

TRADE AND GENDER INEQUALITY IN MOROCCO

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ABSTRACT: *This paper uses cointegration and vector-error correction estimation to explore the long-run relationship and short-run dynamics between gender inequality and openness to international trade in Morocco. The empirical results suggest that there is a stable long-run relationship between gender equality and openness to trade. This relationship is positive, implying that in the long-run trade and gender equality move together and have a positive association. Furthermore, the bulk of the adjustment to the long-run equilibrium is done by trade openness and the adjustment takes place quite rapidly. This implies that whenever the two variables start to diverge, trade openness tries to rapidly correct this divergence. The results also show that there is no empirical evidence that the variables are Granger caused by each other.*

INTRODUCTION

It is widely argued that trade may be associated with several types of inequalities, particularly in the short run. Some authors have shown that trade increases the disparities between rural and urban regions mainly because trade reforms tend to benefit urban areas and may have negative effects on rural sectors (Baliamoune-Lutz and Lutz 2005). Openness to trade may also increase the skilled-unskilled wage gap, as demand for skilled labor may increase and hence increase the income for skilled workers (Wood 1997). Finally, more openness to international trade may exacerbate gender inequality due to women's lower access to resources and skills (Tauli-Corpuz 2001; Çağatay and Ertück 2004; Baliamoune-Lutz 2005).

Several studies have shown that female labor in developing countries has increased particularly in export-oriented manufacturing sectors. In Baliamoune-Lutz (2005), I argue that countries that have increased their integration in world markets by becoming more export-oriented may be expected to have higher gender equality in male-female employment but not necessarily in education, as women may leave school early to join the labor force. In addition, women may be increasing their share of the employed labor force by accepting lower wages, mainly because they have weak bargaining power. This in turn, could be beneficial for firm investment and the country's economic growth, at least in the short run. For example, using data from a group of semi-industrialized export oriented countries, Seguino (2000) has found that gender inequality reflected in lower wages for women (relative to men) contributed to higher growth through its positive effect on exports. Also, using plant-level data from Turkey, Ozler (2000), shows that female employment is concentrated in 'low-skill' 'low-pay' jobs.

Standard trade theory predicts that trade would lead to a movement towards equalization of skilled-unskilled wages. But this result may not hold for many developing countries that rely on agricultural exports or export of low-skill based (unskilled-labor intensive) manufacturing, such as textiles. In fact, increased openness to trade in such countries may increase gender inequality (Çağatay 2001). Thus, given the ambiguity in the relationship between trade liberalization and women's welfare, the effects can only be determined empirically or through case studies.

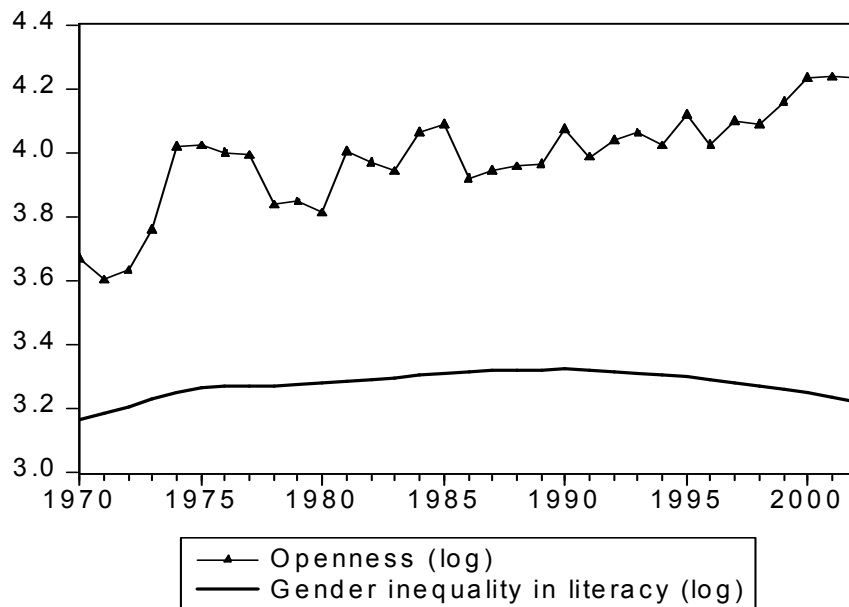
This paper uses a vector autoregression-correction model (VECM) on time series data from Morocco to explore the links between openness to trade and gender inequality in education (literacy). The empirical

results indicate that there is a long-run positive relationship between gender equality and openness to trade. In addition, I find that the adjustment to this long-run equilibrium is rapid and is being done mainly by trade openness.

EMPIRICAL ANALYSIS

In Baliamoune-Lutz (2006), I argue that “[g]ender inequality may manifest itself through various dimensions including unequal access to education or health services, inequality in employment, customs and laws that benefit men relative to women, and religion.” However, due to lack of adequate time series data on most of these factors, and to the fact that gender inequality in education tends to influence—and also be influenced by—the other sources of gender inequality, gender inequality in education is often used as a measure gender inequity in Morocco. Recent studies that have used gender inequality in education as a measure of gender inequality include Klasen 2002 and Baliamoune-Lutz 2005 and 2006. Many studies find empirical evidence that female education has a direct association with productivity and it has also been shown that “[g]ender differentials in education and health are not an efficient economic choice” (Dollar and Gatti 1999).

Figure 1. Openness and Adult Literacy Differential in Morocco (1970-2002)



I use the difference between male literacy and female literacy as an indicator of gender inequality, and trade as percent of GDP as a measure of openness to trade. Data are for the period 1970-2002 and are from the World Bank World Development Indicators CD ROM. The relationship between gender inequality in literacy (adult male literacy minus adult female literacy, in log form) is depicted in Figure 1.

Since the data are time series we should test their time series properties. First, we test for the presence of unit root (nonstationarity of the series). Table 1 displays the results from augmented Dickey-Fuller unit-root tests. The results indicate that both series have unit roots. The first-differences of the two variables appear to be stationary.

**Table 1. Unit-root test (Augmented Dickey-Fuller test statistic, summarized results)
Null Hypothesis: Variable has unit root**

	Test critical values		
	(1% level):	t-Statistic	Prob.*
Gender inequality (level)	-2.960411	-1.153488	0.6814
Gender inequality (first difference)	-3.595026	-4.335088	0.0105
Openness (level)	-3.557759	-3.107102	0.1218
Openness (first difference)	-2.960411	-6.182008	0.0000

*MacKinnon (1996) one-sided p-values. The critical values differ due to differences in the specification (lag length, inclusion/exclusion of a time trend and/or a constant):

Because the two series are nonstationary it is important to test for cointegration. Cointegration implies that if two time series x and y are integrated of order one $[I(1)]$, then there is a vector β , such that the residual term (z) from the regression of y_t on x_t is integrated of order zero $[I(0)]$. Thus, the cointegration test allows us to determine whether two (or more) non-stationary series are cointegrated or not. If they are cointegrated then we may view this cointegration relationship as a long-run equilibrium relationship between the two variables. In addition, we must take this into consideration when estimating the vector autoregressive (VAR) model by incorporating an error-correction term. The coefficient on the error-correction term reflects the speed of adjustment to the long-run equilibrium.

The results reported in Table 2 indicate that gender inequality and openness to trade are indeed cointegrated; i.e., they have a stable long-run relationship. The beta coefficient in the cointegration equation (the regression of *gender inequality* on *openness*) is 0.81, implying a positive long-term relationship between the gender equality and openness and trade. Note that in the regression of gender inequality (as dependent variable) on openness (as a right-hand side variable) the beta coefficient is *negative* 0.81. This suggests that in the long run, gender equality and openness to trade have positive co-movements.

The VEC equation, can be formulated as follows:

$$\begin{aligned} \Delta y_t &= \rho_0 + \rho_1 \Delta y_{t-1} + \rho_2 \Delta x_{t-1} - \gamma z_{t-1} + \varepsilon_t \\ \Delta x_t &= \lambda_0 + \lambda_1 \Delta y_{t-1} + \lambda_2 \Delta y_{t-2} - \gamma z_{t-1} + v_t \end{aligned} \quad (1)$$

where z is the residual term from the static regression of y_t on x_t .

Table 2. Cointegration test results

Rank Test: (Trace)				
Hypothesized		Trace	0.01	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.511917	22.42267	19.93711	0.0039
At most 1	0.006023	0.187281	6.634897	0.6652

Trace test indicates 1 cointegrating equation at the 0.01 level
 * denotes rejection of the hypothesis at the 0.01 level
 **MacKinnon-Haug-Michelis (1999) p-values

Rank Test (Maximum Eigenvalue)		
Hypothesized	Max-Eigen	0.01

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.511917	22.23539	18.52001	0.0023
At most 1	0.006023	0.187281	6.634897	0.6652

Max-eigenvalue test indicates 1 cointegrating equation at the 0.01 level
 * denotes rejection of the hypothesis at the 0.01 level
 **MacKinnon-Haug-Michelis (1999) p-values

Equation (1) represents a dynamic model used to test Granger causality between x and y and test whether there is evidence of short-run adjustment by evaluating the statistical significance of the coefficient on z (the error-correction term). The Wald test is used to test for lag exclusion and the test results are reported in Table 3.

Table 3: VEC Lag Exclusion Wald Tests

	D(Gender inequality)	D(Openness)	Joint
DLag 1	34.70919 [2.90e-08]	0.519572 [0.771216]	35.19590 [4.23e-07]
DLag 2	1.606390 [0.447896]	1.508866 [0.470277]	3.162160 [0.531064]
df	2	2	4

In Table 4, the cointegration equation appears in the top half of the table while the error-correction VAR equation appears in the second half of the table. The coefficients on the error-correction term indicate that short-run adjustments to the long-run equilibrium seem to be done by both variables (the coefficients on the EC term are significant at the 5-percent level of significance or better and are both negative). However, the adjustment speed associated with openness is much higher, 47 percent a year (the coefficient on the error-correction term in the equation for trade openness is -0.47) versus 1 percent a year (from the equation for gender inequality).

Thus, almost all of the adjustment is being done by openness to trade. The remaining terms in the VECM equations allow us to test for Granger causality. The coefficients on lagged values of gender inequality and openness are statistically insignificant, implying that neither variable is Granger caused by the other variable.

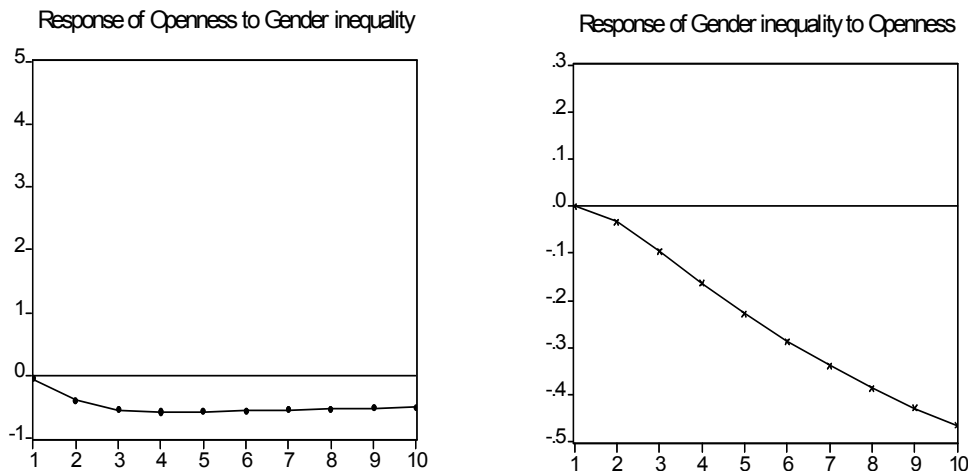
Table 2: Cointegration and error-correction equations
 Standard error in () and t-statistics in []

GENDER INEQUALITY(-1)	1.000000
OPENNESS(-1)	0.810414 (0.16265) [4.98253]
C	-70.63367
Error Correction equation	
	D(GENDER INEQUALITY) D(OPENNESS)

Error-correction term (ECM) from cointegrating equation	-0.013741 (0.00282) [-4.86635]	-0.474189 (0.22699) [-2.08904]
D(GENDER INEQUALITY(-1))	0.697879 (0.06802) [10.2593]	-6.056887 (5.46831) [-1.10763]
D(OPENNESS(-1))	0.003652 (0.00270) [1.35148]	0.075359 (0.21723) [0.34690]
C	-0.013218 (0.01046) [-1.26364]	1.304519 (0.84090) [1.55133]

Figure 2 displays the responses of each variable to a one-time innovation (a shock of one standard deviation) in the other variable. The response of trade openness to gender inequality seems insignificant and does not increase in magnitude over time. On the other hand, the response of gender inequality to a one-time innovation in trade openness not only is permanent and significant but it also increases in magnitude over time.

Figure 2. Response to Cholesky One S.D. Innovations



CONCLUSION

This paper examines the relationship between gender inequality in education (literacy) and openness to international trade using Moroccan data over the period 1970-2002. This is an interesting question given that gender inequality in Morocco is relatively high (exceeding 25 points throughout most of the 1970-2002 period). In fact, gender inequality has increased in the second half of the 1980s and the first half of the 1990s, a period during which Morocco has implemented several trade and financial reforms. In addition, Morocco relies heavily on agricultural products and light manufacturing, particularly textile and electronic products for its export sector. These types of exports tend to be unskilled-labor (or low-skill labor) intensive.

The econometric results indicate that openness to trade and gender equality are cointegrated; i.e, they have a stable long-run relationship. I show that in the long-run increased openness to trade is associated with higher gender equality. In the short-run, openness does the adjustment to the long-run equilibrium. This could be interpreted as a response to short-run movements in gender inequality. The coefficient on the error-correction term is negative, suggesting that in the short run higher gender inequality is associated with a fall in openness (openness falls each time gender inequality increases) so that the long-run equilibrium is reestablished. However, I could not find empirical evidence that either variable is Granger caused by the other variable.

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