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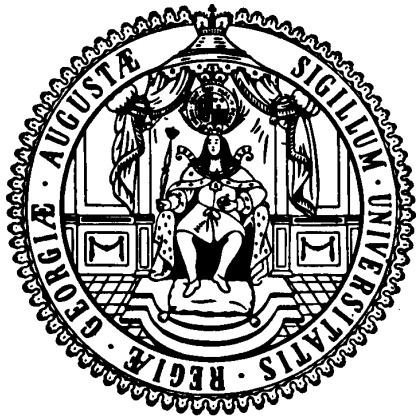

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The Impact of Gender Inequality in Education and Employment on Economic Growth in Developing Countries: Updates and Extensions

Stephan Klasen, Francesca Lamanna

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Platz der Göttinger Sieben 3 · 37073 Goettingen · Germany · Phone: +49-(0)551-398172 · Fax: +49-(0)551-398173
e-mail: uwia@gwdg.de · http://www.iai.wiwi.uni-goettingen.de

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Stephan Klasen, University of Göttingen
sklasen@uni-goettingen.de

Francesca Lamanna, World Bank Group[1]
flamanna@worldbank.org

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Abstract:

Using cross-country and panel regressions, we investigate to what extent gender gaps in education and employment (proxied using gender gaps in labor force participation) reduce economic growth. Using most recent data and investigating a long time period (1960-2000), we update the results of previous studies on education gaps on growth and extend the analysis to employment gaps using panel data. We find that gender gaps in education and employment significantly reduce economic growth. The combined 'costs' of education and employment gaps in Middle East and North Africa and South Asia amount respectively to 0.9-1.7 and 0.1-1.6 percentage point differences in growth compared to East Asia. Gender gaps in employment appear to have an increasing effect on economic growth differences between regions, with the Middle East and North Africa and South Asia suffering from slower growth in female employment.

Keywords: gender inequality, growth, education, employment, discrimination

JEL Codes: J7, J16, O4

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1. Introduction

There are many reasons to be concerned about existing gender inequalities in important well-being related dimensions such as education, health, employment, or pay. From a well-being as well as an equity perspective, such gender inequalities are problematic as they lower well-being and are a form of injustice in most conceptions of equity or justice.[2] While such a view would argue for reducing gender inequalities in these dimensions of well-being on intrinsic grounds, recently a literature has developed that has investigated the instrumental effects of gender inequality on other important development outcomes with a particular focus on economic growth. Without denying the importance of reducing gender inequality on intrinsic grounds, this paper is a contribution to that latter literature.

A significant focus of that literature has been to examine the impact of gender inequality in education on economic growth. A number of theoretical contributions have suggested a negative link between gender inequality and economic growth (e.g. Oded Galor and David Weil 1996; Nils-Petter Lagerlöf 2003). This literature shows that, largely due to the impact of female education on fertility and the creation of human capital of the next generation, a lower gender gap will spur economic development. The next section will briefly summarize the main findings from that literature.

In parallel, an empirical literature has also examined these effects. While some earlier studies had suggested that gender inequality in education might actually increase economic growth (Robert Barro and Jong-Wha Lee 1994; Barro and Xavier Sala-I-Martin 1995), more recent work has shown that the opposite appears to be the case (Anne Hill and Elizabeth King 1995; David Dollar and Roberta Gatti 1999; Kristin Forbes 2000; Stephen Knowles, Paula Lorgelly and Dorian Owen 2002; Stephan Klasen 2002; Steven Yamarik and Sucharita Ghosh 2003; Dina Abu-Ghaida and Klasen 2004). These studies not only differed from previous analyses in their findings of the impact of gender inequality on economic growth, but also were able to explain why earlier studies had found the opposite effect and why more careful econometric techniques yielded the new finding that gender inequality in education reduces economic growth.[3]

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[2] See Klasen and Wink (2003) and Klasen (2002, 2007) for a discussion of these issues.

[3] Among the problems in the findings by Barro and co-authors identified by these studies were the absence of regional dummy variables, particularly for Latin America and East Asia. In the former, low initial gender gaps were accompanied by low growth, while in the latter relatively high initial gender gaps were accompanied by high subsequent growth. In the absence of regional dummy variables, a causal link is made between these associations. It is quite likely, however, that the growth experiences of these regions were also influenced by other region-specific factors that are largely unrelated to gender gaps. The fact that these regional dummies are (at least jointly) significant and that then the negative effect of female education reverses itself once regional (or country fixed) effects are considered supports this view. Further problems with these studies are the use of initial period education variables, the high collinearity between

These macro studies are also consistent with findings using micro data showing that girls have a higher marginal return to education, which is even higher if the impact of female education on fertility and education of the next generation is included (Hill and King 1995; World Bank 2001; King, Klasen, and Maria Porter 2008).

The effects found are quite large for the regions where gender inequality is sizable, such as South Asia or the Middle East and North Africa (MENA). In fact, Klasen (2002) estimated that 0.9 percentage points of the 1.8 percentage point annual per capita growth difference between the countries in MENA and those in East Asia and the Pacific can be attributed to higher initial gender inequality in education there as well as a slower closing of the gap vis-à-vis East Asia and the Pacific.[4]

While these results are instructive, they are based on information on education and economic performance until 1990. Recently, new data on education achievement and economic performance have become available that now stretch to 2000 so that one purpose of the paper is to update the findings of the impact of gender inequality on economic growth. We will do this by using an updated and extended data set and the same econometric specification that was used in Klasen (2002). For some regions (including the MENA region), an update is particularly germane as the gender gaps in education have been closing more rapidly recently so that one would expect smaller but still remarkable costs for the existing gender gap in education.

A subject that has not been investigated in great detail is the impact of gender inequality in *employment* and *pay* on economic growth. The relatively small theoretical literature on the subject yields conflicting results (e.g. Robert Blecker and Stephanie Seguino 2002; Berta Esteve-Volart 2004; Tiago de Cavalcanti and Jose Tavares 2007). While there is some empirical literature suggesting that high *earnings* gaps, combined with high female labour force participation rates, helped spur export-oriented economic growth in some Asian countries (e.g. Stephanie Seguino 2000a, b; Matthias Busse and Christian Spielmann 2006), there has not been a thorough empirical investigation of the role of gender gaps in *employment* on economic growth and the few studies existing have to be treated with caution due to problems of endogeneity, unobserved heterogeneity and poor data availability and quality.

These issues can best be treated in a panel framework, where one considers the impact of initial employment on subsequent economic growth, and thus can at least partly address issues of endogeneity and unobserved heterogeneneity. Unfortunately, such panel data is only available for labour force participation rates by sex, not for employment by sex; we show below, however, that available data suggest that gender

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male and female education, and the endogeneity of these variables. For a discussion of these issues, see Dollar and Gatti (1999), Lorgelly and Owen (1999), Forbes (2000) and Klasen (2002),

[4] The reported figures in Klasen (2002) are actually slightly different, as Israel, Sudan, and Turkey were all included in the Middle East Region. For this report, they were allocated to other regions (Israel to OECD, Turkey to Eastern Europe, Central Asia and Sudan to Sub Saharan Africa) and therefore the analysis in Klasen (2002) was redone to reflect this. The figures reported above are based on that analysis.

gaps in labor force participation and employment are closely correlated so that one can well proxy for the other. With forty years of data, an analysis of the gender gaps in labour force participation is now possible and therefore a second aim of the paper is to investigate the impact of gender gaps in labour force participation (as a proxy for gender gaps in employment) on economic growth in such a panel framework.

2. Gender Inequality and Economic Performance: Theory and Evidence

There have been a number of theoretical and empirical studies finding that gender inequality in education and employment reduce economic growth.[5] The main arguments from the literature, which are discussed in detail in Klasen (1999, 2002, 2006) are briefly summarized below.

Regarding gender inequality in education, the theoretical literature suggests as a first argument that such gender inequality reduces the average amount of human capital in a society and thus harms economic performance. It does so as by artificially restricting the pool of talent from which to draw for education and thereby excluding highly qualified girls (and taking less qualified boys instead, e.g. Dollar and Gatti, 1999). Moreover, if there are declining marginal returns to education, restricting the education of girls to lower levels while taking the education of boys to higher levels means that the marginal return to educating girls is higher than that of boys and thus would boost overall economic performance (World Bank 2001; Knowles et al. 2002).

A second argument relates to externalities of female education. Promoting female education is known to reduce fertility levels, reduce child mortality levels, and promote the education of the next generation. Each factor in turn has a positive impact on economic growth. Thus gender gaps in education reduce the benefits to society of high female education (e.g. Galor and Weil 1996; Lagerlöf 1999; World Bank 2001; King, Klasen, and Porter 2008). There is also an important timing issue involved here. Reduced fertility levels will, after some twenty years, lead to a favourable demographic constellation which Bloom and Williamson (1998) refer to as a 'demographic gift'. For a period of several decades, the working age population will grow much faster than overall population, thus lowering dependency rates with positive repercussions for per capita economic growth.[6]

A third argument relates to international competitiveness. Many East Asian countries have been able to be competitive on world markets through the use of female-intensive export-oriented manufacturing industries, a strategy that is now finding followers in South Asia and individual countries across the developing world (e.g. Seguino, 2000a, b).[7] In order for such competitive export industries to emerge and grow, women need to be educated and there must no barrier to their employment in such

[5] See, for example, Abu-Ghaida and Klasen (2004), Klasen (2006), Janet Stotsky (2006) and Mark Blackden et al (2007), for a review.

[6] See Bloom and Williamson (1998) and Klasen (2002) for a full exposition of these arguments.

[7] Klasen (2006) reviews the literature and also notes that such strategies have now been extended, with some success to countries sich as Tunisia, Bangladesh, China, and Vietnam.

sectors. Gender inequality in education and employment would reduce the ability of countries to capitalize on these opportunities (World Bank 2001; Busse and Spielmann 2006).[8]

Regarding gender gaps in employment, there are a number of closely related arguments. First, there is a similar argument that it imposes a distortion on the economy as do gender gaps in education. It artificially reduces the pool of talent from which employers can draw upon, thereby reducing the average ability of the workforce (e.g. Esteve-Volart 2004). Such distortions would not only affect dependent employed, but similar arguments could be made for self-employed in agricultural and non-agricultural sectors where unequal access to critical inputs, technologies, and resources would reduce the average productivity of these ventures thereby reducing economic growth (see Mark Blackden et al 2007). As self-employment (including in agriculture) is included in our empirical assessment, these arguments might have some empirical relevance in accounting for the results.

A second also closely related argument suggests that gender inequality in employment can reduce economic growth via demographic effects. A model by Cavalcanti and Tavares (2007) suggest that gender inequality in employment would be associated with higher fertility levels which in turn reduce economic growth.

Thirdly, the results by Seguino (2000a, b) on the impact of gender gaps in pay on international competitiveness imply that gender gaps in employment access would also reduce economic growth as it would deprive countries to use (relatively cheap) female labour as a competitive advantage in an export-oriented growth strategy.

A fourth argument relates to the importance of female employment and earnings for their bargaining power within families. There is a sizable literature that demonstrates that female employment and earnings increase their bargaining power in the home (e.g. Amartya Sen 1990; Thomas Duncan 1997; Lawrence Haddad, John Hoddinott, and Harold Alderman 1997; World Bank 2001; Stephan Klasen and Claudia Wink 2003; King, Klasen, and Porter 2008). This not only benefits the women concerned, but their greater bargaining power can have a range of growth-enhancing effects. These could include higher savings as women and men differ in their savings behaviour (e.g. Stephanie Seguino and Maria Sagrario Floro 2003), more productive investments and use and repayment of credit (see Janet Stosky 2006), and higher investments in the health and education of their children, thus promoting human capital of the next generation and therefore economic growth (e.g. Thomas 1997; World Bank 2001).

A fifth argument relates to governance. There is a growing but still rather speculative and suggestive literature that has collated evidence that workers, on average, appear to be less prone to corruption and nepotism than men (World Bank 2001; Anand

[8] There is also some empirical support for the claim by Seguino (2000a, b) that higher gender wage gaps were a further pre-condition of these export-oriented strategies. There is a related debate as to whether growth has reduced these gender wage gaps, which appears to be the case in many, but not all countries; also, they remain large, particularly when controlling for education. For a discussion, see Seguino (2000a, b), Klasen (2002), Busse and Spielmann (2006) and Stotsky, (2006), among others.

Swamy, Omar Azfar, Stephen Knack and Young Lee 2001). If these findings prove to be robust, greater female employment might be beneficial for economic performance in this sense as well.[9]

There is a related theoretical literature that examines the impact of gender discrimination in pay on economic performance. Here the theoretical literature is quite divided. On the one hand, studies by Galor and Weil (1996) and Calvalcanti and Tavares (2007) suggest that large gender pay gaps will reduce economic growth. Such gender pay gaps reduce female employment, increase fertility, and lower economic growth through these participation and demographic effects. In contrast, Blecker and Seguino (2002) highlight a different mechanism, leading to contrasting results. They suggest that high gender pay gaps and associated low female wages increase the competitiveness of export-oriented industrializing economies and thus boost the growth performance of these countries. The most important difference of this study, in contrast to the models considered above, is that it is focusing more on short-term demand-induced growth effects, while the other models are long-term growth models where growth is driven by supply constraints. Clearly both effects can be relevant, depending on the time horizon considered, an issue that is also discussed briefly below.

It is important to point out that it is theoretically not easy to separate the effects between gender gaps in education, employment, and pay. In fact, in most of the models considered above, gender gaps in one dimension tend to lead to gender gaps in other dimensions, with the causality running in both directions.[10] For example, gender gaps in education might automatically lead to gender gaps in employment, particularly in the formal sector, where employers will prefer educated workers and thus will not consider applications of uneducated women. Conversely, if there are large barriers to female employment or gender gaps in pay, rational parents (and girls) might decide that education of girls is not as lucrative which might therefore lead to lower demands for female education and resulting gender gaps in education.[11] Thus gender gaps in education and employment are closely related to each other.[12]

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[9] See a related discussion in King, Klasen, and Porter (2008) about the growth and welfare effects of women as policy-makers. The 'causes' of these differences in behavior may well be related to different socialization of girls and boys, a subject that leads beyond the scope of this paper.

[10] The one exception are again the two short-term structuralists models of Blecker and Seguino (2002) where large gender gaps in pay, implicitly combined combined with no gender gaps in education and employment, can deliver the income-enhancing effects;

[11] On these issues, see discussions in King and Hill (1993), Alderman et al. (1995, 1996), and World Bank (2001)

[12] Also, it is not obvious which factor is the prime cause of gender gaps that one should then include in a reduced form estimation.

They are not measuring the same thing, however, and thus are important to investigate separately. For one, it might be the case that the two issues are largely driven by institutional factors that govern education and employment access and do not therefore greatly depend on each other. For example, one might think of an education policy that strives to achieve universal education and thus reduces gender gaps, while there continue to be significant barriers to employment for females in the labour market. This might be particularly relevant to the situation in the Middle East and North Africa but most recently also for South Asia. Moreover, the externalities of female education and female employment are not all the same. For example, female education is likely to lead to lower fertility and child mortality of the off-spring, while the effect of female employment on these items is likely to be much smaller and more indirect (working mainly through greater female bargaining power; and there may be also be opposite effects including that the absence of women in the home might in some cases negatively impact on the quality of child care). Conversely, the governance externality applies solely to female employment, not to female education.

On the empirical evidence, there is a considerable literature now documenting that gender gaps in education reduce economic growth. King and Hill (1993) as well as Knowles et al. (2002) use a Solow-growth framework and find that gender gaps in education significantly reduce the level of GDP. Dollar and Gatti (1999), Forbes (2000), Yamarik and Ghosh (2003), Appiah and McMahon (2002) and Klasen (2002) investigate the impact of gender gaps on economic growth and all find that gender gaps in education have a negative impact on subsequent economic growth. They also find that the earlier results by Barro and Lee (1994) that female education might negatively impact economic growth do not stand up to closer econometric scrutiny.

There are much fewer empirical studies on the impact of gender gaps in employment and pay on economic growth, largely related to data and econometric issues discussed above. Klasen (1999) found that increases in female labor force participation and formal sector employment were associated with higher growth in a cross-country context. Differences in female participation and employment might have accounted for another 0.3 percentage points in the growth difference between the MENA region and East Asia and the Pacific (EAP). But these findings have to be treated with caution as they may suffer from reverse causality. In particular, it might be the case that high growth draws women into the labor force (rather than increasing female participation promoting economic growth). There are no easy ways to correct for this econometrically as there are unlikely to be valid instruments that can be used. Also, there are questions about the international comparability of data on labor force participation and formal sector employment rates. To the extent that the problems of comparability affect levels but not trends over time, these problems might be avoided in a fixed effects panel setting as the one we are undertaking here.

At the sub-national level, Berta Esteve-Volart has found significant negative effects of gender gaps in employment and managerial positions on economic growth of India's states using panel data and controlling for endogeneity using instrumental variables (Esteve-Volart, 2004).

There are some papers by Seguino (2000a, b) that support the contention that the combination of low gender gaps in education and employment with large gender gaps in pay (and resulting low female wages) were a contributing factor to the growth experience

of export-oriented middle income countries. Supporting this empirical claim is a paper by Busse and Spielman (2006) which finds for a sample of 23 developing countries that a combination of low gender gaps in education and employment and large gender gaps in pay helped promote exports. Unfortunately, there are no comprehensive, standardized and comparable data on gender pay gaps across many countries so that these analyses have been based on relatively small and rather specific samples of countries.[13]

Also empirically, there are some questions about separation of the effects of gender gaps in education and labor force participation or employment. In regressions that only consider the effect of gender gaps in education, they might implicitly also measure the impact of gender gaps in employment, particularly if the two are highly correlated. Such high correlation might also make it difficult to separately identify the effects when both are included in a regression (due to the multicollinearity problem).[14] Also, it will be difficult to assess which of the two is the causal driver of the other, given the close and plausible theoretical and empirical linkage.

In sum, there is considerable theoretical support for the notion that gender gaps in education and employment are likely to reduce economic performance (while the literature on the effect of gender pas in pay is more divided). The empirical results also point to negative effects of gender gaps in education, but there is little reliable cross-country evidence on gender gaps in employment. In the following section we will discuss gender gaps in education and employment by developing region before estimating the impact of these gaps on economic performance there.

3. Education, Labor Force Participation, Employment, and Economic Performance

In this section we will present data on growth, education, labor force participation, and employment of the different world regions with particular focus on the Middle East and North Africa Region (MENA)[15], Sub Saharan Africa, and South Asia, the areas with particularly high gender gaps in education and/or employment. The data sources and definitions are shown in Table 1.

[13] In the case of these papers, the focus on semi-industrialized, export-oriented countries was intended. But this can therefore not address the question whether there is a more general relationship between pay gaps and growth in developing countries that do not belong to this small group.

[14] It turns out that in our total sample, gender gaps in education and employment are not very closely correlated so that it should be possibly to separately identify the effects. This overall low correlation is largely driven by a negative correlation between gender gaps in education and employment in Sub Saharan Africa and, to a lesser extent, South Asia, while in the other regions, the correlation is positive and usually large and significant. This negative correlation in Sub Saharan Africa is related to high female employment in agriculture despite low levels of female education; in this case, low education is not a barrier to high female employment as is the case elsewhere (in the formal sector in Africa, see Klasen 2006; Blackden et al. 2007)

[15] See Annexes for the list of countries per region for which we have data availability.

Table 1: Variables names, definition and data source (entire page)

As shown in figure 1, the fastest-growing region in the past forty years according to our data set has been the region of East Asia and the Pacific. The real per capita annual growth rate between 1960 and 2000 in this region was 4.05%. On the contrary, the region that registered least growth is the Sub-Saharan Africa region (0.57%). Latin American and Caribbean countries (LAC) did not experience high growth rates either: they grew 1.53% annually. Middle East and OECD countries' growth rates are in-between at 2.24% and 2.66% annual growth per capita, respectively. To better analyze the pattern of the per capita growth rate we will decompose it in decades for the past forty years (1960s-1970s-1980s and 1990s) and consider the different world's regions growth rates in the different decades.

Figure1: Real Regional per capita annual growth rate 1960-2000 (less than half page)

Considering the growth rate per decade in figure 2 allows us to take into account the growth rates of Eastern Europe (ECA), because after 1990 the data available for this region increases significantly. During the nineties those countries were in transition and their rate of per capita growth was very low (0.26%). But also in Sub-Saharan Africa, the annual per capita growth rate decreased in the last 4 decades and actually shows negative growth in the 1990s (-0.21).

Figure 2: Real Regional per capita annual growth rate per decade (less than half a page)

In other world regions the per capita growth rate was generally higher in the 1960s and 1970s and then it decreased in the 1980s and 1990s with the exception of the South Asia region (SA) where the annual growth rate grew quickly in 1980s and was maintained almost at the same level in the 1990s. This result was largely driven by India and Sri Lanka. But their neighbors (EAP countries) still remain the countries that experience largely higher annual per capita growth rate in each decade. The region of Middle East and North Africa (MENA) together with Latin America seems to be successfully recovering from very low growth in the 1980s. One should point out that the data for the Middle East and North Africa included in the analysis do not consider many of the oil-exporting Arab states including Saudi Arabia, Kuwait, UAE, Oman, and Libya for which no income data over time.[16] Nevertheless, the growth experience there is to a

[16] Also note that following the World Bank country classification system, Turkey is considered to belong to the Eastern Europe and Central Asia and Israel to OECD.

considerable extent influenced by the direct and indirect impact of oil prices on oil-producing (and neighboring) countries.[17]

Non-economic indicators of well-being show a similar pattern, although some differences emerge (Appendix Table1). The three indicators shown, under five mortality, fertility, and life expectancy all show larger improvements than the income measures. But the pace of improvements is similar to the growth indicator, with East Asia and Pacific showing the fastest improvements on most indicators, while Sub Saharan Africa showing the slowest. Here the MENA region compares very favorably with rapid improvements in life expectancy and under five mortality, and large reductions in fertility, particularly in the past 20 years while in South Asia the improvement was generally smaller.

Turning to the indicators of concern here, gender inequality in education, labor force participation, and employment, in the appendix Tables A.2 and A.3 show the development in the regions between 1960 and 2000 by decade. The tables show that in all the regions, the education level of the adult population has increased considerably since 1960. Male and female adults have between 1.8 and 4.4 more years of education in 2000 than in 1960, with Sub Saharan Africa showing the slowest progress and East Asia and the MENA region the fastest. Regarding gender inequality, the data show considerable gender inequality in education in 1960 in most regions. The worst affected were South Asia, Sub Saharan Africa, and the MENA region, where female adults had about half or less the education level than their male peers. In all regions, this gap has been reduced, but the gap remains sizable in some. In South Asia, female adults still only have about 60% of the educational achievement of males, and the gap has closed quite slowly in Sub Saharan Africa. The gaps have been closing faster in East Asia and Pacific and also in the MENA region where female adults (15 and older) now have about 73% of the education of males.

Appendix Table A.3 examines data on labor force participation rates by gender, the female share of the labor force, and the rates of formal sector employment. The data show that inequality in labor force participation is also considerable, although the gaps have been narrowing. From these data a consistent pattern emerges. In particular, East Asia and the Pacific as well as Latin America show rapidly declining gender gaps in labor force participation and formal sector employment; Sub Saharan Africa show declines in female labor force participation, but from a high level[18]; and the MENA region has the lowest female labor force participation rate and formal sector participation

[17] Iran is the only major oil producer included in the sample, but Egypt, Algeria, and Yemen also depend, directly or indirectly (via migration and remittances) on oil-production.

[18] Sub Saharan Africa's high female labor participation rate is largely confined to the agricultural sector which still employs the majority of workers in most Sub Saharan African countries. The international comparability of labor force participation data in own-account agriculture is particularly problematic. In formal sector employment, female employment rates are much lower and the gender gap is significant; but these data are, as discussed, missing for many countries and show consistency and comparability problems.

of women throughout the period. As in other regions, in MENA the gaps in labor force participation rates have also narrowed in recent decades, but by less than most other regions.[19] In South Asia the gender gap in labor force participation in the past four decades was only marginally reduced.

From our theoretical discussion, we would expect that excluding women from the pool of talent is particularly damaging formal sector employment which may depend predominantly on having the best talent. Thus using the gender gap in formal sector employment might be most appropriate. On the other hand, these data are available from the ILO for a much smaller pool of countries and it appears that measurement error and international comparability is particularly problematic using these data. Therefore for the empirical analysis that follows, we will use the gender gaps in labor force participation only.

Even if formal sector employment data are not readily available and comparable, one might still want to use overall the employment rate (i.e. employed women as a share of the working-age population) rather than labor force participation data as the presumed theoretical effects are related to employment rather than participation. The difference between the two is, of course, the unemployment rates. While we do not have reliable employment data at the national level, the KILM data of the ILO (ILO, 2007) suggest that, first, unemployment rates are below 10% in all regions except the MENA region (where they are believed to hover around 12-14%), and that, second, the differences in male and female unemployment rates are quite low (usually less than 1 percentage point) so that labor force participation data appear to be reasonable proxies for employment levels by sex.[20] Thus we believe that the data on gender gaps in labor force participation rates will be reasonable proxies for gender gaps in overall employment rates.

In general, however, the quality and comparability also of the ILO labor force data is open to question. The data are estimates based sometimes on very patchy primary data. The comparability problems are likely to be larger in level differences across countries than in trends over time. Despite these problems, we are forced to rely on the available ILO labor force data as the only available cross-country panel data for our

[19] The combination of rapidly shrinking gender gaps in education yet large and persistent gender gaps in employment in the MENA region constitutes a major puzzle. See World Bank (2004) for a careful discussion.

[20] Unemployment rates for females in Latin America and in the Middle East and North Africa are several points higher than for males. Thus in these regions, the gender gap in employment is actually slightly larger than in labor force participation. But as this gender gap in unemployment rates is rather stable over time, it would be absorbed by the country-specific effects in our panel estimation. We also tried to use sectoral employment data that is available for some countries since the 1980s to adjust our labor force participation data to focus on non-agricultural employment. But there were so many data gaps and measurement error and comparability was so severe that these data turned out to be unusable.

analysis. Inherent measurement error in all the labor force estimates leads to the well-known downward bias of coefficients in regression analyses. Thus any effect that we find is likely to understate the true extent of the effect. Unfortunately, it is very difficult to econometrically control for measurement error. We know little about its structure, nor are there good instruments to address it. We hope that our panel analyses will at least partly reduce this problem to the extent that measurement error and comparability problems are lower across time than they are across space and can therefore be partly controlled for by using country-specific effects.

4. Data and Estimation procedure

Since the early 1990s a good deal of empirical growth research using cross-country data was inspired by new growth theories and the availability of better data. In our estimation strategy, we make use of cross-country and panel growth regressions as have been pioneered by Barro (1991) and used in a large literature since. Our particular estimation strategy for the cross-section analysis follows Klasen (2002); in the panel analysis we will extend the analysis. As our focus is on long-run economic growth, the most basic specification will use purely cross-country data where the period 1960-2000 will be treated as a single observation for each country. In order to partly control for possible endogeneity issues and unobserved heterogeneity, we will also consider panel regressions that treat each decade as one observation and use initial values of the covariates. Those panel regressions will also allow us to properly study the impact of gender inequalities in labor force participation on economic growth.

We include a number of regressors that were found to effect economic growth in the literature, including population growth, growth in the working age population, openness (exports plus imports as a share of GDP), the investment rate, human capital, and regional dummy variables to capture region-specific effects, which are invariably not captured in such cross-country regressions and can include common geographic, institutional, policy, trade, or conflict experiences within regions.[21]

In order to avoid some of the methodological problems of earlier studies on gender inequality and economic growth, we do not include in our equations male and female education level separately. Instead, we generate four different education variables, one for the initial level of education in 1960, one for the gender gap in the level of education in the 1960, one for the growth in the level of education in the period 1960-2000 and one for the growth rate of the female-male education level ratio for the period 1960-2000. For the level of education, we could use the average education, the male or the female education level. Each would make different assumptions about the possibilities to affect the gender gap. Using the male educational level as a proxy for average education provides an upper-bound estimate of the effect of gender inequality in

[21] We have also undertaken some further robustness checks using more variables used in standard growth regression analysis. The results are available on request. While the use of regional dummy variables is invariably a measure of our ignorance, in many cross-country regressions they turn out to be significant pointing to region-specific left-out variables that are hard to capture in standard cross-country regressions.

education on growth as it implicitly assumes that one could improve the gender gap in education by sending more girls to school without having to take out boys (as the male education levels is held constant this way).[22] In the alternative specification, when we use average education and the gender gap in average education in our equations we assume that any increase in female education means an equal sized reduction in male education and thus constitutes a lower-bound estimate of the effect of gender inequality on economic growth.

It may well be the case that gender inequality in education has a direct impact on economic growth; but gender inequality may also affect economic growth through effects it has on investment rates, overall population growth, and growth in the working age population. The interest is in capturing both the direct and indirect effects of gender inequality on economic growth. Following Klasen (2002) we will estimate a set of regressions to capture these two effects.

The data used in this paper come from different data sources. Table 1 provides information on data sources and a description of the computation of the main variables of interest. Using the variables defined in Table 1, the equations estimated (using OLS) in the cross-country analysis are the following[23]:

$$g= \alpha +\beta_1 INV+ \beta_2 POPGRO + \beta_3 LFG + \beta_4 ED60 + \beta_5 GED + \beta_6 RED60 + \beta_7 RGED + \beta_8 X + \epsilon \quad (1)$$

$$INV= \alpha+ \beta_9 POPGRO+ \beta_{10} LFG + \beta_{11} ED60 + \beta_{12} GED + \beta_{13} RED60 + \beta_{14} RGED + \beta_{15} X + \epsilon \quad (2)$$

$$POPGRO= \alpha + \beta_{16} OPEN + \beta_{17} ED60 + \beta_{18} GED+ \beta_{19} RED60 + \beta_{20} RGED+ \beta_{21} X + \epsilon \quad (3)$$

$$LFG= \alpha + \beta_{22} OPEN + \beta_{23} ED60 + \beta_{24} GED + \beta_{25} RED60 + \beta_{26} RGED + \beta_{27} X + \epsilon \quad (4)$$

$$g= \alpha + \beta_{28} OPEN +\beta_{29} ED + \beta_{30} GED + \beta_{31} RED60 + \beta_{32} RGED + \beta_{33} X+ \epsilon \quad (5)$$

$$g=\alpha +\beta_{34} INV+ \beta_{35} POPGRO+ \beta_{36} LFG +\beta_{37} AED60 + \beta_{38} GAED+ \beta_{39} RED60+ \beta_{40} RGED+ \beta_{41} X+ \epsilon \quad (6)$$

$$g= \alpha +\beta_{42} AED + \beta_{43} GAED + \beta_{44} RED60 + \beta_{45} RGED + \beta_{46} X+ \epsilon \quad (7)$$

The first equation measures the direct impact of education and the gender bias in education on economic growth, as it controls for investment, population and working age population growth. In all regressions we do control for regional variation[24]. Education and gender bias in education could, however, influence population growth, investment

[22] Knowles et al. (2002) suggest that this is the most suitable specification for analyzing gender gaps in education. This specification was also used in Klasen (2002).

[23] Note: equation 3 and 4 contain an additional explanatory variable with respect to Klasen (2002); openness.

[24] We use dummy variables for all regions, where the region left out is East Asia and Pacific.

and growth in the working age population in the future. Therefore there is a need to consider the indirect impact of education and gender inequalities on economic growth via these variables (equation 2-4). The total effect of gender inequality in education on growth is determined by the path analysis, in which we simply sum the direct effect and indirect effects of gender inequalities in education on growth (see Klasen, 2002).

The fifth equation is the so called "reduced form" regression. In this equation, investment, overall population and working age population growth variables are omitted. We expect the coefficients on education of this regression to measure the total effect of gender bias in education directly. The results should then be comparable to the sum of direct and indirect effects calculated using the path analysis.

Equations 6-7 consider the total number of years of schooling as a measure for the average human capital generating a lower bound estimate of these effects.

The model is then re-estimated using panel data where dependent and explanatory variables refer to the following decades; 1960-69, 1970-79, 1980-89, 1990-2000. Using panel data would allow us to control for endogeneity of the education and labor force participation variables by using initial values of each decade, and address unobserved heterogeneity and/or measurement error using country-specific effects. [25] This way we feel we are able to generate more robust estimates, particularly regarding the labor force participation variables where endogeneity and measurement error are likely to be particularly problematic.

We will use several variables to investigate the impact of gender inequalities in employment on growth across the world. In a first specification we will add to our equation female share of the labor force. This specification holds the total labor force fixed and just adjusts the female share of labor force assuming that higher female employment could only come about through increased total employment. While this might be the best specification, it does not allow for possible influences of male labor force participation on economic growth, which might bias the results.[26] We use a similar technique to that used in the cross-country growth regression model for the education variables with employment. We generate upper and lower bound estimates. We use male activity rates together with female-male ratio as upper bound estimates (the assumption is that the female-male ratio could be increased without reducing male activity rates, basically more jobs in total) and the total activity rate together with the female-male ratio

[25] In the panel we use the total years of schooling of the population over 25. We do so because in the panel analysis we only have a ten-year window in which human capital (and gender differences) can have an effect and thus we want to focus our attention on the human capital of the labor force (rather than also including the 15-24 year old, only some of whom are in the labor force). In robustness checks, we also include the years of education of adults 15 or older to particularly capture the effects of young educated women who make up a significant share of female employment in many developing countries.

[26] On the other hand, empirically male labor force participation rates do not differ much across space and over time so that the growth effects observed are probably due to increased female employment.

as lower bound (the assumption is that any additional female job would lead to fewer male jobs). As with the education estimates, we believe that the true effects are closer to the former than the latter specification. It turns out that the best panel specification is to use fixed effects to control for unobserved heterogeneity[27].

Compared to Klasen (2002), the country sample is smaller due firstly to changes in data availability from Penn World Tables, secondly to the elimination of apparently inconsistent data for education in two countries and thirdly to the lack of data for many transition countries before 1990[28].

Table 2 shows the descriptive statistic of some variables of interest for the cross-country analysis. This includes a number of variables typically used in cross-country growth models. We already commented above on trends and regional differences in GDP growth, education, labor force, and non-income indicators of well-being by decade. One point of note is the variable RGED which measures the female-male ratio of growth in education in the period 1960-2000. This variable clearly reflects the different progress made in reducing the gender gap in education in a region. While the ratio is far above 1 in East Asia and the Pacific, suggesting that females expanded their education faster than males, the reverse is the case especially in South Asia (0.77) but also in MENA region (0.87). The figures for SSA shows that female expanded their education about as fast as men. Table 2 also includes data on other regressors including the investment rate, population growth, and working age population growth. Here well-known differences emerge. The region of East Asia and the Pacific is notable for its high investment rates, its high level of openness, its high growth in the working age population, and its moderate population growth. The reverse is the case for Sub Saharan Africa: investment rates are low and population growth rates are high The MENA region shows very high levels of population growth, but also sizable investment rates and levels of openness. While South

[27] We have run the regressions for random effect but specification tests (Hausman tests) suggested that the fixed effect specification is superior.

[28] The previous version of the Penn Table (5.6) provided data for the following additional countries: Djibouti, Malta, Oman, Puerto Rico, Saudi, Somalia, Surinam, Iraq, Liberia, Myanmar, Reunion, Sudan, Swaziland, and Yugoslavia. For the last 9 countries Barro-Lee data on education were available. In addition to that the data for Eastern Europe countries were not limited to the 1990s. Penn 6.1 provides data for the entire sample set only for two Eastern Europe countries (Romania and Cyprus). Barro-Lee education data are suspicious for Austria and Bolivia, as they suggest stagnating or declining educational attainment despite substantial increases in enrolments. Hence we dropped these two countries from our analysis.

Asia shows relatively high rates of population growth and low level of openness and investment.[29]

Table 2: Descriptive statistic for Cross-Section Analysis (less than half page)

5. Results

Table 3 shows the basic set of cross-country regressions using the approach from Klasen (2002) as shown above, but with the new data that now stretch from 1960-2000. We start by considering the basic regression in column 1. Before turning to the education variables, we briefly comment on the other regressors. Compared to Klasen (2002), we observe a considerably better fit of the regression results, which might partially be due to the slightly smaller (and more homogeneous) sample. Also, all the direct and reduced form regressions pass the omitted variable test.[30] The substantive results confirm many of the findings from the empirical growth literature. First, we see a strong conditional convergence effect, there is a sizable positive impact of investment on economic growth, a large negative impact of population growth, while we also observe a large positive impact of growth of the working age population. These findings confirm that the timing of the demographic transition can have a powerful impact on economic growth (David Bloom and Jeffrey Williamson 1998). The size of the effect is considerably larger now than it was in Klasen (2002). When population growth is falling due to lower fertility, but working age population growth is still high due to past high fertility, countries are receiving a 'demographic gift' of a low dependency burden (Bloom and Williamson 1998) that allows higher savings, a higher ratio of workers to population, and higher investment demand. Given that fertility in the MENA and South Asia region is falling rapidly, one would expect the region to enter this phase of the 'demographic gift' in coming decades. To what extent they will be able to capitalize on this opportunity will depend largely on the ability to generate employment for the large numbers of young people entering the working age population and labour force in coming decades.

Of the regional dummy variables, only those for Sub Saharan Africa and Latin America have a (marginally) significant negative coefficient. The size of the coefficients are much smaller than in Klasen (2002), suggesting that the model is better able to explain the growth differences between regions than was possible in Klasen (2002).

[29] It is quite difficult to adequately measure trade openness and the variable we use, export plus imports as a share of GDP, are not free from problems as these ratios are systematically lower in larger economies despite identical trade policies; other proxies have different problems. For a discussion, see Jeffrey Frankel and David Roemer (1999) and Dani Rodrik and FranciscoRodriguez (2000)

[30] The population growth regression does not pass the Reset test, suggesting that omitted variables and/or non-linearities in these regressions might be a problem. This does not affect out main (including the size of the direct, indirect and total effects) results and could only have a possible (and likely minor) influence on the relative importance of these two indirect effects.

Turning to the education variables, the initial male education and the growth of male education have the expected positive signs, although only the education growth variable is significant. The initial female-male ratio of education has the expected positive sign but it is not significant (differently from Klasen, 2002 where it was marginally significant). In contrast, the female-male ratio of growth in adult years of schooling is significant and larger in magnitude than found in Klasen (2002). As these coefficients express the direct effect of gender inequality on economic growth, it appears that the direct effect of *initial* gender inequality on economic growth is relatively small while the impact of the gender inequality in the *growth* of education has a sizable direct impact on growth.[31]

Columns 2-4 estimate the indirect impact of gender inequality in education on economic growth through the effects they have on investment, population growth, and labour force growth. The investment regression shows that the initial female male ratio of education has a significant positive effect on growth, while the impact of gender inequality in the growth of education is also positive but not significant. In the population growth and working age population growth regressions, the impact of gender inequality in education is in the right direction, though not significant.[32]

Column 5 shows the reduced form regression, which omits the investment, population growth, and working age growth variables and thus gives a direct estimate of the total effect of gender inequality in education on economic growth. The coefficients on both the initial ratio as well as the ratio of educational growth are considerably larger than in column 1 and now both are highly significant. This suggests that gender inequality in education, both initial as well as gaps in educational growth, have a significant negative impact on growth. A comparison between column 1 and 5 shows that the initial gender gap in education has mainly an indirect impact on economic growth (it appears from column 2 to be via investment) while the female-male ratio of educational growth has mainly a direct impact.

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[31] But here, endogeneity might be a problem which will be partially addressed in the panel regressions.

[32] While there is a large and conclusive literature that shows that female education reduces fertility (e.g. see Schultz 1997; Klasen, 1999; and World Bank 2001 for a survey), the link between female education and population growth rates is less strong as population growth is also affected by the age structure of the population. In a population with a large share of women in child-bearing age, even a low total fertility rate for each of them can generate considerable population growth compared to a population where the share of women is lower. Therefore it is not surprising that the link here is weaker than if one used the total fertility rate as the dependent variable. When we include labor force growth in the population equation to proxy for the effect of the age structure, the effects of the initial female-male ratio of schooling and the ratio of the growth become significant, as expected.

Regressions 6 and 7 use average education and thus estimate a lower bound effect of the impact of gender inequality on economic growth. The effects are generally predictably smaller and somewhat less significant.

Table 3: Gender Inequality in Education and Economic Growth (one page)

In Table 4 we calculate to what extent gender bias in education can explain growth differences between the various regions of the world. We do this for the upper and lower bound estimates. Fortunately, the difference between these two estimates is fairly small.

Table 4: Gender inequality and growth differences between Regions (half a page or little more)

We also note that the sum of direct and indirect effect (regression 1-4) gives very similar results as the direct estimate from the reduced form (regression 5). As expected, the regions with the largest gender gaps in education, South Asia, Sub Saharan Africa and MENA suffer the largest losses in terms of economic growth. But there are big differences here. In contrast to Klasen (2002) where both South Asia and the MENA region were suffering similar losses of about 0.9 percentage points in annual per capita growth per year, the losses are now slightly larger for South Asia, around 1 percentage point, and very much smaller for the MENA region, at about 0.7 percentage points per year. The difference for the diverging performance lies in the faster expansion of female schooling in the MENA region which has contributed to closing the gender gap in education, while progress in South Asia was much more modest.

When examining the pathways through which gender inequality in MENA, South Asia and Sub-Saharan Africa leads to lower growth, there is a sizable direct effect which amounts to about 60% of the total difference. This direct effect refers mainly to the lowering of the quality of human capital as a result of gender inequalities in education. But this is actually somewhat smaller than found in Klasen (2002) where for MENA about 75% of the total effect was accounted for by the direct effect. The indirect effect via investment has become somewhat smaller while via demographic more important. Clearly all pathways investigated contribute to the resulting growth difference, and the magnitudes have shifted toward a greater importance of the demographic pathway which suggests that higher female education lowers population growth which in turn helps improve economic growth.

Table 5 shows the result of panel regressions using fixed effects, which was found to be the preferred specification based on the Hausman test. Also here, the empirical findings in those regressions are consistent with the empirical and theoretical literature: we find conditional convergence, a positive effect on growth of the working age population, and a negative effect of population growth, though both are significant in

only some specifications.[33] Investment rates significantly promote growth and openness has a small positive, but rarely significant impact.

The specification in regression 8 only examines the impact of gender gaps in education on economic growth. In contrast to the panel results in Klasen (2002) and the cross-section results shown here, the positive effect of a high female-male years of schooling ratio among the adult population (the female-male ratio of education of adults 25 or older) is relatively small and not statistically significant. Further investigations show that this is not driven by a slightly different composition of sample, but by the addition of the 1990s. If the 1990s are dropped, a higher females-male ratio of years of schooling has a large and significant effect (not shown here). In fact, it is due to the two regions Latin America and Sub Saharan Africa in the 1990s. If we exclude these regions for that time period, regression 9 shows that then the positive effect of higher gender equality in education is again sizable and significant.[34] It appears that the moderate to poor growth performance in these two regions despite falling gender gaps in education is important enough to reduce the overall effect of educational gender gaps to insignificance. It seems plausible to assume that the poor growth performance particularly of Sub Saharan Africa was not related to the reduced gender gaps in education, but many other factors that have been analyzed in the literature (e.g. Paul Collier and Jan Willem Gunning 1999; World Bank 2006). Conversely, regression 9 suggests that in all other regions, the impact of gender gaps in education on growth remains as strong in the 1990s as before (in fact, slightly stronger).

In regression 10, we replace the education variable with the education of adults 15 or older. This is to also capture the effects of high employment rates of educated women in the young age groups of 15-24 which might have a particularly large impact on growth. It turns out that in this specification the effect of gender gaps in education on growth are only significant if we limit the analysis to OECD, East Asian, and South Asian countries. But there the effect is very large and highly significant. This appears plausible as these are the regions where young educated women have been particularly active in the labor market.

In regressions 11 to 16, we consider the full sample again and include various labor force participation variables.[35] We consider two different explanatory variables for the labor force participation: the female share of the total labor force (FLFT) and the ratio of female to male economic activity rates (RACT=FACT/MACT). In regression 11 the female share of the labor force (FLFT) has a positive, large significant coefficient on

[33] This may be related to the fact that the impact of population growth and working age population growth materializes with some delay and may therefore not be well-captured in the 10 year periods considered.

[34] It is even larger if we consider the reduced form estimate, i.e. if we leave out the investment rate, labor force growth, and population growth. In both cases, they are larger than identical panel regressions in Klasen (2002).

[35] We also analysed the sample where we dropped Sub Saharan Africa and Latin America in the 1990s and report on the results where appropriate.

economic growth, i.e. countries where the (initial) female share increased from decade to decade were able to achieve higher rates of subsequent economic growth. The effect of gender-gaps in education (ORED 25+) in this specification is considerable but not significant. If we exclude Sub Saharan Africa and Latin America in the 1990s, the effect becomes much larger and highly significant.[36] In regression 12, we use the other education variable (YRED 15+) which shows a large impact of education gaps on growth, and a smaller and no longer significant impact of female shares of the labor force, again reduced to OECD, East Asia, and South Asia.

In regression 13 we use the male labor force participation rate (Male activity rate: MACT) and the ratio of the female to male labor force participation rates (Ratio of activity rates: RACT) as an alternative way to capture the gender gap in employment. This female-male ratio is highly significant and positive, while the male economic active rate has a non-significant negative sign. If we add the education gap in regression 14 the coefficient on the gender gap in labor force participation is still positive and significant but smaller, while the coefficient on the male activity rate is now positive but still insignificant. The coefficient on educational gaps is not significant. In the reduced sample (excluding Sub Saharan Africa and Latin America for the 1990s), it becomes significant also in this specification while the impact of activity rates becomes slightly smaller but remains significant (see regression 15). Lastly, we limit our sample to OECD countries, East Asia, and South Asia and use the alternative education variable and find that then education gaps have a very large impact on growth while gaps in activity rates have a smaller (and only marginally significant) impact on growth.

Since the coefficient on the male activity rate is small and insignificant, altering the male activity rate when one increases the female activity rate would not have a significant impact on growth. Thus, in contrast to the education regressions in Table 3, it is not necessary to calculate an upper and lower bound regression as the male activity rate seems to be immaterial for growth.[37]

On the whole, these results suggest that gender gaps in labor force participation have a negative impact on economic growth; since these gaps proxy for gaps in employment (see discussion above), gender gaps in employment similarly negatively affect economic growth. For the MENA and South Asia region, where female employment is still very low, this could have a significant impact on economic growth. The results also give some interesting insights into the relative importance of education and employment gaps in different time periods. In the full sample of countries, educational gender gaps are not so important, while employment gaps have a particularly large impact on economic performance. This is largely due to the experience of the 1990s where gender gaps in employment appear to be more consequential than those in education. Once Sub-Saharan Africa and Latin America in the 1990s are excluded, however, education and employment gaps have a similar impact on economic growth. If we change to an education variable that particularly includes young people, the results

[36] The regression is not shown but available on request.

[37] This is confirmed by regressions (not shown here) where we replaced the male activity rate with the total activity rate and now find that the impact of the gender gap is larger while the impact of the total activity rate is now negative. These regressions are available on request.

suggest indeed that education gaps are more important than employment gaps, at least in the OECD, East Asia, and South Asia. This suggests that previous studies that only examined gender gaps in education were partly implicitly capturing the effects of gender gaps in employment and it is indeed useful to consider the two jointly as we have done here. It also suggests, however, that it is not easy to clearly answer the question as to the relative important of the two which appears to be quite sensitive to the sample, time period, and education variable used. This will become more apparent below.

In further analyses, we also considered some interaction terms. Of particular interest is to interact the effect of openness with gender gaps in labor force participation to see whether the effects of gender gaps in labor force participation rates are different in countries that are more exposed to international trade. The results (not shown here) show a positive (but not significant) interaction term while coefficient on RACT is now smaller and still highly significant in all specifications. This provides some supporting evidence that in countries that are strongly exposed to international trade, lower gender gaps in labor force participation are particularly beneficial to economic growth, in line with some of the arguments made above.

Table 5: Gender inequality and Economic growth (one page)

Once again, we simulate the impact of gender inequality in education and employment (using gender gaps in labor force participation as our proxy) based on these panel regressions. In Table 6 we show to what extent the difference in economic growth between East Asia and the Pacific and the MENA can be accounted for by differences in gender inequality in education and employment. Estimates based on regression 9 already show that gender gaps in education can account for a sizable portion of growth differences, but this difference in declining, due to a shrinking difference in gender gaps in education between the two regions. Once gender gaps in employment are included, the share of growth differences explained by these combined gaps increases significantly; in fact, in the 1960s, 1970s and 1990s, the gaps can account for all of the growth differences or even more than that in some specifications suggesting that the MENA region would have grown faster than East Asia in the absence of the gaps. The growth costs, compared to East Asia, of gender gaps in employment, are increasing over time as the gender gaps in employment are shrinking much faster in East Asia than in MENA. In most specifications, the gender gaps in employment explain a larger share of the growth differences with East Asia, suggesting that MENA is particularly held back by its low female labor force participation rates, a subject much discussed in the literature (e.g. World Bank 2004).

Table 6: Gender Inequality in Education and Employment and Growth impact (EAP-MENA) (less than half page, probably a quarter)

Table 7 shows to what extent the growth differences between South Asia and East Asia can be explained by gender gaps in education and employment. Here the impact of larger educational gender gaps in South Asia plays a particularly large role. Depending on the specification, it can account for a growth difference between 0.2 and 1.4 percentage points. In contrast, the impact of employment effects is generally smaller, but is increasing over time. In fact, the ILO data we use showed smaller gender gaps in labor force participation in South Asia than in East Asia in the 1960s and 1970s; if these level

difference are to be believed, then South Asia's main problem has been, apart from their stubbornly high gender gaps in education, that female participation and employment has expanded much slower than in East Asia and this is exacting a rising growth costs, compared to East Asia. This is also consistent with country studies showing that East Asian economies such as China, Vietnam, and Indonesia have benefited particularly from integrating women into the labor market; in South Asia, only Bangladesh has followed such a route and appears to have profited from it.[38]

While these calculations nicely show the particular constraints in different regions, they cannot give clear answers to the question whether gender gaps in education or employment lead to higher growth costs. This depends to a significant degree on the education variable, the time period, and the sample. But we can say with more certainty that in relative terms, MENA's problem are more on the employment front, while in South Asia they are more on the education front (though rising on the employment front).

Table 7: Gender Inequality in Education and Employment and Growth impact (EAP-SA) (less than half page, probably a quarter)

6. Conclusions and Caveats

The challenge of increasing the economic growth of a country is, as suggested here, to a considerable extent linked to the role played by women in the society. The costs of discrimination toward women in education and employment not only harm the women concerned, but impose a cost for the entire society.

In South Asia women are still in the twenty first century very much discriminated against in both education level and economic participation. In Middle East and North Africa the gender gap in education has been reduced from high levels, but gender gaps in employment remain pervasive. In contrast to some Asian countries, where export-oriented industries have led to a reduction of the gender gap in the labour market in the last decades, increased female education in MENA has not translated into higher labour market participation. Women in this region are encountering structural barriers[39] in employment but those barriers may also be social, cultural, and ideological (World Bank 2004).

Regarding the growth costs of gender inequality, we find the following:

Firstly, gender inequality in education reduces economic growth also in the 1990s. The findings from earlier studies that used data up until 1990 are largely confirmed through this expanded analysis although the impact of gender gaps in education in the 1990s in the panel specification is sensitive to the inclusion of specific regions in the 1990s.

Secondly, gender inequality in education in the Middle East and North Africa and South Asia region continues to harm growth in that region, but by decreasing amounts. This is due to the fact that gender gaps in education have been sharply reduced there over

[38] See Klasen (2006) for further discussions on these country studies.

[39] Structural barriers related to the economic reconstruction, recession and limited domestic and foreign investment.

the past two decades, with much faster progress in MENA than in South Asia. As a result, we expect gender inequality in education to play a decreasing role in harming growth prospects in MENA and South Asia. While this is true in an absolute sense, it is not always true in a relative sense. As East Asia has closed its gender gaps in education much faster than South Asia, the growth differences accounted for by differences in gender gaps between the two regions mounted in past decades.

Thirdly, the panel analysis suggests that gender inequality in labor force participation (as a proxy for gender gaps in employment) has a sizable negative impact on economic growth. Simulations suggest that MENA's and South Asia growth prospects, when compared to other regions, are significantly reduced through this effect as the impact of gender inequality in employment is large and has been falling much slower than in other regions.

Thus a significant constraint to higher economic growth in those regions appears to be the substantial gender inequality persisting in education and employment. While these results are suggestive, we want to emphasize that the assessment of the impact of employment gaps is based on data for labor force participation rates that are measured with error and are often not fully comparable internationally. It is highly lamentable that comparable labor force participation and employment data are not available for most developing countries. This is despite the fact that increasing numbers of household and labor force surveys are undertaken in these countries, but the results are not used to generate consistent and comparable data on employment, labor force participation and pay.[40] This remains a major challenge for the ILO and other international organizations charged with providing such data.

Also, the usual caveats of cross-country regressions apply, including omitted variable bias, model uncertainty, endogeneity, among others. We have tried to control for some of these issues, but more work will be needed to solidify the findings. In particular, we were only partly able to control for endogeneity in the panel regressions and further work on identifying suitable instruments is clearly an important area for further research. Lastly, we need to acknowledge that our results concern the impact of gender gaps in education and employment on measured national output. To the extent that higher female labor force participation comes at the expense of reduced household labor, the economic and well-being losses of such a reduction is not included in our assessment.[41] The extent to which this might be a problem is clearly an area of further research.

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[40] This is particularly lamentable as these household surveys have been used by the World Bank to generate roughly consistent and comparable and publicly available poverty statitics for developing countries. It is a shame that ILO does not have the capacity, funding, or political will to use these same data to generate internationally comparable employment data.

[41] To the extent such increased labor force participation would come in addition to non-market work, the double burden this implies for the women concerned is also not considered here, but clearly is an issue that is under investigation in the literature.

If our results are confirmed by further studies, this points to an urgent need of increasing female education level and their participation in the labour force. While our results suggests that changing the composition of the labour force to include more females (and thus fewer males) would have a positive effect on growth, a more realistic policy recommendation would be to develop an employment-intensive growth strategy that makes particular use of females. At the least, the results suggest that current barriers to female employment are not only disadvantageous to females, but also appear to reduce economic growth in developing countries, and particularly in MENA and South Asia

One should also bear in mind the findings from a large literature suggesting that gender inequality in education and employment also have a significant negative impact on other development goals such as reductions in fertility, child mortality, and undernutrition. Thus reducing existing gender inequality in education and employment will not only promote growth, but also further these other valuable development goals.[42]

[42] Abu-Ghaida and Klasen (2004) and King et al (2008) to estimate the magnitude of these effects.

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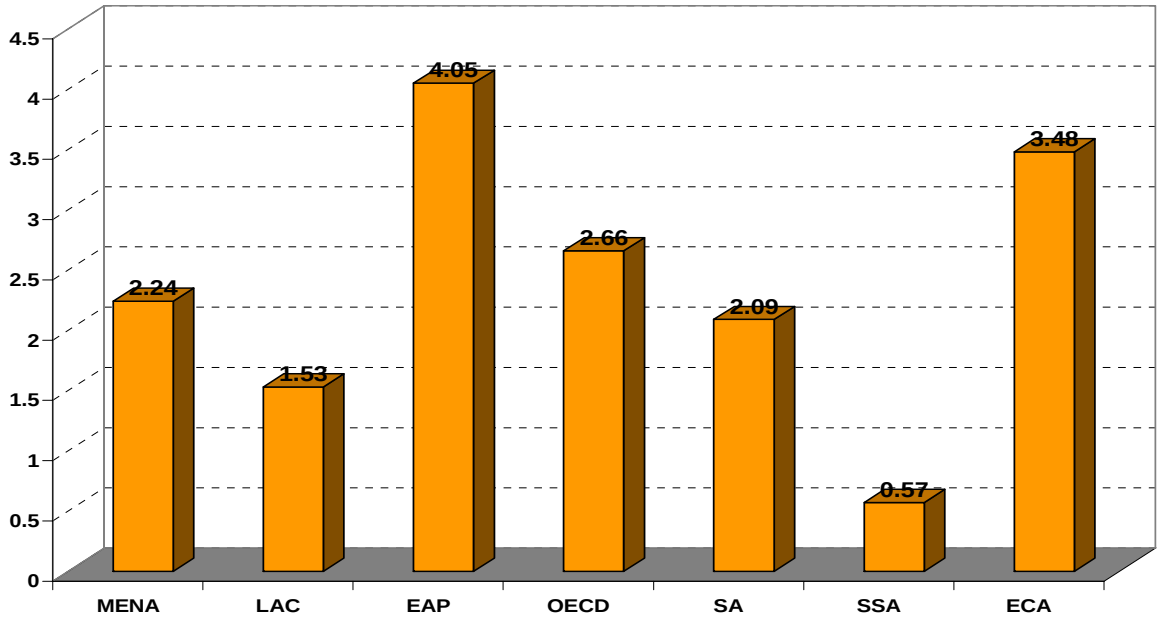
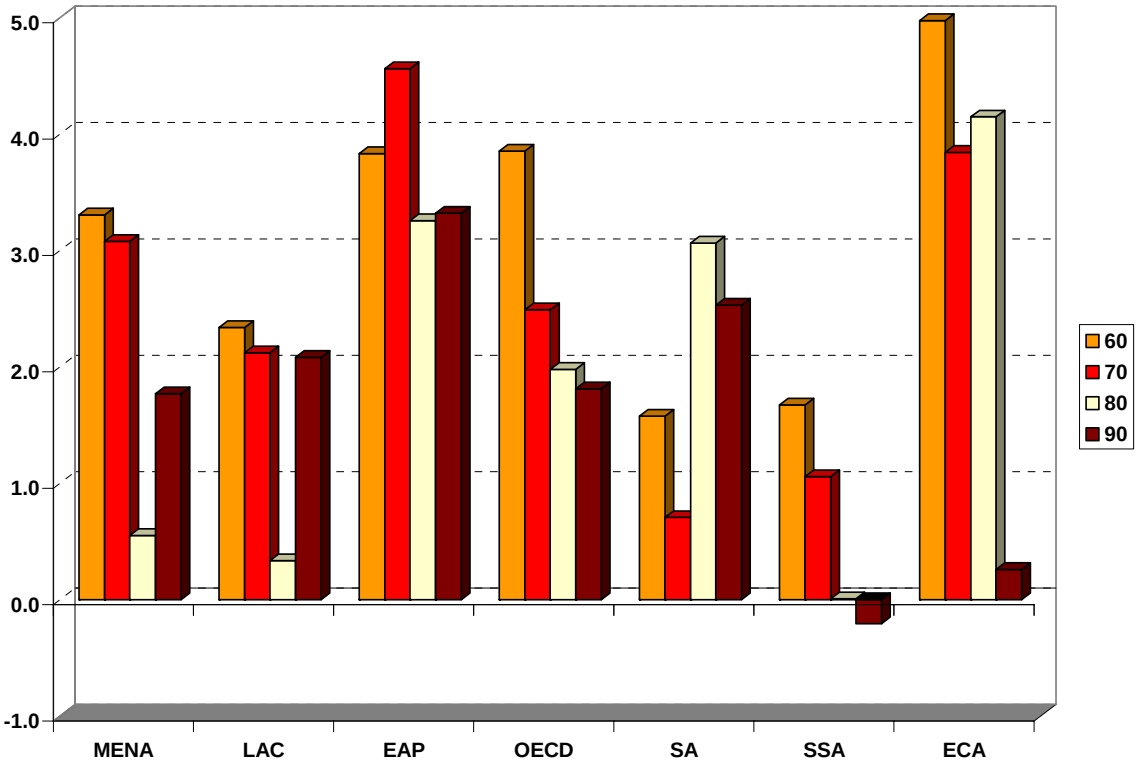
GRAPHS AND FIGURES

Figure1: Real Regional per capita annual growth rate 1960-2000



Source: Penn World Table 6.1. Note that the sample of countries included is restricted due to data availability, see Annex for detailed listing. Figures refer to unweighted averages and not all countries in each region are included due to data availability. Note: World region: SA (South Asia), SSA (Sub-Saharan Africa), ECA (Eastern Europe), EAP (East Asia and Pacific), LAC (Latin America and Caribbean, MENA (Middle East and North Africa), OECD (Industrialized countries members of OECD).

Figure 2: Real Regional per capita annual growth rate per decade



Source: Penn World Table 6.1.

Table 1: Variables names, definition and data source

Variable name	Definition	Data source
G	Per capita annual compound growth rate in Purchasing power parity-adjusted GDP per capita	Penn World Table (6.1)
GDP60(00)	Real GDP per capita in PPP-terms in 1960 (2000)	Penn World Table (6.1)
INV	Average investment rates	Penn World Table (6.1)
POPGRO	Growth rate of total population	Penn World Table (6.1)
OPEN	Average of exports plus imports as a share of GDP	World Development Indicators (WDI, 2002)
LFG	Growth rate of working age population (15-64)	WDI, 2002
FERT60(00)	Level of fertility 1960 (2000)	WDI, 2003
M560(00)	Under five mortality rate 1960 (2000)	WDI, 2004
Life	Life expectancy measured in years	WDI, 2005
ED	Number of year of schooling for the male population(15+ and 25+)	Barro and Lee (2000)
AED	Number of year of schooling for the population	Barro and Lee (2000)
GED	Absolute (annual) growth in male years of schooling	Barro and Lee (2000)
GEDF	Absolute (annual) growth in female years of schooling	
GAED	Absolute growth in total years of schooling	Barro and Lee (2000)
RED	Female-Male ratio of schooling	Barro and Lee (2000)
RGED	Female-male ratio of the growth in the years of schooling	Barro and Lee (2000)
MACT	Male economic activity rate (15-64)	ILO Laborsta (2003)
FACT	Female economic activity rate (15-64)	ILO Laborsta (2003)
RACT	Female-Male Ratio of Activity Rates (15-64)	ILO Laborsta (2003)
TACT	Total economic activity rate (15-64)	ILO Laborsta (2003)
FLFT	Female share of the total labor force (15-64)	ILO Laborsta (2003)

Table 2: Descriptive statistic for Cross-Section Analysis

	TOTAL	MENA	LAC	EAP	OECD	SA	SSA	ECA
G	1.78	2.24	1.53	4.05	2.66	2.09	0.57	3.48
INV	15.48	13.18	13.96	20.53	23.92	11.21	10.45	17.31
OPEN	72.98	71.41	79.37	87.82	57.26	38.6	74.76	81.91
M560	166.65	233.75	135.5	139.56	37.45	228	273.08	80.78
M500	64.35	45.13	32	31.77	6.62	80.65	147.42	16.38
POPGRO	1.89	2.75	1.79	2.01	0.73	2.2	2.5	0.91
FERT60	5.31	7.12	6.12	5.69	2.88	6.3	6.49	3.24
FERT00	3.15	3.32	2.7	2.27	1.67	3.45	5.09	1.47
GDP60	3377	1971	3299	1813	8473	930	1478	2233
GDP00	8693	4462	6897	12033	23153	2186	2375	7910
LFG	2.02	2.95	2.35	2.69	0.86	2.33	2.46	1
RED60	0.7	0.39	0.91	0.59	0.93	0.29	0.47	0.73
RGED	1.03	0.87	1.09	1.24	1.02	0.77	0.97	1.05
EDF60	3.41	0.65	3.26	2.74	6.56	0.89	1.19	5.24
GEDF	0.07	0.11	0.07	0.1	0.07	0.06	0.05	0.09

Source: WDI 2002,Penn World Table 6.1, Barro & Lee (2000).

Note: In addition to the dependent and explanatory variables of our cross-country model we do report child mortality (under 5 years of life) in 1960 (M560) and in 2000 (M500), the fertility rate (FERT) and the gross domestic product per capita (GDP) in 1960 and in 2000 for each region.

Table 3: Gender Inequality in Education and Economic Growth

Dependent variable	Growth (1)	INV (2)	POPGRO (3)	LFG (4)	Growth (5)	Growth (6) +	Growth (7) +
LOGGDP60	-2.27***	-3.51	-0.18	-0.21	-2.47***	-2.29***	-2.52***
	0.50	3.1	0.34	0.36	0.63	0.52	0.65
POPGRO	-2.80***	0.91				-2.79***	
	0.53	2.25				0.53	
LFG	2.33***	0.04				2.32***	
	0.47	2.10				0.47	
OPEN	-0.001	0.041**	-0.003	-0.002	0.005*	-0.0005	0.006*
	0.003	0.02	0.002	0.002	0.004	0.003	0.004
INV	0.06***					0.06***	
	0.02					0.02	
RED60	0.68	5.84**	-0.4	-0.17	1.75**	0.76	1.72**
	0.85	3.08	0.32	0.33	0.89	0.89	0.91
ED60	0.01	0.92**	-0.02	0.01	0.16**	0	0.13*
	0.07	0.44	0.05	0.06	0.09	0.08	0.10
GED	10.42***	35.42	-1.01	0.85	17.33***	10.59***	18.31***
	4.35	28.95	1.94	2.14	4.46	4.78	4.86
RGED	0.70***	2.07	0.001	0.05	0.95***	0.47**	0.62**
	0.29	2.19	0.25	0.25	0.37	0.25	0.34
SA	-0.07	-3.58	-0.17	-0.46**	-0.90*	-0.02	-0.85*
	0.59	3.07	0.24	0.24	0.64	0.61	0.65
SSA	-0.83*	-6.92***	0.40**	-0.06	-2.49***	-0.81*	-2.47***
	0.57	2.76	0.22	0.22	0.70	0.58	0.71
ECA	-0.1	3.57	-0.91**	-1.32***	-0.46	-0.1	-0.46
	0.63	2.80	0.41	0.54	0.87	0.63	0.88
LAC	-0.87*	-4.87**	0.08	-0.17	-1.79***	-0.87*	-1.81***
	0.56	2.73	0.28	0.27	0.74	0.56	0.74
MENA	-0.17	-3.77	0.72**	0.48	-1.26**	-0.12	-1.24**
	0.53	3.77	0.42	0.41	0.66	0.52	0.65
OECD	0.47	4.81*	-1.07***	-1.64***	-0.12	0.55	0.01
	0.60	3.04	0.37	0.38	0.83	0.60	0.82
CONSTANT	7.35***	13.65	3.26***	3.39***	7.16***	7.65***	7.73***
	1.84	11.80	1.06	1.11	2.10	1.85	2.14
ADJ R2	0.76	0.66	0.64	0.62	0.63	0.76	0.64
OV Test	passed	passed	Failed	passed	passed	passed	Passed
OBS	93	93	93	93	93	93	93

Source: Authors computation

Heteroscedasticity-adjusted standard-errors reported under the coefficients. *** Refers to 99%; ** to 95%; and * to 90% significance level using a one-tail test.

+: regression with total education instead of male education only. OV test refers to the Ramsey Reset test for omitted variables.

Table 4: Gender inequality and growth differences between Regions

	Difference SSA-EAP	Difference SA-EAP	Difference MENA-EAP	Difference SSA-EAP	Difference SA-EAP	Difference MENA-EAP
Total annual growth difference	**3.48**	**1.96**	**1.74**	**3.48**	**1.96**	**1.74**
	Upper bound estimate			**Lower bound estimate**		
Accounted for by:						
Direct effect of gender inequality in education (1)	0.26[43]	0.52	0.38	0.22	0.45	0.33
Of which: Initial ratio (RED60)	0.08	0.20	0.14	0.09	0.23	0.15
Ratio of educational growth (RGED)	0.18	0.31	0.24	0.13	0.22	0.17
Indirect effects: via investment	0.08	0.17	0.12	0.07	0.14	0.07
via population growth (3)	0.14	0.33	0.22	0.10	0.26	0.17
via labor force growth (4)	-0.02	-0.06	-0.04	-0.01	-0.04	-0.02
Total Indirect Effect	0.22	0.34	0.30	0.16	0.36	0.22
Of which: Initial ratio (RED60)	0.13	0.32	0.22	0.12	0.29	0.14
Ratio of educational growth (RGED)	0.07	0.12	0.09	0.04	0.07	0.04
Total Direct and Indirect effect	**0.46**	**0.95**	**0.69**	**0.38**	**0.81**	**0.55**
Total effect using Reduced form (5)	**0.47**	**0.97**	**0.70**	**0.38**	**0.81**	**0.41**
Of which: RED60	0.22	0.52	0.36	0.21	0.52	0.24
Of which: RGED	0.25	0.45	0.35	0.17	0.29	0.16

Source: Authors computation

[43] Sums do not add up precisely due rounding.

Table 5: Gender inequality and Economic growth

	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
LOGGDP	-5.54***	-7.82***	-10.37***	-6.08***	-10.81***	-6.99***	-6.14***	-8.48***	-11.09***
	1.42	1.33	1.31	1.43	1.32	1.28	1.48	1.41	1.28
POPGRO	-0.57*	-0.44	-0.22	-0.47	-0.23	-0.47*	-0.59*	-0.45	-0.20
	0.42	0.35	0.40	0.40	0.39	0.37	0.42	0.37	0.39
LFG	0.31	0.46*	0.32	0.38	0.34	0.48*	0.45*	0.54**	0.29
	0.27	0.31	0.40	0.31	0.40	0.30	0.31	0.31	0.37
FLFT				7.86**	4.17				
				3.49	3.36				
OPEN	0.002	0.005	0.006	0.000	0.006	0.001	0.001	0.003	0.007
	0.004	0.005	0.008	0.005	0.007	0.005	0.004	0.005	0.007
INV	0.09***	0.10***	0.13***	0.10***	0.14***	0.12***	0.10***	0.10***	0.14***
	0.03	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.02
OED25+	0.00	0.08		0.00			0.00	0.05	
	0.16	0.17		0.16			0.16	0.16	
ORED25+	0.43	2.30**		1.01			1.14	3.09**	
	1.45	1.28		1.43			1.51	1.41	
YED15+			0.31**		0.31***				0.29***
			0.13		0.12				0.12
YRED15+			3.33**		3.66**				4.42***
			1.65		1.70				1.76
RACT						5.41***	3.72**	2.97**	1.93*
						1.48	1.51	1.37	1.49
MACT						-0.70	3.85	-0.91	-6.60
						6.69	6.90	7.03	5.73
1960S	0.12	-0.65	-1.32***	0.59	-0.97*	0.61	0.40	-0.21	-0.49
	0.57	0.59	0.51	0.61	0.59	0.58	0.70	0.76	0.74
1970S	0.04	-0.52	-1.04***	0.37	-0.80**	0.30	0.28	-0.18	-0.47
	0.38	0.41	0.38	0.41	0.44	0.37	0.46	0.51	0.54
1980S	-0.60 **	-1.07***	-0.62***	-0.44*	-0.52**	-0.31	-0.46	-0.86***	-0.33
	0.26	0.29	0.25	0.27	0.26	0.26	0.29	0.33	0.30
Constant	20.20***	26.79***	34.93***	18.53***	34.58***	21.45***	16.04**	27.53***	40.98***
	4.87	4.78	4.73	4.89	4.55	7.80	8.03	7.51	6.32
R2	0.32	0.43	0.60	0.34	0.61	0.36	0.34	0.44	0.62
OBS	341	296	143	341	307	441	341	296	143

Note: Heteroscedasticity-adjusted standard errors reported under the coefficient. *** Refers to 99%; ** to 95%; and * to 90% significance level using a one-tail test. In regressions 9 and 15, the sample excludes Sub Saharan Africa and Latin America for the 1990s. In regressions 10, 12, and 16, only OECD, East Asian and South Asian countries are included.

Table 6: Gender Inequality in Education and Employment and Growth impact (EAP-MENA)

	1960s	1970s	1980s	1990s
Growth difference EAP-MENA by decades	**0.53**	**1.48**	**2.71**	**1.55**
Regression 9				
Education effect (ORED)	0.41	0.65	0.61	0.54
Regression 11				
Education effect (ORED)	0.18	0.29	0.27	0.24
Employment effect (FLFT)	0.75	0.86	0.96	1.06
Total Effect	0.93	1.15	1.23	1.30
Regression 13				
Employment effect (RACT)	1.15	1.36	1.62	1.73
Regression 14				
Education effect (ORED)	0.20	0.32	0.30	0.27
Employment effect (RACT)	0.79	0.94	1.11	1.19
Total Effect	0.99	1.26	1.41	1.45
Regression 15				
Education effect (ORED)	0.55	0.88	0.82	0.72
Employment effect (RACT)	0.63	0.75	0.89	0.95
Total effect	1.18	1.62	1.71	1.67

Source: Authors' computation based on Table 5. Since regressions 10, 12, and 16 did not include data from the MENA region, they are not included in the simulations.

Table 7: Gender Inequality in Education and Employment and Growth impact (EAP-SA)

	1960s	1970s	1980s	1990s
Growth difference EAP-SA by decades	**2.26**	**3.86**	**0.19**	**0.79**
Regression 9				
Education effect (ORED)	0.57	0.50	0.67	0.73
Regression 10				
Education effect (YRED)	0.69	0.88	0.95	0.78
Regression 11				
Education effect (ORED)	0.25	0.22	0.29	0.32
Employment effect (FLFT)	-0.17	0.09	0.34	0.45
Total Effect	0.08	0.31	0.63	0.77
Regression 12				
Education effect (YRED)	1.08	1.11	1.19	1.00
Employment effect (FLFT)	-0.09	0.05	0.18	0.24
Total Effect	0.98	1.15	1.37	1.24
Regression 13				
Employment effect (RACT)	-0.37	-0.02	0.43	0.60
Regression 14				
Education effect (ORED)	0.28	0.25	0.33	0.36
Employment effect (RACT)	-0.26	-0.01	0.29	0.42
Total effect	0.03	0.24	0.63	0.78
Regression 15				
Education effect (ORED)	0.77	0.67	0.90	0.99
Employment effect (RACT)	-0.20	-0.01	0.24	0.33
Total effect	0.56	0.66	1.14	1.32
Regression 16				
Education effect (YRED)	1.30	1.34	1.44	1.21
Employment effect (RACT)	-0.13	-0.01	0.15	0.22
Total effect	1.17	1.33	1.59	1.43

Source: Authors computations based on Table 5

Appendix:

List of Countries for our analysis by region:

Middle East and North Africa	Sub-Saharan Africa	OECD	Latin Amercian and Caribbean	Eastern and Central Europe
Algeria	Angola	Australia	Antigua and Barbuda	Albania
Egypt	Benin	Austria	Argentina	Armenia
Iran	Botswana	Belgium	Barbados	Belarus
Jordan	Burkina Faso	Canada	Belize	Bulgaria
Lebanon	Burundi	Czech Republic	Bolivia	Cyprus
Morocco	Cameroon	Denmark	Brazil	Estonia
Syria	Cape Verde	Finland	Chile	Latvia
Tunisia	Central African Republic	France	Colombia	Macedonia+
Yemen	Chad	Germany	Costa Rica	Poland
	Comoros	Greece	Cuba	Romania
East Asia and Pacific	Congo, Dem.Rep.	Hungary	Dominica	Russian Federation +
	Congo, Republic	Iceland	Dominican Republic	Slovak Republic
China	Cote d'Ivoire	Ireland	Ecuador	Slovenia
Fiji	Equatorial Guinea	Israel	El Salvador	Turkey
Hong Kong	Ethiopia	Italy	Grenada	Ukraine
Indonesia	Gabon	Japan	Guatemala	
Korea	Gambia, The	Luxembourg	Guyana	
Macao, China	Ghana	Netherlands	Haiti	
Malaysia	Guinea	New Zealand	Honduras	
Papua New Guinea	Guinea-Bissau	Norway	Jamaica	
Philippines	Kenya	Portugal	Mexico	
Singapore	Lesotho	Spain	Nicaragua	
Taiwan	Madagascar	Sweden	Panama	
Thailand	Malawi	Switzerland	Paraguay	
	Mali	United Kingdom	Peru	
South Asia	Mauritania	United States	St. Kitts and Nevis	
	Mauritius		St. Lucia	
Bangladesh	Mozambique		St.Vincent & Gren.	
India	Namibia		Trinidad and Tobago	
Nepal	Niger		Uruguay	
Pakistan	Nigeria		Venezuela, RB	
Sri Lanka	Rwanda			
	Sao Tome and Principe			
	Senegal			
	Seychelles			
	Sierra Leone			
	South Africa			
	Tanzania			
	Togo			
	Uganda			
	Zambia			
	Zimbabwe			

+ Data were not available for the entire period of analysis

Table A1: Annual per capita income and other non-economic Indicators by Region, 1960-1990

EAP	**1960**	**1970**	**1980**	**1990**	**2000**
Under five mortality	138.50	89.63	56.43	42.00	31.59
Total fertility	5.62	4.65	3.39	2.83	2.31
Life expectancy	52.57	59.87	64.94	68.76	71.55
Income per capita	1813	2963	5117	8930	11755
SA					
Under five mortality	228.00	192.00	154.60	109.40	80.64
Total fertility	6.30	6.02	5.54	4.31	3.45
Life expectancy	45.32	50.02	54.70	59.36	63.80
Income per capita	930	1099	1187	1660	2186
SSA					
Under five mortality	273.89	233.86	182.47	148.96	146.15
Total fertility	6.49	6.53	6.49	5.98	5.13
Life expectancy	40.40	44.30	48.08	51.18	49.06
Income per capita	1488	1868	2087	2182	2400
MENA					
Under five mortality	233.75	188.13	137.57	68.88	45.14
Total fertility	7.12	6.78	6.13	4.68	3.32
Life expectancy	47.89	53.08	58.55	64.86	68.37
Income per capita	1968	2762	3660	3499	4462
ECA					
Under five mortality	80.78	55.11	43.20	25.05	16.40
Total fertility	3.24	2.78	2.40	2.14	1.47
Life expectancy	66.15	68.77	69.59	70.79	71.59
Income per capita	2233	3650	5300	9323	7346
LAC					
Under five mortality	135.58	109.00	70.91	42.65	30.85
Total fertility	6.13	5.37	4.10	3.29	2.69
Life expectancy	57.25	61.64	65.72	69.14	71.56
Income per capita	3362	4270	5072	5471	7086
OECD					
Under five mortality	37.67	26.05	15.14	9.73	6.61
Total fertility	2.87	2.46	1.93	1.79	1.65
Life expectancy	70.19	71.72	73.80	75.76	77.73
Income per capita	8386	12024	15420	18875	23173

Source: Penn World Table 6.1 and WDI 2002. Please note that the data for ECA refer to only two observations before the 1990s (Cyprus and Romania). All are unweighted averages and might in some cases be affected by compositional changes.

Table A2: Education Indicators by Region, 1960-1999

East Asia and Pacific	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	2.11	2.71	3.75	5.22	6.55
male education 25+ (OED25+)	4.11	4.74	5.59	6.81	7.8
total education 25+ (OTED25+)	3.13	3.73	4.68	6.02	7.18
ratio female-male education 25+ (ORED25+)	0.5	0.56	0.65	0.75	0.83
female education 15+ (FED)	2.74	3.53	4.46	5.46	6.7
male education 15+ (ED)	4.6	5.21	5.9	6.77	7.85
total education 15+ (TED)	3.68	4.38	5.19	6.12	7.28
ratio female male education 15+ (RED)	0.59	0.67	0.7	0.76	0.84
South Asia	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	0.7	1.24	1.51	1.9	2.55
male education 25+ (OED25+)	1.77	2.37	3.2	3.83	4.49
total education 25+ (OTED25+)	1.27	1.72	2.39	2.89	3.54
ratio female-male education 25+ (ORED25+)	0.25	0.34	0.36	0.43	0.51
female education 15+ (FED)	0.89	1.3	1.86	2.68	3.23
male education 15+ (ED)	1.9	2.48	3.58	4.5	5.05
total education 15+ (TED)	1.42	1.91	2.75	3.62	4.16
ratio female male education 15+ (RED)	0.29	0.37	0.43	0.54	0.6
Sub-Saharan Africa	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	0.92	0.97	1.37	1.92	2.63
male education 25+ (OED25+)	1.67	1.80	2.54	3.21	3.92
total education 25+ (OTED25+)	1.28	1.37	1.93	2.54	3.25
ratio female-male education 25+ (ORED25+)	0.43	0.45	0.47	0.55	0.62
female education 15+ (FED)	1.23	1.39	1.73	2.34	2.87
male education 15+ (ED)	2.05	2.32	2.76	3.52	3.92
total education 15+ (TED)	1.63	1.84	2.23	2.92	3.38
ratio female male education 15+ (RED)	0.48	0.52	0.60	0.62	0.70
Middle East and North Africa	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	0.44	0.60	1.25	2.57	4.18
male education 25+ (OED25+)	1.36	2.10	3.23	4.99	6.39
total education 25+ (OTED25+)	0.91	1.34	2.24	3.78	5.29
ratio female-male education 25+ (ORED25+)	0.32	0.28	0.39	0.51	0.65
female education 15+ (FED)	0.65	1.17	1.86	3.17	4.77
Male education 15+ (ED)	1.76	2.85	3.58	5.11	6.52
Total education 15+ (TED)	1.21	2.01	2.72	4.14	5.65
ratio female male education 15+ (RED)	0.38	0.41	0.47	0.58	0.73
Eastern Europe and Central Asia	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	3.48	4.12	5.20	6.62	7.33
male education 25+ (OED25+)	5.28	5.66	6.82	8.02	8.32
total education 25+ (OTED25+)	4.34	4.87	5.99	7.32	7.82
ratio female-male education 25+ (ORED25+)	0.59	0.66	0.70	0.78	0.85
female education 15+ (FED)	5.24	5.90	6.56	8.24	7.57
male education 15+ (ED)	6.13	6.71	7.82	8.92	8.61
total education 15+ (TED)	5.66	6.29	7.18	8.57	8.09

ratio female male education 15+ (RED)	0.82	0.85	0.83	0.91	0.86
Latin America and Caribbean	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	2.91	3.35	4.2	5.08	5.87
male education 25+ (OED25+)	3.42	3.93	4.65	5.42	6
total education 25+ (OTED25+)	3.16	3.63	4.42	5.25	5.94
ratio female-male education 25+ (ORED25+)	0.83	0.83	0.89	0.93	0.98
female education 15+ (FED)	3.3	3.88	4.81	5.52	6.08
male education 15+ (ED)	3.69	4.3	5.09	5.73	6.27
total education 15+ (TED)	3.49	4.09	4.95	5.62	6.18
ratio female male education 15+ (RED)	0.9	0.89	0.94	0.96	0.96
OECD	**1960**	**1970**	**1980**	**1990**	**1999**
female education 25+ (OFED25+)	6.39	6.91	7.84	8.40	9.12
male education 25+ (OED25+)	6.98	7.62	8.68	9.30	9.82
total education 25+ (OTED25+)	6.66	7.25	8.24	8.83	9.46
ratio female-male education 25+ (ORED25+)	0.91	0.90	0.90	0.90	0.93
female education 15+ (FED)	6.54	7.13	8.06	8.69	9.30
male education 15+ (ED)	7.11	7.70	8.66	9.27	9.85
total education 15+ (TED)	6.81	7.40	8.35	8.97	9.57
ratio female male education 15+ (RED)	0.91	0.92	0.93	0.93	0.94

Source: Barro-Lee (2000). All refer to unweighted averages.

Table A3: Labor market Indicators by Region, 1960-2000

East Asia and Pacific	**1960**	**1970**	**1980**	**1990**	**2000**
male economic activity rate, 15-64 (MACT)	90.69	87.82	86.41	85.71	84.94
total economic activity rate, 15-64 (TACT)	66.43	67.25	69.84	71.07	72.47
ratio female-male economic activity rate, 15-64 (RACT)	0.45	0.52	0.61	0.66	0.7
female economic activity rate, 15-64 (FACT)	41.33	46.25	52.85	56.47	59.67
female share of labor force, 15-64 (FLFT)	28.52	32.41	36.13	38.66	40.31
female employee rate (EMPLF)		0.17	0.22	0.29	0.3
male employee rate (EMPLM)		0.39	0.43	0.46	0.45
ratio female-male employees (REMPL)		0.4	0.49	0.6	0.66
South Asia					
male economic activity rate, 15-64 (MACT)	92.5	90.4	88.6	87.61	86.22
total economic activity rate, 15-64 (TACT)	71.99	70.31	68.91	68.62	69.1
ratio female-male economic activity rate, 15-64 (RACT)	0.52	0.53	0.53	0.55	0.59
female economic activity rate, 15-64 (FACT)	48.61	47.84	47.22	47.88	50.87
female share of labor force, 15-64 (FLFT)	30.71	31.28	31.82	32.9	35.28
female employee rate (EMPLF)		0.05	0.06	0.1	0.08
male employee rate (EMPLM)		0.27	0.3	0.34	0.27
ratio female-male employees (REMPL)		0.15	0.18	0.27	0.26
Sub Saharan Africa					
male economic activity rate, 15-64 (MACT)	92.65	91.34	89.75	88.59	87.49
total economic activity rate, 15-64 (TACT)	80.81	79.49	78.13	77.17	76.57
ratio female-male economic activity rate, 15-64 (RACT)	0.75	0.75	0.75	0.75	0.75
female economic activity rate, 15-64 (FACT)	69.62	68.59	67.2	66.44	66.1
female share of labor force, 15-64 (FLFT)	43.45	43.59	43.53	43.56	43.48
female employee rate (EMPLF)		0.12	0.09	0.09	0.03
male employee rate (EMPLM)		0.46	0.27	0.26	0.08
ratio female-male employees (REMPL)		0.2	0.26	0.28	0.34
Middle East and North Africa					
male economic activity rate, 15-64 (MACT)	88.84	85.39	82.03	81.02	81.21
total economic activity rate, 15-64 (TACT)	55.44	54.04	53.49	54.34	57.62
ratio female-male economic activity rate, 15-64 (RACT)	0.24	0.27	0.31	0.34	0.41
female economic activity rate, 15-64 (FACT)	21.56	23.21	25.54	27.50	33.70
Female share of labor force, 15-64 (FLFT)	19.01	21.45	23.89	25.09	28.94
Female employee rate (EMPLF)		0.07	0.07	0.09	0.11
male employee rate (EMPLM)		0.56	0.53	0.56	0.58
ratio female-male employees (REMPL)		0.12	0.13	0.18	0.25
Eastern Europe and Central Asia					
male economic activity rate, 15-64 (MACT)	88.67	84.83	83.76	81.47	80.31
total economic activity rate, 15-64 (TACT)	73.22	73.12	74.97	73.66	73.65
ratio female-male economic activity rate, 15-64 (RACT)	0.67	0.73	0.79	0.81	0.84
female economic activity rate, 15-64 (FACT)	59.42	62.18	66.24	65.85	66.97
female share of labor force, 15-64 (FLFT)	42.49	43.46	44.74	45.13	46
female employee rate (EMPLF)		0.25	0.38	0.41	0.31
male employee rate (EMPLM)		0.51	0.62	0.55	0.44
ratio female-male employees (REMPL)		0.45	0.57	0.68	0.6
Latin America and Caribbean					
male economic activity rate, 15-64 (MACT)	91.64	88.57	86.34	85.41	84.63
total economic activity rate, 15-64 (TACT)	59.55	59.45	61.12	63.43	65.78
ratio female-male economic activity rate, 15-64 (RACT)	0.3	0.34	0.41	0.49	0.56
female economic activity rate, 15-64 (FACT)	27.91	30.51	35.73	41.77	46.88
female share of labor force, 15-64 (FLFT)	22.93	25.24	28.87	32.77	35.63

female employee rate (EMPLF)		0.18	0.21	0.22	0.24
male employee rate (EMPLM)		0.51	0.48	0.4	0.42
ratio female-male employees (REMPL)		0.37	0.45	0.56	0.56
OECD					
male economic activity rate, 15-64 (MACT)	90.28	86.80	84.66	81.55	81.12
total economic activity rate, 15-64 (TACT)	63.35	64.99	68.64	70.57	72.00
ratio female-male economic activity rate, 15-64 (RACT)	0.41	0.50	0.62	0.73	0.77
female economic activity rate, 15-64 (FACT)	37.32	43.16	52.72	59.36	62.82
female share of labor force, 15-64 (FLFT)	29.45	33.11	37.96	41.48	43.06
female employee rate (EMPLF)		0.32	0.41	0.48	0.48
male employee rate (EMPLM)		0.65	0.64	0.62	0.59
ratio female-male employees (REMPL)		0.48	0.62	0.75	0.79

Source: WISTAT 3, LABORSTA (ILO Bureau of Statistics).
Note: All refer to unweighted averages. Employees data only until 1995. The male and female employee rate refers to the numbers of dependently employed as a share of the working age population. As it excludes self-employment and own-account agriculture, it is therefore an indicator of the formal sector employment rate and has been referred to as such in the text. The female, male and total economic activity rates refer to the population aged 15-64 and come from the ILO dataset on line.