How do informal and formal restrictions on women affect economic performance?

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I. Introduction

This paper explores how informal and formal restrictions on women affect economic performance. In the literature regarding women's status, economic development was at first considered key to reducing the inequalities between men and women and therefore affording women more economic opportunities[1]. However, other research established that social institutions were fundamental in constraining women's status and their participation in the market[2]. More recent research has focused on finding valid indicators to measure gender inequalities as a means to address the origins of such discrimination[3]. These indicators have placed emphasis on access to education, healthcare, and family planning as avenues to increase women's participation in the formalized labor sector, consequently increasing their economic independence. However, Jutting and Morrisson (2004) found that informal and formal restrictions on women, in a dataset of 65 developing countries, affected their access to resources like education, healthcare, and family planning, and therefore limit their economic opportunities. This paper extends the Jutting and Morrissson (2004) analysis by examining the impact upon GDP per capita of the formal and informal restrictions.

Developmental programs and neoclassical theory suggest that increasing women's economic opportunities and participation in the market will increase an economy's productive capabilities and performance. The results of the estimated models show that informal restrictions, such as the percentage of women married under the age of 20, and formal restrictions, a property rights structure which assigns property rights to the husband, father, or brother, have a significant and negative affect on the economic performance of the nation, even when controlling for regional variation. Surprisingly, the model estimates the formal restriction, limiting women's freedom of movement and dress, to have a significant but positive relationship to the nation's income. However, when controlling for regional variations, the formal restriction limiting women's freedom of movement and dress loses significance; no individual region is conclusively found to drive the restrictions affect on GDP per capita for the 65 nations in the dataset.

II. Background

Informal restrictions, like informal institutions, can be defined as norms of behavior, conventions, traditions; these institutions are decentralized and self-enforced by a community[4]. Formal restrictions, like formal institutions, however, are rules that humans devise, such as written rules, laws, and constitutions[5]. O. Williamson (2000) devised four hierarchal-levels of institutions for social analysis; the

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[1] i.e. Boserup 1970; Forsythe et al 2000
[2] i.e. Tinker and Bramsen, 1976; Semyonov, 1986; Jutting and Morrisson, 2004
[3] i.e. United Nation's Development Programme, the World Bank, the World Economic Forum
[4] North, 1994
[5] North 1990, 1994

diagram is attached to appendix B. Williamson's model shows hierarchal, yet interactive, levels of institutions, in which a higher level imposes constraints on the level immediately below it, demonstrated via solid arrows, and reverse arrows connecting lower levels with higher levels signal feedback. Additionally, Williamson includes time horizons for the frequency of change for institutions at each level, where level one institutions, such as customs, traditions, and religion, are very slow to change, from centuries to millennia, level two institutions, like property rights, decades to centuries, and so forth. The time horizons for change designate the location of the institutional level in the hierarchy.

The first and second levels of Williamson's model formulate the two Jutting and Morrisson (2004) indices measuring informal and formal restrictions on women used in this paper. The first index is called NON-ECO and measures religious and cultural norms, or informal restrictions with regard to women in each of the 65 developing countries included in the dataset. The main assumption is that these norms and customs persist for centuries and are slow to change, therefore constituting level one institutions. The second index is called ECO and measures the institutional environment, or the formal restrictions, specifically the property and inheritance rights and freedom of movement and dress, constraining women in each of the 65 developing countries. These constitutional or legal constraints change more quickly than the norms.

As North (1991) describes, and Williamson applies to his model, the informal restrictions that structure political, economic, and social interactions are located, then, within level one institutions, and the formal restrictions are located in level two institutions. The variables comprising the ECO index are the informal restrictions, which as North proposes, structure the formal restrictions of the game, or the variables in the NON-ECO index. This is reflected in the hierarchal design of Williamson's model: informal restrictions, like religion and cultural norms, shape the design of formal restrictions, like property and inheritance rights, in societies. For example, Bina Agarwal (1994) found that the economic inequalities between men and women in South Asia were intrinsically related to their different rights in land, a formal restriction, and that these differences in land rights were linked to the culture's gender ideologies, an informal restriction. The correlation matrix in appendix A, containing the variables of the two indices and the GDPPC, show that the correlations between the informal variables and the formal variables are high: the informal restrictions upon women are strongly correlated with the design of the formal restrictions in the developing countries.

III. Jutting and Morrisson Indices

Jutting and Morrisson (2004), using Williamson's institutional model, calculate two indices measuring women's discrimination. They use variables quantifying informal and formal restrictions upon

women in 65 developing countries[6]. The Non-Economic index, named by Jutting and Morrisson (2004), or NON-ECO, gauges three variables that, in their view, have a non-economic character and have pervaded historically, to determine the informal restrictions with regard to women for each of the 65 nations: female genital mutilation (FGM), marriage before the age of 20 (MARRIAGE), and polygamy (POLYG). All of these variables are constraints or opportunities which have economic consequences. For example, the percentage of women married before the age of 20 is a result of many underlying economic issues. However, the original authors used this nomenclature and for simplicity, this paper will refer to the index as NON-ECO, although this terminology is erroneous.

According to Jutting and Morrisson (2004), all variables were selected under the assumption that "these customs constrain women's freedom to choose the economic activities they wish to pursue"[7]. The FGM and MARRIAGE variables are continuous and the POLYG variable is dichotomous[8]. The coding of POLYG refers to its legality not its frequency because countrywide estimates of how many women live in polygamous households are not available[9]. The variables Jutting and Morrisson (2004) use in their Economic index, or ECO, to quantify formal restrictions, with regard to women are: property (PROP) and inheritance rights (INHERIT), and freedom of movement and dress (FREEDOM)[10].

A. Measurement of Informal Restrictions Variables (NON-ECO index)

The FGM variable is measured by the percentage of women who have been excised. The practice exists in most but not all Sub-Saharan African countries, as well as in some Middle Eastern nations. Jutting and Morrisson (2004) assert that the FGM variable does not fully reflect the various forms of violence that women confront, but better data on violence are not available[11]. In an OECD policy brief (2005), Jutting and Morrisson discuss how genital mutilation, which is not prescribed by any of the main religions, continues despite actions led by governments and international non-governmental bodies to prohibit it.

Similarly, the MARRIAGE variable is considered by Jutting and Morrisson (2004) to be a cultural tradition, like FGM, and is measured by the percentage of women married between the ages of 15 and 19. In traditional societies where girls are married at young ages, parents may be unwilling to invest in education for their daughters, the main avenue for human capital development and entrance to the labor market, because the girls leave the parental household early, making the return on investment uncertain or zero.

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[6] See appendix G for entire dataset
[7] Pg 16
[8] See appendix A
[9] Jutting and Morrisson (2004), pg 16
[10] See appendix A
[11] Pg 16

The third variable is POLYG and is coded as 1 when permitted, and zero when it is forbidden. Polygamy allows wealthy, old, and already married men, according to Jutting and Morrisson (2005), to have spouses 20 to 30 years younger than they are and these unions come close to "commercial transactions, in which poor parents 'sell' their daughters against financial compensation"[12].

These three variables constitute informal restrictions contained in the level one institutions of Williamson's model. They represent the customs, traditions, norms, and religion that shape women's status in their respective societies.

B. Measurement of Formal Restrictions Variables (ECO index)

Jutting and Morrisson's (2004) ECO index quantifies level two institution's role in women's status. Three variables measure the formal restrictions with regard to women: PROP, INHERIT, and FREEDOM. Each variable was selected on the pretext that it has economic impact upon women: if women are barred from inheritance, cannot borrow or own property in their own names and cannot move around and dress freely, they cannot gain economic independence[13]. Women are considered disadvantaged in inheritance when different sexed children inherit unequally from the father's estate or when a husband dies childless and his estate goes only to his family, not to his widow. In these cases, INHERIT is assigned a value of one. It is coded zero when there is equality of inheritance rights between different sexed children and when in the absence of children, the rules on inheritance are identical for men and women.

The PROP variable is weighted as follows: 30 per cent for access to bank loans, 30 per cent for the right to ownership of property other than land, and 40 per cent for access to land ownership. For example, if women can borrow freely from banks and can own property, but not land, then the variable takes a value of 0.4. If women have none of these rights, then the variable takes a value of 1; this is counterintuitive and must be highlighted because of its impact on the interpretation of the model results.

The FREEDOM variable is weighted 0.5 for prohibitions in women's movement or in their dress. According to Jutting and Morrisson (2004), the two freedoms usually relate, for example in the North Indian custom of purdah, veiled women cannot leave their homes without permission from their husbands. When women have freedom of movement but must wear the veil, the variable's value is 0.5; however, if this obligation only applies to half the population, which is the case in Morocco, the value becomes 0.25.

These three variables gauge the formal restrictions on women in the 65 developing countries. They represent the restrictions on women, which are formally enforced by law, through inheritance, property, and freedom of movement and dress.

C. Causality

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[12] Pg 17

[13] Jutting and Morrisson (2004), pg 16

Applying Williamson's (2000) framework to informal and formal restrictions upon women and their affect upon economic performance doesn't eliminate causality concerns. Perhaps richer countries can afford to have more equal institutions and treat their women better so that higher GDP per capita leads to higher demand for gender equal institutions. Even more serious is the possibility that some unobserved variable is truly causing the informal and formal restrictions on women or the low growth rates in the countries. This paper is not attempting to provide a causal link between informal and formal restrictions on women and economic performance[14]. Instead it attempts to cross-sectionally explore how restrictions on women are related to the economic performance of the developing nations in the dataset. The issue of causality can be addressed with an instrumental variables approach, but that is step beyond the present analysis.

However, this paper will use the sex ratio at birth in each country as an instrument for the MARRIAGE variable. The sex ratio is a variable exogenous from the outcome variable, income, but correlated with MARRIAGE. When the sex ratio, male to female, at birth is greater than one, implying that there are more males born than females, then women usually marry earlier. The lower the ratio of women to men, or the lower the supply of women, the more likely women will marry younger to men who are unable to find a partner of similar age. Additionally, in an attempt to better address the causality, this paper estimates a fixed effects model with dummy variables controlling for regional variation.

Following Williamson's (2000) theory, the models in this paper will first separately estimate the relationship of the informal and formal restrictions on women and economic development and then estimate a model including all the restrictions. Subsequently, an instrumental variable model will be estimated and finally a fixed effect model with the regional dummy variables. There is a high correlation, 0.66, between property rights and inheritance rights for the formal restrictions variables[15]. This is expected, since a main avenue through which women acquire property is through inheritance. Consequently, both property and inheritance rights are and are not included in the same estimation, to avoid increased standard errors and insignificance amongst the independent variables.

IV. Theory

Informal and formal restrictions on women constrain their access to resources and economic opportunity[16]. These restrictions affect how women participate in the formal sector of the economy and may therefore hinder a nation's economic growth and performance. Williamson's (2000) model asserts that level one institutions constrain and shape level two institutions, or that informal restrictions shape formal restrictions in societies. Applying this theory to restrictions on women's status, using the two

[14] Many of the writers in this literature assume that correlation is causality (i.e. Forsythe et al, 2000; Jutting and Morrisson, 2004).
[15] See appendix A
[16] Jutting and Morrisson (2004)

indices created by Jutting and Morrisson (2004) as measures of informal and formal restrictions upon women in developing countries, this paper formulates a model to examine whether restrictions upon women in developing nations affect the countries' economic performance, as measured by GDP per capita.

Much of the theory in gender and economic development sought to find valid indicators for gender inequality. The validity of previous indices measuring gender inequalities has been widely debated and questioned[17]. Jutting and Morrisson (2004) developed their indices in response to the criticism raised against the United Nations Development Programme indicators, specifically the Gender-related Development Index and the Gender Empowerment Measure, because of their failure to grasp the institutional frameworks that constrain the economic role of women. The previous indices measure the results of gender discrimination rather than understand the principal causes. Consequently, the Jutting and Morrisson (2004) indices are, at present, more expansive than existing indices in their inclusion of institutional and economic variables which disadvantage women.

A. Dependent Variables

The dependent variable is the economic performance of the developing countries, measured by the log of GDP per capita, to compare the relative levels of income for the nations. Although not an exhaustive measure of economic performance, it is the data available for a cross-sectional analysis.

B. Independent Variables

The independent variables are the three components of Jutting and Morrisson's (2004) NON-ECO index, or the informal restrictions on women, and the components of the ECO index, or the formal restrictions on women. The informal restrictions on women variables include: FGM, MARRIAGE, and POLYG. AUTHORITY was eliminated due to its high correlation with POLYG.

The second set of independent variables is the formal restrictions on women: inheritance rights (INHERIT), property rights (PROP), and freedom of movement and dress (FREEDOM).

Additionally, sex ratios will be included as an instrument for the MARRIAGE variable in the instrumental variables regressions and four dummy variables controlling for regional variation will be included in the fixed effects model. The four dummy regional variables are: Latin America, Asia, the Middle East, and Sub-Saharan Africa.

C. Model

Based upon the framework developed above, the following least squares models are estimated:

$$\text{Log(GDPPC)} = \beta_0 + \beta_1(\text{FGM}) + \beta_2(\text{MARRIAGE}) + \beta_3(\text{POLYG}) \qquad (1)$$

$$\text{Log(GDPPC)} = \beta_0 + \beta_1(\text{FREEDOM}) + \beta_2(\text{PROP/INHERIT}) \qquad (2)$$

$$\text{Log(GDPPC)} = \beta_0 + \beta_1(\text{FGM}) + \beta_2(\text{MARRIAGE}) + \beta_3(\text{POLYG}) +$$

[17] Diijkstra, 2000; Bardhan and Klasen, 1999; Dijkstra and Hanmer, 2000; White, 1997

$$\beta_4(\text{FREEDOM}) + B_5(\text{PROP/INHERIT}) \qquad (3)$$

Following the least squares estimates, models will be generated for the three equations standardizing the coefficients to examine the relative impact of each independent variable on economic performance. Subsequently, equations (1) and (3) will be estimated with the instrumental variable for MARRIAGE and equation (3) will be estimated including the regional dummy variables in the fixed effects model. Generally, with the variables contained in the Jutting and Morrisson (2004) indices, the closer the variable's value is to one, the less equality between genders in that institution. When the variables are coded zero, this is interpreted as gender equality with respect to that social institution. This understanding is necessary to predict the results for the estimated model.

D. Hypotheses

The more restrictive to women the independent variables are, the closer the value to one. The informal restrictions variables, FGM, POLYG, and MARRIAGE, should all have a negative affect on economic performance, or GDPPC. The FGM variable evinces violence against women. The more women excision is practiced upon, the more a culture promotes violence against women and therefore their subordination. However, the FGM variable may not be significant in affecting economic performance because the presence of FGM does not necessarily limit a women's economic opportunity; it does reflect a society's regard to the status of women, however. The POLYG variable should be significant in affecting the GDPPC. When men acquire more wives, the women are seen as commercial transactions, purchased to produce male heirs. This limits women's economic opportunity and therefore their participation in the formal labor sector because they are expected to child rear and care for their husband's household. Similarly, the MARRIAGE variable should be significant in negatively affecting the economic performance of the nations. The higher the percentage of women married under 20, as explored above, the less incentive offered to parents to educate their daughters, the main avenue for entrance into the labor market. This constrains women's economic opportunity.

The formal restrictions on women variables should be significant in negatively affecting GDPPC. Property rights provide the incentive for production and exchange, and their allocation in a society affects the efficiency of resource use. Property rights structures which disadvantage women, then, do not provide the incentive for women to produce and exchange. This inefficiently allocates a society's resource use and therefore PROP should negatively affect the economic performance of the nation. Similarly, INHERIT disadvantages women from inheriting property from their husbands. Without the ability to inherit land and property, women are economically limited in their ability to derive income and produce. Again, INHERIT should be significant in negatively affecting GDPPC. Finally, FREEDOM limits a women's ability to dress and move freely. When a woman is limited from going to certain places, her economic opportunity to exchange in the market is severely restricted.

V. Results

A. Least Squares and Standardized Estimates

The least squares results from estimating equation (1), see appendix C, show only MARRIAGE as significant at the .01 level. The equation's adjusted r-squared is 0.45. When the model is estimated standardizing the coefficients, see appendix C, the beta for the MARRIAGE variable is -0.622: an increase in one standard deviation of MARRIAGE results in an average decrease of log(GDPPC) by approximately 63 percent. A high percentage of women married under the age of 20 negatively affects the income of the developing countries contained in the dataset

The least squares results from estimating equation (2) including PROP, see appendix D, show both FREEDOM and PROP significant at the .01 level. The equation's adjusted r-squared is 0.35. Surprisingly, the coefficient for FREEDOM is positive, unlike the expected negative coefficient for PROP. When standardizing the coefficients, see appendix D, the beta for FREEDOM is 0.343 and the beta for PROP is -0.632. Property rights structures which disadvantage women by discouraging them from production and exchange, negatively impact the income of the developing nations. However, constraining women's freedom of movement and dress is found to positively impact the nation's relative change in income.

When equation (2) is estimated with least squares including INHERIT, the adjusted r-squared of the equation falls to 0.11, though both FREEDOM and INHERIT are significant at the 0.01 level[18]. Equation (2) including PROP is a better fit for the estimated models. Yet, when INHERIT is included, the coefficient for FREEDOM remains positive. Unexpectedly, the model estimates imply that constraining women's freedom of movement and dress positively affects the income of the countries contained in the dataset. This is inconsistent with the original hypothesis.

Because the model including PROP for equation (2) was a better fit than when equation (2) was estimated with INHERI, equation (3) is estimated only with the inclusion of PROP[19]. The adjusted r-squared is 0.56 and MARRIAGE, PROP, and FREEDOM are all significant at the 0.01 level. Again the coefficient for FREEDOM is positive and the remaining coefficients have the expected negative signs. When the coefficients are standardized, see appendix E, a single standard deviation in PROP affects the economic performance of the country negatively, by approximately 38 percent; for FREEDOM positively by approximately 29 percent; and for MARRIAGE negatively by approximately 19 percent.

The results from the estimates show FREEDOM positively affecting a country's economic performance. Yet, formal restrictions on women's movement an dress, in theory, should negatively affect the economic performance because it constrains women's economic participation and opportunity.

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[18] See appendix D
[19] See appendix E

The mean GDPPC for data available in 59 countries is $3237.73 with a standard deviation of $2977.79[20]. The large standard deviation suggests a skewed distribution of GDPPC amongst the included countries. When restricting these 59 countries to nation's which have formal restrictions on women's dress and movement, there remain only 18 countries, mostly Middle Eastern and African nations. The mean GDPPC for the 18 countries is $4021.22 and the standard deviation in income is $3326.60, largely due to four Sub-Saharan African nations with GDP per capitas less than $1000. The average income for the countries with formal restrictions on women's movement and dress is higher than the average for the dataset including all 59 nations.

Many of the Middle Eastern nations, in the set of 18 which restrict women's movement and dress, are oil producers, like Saudi Arabia and the United Arab Emirates; this may explain their relatively high GDP per capitas. For example, the United Arab Emirates is one of the 18 countries which restricts women's movement and freedom of dress and it has the highest GDPPC of all the countries included in the dataset, at $13,857. Consequently, these relatively higher incomes may be skewing the influence of restrictions on women's movement and dress to positively affect changes in a nation's GDPPC because the countries are wealthier to begin with: their average GDPPC is higher than the average including the rest of the dataset.

B. Instrumental Variable and Fixed Effects Estimates

When estimating equation (1) with the instrumental variable, sex ratios, for MARRIAGE[21], the coefficient, standard error, and significance at the 0.01 level for the MARRIAGE variable are the same as in the least squares estimates. This is also true when equation (3) is estimated with the instrumental variable for MARRIAGE: the coefficient, standard error and significance of MARRIAGE at the 0.01 level remain the same as in the least squares estimates[22].

However, when controlling for regional variation with the estimation of equation (3), not only does the adjusted r-squared increase to 0.59, but the FREEDOM variable has lost significance and PROP has decreased in significance to the 0.05 level[23]. MARRIAGE is still significant at the 0.01 level. Additionally, the dummy regional variable for Asia is significant at the 0.05 level. Thus, when controlling for regional variation, FREEDOM is no longer significant in affecting the countries' incomes. The countries in the dataset located in Asia are found to be significant in driving the affect restrictions on women have on GDP per capita.

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[20] See appendix A
[21] See appendix F
[22] See appendix F
[23] See appendix F

However, when equation (3) is estimated with each of the four regional variables[24], only the Middle East dummy is significant at the 0.05 level: the dummy for Asia is no longer significant when included alone. When the Middle East regional variable is included, FREEDOM expectedly loses its significance but PROP and MARRIED are still significant. In all four estimations of equation (3), with the inclusion of each regional dummy variable, MARRIAGE and PROP are always significant. However, the affects of regional variation are ambiguous. When all regional dummies are included, Asia is found significant in the estimation of equation (3). But when the regional dummies are included individually in equation (3), only the Middle East dummy is found significant. Therefore, there is not one region driving the affects of formal and informal restrictions on women on GDP per capita for the 65 countries contained in the dataset.

VI. Conclusions

Using two indices created by Jutting and Morrisson (2004) to gauge informal and formal restrictions on women, this paper explores the influence of these restrictions upon economic performance, as measured by the log of GDPPC. The dataset includes 65 developing nations in a cross-sectional analysis for 2000. The results from the estimated models show that high percentages of women married under the age of 20 and a property rights structure which disadvantages women negatively affects the incomes of the developing nations. Surprisingly, formal restrictions upon women's freedom of movement and dress are found to positively impact a nation's economic performance. However, when controlling for regional variation, FREEDOM loses its significance in affecting GDP per capita. When sex ratios are instrumented for MARRIAGE, there is no difference in the variable's coefficient, standard error, or significance from the least squares estimates. The models estimated to control for regional variations found no individual region conclusively driving the restrictions affect on GDP per capita for the 65 nations in the dataset. PROP and MARRIAGE are significant in all models, even when controlling for regional variations.

These results provide a first round estimate of the affect of restrictions on women upon economic performance. They do not, however, conclude that informal and formal restrictions on women cause the economic performance of the included nations. Because cross-sectional analysis is limited in scope, future research in this area should focus on credible instruments to ascertain causality. Part of this could come from historical data. Then a time series model could be estimated to provide a richer perspective of the influence restrictions upon women have on the economic performance of nations over time.

[24] See appendix F

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APPENDICES

APPENDIX A - Measurement, Statistics and Correlations of Variables

Measurement of independent variables from Jutting and Morrisson (2004) indices:

NON-ECO	ECO
1.) FGM -% of women excision is practiced upon **2.)** MARRIAGE -% of women 15-19 married **3.)** POLYG -If legal = 1, if not = 0	**1.)** INHERITANCE -Unequal inheritance for different sexed children or widow does not inherit after husband's death = 1, equality in inheritance = 0 **2.)** PROP -Weighted: 0.3 for access to bank loans; 0.3 access to property not including land; 0.4 access to land Variable =1 when women have no rights **3.)** FREEDOM -Weighted 0.5 for prohibitions in clothing and 0.5 for movement

Statistics for variables

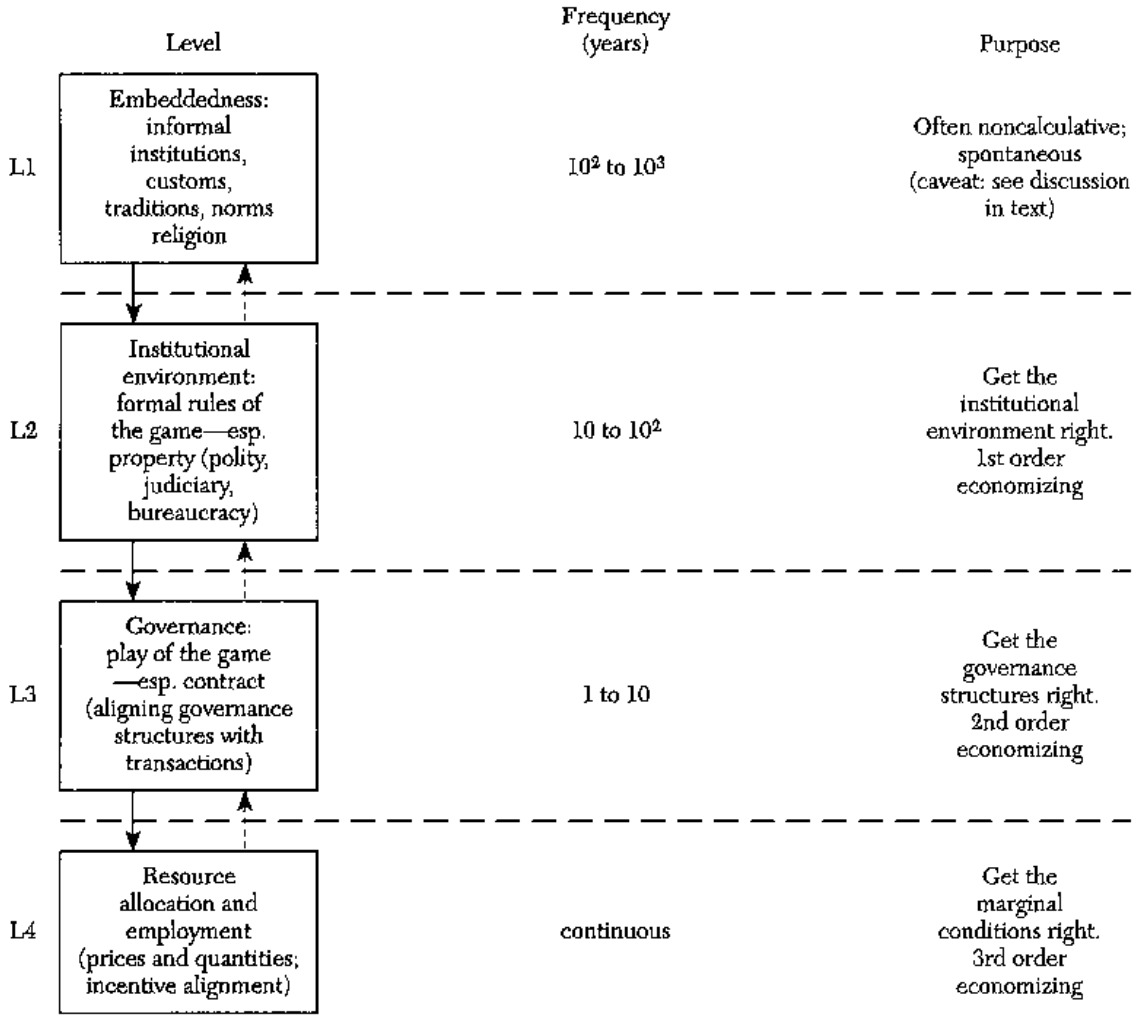
	FGM	FREEDOM	GDPPC	INHERIT	MARRIED	POLYG	PROP
Mean	0.15	0.15	3237.73	0.54	0.23	0.50	0.35
Median	0.00	0.00	2291.00	0.80	0.20	0.60	0.33
Max	1.00	1.00	13857.00	1.00	0.62	1.00	1.00
Min	0.00	0.00	471.00	0.00	0.01	0.00	0.00
Std. Dev	0.27	0.27	2977.79	0.49	0.14	0.45	0.34
Skewness	1.89	1.69	1.71	-0.15	0.68	-0.03	0.29
Sum	9.04	8.70	191026	31.60	13.53	29.40	20.63
Sum Sq Dev	4.33	4.18	5.14E+08	13.72	1.16	11.59	6.76
Observations	59	59	59	59	59	59	59

APPENDIX A - Continued

Correlation matrix

	FGM	FREEDOM	GDPPC	INHERIT	MARRIED	POLYG	PROP
FGM	1.00	0.15	-0.22	0.37	0.18	0.52	0.22
FREEDOM	0.15	1.00	0.17	0.42	0.04	0.47	0.34
GDPPC	-0.22	0.17	1.00	-0.20	-0.51	-0.23	-0.39
INHERIT	0.37	0.42	-0.20	1.00	0.28	0.78	0.66
MARRIED	0.18	0.04	-0.51	0.28	1.00	0.32	0.44
POLYG	0.52	0.47	-0.23	0.78	0.32	1.00	0.60
PROP	0.22	0.34	-0.39	0.66	0.44	0.60	1.00

APPENDIX B – Willamson's (2000) model



O. Williamson (2000)

APPENDIX C – Least squares and standardized estimations for Equation (1)

Least squares results for equation (1):

LS Estimations	Married	FGM	Polyg	Adj-rsquared
1 n=59	-4.23** (0.633)			0.43
2 n=59	-4.01** (0.629)	-0.624 (0.325)		0.46
3 n=59	**-3.97** (0.659)**	**-0.581 (0.377)**	**-0.055 (0.240)**	**0.45**

*=significant at .05 level **=significant at .01 level

Standardized coefficient results for equation (2), specifically estimation 3 from above least squares table:

Source	SS	df	MS
Model	22.34999	3	7.44999
Residual	24.7748	55	0.45045
Total	**47.1248**	**58**	**0.81249**

Number of observations = 59
F (3, 55) = 16.54
Prob>F = 0.00
Adj R-squared = 0.45

Log(GDPPC)	Coefficient	Std. Error	t	P>abs(t)	Beta
POLYG	-0.0548	0.240	-0.23	0.820	-0.0272
FGM	-0.581	0.377	-1.54	0.129	-0.176
MARRIED	-3.966	0.659	-6.01	0.000	-0.622
constant	8.724	0.176	49.46	0.000	

APPENDIX D – Least Squares and Standardized estimations for Equation (2)

Least squares results for equation (2):

LS Estimations	FREEDOM	PROP	INHERITANCE	Adj-rsquared
1 n=59	0.423 (0.441)			-0
2 **n=59**	**1.152**** **(0.380)**	**-1.668**** **(0.299)**		**0.35**
3 n=59	0.966* (0.458)		-0.716** (0.253)	0.108

*=significant at .05 level **=significant at .01 level

Standardized coefficient estimate for equation (2), specifically for estimation 2 in above table including PROP:

Source	SS	df	MS
Model	17.3244	2	8.6622
Residual	29.8004	56	0.5322
Total	**47.1248**	**58**	**0.8125**

Number of observations = 59
F (2, 56) = 16.28
Prob>F = 0.00
Adj R-squared = 0.35

Log(GDPPC)	Coefficient	Std. Error	t	P>abs(t)	Beta
FREEDOM	1.152	0.380	3.03	0.004	0.343
PROP	-1.668	0.299	-5.58	0.000	-0.632
constant	8.111	0.138	58.76	0.000	

Standardized coefficient estimate for equation (2), specifically for estimation 3 in least squares table including INHERITANCE:

Source	SS	df	MS
Model	6.5554	2	3.2778
Residual	40.5693	56	0.7245
Total	**47.1248**	**58**	**0.8125**

APPENDIX D - Continued

Number of observations = 59
F (2, 56) = 4.52
Prob>F = 0.0151
Adj R-squared = 0.11

Log(GDPPC)	Coefficient	Std. Error	t	P>abs(t)	Beta
FREEDOM	0.967	0.458	2.11	0.040	0.288
INHERITANCE	-0.716	0.253	-2.83	0.006	-0.386
constant	7.939	0.166	47.83	0.000	

APPENDIX E – Least squares and standardized estimations for Equation (3)

Least squares results for equation (3):
Observations = 59
Adj R-squared = 0.562

Variable	Coefficient	Std. Error	Prob
C	8.678	0.158	0.000
POLYG	0.046	0.270	0.866
FGM	-0.633	0.341	0.069
MARRIED	-3.074**	0.630	0.000
PROP	-0.989**	0.308	0.002
FREEDOM	0.983**	0.338	0.005

*=significant at .05 level **=significant at .01 level

Standardized coefficient results for equation (3):

Source	SS	df	MS
Model	28.2606	5	5.6521
Residual	18.8642	53	0.3559
Total	**47.1248**	**58**	**0.8125**

Number of observations = 59
F (5, 53) = 15.88
Prob>F = 0.00
Adj R-squared = 0.56

Log(GDPPC)	Coefficient	Std. Error	t	P>abs(t)	Beta
FREEDOM	0.983	0.338	2.91	0.005	0.293
PROP	-0.989	0.308	-3.21	0.002	-0.375
POLYG	0.046	0.270	0.17	0.865	0.023
FGM	-0.633	0.341	-1.86	0.069	-0.192
MARRIED	-3.074	0.630	-4.88	0.000	-0.482
Constant	8.678	0.158	55.04	0.000	

APPENDIX F – Instrumental Variable and Fixed Effects

Instrumental variable regression for Equation (1):
Number of observations = 59
Adj r-squared = 0.45

	Coef	Std Error	Prob
MARRIED	-3.966**	0.659	0.000
POLYG	-0.055	0.240	0.820
FGM	-0.581	0.377	0.129
CONSTANT	8.724	0.176	0.000

**= significant at 0.01 level *=significant at 0.05 level

Instrumental variable regression for Equation (3):

Number of observations = 59
Adj r-squared = 0.56

	Coef	Std Error	Prob
FREEDOM	0.983**	0.338	0.005
PROP	-0.989**	0.308	0.002
POLYG	0.046	0.270	0.865
FGM	-0.633	0.341	0.069
MARRIED	-3.074**	0.630	0.00
CONSTANT	8.678	0.158	0.00

**= significant at 0.01 level *=significant at 0.05 level

APPENDIX F – Continued Fixed Effects

Fixed Effects regression controlling for ALL regions:

Number of observations = 59
Adj r-squared = 0.58

	Coef	Std Error	Prob
FREEDOM	0.628	0.408	0.130
PROP	-0.837*	0.342	0.018
POLYG	-0.114	0.313	0.716
FGM	-0.672	0.340	0.054
MARRIED	-2.495**	0.712	0.001
I_REGION ASIA	-0.631*	0.300	0.040
I_REGION LATIN	-0.388	0.354	0.278
I_REGION SUB	-0.549	0.297	0.071

**= significant at 0.01 level *=significant at 0.05 level

Fixed Effect regressions for EACH region:

SUBSAHARAN AFRICA
Number of Observations = 59
Adj r-squared = 0.56

	Coef	Std Error	Prob
FREEDOM	0.750	0.406	0.070
PROP	-0.823*	0.347	0.021
POLYG	0.087	0.273	0.750
FGM	-0.571	0.346	0.105
MARRIED	-2.917**	0.648	0.000
DUMMY_SUB	-0.248	0.240	0.305

**= significant at 0.01 level *=significant at 0.05 level

MIDDLE EAST
Number of Observations = 59
Adj r-squared = 0.59

	Coef	Std Error	Prob
FREEDOM	0.595	0.369	0.112
PROP	-0.886**	0.301	0.005
POLYG	-0.199	0.282	0.484
FGM	-0.659	0.329	0.051
MARRIED	-2.351**	0.687	0.001
DUMMY_MIDDLE	0.583*	0.259	0.029

**= significant at 0.01 level *=significant at 0.05 level

APPENDIX F – Continued Fixed Effects

LATIN AMERICA
Number of Observations = 59
Adj r-squared = 0.56

	Coef	Std Error	Prob
FREEDOM	0.974**	0.339	0.006
PROP	-0.912**	0.325	0.007
POLYG	0.142	0.297	0.634
FGM	-0.625	0.342	0.073
MARRIED	-3.198**	0.651	0.000
DUMMY_LATIN	0.198	0.249	0.431

**= significant at 0.01 level *=significant at 0.05 level

ASIA
Number of Observations = 59
Adj r-squared = 0.57

	Coef	Std Error	Prob
FREEDOM	1.057**	0.337	0.003
PROP	-1.021**	0.305	0.002
POLYG	0.014	0.268	0.959
FGM	-0.716*	0.341	0.041
MARRIED	-3.080**	0.622	0.000
DUMMY_ASIA	8.764	0.214	0.134

**= significant at 0.01 level *=significant at 0.05 level

APPENDIX G – Entire Dataset

	freedom	inheritance	prop	polyg	fgm	married	GDPPC	sex ratio
Fiji	0	0	0.35	0	0	0.13		1.05
Bangladesh	0	1	0.5	1	0	0.5	835	1.06
India	0.75	0.5	0.5	0.2	0	0.39	1818	1.05
Nepal	0	0.8	0.79	0.1	0	0.44	954	1.05
Pakistan	1	1	0.62	1	0	0.22	1952	1.05
China	0	0	0	0	0	0.02	3259	1.09
Korea, Rep	0	0	0	0	0	0.01	13317	1.11
Indonesia	0	0	0	0.8	0.1	0.14	3031	1.05
Myanmar	0	0	0	0	0	0.07	1050	1.06
Philippines	0	0	0	0	0	0.1	2291	1.05
Thailand	0	0	0	0	0	0.06	6398	1.05
Brazil	0	0	0	0	0	0.17	5459	1.05
Colombia	0	0	0	0	0	0.17	5317	1.03
Costa Rica	0	0	0	0	0	0.06	5346	1.05
Cuba	0	0	0	0	0	0.29	2164	1.06
Dominican Rep.	0	0	0	0	0	0.29	3163	1.05
Ecuador	0	0	0	0	0	0.2	4165	1.05
El Salvador	0	0	0	0	0	0.16	2717	1.05
Haiti	0	0	0	0	0	0.17	816	1.05
Honduras	0	0	0.33	0	0	0.3	2035	1.05
Nicaragua	0	0	0	0	0	0.34	1451	1.05
Panama	0	0	0	0	0	0.21	5705	1.04
Paraguay	0	0	0	0	0	0.17	3160	1.05
Peru	0	0	0.15	0	0	0.13	3666	1.05
Venezuela	0	0	0	0	0	0.2	8965	1.07
Angola	0	1	0.24	1	0.5	0.36	647	1.05
Benin	0	0.5	0.4	0.8	0.5	0.29	1257	1.03
Botswana	0	1	0.58	0.2	0	0.06	4200	1.03
Burkina Faso	0	0	0.4	0.9	0.7	0.45		1.03
Cameroon	0	0	0.73	0.6	0.2	0.36	1008	1.03
Chad	0.5	1	0.8	1	0.6	0.49	471	1.04
Central Africa	0	1	0.4	0.7	0.5	0.42	653	1.03
Cote d'Ivoire	0	0	0.24	0.8	0.6	0.28	1373	1.03
Equatorial Guinea	0	1	1	1	0	0.26		1.03
Eritrea	0.25	1	0.5	1	0.9	0.38		1.03
Guinea	0	0	0.4	1	0.8	0.49		1.03
Kenya	0	1	0.7	0.6	0.5	0.17	1075	1.03
Madagascar	0	0.1	0	0.2	0	0.34	690	1.03
Mali	0	1	0.82	1	0.92	0.5	783	1.03
Mauritania	0.25	1	0.5	1	0.25	0.36	993	1.03
Mauritius	0	0	0	0	0	0.11	9350	1.02
Mozambique	0	1	0.5	1	0	0.47	1187	1.03
Niger	0.4	1	0.88	1	0.2	0.62	532	1.03
Senegal	0	0.7	0.5	0.9	0.2	0.29	1302	1.03
South Africa	0	1	0.7	0.5	0.1	0.04	3858	1.02
Tanzania	0	1	0.88	0.65	0.1	0.25	553	1.03

Togo	0	0	0.82	0.6	0.12	0.2	644	1.03
Uganda	0	1	1	0.3	0.05	0.5	726	1.03
Zambia	0	1	0.7	1	0	0.27	674	1.03
Zimbabwe	0	1	0.7	0.7	0	0.21	1448	1.03
Algeria	0.25	1	0.78	1	0	0.1	2689	1.04
Bahrain	0	1	0	1	1	0.07	4620	1.03
Egypt	0.35	1	0	1	0.97	0.14	2128	1.05
Iran	0.5	1	0	1	0	0.22	4265	1.05
Jordan	0.4	1	0.56	1	0	0.09	4139	1.06
Libya	0.15	1	0	1	0	0.01		1.05
Morocco	0.25	1	0.7	1	0	0.13	2693	1.05
Oman	0.5	1	0.4	1	0.2	0.21	6267	1.05
Saudi Arabia	0.85	1	0.7	1	0	0.16	8225	1.05
Sudan	0.85	1	0.95	1	0.89	0.16	880	1.05
Syria	0.1	1	0.2	0.75	0	0.25	5765	1.06
Tunisia	0	1	0	0	0	0.03	4190	1.08
Turkey	0.5	0	0.2	0	0	0.14	6552	1.05
United Arab Emirates	0.75	1	0.4	1	0.31	0.19	13857	1.05
Yemen	0.5	1	0.76	1	0.23	0.24	2298	1.05