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Does trade openness affect youth unemployment? New evidence from developing and emerging economies

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Abstract

This paper provides an empirical assessment of the effects of trade openness on youth unemployment in 89 developing and emerging economies for the period from 1990 to 2018. Results from Fixed-effects and Arellano-Bond GMM estimations indicate that the impact of trade openness on youth unemployment is not uniform across countries and genders. Openness to trade does not seem to influence youth unemployment in sub-Saharan Africa and Asian countries. On the other hand, we find that trade openness unambiguously reduces female and male youth unemployment in Latin America and the Caribbean, while it reduces only male unemployment in the Middle East and North Africa.

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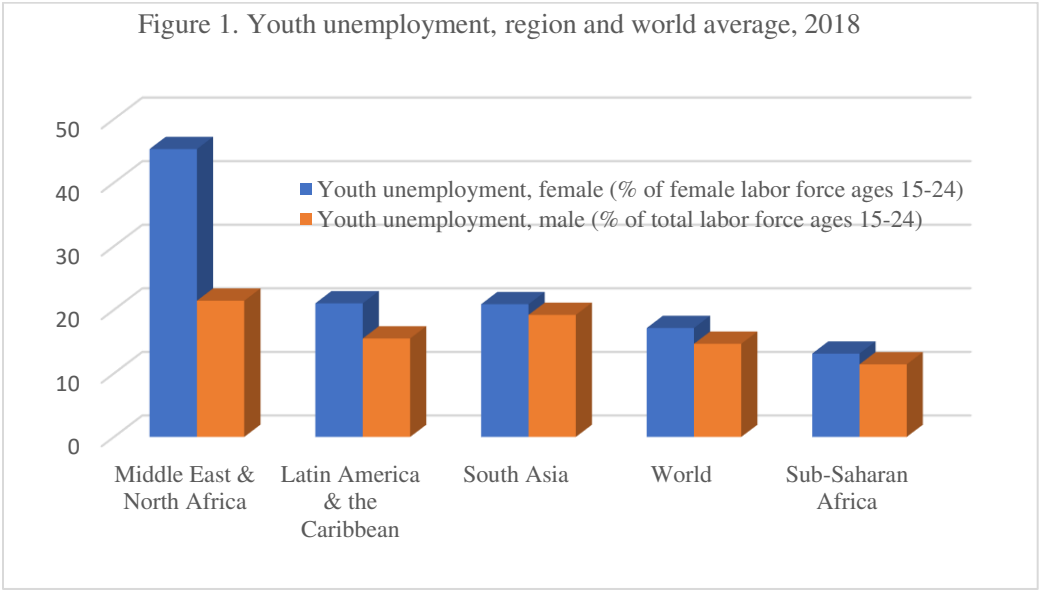
1. Introduction

Youth unemployment is one of the main socioeconomic challenges facing many developing countries in the 21st century, especially in sub-Saharan Africa (SSA), the Middle East and North Africa (MENA), and South Asia (Figure 1). Notwithstanding the impacts of the COVID-19 pandemic on labor markets, many countries in these regions have failed to meet an important target of sustainable development goal 8 (SDG8), which calls for a substantial reduction in the proportion of youth not in employment, education, or training, by 2020. At the same time, SDG17 considers international trade as a means of implementation for the 2030 Sustainable Development Agenda.

Figure 1. Youth unemployment, region and world average, 2018



Source of data: World Development Indicators database online (World Bank), accessed on 11/29/2021.

A key question is: does international trade cause higher youth unemployment? This can be the outcome if increased openness to trade attracts youth to the labor force, but other factors, such as lack of skills, employer reluctance to hire younger workers, and labor market rigidities, prevent youth from joining the ranks of the employed.

Belenkiy and Riker (2015) noted that theoretical models show a complex and often ambiguous relationship between trade and unemployment; "whether trade increases or reduces unemployment rates depends in a complicated way on the industry composition of a country's output and on differences in labor market frictions across industries and countries." Similarly, the empirical literature contains mixed evidence on the relationship between trade openness and unemployment.

A large body of empirical research investigated the effects of trade openness on unemployment (or employment) using micro-level data mainly from manufacturing industries in developed countries (Dutt *et al.*, 2009; Felbermayr *et al.*, 2011; Autor *et al.*, 2013; Gozgor, 2014; Mohler *et al.*, 2018). On the other hand, empirical literature focusing on the impacts of trade and

unemployment in developing countries is small but growing (Menezes-Filho and Muendler, 2011; Hasan *et al*., 2012; Coşar *et al*., 2016; Selwaness and Zaki, 2019).

Research on the impacts of trade on *youth* labor market outcomes, especially in developing countries, is remarkably limited. Yet, many theoretical and empirical studies focusing on the impacts of trade on labor market outcomes use models that consider age, skills, and labor mobility as important factors influencing trade-induced effects. Since youth, especially in developing countries, may have different skills and can have costless (or low-cost) mobility compared with older age groups, we should expect the effects of trade openness on young workers to be different from the effects on older workers.

The literature includes only three empirical studies that focused primarily on the effects of trade openness on *youth* unemployment (or employment) in developing countries: Anyanwu (2014), Awad (2019), and Kpognon *et al.* (2020). All three studies used panel data from African countries only. Anyanwu (2014) explored the effects of intra-regional trade in Africa on youth unemployment using panel data from 1980 to 2010. He found that higher levels of intra-African trade reduce the aggregate male and female youth unemployment. Similarly, Awad (2019) investigated the effects of globalization on youth unemployment by applying a system GMM estimation to data from 50 African countries, covering the period 1994 to 2013. He found that greater openness to global markets reduced youth unemployment rates.

On the other hand, Kpognon *et al.* (2020) used data from 41 SSA countries for the period from 2002 to 2015 and examined how labor market rigidities influenced the effects of trade on youth unemployment. Based on results from pooled ordinary least squares (OLS) regression and instrumental variable two-stage least-squares (IV-2SLS) estimations, the authors concluded that both openness to international trade and labor market rigidity had a positive and statistically significant impact on youth employment. However, their results showed that the interplay of labor market rigidity with openness to trade negatively impacted youth employment, suggesting that trade openness exerts a negative influence on youth employment in more rigid labor markets in SSA. Furthermore, Kpognon *et al.* (2020) examined the impacts of trade and labor market rigidity on female youth employment in SSA and found that trade openness and labor market rigidity negatively impacted young women's employment. In contrast, the interaction of trade openness with labor market rigidity had a positive influence. Kpognon *et al.* noted that this last result means that since women often face discrimination in the labor market, and employers tend to encourage and benefit from this situation, "[s]tricter labor market regulations in favor of women and young women would be more favorable to them."

This paper aims to fill the gap in research on trade and youth labor market outcomes by using data from a larger sample, including African countries, as well as developing and emerging economies from Latin America and the Caribbean (LAC) and Asia. We investigate the effects of trade openness on youth unemployment rates using fixed-effects (FE) and Arellano-Bond general-method-of-moments (A-B GMM) estimators, and data for 89 developing and emerging economies for the period from 1990 to 2018. We estimate the models including the interplay between the region (SSA, MENA and LAC) and trade openness and also perform estimation for each region separately (including for developing and emerging economies in Asia).

The results indicate that trade openness unambiguously reduces female and male youth unemployment rates in LAC, while it does not have a significant impact in SSA and Asian countries. On the other hand, trade openness seems to reduce male youth unemployment but generally has no effect on female youth unemployment in the MENA countries. Interestingly, we find consistent evidence of hysteresis in youth unemployment in all regions. Moreover, the results from the specification by region show that higher fertility rates are associated with lower youth unemployment in SSA and Asia, while higher secondary school enrollment rates are associated with higher male youth unemployment in MENA and higher male and female youth unemployment in LAC. We also find that higher income reduces youth unemployment only in Asia. The cross-region and cross-gender heterogeneity in the impacts of trade openness, secondary education, fertility, and income on youth unemployment underscores the importance of accounting for regional and gender differences when formulating national and international policies.

2. Methodology and data

We examine the relationship between youth unemployment rates and trade openness by estimating variants of the following equation:

$$y_{i,t} = \alpha y_{i,t-1} + X_{i,t}\beta + \mu_i + \varepsilon_{i,t}, \qquad (1)$$

where $y_{i,t}$ is youth unemployment rate in country i at time t and X is a row vector of the factors that influence the dependent variable, including trade openness and other control variables. μ_i is the individual (country) fixed effect, and $\varepsilon_{i,t}$ is a time-varying error term.

Unemployment may cause trade openness and other right-hand-side (RHS) variables we use in the estimation. Thus, we also use the A-B GMM estimator to take this potential endogeneity problem into account. Applying the A-B GMM estimator to the specification in equation (1) yields

$$\Delta y_{i,t} = \alpha \Delta y_{i,t-1} + \Delta X_{i,t}\beta + \Delta \varepsilon_{i,t}, \qquad (2)$$

We investigate the impacts of trade on total, male, and female youth unemployment using data on unemployment rates from the International Labor Organization (ILO). Youth unemployment rate (yunemp) represents the share of the labor force ages 15-24 without work but available for and seeking employment. Our RHS variable of primary interest is openness to international trade (in log form), which we measure by the sum of exports and imports as a share of a country's GDP. Instead of separating the two variables, we include both exports and imports because international trade can lead to job creation in expanding (export) industries and job destruction in import-competing industries. We are interested in assessing the net effect of increased trade flows on youth unemployment rates. We also include other control variables: fertility rates (births per woman), internet use (individuals using the Internet, % of the population), real gross domestic product (GDP) per capita (in log form), secondary education enrollments (ratio of total enrollment to the population), a time trend, and interactions of trade openness with region dummy variables for SSA, MENA, and LAC. Data on these variables are from the World Bank's World Development Indicators database. The main control variables have generally been used in studies investigating the determinants of unemployment.

3. Estimation Results

We investigate the effects of trade on youth unemployment using the fixed-effects (FE) and A-B GMM estimators after controlling for the roles of fertility, secondary education, income, internet use and time. We include the lagged value of the dependent variable on the RHS to take into account potential hysteresis in unemployment (Blanchard and Summers, 1986; Yagan, 2019; von Wachter, 2020). We also explore whether these factors have gender-differentiated impacts by estimating the effects on total, female, and male youth labor force participation rates. We first present the FE and A-B GMM estimation results (Tables 1 and 2) and then we perform robustness checks to assess the robustness of the primary regression coefficient estimates.

Table 1 —Trade and youth unemployment: Fixed-effects estimates
Dependent variable: Youth unemployment rate (yunemp)

	Model 1			Model 2		
	Total	Female	Male	Total	Female	Male
yunemp_lag	0.867***	0.859***	0.875***	0.868***	0.857***	0.871***
	(0.010)	(0.011)	(0.010)	(0.011)	(0.011)	(0.010)
trade	0.389**	-0.158	0.459***	0.328	0.416	0.289
	(0.161)	(0.421)	(0.159)	(0.329)	(0.423)	(0.325)
fertility	-0.261**	-0.567***	-0.180	-0.279**	-0.554***	-0.216*
	(0.122)	(0.159)	(0.121)	(0.121)	(0.158)	(0.120)
income	-0.067	-0.315	-0.066	-0.259	-0.448	-0.268
	(0.223)	(0.287)	(0.222)	(0.229)	(0.295)	(0.227)
internet	0.001	0.008**	0.0002	0.003	0.008*	0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.003)
time	-0.017	-0.029*	-0.015	-0.015	-0.022	-0.016
	(0.012)	(0.015)	(0.012)	(0.012)	(0.015)	(0.012)
MENA x trade				-1.921***	0.852	-2.814***
				(0.610)	(0.784)	(0.606)
LAC x trade				-2.571***	-2.90***	-2.397***
				(0.483)	(0.618)	(0.478)
SSA x trade				-0.179	-0.269	-0.135
				(0.392)	(0.505)	(0.388)
N. observations	2196	2196	2196	2196	2196	2196
R-sq						
Within	0.77	0.76	0.77	0.77	0.77	0.78
Between	0.99	0.99	0.99	0.83	0.86	0.73
Overall	0.98	0.97	0.98	0.82	0.85	0.74

Standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

3.1 FE and A-B GMM estimates

The results associated with Model 1 in Table 1 suggest that trade openness increases total and male youth unemployment but does not have a significant effect on female youth unemployment. To control for regional differences, we add the interaction between dummy variables for three regions and trade openness. The results under Model 2 indicate that trade openness is associated with lower female and male youth unemployment in LAC, while in the MENA region trade openness is associated with lower male youth unemployment but does not seem to reduce female youth

unemployment. On the other hand, the effect of trade openness on youth unemployment in SSA and Asian countries is statistically nonsignificant.

To take into account the potential problem of endogeneity, we perform A-B GMM estimations and report the estimates in Table 2. The statistical evidence on the effect of trade openness is similar to the one obtained in the FE estimation. We find that trade openness reduces female and male youth unemployment in LAC, whereas in the MENA region, trade reduces male youth unemployment but has no effect on female youth unemployment.

Table 2 —Trade and youth unemployment: A-B GMM estimates
Dependent variable: Youth unemployment rate (yunemp)

	Model 1			Model 2		
	Total	Female	Male	Total	Female	Male
yunemp_lag	0.833***	0.794***	0.849***	0.846***	0.820***	0.855***
	(0.025)	(0.029)	(0.028)	(0.019)	(0.023)	(0.021)
trade	-0.482	0.291	-0.746*	0.317	0.499	-0.248
	(0.395)	(0.440)	(0.390)	(0.396)	(0.443)	(0.426)
fertility	-0.223	-0.576*	-0.196	-0.257	-0.642**	-0.188
	(0.257)	(0.340)	(0.262)	(0.173)	(0.308)	(0.183)
income	-0.554*	-0.765	-0.442	-0.565**	-0.794	-0.593**
	(0.329)	(0.568)	(0.294)	(0.274)	(0.500)	(0.266)
internet	0.001	0.010	0.001	0.004	0.001	0.003
	(0.004)	(0.008)	(0.004)	(0.005)	(0.008)	(0.004)
time	-0.005	-0.025	-0.008	-0.010	-0.023	-0.008
	(0.021)	(0.027)	(0.021)	(0.016)	(0.025)	(0.016)
MENA x trade				-1.861*	1.562	-2.948**
				(1.082)	(1.281)	(1.179)
LAC x trade				-2.635***	-2.910***	-2.517***
				(0.887)	(0.953)	(0.833)
SSA x trade				0.006	-0.139	0.0035
				(0.465)	(0.547)	(0.504)
N. observations	2091	2091	2091	2091	2091	2091
A-B test for AR(2);	-0.725	1.198	-1.424	-0.801	1.181	-1.488
z [p>z]	[0.47]	[0.23]	[0.15]	[0.42]	[0.24]	[0.14]

The reported A-B GMM estimates pass the Sargan test for overidentifying restrictions (results may be obtained from the author upon request). Standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

3.2 Robustness analysis

To test the robustness of the results discussed in the previous section, we estimate several additional regressions using FE and A-B GMM estimators and focusing on male and female youth unemployment (Tables 3 and 4). We first test for the presence of nonlinearity in the relationship between trade openness and youth unemployment. The results reported under Models 1 and 2 (in Tables 3 and 4) show that the coefficient on the square form of trade openness is statistically nonsignificant, indicating that we cannot confirm the presence of a non-linear relationship between trade and youth unemployment. Second, we include secondary school enrollment as proxy for human capital (Models 3 and 4). Interestingly, the FE results show that secondary school enrollments have a positive association with both male and female unemployment, while the AB-

GMM results indicate that higher secondary school enrollment ratios increase male youth unemployment but have no significant effects on female youth unemployment. We also find that higher fertility rates are associated with lower unemployment, although this result is not statistically significant once we control for secondary schooling.

Table 3—Fixed-effects estimates: Robustness check
Dependent variable: Youth unemployment rate (yunemp)

	Model 1		Model 2		Model 3		Model 4	
	Female	Male	Female	Male	Female	Male	Female	Male
yunemp_lag	0.857***	0.871***	0.858***	0.871***	0.839***	0.867***	0.840***	0.868***
	(0.011)	(0.010)	(0.011)	(0.011)	(0.016)	(0.015)	(0.016)	(0.015)
Trade	0.214	-0.131	-0.103	-0.269	-0.614*	0.542*	0.615*	0.541*
	(1.690)	(1.298)	(1.690)	(1.205)	(0.370)	(0.293)	(0.370)	(0.294)
fertility	-0.555***	-0.218*	-0.559***	-0.220*	-0.197	-0.011		
	(0.158)	(0.120)	(0.158)	(0.120)	(0.229)	(0.180)		
income	-0.446	-0.2623	-0.411	-0.248	-1.068	-0.591	-1.081**	-0.592
	(0.295)	(0.227)	(0.287)	(0.221)	(0.479)	(0.372)	(0.479)	(0.372)
internet	0.008*	0.003	0.008*	0.003	0.010*	0.003	0.009	0.003
	(0.004)	(0.003)	(0.004)	(0.003)	(0.005)	(0.004)	(0.005)	(0.004)
time	-0.022	-0.016	-0.024	-0.016	-0.018	-0.024	-0.006	-0.023
	(0.015)	(0.012)	(0.015)	(0.012)	(0.024)	(0.019)	(0.020)	(0.016)
MENA x trade	0.851	-2.816***	1.015	-2.742***	1.252	-3.126***	1.266	-3.124***
	(0.785)	(0.606)	(0.713)	(0.548)	(1.065)	(0.848)	(1.065)	(0.846)
LAC x trade	-2.880***	-2.359***	-2.693***	-2.278***	-3.077***	-3.085***	-3.079***	-3.085***
	(0.639)	(0.491)	(0.519)	(0.491)	(0.743)	(0.587)	(0.743)	(0.586)
SSA x trade	-0.257	-0.112						
	(0.513)	(0.394)						
trade squared	0.023	0.049	0.040	0.056				
	(0.191)	(0.146)	(0.188)	(0.144)				
secondary school enrollments					0.015*	0.017**	0.016**	0.017**
					(0.008)	(0.006)	(0.008)	(0.006)
N. observations	2196	2196	2196	2196	1326	1326	1326	1326
R-sq								
Within	077	078	077	076	071	074	071	075
Between	0.86	0.73	0.87	0.73	0.83	0.65	0.83	0.65
Overall	0.85	0.74	0.86	0.74	0.80	0.65	0.79	0.65

Standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

The estimates reported in Tables 3 and 4 confirm the robustness of the results in Tables 1 and 2. Increased trade openness unambiguously reduces female and male youth unemployment in LAC, while it reduces only male youth unemployment in the MENA countries. On the other hand, trade openness does not seem to have an impact on youth unemployment in SSA and Asian countries, notwithstanding the mixed and weak statistical evidence of a relationship between trade and youth unemployment under Models 3 and 4 in Table 3.

Furthermore, we estimate the effects of trade in each region separately using the A-B GMM estimator and the results we obtain confirm the findings in previous estimations. The estimates reported in Table 5 show that trade openness reduces male and female unemployment rates in LAC, while it reduces only male unemployment rates in the MENA region. On the other hand,

trade does not seem to affect youth unemployment rates in SSA and Asia. Thus, these results are consistent with those on the previous specifications.

Interestingly, we find that the coefficient on the lagged dependent variable is consistently positive, generally high in magnitude, and statistically significant (at the 1-percent level). This result indicates that there is significant hysteresis in youth unemployment, and implies that expansionary fiscal and monetary policies may lead to economic recovery or expansion but youth unemployment rates could continue to rise.

We also find evidence that the impacts of other variables are heterogenous. The results show that higher secondary school enrollment rates are associated with higher male and female youth unemployment in LAC and with higher male youth unemployment in MENA. On the other hand, we find that higher fertility rates are associated with lower youth unemployment in SSA and Asia, while higher income reduces youth unemployment only in Asia. This cross-region and cross-gender heterogeneity in the impacts of trade openness, secondary education, and fertility on youth unemployment underscores the importance of accounting for regional and gender differences when formulating national and international policies.

Table 4 —A-B GMM estimates; Robustness check
Dependent variable: Youth unemployment rate (yunemp)

	Model 1		Model 2		Model 3		Model 4	
	Female	Male	Female	Male	Female	Male	Female	Male
yunemp_lag	0.822***	0.857***	0.818***	0.854***	0.726***	0.801***	0.734***	0.806***
	(0.024)	(0.022)	(0.025)	(0.026)	(0.032)	(0.030)	(0.029)	(0.033)
trade	1.408	0.589	1.071	0.0693	0.439	0.393	0.326	0.269
	(2.477)	(1.963)	(2.346)	(2.098)	(0.511)	(0.364)	(0.547)	(0.410)
fertility	-0.619**	-0.172	-0.691**	-0.175	-0.660	-0.456		
	(0.291)	(0.176)	(0.302)	(0.178)	(0.491)	(0.395)		
income	-0.785*	-0.502**	-0.784	-0.519**	-1.437	-1.107	-1.579	-1.061
	(0.476)	(0.249)	(0.498)	(0.255)	(1.245)	(0.954)	(1.277)	(0.986)
internet	0.010	0.003	0.011	0.002	0.006	0.011	-0.001	0.006
	(0.008)	(0.016)	(0.007)	(0.004)	(0.009)	(0.008)	(0.010)	(0.009)
time	-0.024	-0.009	-0.031	-0.007	-0.053	-0.089**	-0.004	-0.058
	(0.024)	(0.016)	(0.024)	(0.016)	(0.042)	(0.042)	(0.046)	(0.039)
MENA x trade	1.399	-2.978**	1.559	-2.945**	2.776	-3.864**	2.776	-3.754*
	(1.261)	(1.177)	(1.287)	(1.139)	(2.112)	(1.949)	(2.112)	(1.972)
LAC x trade	-3.043***	-2.56***	-2.957***	-2.54***	-2.554**	-2.364**	-2.544**	-2.458**
	(0.639)	(0.773)	(0.805)	(0.702)	(1.298)	(1.105)	(1.295)	(1.102)
SSA x trade	-0.283	-0.068						
	(0.581)	(0.467)						
trade squared	-0.095	-0.026	-0.074	0.030				
	(0.280)	(0.235)	(0.278)	(0.258)				
secondary school enrollments					0.021	0.036***	0.023	0.037***
					(0.017)	(0.013)	(0.018)	(0.013)
N. observations	2091	2091	2091	2091	1097	1097	1097	1097
A-B test for AR(2), z [p>z]	1.187	-1.486	1.179	-1.479	1.012	-0.961	1.010	-0.963
	[0.23]	[0.14]	[0.24]	[0.14]	[0.13]	[0.34]	[0.15]	[0.33]

The reported A-B GMM estimates pass the Sargan test for overidentifying restrictions (results may be obtained from the author upon request). Standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5 —Trade openness and youth unemployment by region: GMM estimates
Dependent variable: Youth unemployment rate (yunemp)

	MENA		LAC		SSA		Asia	
	Female	Male	Female	Male	Female	Male	Female	Male
Unemp_lag	0.640***	0.839***	0.739***	0.775***	0.683***	0.752***	0.736***	0.677***
	(0.064)	(0.045)	(0.037)	(0.034)	(0.034)	(0.050)	(0.072)	(0.075)
Trade	3.205	-2.694*	-2.201***	-2.437***	0.006	0.240	1.083	0.715
	2.898)	(1.405)	(0.855)	(0.671)	(0.569)	(0.278)	(0.916)	(0.738)
Fertility	-1.051	-0.278	1.097	1.245	-2.785**	-1.931**	-1.086*	-1.469**
	(0.755)	(0.627)	(1.432)	(1.091)	(1.297)	(0.818)	(0.568)	(0.568)
income	-3.043	-2.807	-2.685	-1.626	-1.609	-1.232	-4.720**	-4.379**
	(1.169)	(2.987)	(2.023)	(1.547)	(1.431)	(1.167)	(2.301)	(2.186)
Internet	0.040	0.056**	-0.025	-0.027	-0.024	0.024	0.001	0.006
	(0.031)	(0.024)	(0.034)	(0.026)	(0.023)	(0.018)	(0.009)	(0.008)
secondary school	0.018	0.065**	0.062**	0.069***	-0.030	-0.011	-0.010	-0.007
enrollments	(0.047)	(0.029)	(0.024)	(0.021)	(0.025)	(0.020)	(0.011)	(0.013)
Time	-0.171	-0.262**	0.060	0.072	-0.103	-0.127***	0.128	0.097
	(0.151)	(0.124)	(0.172)	(0.132)	(0.063)	(0.046)	(0.079)	(0.087)
N. observations	177	177	276	276	402	402	242	242
A-B test for	0.791	0.191	1.428	-0.189	0.261	-1.215	0.686	-1.096
AR(2), z [p>z]	[0.43]	[0.85]	[0.15]	[0.85]	[0.79]	[022]	[0.49]	[027]

The reported A-B GMM estimates pass the Sargan test for overidentifying restrictions (results may be obtained from the author upon request). Standard errors are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

4. Conclusion

The analysis in this paper suggests that the effect of trade openness on youth unemployment is not uniform across countries and genders. We find that trade openness does not have significant effects on youth unemployment in SSA and Asian countries. In contrast, the results show that trade openness unambiguously reduces female and male youth unemployment rates in LAC, while in the MENA region, it reduces only male unemployment rates. We also find evidence supporting the presence of hysteresis in youth unemployment, which may underscore the ineffectiveness (or lack) of labor market policies and skill development programs for young workers in many countries.

The heterogeneity in the effects of trade openness on youth unemployment could be the result of many factors, including differences in labor market institutions, sectoral composition of trade, and labor market frictions across industries and economies. In countries where trade openness does not have a positive impact (at the macro level) on youth employment, it is important to ask whether this is due to the nature of traded goods and services or whether other factors prevent the trade-induced reallocation of workers across sectors and geographical locations by causing imperfect youth labor mobility (Dix-Carneiro, 2014; Coşar *et al.*, 2016).The answer to this question should provide important guidance to policymakers as it would help identify key entry points to enable youth to gain from greater openness to trade. Suppose imperfect or low labor mobility is the main cause of the lack of favorable impacts (in terms of employment) from trade. In that case, we should investigate the type and causes of this worker's immobility. Different policy approaches would apply depending on whether it is geographical or occupational immobility of youth labor. If it is the former, perhaps housing subsidies and provision of youth-friendly public transportation (e.g., high-speed trains and technology-equipped trams and busses) could provide strong incentives to young workers. On the other hand, if the main source is occupational labor immobility, policy initiatives may need to primarily focus on skill upgrading through apprenticeship and training and other targeted investments in human capital. Policymakers should also consider the potential impacts of labor market rigidities on youth labor mobility and trade-induced effects (Awad, 2019; Kpognon *et al.,* 2020).

We also find that higher secondary school enrollment rates are associated with higher male and female youth unemployment in LAC and with higher male youth unemployment in MENA, whereas higher fertility rates are associated with lower youth unemployment in SSA and Asia. On the other hand, the impact of income is significant only in Asia, where higher income seems to reduce both male and female youth unemployment. This result may be due to economic growth being relatively more inclusive in Asia than in other developing regions.

The estimated effects of secondary schooling (in LAC and MENA) and fertility (in SSA and Asia) seem counter-intuitive. A possible explanation for the impact of secondary schooling is that the effect could stem from labor market mismatches. In the case of fertility, it is possible that higher fertility rates may prevent pregnant women from working or keeping their jobs, thus creating employment opportunities for youth.

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