# Price, Quantity or Complexity: Responses of Chinese Textile Firms to Trade and Exchange Rate Policies

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## Abstract

Exporting firms may adjust price, quantity and/or complexity of products in response to changes in external environment. This paper investigates how Chinese textile firms respond to global elimination of textile import quotas in early 2005, safeguard quotas by U.S. in middle 2005, and RMB appreciation in late 2005. Evidence shows that Chinese firms responded to global quota elimination by cutting price and increasing quantity, and responded to U.S. safeguard quotas by raising price and reducing quantity. They raised price but did not reduce quantity in response to RMB appreciation. There is no evidence that Chinese textile firms adjusted export product complexity in response to the policy changes.

## Key Words

Exporting, Textiles, Import Quota, Exchange Rate, Product Complexity

## Introduction

Researchers in international business have paid much attention to behavior and strategies of firms in international markets (Ruigrok et al. 2007, Park et al. 2006), and link between firm structure and export performance (Beamish, et al. 1999, YoshiKawa et al. 2006). As more and more Chinese firms participate in international business, understanding their behavior has attracted research interests. In this paper we examine the responses of Chinese textile firms to several policy changes. Textile and apparel are China's major exporting products. After its entry into the World Trade Organization (WTO) in December 2001, China's textile exporters have witnessed two major policy events, one being change in global import quota policies, the other being change of RMB exchange rates. Following WTO's Agreement on Textiles and Clothing (ATC) reached during the Uruguay Round of trade negotiations, global textile quotas were gradually eliminated at three successive stages in 1995, 1998, and 2002 respectively, followed by full elimination of remaining quotas in January 2005. Upon becoming a WTO member in December 2001, China was granted the first three stages of textile import quota liberalization in one installment in 2002. When global textile quotas were finally phased out in January 2005, China's textile exports were free of quantitative restrictions. However, in mid 2005, the U.S. and the EU launched safeguard measures in mid 2005 by setting new textile quotas. Meanwhile, the Chinese government announced on July 21, 2005 that RMB exchange rate appreciated by 2.1% against the U.S. dollar. Since then the RMB has been on the upward trail, appreciating by 2.6% in 2005, 3.4% in 2006, and 3.9% in 2007 (to September).

Recently there are some studies on response of Chinese textile exports to changes in textile quota policies (Mayer 2005, Whally 2006, Brambilla et al. 2007, Harrigan/Barrows 2006). Whally (2006) finds that there were large increases in shipments from China to both the U.S. and the EU with large price falls for these shipments after the global-wise elimination of quotas at the beginning of 2005. This phenomenon is similar to what happened in year 2002 for exports by Chinese firms to the U.S. at the third stage of ATC integration (Mayer, 2005). Brambilla et al. (2007)

investigate separately all the four phases of ATC integration, and find that quantities of quota-binding products exported by Chinese firms increased more sharply than unbinding products both in 2002 and 2005; meanwhile, prices of quota-binding products exported by Chinese firms fell more sharply than unbinding products both in 2002 and 2005. However, Brambilla et al. (2007) have not paid attention to the safe guard quotas launched by the U.S. and the EU in mid 2005. In another recent study, Harrigan/Barrows (2006) try to identify the impact of both the global-wise quota elimination and safeguard quota imposition on China and the rest of the world. They find that both textile price and quality fell significantly after the elimination of global-wise quotas at the beginning of 2005. However, they are not able to identify the theory-predicted positive effects of the safeguard quotas.

Several recent studies have examined the impact of RMB exchange rate on China's textile exports (Gu/Wu 2007, Ye/Hu 2007, Dong/Chen 2006). Gu/Wu (2007) focus on three 3-digit SITC categories of China's textile exports, namely SITC651 (Textile Yarn), SITC652 (Cotton Fabrics, Woven), and SITC658 (Made-up Articles, Wholly), and find that 1-percent RMB appreciation would lead to an increase in prices of SITC651 and SITC658 by 1.28-1.85 percent, and little change in price of SITC652. Ye/Hu (2007) find that real effective RMB exchange rate almost has no effect on the volume of China's textile exports to the U.S, while Dong/Chen (2006) find that nominal effective RMB exchange rate has moderate but significant effect on China's textile exports.

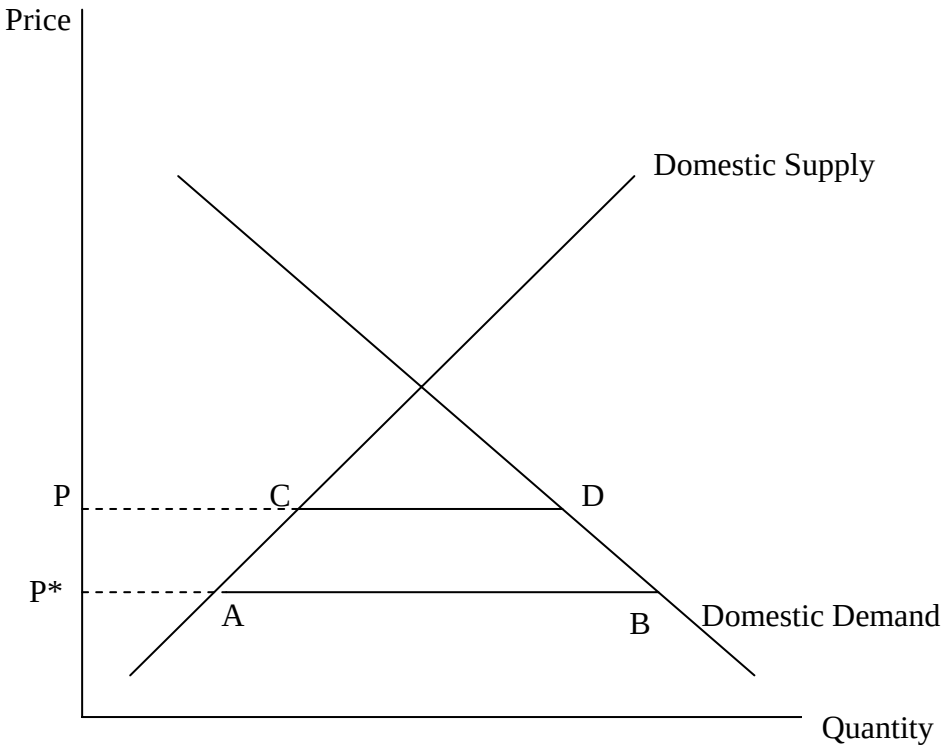
The contribution of this paper is twofold. First, we estimate simultaneously the impact of quota elimination in early 2005 and that of safeguard quotas launched in mid 2005 on prices and quantities of China's textile exports to the US. Secondly, we estimate simultaneously the impacts of import quota and RMB exchange rate policies, and also consider the impact of export product complexity.

The remainder of the paper is organized as follows. In the next section, we describe the theoretical framework for the study, based upon which we generate our hypotheses. In the following section we describe our sample and data. In the next section we report empirical results. The final section concludes.

## Hypotheses

Figure 1 illustrates the price and quantity effects of import quota. Consider a textile importing country. Under free trade, its domestic textile price equals the world price $P^*$ with import quantity equal to AB. When the country imposes an import quota, its import quantity becomes CD. Given the import quota, domestic demand exceeds supply at the price P*, and consequently price must rise to P to restore equilibrium.

**Figure 1.** Price and Quantity Effects of Import Quota




In practice, quotas may be binding or unbinding. We define binding quotas as the ones in which the amount of exports have reached quota fill rates of no less than 90%, and unbinding quotas as the ones with quota fill rates less than 90%. When quotas are eliminated, products previously subject to binding quotas should exhibit steeper growth in quantities and bigger drops in prices than previously unconstraint ones (Brambilla et al. 2007). Contrarily when quotas are imposed, products initially subject to binding quotas should exhibit steeper decline in quantities and sharper

increase in prices than previously unconstraint products. Therefore, we have the following hypothesis:

*Hypothesis 1*. Imposition of a binding import quota will cause exporting firms to increase price and decrease quantity; elimination of a binding import quota will have the opposite effects.

International trade theories also suggest another channel through which an import quota affects price (Falvey 1979, Rodriguzez 1979). Because an import quota is a restriction on quantity, exporting firms would respond by adjusting product structure to export goods of higher quality and complexity. Based on this theory, we have the following hypothesis.

*Hypothesis 2*. Imposition of a binding import quota will cause exporting firms to export goods of higher quality and complexity; elimination of a binding import quota will have the opposite effects.

The impact of exchange rates on export price is related to the concept of exchange rate pass-through, which measures how much export price would change with respect to one-percent change in exchange rate. Economic models regarding exchange rate pass-through are discussed in Hooper/Mann (1989) and Knetter (1989, 1993). According to theory, degree of pass-through is affected by exporter's production costs, exporting margins, and price elasticity of demand in the importing country. Depending upon the magnitudes of these factors, degree of pass-through may be equal to or greater than unity (complete pass-through), where the costs incurred by an appreciation of exporter's currency are completely transferred to consumers in the importing country, or less than unity (incomplete pass-through), where the costs incurred are partially transferred to the importing country. When pass-through equals zero, the costs incurred by exchange rate changes are totally absorbed by the exporters. In general, exchange rate pass-through is non-zero. In the meantime, exchange rate

appreciation generally has a lagged negative effect upon export quantity. Therefore, we have the following hypothesis:

*Hypothesis 3.* Exchange rate appreciation will lead exporting firms to raise export price, and will have a lagged negative effect on export quantity.

## Methodology and Data

### Sample

Our empirical estimation uses data from year 2001 to year 2006. In order to identify the effects of both global-wise quota elimination at the beginning of 2005 and the safe guard quotas and change in the RMB exchange rate policy in mid 2005, we split both year 2005 and year 2006 into two even periods of time, called 2005H1, 2005H2, 2006H1 and 2006H2 respectively. Therefore, there are eight periods of time in our dataset, though there are only six years involved.

The textile exports to the U.S. by Chinese firms are collected by the U.S. Department of Commerce, classified at the 10-digit Harmonized System (HS10) level. There are more than thousands of HS10 textile items exported to the U.S. by Chinese firms each year. For these HS10 items quota groups are constructed by the Office of Textiles (OTEXA), a division of the Department of Commerce. The main information about the structure of quota groups is contained in the OTEXA file, “Textile Category Description and Conversion Factors”, where the 3-digit quota group codes and HS10 codes of products within each quota group are provided. Besides, OTEXA adjusts quota groups annually, such as adding some new quota groups, or dropping out some quota groups. In order to calculate price and quantity indices for each quota group, we make the corresponding adjustment for quota groups: If there is a new quota group appearing in period t, then we construct a same quota group backward in period *t-1* containing the same 10-digit product codes; if there is a quota group appearing in period *t-1* but disappearing in period *t*, then we construct a same quota group forward in period *t* containing the same 10-digit HS product codes. In practice, this

rearrangement does not cause the overlap of HS10 products among quota groups. It should be noted that, except for those quotas constructed by our re-arrangement, a quota group in period *t* may contain HS10 products not all the same as the same quota group in period *t-1*. Finally, if two quota groups with different group code contain exactly the same HS10 products, then we unify the code for these two groups. After these adjustments, there are 187 different quota groups in our dataset. As with Harrigan & Barrows (2006) and Brambilla (2007), if a quota has fill rate equal to or greater than 90%, then this quota is binding; otherwise it is unbinding. Table 1 lists the number of binding quotas and the percentage of binding quotas in the total quota groups for the U.S. imports of textiles from China. It shows that, in year 2001 (before China's entry into WTO) and in year 2004 (before the quota were eliminated), the percentage of binding quotas reached the highest. There is no binding quota in 2005H1 due to global-wise quota elimination, while in 2005H2 all binding quotas are of safeguard quotas. There is no binding quota after year 2005 even though safeguard quotas still stand.

**Table 1.** Number of Quota Groups and Binding Quota Groups

| | No. of Quotas | No. of binding Quotas | Percentage (%) |
|---|---|---|---|
| 2001 | 166 | 37 | 22.29 |
| 2002 | 173 | 31 | 17.92 |
| 2003 | 172 | 21 | 12.21 |
| 2004 | 172 | 38 | 22.09 |
| 2005H1 | 172 | 0 | 0.00 |
| 2005H2 | 145 | 16 | 11.03 |
| 2006H1 | 153 | 0 | 0.00 |
| 2006H2 | 153 | 0 | 0.00 |

Note：The U.S. set the safeguard quotas in May 2005, which actually is contained in this table in the second half of 2005.

**Dependent Variables**

There are two dependent variables, price and quantity indices of Chinese exporting goods. The price index for a quota group is a time difference of the weighted average of the log prices of products within that quota group. Similarly, the quantity index for a quota group is a time difference of the weighted average of the log quantity of products within that quota group. The weight for the price or quantity of a product within a quota group is the logarithmic mean of the share of that product in that quota group's actual export value. As such, both the price and quantity indices have taken into consideration the changes in the price or quantity of each product, and the change in member products in each quota group. The methodologies for construction of price and quantity indices are introduced by Feentra (1994) and Sato (1976).

**Independent Variables**

Independent variables include Q2005H1, Q2005H2, Q2006H1, GEXR, and GPRODY. Q2005H1 is a dummy for quota constraint in the first half of 2005. When a quota group is binding in 2004, Q2005H1=1, otherwise Q2005H1=0. Q2005H2 is a dummy for quota constraint in the second half of 2005. When a quota group is binding in the second half of 2005, Q2005H2=1, otherwise Q2005H2=0. Q2006H1 is a dummy for quota constraint in the first half of 2006. When a quota is binding in the second half of 2005, Q2006H1=1, otherwise Q2006H1=0. Q2005H1 is used to test the effect of global-wise quota elimination at the beginning of 2005, while Q2005H2 and Q2006H1 are used to test the effect of safeguard quotas launched in the mid 2005.

GEXR is a variable representing percentage change of the RMB exchange rate against the USD. We assume that Chinese firms would take into consideration the exchange rate changes over the previous year when they price their exporting goods[1]. In July 2005 the RMB exchange rate policy changed, and the trend appreciation of the RMB against the USD appears. The RMB appreciated against the USD by 2.56% in year 2005 (from 8.2765 on Jan.1, 2005 to 8.0702 on Dec. 30, 2005), and we relate the RMB appreciation of this magnitude to the exports of textiles in 2006H1. The RMB

appreciated against the USD by 3.53% from the second half of 2005 to the first half of 2006 (i.e. from 8.2764 on June 30, 2005 to 7.9943 on June 30, 2006), and we relate the RMB appreciation of this magnitude to the exports of textiles in 2006H2. In order to limit our test for the exchange rate effect only in year 2006, we set the value of GEXR2006=0 in other period of time in our sample.

GPRODY is the annual percentage change in product complexity in year 2005, which is used to test Hypothesis (2). The product complexity is suggested by Rodrik (2006), which is the weighted average of the output of exporting nations, with the weights being the revealed comparative advantage of each nation in exports. When GPRODY increases, a nation's exports shift to higher quality products, or the product complexity increases. In our dataset GPRODY is a lagged variable, since we aim to test whether higher product complexity observed in year 2005 had a positive effect upon prices and quantities of exports in year 2006. To use lagged GPRODY can also avoid the endogeneity problem for product quality associated with the rise in export prices. For 2006H1 and 2006H2, the same set of values of GPRODY is applied. For other periods of time, we set GPRODY=0.

**Control Variables**

Control variables include time dummies for years 2002-2004, D2002, D2003 and D2004, for the first and second half year of 2005, D2005H1 and D2005H2, and for the first half of 2006, D2006H1. Furthermore, there are dummies controlling for the quota-wise fixed effect.

## Empirical Results

The correlation matrix in Table 2 shows low correlations between independent variables. A maximum VIF value in excess of 10 is frequently taken as an indication that multicollinearity may be unduly influencing the least squares estimates. According to this benchmark, our model has no serious problem with multicollinearity.

**Table 2.** Descriptive Statistics and Correlation Matrix

| Variable | Mean | SD | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|---|
| 1. Price | -0.033 | 0.291 | 1.000 | | | | | | |
| 2. Quantity | 0.149 | 1.021 | -0.413 | 1.000 | | | | | |
| 3. Q2005H1 | 0.030 | 0.170 | -0.240 | 0.088 | 1.000 | | | | |
| 4. Q2005H2 | 0.013 | 0.111 | 0.024 | -0.191 | -0.020 | 1.000 | | | |
| 5. Q2006H1 | 0.009 | 0.097 | 0.082 | -0.018 | -0.017 | -0.011 | 1.000 | | |
| 6. GEXR | 0.007 | 0.013 | 0.150 | -0.005 | -0.093 | -0.060 | 0.141 | 1.000 | |
| 7. GRPODY | 0.010 | 0.121 | 0.046 | -0.011 | -0.015 | -0.010 | 0.015 | 0.156 | 1.000 |
| N=1274 | | | | | | | | | |

Table 3 presents the effect of quotas upon prices of textiles exported by Chinese firms. We find that the dummy variables for year 2002 (D2002) and for the first half of year 2005 (D2005H1) are negative and significant, implying that the less constraint of quotas for Chinese firms after China's entry into WTO at the beginning of 2002 and the global-wise elimination of quotas at the beginning of 2005 led to a fall in exporting prices of all textiles, regardless of quota groups being binding or not. It should be noted that the fall in exporting prices related to D2002 and D2005H1, was a result of an increase in global supply of textiles, from which the quota effect was not identified.

In regression (1) under Sample A, the coefficient to Q2005H1 is negative and significant at 99% significance level, indicating that the global-wise elimination of quotas led to a fall in exporting prices of products with binding quotas. In Regression (1) under Sample B, the coefficient to Q2005H2 is positive and significant at 90% significance level, indicating that the safeguard quotas launched led to a rise in exporting prices of products with binding quotas. Note that in these two regressions, Q2005H1 and Q2005H2 are estimated separately. In regression (1) under Sample B however, we estimate Q2005H1 and Q2005H2 simultaneously. Still, the coefficient to Q2005H1 is negative and that of Q2005H2 is positive. While the coefficient to Q2005H1 is significant at 95% significance level, the negative effect of global-wise elimination of quotas remains in the second half of 2005, making the coefficient to Q2005H2 insignificant. In regression (1) under Sample C, the sample is extended to the first half of 2006. The coefficient estimates for Q2005H1 and Q2005H2 are

similar to what are obtained in regression (2) under Sample B. Furthermore, the coefficient to Q2006H1 is positive and significant at 99% significance level, indicating that the effect of global-wise elimination of quotas was weakening and dominated by the safeguard quotas in the first half of 2006. By combining regressions under Samples A-C, we conclude that the global-wise elimination of quotas at the beginning of 2005 did lead to a steeper decline in exporting prices of products with binding quotas, and the safeguard quotas launched in mid 2005 did lead to a sharper increase in exporting prices of products with binding quotas.

**Table 3.** Price Effects of Import Quotas

| Variable | Sample A | Sample B | | Sample C |
|---|---|---|---|---|
| | (1) | (1) | (2) | (1) |
| Intercept | -0.014 | -0.012 | -0.013 | -0.012 |
| | (0.64) | (0.53) | (0.58) | (0.57) |
| D2002 | -0.138 | -0.137 | -0.137 | -0.137 |
| | (3.56)*** | (3.55)*** | (3.54)*** | (3.56)*** |
| D2003 | 0.004 | 0.001 | 0.002 | 0.001 |
| | (0.12) | (0.02) | (0.08) | (0.03) |
| D2004 | 0.024 | 0.02 | 0.022 | 0.02 |
| | (0.83) | (0.72) | (0.78) | (0.72) |
| D2005H1 | -0.068 | -0.159 | -0.078 | -0.08 |
| | (1.88)* | (4.80)*** | (2.16)** | (2.34)** |
| D2005H2 | | 0.001 | 0.005 | 0.004 |
| | | (0.05) | (0.18) | (0.13) |
| D2006H1 | | | | 0.051 |
| | | | | (1.47) |
| Q2005H1 | -0.372 | | -0.355 | -0.349 |
| | (7.44)*** | | (7.22)*** | (7.25)*** |
| Q2005H2 | | 0.083 | 0.061 | 0.068 |
| | | (1.69)* | (1.19) | (1.20) |
| Q2006H1 | | | | 0.184 |
| | | | | (2.99)*** |
| N | 841 | 986 | 986 | 1136 |
| $R^2$ | 0.29 | 0.2 | 0.24 | 0.21 |

Note: The group-wise fixed effects are controlled. Heteroskadasticity-adjusted t statistics (absolute value) in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

Table 4 presents the effect of quotas upon quantities of textiles exported by Chinese firms. It shows that the coefficient to D2002 is positive and significant in all

the four regressions, implying that the quota phase-out led to a rise in quantities supplied in global market. However, the coefficient to D2005H1 is negative in all the regressions. This should be related to the fact that, when quotas were finally eliminated, exporting quantities shifted to former quota-bound products, leading to the negative sign of coefficient to D2005H1. Similarly, when the safeguard quotas were launched, the exporting quantities shifted to non-quota-constrained products, leading to the positive sign of coefficient to D2005H2.

**Table 4.** Quantity Effects of Import Quotas

| Variable | Sample A | Sample B | | Sample C |
|---|---|---|---|---|
| | (1) | (1) | (2) | (1) |
| Intercept | 0.077 | 0.068 | 0.071 | 0.075 |
| | (1.15) | (1.05) | (1.10) | (1.16) |
| D2002 | 0.392 | 0.396 | 0.394 | 0.392 |
| | (3.33)*** | (3.34)*** | (3.34)*** | (3.29)*** |
| D2003 | 0.066 | 0.08 | 0.075 | 0.073 |
| | (0.66) | (0.83) | (0.79) | (0.76) |
| D2004 | 0.062 | 0.081 | 0.076 | 0.075 |
| | (0.72) | (0.98) | (0.92) | (0.91) |
| D2005H1 | -0.316 | -0.083 | -0.296 | -0.309 |
| | (2.34)** | (0.71) | (2.24)** | (2.43)** |
| D2005H2 | | 0.368 | 0.357 | 0.355 |
| | | (3.49)*** | (3.36)*** | (3.16)*** |
| D2006H1 | | | | -0.374 |
| | | | | (3.30)*** |
| Q2005H1 | 0.993 | | 0.926 | 0.971 |
| | (5.27)*** | | (4.72)*** | (5.19)*** |
| Q2005H2 | | -2.152 | -2.094 | -2.101 |
| | | (7.94)*** | (7.92)*** | (7.11)*** |
| Q2006H1 | | | | 0.096 |
| | | | | (0.25) |
| N | 841 | 986 | 986 | 1136 |
| $R^2$ | 0.2 | 0.18 | 0.2 | 0.19 |

Note: The group-wise fixed effects are controlled. Heteroskadasticity-adjusted t statistics (absolute value) in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

In regression (1) under Sample A, the coefficient to Q2005H1 is positive and significant at 99% significance level, indicating that the global-wise elimination of quotas led to a rise in exporting quantities of textiles with initially binding quotas. In

regression (1) under sample B, the coefficient to Q2005H2 is negative and significant at 99% significance level, indicating that the binding safeguard quotas led to a fall in exporting quantities of textiles. Note that the coefficients of Q2005H1 and Q2005H2 are estimated separately in regression (1) under both Samples A and B. In regression (2) under Sample B, we estimate the coefficient to Q2005H1 and Q2005H2 simultaneously. The similar results are obtained for both the coefficients. In regression (1) under Sample C, we extend sample to include the first half of 2006. The coefficients for Q2005H1 and Q2005H2 remain almost unchanged from regression (2) under Sample B. Though the coefficient to Q2006H1 is positive, it is deeply insignificant and indifferent from zero in statistical view. Based upon all the regressions in Samples A, B and C, we conclude that, the global-wise elimination of quotas did led to a sharper increase in textiles quantities with binding quotas, while the binding safeguard quotas did led to a steeper fall in textiles quantities exported by Chinese firms. By combining results presented in Tables 3 and 4, we find evidence to support Hypothesis (1).

Table 5 presents the results regarding the effects of exchange rates and product complexity upon exporting prices (Since there are missing observations in GPRODY, the number of observations in regression (1) differs from that in regression (2) and (3) ). Look first at the effects of exchange rate changes. In regression (1) under Sample D, the effect of exchange rates is estimated without adding the variable GPRODY. It shows that the coefficient to GEXR is positive and significant at 90% significance level. In regression (3) under Sample D, we estimate the coefficients to GEXR and GPRODY simultaneously. It shows that, the coefficient to GEXR is positive and significant at 95% significant level. In both regressions the coefficient to GEXR is greater than unity, which means that the exchange rate pass-through is complete in this case. On the other hand, we find that the coefficient to GEXR is positive in both regressions (1) and (3) under Sample D in Table 6, which means that the RMB exchange rate appreciation actually led to an increase in quantities of China’s textile exports a half year later. This result is quote skeptical. Nevertheless the Hypothesis (3) is not supported.

**Table 5.** Price Effects of Exchange Rates and Product Complexity

| Variable | Sample D | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Intercept | -0.009 | 0.02 | -0.01 |
| | (0.41) | (1.52) | (0.51) |
| D2002 | -0.139 | -0.167 | -0.138 |
| | (3.61)*** | (4.70)*** | (3.63)*** |
| D2003 | -0.002 | -0.031 | -0.001 |
| | (0.06) | (1.25) | (0.03) |
| D2004 | 0.017 | -0.011 | 0.019 |
| | (0.61) | (0.51) | (0.71) |
| D2005H1 | -0.09 | -0.117 | -0.087 |
| | (2.63)*** | (3.88)*** | (2.58)** |
| D2005H2 | 0.001 | -0.029 | 0.002 |
| | (0.03) | (1.23) | (0.07) |
| Q2005H1 | -0.333 | -0.335 | -0.336 |
| | (6.95)*** | (6.97)*** | (6.97)*** |
| Q2005H2 | 0.042 | 0.042 | 0.041 |
| | (0.80) | (0.79) | (0.77) |
| Q2006H1 | 0.165 | 0.196 | 0.187 |
| | (2.27)** | (2.08)** | (1.99)** |
| GEXR | 1.582 | | 1.61 |
| | (1.94)* | | (2.13)** |
| GPRODY | | 0.11 | 0.094 |
| | | (1.39) | (1.20) |
| N | 1293 | 1274 | 1274 |
| $R^2$ | 0.19 | 0.2 | 0.2 |

Note: The group-wise fixed effects are controlled. Heteroskadasticity-adjusted t statistics (absolute value) in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

Finally, let's check the effect of product complexity upon China's textile exports. The negative sign of the coefficient to GPRODY in Table 5 means that higher product complexity led to higher prices of textiles exported by Chinese firms. In Table 6 however the sign of the coefficient to GPRODY is negative, meaning that the increase in export quantities actually was related to lower-end products, which might be due to the fact that products with safeguard quotas are actually not high quality products. Unfortunately, in both regressions (2) and (3) in either Table 5 or Table 6, the coefficient to GPRODY is insignificant, so Hypothesis (2) is not supported.

**Table 6.** Quantity Effects of Exchange Rates and Product Complexity

| Variable | Sample D | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Intercept | -0.026 | 0.088 | -0.026 |
| | (0.41) | (1.78)* | (0.42) |
| D2002 | 0.487 | 0.375 | 0.485 |
| | (4.09)*** | (3.27)*** | (4.08)*** |
| D2003 | 0.176 | 0.059 | 0.173 |
| | (1.87)* | (0.69) | (1.84)* |
| D2004 | 0.177 | 0.06 | 0.174 |
| | (2.18)** | (0.85) | (2.16)** |
| D2005H1 | -0.179 | -0.301 | -0.186 |
| | (1.41) | (2.50)** | (1.46) |
| D2005H2 | 0.475 | 0.35 | 0.468 |
| | (4.61)*** | (3.70)*** | (4.54)*** |
| Q2005H1 | 0.857 | 0.877 | 0.872 |
| | (4.58)*** | (4.63)*** | (4.62)*** |
| Q2005H2 | -2.225 | -2.179 | -2.184 |
| | (7.81)*** | (7.83)*** | (7.83)*** |
| Q2006H1 | -0.446 | -0.344 | -0.379 |
| | (1.19) | (0.74) | (0.82) |
| GEXR | 6.419 | | 6.121 |
| | (2.24)** | | (2.12)** |
| GPRODY | | -0.051 | -0.113 |
| | | (0.16) | (0.35) |
| N | 1293 | 1274 | 1274 |
| $R^2$ | 0.15 | 0.15 | 0.15 |

Note: The group-wise fixed effects are controlled. Heteroskadasticity-adjusted t statistics (absolute value) in parentheses. *significant at 10%; **significant at 5%; ***significant at 1%.

## Discussion

As shown in regression (1) under Sample A in Table 3, the global-wise elimination of quotas at the beginning of 2005 led to a fall in the prices of textiles with binding quotas in 2004 by 37%, which is consistent with Harrigan & Barrows (2006). Regression (1) under Sample B shows that, the safeguard quotas launched in mid 2005 made the prices of textiles exported by Chinese firms with binding quotas rise by 8.3%. This estimate is significant at 10% level. As a comparison, Harrigan & Barrow (2006) also try to find this positive effect. They estimate the effects of

Q2005H1 and Q2005H2 simultaneously without splitting year 2005 into two time periods, and find that the coefficient to Q2005H2 is negative (-0.15) and significant. Since the effect of Q2005H2 is opposite to what the trade theories predict, Harrigan & Barrow (2006) explain it in the following way: The negative effect of global-wise elimination of quotas upon the export prices is so large, that it persists in the second half of 2005, enough to offset the positive effect of safeguard quotas, which makes the coefficient to Q2005H2 in their regression to be negative. Their hypothesis is reasonable but without empirical evidence. Our innovation is to split year 2005 into two even periods of time, and estimate the effects of Q2005H1 and Q2005H2 simultaneously. As a result, regression (2) under Sample B successfully identifies both the negative effect of global-wise elimination of quotas and the positive effects of safeguard quotas launched. We find that the coefficient to Q2005H1 is negative (-0.335) and significant at 5% level, and the coefficient to Q2005H2 is positive though not very insignificant. In regression (1) under Sample C in Table 3, we include observations in the first half of 2006. Since the carry-over of the negative effect of global-wise elimination of quotas became weaker in the first half of 2006, we are able to identify the positive effect of safeguard quotas in that period more significantly. This finding is the first of such in literature.

To identify the exchange rate effects we do not include time dummies for the first and second halves of 2006, D2006H1 and D2006H2, otherwise the exchange rate effects would be absorbed by these time dummies and cannot be identified. Regression (2) under Sample D in Table 5 shows that the pass-through of the RMB exchange rate is 1.61, significant at 95% significance level, which means that when the RMB appreciates against the USD by 1%, the price indices of textiles tend to increase by 1.61%. It should be noted that the exchange rate pass-through is not for a single product; rather it is for the whole bundle of products of textiles. We guess that after the RMB appreciation, exports by Chinese firms may have tilted up in quality and value-added, which could cause the degree of pass-through greater than unity. Of course, this hypothesis remains to be tested in the future. As for export quantities, the result that the RMB appreciation led to more exports seems unreasonable. We guess

that the variable GEXR might contain information of other market factors which have positive effects upon export quantities. However due to the lack of enough data, we are not able to control these factors. This is the weakness of our paper.

We may estimate the contribution of the changes in policies of quotas and exchange rates to export prices and quantities. Take the export prices as an example. In the first half of 2006 the overall price index of China's exports to the U.S. rose by 5.73%; From Table 1 we know that 11% of safe guard quotas were binding; Regression (2) under Sample D in Table 5 shows that the quota effect upon the export prices in the first half of 2006 is 0.187. Therefore the contribution of safeguard quotas upon the rise in export prices is

$$0.11 \times 0.187/0.0573 = 36\%.$$

On the other hand, the RMB exchange rate appreciates by 2.56% in 2005 (, which has an effect upon export prices in the first half of 2006); Regression (2) under Sample D in Table 5 shows that the pass-through in the first half of 2006 is 1.61. Therefore the contribution of the RMB appreciation upon the rise of export prices is

$$0.0256 \times 1.61/0.0573 = 72\%.$$

Since the exchange rate pass-through may be over-estimated by containing effect of other market factors, the contribution of the RMB appreciation estimated should be treated as the upper-limit[2]. In general, the safeguard quotas may contribute more than 30% to the rise in the prices of textiles exported from China to the US in the first half of 2006, while the RMB appreciation may contribute less than 70% during the same period.

## Conclusion

Exporting firms may adjust price, quantity and/or complexity of products in response to changes in external environment. This paper investigates how Chinese textile firms respond to global elimination of textile import quotas in early 2005, safeguard quotas by U.S. in middle 2005, and RMB appreciation in late 2005. We find evidence that Chinese firms responded to global quota elimination by cutting price

and increasing quantity, and responded to U.S. safeguard quotas by raising price and reducing quantity. We find evidence that Chinese textile firms raised price but did not reduce quantity in response to RMB appreciation. We find no evidence that Chinese textile firms adjusted export product complexity in response to the policy changes.

**Endnotes**

1. If assume exporters take into consideration the exchange rate changes over the previous a half year, the result is similar but insignificant.

2. The sum of both contributions is greater than unity is statistically possible, in that regression (4.2) includes effects of other variables (for example, the average contribution of group-wise effects may be negative).

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