

## Gender Bias, Governance, and Economic Growth

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**Abstract:** *We explore the impact of gender equity on economic growth in an unbalanced panel of 91 countries over the period 1990-2006. An exploratory factor analysis allows us to identify two distinct dimensions of gender equity, namely, equity in the access to economic opportunities such as education and equity in economic and political participation. Subsequent regression analysis reveals that a standard deviation improvement in the former increases economic growth by between 0.6 and one percentage point. However, a corresponding improvement in participatory dimension of gender equity has a less pronounced impact. Our findings suggest a more nuanced role of education as a determinant of growth.*

**Keywords:** economic growth, gender, discrimination, institutions

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### I. Introduction

The impact of gender disparity on economic growth has emerged as an important area of inquiry in the last two decades and there is considerable evidence that gender inequality, especially in education, (Hill and King, 1995; Klasen, 1999; Knowles et al., 2002; Klasen and Lamanna, 2009) has acted as a significant impediment to economic growth.<sup>1</sup> This paper contributes to the literature by investigating the impact of gender equity on economic growth in an extended sample of countries from 1990-2006. Our analysis is based on two premises. First, gender equality is inherently multidimensional and various manifestations of gender bias may well differ

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1. Perhaps for lack of reliable data, the growth impact of gender inequality in employment remains less explored in the cross-national context (Klasen and Lamanna, 2009) and there is a lack of consensus on whether inequality, especially the wage gap, constitutes an impediment to growth: While Seguino (2000) and Busse and Spielmann (2006) find a positive impact of the gender wage gap on economic growth, Klasen and Lamanna (2009) and Schober and Ebmer (2009) find the reverse. In fact, existing evidence on the question appears to be sensitive both to the choice of indicator for gender inequality in employment and to the construction of the sample.

in their consequences on economic growth. Second, given the association of gender outcomes with the structure of political institutions in a society (Brown, 2004; Richards and Gelleny, 2007; Beer, 2009), an inquiry into the impact of gender equity on economic growth should control for institutional structure, and the same concerns of multidimensionality pertain to the notion of institutions (Acemoglu and Johnson, 2005; Bang and Mitra, 2011a; Jong-a-Pin, 2009).

To address the multidimensionality of gender equity and its interplay with institutional structure, we conduct an exploratory factor analysis on a set of institutional variables and five distinct indicators of equity, including the fertility rate, the percentage of women in parliament, and the gender gaps in literacy, secondary enrolment, and labor force participation. The procedure reveals two latent dimensions of gender equity that are respectively interpreted as equity in the *access to economic opportunity* and equity in *economic and political participation*. Subsequent analysis indicates that the two dimensions of equity differ in their impact on economic growth: On average, a standard deviation improvement in the former significantly increases growth by a factor between 0.6 and 1, depending on the empirical specification. The impact of the participation dimension of gender equity is less, and its significance is far less robust.

In addition to the two dimensions of gender equity, the factor analysis identifies four distinct aspects of institutional character, namely, the level of democracy in society; the transparency of governance; the credibility of the regime; and the security of civil society. Each of the first three dimensions is seen to have a positive impact on economic growth. However, the security of civil society appears to have little if any impact.

The paper is organized as follows: Section 2 provides a brief review of conceptual foundations; Section 3 introduces our data and estimation strategy; Section 4 outlines the exploratory factor analysis performed on the gender and institutional variables in order to identify the salient dimensions of gender equity as distinct from institutional structure; Section 5 documents the impact of the various dimensions of gender equity on growth; and Section 6 concludes by summarizing our analysis and stating the policy implications.

## **II. Conceptual Foundations**

With few exceptions (Klasen, 1999; Klasen and Lamanna, 2009), most cross-national studies on the impact of gender disparity on economic growth focus either on gender bias in education (Hill

and King, 1995; Dollar and Gatti, 1999; Knowles *et al.*, 2002) or on bias in employment (Seguino, 2000; Busse and Spielmann, 2006; Cavalcanti and Tavares, 2007; Schober and Ebmer, 2009), with a related literature investigating the impact of fertility on economic growth (Galor and Weil, 1996; Cavalcanti and Tavares, 2007; Bloom *et al.*, 2009), typically in conjunction with disparities in education or employment.<sup>2</sup> In contrast to the majority of these contributions, our analysis incorporates information from five distinct indicators of gender equity. Particularly with respect to studies that employ the wage gap to measure gender inequality, this reduces the loss of information due to the unavailability of reliable wage data for a vast number of countries (Polachek and Xiang, 2009).

More fundamentally, if one believes that a general ethos of gender bias in society will manifest itself along multiple dimensions (Seguino, 2007; Beer, 2009), then focusing on one dimension in isolation as per the dominant convention in the field is likely to understate the impact of gender stratification. In particular, restricting the set of variables that capture various forms of gender disparity is likely to be subject to an unacceptable level of omitted variable bias.

One may, of course, utilize information from various indicators by aggregating them into a unidimensional index of gender disparity, but this has its own set of caveats. Existing indices such as the Gender Empowerment Measure (GEM) and the Gender-Related Development Index (GDI) have been criticized on the grounds that they do not reflect gender equality *per se* (Dijkstra, 2006; Klasen, 2009). As importantly for our purpose of investigating the impact of gender equality on growth, the various aspects of gender equity being aggregated into a composite variable may differ in their impacts on economic growth, so that the composite index may well be subject to considerable measurement error.

As noted by Klasen and Lamanna (2009), an important methodological challenge to incorporating multiple dimensions of gender bias in a unified empirical model is the likelihood of multicollinearity between the variables. An advantage of factor analysis is its ability to address this concern in addition to the caveats of omitted variable bias and measurement error. The aspects of gender equity identified by the analysis take the form of latent factors that are

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2. Gender bias in education is typically captured by differentials in the secondary enrolment rate (Hill and King, 1995), the secondary attainment rate (Dollar and Gatti, 1999), and average years of schooling in the adult population (Klasen, 1999; Knowles *et al.*, 2002; Klasen and Lamanna, 2009) and the bias in employment is captured by the gender wage gap (Seguino, 2000; Busse and Spielmann, 2006; Cavalcanti and Tavares, 2007; Schober and Ebmer, 2009) and the gender differential in labor force participation (Klasen, 1999; Cavalcanti and Tavares, 2007; Klasen and Lamanna, 2009).

approximately orthogonal, addressing the concern of multicollinearity. Further, since the predicted factors are uncorrelated, the impact of multiple dimensions of gender equity can be addressed in the same empirical model without having to aggregate or employ multiple models each focusing on a specific dimension of equity, reducing the scope for omitted variable bias and measurement error.

Lastly, a key contribution of our analysis is that we are able to estimate the impact of gender equity independent of the impact of institutional quality. There is considerable evidence that the level of democracy, in particular, plays a critical role in female attainment by increasing the bargaining power of women within the household (Klasen and Wink, 2003), thereby allowing a mother to invest more on education for her daughter and postpone the marriage and resultant fertility decision. At an aggregate level, electoral accountability and the greater respect for civil liberties associated with a democracy allow women to mobilize, pursue their interests as a group, and hold the government responsible for injustices (Beer, 2009). Indeed empirical evidence does indicate a positive association of democracy, in particular, and institutional quality, in general, with greater female access to health, education, and the labor market (Brown, 2004; Morrison and Jutting, 2004; Beer, 2009).<sup>3</sup> In extracting the variation in gender equity away from that induced by institutional structure, our analysis thus improves on existing estimates.

### III. Data and Methodology

We test the impact of gender bias on economic growth using a standard neoclassical model (Barro, 1991; Barro and Sala-i-Martin, 1995) augmented with measures of gender equity:

$$(1) \quad GROWTH_{it} = \alpha + \beta X_{it} + \gamma Z_{it} + \varepsilon_{it} .$$

Our initial analysis divides the sample period 1990 – 2004 into three five year intervals and the value of a variable in each subperiod is the average of its values over the relevant interval. Thus, the dependent variable  $GROWTH_{it}$  is the five year moving average of the annual growth rate of gross domestic product (GDP) per capita; the vector  $X_{it}$  includes a correspondingly smoothed set of controls, including institutional structure; and the vector  $Z_{it}$  includes the averaged gender

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3. Interestingly, Cooray and Potrafke (2010) find no significant impact of democracy on female educational attainment and Beer (2009) obtains a negative impact, even though she does find a positive impact of democracy on other measures of female attainment, including reduced fertility and increased labor force participation.

variables of interest. The exercise covers a sample of 91 countries comprising an unbalanced panel of 224 observations over the sample period. Table A-1 in the appendix lists the countries covered in our sample and summary statistics for our initial analysis are presented in Table 1(a). The remainder of this section is devoted to a description of the independent variables.

### 1. *Standard Correlates of Economic Growth*

For each country, the first set of controls includes the natural logarithm of per capita GDP at the end of the previous subperiod; investment, measured by gross capital formation (GCF) as a percentage of GDP; government consumption net of defense and education expenditure as a percentage of GDP; the consumer price index (CPI) inflation rate; and a measure of trade openness defined as the sum of exports and imports as a percentage of GDP, taken from the World Bank's World Development Indicators (WDI). Since the volume of trade is likely to be correlated with the geographical area and population of a country, we follow Barro (1991) in filtering the measure of trade for the impact of these variables.<sup>4</sup> Lastly, since conventional gender aggregated measures of human capital are strongly correlated with our variables of interest, we follow Klasen and Lamanna (2009) in using the male secondary enrollment rate from Barro and Lee (2001) to capture the average level of human capital.

### 2. *Institutional Determinants of Economic Growth*

The literature on institutions differentiates between *de jure* and *de facto* indicators of institutional quality (Acemoglu and Robinson, 2006), where the former represent constitutional constraints on the abuse of government authority and the latter reflect the extent to which such formal constraints translate to actual practice. Consistent with the convention, we restrict our analysis to *de facto* variables alone.<sup>5</sup>

The institutional variables used in our analysis include four distinct sets of indices. The first comprises indicators of the type of regime: The Polity Index from the Polity IV Project quantifies the degree of democracy in a country, based on the competitiveness of executive

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4. We regress the trade variable on log population and land area for all countries in all years of the sample period and obtain the predicted residuals. The five year moving averages of the residuals for each country are taken as our measure of trade openness.

5. There has been some concern that *de facto* indicators do not reflect institutions in the sense of structural characteristics that constrain individual behavior (North, 1982) as much as the consequences of such characteristics (Glaeser *et al.*, 2004). However, constraints on the abuse of political authority may exist as behavioral norms without being formalized into constitutional precepts (Pande and Udry, 2005). Even if such formal constraints exist, they are important only to the extent that political actors commit to obeying these rules (Hall *et al.*, 2010).

recruitment, executive constraints, and the competitiveness of participation in government.<sup>6</sup> The Democratic Accountability Index from the International Country Risk Guide (ICRG) provides an alternative measure based on the responsiveness of the government to the needs and concerns of the citizenry.<sup>7</sup>

The second set is typically used to capture the stability of governance: Regime Durability from Polity IV provides a direct measure of continuity based on the number of years since the last regime change. The ICRG Government Stability Index, on the other hand, uses information on unity within the government, legislative strength, and the level of popular support, to capture the ability of the government to ensure the continuity of declared policies. Capturing the absence of explicit threats to the stability of governance, the Indices of Internal and External Conflict from ICRG reflect the absence of internal and interstate violence; and the ICRG Index of Ethnic Tension captures the absence of social conflict on the lines of race and ethnicity.

The third set is typically used to capture the state of electoral competition: The Legislative and Executive Indices of Electoral Competition from the Database of Political Institutions (DPI) reflect the diversity of ideological views represented in parliament and the extent to which popular preferences determine the selection of the chief executive.<sup>8</sup>

The last set of indices is typically used to capture the quality and efficiency of governance: The Corruption Index measures the absence of corruption within the political system; the Bureaucratic Quality Index reflects the autonomy of the bureaucracy from political control; and the Investment Profile Index measures the security of property rights. All three are taken from the ICRG.

### *3. Measures of Gender Equity*

We utilize five distinct indicators of gender equity. The gender gaps in literacy and secondary attainment from WDI capture constraints on skill investment arising from a social ethos that prioritizes the male child in the household resource allocation decision (Dreze and Kingdon, 2001; Kingdon, 2005). The WDI gender gap in labor force participation, captures the inevitable consequence of biased resource allocation at the household level; in addition to restricted female

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6. Obtained from Center for Systematic Peace, <http://www.systemicpeace.org/polity/polity4.htm>.

7. See Marshall et al. (2009) for a description of the Polity IV variables and the underlying methodology. Corresponding information for the ICRG variables can be found at the homepage of the PRS Group: [http://www.prsgroup.com/ICRG\\_Methodology.aspx](http://www.prsgroup.com/ICRG_Methodology.aspx)

8. See Beck et al. (2001) for a description of the DPI variables and the underlying methodology. This dataset is publicly available from the World Bank, <http://econ.worldbank.org/research>.

access to formal sector employment (Dreze and Sen, 1995); direct discrimination in the labor market (Esteve-Volart, 2004); reduced mobility of female workers; and social norms that prioritize fertility decisions over professional attainment (Munshi and Myaux, 2006). The inverse of the adolescent fertility rate, also from WDI, explicitly captures the fertility aspect of gender bias.<sup>9</sup> Lastly, the percentage of women in parliament from the Women in National Parliaments Dataset released by the Inter-Parliamentary Union (IPU) captures the voice of women in the design and implementation of social policy.<sup>10</sup>

#### 4. Methodological Concerns

Estimating equation (1) confronts us with a number of concerns: First, the institutional variables described previously bear a high degree of collinearity. The early literature on institutions had typically addressed the problem of multicollinearity by aggregating available variables into a unidimensional index of institutional character (Knack and Keefer, 1995; Alesina and Perotti, 1996; Perotti 1996). The limitation of this method is that the various aspects of institutional quality being aggregated are likely to differ in their impacts on economic growth, so that the composite variable may well be subject to an unacceptable degree of measurement error (Jong-A-Pin, 2009; Bang and Mitra, 2011a).<sup>11</sup>

The recent literature has adopted a more restrictive definition of institutional quality and focused on the subset of institutions that preserve the security of property rights (Acemoglu *et al.*, 2005; Rodrik *et al.*, 2004). While this constitutes an improvement on the previous methodology, one may ask if aspects of institutional quality other than property rights have any impact on economic performance.<sup>12</sup> If they do, then this convention is, at least in principle, subject to the same caveat as the previous procedure of aggregation (Bang and Mitra, 2011b).<sup>13</sup>

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9. All gender gaps are defined as the ratio of female to male magnitudes of the relevant variables, whereby a higher value of the ratio indicates greater gender equity. To maintain parity with this convention, we take the inverse of the adolescent fertility rate rather than the fertility rate itself.

10. For countries with a bicameral parliamentary system, we take the percentage of women in the lower house of parliament. The Inter-Parliamentary Union (<http://www.ipu.org/wmn-e/classif-arc.htm>) does not provide data for years prior to 1997. We have relied on version 3.0 of the Democracy Time Series Data compiled by Pippa Norris (<http://www.pippanorris.com>) for the missing years.

11. Highlighting this problem, Langbein and Knack (2010) undertake a confirmatory factor analysis of the World Governance Indicators (WGI) to determine if these measures are causally related to single latent variable *good governance* and fail to confirm this hypothesis.

12. North (1982) distinguishes between two roles of institutional structure and asserts the importance of both: On one hand, institutions act as constraints on expropriation by the government or elite interests. On the other hand, they reduce transaction costs.

13. Focusing on property rights in isolation to other aspects of institutional quality leads to virtually identical results (available on request).

As previously mentioned, the same problem of multicollinearity arises from the gender variables of interest. Consider the fertility rate, for example. There is ample evidence that female educational attainment plays a critical role in reducing fertility by way of reducing the desired family size, reducing the need to plan a greater number of births in order to achieve the desired family size, and increasing the ability to implement the planned number of births (Murthi *et al.*, 1995; Dreze and Murthi, 2001). Hence, it would be logical to expect a strong correlation between the gender gaps in education and the fertility rate. The literature has typically avoided this problem by focusing either on gender bias in education (Klasen, 1999, 2002; Knowles *et al.*, 2002) or on its analogue in employment (Seguino, 2000; Busse and Spielmann, 2006; Schober and Ebmer, 2009).<sup>14</sup> As previously mentioned, the caveat to this convention is that it captures the impact of a specific manifestation of gender bias. If one admits that a general ethos of gender discrimination in a society will manifest itself along multiple dimensions, then focusing on one dimension in isolation is likely to understate the impact of such an ethos.

Finally, as previously mentioned, the gender variables are likely to be correlated with the indices of institutional structure, since institutions play a critical role in determining the security of property rights for women (Peterman, 2011); and more fundamentally, the level of female access to nutrition, health, education, and the labor market (Brown, 2004; Morrison and Jutting, 2004; Beer, 2009).<sup>15</sup>

To address these concerns, we follow Bang and Mitra (2011a, b) in conducting an Exploratory Factor Analysis (EFA) on the set of gender and institutional variables. This allows us to identify two distinct dimensions of gender bias and four distinct dimensions of institutional structure that are orthogonal to each other. These six factors are subsequently included in the vectors  $Z_{it}$  and  $X_{it}$  respectively. The procedure is described in the next section.

#### IV. Multidimensionality of Gender Equity and Institutional Structure

The methodology of EFA is based on the assumption that each of a set of potentially correlated variables is generated by a linear combination of a smaller set *latent factors* and an individual error term. The hypothesized latent factors include *common factors* that impact more than one

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14. See Klasen and Lamanna (2009) for an exception that integrates both dimensions.

15. We admit that the institutional variables used in our analysis relate to the quality of *formal institutions* and may not capture the full impact of social norms that constrain female attainment. However, the quality of formal institutions is, in general, indicative of the ability of a society to prevent the practice of discrimination even if there is rampant prejudice.



observed variable and *specific factors* that are unique to each variable. Hence, variation in each of the observed variables can be decomposed into the part caused by variation in the common factors and the part unique to the variable in the form of specific factors and measurement error. The unique portion of the decomposed variance can be seen as a residual, consisting of a random component and measurement error.<sup>16</sup>

The value of EFA lies in its ability to explore a theoretical structure underlying multivariate data, since the common factors identified by the method ideally lend themselves to theoretical interpretation. Further, since the factors emerge from a process of optimization, they are less susceptible to measurement bias than indices constructed on the basis of subjective assignment of weights to the constituent variables. In addition, being extracted by identifying common sources of variation in the observed variables, the factors are, by construction, free of high degrees of multicollinearity. This allows us include all dimensions of gender equity and institutional character simultaneously in the growth regression, thus avoiding the problem of omitted variable bias.

The EFA conducted on the gender and institutional variables employs the *principle component* factor extraction method with a *promax* rotation procedure and factor loadings from the exercise are reported in Table 2.<sup>17</sup> Six common factors underlying the observed variables emerge from the analysis. Of these, the last two are dominated by the gender variables and may be taken to represent latent dimensions of gender equality. As explained subsequently, we interpret these as indicative of equity in the access to economic opportunity and equity in economic and political participation respectively. The first four factors, on the other hand, capture aspects of institutional quality that are respectively interpreted as the level of democracy, the transparency of governance, the credibility of a regime, and the security of civil society. The remainder of this section will be devoted to clarifying the interpretations of these factors.<sup>18</sup>

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16. Specifically, the uniqueness factor consists of the total variability of each variable minus the sum of its squared factor loadings.

17. The advantage of *principle component extraction* is that it requires no distributional assumption on the set of variables. By contrast, the alternative procedure of *maximum likelihood extraction* requires the assumption of multivariate normality. With respect to the rotation procedure, there are *orthogonal* and *oblique* methods. Orthogonal methods, such as *oblimin*, have the advantage of minimizing the correlation between constructed factors; while oblique methods, such as *promax*, are considered to be more amenable to interpretation. We have replicated the analysis using an *oblimin* rotation procedure and obtained virtually identical factors (results available on request).

18. As a robustness check, we run the EFA separately for the gender and institutional variables. These exercises yield identical factors as the combined analysis (available on request).

### 1. *Aspects of Gender Equity*

The first gender factor is primarily composed of the secondary enrolment gap (0.4219) and the inverse of the fertility rate (0.3834), with the gender gap in adult literacy (0.2828) making a smaller yet prominent contribution. The gender gaps in secondary enrolment and adult literacy are direct reflections of constrained female access to skill investment and the fertility rate is indicative of cultural norms that limit access to education and employment (Munshi and Myaux, 2006; Bang and Mitra, 2011b). As such, it is natural to interpret this factor as representing *gender equity in the access to economic opportunity*.

The second gender factor is determined by the gender gap in labor force participation (0.5101) and the percentage of women in parliament (0.4634). The two variables may be regarded as capturing complementary dimensions of participatory equity. Hence, we interpret this factor as representing *gender equity in economic and political participation*.

The last two columns of Table 3 provide an idea of how countries in our sample ranked with respect to the two dimensions of gender equity in the year 2004. Highlighting the need to distinguish between different manifestations of gender bias, note that Italy, for example, is third with respect to equity in the access to economic opportunity, but attains a much less satisfactory rank of 45 when evaluated in terms of the ability to ensure participatory equity for women.

### 2. *Aspects of Institutional Structure*

The first institutional factor is dominated by the Bureaucratic Quality Index (0.818), the Corruption Index (0.7231), the Democratic Accountability Index (0.648), and Regime Durability (0.6066). While the first two variables are clear indicators of the transparency of governance, the last may be regarded as an indirect reflection of transparency, since the durability of a regime is critically dependent on its ability to provide a transparent administration with an efficient bureaucracy that does not engage in corruption and other modes of rent seeking. Note that an analogous interpretation holds for the Democratic Accountability Index. This variable measures the level of democracy based on the extent to which needs and concerns of the citizenry are met with adequate response by the state. Since state response to popular concerns is inherently tied to the level and quality of administrative machinery, it is not surprising that the index bears a high degree of correlation with measures of political transparency. As such, we interpret the common

factor as reflecting the *transparency of governance*. Note also that the inverse of the fertility rate (0.5426) features prominently in this factor, reinforcing the need to control for institutional quality in assessing the impact of gender bias on economic growth.

The second institutional factor is primarily composed of the Executive Index of Electoral Competition (0.8857), the Legislative Index of Electoral Competition (0.8266), the Polity Index (0.7796), and the Democratic Accountability Index (0.5446). The first two indices reflect the extent to which the political leadership of a country is determined by free elections rather than dictate; the Democratic Accountability Index reflects formal and informal constraints on the exercise of autocratic power that allow popular preferences to be reflected in social outcomes; and the Polity Index combines both dimensions. Hence, it is natural to interpret this factor as representing the level of *democracy* in a society. Note that the gender gap in secondary enrollment (0.3544) and the inverse of the fertility rate (0.3103) contribute to this factor, consistent with the well documented association of democracy with greater female attainment (Brown, 2004; Beer, 2009).

The third factor is primarily composed of the Index of Internal Conflict (0.6911), Ethnic Tension (0.6341), and the Index of External Conflict (0.5647). Each of these indices reflects the absence of a particular form of violence. As such, it is natural to interpret this factor as reflecting the *security of civil society*.

The last institutional factor is determined by the Investment Profile Index (0.7557), the Government Stability Index (0.7761), and the Index of Internal Conflict (0.3107). The first variable is a direct reflection of the credibility of a regime in terms of its ability to protect property rights, enforce contracts, and minimize delays in payments receivable from the government; the second reflects the credibility of declared policies in terms of their security against radical shifts within the government; and the third is consistent with the idea that the perceived credibility of a regime reduces the risk of internal conflict. Hence, it is reasonable to interpret this factor as reflecting the perceived *credibility of the government*.

The first four columns of Table 3 rank the countries in our sample with respect to the four aspects of institutional structure. Note that Oman, for example, ranks second with respect to the credibility of the regime; fourth with respect to the security of civil society; and given that it is a monarchy, last with respect to the level of democracy. As with the notion of gender equity, this

underlines the need to adopt a more nuanced view of institutions. In particular, it questions the adequacy of democracy as the sole measure of institutional quality in an economy.

## V. Results and Robustness

The ordinary least squares estimation of equation (1) reported in column one of Table 4 confirms our hypothesis that the various aspects of gender equity differ in their impacts on economic growth: On the average, a standard deviation improvement in the access dimension of gender equity is seen to increase growth by a factor of about 0.92 and the impact is significant at the one percent level. By contrast, a standard deviation improvement in the participation dimension of gender equity increases economic growth by a factor of about 0.45 and the impact is only marginally significant at the 10 percent level.

Again consistent with our hypothesis, the various dimensions of institutional character exhibit differential impacts on economic growth: On the average, a standard deviation increase in the level of democracy improves growth by a factor of 0.88; a corresponding increase in the credibility of a regime improves growth by a factor of 0.58; and a similar increase in the transparency of governance improves growth by a factor of 0.69. While the first two variables are significant at the one percent level, the last is significant at five percent. Interestingly, the impact of security turns out to be insignificant at any acceptable level of significance.<sup>19</sup>

The standard correlates of growth have the signs predicted by theory: The initial per capita GDP has a negative impact on growth at the one percent level, consistent with the neoclassical hypothesis of *convergence* (Barro, 1991). Investment has a positive impact at the one percent level, also consistent with intuition. The statistical insignificance of the trade variable in this and subsequent specifications is again in line with recent evidence on the primacy of institutions over trade as determinants of economic growth (Rodrik et al., 2004, Rigobon and Rodrik, 2005).<sup>20</sup> The inflation rate exhibits the negative sign predicted by theory and the statistical insignificance of the variable appears to be a consequence of the relatively small size of our sample. Indeed, it assumes significance at the one percent level once we address concerns regarding the consistency of our results by considering five year moving averages of the

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19. The statistical insignificance of conflict is an example of the general lack of robustness regarding the impact of political violence on economic growth (Polachek and Sevastianova, 2010). Several reasons for this have been advanced: First, the impact of conflict on economic growth may depend critically on the intensity of violence (Polachek and Sevastianova, 2010) and most studies on conflict do not distinguish between high and low intensity episodes of violence. Second, there is some evidence that ethnic and revolutionary conflict differ in their impacts on economic outcomes (Bang and Mitra, 2011c). Finally, and analogous to the point made about gender equity in this paper, the lack of robustness regarding the impact of conflict may also be a consequence of the multidimensionality of political instability (Jong-A-Pin, 2009).

20. Rodrik et al. (2004) show that once institutional quality is controlled for, the impact of trade on economic growth is insignificant. See Dollar and Kraay (2003) for a dissenting view.

variables instead of the nonoverlapping five year averages of our base specification. This is also what we observe for net government consumption, but the general lack of consensus regarding the impact of the variable (Bose et al., 2007) prevents us from reading too much into this result.<sup>21</sup>

Consistent with the results obtained by a number of studies in the area (Hill and King, 1995; Dollar and Gatti, 1999; Forbes, 2000), the coefficient on male secondary enrolment turns out to be insignificant and remains so in all subsequent specifications that include this variable.<sup>22</sup> The fact that an increase in male education is seen to have an insignificant impact on growth in the presence of an existing gender gap in the access to skill investment suggests that the importance of human capital as a determinant of growth depends critically on the level of equity allowed in the access to its acquisition.

One could, of course, ask if our results are being confounded by multicollinearity between the male secondary enrolment rate and measures of gender equity. To address this concern, our next specification omits the former from the list of regressors. The results of this exercise are reported in column two of Table 4. As before, the access dimension of gender equity is seen to have a greater impact on economic growth as compared to the participation dimension. In fact, the participation variable becomes insignificant in this specification, even though it retains its positive sign. The democracy, credibility, and transparency aspects of institutional character retain both sign and significance and security remains statistically insignificant. Note further that the coefficients on institutional and other controls remain fairly stable over the change in specification.

### 1. *Results with Annual Intervals*

The penultimate step in our analysis estimates equation (1) by reducing the length of time intervals to a single year. There are two reasons for this exercise: First, it addresses concerns

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21. As an example of the lack of consensus, while Barro (1991) finds a negative impact of net government consumption on growth, while Sala-i-Martin (1997) fails to find any robust association between the variables. See Bose et al. (2007) and the references therein for an idea of this literature.

22. Hill and King (1995) use the secondary enrollment rate to capture the gender specific accumulation of human capital, but Dollar and Gatti (1999) use the secondary attainment rate and Forbes (2000) uses the average years of schooling in the adult population. The difference in the choice of variable as also the empirical methods employed prevents us from claiming any direct comparability, even though all of these studies confirm the general lack of robustness of male education as a determinant of growth, once human capital is disaggregated by gender. Also see the studies by Caselli *et al.* (1996), who find a significantly negative impact of male education on growth in contrast to the significantly positive impact of female education, and Columbe and Tremblay (2006), who find a significantly greater impact of female literacy on economic growth than male literacy.

regarding the consistency of our results. Second, while averaging helps to smooth out fluctuations induced by the business cycle, it may relate institutional characteristics at a given instant to growth experience at different points of time, thereby leading to spurious conclusions on the relevance of the former (Przeworski et al., 2000). To balance the two concerns, we take five year moving averages of our variables rather than the contemporaneous values and replicate the specifications with and without male secondary enrolment in columns three and four respectively.

The access dimension of gender equity retains sign and significance in both specifications but the participation dimension acquires significance at the one percent level, both when we include male secondary enrolment and when we leave it out. Despite the gain in significance, the coefficient on the access variable remains greater than that on the participation variable in both specifications, confirming our initial results on the relatively greater impact of the former on economic growth. Lending further credence to this conclusion is the fact that the participation factor returns to insignificance once we consider a balanced panel of observations.

The impacts of the institutional variables remain as before: Both specifications yield a positive impact of democracy, credibility, and transparency at the one percent level and security remains statistically insignificant in both. For the most part, the economic controls retain both sign and significance from the previous models: The initial per capita GDP remains negatively significant at the one percent level, investment retains its positive impact at the same level, and the trade variable remains insignificant in both columns three and four. In fact, the only change is with respect to net government consumption and the inflation rate. As previously mentioned, these variables are now seen to have a negative impact at the one percent level of significance. Finally, note that male secondary enrolment remains statistically insignificant when we include it in column 3.

## 2. *Results with a Balanced Panel*

It is reasonable to ask if the results obtained so far depend on our consideration of an unbalanced panel and are sensitive to the choice of time period. To address these concerns, the last step in our analysis replicates the previous specifications using a balanced sample of countries over the period 1988-2002. To economize on space, we only report the balanced panel analogues of the specifications including male secondary enrolment. Excluding male education

yields virtually identical results with respect to the gender and institutional variables and the results of these exercises are available on request.

Column 5 of Table 4 presents the balanced sample analogue of our original specification where the sample period is divided into nonoverlapping five year intervals. As in the original specification reported in column 1, gender equity in the access to economic opportunity has a positive impact on economic growth at the one percent level and gender equity in participation a statistically insignificant impact. In fact, the coefficient on the participation variable reverses sign from the original specification, reinforcing concerns regarding the robustness of its impact. Note also that the various aspects of institutional structure remain comparable in sign and significance to the unbalanced panel analogue.

Column 6 reports results obtained from the balanced sample when we consider five year moving averages of the variables. As before, we obtain a more robust impact of gender equity in the access to economic opportunity than equity in economic and political participation: A standard deviation increase in the former is seen to improve growth by a factor of about 0.57 and the impact is significant at the one percent level, while the impact of the participation variable is insignificant at any acceptable level of significance. The impacts of the institutional variables remain consistent with the unbalanced panel analogue reported in column 2: Democracy, credibility, and transparency have a positive impact on growth at the one percent level and security an insignificant impact. Finally, the economic correlates of growth, by and large, retain both sign and significance from the analogous specification, the sole exceptions being the insignificance of net government consumption and the gain in insignificance of the trade variable.

We conclude this section with the observation that our results appear to indicate a more robust impact of the access dimension of gender equity on economic growth as compared to the participation dimension. In fact, once we address concerns regarding the consistency of results obtained with nonoverlapping five year intervals and construct our sample using five year moving averages of the variables, difference tests conducted on the two dimensions of gender equity reveal a greater impact of the access dimension of gender equity on economic growth than



the participation dimension, and this holds for the rolling averages in both the unbalanced and the balanced panels.<sup>23</sup> The results of these exercises are reported at the foot of Table 4.

## **VI. Conclusion**

This paper investigated the consequences of gender equity on the growth experience of nations. An exploratory factor analysis conducted on five indicators of gender equality and a representative set of institutional variables revealed two latent dimensions of gender equity, namely, equity in the access to economic opportunity and equity in economic and political participation. Confirming our hypothesis on the differential impacts of various dimensions of gender equity, subsequent regression analysis found a robust positive impact of the access dimension on economic growth, while the impact of the participation dimension was found to be ambiguous. In fact, difference tests conducted on the coefficients of the gender factors appeared to indicate a greater impact of the access dimension of gender equity on economic growth compared to the participation dimension.

In addition to the two dimensions of gender equity, the factor analysis identified four aspects of institutional structure pertaining to the level of democracy, the transparency of governance, the credibility of a regime, and the security of civil society, respectively. Again confirming our initial conjecture, the various aspects of institutional structure were found to differ in their consequences on economic growth: Democracy, transparency, and credibility were seen to have robust positive impacts on growth, while the security of civil society remained statistically insignificant in each of our specifications.

In addressing the multidimensionality of gender equity and its interplay with institutional structure, this paper provides a more nuanced analysis of the role of the gender equality as a determinant of economic growth and underlines the need to adopt a gendered perspective on policy design in developing societies. No study on the topic of gender can understate the importance of attaining greater equality in the access to education and this is indeed a conclusion that emerges from our analysis. Further, the relative importance of the access dimension of equity appears to indicate that the detrimental impact of gender bias on economic growth derives primarily from its role in inducing suboptimal decisions at the level of the household: Denying

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23. Comparing the impacts of the two aspects of gender equity, we exploit another convenient feature of factor analysis: There is no loss of generality in assuming that the standard deviation of each factor is unity. This is because rescaling any column of the factor loadings obtained as a solution will itself be a solution to the program.

the girl child the same access to education as her male sibling and prioritizing the fertility aspect of femininity sows the seeds of persisting exclusion over the life cycle of a woman and this takes its toll on economic performance by reducing the stock of human capital and denying society the positive intergenerational externalities of female attainment. Of course, we do not deny the importance of ensuring a voice for women in the design and implementation of social policy. But this may fail to have the desired impact if it is not accompanied by a corresponding empowerment that redresses the asymmetries of bargaining power within the household.

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## Tables

Table 1. Summary Statistics

Table 1a: Unbalanced Panel

Variable	Mean	Std. Dev.	Min	Max
GDP per Capita Growth	1.968	2.496	-7.322	11.178
Secondary Attainment	18.364	12.355	0.543	53.621
ln(GDP p.c.)t-5	7.916	1.620	4.885	10.510
Investment	21.884	5.622	5.371	41.696
Government Expenditure	12.449	5.432	1.018	25.508
Openness	-5.565	35.025	-58.699	166.666
CPI Inflation	20.818	132.600	-1.390	2,408.540
Democracy	0.134	0.800	-2.842	1.069
Transparency	0.155	0.933	-2.368	1.939
Security	0.011	0.798	-3.467	1.683
Credibility	0.128	0.854	-2.232	2.214
Access	0.011	0.646	-2.210	3.820
Participation	0.005	0.670	-1.564	2.129
Observations	1,130			

Table 1b: Balanced Panel

Variable	Mean	Std. Dev.	Min	Max
GDP per Capita Growth	2.044	2.233	-7.322	8.577
Secondary Attainment	20.199	12.770	0.543	53.621
ln(GDP p.c.)t-5	8.334	1.617	4.885	10.510
Investment	22.276	4.986	9.996	41.696
Government Expenditure	13.372	5.517	1.018	25.508
Openness	-4.668	33.858	-58.328	135.770
CPI Inflation	8.443	13.304	-1.390	197.343
Democracy	0.178	0.689	-2.842	0.984
Transparency	0.390	0.939	-2.368	1.939
Security	0.094	0.713	-2.552	1.683
Credibility	0.265	0.827	-2.013	2.214
Access	0.024	0.578	-1.453	1.180
Participation	0.020	0.678	-1.391	1.883
Observations	751			

Table 2. Factor Analysis (Method: Principle Factor; Rotation: Oblique Promax[1])

Factor	Variance	Proportion	LR test: independent vs. saturated:						
Transparency	2.9500	0.3148	$\chi^2(136)$	12,000					
Democracy	2.9440	0.3141	P-value	0					
Security	1.6988	0.1813							
Credibility	1.5087	0.1610							
Participation	0.5944	0.0634							
Access	0.5074	0.0541							
Factor7	0.1071	0.0114							
Factor8	0.0721	0.0077							
Rotated factor loadings									
Variable	Transparency	Democracy	Security	Credibility	Participation	Access	Factor7	Factor8	Uniqueness
Democratic Accountability	0.6480	0.5446	0.1999	0.1443	0.0159	0.0347	0.0003	0.1444	0.2004
Corruption Index	0.7231	0.2293	0.3135	-0.0799	0.2290	0.0494	0.0803	0.0027	0.2585
Investment Profile	0.2045	0.2202	0.1391	0.7557	0.0602	0.0511	-0.0569	0.0552	0.3068
Bureaucratic Quality	0.8180	0.2276	0.1692	0.1761	0.0223	0.0419	-0.0722	-0.0440	0.2100
Government Stability	0.0135	0.0500	0.1942	0.7761	0.0086	0.0225	0.0516	-0.0477	0.3517
Ethnic Tensions Index	0.2598	0.1565	0.6341	0.1480	-0.0103	0.1686	0.1273	-0.0369	0.4379
Internal Conflict Index	0.4056	0.1430	0.6911	0.3107	0.1217	0.0075	-0.0316	0.0060	0.2250
External Conflict Index	0.2286	0.3065	0.5647	0.2050	0.0993	0.0744	-0.1295	0.0795	0.4543
Polity Index	0.3633	0.7796	0.1616	0.0502	0.0783	0.1925	-0.0590	0.1353	0.1667
Regime Durability	0.6066	0.0657	0.0592	0.0724	0.0166	0.0134	0.1372	-0.0015	0.5997
Leg. Electoral Competition	0.1126	0.8266	0.1064	0.1189	-0.0225	0.0320	0.0741	-0.0670	0.2672
Exec. Electoral Competition	0.1338	0.8857	0.0600	0.0824	0.0812	-0.0225	-0.0228	-0.0395	0.1781
Labor Force Participation Gap	0.2008	0.1591	0.1319	0.1217	0.5101	-0.0597	-0.0809	0.0183	0.6315
Percent Female in Parliament	0.2977	0.1238	0.1757	0.0853	0.4634	0.1326	0.0957	-0.0114	0.6163
Literacy Rate Gap	0.0169	0.1048	0.1592	-0.0412	0.1221	0.2828	-0.0079	0.1065	0.8554
Secondary Enrollment Gap	0.2399	0.3544	0.2850	0.1698	-0.0407	0.4219	0.0681	-0.0079	0.5224
Fertility <sup>-1</sup>	0.5426	0.3103	0.2773	0.1881	0.0874	0.3834	-0.0827	-0.0063	0.3355
Observations	1,224								



Table 3. Selected Percentiles of Institutional and Gender Factor Variables.

	Democracy	Transparency	Security	Credibility	Access	Participation
<b>Top Five</b>						
1	Nicaragua	Canada	Syria	Bahrain	Colombia	Mozambique
2	India	Switzerland	Tunisia	Oman	China	Sweden
3	Dom. Rep.	USA	Mongolia	Botswana	Italy	Finland
4	Senegal	Sweden	Oman	Spain	Bulgaria	Norway
5	Niger	UK	Finland	Kuwait	Spain	Uganda
<b>First Quartile</b>						
21	Lithuania	Greece	Ireland	Guatemala	Portugal	Namibia
22	Albania	Portugal	Jordan	Gambia	Japan	Latvia
<b>Middle Five</b>						
41	Portugal	Indonesia	Namibia	Austria	Belgium	Argentina
42	Italy	Colombia	Burkina Faso	Congo, Rep.	Honduras	Israel
43	Spain	Brazil	Italy	Dom. Rep.	Brazil	Poland
44	Chile	Malaysia	Brazil	Mongolia	Ecuador	Burkina Faso
45	France	Uruguay	Belgium	Cameroon	Peru	Italy
<b>Third Quartile</b>						
65	Jamaica	Botswana	Bolivia	Malawi	Bolivia	Mexico
66	Namibia	Bangladesh	Malawi	Switzerland	USA	Nicaragua
<b>Bottom Five</b>						
83	Kuwait	Mali	Algeria	Argentina	Mali	Syria
84	Pakistan	Mozambique	Colombia	Cote d'Ivoire	Ethiopia	Egypt
85	China	Paraguay	Sri Lanka	Ecuador	Togo	Kuwait
86	Bahrain	Cote d'Ivoire	India	Venezuela	Niger	India
87	Oman	Togo	Israel	Zimbabwe	Gambia	Jordan

Table 4. Regression Results

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	<b>Unbalanced Panel</b>				<b>Balanced Panel</b>	
	Non-Overlapping Averages	Non-Overlapping Averages	Rolling Averages	Rolling Averages	Non-Overlapping Averages	Rolling Averages
ln(GDP per capita) <sub>t-5</sub>	-0.532*** (0.204)	-0.566*** (0.192)	-0.400*** (0.0922)	-0.372*** (0.0872)	-0.659** (0.289)	-0.528*** (0.115)
Investment	0.211*** (0.0273)	0.211*** (0.0260)	0.203*** (0.0121)	0.205*** (0.0115)	0.211*** (0.0372)	0.200*** (0.0147)
Net Gov. Expenditure	-0.0390 (0.0365)	-0.0284 (0.0340)	-0.0501*** (0.0164)	-0.0456*** (0.0147)	0.0150 (0.0420)	0.00277 (0.0182)
Openness	0.00182 (0.00422)	0.00122 (0.00407)	0.00200 (0.00195)	0.00224 (0.00187)	0.00704 (0.00522)	0.00532** (0.00223)
Inflation Rate	-0.00543 (0.00581)	-0.00516 (0.00568)	-0.00287*** (0.000468)	-0.00247*** (0.000447)	0.00119 (0.0154)	-0.0229*** (0.00575)
Democracy	0.883*** (0.201)	0.922*** (0.195)	0.552*** (0.0875)	0.551*** (0.0848)	1.064*** (0.283)	0.490*** (0.111)
Transparency	0.692** (0.278)	0.616** (0.271)	0.538*** (0.127)	0.524*** (0.125)	0.886** (0.370)	0.678*** (0.154)
Security	-0.163 (0.200)	-0.183 (0.198)	-0.0678 (0.0897)	-0.0563 (0.0890)	0.0761 (0.288)	0.138 (0.122)
Credibility	0.578*** (0.179)	0.616*** (0.172)	0.506*** (0.0792)	0.556*** (0.0764)	0.817*** (0.228)	0.596*** (0.0993)
Gender Access	0.916*** (0.274)	0.853*** (0.262)	0.648*** (0.120)	0.660*** (0.117)	0.797** (0.363)	0.574*** (0.150)
Gender Participation	0.452* (0.239)	0.362 (0.227)	0.327*** (0.105)	0.273*** (0.101)	-0.0447 (0.291)	-0.0206 (0.121)
Male Secondary Attainment	-0.0138 (0.0152)		0.00236 (0.00724)		-0.0227 (0.0172)	-0.00415 (0.00778)
Constant	2.169 (1.742)	2.052 (1.661)	1.109 (0.767)	0.813 (0.740)	2.459 (2.370)	1.709* (0.948)
Observations	224	233	1,130	1,180	145	751
R-squared	0.405	0.411	0.358	0.357	0.375	0.351
Access Minus Participation	0.463 (0.385)	0.321* (0.169)	0.491 (0.374)	0.387** (0.165)	0.842* (0.481)	0.595*** (0.191)

Standard errors in parentheses; \*\*\* p<0.01, \*\* p<0.05, \* p<0.1