161	-0.256*	-0.282	-0.411	-0.464**	-0.201
	(0.133)	0.111	0.184	0.770	0.151	0.773
Herfindahl IndexI*Import Penetration (HI_{ij89}*IPI_{jt-1})	-2.26* (1.13)					
Market-to-Book (MtB_{it-1})	-0.006***	-0.0050**	-0.0027	-0.0050	-0.0094	-0.0347**
	(0.001)	0.0014	0.0016	0.0026	0.0062	0.0054
Profitability ($Prof_{it-1}$)	-0.044***	-0.033*	-0.083***	-0.067*	-0.057**	-0.027
	(0.013)	0.015	0.004	0.023	0.020	0.083
Asset Tangibility ($Tang_{it-1}$)	0.189***	0.226***	0.169***	0.193**	0.141***	-0.290**
	(0.026)	0.027	0.016	0.035	0.025	0.046
Firm Size ($Size_{it-1}$)	0.022**	0.016**	0.038***	0.024**	0.036***	0.004
	(0.005)	0.004	0.003	0.007	0.005	0.007
firm fixed-effects	yes	yes	yes	yes	yes	yes
year fixed-effects	yes	yes	yes	yes	yes	yes
# clusters	21	5	3	4	6	3
Adjusted R^2	0.68	0.64	0.70	0.69	0.71	0.80
Sample Size	29595	16690	4240	3348	4591	726

Note:

*, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table XII: Ex ante corporate governance and the effect of import competition on financial leverage

This table tests how ex ante corporate governance affects the competition-leverage relation. Corporate governance is measured by the governance index (G) in Gompers et al (2003). Ex ante corporate governance is the 1990 value of G, i.e., G_{i90}. Firms with missing values in G_{i90} are excluded.

Regression model in column (2):

$$(D/A)_{it} = a_i + a_t + g\,IPI_{jt-1} + hG_{i90} * IPI_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it}$$

Columns (3) to (7) are regressions using the data of firms that are in different quintiles of the 1990 G. Data are clustered by industry and robust standard errors are reported in the parentheses below the estimated coefficients. Firm and year fixed-effects are included in the regressions except for column (8), which is a cross-sectional regression in year 1990. For definitions of variables used in this table, please refer to Table IV.

Dependent = $(D/A)_{it}$	(1)	(2)	(3) Quintile 1 G_{90}<=6	(4) Quintile 2 G_{90}=[7,8]	(5) Quintile 3 G_{90}=[9,10]	(6) Quintile 4 G_{90}=[11,12]	(7) Quintile 5 G_{90}>=13	(8) t=1990 sample
Import Penetration (IPI_{jt-1})	-0.309***	-0.890**	0.188	-0.665*	-0.539**	-0.067	-0.482**	
	(0.098)	(0.346)	(0.384)	(0.350)	(0.216)	(0.368)	(0.222)	
Governance*Import		0.059*						
Penetration (G_{i90}*IPI_{jt-1})		(0.033)						
Market-to-Book*Import	-0.0066							
Penetration (MtB_{it-1}*IPI_{jt-1})	(0.0057)							
Governance (G_{i90})								-0.003
								(0.002)
Market-to-Book (MtB_{it-1})	-0.0040**	-0.0150***	-0.0089	-0.0108**	-0.0268***	-0.0177***	-0.0188**	-0.055***
	(0.0017)	(0.0029)	(0.0062)	(0.0044)	(0.0053)	(0.0049)	(0.0076)	(0.0103)
Profitability ($Prof_{it-1}$)	-0.044***	-0.146***	-0.067	-0.208**	-0.128	-0.142	-0.317**	-0.134
	(0.014)	(0.024)	(0.048)	(0.080)	(0.086)	(0.099)	(0.120)	(0.079)
Asset Tangibility ($Tang_{it-1}$)	0.188***	0.016*	0.168	-0.077	0.046	0.023	-0.086	0.074
	(0.026)	(0.052)	(0.115)	(0.098)	(0.131)	(0.044)	(0.145)	(0.045)
Firm Size ($Size_{it-1}$)	0.022***	0.030***	0.043*	0.023	0.010	0.040**	0.038	0.0105**
	(0.005)	(0.011)	(0.023)	(0.019)	(0.012)	(0.018)	(0.029)	(0.0052)
firm fixed-effects	yes	yes	yes	yes	yes	yes	yes	yes
year fixed-effects	yes	yes	yes	yes	yes	yes	yes	yes
# clusters	21	21	21	21	16	19	19	21
Adjusted R^2	0.68	0.70	0.72	0.72	0.70	0.72	0.62	0.12
Sample Size	29595	5895	1164	1279	1380	1248	824	543

Note:

*, **, and *** beside the estimated coefficients denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Appendices

A. A simple illustrative model about the effect of quota elimination on domestic production, equilibrium price and profits.

I consider an economy that had a protective quota, denoted by $\overline{Q}_f$, and then totally eliminates it. I assume the economy is in equilibrium before the policy change, i.e., the product markets clear. Following the standard microeconomic literature, I assume domestic firms maximize profits. Then I show that quota elimination increases imports and decreases domestic product price, and that domestic firms profit less, ceteris paribus.

Aggregate demand and supply in the product market

Consider the following product market demand and supply system:

Industry demand: $Q_D = a - bP$ (1.1)

Domestic supply: $Q_{S,d} = c_d P$ (1.2)

Foreign(Import) supply: $Q_{S,f} = c_f P$ (1.3) [16]

where a, b, c_d and c_f are non-negative model parameters. a can be viewed as the maximum demand of the economy and b is an inverse marginal demand parameter. Assume that $0<c_d < c_f$. Since c_d and c_f are related to inverse marginal costs, I implicitly assume that foreign suppliers have a comparative advantage. In the extreme, c_f equals positive infinity, which means foreign supply can be very big at a very low price.

Without quota protection, market equilibrium is determined by the following system

$$Q_D = Q_{S,d} + Q_{S,f}$$

which yields the equilibrium price and quantity

$$P^* = \frac{a}{b + c_d + c_f} \quad (1.4)$$

$$Q^* = \frac{a(c_d + c_f)}{b + c_d + c_f}$$

[16]Note that by omitting negative intercept terms in (1.2) and (1.3), I set the fixed costs of production to zero for both foreign and domestic suppliers for model simplicity.

Substituting (1.4) into (1.2) yields domestic quantity $Q_{S,d}^* = \frac{ac_d}{b + c_d + c_f}$. (1.5)

Substituting (1.4) into (1.3) yields import quantity $Q_{S,f}^* = \frac{ac_f}{b + c_d + c_f}$. (1.6)

Since $c_d < c_f$, we know that $Q_{S,d}^* < Q_{S,f}^*$.

With quota protection, $Q_{S,f}^{**} = \bar{Q}_f$. Assume $\bar{Q}_f < Q_{S,f}^*$, so that quota is protective. The equilibrium price is determined by the following system

$$Q_d = Q_{s,d} + \bar{Q}_f$$

which yields the equilibrium price and quantity

$$P^{**} = \frac{a - \bar{Q}_f}{b + c_d} \quad (1.7)$$

$$Q^{**} = \frac{ac_d - b\bar{Q}_f}{b + c_d}$$

Substituting (1.7) into (1.2) yields domestic quantity $Q_{S,d}^{**} = \frac{ac_d - \bar{Q}_f c_d}{b + c_d}$ (1.8)

It is easy to show that $P^* < P^{**}$. This means that when import quota is lifted, the prevailing market price becomes lower. The difference between P* and P** depends on how restrictive the quota limit was. One can also easily find that domestic production is lower and the share of imports in total production is higher when quota is lifted.

Profitability of individual domestic firms

Assume there are n firms in the industry, indexed by $i \in (1, 2, 3, \ldots, n)$. Each firm chooses its production quantity to maximize its profit. Also assume that the marginal cost of firm i is $(1/c^i)q^i$.

Firm i's profit

$$\pi^i = P \cdot q^i - \int_{q=0}^{q^i} \frac{1}{c^i} q dq = P \cdot q^i - \frac{1}{2c^i} q^{i2} \quad (1.9)$$

Solving the first order condition gives the condition for profit maximization of firm i, i.e.,

$$q^{i*} = c^i P \quad (1.10)$$

which is the firm's optimal production.

To see how individual firm's production function maps to the domestic supply function, I aggregate the individual supply function over all n firms and get $Q_{S,d} = \sum_{i=1}^{n} q^i = \sum_{i=1}^{n} c^i \cdot P$. By comparing it with the domestic supply function (1.2) I obtain $c_d = \sum_{i=1}^{n} c^i$. This result implies that individual firms' marginal production costs are directly linked to the shape of the aggregate domestic supply.

Substituting (1.10) into (1.9), I get firm i's optimal profits $\pi^{i*} = \frac{1}{2} c^i P^2$ (1.11)

To summarize the above model, when quota is lifted, imports surge and the prevailing market price becomes lower. Consequently, individual domestic firms produce less and profit less, too.

B. Listed textile and apparel firms compared with the whole industry sector

In the Economic Census years from 1987 to 2002, listed textile and apparel firms are compared with the sector aggregates in terms of number of companies, number of employees and total capital expenditures. The data for sector aggregates come from the General Summary files of the Economic Census in 2002. The data for listed firms are from the COMPUSTAT North American Industry Annual file. The number of employees is data 29 and capital expenditures is data 128.

census year		Number of companies	%	employees (1,000)	%	capital expenditure ($mil)	%
2002	all firms	22,785	100%	796	100%	2,364	100%
1997		27,218	100%	1,338	100%	4,352	100%
1992		26,225	100%	1,602	100%	3,170	100%
1987		26,283	100%	1,753	100%	2,764	100%
2002	listed firms only	64	0.3%	401	50%	1,246	53%
1997		114	0.4%	498	37%	2,489	57%
1992		111	0.4%	508	32%	1,712	54%
1987		110	0.4%	602	34%	1,741	63%

C. Industry tariff and import penetration data

Import penetration equals import divided by the sum of import and domestic production. The industry tariff is the equal-weighted ad valorem MFN rates of all 10-digit HTS imported products in an industry. The horizontal label is the 3-digit NAICS code, the corresponding industry names are in Table V.

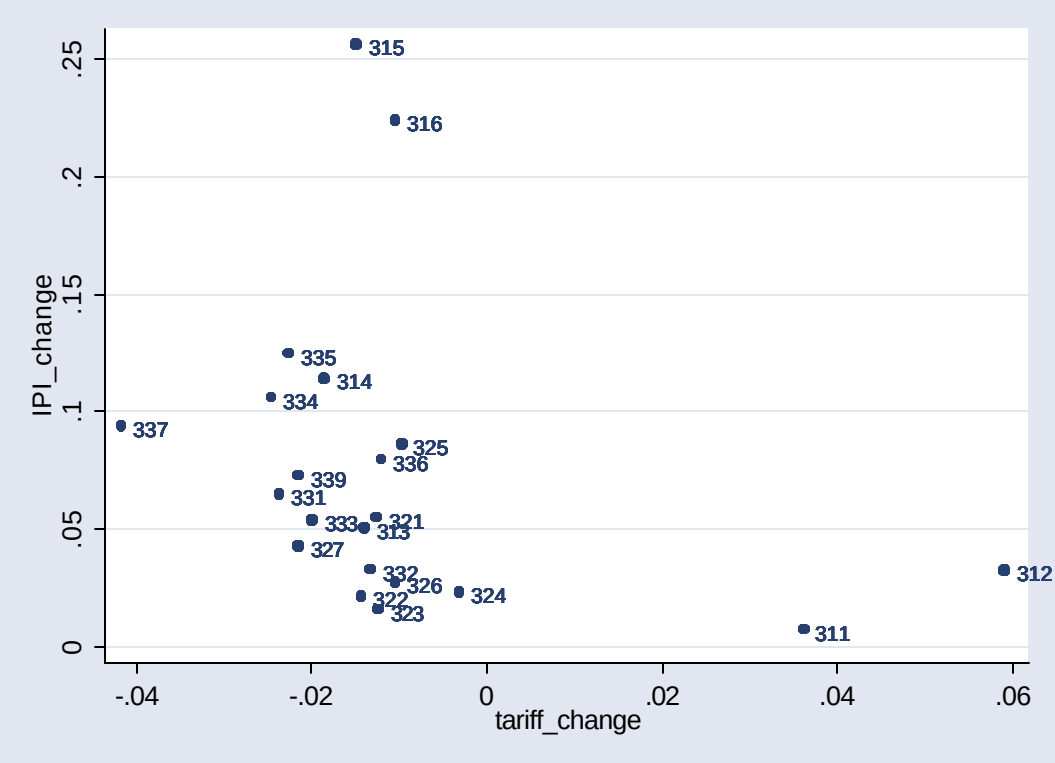
Industry tariff

tariff	311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
1989	5.8%	10.9%	11.4%	8.0%	13.4%	12.6%	3.4%	2.4%	2.0%	1.6%	5.3%	4.7%	6.9%	4.4%	4.4%	3.4%	4.3%	4.5%	4.2%	4.7%	5.3%
1990	5.9%	9.3%	11.3%	7.6%	13.5%	12.6%	3.4%	2.4%	2.0%	1.5%	5.3%	4.7%	6.8%	4.4%	4.4%	3.4%	4.1%	4.6%	4.2%	4.6%	5.2%
1991	6.0%	10.4%	11.2%	7.6%	13.5%	12.5%	3.4%	2.4%	2.0%	1.5%	5.2%	4.7%	7.1%	4.5%	4.4%	3.4%	4.2%	4.6%	4.2%	4.6%	5.2%
1992	5.9%	7.1%	11.3%	7.8%	13.3%	12.5%	3.4%	2.4%	2.0%	1.6%	5.3%	4.7%	7.1%	4.5%	4.4%	3.4%	4.2%	4.6%	4.3%	4.6%	5.3%
1993	6.1%	6.7%	11.6%	7.8%	13.4%	12.7%	3.4%	2.4%	2.0%	1.6%	5.4%	4.7%	7.0%	4.5%	4.4%	3.4%	4.3%	4.4%	4.3%	4.5%	5.3%
1994	6.0%	6.9%	11.2%	7.8%	13.4%	12.4%	3.4%	2.4%	2.0%	1.7%	5.3%	4.7%	7.0%	4.5%	4.4%	3.4%	4.2%	4.4%	4.3%	4.5%	5.3%
1995	9.9%	6.9%	11.0%	7.8%	12.2%	11.9%	2.9%	2.2%	1.8%	1.4%	4.7%	4.3%	6.4%	4.1%	4.2%	2.9%	4.4%	3.9%	4.2%	3.2%	4.4%
1996	9.1%	20.1%	10.5%	7.1%	11.9%	11.0%	3.0%	2.0%	1.6%	1.3%	4.5%	4.2%	5.8%	3.8%	3.8%	2.5%	3.4%	3.6%	3.9%	2.6%	4.0%
1997	9.3%	18.8%	11.4%	7.0%	13.1%	12.3%	2.8%	1.8%	1.5%	1.7%	5.3%	4.0%	5.5%	3.4%	3.8%	2.3%	3.5%	3.3%	3.6%	1.9%	4.0%
1998	10.0%	18.2%	11.1%	6.7%	12.8%	11.8%	2.5%	1.6%	1.3%	1.7%	5.0%	3.9%	5.2%	3.1%	3.5%	1.9%	2.7%	2.8%	3.3%	1.2%	3.6%
1999	9.7%	16.3%	10.2%	6.2%	12.2%	11.4%	2.1%	1.2%	0.9%	1.4%	4.5%	3.7%	4.8%	2.4%	3.1%	1.4%	1.9%	2.3%	3.0%	0.5%	3.1%
2000	9.7%	17.0%	10.3%	6.2%	12.2%	11.6%	2.1%	1.2%	0.9%	1.3%	4.5%	3.7%	4.8%	2.3%	3.1%	1.4%	1.8%	2.3%	3.0%	0.5%	3.2%
2001	9.5%	16.8%	10.0%	6.1%	12.0%	11.6%	2.1%	1.0%	0.7%	1.3%	4.3%	3.7%	4.7%	2.1%	3.1%	1.4%	1.9%	2.3%	3.0%	0.5%	3.1%

Import Penetration

IPI	311	312	313	314	315	316	321	322	323	324	325	326	327	331	332	333	334	335	336	337	339
1989	3.6%	3.4%	7.3%	8.3%	30.4%	52.5%	9.2%	8.5%	2.4%	7.8%	6.7%	6.5%	8.5%	14.8%	6.4%	16.9%	22.3%	13.9%	18.3%	8.4%	25.2%
1990	3.8%	3.5%	7.7%	8.9%	30.8%	55.2%	8.8%	8.4%	2.4%	7.9%	7.1%	6.3%	8.6%	14.1%	6.3%	16.7%	22.3%	14.6%	18.8%	8.6%	24.5%
1991	3.5%	3.4%	8.4%	9.3%	30.6%	56.6%	8.9%	7.7%	2.4%	6.8%	7.4%	6.2%	8.7%	14.6%	6.4%	16.5%	23.7%	15.8%	19.1%	8.9%	24.2%
1992	3.6%	3.8%	8.7%	9.9%	33.1%	55.5%	9.8%	7.6%	2.5%	6.9%	8.1%	6.6%	8.9%	14.4%	6.8%	17.2%	25.0%	16.9%	18.6%	8.9%	26.0%
1993	3.4%	4.2%	8.8%	10.1%	34.2%	57.9%	11.0%	7.9%	2.6%	6.7%	8.3%	6.7%	9.2%	14.6%	7.1%	17.8%	26.9%	17.3%	19.0%	9.4%	26.4%
1994	3.6%	3.7%	8.6%	10.9%	35.3%	60.6%	11.5%	7.9%	2.8%	6.5%	9.0%	7.0%	9.9%	16.8%	7.4%	19.2%	28.5%	17.8%	19.9%	10.3%	27.2%
1995	3.7%	3.8%	8.8%	12.0%	36.8%	63.6%	11.2%	9.1%	3.1%	5.5%	9.8%	7.2%	10.4%	16.7%	7.3%	19.9%	29.6%	18.6%	20.3%	10.9%	27.7%
1996	4.1%	4.1%	9.1%	11.9%	38.2%	64.4%	12.5%	8.8%	3.1%	7.2%	10.5%	7.4%	10.3%	17.2%	7.8%	19.6%	29.0%	19.0%	20.8%	11.8%	28.2%
1997	4.2%	4.6%	10.2%	12.8%	41.6%	64.7%	12.7%	9.0%	3.2%	7.0%	10.9%	7.6%	10.9%	17.8%	8.1%	20.1%	28.8%	20.0%	20.8%	12.4%	29.9%
1998	4.2%	5.1%	10.4%	15.0%	45.6%	66.8%	12.7%	9.3%	3.4%	7.2%	11.7%	8.1%	11.2%	19.7%	8.4%	20.9%	29.8%	21.0%	21.1%	13.5%	30.6%
1999	4.2%	6.0%	10.9%	16.1%	47.7%	68.1%	14.1%	9.6%	3.6%	8.0%	12.9%	8.6%	12.3%	19.2%	8.8%	21.3%	31.2%	23.3%	22.5%	15.5%	31.6%
2000	4.2%	6.5%	12.2%	18.0%	52.4%	70.3%	14.1%	10.5%	3.9%	10.0%	14.1%	9.1%	13.4%	22.1%	9.7%	22.1%	33.4%	24.7%	25.5%	17.4%	32.5%
2001	4.3%	6.6%	12.4%	19.6%	56.0%	74.8%	14.7%	10.6%	4.0%	10.1%	15.3%	9.2%	12.7%	21.3%	9.7%	22.3%	32.9%	26.4%	26.3%	17.8%	32.5%

This graph shows the correlation between the cumulative change in industry-level tariffs and import penetration in years 1989 to 2001. The horizontal axis is the change in the tariff and the vertical axis is the change in import penetration. The data label is the 3-digit NAICS code, whose corresponding industry names can be found in Table V.



D. First stage regressions

This table summarizes the first stage of the main instrumental variable regression

$$(D/A)_{it} = a_i + a_t + g\,Imp_{jt-1} + b_1 MtB_{it-1} + b_2 Prof_{it-1} + b_3 Tang_{it-1} + b_4 Size_{it-1} + e_{it}$$

The instrumental variable is the industry-level tariff. The two columns contain first stage regressions of the two IV regressions in Table VI. The left column corresponds to 1-year lagged tariff as IV (column 7) and the right column corresponds to 8-year moving average tariff as IV (column 8).

dependent variable:	Import Penetration (IPI_{jt-1})	
	(7)	(8)
Tariff rate	-0.366*	-1.092***
	(0.209)	(0.394)
Market-to-Book (MtB_{it-1})	0.00021	0.000227
	(0.000142)	(0.000144)
Profitability ($Prof_{it-1}$)	-0.0008	-0.00063
	(0.00082)	(0.00079)
Asset Tangibility ($Tang_{it-1}$)	-0.0022	-0.0026
	(0.0036)	(0.0034)
Firm Size ($Size_{it-1}$)	0.00024	0.00022
	(0.00068)	(0.00068)
firm fixed-effects	yes	yes
year fixed-effects	yes	yes
F test of Tariff	3.06	7.67
Adjusted R^2	0.99	0.99
Sample Size	29595	29595

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Figure 1. Aggregate production and employment of the textile and apparel subsector

The real value-added production (Figure 1a) and employment (Figure 1b) as well as the COMPUSTAT listed firm counts (Figure 1c) of the textile and apparel subsector are presented from 1990 to 2004. Figure 1d and 1e are the average debt-to-asset ratio of the textile and apparel subsector over time. Figure 1d contrasts the textile and apparel subsector with the rest of the manufacturing sector. Figure 1e presents the debt-to-asset ratio of the average textile and apparel firm in access of the average other manufacturing firm. The dark bars represent the apparel industry while the light-colored bars represent the textile industry. Production is in the 2002 real dollar term. The production numbers are from the Federal Reserve Statistical Release: G.17. Industrial Production by Market, Industry Groups. The employment data are from the Bureau of Labor Statistics, U.S. Department of Labor. Figures 1c to 1e are based on COMPUSTAT listed firms.

Figure 1a. Domestic production

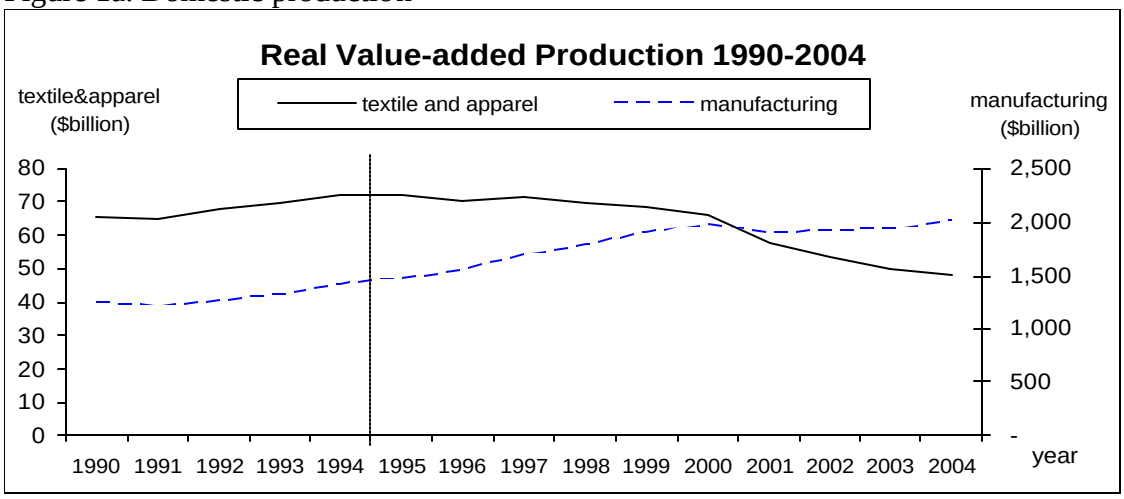


Figure 1b. Domestic employment

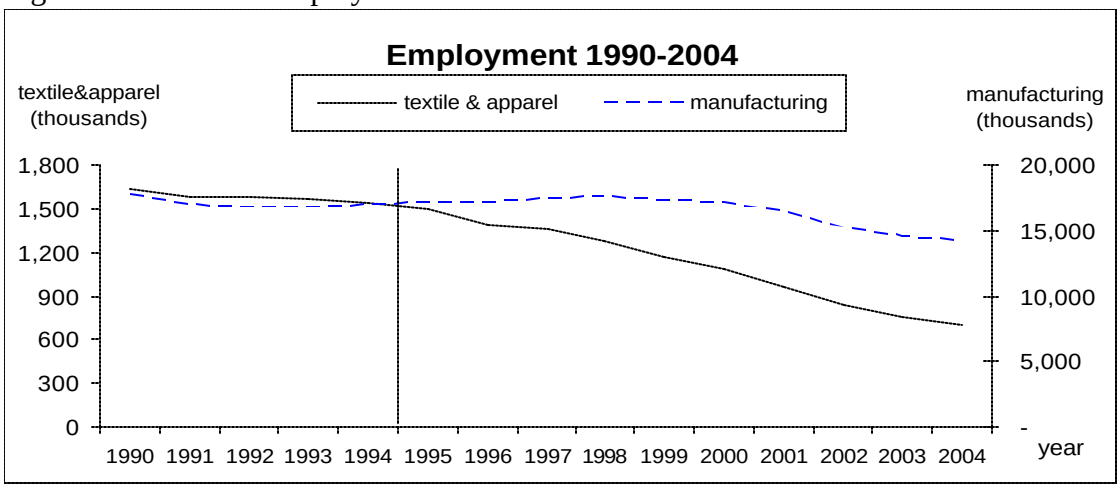


Figure 1c. Number of listed firms



Figure 1d. Book debt-to-asset

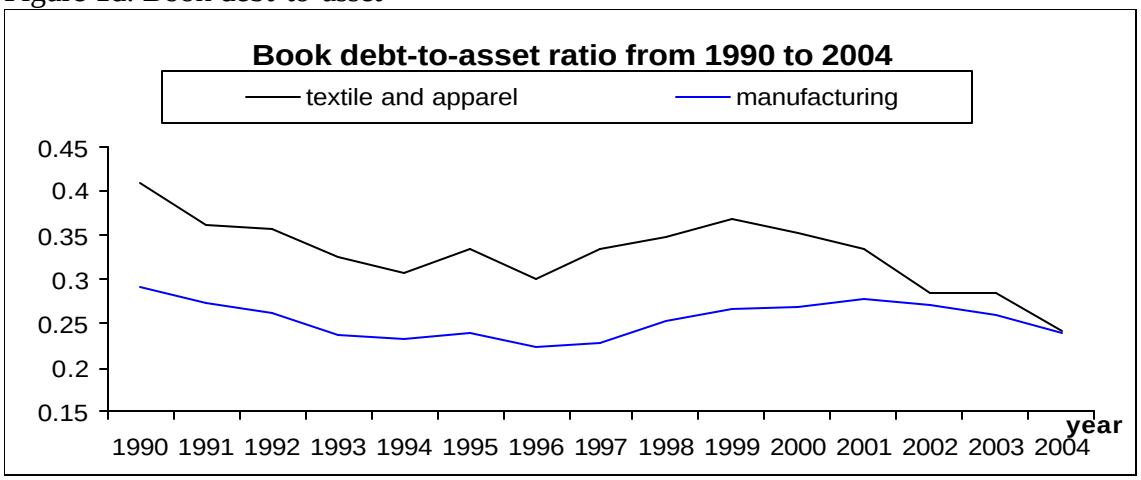
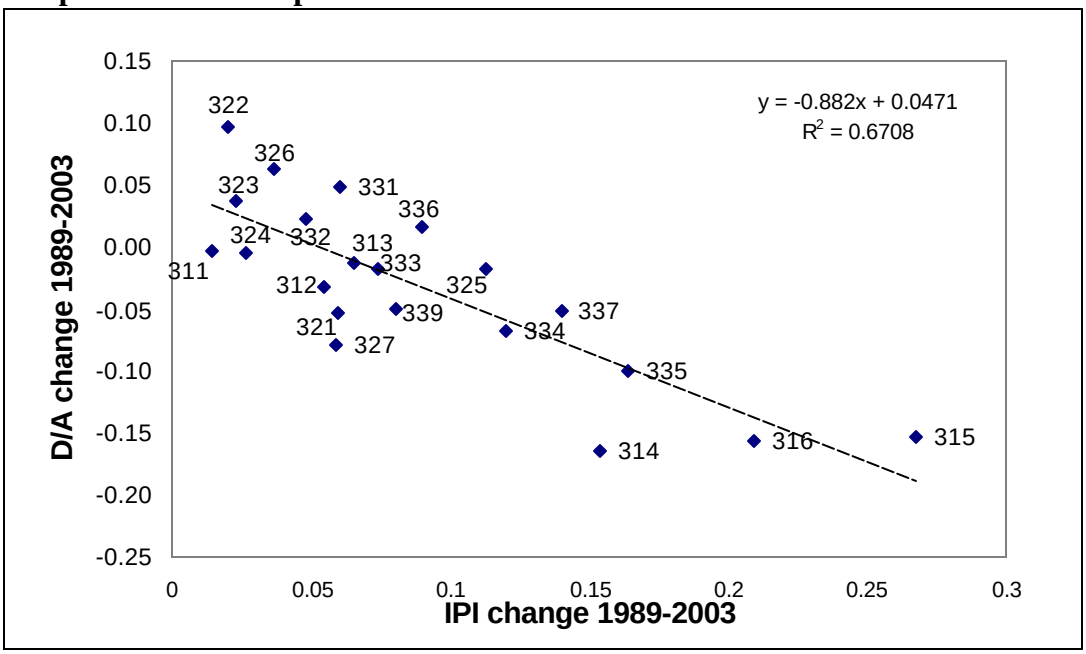


Figure 1e

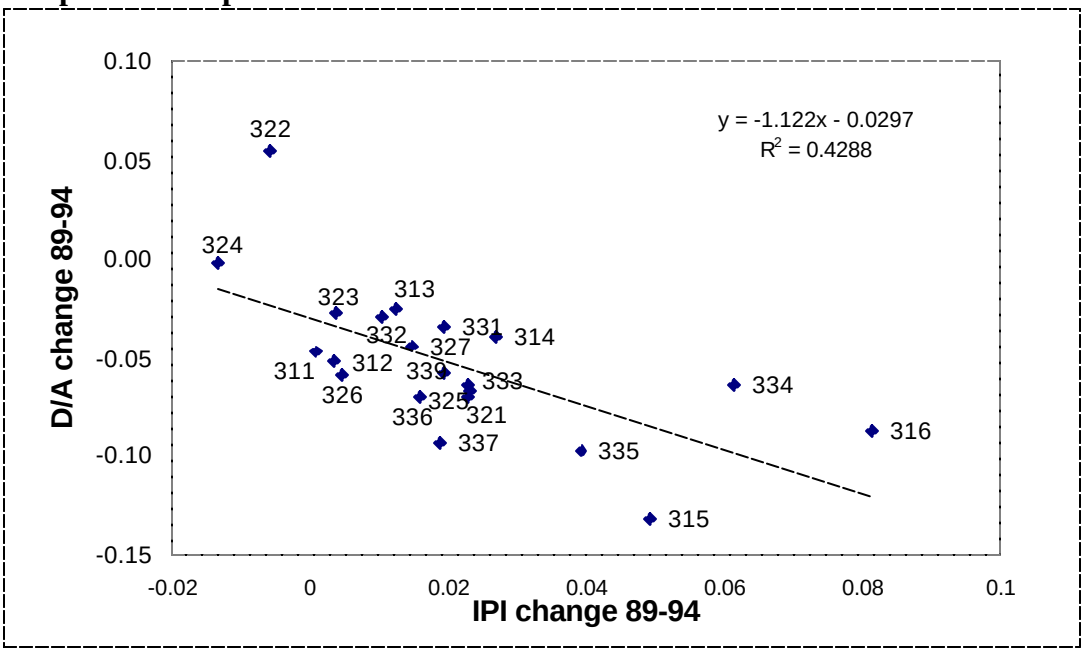


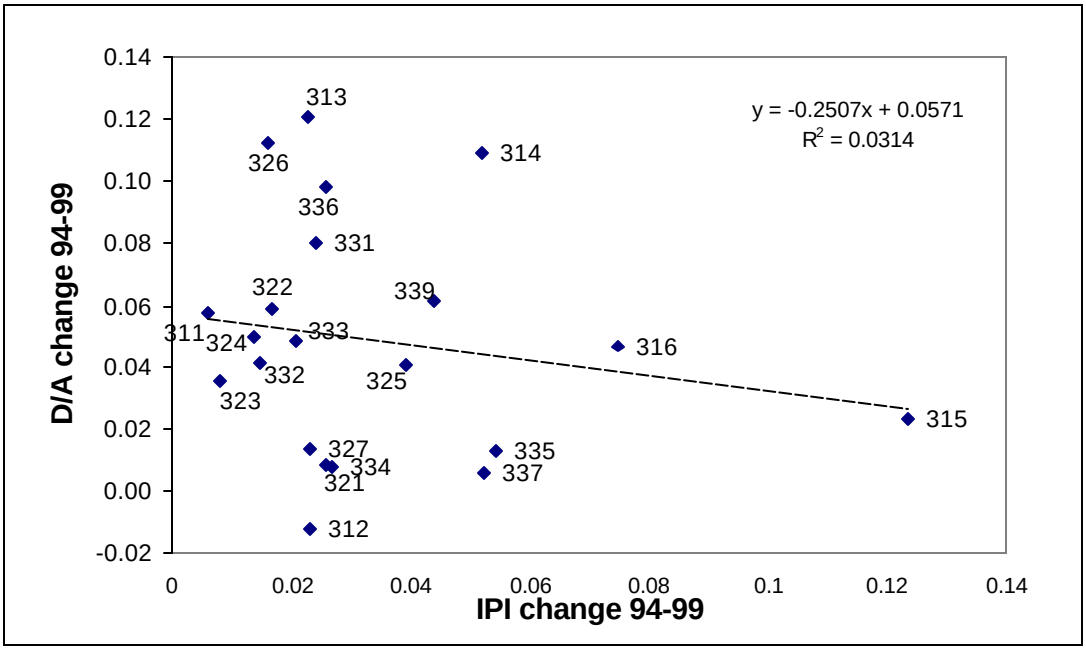
Figure 2: Import competition change negatively correlates with leverage change
The import penetration index (IPI) change and the book debt-to-asset ratio change over the 14 years (from 1989 to 2003) as well as three sub-periods (1989-1994, 1994-1999, 1999-2003) are drawn in scatter plots for 3-digit NAICS industries. Import penetration is defined as import / (import + domestic production). The data labels are 3-digit NAICS codes. The industry names corresponding to the codes are contained in Table V.

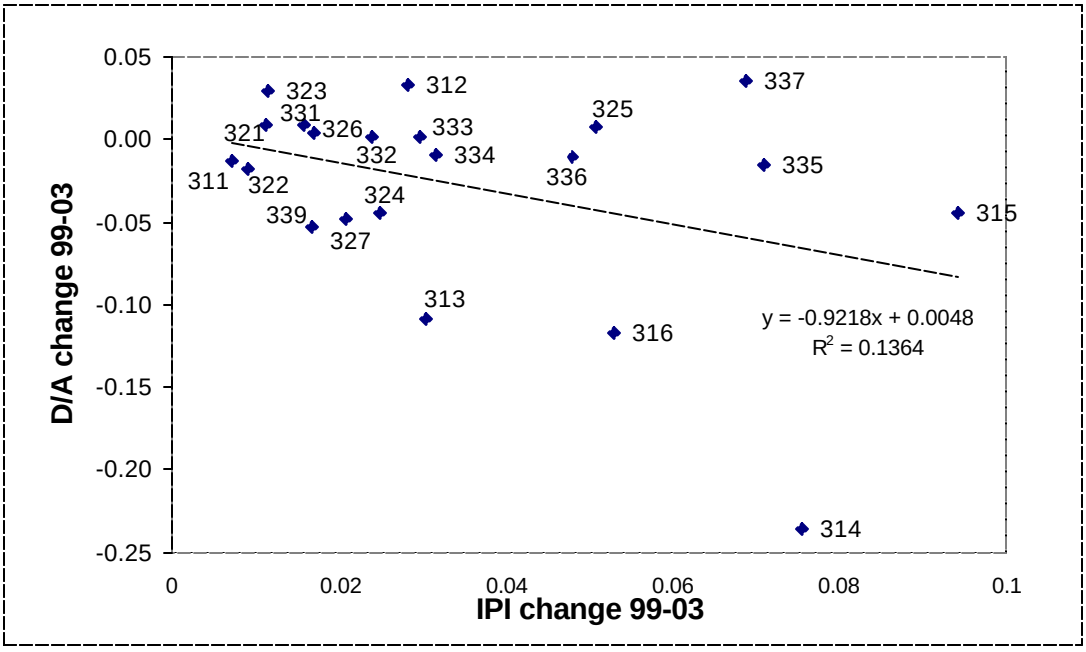
Graph for the whole period



Graphs for sub-periods




y = -0.2507x + 0.0571
R2 = 0.0314
D/A change 94-99
IPI change 94-99
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
-0.02
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
313
326
314
336
331
322
339
311
324
333
316
332
325
323
315
327
335
334
337
321
312


y = -0.9218x + 0.0048
R2 = 0.1364
D/A change 99-03
IPI change 99-03
0.05
0.00
-0.05
-0.10
-0.15
-0.20
-0.25
0
0.02
0.04
0.06
0.08
0.1
323
312
337
331
325
321
326
333
332
334
336
335
311
322
324
315
339
327
313
316
314