Apparel Export Jobs for Women:

Ladder up or Poverty Trap?

William Gruben**

Darryl McLeod*

Maria Davalos***

May 31, 2006

Paper prepared for the 2006 parallel LACEA-LAMES meetings
ITAM, Mexico City, November 2-4th

For the latest draft of this paper please check:
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JEL Classifications: F1, D1, O15

Key Words: trade and gender, globalization issues, regional integration, human capital investment.

Abstract: Our earlier paper suggests apparel exports increase female school enrollment, especially in "high gender bias" countries. This paper compares apparel with other exports and tests our assertion that MFA quotas create exogenous shifts in trade patters using GMM dynamic panel tests of over-identifying restrictions or instrument "exogeneity." We also compare the impact of apparel jobs on school enrollment in Latin America vs. Asia and Africa. The Latin NAFTA-DR-CAFTA apparel export boom started later than in Asia, but since 1995 apparel exports appear to have similar effects on school enrollments in all three regions.

Corresponding author: Darryl McLeod, Economics, Fordham University mcleod@fordham.edu

*Associate Professor, Fordham University Department of Economics, mcleod@fordham.edu,
**Vice President-Senior Economist, Federal Reserve Bank of Dallas william.C.Gruben@dal.frb.org.
*** PhD. Candidate, Fordham University, Economics Dept. (davalos@fordham.edu)

Trade and Gender Bias in Latin America vs. Asia:

Does the Type of Trade Matter?

This paper explores the impact of apparel and footwear on female school enrollment and on the gender gap in primary and secondary school enrollment. Leamer (1998) and Ridao-Cano and Wood (2003) argue along Stolper-Samuelson lines that labor intensive exports, such as apparel or footwear, tend to raise unskilled wages and lower skilled wage thereby reducing the incentive to invest in education. Vijaya (2003) argues further that young women who must balance the demands of poverty and family are particularly likely to leave school for the immediate rewards of an apparel factory job. These authors provide some empirical evidence supporting this de-schooling hypothesis. Vijaya (2003) in particular argues that trade fails to close the gender gap in countries with a history of gender bias (low female to male enrollment).

As argued in McLeod et. al. (2005) apparel exports provide an excellent opportunity to test the hypothesis that trade reduces school attendance by young women. Apparel and footwear factories employ disproportionately large numbers of women. It is also helpful that, between 1974 and 2004, trade in expanded rapidly in many poor, high gender bias countries including Bangladesh, Pakistan and Cambodia[1] subject to limits imposed by Multi-Fiber Agreement export quotas. Our data set consists of exports by fifty developing countries to major OECD members over the 1974 to 2004 MFA quota epoch. Trade shifts dictated by MFA quotas and shifting regional trade agreements including DR-CAFTA and NAFTA create a sort of "natural experiment" in trade expansion less subject to the endogeneity issues raised by Rodriguez and Rodrik (2000) and Frenkel and Romer (1999) among others.

[1] Where gender bias is indicated by Sen's (2000) missing women criteria for example.

Like most studies in this area, we use school enrollment and birth rates as proxies for changes in women's status in part because consistent data on relative wages and employment by gender are generally not available. If apparel jobs trap women in dead-end jobs, leaving domestic obligations unchanged, as Vijaya (2003) argues, higher apparel export quotas are unlikely to raise female enrollment or reduce birth rates.[2] But our simple overlapping generations model (Section 2) suggests that the prospect of higher wages and remittances to families living in rural sending areas encourages parents to send younger siblings to school, especially if export oriented employers demand higher levels of schooling. [3] In addition, if young women with more education are more likely to get jobs in shoe or garment factories, and young women are more likely to send remittances home than young men, parents will be more likely send girls to school[4]. Section 2 of this paper puts together a simple overlapping generations-poverty trap model one implication of which is that apparel factories may lead to more not less investment in the education on girls.

Testing the above hypotheses, as is attempted here, presents several challenges. One is the usual problem of determining the direction of causality. It is possible that export firms will be attracted to countries with more educated workforce, so higher enrollments cause exports and not vice versa. This problem is mitigated in somewhat by the arbitrary distribution of MFA quotas

[2] Vijaya's (2003, page 21) concern is that in "...in low-skilled developing countries where a gender gap in education exists, trade related employment trends have the potential to establish an employment structure that lowers women's incentives to invest in higher education." She provides some econometric evidence that trade has failed to close the gender enrollment gap, except where disparities were low initially. Similarly Ridao-Cano and Wood (1999) and Baslevent and Onaran (2004) find trade does little to close LDC gender gaps. Leamer (1998) and Ridao-Cano and Wood (1999) argue trade in labor intensive products widens the North-South "skills gap" by raising the skill premium in the North and lowering it the South. Wei and Wu (2002) and Harrison (2005), on the other hand, find trade openness and low tariffs to be generally correlated with lower infant mortality and poverty rates as well as longer life expectancy.

[3] A 1993 Bangladesh garment workers survey "shows that the literacy rate of garment workers is much higher than that of workers employed in non-export industries….The 1997 survey did not find any uneducated workers in the DEPZ factories. The average years of schooling attained by female garment workers increased …from 4.1 years in 1993 to 6.3 years in 1997. In the DEPZ [Dhaka Export Processing Zones] garment factories female workers have at least eight years of formal schooling." see Paul-Majumder and Begum (1997) p. 7. The share of Bangladeshi workers with some secondary education rose from 27% in 1990 to 38% in 1997, see Paul-Majumber and Begum (2000) Table 5

[4] VanWey (2004) for example finds that in Thailand "66% of female migrants remit, only 53% of male migrants remit" (p. 751) while "… they [women] respond more strongly than do men to the dependents in their home households" (p. 754). Similarly, de la Briere et.al. (2002) find women in the Dominican Republic are more likely to send remittances back home to parents who miss some days of work than are men.

during the thirty year 1974-2004 window covered by this study: this is why we only use exports to OECD countries that were generally subject to quotas. However, this paper also presents some dynamic panel estimates using total OECD imports as instruments: these estimates corroborate the findings and reinforce our argument regarding the exogeneity of apparel exports across countries and over time.

1. Generations of workers and parents

A model similar to that of McLeod et. al (2005) links higher real wages paid by export factories to include decisions regarding work and marriage. Assume workers and parents make work and schooling decisions over two periods: young adults work for a period of time and then return to the village to become parents (very few workers in apparel and garment factories are over thirty, a fact consistent with the stages of adulthood model). As in Kremer and Chen (1999) the duration of the first period depends on how many children parents plan to have: larger families require leaving factory work sooner. To the extent that full time-work impinges upon domestic obligations of women more than men, as Vijaya (2004) suggests, this model focuses on the decisions of young women.

A key feature of this model is that in contrast to the skilled/unskilled dichotomy of the Stolper-Samuelson model traded goods (shoes and clothing for example) can be produced using two technologies, both of which require labor and human capital. Informal or home production requires labor and human capital as captured by the production function in equation (1.1),

$$Q_T = aH^{\alpha}L^{1-\alpha} \qquad (1.1)$$

whereas factory production requires some outlay of fixed capital, F,

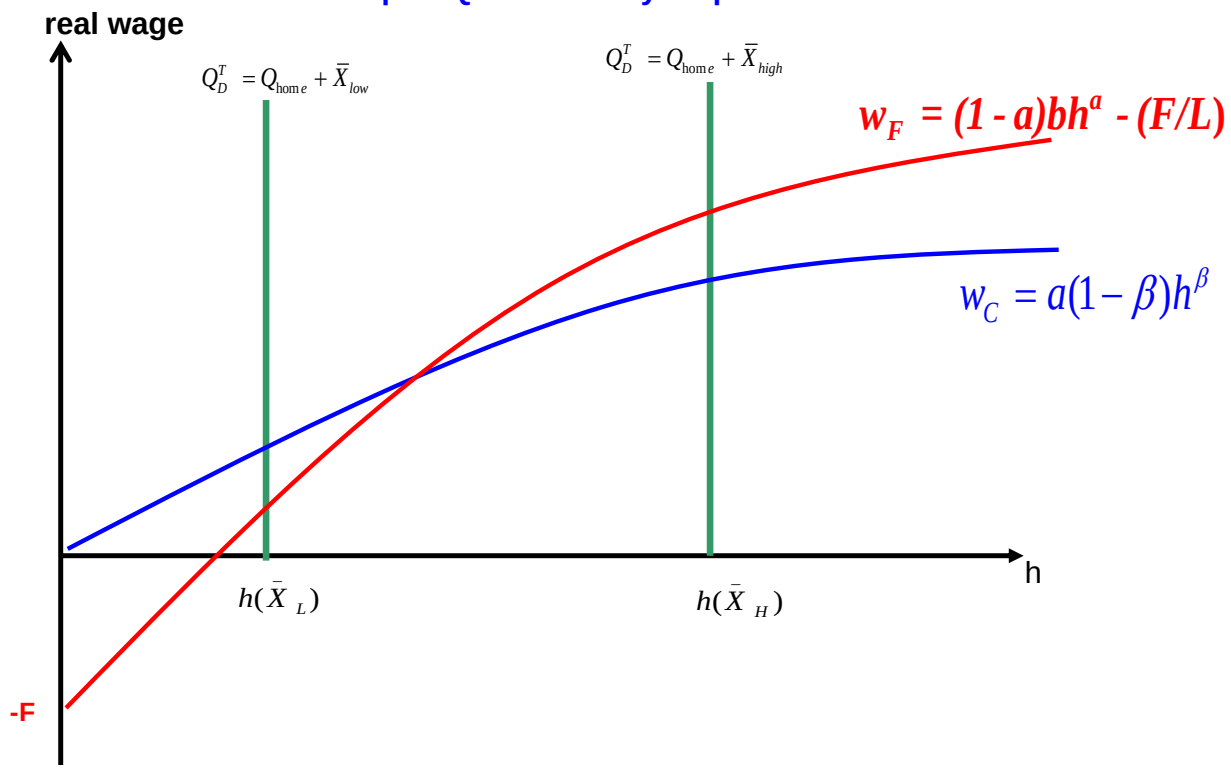
$$Q_T^F = F + bH^{\alpha}L^{1-\alpha} \qquad (1.2)$$

The reward for outlays of fixed capital, is higher productivity, so that b > a. The real wage implied by (1.2) can be written as a function of human capital per worker, h = H/L,

$$w_1 = (1-\alpha)bh^{\alpha} - rF \qquad (1.3)$$

where investors expect a return of r on fixed costs F. Factories exhibit increasing returns to scale as fixed costs F are spread over more and more units. These alternative techniques set up a classic "market size" poverty trap, as shown in Figure 1 below. Low levels of demand, perhaps due to export quotas, allow cottage production to dominate, as shown at for the vertical line over X_{low} in Figure 1. However an increase in overall demand (due to an expansion in export quotas for example) to X_{high} makes factory production more profitable than home production, increasing real wages.

Figure 1
Export Quota Poverty Trap



The expansion of export demand can influence decisions to invest in education mainly because it increases the expected return on education. Consider two overlapping generations of workers: young workers work full time at factory or home production. At some point, young adults quit the factory, move back to the village, switching to home or part-time nontraded services production that leave them time to raise n children. Before young workers become parents they send remittances home as young workers and expect to receive the same when they are parents. Workers who expect to become parents maximize utility over the two phases of their lives,

$$\underset{h,n}{Max}\, V(c,n) = v_1 + \rho v_2 \qquad (1.4)$$

where $v_1 = c_1 = w_1 L(1-\varphi n) - R$, where $R = \pi(\cdot)\lambda\,(w_1 * L)$

implying that, $v_1 = c_1 = [1 - \varphi n - \pi(\cdot)\lambda]\, w_1 L$, and

$v_2 = n*(R - \varepsilon h) + \ln(n) + \varphi n L w_2$.

In the first period, young workers decide how to allocate lifetime labor, L. Having n children requires fraction φn of a worker's L-year lifetime plus spending εh per child on education. Typically workers spend λL of their working lifetimes earning income to send back to their families in rural villages as remittances R. In this overlapping generations context workers expect to receive similar remittances as parents from their children.

However, workers may or may not send remittances home: $\pi(w_2/w_{1,}g)$ is the probability that a given child will send remittances home. This probability depends in turn on the relative wage gap and gender, g. Studies show that females are more likely to send remittances home perhaps to obligate parents to help with their return, to arrange and pay for wedding costs, etc. As the rural/ urban or home/factory wage differential increase, the probability that workers sends remittances home may rise or fall. Higher wages have an income effect on young workers, making more likely

remittances increase. However, high factory wages may also reduce the likelihood that workers return to the village to raise their families, reducing remittances.

The key decision variables in this model are the number of children, n, and the investment in education per worker, h. Children require workers to devote fraction φ of their productive lives to child rearing. Hence, a large n impinges upon the amount of time that person can spending working full time in the factory. However, children also add pleasure directly to the lives of their parents, as captured by the ln(n).

In the second phase to their working lives these agents, who are now parents, receive remittances R and spend nεh educating their children. Setting L = 1 and solving for the n that maximizes V in (1.4) yields,

$$\boldsymbol{n} = \frac{\rho}{(\varphi - \pi(\bullet)\lambda\rho)\boldsymbol{w}_1 - \rho(\varphi \boldsymbol{w}_2 - \varepsilon \boldsymbol{h})} \qquad (1.5)$$

where w_2 is the home or nontraded sector wage earned by parents with children. Note that the effect of traded good wages w_1 on the number of children each family has depends on the net sacrifice ratio $\varphi - \pi(\bullet)\lambda\rho$ which is the time spent raising children minus the amount children work to return in the form of remittances at the same wage rate. We assume raising children involves parents' time and therefore some sacrifice of income. An increase in factory wages w_1 raises the opportunity cost of parents' time and lowers n. The second term in denominator is earnings per child, net of education expenses. An increase in the cost of education lowers n, while enhanced at home earnings opportunities for parents φw_2 increases n.

Our last task is to determine the effect of higher wages in period 1 on investment in human capital. Wages rise because workers move from cottage industries to factories, raising TFP from a to b. From the point of view of parents, higher wages for young workers both increases remittances

λw_1 and, indirectly, reduced n. Both of these effects tend to increase h: education per worker. However, higher wage inequality may reduce the probability $\pi(\cdot)$ that children send remittances home. To see how these effects play out, we write the first-order condition for h as an implicit function of h and the other parameters in the model,

$$\{\alpha(1-\alpha)\boldsymbol{b}\boldsymbol{h}^{\alpha-1}\}\left[\frac{(1-\lambda-\varphi\boldsymbol{n})}{\boldsymbol{n}}+\pi(\bullet)\rho\lambda\right]=\rho\varepsilon\,. \qquad (1.6)$$

The first term in (1.6) reflects is impact of higher h on the real wage, but the second term involves the secondary effects a rise in b or $w_1$on n and $\pi(\cdot)$. An increase in b may have offsetting effects on the term in brackets. A rise in period one real wages w_1 reduces the birth rate n and increases $z(n,\pi)$, but the same rise in real wages may raise or lower $\pi(\cdot)$. It is possible that these effects offset one another, such that $\frac{\partial z(n,\pi)}{\partial w_1}=0$ where $z(n,\pi)$ is the square bracket term from equation (1.6).

Then solving explicitly for h yields,

$$\boldsymbol{h}=\left[\frac{\boldsymbol{z}(\boldsymbol{n},\pi)\alpha(1-\alpha)\boldsymbol{b}}{\rho\varepsilon}\right]^{\frac{1}{1-\alpha}}\,. \qquad (1.7)$$

In any case, a rise in real wages or b lowers n and raises $z(n,\pi)$ so this reinforces the positive effect of higher real wages on h. If the income effect of higher wages dominates the tendency to stay in the city, h rises with b, unambiguously. Finally, note that the impact of $\pi(\cdot)$ on the numerator of (1.7) is $\lambda\rho$, so unless the a higher w_1 reduces $\pi(\cdot)$ dramatically, the fall in $\pi(\cdot)$ is unlikely of offset the positive impacts of b and n on h.

The explicit solution for h in equation (1.7) reminds us that if $\pi(\cdot)$ is higher for women, an increase in real wages (a rise in b, or switch from a to b) has a larger impact on education spending for females than for males. Higher wages increase parents' investment in education generally but

their will be a bias toward educating girls, because the higher wages generated by that investment education are more likely to be sent back to the parents.

3. Trade and School Enrollment: Evidence by Region and Export Type

McLeod et. al (2005) report some empirical evidence suggesting that the increased apparel exports reduce birth rates and increase investment in schooling, especially in countries with high gender bias (low female compared to male school enrollment). This section looks at the robustness of these results with respect to region, to type of export and with respect to various tests of the direction of causality between schooling and trade. Enrollment data presents several challenges, not the least of which is that prior to 1990, data on enrollments are only available at five year intervals. This makes our basic time period five years.

Table 1 provides a simple set of "difference on difference" estimates that help fix ideas and highlight the basic issues discussed in a number of contexts. Equations 1.1a through 1.1c provide benchmark regressions. They show how changes in gross female secondary enrollment depend on changes in per capita income and changes in apparel and *other* (i.e. all non-apparel) merchandise exports. Lagged total gross secondary enrollment (male and female) serves as our proxy for a range of other factors influencing school enrollments (spending on education, school fees, etc.). Note equation 1.1 predicts about 40% of any increase in overall secondary enrollment is female. Equation 1.2 splits all of these variables between Latin America and non-Latin countries. The female share is of new secondary enrollment is evidently a higher 46% in Latin American while for non-Latin Countries this same share is only 35%.

These higher secondary enrollment rates for women are a relatively recent phenomenon. Equation 1.4 and 1.5 estimate the same equation over the earlier 1975-1995 period: during this period only female students only accounted for 14% of changes in total enrollment inside Latin America and 27% outside Latin America. Moreover, pre 1997 apparel exports had no effect on school enrollments in Latin America, though there were still strong effects observed outside Latin America. Evidently, the apparel export boom in Latin America is a relatively recent, post-1995 phenomenon in Latin and Central America as Honduras, El Salvador and Mexico rapidly expanded their exports in the past decade. Prior to that, rapid growth of MFA apparel exports was largely an Asian phenomenon.

Our sample of fifty countries was chosen because they had footwear and/or apparel exports in excess of 1% of GDP at some point in time. However, some smaller countries are bound to be outliers. In our case it is Oman, Mauritius, Madagascar, Trinidad and Tobago and Nicaragua that can create sharp changes in the estimated garment export coefficient – as demonstrated by the differences between equation 1.1a and 1.1b. Note that the significance of apparel exports does not change but the coefficient rises from 1.4 in equation 1.1a to 1.8 in 1.1b using only the 45-country sample. Occasionally we drop one or more of these five small countries to obtain a more representative estimate of the coefficient on garment exports.[5]

Finally, McLeod et. al. (2005) uses fixed effects from enrollment regressions to measure "unobserved" gender bias. Countries often under-perform in school enrollment growth, give per capital income and previous enrollment levels—situations in which female students have much lower enrollments then male—female enrollment performance in relative worse—may reflect

[5] Why are these countries outliers? The story is different in every case. In Mauritius for example there was a very rapid expansion of apparel exports and secondary enrollment early in the MFA era, however school enrollment continued to increase even as the exports began to diversify away from apparel. This is a typical phenomenon: apparel exports shares rise and then fall as per capita income increases and manufactures diversify into more skill intensive products. Hong Kong, Singapore and Macau all show evidence of this inverted U pattern of exports. For discussion of the other outlier countries see appendix B.

gender bias. The fixed effects terms from a set of male and female enrollment regressions similar to those shown in Table 1 were used as indicators of gender bias (these estimates are included here as Table A-2 in Appendix A). The resulting list of high and low-bias countries is included in Table A-3. An interesting result of this exercise is that apparel exports appear to have a greater effect on enrollments in high-bias countries, as listed in Table A-3. This high bias list only includes a few Latin Countries. Dropping our outliers from the high bias list reported in Appendix A Table A-3 results in our third estimate of equation 1.1, shown in Table 1 as equation 1.1c. Note that the impact of garment exports has risen from 1.4 in the all-country sample (1.1a) to 2.7 (1.1c) in the high-bias sample. That is, in the latter case, a 1% increase in apparel exports as a share of $PPP GDP increases gross female enrollment by 2.7% all else equal. This is a fair substantial increase (but note the fairly high standard error on this coefficient in equation 1.1c).

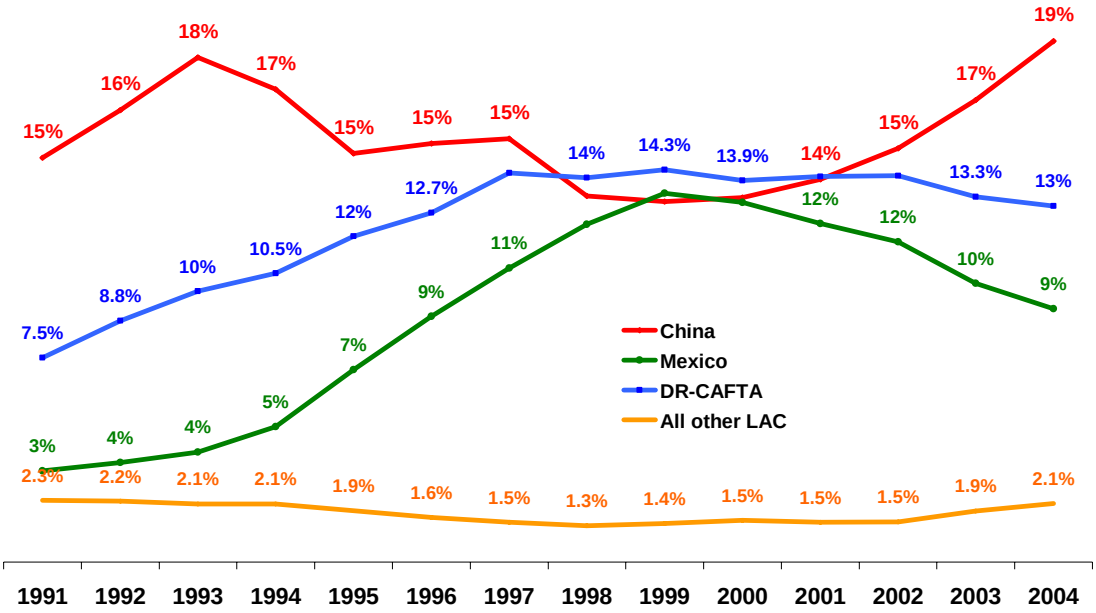
Throughout this paper we use UNESCO enrollment data, as reported in the World Bank's EDSTATs online database in March 2006. Unfortunately, UNESCO switched its enrollment reporting tabulations from the International Standard Classification of Education (ISCED76) to ISCED97 in 1998. We use several strategies to deal with potential inconsistencies in pre and post-1997 enrollment data. First wherever possible we check our estimates using only pre-1998 data, as in equations 1.4 and 1.5 in Table 1. Note that these equations are consistent with the estimates shown in equations 1.1 and 1.2, except for the Latin America apparel export effect. Second, virtually all estimates reported here include time fixed-effects variables (these period fixed effects are included in Table 2) that can capture a discrete shift in enrollments created by a new reporting method. Third, we test various within-year enrollment ratios instead of enrollment levels *per se*: the ratio of male-to-female enrollment rates, the ration of female enrollment to total secondary enrollment, and the ration of secondary to primary enrollment. These ratios compare enrollments

within the same year and hence are less sensitive to changes in enrollment reporting in different years. These points are discussed further below.

Equations 1.2 and 1.3 split all the independent variables into Latin American vs. all other sample countries and Asia vs. all other sample countries. In both regions apparel exports appear to have higher impacts on female secondary enrollments in other countries, but in both cases the coefficients are statistically indistinguishable as indicated by the Wald tests of equal coefficients reported near the bottom of both of these equations.

In McLeod et. al (2005) and in this paper we exploit the fact that apparel exports are regulated by MFA quotas, or at least they were until the end of 2004. The role of tariffs and quotas in determining the pattern of trade is also indicated by shifts in trade caused by NAFTA and DR-CAFTA trade agreements. Figure 2 shows NAFTA and DR-CAFTA had a significant impact on Mexican and DR-CAFTA exports shares, with the latter NAFTA effect waning while the DR-CAFTA countries hold their own against China's surging apparel export growth. This regulation of trade by quotas and regional trade agreements allays some of the usual concerns regarding the endogeneity of export success. Did garment exporters flock to Honduras and Bangladesh because of their well-educated workforce, or in search of MFA quota and low wages? It seems likely it was the latter, as a schooled workforce was not one of these countries' strong points in the 1980s (though enrollments have risen rapidly since).

Figure 2: Regional Apparel Export Shares of U.S. Imports



Source: OECDSource Online May 2006.

Still there may be some residual concern that causality runs from education to trade instead of the reverse as posited here. To address this issue, Table 2 presents a set of GMM dynamic panel estimates following the Arellano and Bond approach of estimating dynamic panel equations in differences using various level variables including lags of the dependent variable as instruments. Other instruments include the world (OECD) total demand for apparel imports and total world exports, both as a share of world GDP $PPP. In addition, we use period dummies and as is clear in equation 2.2 there is a major jump in the period dummy coefficient in the post-1995 period: female enrollment levels jump up starting in 1995 as captured by the last two time fixed effect estimates. However, no such break is evident in either of the gender bias ratios (see the time dummy coefficients reported in eqs. 2.1 and 2.3) suggesting that these ratios are free of the UNESCO classification scheme shift that occurred in 1997. Finally the Sargan test of over-identifying restrictions does not reject the orthogonality of this set of instruments, suggesting that causality may indeed run from apparel exports to enrollments, and in particular to female enrollment ratios.

Equations 2.1 and 2.2 use our 45-country sample to estimate the effect of apparel and other merchandise exports and per capita income on the ratio of female to total secondary enrollment and gross secondary enrollment of females. The ratio of female to total secondary enrollment is a direct measure of gender bias and is free of any problems caused by the change in education reporting standards. In both cases the dependent variable is a percentage or ratio while all right hand variables are in logs. The results for enrollment are similar for those obtained in Table 1, while the ratios suggest apparel exports tend to reduce gender bias in schooling decisions. This effect is especially evident in Equation 2.3 which uses only the high bias group of countries to show how increasing apparel exports boosts female to male secondary enrollment ratios, another index of gender bias. Food, fuel and other merchandise exports do not however have these effects on in female enrollment and relative enrollment rates.

Table 3 addresses the question of whether the type of export matters for female school enrollments. Conditioning on gross primary enrollment of men and women in the previous five-year period, the regressions reported in Table 3 regress log female and the ratio of male to female gross secondary enrollment on log real per capita income and on four categories of merchandise exports: apparel, fuel, food and other goods exports. Do all exports have similar impacts on enrollment? The results are not consistent across regions but several patterns emerge. In most countries, apparel and footwear export industries employ disproportionately large numbers of women, whereas food and fuel imports are less likely to employ women (with some exceptions).

Does this mean that only apparel exports are beneficial? Not at all, as Wei and Wu (2002) find greater openness to trade generally increases longevity and reduces mortality rates. However, exports that employ women even in low wage jobs lead to greater investment in female human capital, consistent with the model presented in Section 1 above. On the other hand , food and fuel exports are not necessarily associated with more entry level jobs for women, and their impact on female enrollment is therefore less predictable.

4. Apparel Jobs and Fertility

Further evidence that apparel and footwear exports affect the status of women can be obtained by studying their impact on birth rates and child labor. Some analysts express concern that working mothers may take their children to work with them, or that school age girls will be employed directly or indirectly at home by garment exporters. However, a common finding of surveys of women in Indonesia and Bangladesh is that garment employment is linked to the postponement of marriage and child bearing. In Bangladesh for example, the average age of marriage rose from 16 to 20 for women working in apparel factories while the age of first child birth rose to 21 from 17. Higher incomes and secondary education also reduce fertility rates. To

the extent that apparel jobs increase secondary enrollment rates, as results of the previous period suggest, they may affect fertility rates directly via delayed marriage and indirectly via higher school attendance. The results shown in Table 5 suggest both channels are at work. Secondary enrollments have a strong negative effect on fertility rates, but apparel and footwear exports exert an additional influence. Again, using the fixed effects from equation 5.1, we split countries by region: Latin America, Asia and Africa. The coefficient on apparel-footwear exports is generally negative but the impacts on fertility are stronger in low income Asia and Africa.

5. Apparel Exports and Child Labor

The flip side of school attendance is child labor force participation. Recently the World Bank and ILO began to collect labor force participation rates for children 11-14. While these data are not gender specific, girls do leave school to work as domestic helpers. They also may forgo secondary school for work in the garment factories, as discussed in the poverty trap model above. Table 6 provides estimates of how apparel and total exports affect child labor force participation in our sample of countries. Again this experiment holds total exports constant, and increases garment exports (both as shares of GDP). This is a test of what happens when a country increases apparel's share of total exports, given that countries' real incomes per capita remain constant. Though the results are not as robust as for enrollment rates and fertility, exports of apparel are associated with reduced child labor force participation. Also note that apparel exports have a more significant impact on child labor force participation in Latin America at the aggregate level.

These results are not surprising in light of our results above for secondary school attendance, but it is somewhat surprising in light the attention this issue has received by some NGO groups. This result is consistent with detailed survey data from Vietnam (World Bank, *Globalization*

Growth and Poverty, Chapter 4) where child labor incidence declined as income grew and even as clothing and footwear exports grew very rapidly.

If girls are put in school in preparation for work in factories, this might explain the results in Table 6. However another factor is simply higher incomes. Though the equations in Table 6 are conditioned on real per capita income (lagged) we also check to see how clothing exports affect economic growth. Here, all variables except per capita income are differenced but otherwise the equation is largely the same. The proxy for human capital we found most correlated with economic growth is female primary enrollment—though this is largely an Asian and African phenomenon. Both apparel and total exports are associated with more rapid GDP growth per capita, though the effect is small. These equations mix random and fixed effects estimates as dictated by the results of Hausman tests, but the coefficient estimates for both estimators were generally very similar.

6. Conclusions and Policy Implications

The arbitrary allocation of MFA apparel quotas to many of the poorest countries in Latin America, Asia and Africa provides a natural experiment for assessing the impact of apparel export jobs on the status of women. China's 2001 entrnace to the WTO and the January 2005 official end imply that many of these apparel exporters may soon relocate. The response of policy-makers to the closing of these plants depends on how one assesses the cost and benefits of these low-wage jobs. If one views these jobs as exploitive dead-end jobs for young women, the loss of apparel export quotas may not be such a bad thing. Ridao-Cano and Wood (1999) and Vijaya (2003), for example, argue that labor intensive exports are a lose-lose proposition: displacing low wage workers, increasing inequality in OECD nations and perpetuating the skills-education gap between North and South and between men and women.

This paper and McLeod et. al. (2005) bring evidence to bear on these arguments by using apparel and footwear export growth to OECD countries over the period 1975 to 2004 as proxies for quota allocations. That paper regresses male and female primary and secondary enrollment rates and birth rates (fertility) on apparel exports, total exports and per capita income. Apparel and footwear exports have a strong positive impact on secondary enrollments particularly in high bias countries. Evidently, apparel and footwear jobs are not a substitute for secondary school attendance (where secondary means 6^{th} grade or above).

This paper extends the findings of McLeod et. al. (2005) in several directions. First, the estimates reported in this paper address several issues regarding the consistency and exogeneity of the enrollment data using different sample periods and GMM dynamic panel estimates that allow use to test the validity of instruments in several contexts. Second, we explore the impact of several types of exports on the similar enrollment and gender bias indices. These results indicate that food and fuel exports, for example, are not consistently associated with higher female enrollments. Third, we test these results over several sub-regions and sample periods. In South and Central America (DR-CAFTA) apparel exports had no evident impact on enrollments prior to 1995. But since then these regions' apparel exports have increased and impacts on female secondary enrollment are evident. Over the MFA period, effects on Latin American enrollments appears to be stronger that elsewhere, but these differences are not statistically significant.

These findings do not support the Ridao-Cano and Wood (1999) argument that expanded low-wage exports discourages human capital investment in low-income countries or Vijaya's(2003) contention that trade does not close gender education gaps in countries where those gaps are large to begin with. In fact, we find the opposite: the impact of apparel exports is greatest in countries where gender bias is high.

More to the point, we find evidence that apparel exports in particular increase female enrollments, but that other types of exports, including food and fuel, may actually be associated with lower school attendance. Primary commodity exports dominate in many low income countries, explaining why total exports might be associated with lower school attendance rates in their findings.

Certainly, Asia has most of the largest garment and footwear exporters – including Bangladesh, India, China, Indonesia and more recently Vietnam and Cambodia. However, a number of Latin American countries including El Salvador, Mexico, Honduras and Nicaragua have seen rapid expansion of garment exports during the waning years of the MFA. Part of the reason why Latin exporters fear Asian post-MFA competition is that they tend to have higher incomes and pay higher wages. Using the nineteen Latin American countries in our sample we re-estimate the core equations for school enrollment and fertility. While the effects on fertility are less pronounced, as one might expect, the impacts on school enrollments and child labor are stronger. In particular, survey data on educational attainment (see Figure 3) suggest gender convergence proceeded apace during the 1990s in even the poorest Latin exporters (Honduras, El Salvador and Nicaragua).

If Latin countries lose export share to China and other Asian exporters during the post-MFA era, alternative employment opportunities for women should become a priority for policy makers and trade negotiators. Latin countries have a strong geographic advantage vis-à-vis the U.S. market, which some factory owners in Honduras and Nicaragua seem to be exploiting to keep their factories open. Promoting employment and educational opportunities for women is another reason to adopt various measures encouraging garment factories in the poorer countries in Central America and the Caribbean, as DR-CAFTA appears to be doing.

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Table 1: Difference on Difference Estimates for various Samples and Regions

Dependent Variable:	Change in Female Secondary Enrollment 1975-2004							1975-1995 (pre-1997)		
Change in gross female	**1.1a**	**1.1b**	**1.1c**	**(1.2)**		**(1.3)**		**(1.4)**	**(1.5)**	
secondary enrollment	All	45	High	LatAm	Non-	Asia	Non	All	LatAm	Non-
(t-statistics)	ctys	ctys	Bias[2/]	ctys	LatAm		Asia	ctys	ctys	LatAm
Change in Apparel export share[1/]	**1.4**	**1.8**	**2.7**	**1.75**	**1.41**	**2.1**	**1.03**	**1.2**	**0.65**	**1.3**
(previous five year period)	*(6.0)*	*(8.3)*	*(2.6)*	*(2.4)*	*(3.3)*	*(3.4)*	*(2.6)*	*(3.9)*	*(0.3)*	*(8.5)*
Log Change in Real Per Capita GDP	**9.4**	**5.3**	**22**	**10.8**	**6.2**	**20.3**	**6.0**	**16**	**19**	**13**
(previous five year period)	*(2.1)*	*(1.4)*	*(3.8)*	*(1.6)*	*(1.4)*	*(1.9)*	*(0.8)*	*(8.9)*	*(6.5)*	*(3.4)*
Change in Other Merch. Exports	**-5.6**	**-5.6**	**-15**					**-3.1**		
(previous five year period)	*-(0.6)*	*-(0.5)*	*-(1.1)*					*-(0.6)*		
Change in Total Secondary Enroll	**0.40**	**0.41**	**0.27**	**0.46**	**0.35**	**0.21**	**0.47**	**0.20**	**0.14**	**0.27**
(previous five year period)	*(2.2)*	*(2.4)*	*(1.1)*	*(2.1)*	*(2.2)*	*(1.2)*	*(2.4)*	*(3.1)*	*(0.9)*	*(3.3)*
Constant	**3.0**	**3.3**	**2.9**	**3.2**		**2.6**		**2.3**	**2.6**	
	(2.6)	*(2.7)*	*(1.6)*	*(2.8)*		*(3.1)*		*(4.0)*	*(5.8)*	
Number of Observations	228	204	94	228		228		133	133	
Number of Countries	50	45	21	50		50		45	45	
Number of 5 year intervals	5	5	5	5		5		3	3	
Adjusted R^2	0.33	0.32	0.35	0.33		0.34		0.42	0.41	
Std Error of Regression	5.5	5.5	5.3	5.5		5.5		4.1	4.2	
Dependent Variable Mean	6.4	6.3	7.2	6.4		6.4		5.0	5.0	
Wald test for same Apparel Coef.				0.13		1.3				
(chi sqr-statistic and prob value)				72%		26%				
Time Period Fixed Effects	yes	yes	yes	yes		yes		yes	yes	
Cross section fixed effects	yes	yes	yes	yes		yes		yes	yes	

1/ Exports are total exports of Apparel ISIC 84) to the 21 largest OECD countries as a share of current dollar GDP in international prices ($PPP). See Table A-1 note 1 for more details.

2/ For a list of high bias countries see Table A-3 in Appendix A.

Table 2: Trade and Female Enrollment, GMM Dynamic Panel Estimates [3/]

Sample	45 Countries		45 Countries		High Bias Ctys	
	2.1		**2.2**		**2.3**	
Dependent Variable: (t-statistics)	Female over Total Second. Enroll.		Female Gross Second. Enroll.		Female over Male Second. Enroll.	
Lagged Dependent Variable	**0.69**	**0.48**	**0.34**	**0.40**	**0.75**	**0.61**
	(20)	*(6.4)*	*(5.9)*	*(4.9)*	*(4.2)*	*(3.4)*
Log Apparel export share of GDP PPP[1/]	**0.02**	**0.04**	**1.71**	**1.89**	**0.10**	**0.11**
(previous five year period)	*(6.5)*	*(6.5)*	*(2.6)*	*(2.3)*	*(6.1)*	*(5.8)*
Log Real Per Capita GDP	**0.03**	**0.07**	**4.6**	**4.7**	**0.52**	**0.31**
(previous five year period)	*(2.4)*	*(3.5)*	*(1.4)*	*(1.4)*	*(1.4)*	*(0.9)*
Log Other Merchandise Exp. Share	**-0.02**	**-0.03**	**4.5**	**3.4**	**0.25**	**0.27**
(previous five year period)	*-(4.5)*	*-(4.2)*	*(3.7)*	*(2.5)*	*(5.9)*	*(4.8)*
Log Fuel or Food Export Share		**-0.02**		**-5.43**		**-0.88**
(previous five year period)		*-(5.8)*		*-(2.9)*		*-(0.9)*
Period Dummy Variable Coefficients						
1985-89	-0.02	0.00	-0.12	-1.04	-0.06	-0.04
1990-94	-0.03	-0.03	0.67	-1.71	-0.09	-0.08
1995-99	-0.04	-0.05	4.22	1.56	-0.18	-0.16
2000-04	-0.04	-0.04	9.31	6.58	-0.08	-0.06
Number of Observations	41	40	42	41	19	19
Number of Countries	181	177	191	185	86	85
Number of 5 year intervals	5	5	5	5	5	5
Mean Dependent Var	0.015	0.015	6.09	6.03	0.06	0.06
Std Error Regression	0.042	0.053	6.24	6.46	0.17	0.18
J-Statistic	20.0	12.9	18.5	11.4	10.3	8.6
Instrument Rank	24	24	25	25	19	19
Sargan Test (prob value).	70%	97%	82%	99%	95%	98%

1/ Exports are total exports of Apparel ISIC 84) to the 21 largest OECD countries as a share of current dollar $PPP GDP (sources: OECDsource Trade Online and PWT 6.1 updated using WDI $PPP data) See Table A-1 for details.

2/ Instruments: lagged dependent variable, lagged per capita income, total world apparel imports and total exports of goods and services.

3/ GMM dynamic panel estimates, white period standard errors.

Table 3: Impact of Trade by Type of Export on Female Enrollment and Bias

Dependent Variable:	**Log Female Enrollment[4/]**				**Log Female/Male Enrollment**			
(t-statistics in parentheses)	45 Ctys	Africa Only	Latin America	Asia Only	45 Ctys	Africa Only	Latin America	Asia Only
Apparel share of $PPP GDP[1/]	**0.02**	**0.08**	**0.06**	**0.09**	**0.04**	**0.03**	**0.01**	**0.04**
(previous five year period)	*(3.2)*	*(8.4)*	*(2.1)*	*(12.3)*	*(17.9)*	*(3.3)*	*(2.5)*	*(2.6)*
Real Per Capital Income $PPP	**0.10**	**0.14**	**0.07**	**0.13**	**0.08**	**-0.02**	**0.03**	**0.07**
(previous five year period)	*(1.5)*	*(0.6)*	*(1.6)*	*(3.2)*	*(2.3)*	*-(0.1)*	*(1.4)*	*(1.7)*
Fuel Export share of GDP PPP	**-0.01**	**-0.03**	**0.01**	**0.04**	**-0.01**	**-0.04**	**0.00**	**-0.02**
(previous five year period)	*-(1.1)*	*-(2.5)*	*(1.7)*	*(4.4)*	*-(3.7)*	*-(3.0)*	*(1.4)*	*-(3.2)*
Food Export share of GDP PPP	**0.02**	**0.14**	**-0.10**	**-0.15**	**-0.02**	**0.02**	**0.02**	**0.01**
	(0.9)	*(2.3)*	*-(2.3)*	*-(7.5)*	*-(1.2)*	*(0.6)*	*(1.6)*	*(0.5)*
Other Goods Export GDP Share	**0.08**	**0.00**	**0.05**	**0.16**	**0.03**	**0.02**	**0.02**	**-0.01**
	(4.6)	*(0.1)*	*(5.5)*	*(9.4)*	*(2.4)*	*(0.6)*	*(1.4)*	*-(0.3)*
Gross Primary Enrollment	**1.2**	**1.2**	**0.7**	**1.4**	**0.49**	**0.48**	**0.12**	**0.42**
(previous five year period)	*(5.1)*	*(4.7)*	*(3.5)*	*(9.3)*	*(3.4)*	*(2.4)*	*(2.3)*	*(4.4)*
Constant	**-2.1**	**-2.3**	**0.6**	**-2.8**	**-2.8**	**-2.0**	**-0.5**	**-2.6**
	-(4.1)	*-(1.0)*	*(0.5)*	*-(3.2)*	*-(5.2)*	*-(1.3)*	*-(1.3)*	*-(4.1)*
Number of Observations	124	46	51	33	188	46	80	52
Number of Countries	44	11	18	12	44	11	19	12
Number of Periods	3	5	3	3	5	5	5	5
Adjusted R^2	0.98	0.97	0.94	0.99	0.92	0.87	0.77	0.97
Std Error of Regression	0.11	0.16	0.10	0.07	0.08	0.11	0.03	0.04
Mean of Dependent Variable	3.61	3.24	3.83	3.69	-0.08	-0.25	0.04	-0.17
Period Fixed Effects	yes	yes	no	no	yes	yes	yes	yes
Country Fixed Effects	yes	yes	yes	yes	yes	yes	yes	yes

1/ Exports are total exports of Apparel ISIC 84) plus Footwear (ISIC 85) to the major OECD countries as a share of current dollar GDP in international prices ($PPP). See Table 2 note 1 for more details.

Table 4: Asia vs. Latin America School Enrollment (5 yr Averages 1975-2004)

	Asia & Africa Only				Latin Countries Only			
	Primary		Secondary		Primary		Secondary	
Dependent Variable:	**4.1**	**4.2**	**4.3**	**4.4**	**4.5**	**4.6**	**4.7**	**4.8**
(Robust errors t-statistics)	Male	Female	Male	Female	Male	Female	Male	Female
Apparel/footwear export share[1/]	**0.01**	**0.03**	**0.06**	**0.12**	**0.02**	**0.02**	**0.09**	**0.10**
(previous five year period)	*(3.1)*	*(6.5)*	*(6.9)*	*(9.2)*	*(2.9)*	*(3.2)*	*(3.3)*	*(4.1)*
Real Per Capital Income $PPP	**0.02**	**0.11**	**0.38**	**0.56**	**-0.07**	**-0.07**	**-0.04**	**0.02**
(previous five year period)	*(0.8)*	*(4.3)*	*(24.9)*	*(42.0)*	*-(0.7)*	*-(0.7)*	*-(0.2)*	*(0.1)*
Total Exports $PPP GDP share	**0.04**	**-0.01**	**-0.04**	**-0.18**	**0.03**	**0.04**	**0.11**	**0.12**
(previous five year period)	*(3.0)*	*-(0.3)*	*-(0.6)*	*-(1.8)*	*(1.4)*	*(1.7)*	*(1.3)*	*(1.7)*
Constant	**4.5**	**3.73**	**1.0**	**-0.57**	**5.4**	**5.4**	**5.0**	**4.67**
	(17.5)	*(14.9)*	*(3.4)*	*-(2.1)*	*(6.7)*	*(6.2)*	*(2.9)*	*(2.7)*
Number of Observations	129	130	129	129	89	89	88	88
Number of Countries	27	27	27	27	18	18	18	18
Estimation Method 3/	FE	FE	FE	FE	FE	FE[5/]	FE	FE
Adjusted R^2	0.76	0.81	0.95	0.94	0.51	0.58	0.68	0.73
Mean of the Dependent Variable	4.58	4.48	3.81	3.62	4.65	4.63	3.85	3.92
Regression standard error	0.08	0.12	0.15	0.21	0.09	0.09	0.24	0.22
Wald Test: Male vs. Female		0.0%		0.0%		94%		86%
Wald Test: LatAm vs. Asia & Africa		0.3%		5.4%		1%		28%
Hausman-Test[4/] (F-statistic)	10	0.6	8	3	4.5	4.7	7.1	8.3
Hausman Test Prob Value	2%	90%	5.1%	36%	22%	19%	7%	4%

1/ Exports are total exports of Apparel ISIC 84) plus Footwear (ISIC 85) to the major OECD countries as a share of current dollar GDP in international prices ($PPP). See Table 2 note 1 for more details.

2/ The log of the previous five year average gross secondary enrollment was used for all estimates in this Table.

3/ Cross section fixed effects (FE) or random effects (RE) estimates selected using the Hausman test reported he

4/ This null hypothesis of this Hausman test is that Random Effects are not correleated with the error term.

5/ All equations estimated fixed effects (FE) even when the Hausman F-test does not reject the rand effects null to facilitate comparisons and because RE estimates were very close to FE estimates reported here.

Table 6: Child Labor Force Participation Rate and Overall Growth Impacts (1975-2004)

	Child Labor[4/]			Real GDP growth per capita		
Dependent Variable: (t-statistics in parentheses)	All Countries	Latin America	Asia-Africa	All Countries	Latin America	Asia-Africa
Apparel/footwear export share[1/]	**-0.13**	**-0.15**	**-0.12**	**0.005**	**0.006**	**0.003**
(previous five year period)	*-(4.2)*	*-(3.6)*	*-(3.3)*	*(3.2)*	*(2.8)*	*(2.4)*
Real Per Capital Income $PPP	**-0.76**	**-0.23**	**-0.92**	**-0.04**	**-0.002**	**-0.034**
(previous five year period)	*-(5.6)*	*-(1.1)*	*-(5.6)*	*-(4.4)*	*-(0.2)*	*-(3.2)*
Total Export Share of GDP	**-0.07**	**-0.06**	**-0.04**	**-0.01**	**0.03**	**0.003**
(previous five year period)	*-(0.3)*	*-(0.3)*	*-(0.3)*	*-(0.8)*	*(3.1)*	*(0.7)*
Female Gross Primary Enrollment				**0.03**	**0.03**	**0.03**
(previous five year period)				*2.15*	*1.31*	*3.38*
Constant	**7.1**	**2.7**	**8.5**	**0.2**	**-0.1**	**0.176**
	(6.6)	*(1.7)*	*(6.0)*	*(2.6)*	*-(1.4)*	*(2.3)*
Number of Observations	198	84	104	180	89	117
Number of Countries	47	18	27	48	18	26
Estimation Method 3/	FE	FE	FE	FE	RE	FE
Adjusted R^2	0.90	0.93	0.90	0.48	0.18	0.51
Std Error of Regression	0.42	0.33	0.48	0.02	0.02	0.02
Hausman Test Random vs. Fixed effects	1.00	1.00	1.00	0.00	0.27	0.02
(prob value reject null of Random effects) 5/				*		*

1/ Exports are total exports of Apparel ISIC 84) plus Footwear (ISIC 85) to the major OECD countries as a share of current dollar GDP in international prices ($PPP). See Table 2 note 1 for more details.

2/ Among the enrollment variables, gross primary female enrollment was the most correlated with per capita GDP growth It serves as a proxy for the growth of the human capital stock in these growth equations.

3/ Fixed or random fixed effects estimates used in accordance with the Hausmann test rejection of the RE null.

4/ Log 5 yr. average labor force participation by children age 11-14 (source: WDI 2005 Online database).

5/ Hausman Test * significant at 1%, ** significant at 5%

Appendix A: Data and Country Groups

Tables A-1 –A-3 are reproduced from McLeod et. al (2005) for ease of reference and to help identify samples used in the various regressions. Table A-1 shows the 25 major exporters in out data sample (for a complete set of data used in these regression is available at www.fordham.edu/economics/mcleod) Tables A-2 and A-3 identify the so-called high bias countries using the methods described in Mcleod et. al. (2005). Note that some of these countries are known for high levels of gender bias and a number are Sen's (1999, p. 104) list of countries with "missing women." One dimension of gender bias is under-enrollment of girls in primary and secondary school. The estimates reported in Tables A-2 regress gross secondary enrollment rates on per capita income, total trade and apparel trade. All data are logs of five-year averages. Though most of these variables apart from per capita income are percentages,[6] there is considerable variance in all of these series. Accordingly, all variables are estimated in natural logs. Export shares are computed as a share of $PPP GDP to avoid fluctuations in shares caused by real exchange rate changes. However, trade shares over GDP at market exchange rates or apparel and footwear's share of total exports also yield results very similar to those reported here.

These fixed effects can be interpreted as indicators of unobserved or, more accurately, unmeasured bias against girls. The fixed effects from Equation A-2,2 are reported in Table A-3. These are individual country deviations from the enrollments predicted by equation A-2.2—under-enrollment by females may reflect gender bias if male under-enrollment is less pronounced. Under-enrollment of both boys and girls, on the other hand, may simply reflect poverty, low quality schools or both as opposed to gender bias. The relevant measure of gender bias is therefore female under/over enrollment minus the same fixed-effect for male students. This difference is reported in the third column. Assuming this difference reflects gender bias, we sort these countries into the two groups shown in Table A-3. The group on the left exhibits high gender bias—there is a big difference between "unobserved" enrollment factors for boys and girls. Countries exhibiting the highest degree of gender bias in secondary education are Cote d'Ivoire, Pakistan, Cambodia, India and Bangladesh. Several Muslim-majority countries are in the high gender bias group. These include Pakistan, Bangladesh, Tunisia, Morocco, Egypt, Oman and Indonesia. With the exception of Peru, Mexico and Bolivia, Latin American countries are among the least gender-biased. Venezuela, Nicaragua, and Honduras exhibit the least gender bias but in part this reflects the relative poor performance of boys in these countries as opposed to exceptionally high performance by girls.

[6] Gross enrollment rates are the percentage of the appropriate age cohort enrolled in primary school. Since older children and adults often return to primary school these gross enrollment rates often exceed 100%, particularly in poor countries where education levels are rising.

Table A-1: Major Exporters to OECD of Footwear and Apparel (ranked by share of total exports)

		Exports of Apparel plus Footwear 1995-2004				Exports of Apparel 1995-2004		
	Country	Exports 1/ Billions $US	Change 95-99 to 00-03	% of Exports	% PPP GDP	Exports Billions $US	% of Exports	% PPP GDP
1	Honduras	$18.5	46%	92%	13.2%	$18.5	92%	13.2%
2	Bangladesh	$37.5	46%	70%	2.2%	$37.1	69%	2.1%
3	Cambodia	$8.4	142%	55%	4.4%	$7.8	51%	4.1%
4	Haiti	$1.9	43%	52%	1.6%	$1.9	52%	1.6%
5	El Salvador	$12.0	54%	43%	4.8%	$11.9	43%	4.8%
6	Sri Lanka	$20.5	20%	40%	3.9%	$20.2	40%	3.8%
7	Guatemala	$11.9	53%	38%	3.1%	$11.9	38%	3.1%
8	Nicaragua	$2.6	81%	35%	1.9%	$2.6	35%	1.9%
9	Tunisia	$26.5	15%	33%	5.3%	$25.1	31%	5.0%
10	Mauritius	$8.1	3%	33%	8.4%	$8.1	33%	8.4%
11	Dominican Republic	$20.9	7%	33%	5.0%	$20.1	31%	4.8%
12	Macao, China	$15.9	14%	31%	21.9%	$14.9	29%	20.5%
13	Madagascar	$2.4	54%	28%	2.3%	$2.4	28%	2.3%
14	Morocco	$24.0	15%	25%	2.7%	$22.8	24%	2.6%
15	Vietnam	$30.2	72%	23%	2.2%	$14.4	11%	1.1%
16	Singapore	$5	16%	22%	0.6%	$5	21%	0.6%
17	Pakistan	$17.3	27%	18%	0.8%	$17.1	18%	0.8%
18	China	$398.5	33%	17%	1.0%	$282.4	12%	0.7%
19	Jamaica	$3.6	-75%	13%	4.3%	$3.6	13%	4.2%
20	Costa Rica	$7.2	-11%	12%	2.7%	$7.2	12.3%	2.6%
21	Indonesia	$52.8	7%	10%	1.0%	$36.3	7.0%	0.7%
22	India	$47.7	21%	9%	0.2%	$44.15	8.7%	0.21%
23	Philippines	$22.8	2%	7%	0.9%	$21.49	6.6%	0.83%
24	Thailand	$37.5	18%	6%	1.1%	$30.3	4.4%	0.9%
25	Mexico	$62.8	39%	5%	0.9%	$60.3	4.7%	0.8%
26	Peru	$3.5	52%	5%	0.3%	$3.5	4.7%	0.3%
27	Jordan	$1.4	263%	4%	0.8%	$1.4	4.4%	0.8%

1/ Exports are total exports of Apparel (STIC 84) plus Footwear (STIC 85) to the largest OECD countries as reported by SourceOECD.org June 2005 (U.S., Germany, Japan, UK, France, Italy, Canada, Spain, Ireland, Canada, Australia, Netherlands Sweden, Belguim-Lux, Austria, Norway, Denmark, and Switzerland. Exports are measured as a share of current $PPP GDP to mitigate the impact of real exchange rate fluctuations. The GDP $PPP estimates are from the PWT 6.1 updated using similar estimates World Bank WDI 2005 online (the source of the total exports of goods and services and real per capital GDP $PPP).

Table A-2: Exports and Enrollment by Gender (5 yr Averages 1975-2004)

Dependent Variable: (t-statistics in parentheses)	A-2.1 Gross Secondary Enroll Total	A-2.1 Gross Secondary Enroll Female	A-2.1 Gross Secondary Enroll Male	A-2.2 Gross Secondary Enroll Total	A-2.2 Gross Secondary Enroll Female	A-2.2 Gross Secondary Enroll Male	A-2.3 Secondary Enroll Female	A-2.3 Secondary Enroll Male
Apparel/footwear export share[1/]	**0.10**	**0.13**	**0.08**	**0.10**	**0.12**	**0.08**	**0.06**	**0.03**
(previous five year period)	*(5.8)*	*(5.7)*	*(5.3)*	*(5.3)*	*(5.4)*	*(5.0)*	*(3.9)*	*(2.7)*
Real Per Capital Income $PPP	**0.35**	**0.44**	**0.29**	**0.35**	**0.46**	**0.27**	**0.07**	**-0.03**
(log level)	*(4.7)*	*(5.7)*	*(4.1)*	*(7.8)*	*(9.4)*	*(6.8)*	*(2.0)*	*-(0.9)*
Total $PPP GDP Export Share				**0.01**	**-0.05**	**0.04**	**0.11**	**0.17**
(previous five year period)				*(0.1)*	*-(0.5)*	*(0.4)*	*(3.7)*	*(3.9)*
Gross Secondary Enrollment [2/]							**0.76**	**0.60**
(previous five year period)							*(10.1)*	*(5.5)*
Constant	**1.55**	**0.98**	**2.00**	**1.62**	**0.68**	**2.23**	**0.98**	**2.47**
	(2.6)	*(1.5)*	*(3.6)*	*(4.3)*	*(1.4)*	*(7.2)*	*(2.3)*	*(9.7)*
Number of Observations	228	228	228	226	226	226	226	226
Number of Countries	48	48	48	48	48	48	48	48
Estimation Method [3/]	FE	FE	FE	FE	FE	FE	FE	FE
Hausman Test Random Effects [3/]	8.1	10.4	5.5	56.6	40.5	35.8	40.5	35.8
Hausman Test Prob value	1.8%	0.6%	6.5%	0.0%	0.0%	0.0%	0.0%	0.0%
Adjusted R^2	0.90	0.91	0.88	0.90	0.91	0.88	0.96	0.94
Mean of the dependent variable [4/]	3.84	3.79	3.87	3.84	3.79	3.87	3.79	3.87
Std Error of Regression	*0.19*	*0.21*	*0.19*	*0.19*	*0.21*	*0.19*	*0.13*	*0.14*

1/ Exports are total exports of Apparel (STIC 84) plus Footwear (STIC 85) to the largest OECD ctys (see Table A-1).

2/ Lagged gross secondary enrollment was used for all equations.

3/ Cross section fixed effects ("fixed") tested against the alternative random effects specification. The chi-square statistic for rejecting the null of random effects is reported here, which may be significant at the 1% (**) or 5% (*) level.

4/ All variables were transformed to natural logs for estimation purposes.

Table A-3: Unobserved Gender Bias based on fixed effects estimates from eq A-2.3

High gender bias				Low gender bias			
	Secondary Enrollment		Difference		Secondary Enrollment		Difference
Cty -Rank [1/]	Female	Male	F-M 2/	Cty -Rank [1/]	Female	Male	F-M 2/
Pakistan	-0.43	0.00	-0.43	Thailand	0.01	-0.01	0.03
Cambodia	-0.57	-0.17	-0.41	Uruguay	0.12	0.09	0.03
India	0.00	0.40	-0.40	Trinidad and Tobago	0.07	0.02	0.05
Cote d'Ivoire	-0.57	-0.17	-0.40	South Africa	0.35	0.28	0.06
Bangladesh	-0.08	0.24	-0.32	Sri Lanka	0.11	0.05	0.06
Morocco	-0.24	0.00	-0.24	Uzbekistan	0.38	0.31	0.07
Tunisia	-0.18	0.03	-0.21	Malaysia	-0.17	-0.24	0.07
Korea, South	-0.12	0.05	-0.17	Jamaica	-0.10	-0.17	0.07
Oman	0.10	0.27	-0.17	Kenya	-0.06	-0.14	0.09
China	0.03	0.20	-0.17	Colombia	0.23	0.14	0.09
Egypt	0.17	0.33	-0.17	Costa Rica	-0.12	-0.21	0.09
Senegal	-0.40	-0.26	-0.14	Chile	0.24	0.13	0.10
Peru	0.21	0.33	-0.12	El Salvador	0.01	-0.10	0.11
Mauritius	-0.24	-0.13	-0.10	Ecuador	0.16	0.03	0.12
Hong Kong	-0.43	-0.33	-0.10	Haiti	0.08	-0.06	0.14
Israel	-0.10	-0.01	-0.09	Jordan	0.17	0.01	0.16
Macao, China	-0.36	-0.27	-0.08	Panama	-0.09	-0.25	0.16
Mexico	0.08	0.14	-0.06	Brazil	0.35	0.18	0.17
Indonesia	0.01	0.07	-0.06	Paraguay	0.25	0.07	0.19
Bolivia	0.13	0.14	-0.01	Dominican Republic	0.08	-0.21	0.29
Argentina	0.36	0.37	-0.01	Honduras	-0.04	-0.37	0.33
Philippines	0.13	0.12	0.01	Tanzania	-0.36	-0.71	0.35
Vietnam	0.22	0.21	0.01	Nicaragua	0.35	-0.03	0.38
Guatemala	-0.08	-0.11	0.02	Venezuela	0.28	-0.18	0.46

1/ Countries are listed from high to low bias, based on the definition of bias discussed in the next note. Cote d Ivoire exhibits the most gender underperformance in secondary enrollment, while Venezuela exhibited the least bias.
2/ These are the fixed effects from equation A-2.2 in Table A-2. A negative sign indicates a lower than expected enrollment in secondary education given that countries per capita income and export performance. This "unobserved" effect may also reflect factors other than discrimination. However these factors should also affect male enrollment, so bias is measured as female underenfollment minus male underenrollment (the third column). Note that is median bias country, Jamaica, was dropped to make each group the same size.