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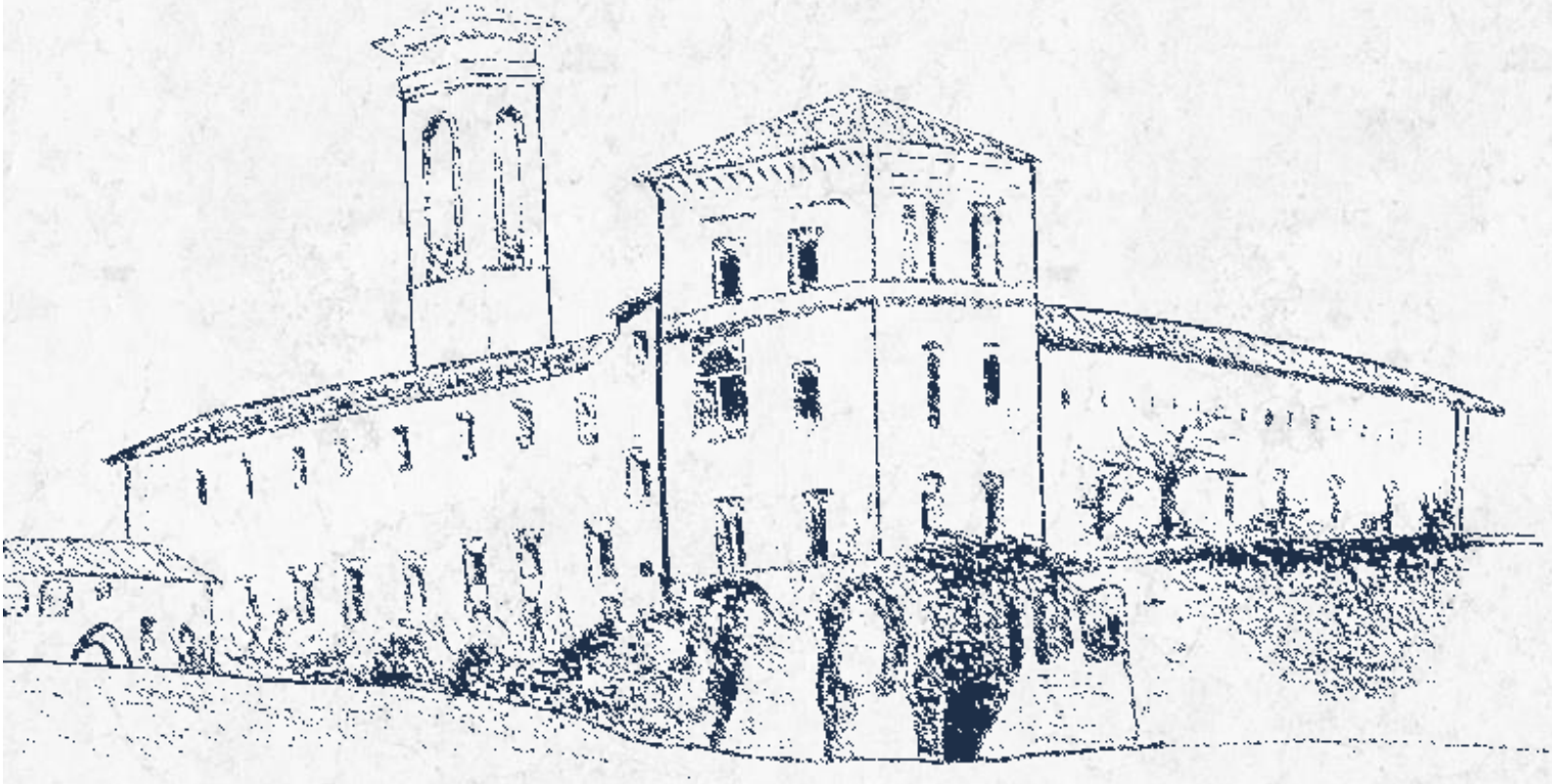

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Plow, Adolescent Fertility and Foreign Direct Investment

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Abstract

Purpose – The purpose of this paper is to examine the impact of adolescent fertility on Foreign Direct Investment (FDI). We used cross country data for the year of 2014 to unravel the causal relation.

Design/methodology/approach – To eliminate the risk of possible omitted variable bias, and reverse causality we use an instrumental variable approach. The instruments used are the plow use variable, and the variable showing the years since the transition to agriculture identifying the male dominant cultural values.

Findings – 2SLS estimation results indicate that adolescent fertility increases FDI. In particular, the result shows that the lower bargaining power of the women at the job market due to a rise in early age fertility would stimulate FDI inflows.

Research limitations/implications – The research proposes the presence of causality running from adolescent fertility to FDI and invites future empirical investigation using richer data set.

Originality/value – The results provide significant implications for both gender distribution of labor market earnings and the applied labor economics. The study is the first study in the literature exploring the nexus between these variables, thus, has significant contribution.

Paper type – Research paper

Keywords – *Adolescent Fertility, FDI, Plow, Two Stage Least Squares*

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1. Introduction

There have been several empirical papers focusing on the role of FDI in economic development, particularly in technology transfer. One variant of this literature focus on the determinants of the FDI which are prerequisite to have to attract FDI and benefit at maximum from it. However, until recently the labor market determinants of FDI was gender blind and was focusing solely on the unit labor cost or the labor market flexibility without gender focus. The newly developing literature on the nexus between FDI and gender distribution of labor market returns mainly focus on the gender wage gap and gender biased skill composition without giving a particular place on the fertility behavior of the women. The paper aims to contribute to the literature by mainly focusing on adolescent fertility and its impact on the FDI.

Along with the bargaining power of the labor that we emphasize in the study, there are several factors referred in the literature that would attract FDI. Edwards (1990), Asiedu (2002), Chakrabarti (2001) argue that trade openness stimulates FDI inflows. Corruption is also considered in the literature as one of the determinants of the FDI (Smarzynska and Wei, 2000). There is no consensus in the literature regarding the impact of corruption on the FDI (Akçay, 2001; Wheeler and Mody, 1992; Henisz, 2000). De jure and de facto legal obstacles, institutional inertia, bureaucracy, easiness of undertaking investment in the country which define the business environment in the country are argued that would affect size of FDI (Kumar et al. 2002). Democracy would be correlated with economic, political stability and the conducive economic and political environment that would affect FDI entrance (Addison and Heshmati, 2003; Guerin and Manzocchi, 2009).

Moreover, lower quality infrastructure which leads to lower expected profits would affect the FDI level (Blonigen, 2005) negatively. De Mooij and Ederveen (2003) show that the median tax elasticity of FDI calculated at the 25 studies is -3.3. Blonigen (2005) argue that low legal protection against the confiscation of the assets decreases the investment by foreign firms in the host country. The rule of law which defines the quality of contract enforcement, property rights, and affect the probability of crime occurrence is used in empirical studies as one of the determinants of FDI (Bailey, 2018; Gani, 2007). Inflation is also used as the factor determining size of FDI as it is significant macroeconomic stability indicator (Kinoshita and Campos, 2003; Botric and Skuflic, 2006). Buckley and Casson (1981) argue that serving to the host market through FDI or export depends on several variables such as transportation cost, establishment cost incurred in the host country, and the size of the host market. They argue that if the (horizontal) FDI faces with increasing returns to

scale due to the large size market in the host country, the trade would not be preferred way to enter the host market.

Until recently the FDI literature has been gender-blind. However, recent studies (Oudraogo and Marlet, 2017; Vahter and Masso, 2018; Bui et al. 2018; Chaudhuri, 2014; Blanton and Blanton, 2015) fill the gap in the literature by providing evidences on the nexus between gender wage gap and the FDI. Bui et al. (2018) using data for the 27 developing economies in the Asia-Pacific region over the period 1992-2011 show that gender equality in economic conditions decreases FDI. They also show that improvement in the political rights of women affects negatively size of FDI implying that rise in the bargaining power of women in political processes would generate deleterious consequences for FDI.

Reich (1981), Bowles and Gintis (1990) explain the wage determination as the result of the bargaining process between capitalist and labor where the wage moves according to bargaining strength of these classes. Women spending a significant amount of time by providing labor for the housework, have less mobility and time flexibility as an employee, thus, traditionally have lower bargaining power in the labor market (Vijaya and Kaltani, 2007; Onaran and Baslevent, 2004). Vijaya and Kaltani, (2007) argue that capital movements in the country, mainly FDI would reduce more the women's traditionally low bargaining power due to harsh competition conditions exerted on the domestic firms.

There are certain factors which are highly correlated with the traditional gender roles determine the bargaining position of the women in the wage determination. The general and specific human capital levels which are highly associated with the labor productivity are at the core of the bargaining process. Topel (1991) show that individuals accumulate specific (tenure) and general (experience) human capital during the job which is lost as they leave the labor market. Erosa et al. (2002) show that childbearing generates significant gender differences in turnover rates, with a sustained impact on employment and wages. Therefore, women leaving the market to childbear would lose significant size of her human capital leading to reduced productivity, and wage level.

Fertility behavior and the timing of the fertility well studied issues in the literature. Axinn & Barber (2001), Basu (2002) argues that education affects the fertility decision, and Becker(1981), Güner and Knowles (2002) demonstrate that labor market outcomes such as low future wages resulting from childbearing affect the current fertility decision. Becker (1973) model the fertility in his model of demand for children which relates the labor market outcomes to the fertility decision through substitution effect. Becker (1981) in his famous quality-quantity trade-off model argues that an increase in the

marginal cost of quality (of children) results in a reduction in family size indicating the quantity-quality trade-off. Michael and Willis (1976), Kearney and Levine (2009), Guinnane (2011) argue that contraceptive use decreases fertility. Adsera (2005), Kravdal (2002), Easterlin et al. (1980) argue that economic uncertainty and sudden economic recession decrease fertility. Kulu and Vikat (2007) argue that housing prices affect fertility decision.

Regarding the fertility timing issue, Malthus (1789) argues that couples do not marry and have children until they reach a sufficient income level to survive as a family. Therefore, he explains that fertility decision and the marriage decision are not separate issues. From the Becker' (1973) perspective, it can be claimed that women with lower expected future wage would prefer not to delay childbearing.

Women faced with the unequal gender distribution of resources, mainly if the opportunity cost of not accumulating the specific and general human capital is low, would have a higher fertility rate, have a higher percentage of a teenage birth. Particularly, general economic conditions might stimulate teenage birth due to low opportunity cost, or might enforce women to postpone marriage/fertility. Moore (1978), Kirby et al. (2001) emphasize the poverty, unemployment as one of the determinants of the teenage childbearing. According to Ni Bhrolchain and Beaujouan (2012); education and childbearing are incompatible activities implying lower fertility rate for young women attaining education. Kraus and Castro-Martin (2018) using data from the 2700 adolescents in secondary schools in Madrid in 2011 show that although Latin American adolescents' fertility timing reflects the cultural motivations from the origin society, they adopt the fertility timing preferences in the host country. Therefore, cultural traits and social norms are useful at adolescent fertility rates.

There are studies on the literature examining the labor market consequences of the teenage childbearing. Moore and Waite (1977) show that teenage mothers have 1 - 4 years less schooling than mother delayed fertility. Fletcher and Wolfe (2009) show that there is an adverse effect of teen childbearing on high school completion and the income level of young adults. Fletcher and Wolfe (2009) using the teenagers who had a miscarriage as the control group and by including community-level factors and birth control choices show that teenage childbearing reduces the probability of receiving the high school diploma by 5 to 10 percentage points, reduces the annual income as by $1000 to $2,400, and increases the likelihood of receiving cash assistance. There is also further evidence provided in the literature regarding the nexus between the fertility induced withdrawals from the labor force and the lower wages (Korenman and Neumark, 1992; Blau and Kahn, 2017). Women are postponing the first birth face with higher employment probabilities and wages (Bratti,2015).

Moreover, loss in human capital due to childbearing would last in the form of lower returns to experience dubbed "mommy track" (Miller, 2011; Bratti, 2015). Notably, women who postpone the first birth have wage premium even she has the same number of children with women who did not delay the first birth. Therefore, women worker experiencing the first birth earlier would provide a premium to the employer as they have lower bargaining power in the labor market.

Young mother during the period of pregnancy and the childbearing after pregnancy would lose some part of the general and specific skills due to many leaves of absences. The employer might exploit the fact that the young mother might not signal the real loss in human capital that would be incurred in the process and bargain for the wages under marginal productivity.

Additionally, employer might extract more wage from the young mother if she is highly risk-averse and face high job search cost, or have locational preferences for the job. Joyce and Keiller (2018), argue that employers might exploit the fact at wage settings that women after first birth look for a job closer to home. Empirical evidence referred above show that women lose a significant proportion of the employment probability by giving early birth; thus, they would face higher job search cost which would decrease the bargaining power of the young mother. In particular, young women suffering from higher childcare per dollars earned in the labor market would prefer low unemployment duration, thus, would accept low wage offers from the employers who might exploit this preference of the young mother.

Moreover, there is also a self-selection issue playing a role in determining the bargaining power of the mother. Particularly, mother entering the labor market who suffer from the opportunity cost of not consuming the time for child-rearing might require immediate money to cover the cost of childcare that would reduce the bargaining position of young mother.

Foreign direct investment, particularly the vertical FDI exploits the local comparative advantages. There is a consensus among scholars that the greater integration to the world economy generates an increase in female employment particularly in the manufacturing sector due to lower unit cost, manual dexterity, stability and flexibility of the female labor (Onaran and Başlevent, 2004; Joekes, 1995; Cağatay and Berik, 1991; Pearson, 1998). High adolescent fertility implying a low level of specific (tenure) and general (experience) human capital levels and possible further interruptions in the women's career path would suggest the lower level of bargaining power in the job market that the FDI might exploit. Furthermore, due to poor local /general economic conditions, the presence of significant social immobility, the gender wage gap, or gender-based social norms, a considerable number of talented women, particularly in developing countries, do not enter the labor force or enter late

following their first birth as an added /part-time worker. In developing countries where the opportunity cost of human capital accumulation is high, the credit market is imperfect, a talented young mother from lower socioeconomic segments would not signal the talent level with education. Therefore, a young mother with a high capacity of talent and high productivity but having low bargaining power would be available for the FDI at low wages.
The paper aims to examine the significance of adolescent fertility as the determinant of FDI. Because the linkage has not been considered between the variables before, the article makes a significant contribution to literature. The paper uses cross country data for the year of 2014 by employing an instrumental variable approach due to the risk of obtaining biased coefficients resulting from the omitted variable bias. The next section discusses the identification strategy which is followed by empirical model and estimation results.

2. Identification Strategy

Fertility behavior might be affected by economic incentives. Particularly, technological advancement and structural transformation of the economy through external sources including FDI would change the wage level, incentives to invest in human capital, gender segregation in sectors, the opportunity cost of childcare, housework. Therefore, there would be reverse causality from FDI to adolescent fertility where the income effect of FDI and technological spillover by FDI might affect labor market outcomes and gender-based distribution of labor market returns. Moreover, there would be some omitted variables correlated with both FDI and adolescent fertility that neither can be observed nor measured correctly. For example, globalization, technological shift or change in tastes and preferences would affect both market fundamentals, FDI and the job prospects for women, adolescent fertility. Therefore, there should be exogenous variation in adolescent fertility that is not accounted by neither omitted variables nor the FDI itself.
OLS would produce biased coefficient estimates in the presence of omitted variable bias and reverse causality. To deal with the endogeneity issues, we implemented the Instrumental Variable approach. The instrument we used two variables which would not be correlated with the flow of FDI (exclusion restriction) and would be associated with adolescent fertility (instrument validity). The first instrument is the plow use in agriculture which is showed (Boserup, 1970; Alesina et al. 2013) that is highly correlated with the emergence and persistence of the male dominant family structure.
Plow use necessitates the manpower as it involves the control of the big animals, and uninterrupted working routine which would contradict with the

women labor routine that is interrupted due to home production tasks (Hazarika, 2018). Alesina et al. (2013) show that plow-use and the gender-based division of labor and gender-based division of political positions, and the validity of glass ceiling in the society is highly correlated in the sense that organizations which use plow densely (higher percentage of population is descended from ethnic groups adopted the plow in agriculture) have lower female labor force participation and seat share in national parliaments. The second instrument used is the years since the transition to agriculture by Hansen et al. (2015), Jha and Sarangi (2014). The device is used as it shows that in agricultural societies with a long history, there is more rigid gender division of labor rendering the low labor force participation rate for female labor and emergence of gender-based social norms.

Because the adolescent fertility would be highly correlated with the gender-based social norms, and patriarchal authority (Adler,1980; Jorgensen and Alexander, 1983; Cusik, 1987; Hindin, 2000), the plow use is implemented as the instrument. Moreover, because gender based norms might affect the FDI variable we added variables such as gender inequality in education attainment, seat share of women in parliaments to control variation in FDI due to gender based social norms. Additionally, we included set of control variables to bolster the exclusion restriction on instruments.

2SLS econometric procedure is used to explore the impact of adolescent fertility on FDI. At the first stage the instruments along with other control variables are regressed on adolescent fertility, and at the second stage the predicted values for adolescent fertility obtained in the first stage and control variables are regressed on the FDI. Wooldridge's robust test score shows that the over-identifying restrictions are valid and instruments are not correlated with error term.

In the literature variables, there are variables used to indicate the patriarchal norms, notably MAS Index (Masculinity index) developed by Hofstede. However, the index values might be affected by the FDI as FDI might affect the gender division of labor and feminization of public and private spheres of the society. Plow use overcomes the reverse causality as there is no possible channel through which FDI would affect the adaptation of plow in agriculture. Moreover, as the variation in the current labor market outcomes correlated with the adolescent fertility would not generate variation in the plow use in agriculture violating the homogeneity of the instruments and generating bias in the estimated coefficient. The variables indicating the current political and economic development which would be correlated with the plow use are already included as the control variables to the model. Therefore, it can be argued that the 2SLS-IV estimation results would not suffer from bias.

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3. Data

Cross country data for the year of 2014 is used. The sample selection is based on data availability. The source of the data and the descriptive statistics are displayed at the table below.

Table 1. Data Source & Descriptive Statistics

Variables	**Source**	**Observation**	**Mean**	**St. Dev**
FDI (% of GDP)	World Development Indicators	185	4.3	6.4
Adolescent Fertility (per 1,000 women ages 15-19)	World Development Indicators	191	48.7	41.2
Plow	Alesina et al. (2013)	204	.48	.48
Neolithic		166	4806.5	2495.5
GDPPC (Constant 2010, $)	World Development Indicators	192	14083.4	18728.3
Inflation (CPI, %)	World Development Indicators	175	4	6.5
Telephone Subscription	World Development Indicators	209	19.18	19.1
Trade (% of GDP)	World Development Indicators	186	95.3	55.3
Service (Value Added , % of GDP)	World Development Indicators	165	54.7	13.4

Industry (Value Added , % of GDP)	World Development Indicators	185	26.6	13.6
Credit (Domestic credit to private sector , % of GDP)	World Development Indicators	167	56.02	44.4
Baseline Controls				
Government Education Expenditure (% of GDP)	World Development Indicators	100	4.7	1.5
Women in Parliaments (% of total seats)	World Development Indicators	186	95.3	55.3
Female Secondary School Enrollment (% of total)	World Development Indicators	131	86.6	29
Population Growth	World Development Indicators	209	1.38	1.41
Secondary Gender (Secondary School Enrollment Gender Parity Index)	World Development Indicators	148	.98	.07
Secondary General (Secondary School Enrollment Rate ,% of total)	World Development Indicators	124	71.5	22.9
Urban Population (% of total)	World Development Indicators	209	59.2	24.25
Life Expectancy (at birth)	World Development Indicators	194	71.7	8.07
Polity 2	Polity IV Project	157	4	6.2

Political Rights	World Bank	190	3.4	2.2
Business Freedom	Heritage Foundation	175	64.5	17.2
Property Rights	Heritage Foundation	172	42.5	24.7
Corporate Tax Rate	Heritage Foundation	175	24.2	9.2
Tariff Rate	Heritage Foundation	171	6.27	5.27
Regulatory Quality	World Governance Indicators	200	-.02	.99
Corruption (Freedom From Corruption Index)	Heritage Foundation	175	39.3	21.6
Historical Controls				
British Legal Origin	La Porta et al. (1998)	193	.33	.47
French Legal Origin	La Porta et al. (1998)	193	.44	.5
Ancestral Political Development	Alesina et al. (2013)	204	3.3	1.04
Ancestral Economic Development	Alesina et al. (2013)	204	6.3	1.38

In all models including the models estimated with OLS, the adolescent fertility have positive coefficients suggesting the positive impact of adolescent fertility on the FDI. The coefficients are .06, .1 for OLS, and vary between .11 and .26 for 2SLS. Therefore, increase in adolescent fertility attracts FDI suggesting the significance of the teenage childbearing on the FDI. We used appropriate controls such as seat share of women in parliaments, the female secondary

school enrollment rate, ancestral economic and political development, gender gap in secondary school enrollment, and ancestral economic and political development to bolster the exclusion restriction.
Results indicate that the impact of GDP per capita on the FDI is negative. Few economic controls are significant in any of the model. Telephone use which is used to measure the infrastructure has positive significant (in one model) impact on the FDI. Population growth has positive significant (in one model) effect on FDI. Corporate tax rate as a policy variable has negative significant, and property rights as the variable representing the institutions have a considerable positive impact on the FDI. Therefore, countries with a lower tax rate and well-protected property rights would attract higher FDI. In one model the results imply that secondary school enrollment gender parity index representing the unequal gender attendance to secondary schooling would decrease the FDI. Life expectancy which is used to proxy the labor productivity is positive indicating that higher life expectancy increases FDI. A polity2 variable which shows the level of democracy in the country varying in the range of -10 (hereditary monarchy) and +10 (consolidated democracy) is positive significant (in one model) indicating that as the democracy improves, FDI increases.

Table 2. Regression Results

Dependent Variable: FDI/GDP							
	OLS	2SLS	2SLS	OLS	2SLS	2SLS	2SLS
Adolescent Fertility	.06** (.03)	.12* (.06)	.1* (.06)	.13* (.07)	.26* (.15)	.25* (.13)	.18* (.1)
GDPPC	-.0001 (.00007)	-.0001** (.00006)	-.0001 (.00008)	-.00015** (.00007)	-.00013*	-.00006 (.00008)	-.00017* (.00007)
Trade	.017 (.035)	.01 (.03)	.016 (.03)	.016 (.025)	.002 (.019)	-.0008 (.016)	.005 (.02)
Patent							.000012 (.000012)

Service			-.026 (.12)	-.023 (1)		-.14 (.14)	
Industry			.12 (.12)	.14 (.11)			
Credit			-.01 (.03)	-.012 (.02)			
Telephone Subscription	.05 (.06)	06 (.06)	.12 (.08)	.13* (.07)	.014 (.08)		.08 (.06)
Secondary General	-.027 (1)	-.016 (.094)	-.07 (.12)	-.07 (.1)	.15 (.15)		.15 (.12)
Inflation	.008 (.08)	.01 (.07)	-.016 (.16)	-.004 (.14)	.27 (.18)	.04 (.17)	
Government Education Expenditure						.68 (.64)	
Secondary Gender	-3.12 (10.8)	-1.6 (10.8)	-6.75 (12.1)	-.7.6 (10.7)			-33.9** (15.3)
Secondary Women					.05 (.08)	.04 (.05)	
Women Seat Share					-.1 (.09)	-.09 (.08)	
Population Growth	.08 (.5)	.12 (.52)	.35 (.55)	.3 (.52)	.79 (1.08)	-1.16 (1.44)	1.8* (.97)
Life Expectancy	.2 (.17)	.25 (.15)	.53 (.32)	.55** (.28)		.72* (.41)	
Urban	-.03 (.09)	-.017 (.08)	.022 (.11)	.035 (.087)	-.1 (.12)	-.05 (.05)	-.1 (.08)
Polity2	.07 (.11)	.05 (.11)	.3 (.18)	.3** (.15)			-.17 (.16)
Business Freedom					.2 (.15)	. 1 (.09)	.06 (.07)
Corporate Tax Rate	-.17 (.11)	-.18* (.11)	-.11 (.12)	-.13 (.12)	.24* (.13)	-.28** (-.14)	-.08 (.11)

Rule of Law							.06 (.32)
Regulatory Quality							1.7 (1.5)
Corruption					.02 (.11)	-.07 (.096)	.15 (.08)
Tariff Rate						.14 (.13)	
Property Rights	.09* (.05)	.12** (.06)	.06 (.06)	.07 (.06)	.18* (.10)	.16* (.09)	
Political Rights					-.13 (.1.2)	-.26 (.55)	
Historical Controls							
Legal UK			1.65 (4.24)	1.8 (3.7)		2.62 (4.18)	
Legal France			-3.27 (3.38)	-3.21 (2.7)		.11 (2.4)	
Ancestral Political Development	-1.15 (71)	-.84 (.68)	-1.2	-1.1 (.8)	.78 (.1.05)	.92 (.88)	-.2.1*** (.8)
Ancestral Economic Development	.34 (.55)	.14 (.56)	-.06 (.67)	.18 (.66)	.72 (.91)	.01 (.57)	.73 (.75)
Continental Dummies	YES	YES	YES	YES	YES	YES	YES
Constant	-7.4 (12.7)	-22 (.15)	-25.6 (16.3)	-34.3* (18.4)	-49.4 (35)	-65.2* (37)	14.2 (15.1)
Observation	91	89	82	80	62	69	65
R^2	.26	.24	.33	.33	.14	.22	.4

F-Test	.09	.00	.00	.00	.00	.00	.00
Wooldridge's Robust Score Test		.36		.73	.18	.11	.72

4. Discussion and Conclusion

The paper explores the linkage between adolescent fertility and the FDI by giving particular attention to the endogeneity issues. It contributes to the literature by being the first study tackling the issue and has originality in using the historical plow use as the instrument to eliminate the risk of the omitted variable bias and reverse causality. To this purpose, we used cross country data for the year of 2014 where the sample selection is based on the data availability. OLS and 2SLS estimation results indicate that the using OLS would lead to underestimation of the valid coefficient indicating the negative bias. Results suggest that OLS estimated coefficients are .06, .1, and they are between .12 and. 26 for 2SLS depending on the covariates included in the model. Therefore, the empirical results suggest that the rise in adolescent fertility attracts FDI conditional on the covariates included into the model indicating the significance of the premium (skill and unit cost) provided by the female labor in the countries with high adolescent fertility. Therefore, the study contributes to the literature that accounts the unit labor cost and human capital level (Dunning, 1988; Zhang and Markusen, 1990; Noorbakhsh et al., 2001) as the labor market origin determinants of FDI by showing the relevance of adolescent fertility in attracting FDI.

The downward bias in OLS estimated coefficients would indicate the omitted variable bias. Moreover, results suggest that the GDP per capita affects negatively the FDI inflows which comply with the results provided by some studies in the literature (Jaspersen et al. 2000; Edwards, 1990; Sadig, 2009). Telephone use (only in one model) used to proxy infrastructure shows the positive impact on the FDI entrance as it is emphasized in the literature (Kinoshita and Campos, 2003; Mollick et al. 2006). Democracy (only in one model) also affects positively the FDI complied with the results provided by (Guerin and Manzocchi, 2009; Addison and Heshmati, 2003). Life expectancy which is used to measure the labor productivity affects positively FDI complies with the results provided by Alsan et al. (2006) and Globerman and Shapiro (2002). The final model indicates that as the education becomes free of gender bias, then FDI would not find attractive to invest in the host country. Furthermore, results suggest that property rights affect positively, corporate tax rate affects negatively the FDI.

It can be argued that teenage childbearing does not produce solely job market consequences, but bears to produce consequences valid for the general economy. We, in particular, argue that FDI which is considered as one of the primary means of knowledge and technology transmission would be attracted by the premium provided by the female labor having low bargaining power due to early childbearing.

The results might also indicate the trap of underinvestment in human capital by female labor where the FDI enables the stability of underinvesment. FDI by exploiting the low bargaining position of young mothers would generate incentives to provide flexible, low paid labor (with a higher probability of employment) that would shape incentives to early birth give particularly in societies where the skill premium is captured mostly by male workers.

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