Title:
Gender equality, human development and demographic trends: are they (jointly) evolving in the right direction?

Authors:
Iñaki Permanyer, Universitat Autònoma de Barcelona.
e-mail: inaki.permanyer@uab.es

Montse Solsona, Universitat Autònoma de Barcelona.
e-mail: msolsona@ced.uab.es

1. Introduction

The measurement of gender inequality has received increasing attention over the past few years. This is due to many different reasons. To start with, the existence of gender inequalities is an issue which is important in itself: the fact that women are still discriminated in many domains of human life is a long lasting unfair state of affairs which must be remedied. For this reason, a growing number of worldwide international conferences have drawn their attention to these issues in an effort, among other things, to enforce the empowerment of women. In an attempt to foster some of these goals, the United Nations Development Program (UNDP) has included "the promotion of gender equality and the empowerment of women" as the third Millennium Development Goal (MDG) (see UNDP 2003).

The interest in measuring gender inequalities has other motivations. It is a well-known fact that the existence of gender inequalities is related (sometimes in a complex and intertwined way) to other socio-economic aspects which can be very relevant from the policy making point of view. Consider the links between gender relations and fertility levels in a given country. There is a growing body of empirical and theoretical evidence suggesting that in the countries where gender relations are more egalitarian, the fertility levels tend to be lower. For this reason, and due to the high momentum of the developing countries populations (see John Bongaarts (1994)), organizations belonging to the population establishment (like most national governments, the United Nations Fund for Population Activities (UNFPA), the International Planned Parenthood Federation (IPPF), the World Bank or the United States Agency for International Development (USAID)) have increasingly fostered the empowerment of women. Another reason why there is a great interest in measuring gender inequalities is its presumed link with countries' economic growth. Some recent studies try to check empirically whether high gender inequality levels in a given country deter its economic growth. Stephan Klasen (1999) and David Dollar and Roberta Gatti (1999) find empirical evidence suggesting that the higher the gender equality, the higher the growth rate. From the other side, Stephanie Seguino (2000) argues that in many east Asian economies between 1975 and 1995, high gender inequality was accompanied by high economic growth.

Be that as it may, the previous paragraphs make clear that there are powerful reasons for having an appropriate method of computing a gender equality index in a multidimensional context. The publication of the values of such an index would be very relevant, as it could stimulate many countries to pay more attention to gender inequality

and to introduce policies aimed at its reduction. Curiously, the United Nations have not included any index of this kind in their Human Development Reports. In order to fill this gap, there have been some relatively recent attempts in the academic and policy literature to produce such an index (see for example the Gender Equality Index (GEI) by Howard White, the Gender Inequality Index (GI) by Nancy Forsythe, Roberto P. Korzeniewick and Valerie Durrant, the Relative Status of Women (RSW) by A. Geske Dijkstra and Lucia C. Hanmer (2000), the Standardized Index of Gender Equality (SIGE) by Dijkstra, the African Gender Status Index (GSI) by UN's Economic Comission for Africa (2004), the Gender Equity Index by Social Watch, the Gender Gap Index by the World Economic Forum and the Multidimensional Gender Equality Index (MGEI) by Iñaki Permanyer (2008)). Surprisingly, most of the aforementioned indices fail to satisfy certain intuitive properties that would be expected from what might be loosely referred as "a reasonable gender inequality index". In the first part of this paper, which is of theoretical nature, we will (only) describe the main properties of those indices which, according to our point of view, are the most reasonable of all. Among these, we include some new indices which, up to now, have neither been introduced in the academic nor in the policy literature.

We contend that the gender inequality indices used in this paper are an improvement with respect to the previous ones on different grounds. Firstly, they are multidimensional, so they include information concerning many relevant variables that should be taken into account when assessing gender inequality levels (curiously, many gender inequality studies have focused their attention on a single dimension, most usually: educational attainment or earned income, thus leaving aside many relevant issues). Our indices have been designed so as to be able to take into account different sources of data: from the widely available macro data presented by UNDP to the more detailed micro data (collected at the individual and household level) of the Demographic and Health Surveys (DHS). In particular, we will consider some extremely relevant dimensions which have traditionally been ignored in large internationally comparable studies, like the decision-making power at the household level or the degree to which individuals are knowledgeable of reproductive health issues. Secondly, special care has been taken from the technical/methodological point of view to ensure that, choosing the appropriate functional form, our gender inequality indices satisfy certain reasonable properties (which are not satisfied by most of the aforementioned indices).

In the second part of this paper, we will present some empirical results that make use of the gender inequality indices defined in the previous section, which are of great interest. We will start by showing the evolution of gender inequality levels for the African countries during the period 1995-2005 using data from UNDP. Our findings reveal that, in general, significant improvements have taken place during that period but, from the other side, these improvements have slowed down significatively in the last few years. In order to have a more general perspective, these results have been compared with the gender inequality levels of the other continents of the world. This comparison reveals that, despite the aforementioned improvements, the African continent still lags behind the other four continents.

An interesting issue we want to explore in this paper is the link between gender equality and certain basic demographic indicators that measure the fertility levels of the different African countries. In particular, we would like to test empirically widely spread theories suggesting that higher gender equality should be accompanied by lower fertility and

mortality levels. Our findings suggest that, even if these theories can be said to hold true "on average", complex non-linear patterns arise which make it difficult to draw neat and universal conclusions. Whenever possible, we will analyse the evolution of these relationships in time during the period 1995-2006. This way, we will be able to check whether these different indicators evolve jointly in time towards certain target values of interest. In the same spirit, an interesting point which, from our point of view has not been thoroughly investigated, is the existing relationship between gender inequality and human development levels. We will explore whether the development levels of African countries (measured with the Human Development Index) are related whith its gender inequality levels (and if so, to what extent) or if, on the contrary, they can be said to be independent issues. Conventional wisdom would vaguely suggest that gender equality and human development should be positively correlated, but more precise measures supporting this statement must (and will) be provided. As before, it will be of great interest to track these results in time during the past eleven years.

The final issue which will be investigated in this paper is the influence on the results of choosing alternative sources of data (other than those provided by UNDP). In particular, we have chosen the DHS dataset, which include many interesting well-being dimensions which are not usually found in this kind of gendered well-being comparisons. Interestingly, we have found that using the new DHS dimensions, the average levels of gender inequality tend to be lower than before but that these gender inequalities continue to favor men against women. However, the reach of the results presented in this section is seriously limited by the problems of data availability (the DHS data do not present yearly results for each country in the African continent as UNDP does). This point raises the important issue of the dependency of our results on the problems of data availability. The fact that such important differences arise when using these alternative sources of data is a further motivation for UNDP to collect a much wider array of internationally comparable gendered well-being indicators that cover a richer spectrum of individuals' lifes.

2. Conceptual and methodological issues in the measurement of gender inequality.

We will start by introducing some notation that will be used throughout the paper. We are considering $n \in N$ different well-being dimensions (N is the set of natural numbers), and for each dimension $1 \leq i \leq n$ we will denote by x_i and y_i the women and men *average* achievement levels respectively (we assume that $x_i, y_i > 0$). A *multidimensional gender equality index* can be defined as a function $G:R_+^{2n} \rightarrow R$, where $G((x_1, y_1),...,(x_n, y_n))$ is used to give an overall measure of the existing gender inequality levels in a given society. As we will later see, in order to define a multidimensional gender equality index, it is important to take into account the direction of the gender gaps for each dimension (or, in other words, which is the sex "favored" by the existing gender inequality levels in that dimension). For that purpose, we will define the following sets: $I=\{1,...,n\}$, $I_W = \{i \in I \mid x_i > y_i\}$ and $I_M = \{i \in I \mid x_i < y_i\}$. I_W and I_M are the list of well-being dimensions for which the corresponding gender gaps favor women and men respectively.

Measuring gender inequality "in itself" or ranking women vs men?

The first decision that should be taken when defining a multidimensional gender equality index is whether we want to measure the "amount" of gender inequality existing in a given society or if we want to measure the extent to which, in overall, one sex performs better than the other in that society. Even if both ideas are relatively similar there is an important conceptual difference between them that will determine the precise formulation of our indicators. If we are only interested in measuring the amount of existing gender inequality, we will not be concerned with the identity of the most favored sex. From the other side, the identity of the most favored sex will be important in the second approach in which we compare women's position against that of men's. Both approaches are important in themselves and have some advantages and disadvantages. Let us start by examining some possible indicators that follow the latter approach.

2.1. Ranking women vs men or gendered gender differences.

If we want to compare women's position against that of men's and decide the extent to which the former is "better" than the latter it is obvious that we should take into account the direction of the gender gaps in each dimension. As one can readily check, well-known indicators like the Gender-related Development Index (GDI) do not make this distinction because they aggregate the gender gaps regardless of their corresponding directions. This is a very important issue which has been pointed out among others by Dijkstra (2002) and Klasen (2006). In order to overcome this limitation, these authors suggest to introduce some indicators that allow for compensation between different dimensions. This means that the gender gaps favoring one sex in certain dimensions will be offset to a certain extent by the gender gaps favoring the opposite sex in the other dimensions.

At this moment, we propose the following class of gender equality indicators that allow for compensation between dimensions

$$G_r := \prod_{i=1}^{n} \left(\frac{x_i}{y_i} \right)^{w_i},$$

where the $w_i > 0$ measure the degree of importance of dimension i and $\sum_i w_i = 1$. Roughly speaking, we could say that when $G_r > 1$ men are on average worse-off than women and when $G_r < 1$ women are on average worse-off than men. If $G_r = 1$ we could say that, on average, there is equality between women and men. Recall that G_r is simply the weighted geometric mean of the relative gender gaps in the different well-being dimensions.

However, the gender equality index G_r has an important drawback, namely: it allows for *full* compensation between dimensions. This means that those indices are unable to distinguish between a country with full gender equality and another with dramatic but equally large gender gaps in opposite directions. This point has been strongly emphasized in Klasen (2006). The natural alternative to this problem would be to allow for something like *partial* compensation between dimensions. To our knowledge,

however, no index has been proposed in the literature that contains this property: this is an interesting issue that merits further research.

When using this kind of indices that try to compare women's position against that of men's there is an additional issue which, to our knowledge, has neither been addressed in the literature. Take G_r (or any other index that compares women's position against that of men's) and consider the ranking of countries according to the corresponding values of the index. Roughly speaking, those countries showing higher values will be the countries in which women perform better than men in most or all the considered well-being dimensions; the opposite situation will be found in countries with lower values of the index and in between we would have the countries with a certain degree of gender equality. At this point, we should ask ourselves whether the achievement of the highest values according to such an index represents a desirable state of affairs or not. It is by no means clear that a country in which women perform much better than men in all well-being dimensions should be ranked above another country with full gender equality. In general, when one ranks different objects according to certain criteria, one expects that the objects ranked at the top have certain attractive or appealing characteristics that are not shared by those ranked at the bottom. In this case, due to the non symmetric nature of our problem, we would be forced to say that societies in which women perform better than men are clearly preferred to societies in which men perform better than women, which is (at least) a debatable assertion. Of course, one might well argue that, from an empirical point of view, most well-being comparisons between women and men show that the latter usually enjoy a more privileged position than the former, so that there should be no great difference between comparing women vs men and in measuring gender inequality in itself. However, as we will later see in the empirical results of this section, there might be important differences when ranking countries according to one criteria or the other. Moreover, we contend that, regardless of what the empirical results might say about the relative position of women and men, it is important to bear in mind the conceptual and normative differences implicit in the construction of the corresponding indices.

The importance of this point is made even more explicit when we want to relate gender (in)equality with other socio-economic issues. Let us suppose, for example, that we want to look for the existence of certain (possibly causal) relations between gender equality and economic growth. It is clear that, once the appropriate variables are chosen to measure economic growth, the corresponding ranking of countries is unambiguous: at the top we have the countries with higher economic growth and at the bottom those with lower economic growth. However, this unambiguity disappears when we measure gender equality by means of G_r or any other indicator that compares women's position against that of men's. According to these indices, the countries placed at the top are not necessarily egalitarian, so the corresponding analysis of correlation between economic growth and gender equality is conceptually flawed.

2.2. Measuring gender inequality “in itself” or ungendered gender differences.

An alternative way of constructing a gender equality index that avoids some of the aforementioned problems is to average the existing gender inequalities in different dimensions without taking into account whether the gaps favor women or men. This way, we would obtain something like an “ungendered gender index” or, in other words, an indicator of the average “amount” of existing gender inequalities in a given society.

At the risk of overemphasizing the obvious, we point out that the values of such indices do not inform us about whether women are better placed than men in a given country (this is why we call them "ungendered"). The following is one of such indices

$$U_r := \left[\prod_{i=1}^{n} \left(\frac{Min\{x_i, y_i\}}{Max\{x_i, y_i\}} \right)^{w_i} \right]^{1+\varepsilon(2B-1)^2}$$

where $\varepsilon \geq 0$ and B is defined as $B := \begin{cases} \log(\Gamma^W)/\log(\Gamma) & if \quad \log(\Gamma) \neq 0 \\ 1/2 & if \quad \log(\Gamma) = 0 \end{cases}$

with $\Gamma := \prod_{i=1}^{n} \left(\frac{Min\{x_i, y_i\}}{Max\{x_i, y_i\}} \right)^{w_i}$ and $\Gamma^W := \begin{cases} \prod_{i \in I_W} \left(\frac{Min\{x_i, y_i\}}{Max\{x_i, y_i\}} \right)^{w_i} & if \quad I_W \neq \phi \\ 1 & if \quad I_W = \phi \end{cases}$

By construction, one has that $0 \leq U_r \leq 1$. When $U_r = 1$ there is no gender inequality at all and, as U_r approaches 0, gender inequality increases. Parameter B is called "Balance", and measures the extent to which the existing gender inequalities favor one sex or the other. One has that $0 \leq B \leq 1$; if $B=1/2$ we have balanced distributions and if B approaches either 0 or 1 we have highly unbalanced distributions. The power $1+\varepsilon(2B-1)^2$ used in the definition of U_r penalizes heavier those countries showing highly imbalanced distributions (i.e: those countries where one sex scores higher than the other in most or all dimensions). The value of $\varepsilon(\geq 0)$ can be thought as an "inequality aversion index" (ε =0 means no inequality aversion and higher values of ε mean higher aversion to inequality; see Atkinson (1970)).

2.3. Comparing the values of G_r and U_r using UNDP data.

At this moment, we would like to know if the values of G_r and U_r give consistent results or not, that is: if the country rankings ensuing from the values of those indicators are more or less "similar" or not. Clearly, the answer to this question depends to a great extent on the n different dimensions that are taken into account in the formulation of G_r and U_r. In this paper we will restrict ourselves most of the time to the dimensions included in the definition of UN's Human Development Index (HDI), which are: decent standard of living (measured as GDP per capita), Education (measured with Gross Secondary and Tertiary enrolment ratios) and Health (measured with life expectancy at birth). In Figure 1 we show the scatterplot of the values of G_r and U_r for 164 countries around the world with available data in year 2000 (Data source: UNDP).

In Figure 1, it is interesting to observe that for a wide range of values (roughly speaking: those for which G_r is below 0.9), the values of both indicators are completely consistent, and it would not make any difference to use one or another. However, the pattern is more complex for the other ones, with the values of G_r going around 1. It turns out that the rankings of those countries arising from the use of G_r or U_r would be completely different. The conclusion we must draw from Figure 1 is that the use of G_r or U_r can make an important difference or not according to the region of the plot we are

moving in. What can we say in the case of Africa? Figure 2 shows the same results as in Figure 1 but separating the African countries from the other ones. Inspecting Figure 2 one can clearly see that the ranking of African countries according to the values of G_r or U_r is completely equivalent (the computation of Spearmann's rank correlation coefficient for the corresponding rankings yields a value of 1). For this reason, in the rest of the paper we will only focus on the values of G_r.

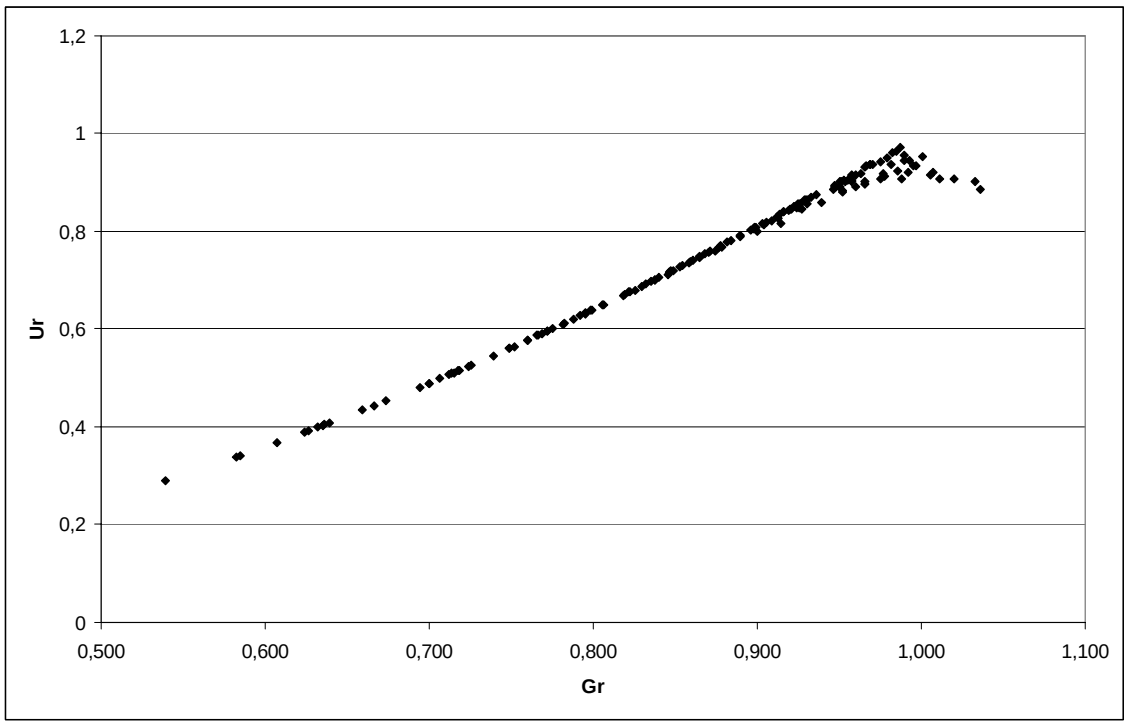

Figure 1. Scatterplot of the values of G_r and U_r, Data source: UNDP, 2000.

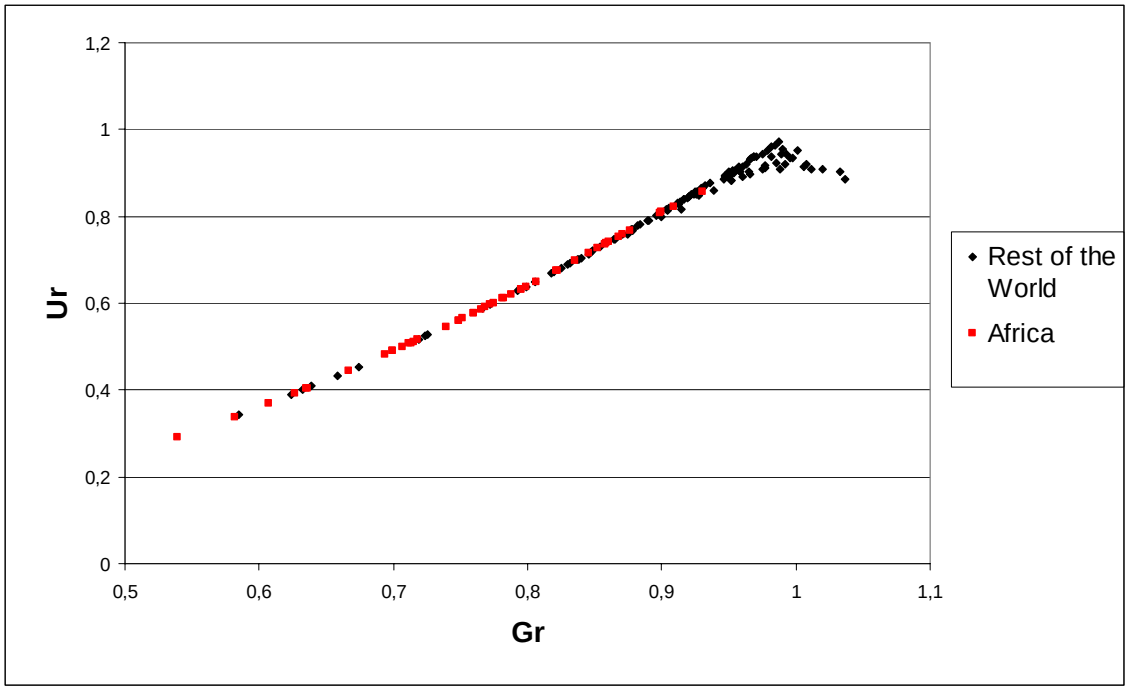

Figure 2. Scatterplot of the values of G_r and U_r, African vs non-African countries contrasted. Data source: UNDP, 2000.

3. Empirical results: Evolution of multidimensional gender inequality across countries in time.

In this section we show some summary results of the evolution of gender inequality in time according to the values of G_r and the data from UNDP in the period 1995-2005. In order to contextualize our results, we will start by a very crude approximation and show the average values of G_r aggregated by continents. The results are presented in Figure 3.

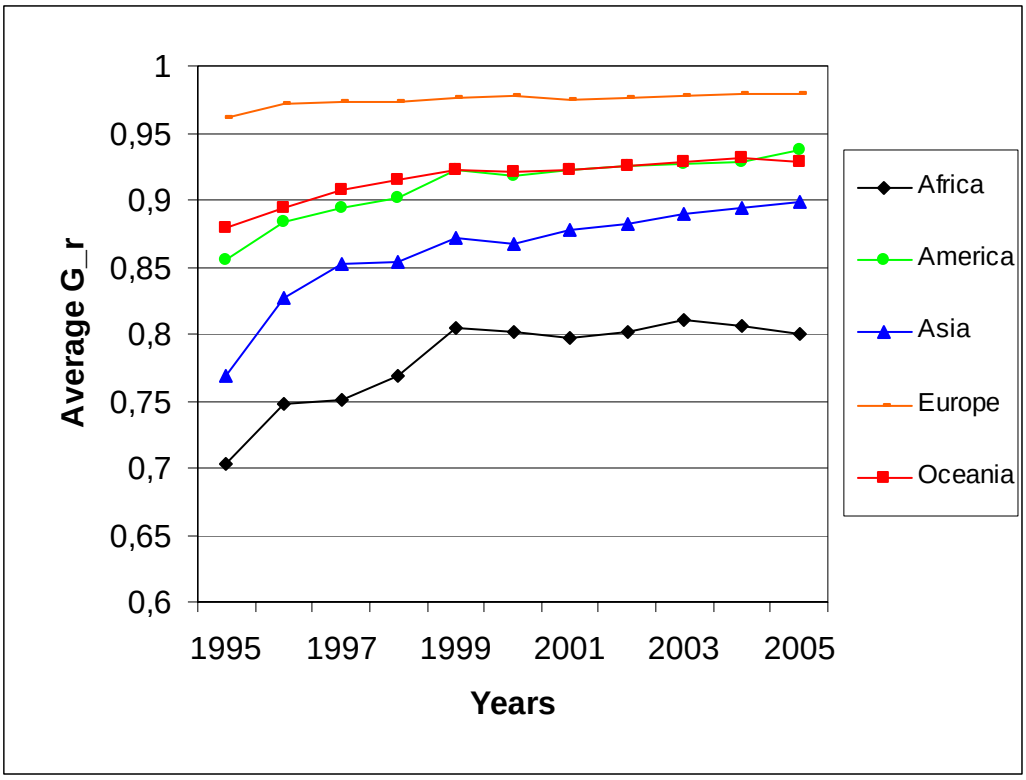

Figure 3. Average values of G_r in the period 1995-2005 separated by continents. Data source: UNDP.

The evolution of G_r for the different continents over time is pretty similar: roughly speaking, they all increase towards the value of 1 at a marginally decreasing pace. Europe is the continent showing higher gender equality levels all over the period. Then we have America and Oceania, which have similar gender equality values. Oceania is better placed than America at the beginning of the period but the situation is reversed at its end. Then we have Asia, which experiences a remarkable improvement from 0.769 in 1995 to 0.899 in 2005. Finally, Africa shows the lower gender equality values all over the period; even if there is an important overall improvement from 1995 to 2005, at the end of the period (years 2003 to 2005) there is even a small decrease of gender equality levels.

Needless to say, these are extremely crude results in which very different societies are mixed together into a single indicator. It will be more interesting to present an analogous figure using African regions[1] only; see Figure 4. There, we can see that all regions except Southern Africa follow a similar pattern and are hardly distinguishable: they all experience a slight monotone increase in the average value of G_r. From the other side, the region of Southern Africa has clearly higher average G_r values than the

[1] We will follow the regional decomposition used in UN Summary Statistical Tables, that is: Northern Africa (including Libyan Arab Jamahiriya, Algeria, Tunisia, Egypt, Morocco, Sudan), Eastern Africa (including Mauritius, Zimbabwe, Kenya, Comoros, Zambia, Tanzania, Madagascar, Uganda, Malawi, Mozambique, Eritrea, Ethiopia, Burundi), Western Africa (including Cape Verde, Ghana, Nigeria, Togo, Benin, Côte d'Ivoire, Mauritania, Senegal, Guinea Bissau, Gambia, Guinea, Mali, Burkina Faso, Niger, Sierra Leone), Middle Africa (including Gabon, Congo, Cameroon, Equatorial Guinea, Democratic Republic of the Congo, Central African Republic, Angola, Chad) and Southern Africa (including South Africa, Botswana, Namibia, Swaziland, Lesotho). In this list we only show the countries for which UNDP's Human Development Index is available.

other regions but at the same time experiences important fluctuations during the 11-year period (this might be due to the low number of countries in that region and its poor data availability, which might severely influence the yearly averages).

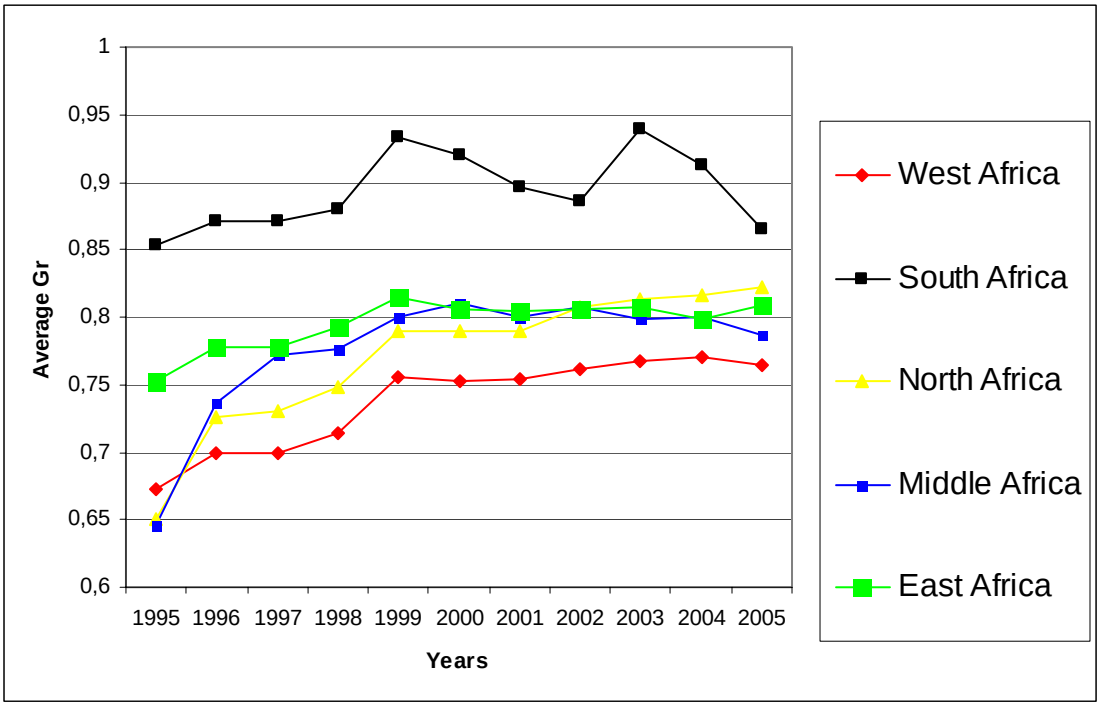

Figure 4. Average values of G_r in the period 1995-2005 separated by African regions. Data source: UNDP.

4. Relationship between gender inequality and human development and demographic behavior indicators.

The existing relationship between gender inequality and other socio-economic issues has been investigated by many social scientists. Many times, such research has been motivated by the corresponding policy implications, which could have a potentially important impact on the whole population at large. For example, there is a growing literature suggesting that higher gender equality levels are correlated with higher economic growth (see, for example, Klasen (1999), Dollar and Gatti (1999)) or with lower fertility rates (see, for example, Smyth (1996), Mason (1997)). However, the direction of causality in these contexts is a much complicated and elusive problem which is far from being solved. A problem shared by all these studies is the lack of an appropriate multidimensional gender equality measure that allows for meaningful comparisons both in time and space (see section 2). This problem can be overcomed to a certain extent by the definition of new gender equality measures like the ones we introduced in section 2. In this section, we explore a related issue, namely: the relation between gender equality levels and Human Development (as measured with the HDI) from one side and demographic behavior from the other (using the Total Fertility Rate (TFR) as an example).

4.1 Relationship between gender inequality and human development.

One might wonder whether higher gender equality levels should be positively correlated with higher Human Development levels or not. In other words, we would like to see whether the classical dilemma between equity and efficiency arises or not. From a purely technical point of view, gender equality could be achieved for many Human Development levels (that is: a priori both variables could be independent), but many empirical and theoretical studies suggest that some kind of relation does exist. Let us start by inspecting Figure 5, where we present a scatterplot of G_r and HDI values for African countries in 1995 and 2005. As expected, the relation between both variables can be said to be, on average, monotonically increasing. However, the relationship between these variables is far from being linear at the beginning of the period (i.e: in 1995). In that year, one can observe that the low HDI values between 0.2 and and 0.4 can occur for a wide range of G_r values oscillating between 0.55 and 0.85 approximately. This means that a given level of (low) human development can be achieved in a wide variety of gender inequality scenarios. However, as the HDI values increase, the range of variability of the corresponding G_r roughly decreases. From the other side, inspecting Figure 5 for the more recent 2005 values we can observe that the variables HDI and G_r are more closely related: the values are well fitted by a straight line of slope ≈ 1.6 (that is: a one percent increase in G_r corresponds roughly to a 1.6 percent increase in HDI).

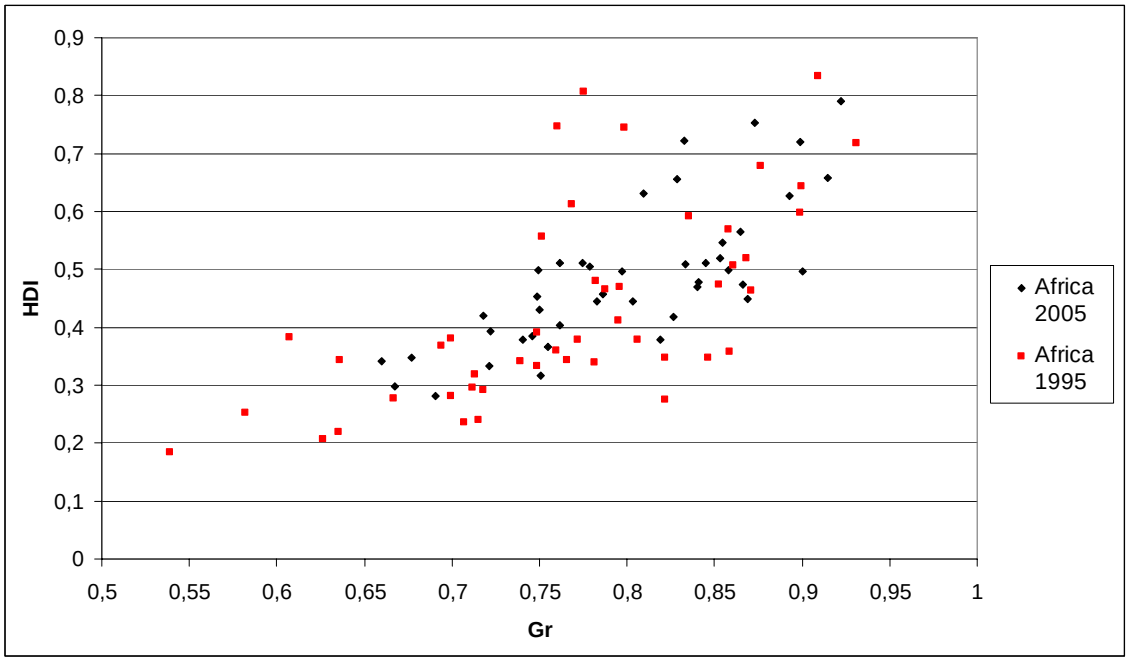

Figure 5. Scatterplot of G_r and HDI values for African countries in 1995 and 2005. Data source: UNDP.

Moreover, we would like to explore the dynamic evolution of the relation between G_r and HDI year by year. This is a more difficult issue, because the different countries can show very different patterns of evolution during the 11-year period and the corresponding figure might appear overburdened and confusing. For this reason we have opted to explore the evolution of the relation between average G_r and average HDI year by year aggregating by the same great regions as before (see Figure 4 and footnote

1). The results are presented in Figure 6. There we can distinguish three broad patterns. To start with we have the group formed by Western Africa, Middle Africa and East Africa (i.e: the "central part" of the continent). There we observe improvements both in average G_r *and* average HDI, even if these improvements slow down at the end of the period. A second pattern is the one followed by Northern Africa, with a great improvement in average G_r but with no significative increase in average HDI. Analogously, the improvement in average G_r seems to slow down at the end of the period. Finally, the third pattern is the one followed by Southern Africa, in which the oscillating behaviour of both indices is somewhat erratic, ending up with similar values to those at the beginning of the period.

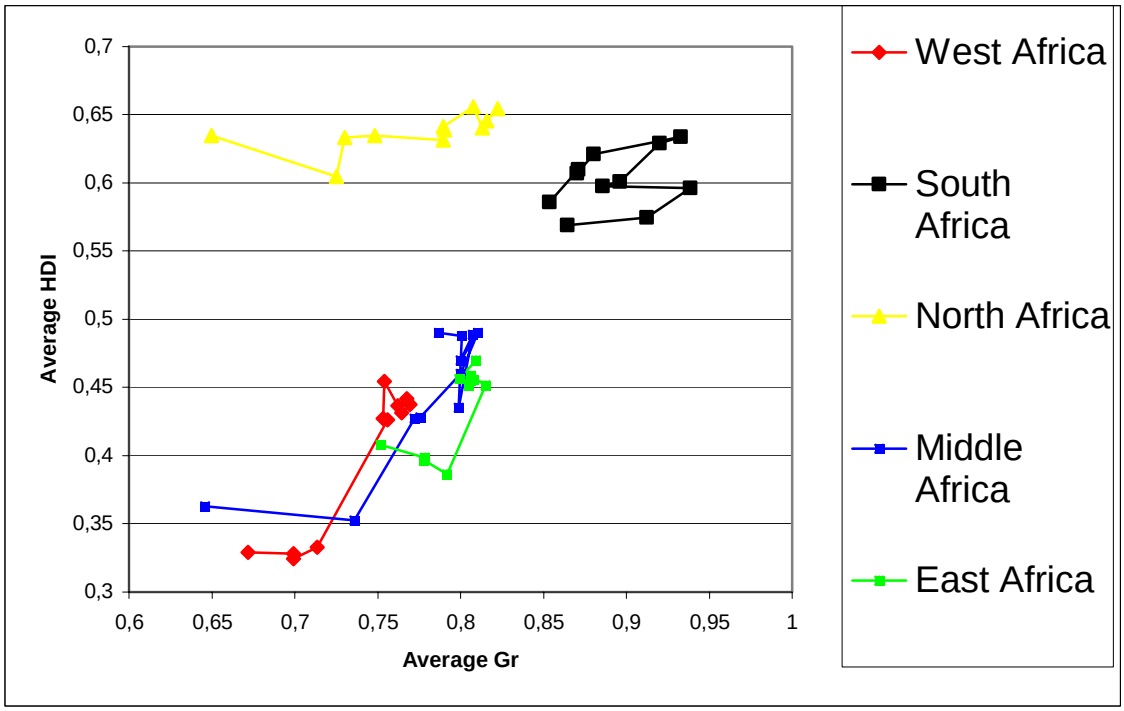

Figure 6. Evolution in time of average G_r and HDI values for African regions between 1995 and 2005. Data source: UNDP.

4.2 Relationship between gender inequality and fertility.

Another issue that has motivated a great deal of research in the past decades is the existing links between the gender relations in a given society and the corresponding fertility levels. There is a vast portion of the literature coming from wide-ranging academic fields which explores different aspects of these links, both from the theoretical and the empirical points of view. The motivation of these studies run from the purely academic to the policy oriented, and among the policy oriented studies, we could distinguish those which are akin to what might be loosely referred as "feminist perspective" and those which have a clear instrumentalist approach (see Smyth (1996)). The latter are characterized by adopting the feminist language and ideas without necessarily sharing its values: most usually, they want to enforce the empowerment of women not as an end in itself but because of the presumed reduction of the corresponding fertility levels. In this section we do not pretend to make an overview of the related literature; the interested reader can find some interesting insights in the works of Mason (1997) or Smyth (1996). The purpose of this section is to make use of

the newly defined gender inequality measure G_r to make a rough comparison between the gender inequality and fertility levels. We want to check the degree to which high gender equality levels are correlated with low fertility levels. Moreover, we want to monitor the evolution of this relation year by year over the period ranging from 1995 to 2005. However, it is important to bear in mind that this kind of comparisons does not pretend to infer the direction of any causal link, they just show descriptive measures of correlation. The study of causal relationships should be complemented with a deep context-dependent qualitative study which is beyond the scope of the present work.

Let us start with a scatterplot of the values of G_r and the Total Fertility Rate (TFR) for the years 1995 and 2005 (see Figure 7). As expected, there is a monotonically decreasing relation, but that relation has substantially changed during that period. In 1995 we can observe that most of the countries had a TFR above 4 and that, for each value of the TFR, there is a great dispersion in the values of G_r (for example, when the TFR is between 6 and 7, G_r can widely oscillate between 0.55 and 0.85). This is interesting because it shows that a given fertility rate does co-exist with a wide range of gender inequality scenarios in different countries. From the other side, in 2005 the variables are more closely related and there is not so much dispersion: the values are well fitted by a straight line of slope $\approx$ -20 (that is: a one point increase in G_r corresponds roughly to a 20 points decrease in TFR).

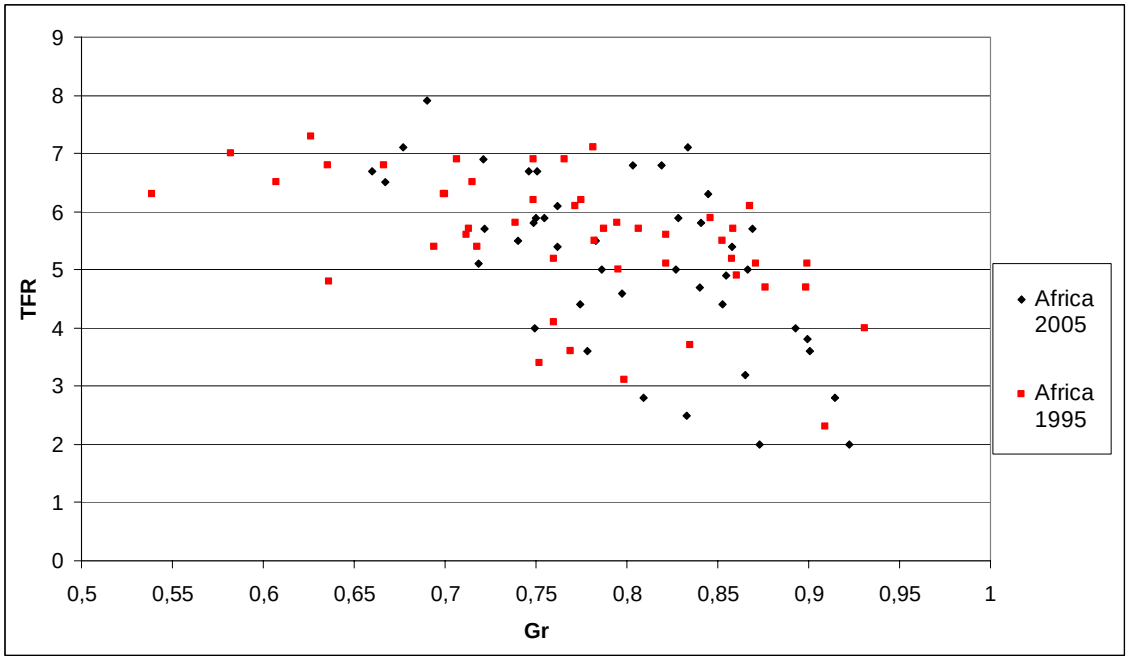

Figure 7. Scatterplot of G_r and TFR values for African countries in 1995 and 2005. Data source: UNDP.

If we try to follow the dinamic evolution of the relation between G_r and HDI for each country year by year we face the same problem as before: with so many countries we would obtain a confusing and overburdened figure which might not provide much relevant information. This is the reason why we aggregate the results among the five aforementioned great African regions: the results are presented in Figure 8. There we can observe that in Western, Eastern and Middle Africa there has been an important improvement with respect to the reduction of average gender inequality but that the average fertility levels have only declined a little bit. From the other side we have the

cases of Northern and Southern Africa. For Northern Africa there has been a great improvement in the reduction of average gender inequality and at the same time an important reduction in fertility levels. For Southern Africa there has been an important reduction in average fertility levels but not in gender inequality levels.

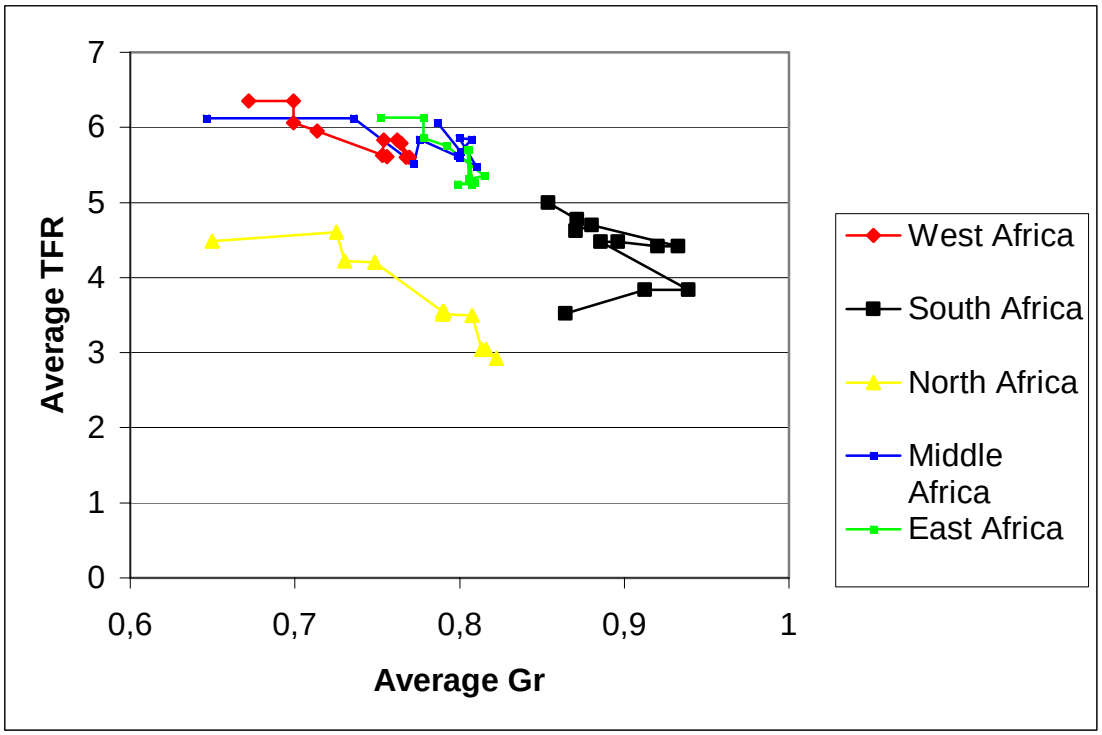

Figure 8. Evolution in time of average G_r and TFR values for African regions between 1995 and 2005. Data source: UNDP.

4.3. Effects of choosing an alternative source of data.

In sections 3, 4.1 and 4.2 we have presented many interesting results concerning the distribution both in time and space of the gender equality indicator G_r when the chosen variables for their computation are the classical ones found in the HDI (namely: life expectancy at birth, literacy rate, secondary and tertiary gross enrolment ratios and GDP per Capita). This choice is justified on grounds of the wide data coverage that allows to make interesting comparisons both in time and space. Moreover, it is also interesting in itself to explore what do these widely used variables tell us about gender inequalities and to compare the corresponding results with other widely known indicators like the HDI or the TFR. However, our analysis would be uncomplete if we do not have a look at other variables that are more appropriate to measure individual's well-being levels than those of the HDI. As it has been argued elsewhere, the GDP is a poor indicator of the standard of living enjoyed by the inhabitants of a given country and its use has raised many criticism (see, for example, Bardhan and Klasen (1999), Dijkstra (2002, 2006), and Klasen (2006)). It would be more reasonable to use other well-being indicators collected at the household level that were more closely related to people's everyday lifes.

An alternative source of data which is widely available in different African countries is the Demographic and Health Surveys. We contend that these surveys can be very

appropriate for the purpose of measuring gender inequalities because, among other things, they inform us about the knowledge that people have about crucial reproductive health matters and about people's decision-making power at the household level. There is much literature devoted to highlight the relevance of those variables in the analysis of gender roles and relations (see, for example, Mueller (1998)). From the negative side, it must be acknowledged that the gain obtained by choosing these interesting indicators is obtained at the cost of loosing data coverage both in time and space: we have data for 19 countries all over the world at a single instant in time (in year 2001 approximately)[2]. The main goal of this short but important section is to compute the values of the gender equality indices G_r and U_r, when, instead of using the variables found in the classical HDI, we use the well-being dimensions achievement levels obtained from the DHS dataset. Using the DHS data, we defined the following list of well-being dimensions: "Being well-sheltered", "Being employed", "Being educated", "Being able to make decisions on one's own" and "Being knowledgeable about reproductive health matters". For more technical details about the definition and measurement of these dimensions see Permanyer (2007), chapters 2 and 5. Of course, it will be of great interest to compare the results arising from both sources of data and check whether important changes take place.

If we compare the U_r values when using both sources of data we obtain the scatterplot presented in Figure 9, where we show the equality line for comparative purposes. In this case, the picture obtained when replacing the classical HDI variables by the new (DHS) ones is very different: the values of U_r (DHS) tend to be lower than those of U_r (HDI). This suggests that, using HDI data, overall gender inequalities might be overemphasized; this might be due to the Standard of Living component of the HDI (GDP per capita), which has been severely criticized elsewhere (see Bardhan and Klasen (1999), Dijkstra and Hanmer (2000)). In particular, this implies that an eventual country ranking according to the U_r (HDI) values would differ completely from the country ranking according to the U_r (DHS) values.

[2] The list of those countries is: Bolivia, Haiti, Nicaragua, Dominican Republic, Armenia, Kazakhstan, Bangladesh, Indonesia, Nepal, Philippines, Benin, Burkina Fasso, Ghana, Kenya, Mali, Mozambique, Nigeria, Uganda and Zambia.

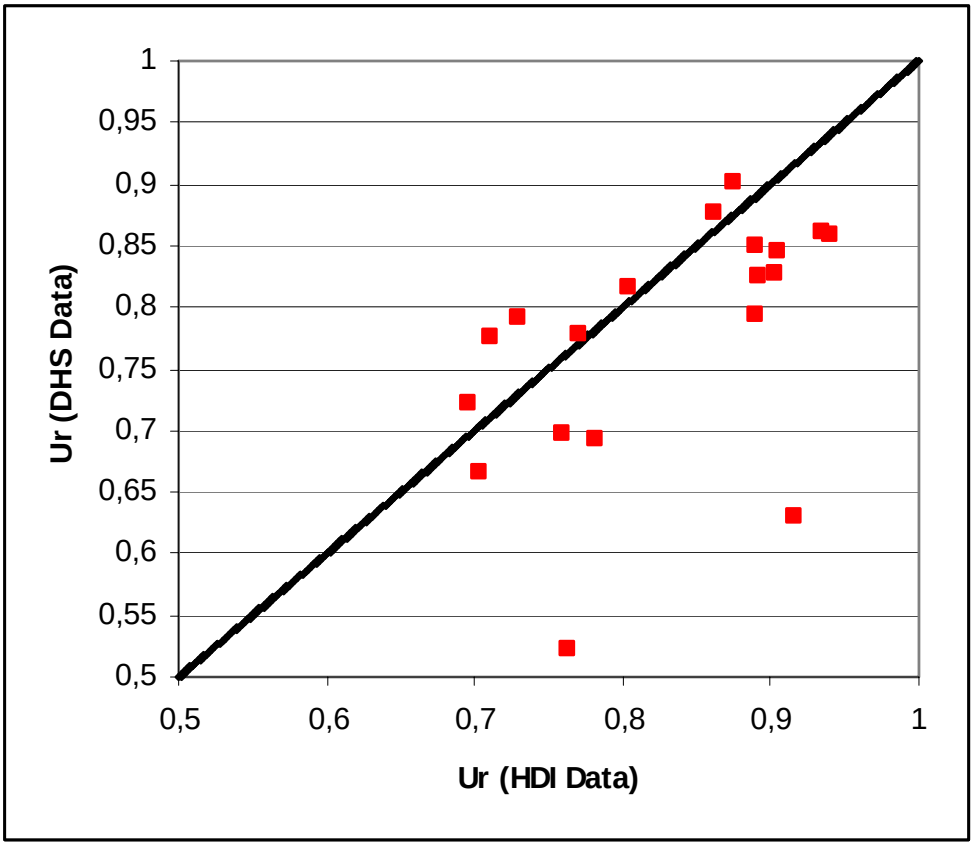

Figure 9. Scatterplot of U_r (HDI) values against U_r (DHS) values.

Recall that the values of U_r are measuring the "amount" of existing gender inequalities, but do not tell us whether women or men are better or worse off. This can be more appropriately measured by means of G_r. In Figure 10 we show the corresponding values of G_r for the classical HDI variables and for the new (DHS) ones. Interestingly, the differences between the distributions of G_r(HDI) and G_r(DHS) are not very large. The correlation coefficient between both distributions is $r = 0.681$ so the country ranking arising from the G_r(HDI) values will not differ greatly from the country ranking arising from the values of G_r(DHS). This means that, even if other gender inequality values are uncovered by the DHS data (see Figure 9), the relative position of women is roughly the same: in overall, the new gender inequalities are still favouring men. There is no country in our dataset for which the change of variables implies a change of relative position of women vis-à-vis men.

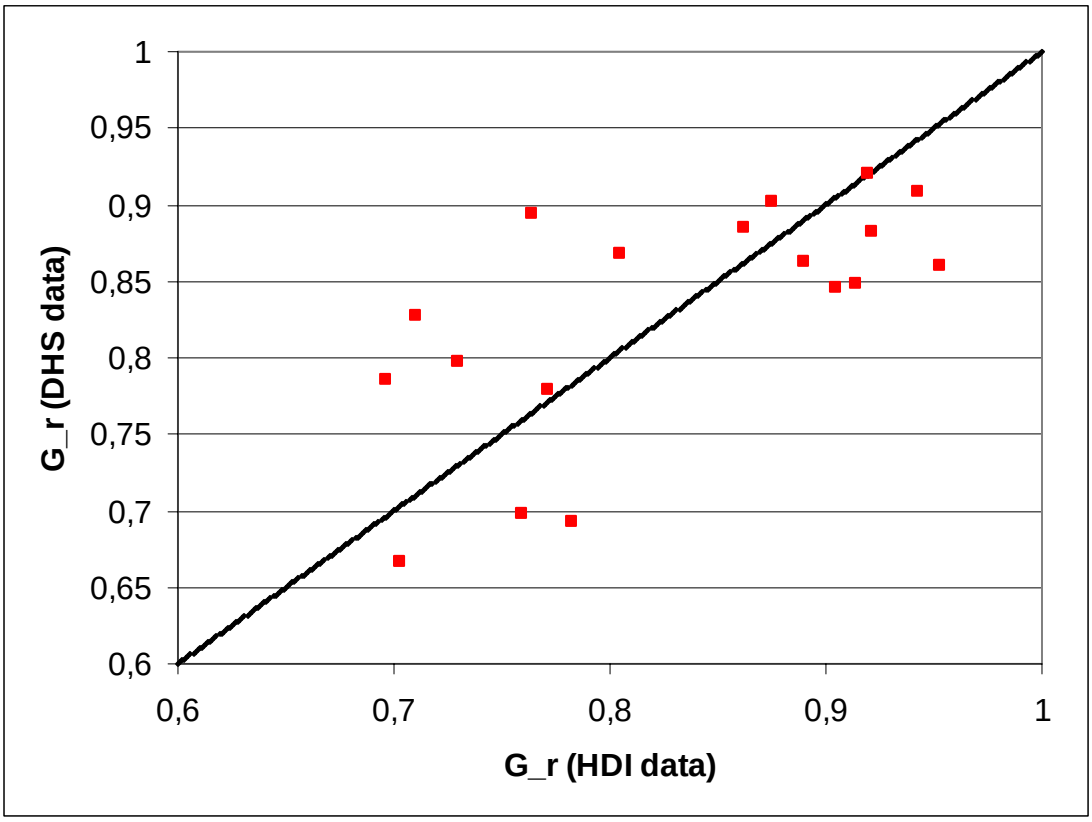

Figure 10. Scatterplot of G_r (HDI) values against G_r (DHS) values.

To sum up, we have seen that the choice of our alternative set of "DHS variables" to measure individual's well-being has important consequences for the measurement of gender inequality levels. When we focus on the new variables, the "amount" of existing gender inequalities seems to be lower than before (on average), even if these new inequalities do not involve a change in the relative position of women vis-à-vis men.

5. Summary and Conclusions.

In this paper we have discussed different issues related to the measurement of gender inequality. Firstly, we have proposed a couple of gender inequality indices: the first one, G_r, measures the extent to which women (men) are better-off than men (women) and the second one, U_r, measures the average level of gender inequality regardless of which sex "benefits" from it. We contend that both measures have their own advantadges and disadvantadges and that, depending on the context, they can be considered as complements or as substitutes (the latter is true for the case of Africa explored in this paper). The proposal of gender inequality indices like the ones presented in this paper is an important topic that merits further research in the future, as it can be very useful for real policy purposes.

Having defined summary measures of gender inequality, we have explored some interesting empirical applications using the widely available UNDP variables included in the definition of the Human Development Index from 1995 to 2005. To start with, we have seen that, on average, gender inequality levels as measured by G_r have been decreasing all over the world during the 11-year period and that, among the 5

continents, Africa is the one recording higher gender inequality levels. Within that continent, Southern Africa is the region with lower gender inequality levels but which has not experienced any significant improvement. From the other side, Northern, Eastern, Western and Middle Africa have higher gender inequality levels than Southern Africa but have clearly reduced that difference by the end of the period.

Another interesting issue investigated in this paper is the existing relationship between gender inequality and human development from one side and a demographic process like fertility from the other. From Figures 6 and 8, we can infer a rough tipology between the 5 African regions as follows. Eastern, Western and Middle Africa (that is, the central part of the continent) can be said to approximately behave in the same way: they all have high gender inequality levels, low human development levels and high fertility rates. Moreover, they all experience an important improvement in gender inequality and human development levels but only a slight decrease in their fertility rates. From another side, one distinguishes the case of Northern Africa, with high gender inequality levels (but experiencing a great reduction by the end of the period), with relatively high human development levels that remain stagnant and with an important decrease in the fertility levels (with an average TFR lower than 3 at the end of the period). Finally, in Southern Africa there are low gender inequality levels, no improvements in the HDI and an important decrease in fertility levels.

It must be emphasized that the previous results might be extremely dependent on the variables we are taking into account for the definition of our gender inequality indices. It would be much more interesting and useful to include different variables, other than those included in the HDI, in order to better grasp certain dimensions of human well-being. We have attempted to do so using the Demographic and Health Surveys and introducing the following five well-being dimensions: “Being well-sheltered”, “Being employed”, “Being educated”, “Being able to make decisions on one’s own” and “Being knowledgeable about reproductive health matters”. Our preliminary results suggest that, using the new variables, gender inequality levels tend to be lower than before (when using the HDI variables) but that the extent to which men are better-off than women is about the same.

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