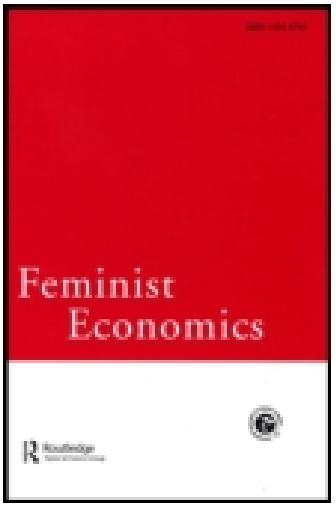

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Measuring Socio-Economic GENDER Inequality: Toward an Alternative to the UNDP Gender-Related Development Index

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MEASURING SOCIO-ECONOMIC GENDER INEQUALITY: TOWARD AN ALTERNATIVE TO THE UNDP GENDER-RELATED DEVELOPMENT INDEX

A. Geske Dijkstra and Lucia C. Hanmer

ABSTRACT

This paper assesses the United Nations Development Program's (UNDP) Gender-Related Development Index (GDI). Although the GDI has increased attention on gender equality in human development, it suffers from several limitations. A major problem is that it conflates relative gender equality with absolute levels of human development and thus gives no information on comparative gender inequality among countries. Using the same indicators as the GDI, the paper constructs a Relative Status of Women (RSW) index, which demonstrates how using a measure of gender equality that abstracts from levels of development results in very different country rankings. However, the RSW is not an ideal measure of gender inequality. The GDI indicators are not the most appropriate ones for measuring gender inequality and hence both the RSW and the GDI have limited validity. The paper concludes by offering a conceptual framework that provides the basis for an alternative measure of gender inequality.

KEYWORDS

Human development index, gender development index, socio-economic gender inequality, international comparisons, measuring economic development

1. INTRODUCTION

Since 1995, the UNDP has published a Gender-Related Development Index (GDI) in its annual *Human Development Report*. The aim of the GDI is to rank countries according to both their absolute level of human development and their relative scores on gender equality. The GDI uses the same indicators and dimensions as the Human Development Index (HDI): life expectancy at birth, representing a long and healthy life; a composite indicator for educational attainment (the adult literacy rate and a combined gross school enrollment ratio), representing knowledge; and real per capita

GDP, representing the standard of living (UNDP 1995). Sex-disaggregated data for each indicator are given a single social value that presumes a fairly strong societal preference for gender equality. The resulting valuations of educational attainment, life expectancy, and GDP per capita are used to calculate a GDI for each country. Another measure presented in UNDP (1995), the Gender Empowerment Measure (GEM), provides a measure of gender inequality in the areas of agency and power. This paper deals only with socio-economic aspects of gender inequality. It assesses the contribution of the GDI to measuring and comparing country performance on gender equality, and explores alternative ways to measure socio-economic gender inequality.

The HDI has generated an extensive academic discussion (see Mark McGillivray and Howard White 1993; F. Graham Pyatt 1992; UNDP 1995: 119–24) which focuses on

- the (*theoretical and policy*) *relevance* of the index;
- the *validity* of the index: are the dimensions and variables used relevant for measuring human development? Does the index apply correct weights for the different indicators?
- the *reliability* of the data used in constructing the index.

With respect to policy relevance, UNDP (1995) argues that the publication of the HDI stimulated many countries to pay more attention to human development, including more attention to data collection on human development. As far as theoretical relevance is concerned, the HDI contributed to renewed interest in the relationship between human development and growth. Publications in the area of the new growth theory stress the importance of education and skills for economic growth (Gene M. Grossman and Elhanan Helpman 1994; N. Gregory Mankiw, David Romer and David Weil 1992; Walter W. McMahon 1998).

The questions of relevance, validity, and reliability must also be addressed for the GDI. Leaving its validity and reliability until the following sections, we discuss its relevance here. With respect to policy relevance, publishing an indicator of gender inequality may increase governments' attention to gender inequality and policies to reduce it. We can also expect it to contribute to theoretical debates concerning the existence and nature of the relationship between gender equality and macroeconomic growth, including the question of whether greater gender equality can enhance growth and development.

In view of the potential practical and theoretical relevance of a socio-economic gender inequality measure, it should be defined so that it: identifies the extent of gender inequality; identifies the causes of gender inequality, with a view to suggesting policies for reducing inequality; and can be used to monitor the impact of these policies over time.

In this paper, we analyze the extent to which the UNDP's GDI meets

these aims, and we explore the potential for an alternative to improvement on the GDI in view of these objectives. Our main criticism of the GDI is that it reflects both absolute levels of well-being and some gender inequality. Countries at low absolute levels of human development but with high gender equality cannot escape a low score on the GDI. The GDI does not measure the extent of gender inequality in itself and, therefore, it cannot be used for the above-mentioned purposes. Although it is of course true that absolute measures of well-being matter, it is better not to combine them with a measure of gender equality. We believe that there is a need for an index of gender inequality that abstracts from absolute levels of human development. Using the same indicators as the UNDP does for GDI, we found that such a measure can be easily constructed. The result, which we present in this paper, is the Relative Status of Women (RSW) index.

The RSW reveals the extent of inequality between female and male achievements in human development. Hence, it can be used to compare countries and compare situations in the same country over time (aims one and three above). We start, therefore, from the normative premise that where men's and women's achievements are equal the situation is better than where women's achievements are consistently lower than men's. However, the empirical indicators used to capture achievements in human development are not perfect. Hence, if we want to understand the human development situation of women in a particular country, we have to examine the RSW in the context of other measures of well-being, such as the HDI, or noncomposite measures such as GDP per capita, maternal mortality rates, female adult literacy, life expectancy, and infant mortality rates for women and girls, the extent of violence against women, and qualitative information about gender relations. We must also look at the corresponding indicators for men such as male adult literacy, life expectancy, and infant mortality rates, as our relative measure may improve if, for example, life expectancy for men declines.

In this paper we describe the calculation of the GDI in greater detail and discuss its strengths and limitations. We then present our alternative index, the RSW, and demonstrate the difference it makes to rankings of country performance on gender-related development if a measure that abstracts from the absolute level of development is used. Finally, we develop an alternative conceptual framework for measuring socio-economic gender equality, examining possible relevant dimensions and variables and relating them such that causal links can be explored.

2. THE GENDER-RELATED DEVELOPMENT INDEX OF THE UNDP

In its formulation of a Gender-Related Development Index, the UNDP starts from the premise that societies have some preference for gender

equality. Improvements in female achievements are given more weight than improvements in male achievements, given females are at a lower average level in the first instance (UNDP 1995). Following Sudhir Anand and Amartya Sen (1995), we outline how the UNDP constructs the GDI.[1]

Anand and Sen (1995) start by noting that the social valuation given to achievements measured by various indicators (life expectancy, literacy, or average earnings, for example) can vary according to the weight given to each of the components of the index. They calculate an "equally distributed equivalent achievement indicator," X_{ede}. X_{ede} is given by:[2]

$$X_{ede} = \frac{(n_f X_f^{1-\varepsilon} + n_m X_m^{1-\varepsilon})^{1/(1-\varepsilon)}}{(n_f + n_m)^{1/(1-\varepsilon)}}$$

$$= (p_f X_f^{1-\varepsilon} + p_m X_m^{1-\varepsilon})^{1/(1-\varepsilon)} \quad (1)$$

where p_f and p_m are the population proportions of males and females respectively, and X_f and X_m are the male and female achievements. Setting ε at different values results in different weights being attributed to the degree of inequality between X_f and X_m.[3]

It is worth briefly noting two properties of equation (1). First, setting ε equal to infinity is akin to a social welfare function that measures society's progress according to the welfare of the poorest or most disadvantaged citizens. And second, the mathematical properties of the function mean that the extent to which the social valuation given to X_{ede} diverges from the population weighted arithmetic mean[4] diminishes as the absolute value of ε gets larger. (Hence it makes a large difference to the social valuation of the achievement if ε is set at 1 rather than 2 but relatively little if it is set at 51 rather than 52.)

The UNDP's GDI refers to the same dimensions and indicators as the HDI. The data series used for each indicator are also identical to those used in the HDI: life expectancy at birth; a weighted average of adult literacy and combined primary, secondary, and tertiary school enrollment ratios; and average per capita GDP.[5] In contrast to the HDI, the data series for each respective indicator are disaggregated by sex and the harmonic mean of male and female achievements vis-à-vis life expectancy, real per capita GDP and educational attainment is calculated (i.e. ε in equation (1) is set equal to 2). Each indicator is indexed following the method used by the HDI[6] and the resulting values are used to calculate the GDI, with each of its elements given an equal weight.

Although sex-disaggregated data for life expectancy at birth and educational attainment provide good indicators of gendered disparity in the dimensions of knowledge and longevity and health, sex-disaggregated per capita GDP is a much weaker indicator. There are few internationally comparable data to indicate women's standard of living and using GDP per

capita disaggregated by sex is obviously unsatisfactory. Anand and Sen (1995: 12) note that, unlike life expectancy and educational attainment,

> No *corresponding* correction [to the social value of achievements given by the arithmetic mean] can be made . . . because gender-specific attributions of income per head cannot be readily linked to the aggregate GDP per capita used in these calculations, and inequalities within the household are difficult to characterise and assess.

Nevertheless, estimates of average male and female per capita GDP are included in the GDI. The restricted availability of sex-disaggregated income data leads the UNDP to use female and male shares of earned income to indicate gender disparities in the standard of living. The female (or male) income share is computed by multiplying the ratio of the female (male) wage to the average wage by the female (or male) share of the economically active population.[7] Multiplying the HDI figure for average GDP per capita by the harmonic mean of the male and female income shares adjusts the HDI (downwards, as the male income share is largest for all countries) so that it reflects gender disparities in earned income.[8]

It is worth noting at this stage that the GDI is described as a Gender-Equity Sensitive Indicator (GESI) rather than as a measure of gender equality as such (Anand and Sen 1995: 7). Anand and Sen (1995: 7) argue that "something like a gender-equality index" is implicitly incorporated in the GDI as:

$$X_{ede} = E \cdot \bar{X}$$
$$E = \frac{X_{ede}}{X} \qquad (2)$$

where $\bar{X}$ is the arithmetic mean and E an index of gender equality. If X_{ede} as defined in equation (1) is rewritten in terms of the relative equality of men and women (X_f/X_m) it can be proven that E is at its maximum (1) when $X_f/X_m = 1$ (see Appendix 3; Anand and Sen 1995).

However, unless $E = 1$, the final value produced by equation (2) gives little intuitive indication of the position of women vis-à-vis that of men. If ε is set equal to infinity then, if women have the lowest achievement scores,[9] the GESI incorporates a measure that relates the achievements of women to average social achievements. If ε is set equal to one or two it represents the ratio of gender-weighted achievements (the geometric and harmonic means respectively) to unweighted achievements (the arithmetic mean). However, whether ε is set equal to infinity, one, or two, none of the resulting measures translates readily into an indicator of the position of women which can be easily used and understood by nonspecialists and policy-makers: a more natural choice would be to relate the achievements of women to those of men. The UNDP chooses to rank countries by the equivalently distributed achievement indicator (X_{ede}) rather than the gender-equality indicator (E) (see Howard White (1997) for the results of using E to rank countries) and

we do not consider E to be a useful, transparent, or accurate representation of gender equality.

By setting ε in equation (1) equal to two the UNDP has chosen to select a fairly strong social preference for gender equality. It is not, however, the maximum value that the preference for equality could take, that of the Rawlsian maxim, which judges social progress entirely by the extent to which the situation of the worst-off group improves. In the case of gender this group may be to women (Anand and Sen 1995). Although the maximum possible preference for equality is not assumed, the GDI changes the HDI rankings in the majority of countries.

Table 1 shows that several of the former centrally planned economies of Eastern Europe and the former Soviet Union show the greatest improvement in development position when the GDI rather than the HDI is used to rank countries. The comparatively high female income share of 38–39 percent for these countries and the high female combined school enrollment rates are the main sources of the improvement. The sources of the deterioration in ranking when the GDI rather than the HDI is used to assess development are more diverse. For most countries it is the low female income share combined with unequal school enrollment and adult literacy. Appendix 1 shows the underlying data from which the GDI is compiled for the countries in Table 1.

Table 1 Comparison of HDI and GDI ranks, 1992

Country	*HDI*	*GDI*	*HDI− GDI*
Greatest improvement			
Poland	43	22	+21
Hungary	42	23	+19
Slovakia	33	16	+17
Czech Republic	31	15	+16
Latvia	40	24	+16
Russian Federation	44	29	+15
Thailand	48	33	+15
Estonia	35	21	+14
Jamaica	66	52	+14
Lithuania	56	44	+12
Greatest fall			
Spain	8	34	−26
United Arab Emirates	37	57	−20
Bahrain	36	56	−20
Saudi Arabia	61	81	−20
Algeria	64	83	−19
Costa Rica	24	42	−18
Yemen	98	116	−18
Libya	58	75	−17
Netherlands	4	20	−16
Egypt	75	91	−16

Source: UNDP (1995: 78).

Equating higher female income shares with more gender-sensitive development and, in the case of the countries shown in the top half of Table 1, a higher level of development than accorded by the HDI is, however, open to question. There is a well-established body of feminist research that documents the double or triple burden of work that women typically face as their work for wages is added to their responsibilities for child care, the family, and community-level tasks. Furthermore, Nancy Folbre (1994) argues that women often face tradeoffs when their income share rises as they face a possible fall in the contribution that men make in cash and time to support children. Equally, however, feminists have established control over and access to money income as a key factor in creating greater gender equality and social welfare. The evidence thus suggests that access to paid work may be a necessary but not sufficient condition for the improvement of the status of women and that gains and losses from greater labor market participation may be closely intermeshed and vary in their impact on specific groups of women in any society. Hence, whether or not higher female income shares can be equated with more gender-sensitive development depends on whether country-specific policies ensure that the benefits to women of higher wage income are not gained at the expense of their rights and welfare in other spheres. Thus, the GDI can be seen as a first step in assessing gender-related development. And as gender relations are socially specific and depend on history, ideology, and culture as well as material economic development, any final judgment of the greater progress in gender equality in one country vis-à-vis another has to be contextualized in more country-specific qualitative and quantitative information than can be contained in one composite indicator.

a. The GDI and income per capita

Ideally, the GDI should be a relevant measure of socio-economic gender inequality. It should point the government's attention to gender inequality, and it should stimulate research on the relationship between gender equality and general welfare. Therefore, one relevant question is: what does the GDI tell us about a country's level of development that per capita GDP does not? In order to assess this, we compared the GDI scores of the countries with their GDP per capita. When we considered the results for all 137 countries for which the GDI can be calculated, the effect of including gender equality in a development measure made little difference to the overall ranking of countries on the basis of income per capita. The GDI turns out to be highly correlated to per capita income, implying in the vast majority of cases that GDI increases as countries get richer.

Figure 1 shows a scatterplot of GDI against the natural log of real (PPP) GDP per capita for 137 developing countries. The scatter suggests a nonlinear relationship between GDI and log GDP. A nonparametric regression

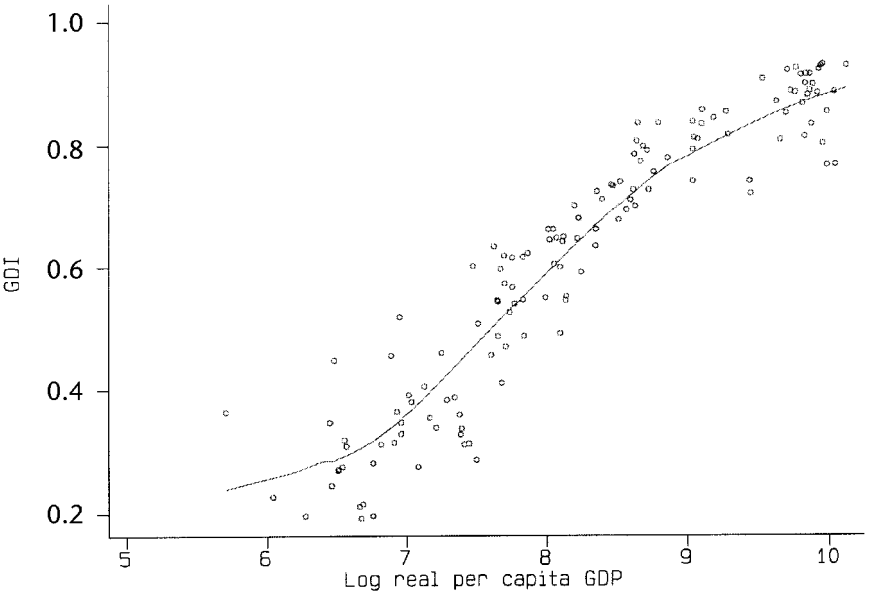

Figure 1 GDI and country GDP per capita

technique, locally weighted scatterplot smoothing (lowess) was used to produce the regression line shown in Figure 1.

Figure 1 suggests that at low levels of development incremental increases in per capita GDP result in only small improvements in the GDI. Above a certain level of per capita GDP (approximately $665), GDI improves more rapidly with increases in per capita income. However, as countries get richer (GDP per capita greater than approximately $4,900), the responsiveness of the GDI to increases in per capita GDP decreases.

b. The relevance of the GDI

One conclusion we can draw from the discussion of the GDI above is that it only gives a limited amount of new information about progress in development. This is because of the close relationship between the HDI and the GDI: as the HDI is strongly positively correlated to GDP per capita (Pyatt 1992), so too is the GDI. Because the GDI takes absolute levels of socio-economic well-being into account it is necessary to assess "... the comparative claims of more relative equality against higher absolute achievements" (Anand and Sen 1995: 4). In our view, a GDI should not assess these claims, but should measure gender inequality *as such*.

Although we agree that the absolute level of well-being matters, we think it is important to have a separate measure of gender inequality which abstracts from the absolute level of well-being, for both practical and

theoretical reasons. Whatever the absolute level of human development, a high degree of gender inequality is an ethical problem and should concern government. Furthermore, understanding of the relationship between gender equality and general welfare can only be advanced if a measure of gender inequality *as such* is available. The empirical research carried out so far has shown that socio-economic gender inequality reduces total welfare, both through the waste of resources and inefficiency inherent in not using the capacity of approximately half the population effectively, and by inappropriate economic policies.[10] So we think that a better GDI can be constructed by using a transparent indicator that captures the relative position of women vis-à-vis that of men.

The second reason why UNDP's GDI does not capture all relevant aspects of socio-economic gender inequality lies in the choice of indicators and the way these indicators are measured. This is the issue of the *validity* of the GDI, to which we now turn.

c. The validity of the GDI

The HDI and the GDI are comprised of exactly the same indicators. However, indicators that may be appropriate for measuring absolute levels of human development, are not necessarily the most appropriate for measuring gender equality or inequality. We consider income, health, and education in turn.

UNDP data showing women's share of earned income are based on the male/female difference in *urban wages*. They do not take into account rural wages, nor the intra-household income distribution, as the UNDP acknowledges (UNDP 1995: 75). "Urban wages" also exclude wages and incomes from the informal sector and income from subsistence activities. Even so, data on average male and female wages in the formal sector were available for only fifty-five countries. The average ratio of the female to male wage (75 percent) was then applied for the other 130 countries (UNDP 1995: 130). So, for most countries, the female/male wage difference was simply assumed. As a result, the validity of the outcome is hampered, but the direction of the bias is difficult to assess. We tend to believe, however, that male/female wage differences will be larger in the rural and informal sectors than in the urban formal sector, so that the average female relative wage will be overestimated. The next step in the computation involves the multiplication of this relative female wage by the female share in employment (see above). But in fact, because there are no data on the female share of employment, data on the female share of the economically active population were used. However, data on the female share in the economically active population are highly influenced by institutional characteristics of the labor market and by measurement problems. In most countries, relatively more women than men work in the informal sector and as unpaid second workers in the ventures of "self-employed" persons (their husbands). Workers in

these types of activities are not likely to be included in the "economically active population," although what they produce is generally counted as part of GDP in the national accounts. This limited coverage will probably result in an underestimation of the female share of the economically active population. It is difficult to predict the net effect of these two biases on the final value of the female share of earned income. A third bias evolves from the neglect of the intra-household income distribution. In many countries, women have little control of household income and so have little actual disposable income, even if they earn the income themselves. This neglect means that the female share of earned income indicates little about the disparities between men's and women's standard of living.

The UNDP uses data on life expectancy at birth for the GDI to capture the ability to lead a long and healthy life. This statistic is estimated in a variety of ways, using different standard life tables, depending on the data that are available and the particular demographic characteristics of the country or region. In many low-income countries life expectancy is estimated using infant and child mortality rates; hence, changes in life expectancy at birth will reflect changes in the probability of death in younger cohorts rather than in older ones. Life expectancy at birth will thus reflect sex-specific differences in infant mortality and is therefore a good indicator of the different values some societies attach to male and female human life. However, it does not include aspects of the different morbidity and disability risks that men and women may face due to differential access to food and nutrition, for example, or the particular risks women face in childbearing. Where age-specific mortality rate data are available, usually in middle- and high-income countries, life expectancy at birth will be estimated from these data and will therefore reflect sex-specific mortality risks at different ages and thus capture many aspects of gendered differences in health. Thus life expectancy at birth may not be comparable between countries.

For education, the GDI uses a combination of the adult female literacy rates and a combined primary, secondary, and tertiary school enrollment ratio. This indicator is relevant, and data are available for most countries. However, the access to education in quantitative terms does not tell us much about the product of education: the increase of cognitive and other skills. The *quality* of education is also important. Indicators for this can be number of pupils per teacher, drop-out rates, and repetition rates.

Time-use studies are reported in Chapter 4 of UNDP (1995) for thirty-one countries, and they document the higher workload for women if paid and unpaid activities are counted. As UNDP (1995: 91) states, "a higher workload leads to less leisure and even less sleep. Conventional measures of well-being, . . . , neglect this debilitating aspect of intense work. A human development perspective cannot afford to overlook it. However, time-use data are not included in the GDI, probably because they are not available for all countries.

We noted earlier that in order to interpret whether increases in the female income share constituted an improvement in the position of women, their work in unremunerated spheres (often resulting in the double and triple burden) needed to be taken into account. Time-use studies would be one way to do this. Hence, we agree with the UNDP that time is an important dimension of gender equality. And we think that efforts to extend the production boundary of conventional national income accounts so that the full contribution of women's labor time to economic and human development becomes visible should be supported and promoted by the relevant national and international institutions.

d. Conclusion

We conclude that the UNDP's GDI is a useful first step for assessing the socio-economic gender dimensions of human development. As it assumes a fairly strong social preference for gender equality, the absolute level of a country's human development (as measured by the HDI) is substantially discounted if gender inequality is high. However, the relevance of this Gender-Related Development Index is limited because absolute levels of human development play such a large role in it. And although it is possible to derive a relative measure of gender inequality from the GDI, it is not a transparent or accurate representation of gender inequality. Furthermore, the indicators used in the GDI could have greater validity.

3. MEASURING GENDER INEQUALITY AS SUCH: THE RELATIVE STATUS OF WOMEN (RSW) INDEX

An index that seeks to evaluate and compare the performance of countries on gender equality should aim to measure the position of women compared to that of men, which is a measure that is easily understood and often exactly what is meant by gender inequality. We show below that such an indicator can be easily constructed using the HDI indicators.

Using the HDI indicators an index of gender equality that abstracts from absolute levels of well-being, which we call the Relative Status of Women (RSW), can be constructed as follows:

$$RSW = \frac{1}{3}\left(\frac{E_f}{E_m} + \frac{L_f}{L_m} + \frac{w_f^*}{w_m^*}\right) \tag{3}$$

where, E_{m} and E_f is the male and female educational attainment index; L_{m} and L_f is the male and female life expectancy index; and, w_m^* and w_f^* is the male and female rate of return to labor time.

This can be rewritten as,[11]

$$RSW = \frac{1}{3}\left(\frac{E_f}{E_m} + \frac{L_f}{L_m} + \frac{Y_f}{P_f}\right) \tag{4}$$

where Y_f is the female share of earned income and, P_f is the female share of the population.

In equation (4) the indices for life expectancy and educational attainment are computed in exactly the same way as they are for the GDI (see UNDP 1995: 132). The difference between the RSW and the GDI is that for the RSW the ratios of female-to-male indices for education and life expectancy are used rather than a weighted average of the levels of these indices. For the income indicator we use the ratio of the implicit rate of return to women's to men's labor time, which does not need to be indexed as its maximum and minimum values are one and zero respectively. All components of the RSW index are weighted equally; hence if

$$RSW = \frac{E_f}{E_m} = \frac{L_f}{L_m} = \frac{w_f^*}{w_m^*} = 1 \tag{5}$$

there is equality between men and women. Whereas if $RSW < 1$, women are discriminated against and if $RSW > 1$ men are discriminated against.

Using data from the *Human Development Reports* (1995, 1996) we calculated the RSW for 136 developing countries. Figure 2 shows the relationship between the RSW and per capita GDP and Table 2 shows the ten top and bottom ranked countries (the ranking for the complete set of countries is shown in Appendix 2).

The RSW succeeds in the task of giving information about countries' level of development that is not captured by per capita GDP. Figure 2 shows that, compared to the relationship between the GDI and logged per capita income (Figure 1), the relationship between RSW and logged per capita income is weak. The scatterplot shows that there are a large number of outliers and that there is a slight tendency for greater dispersion around the regression line at lower levels of per capita income. The correlation between the level of per capita income and the RSW (R^2) is thus weak (regression results are shown in Appendix 3) and results suggest the model is almost certainly underspecified; that is, other independent variables need to be included in the regression model.

Table 2 shows the ten best and worst performers according to the RSW. Women's relative status is highest in Estonia and lowest in Yemen. According to the RSW, in contrast to the GDI,[12] the ten countries that make up the ten best performers include only two high-income countries, Finland and Sweden, seven lower middle-income ones (Estonia, Latvia, the Russian Federation, the Slovak Republic, Lithuania, Poland, and Jamaica) and one upper middle-income country, Hungary. Countries that rank as the ten worst performers include the upper middle-income country Saudi Arabia,

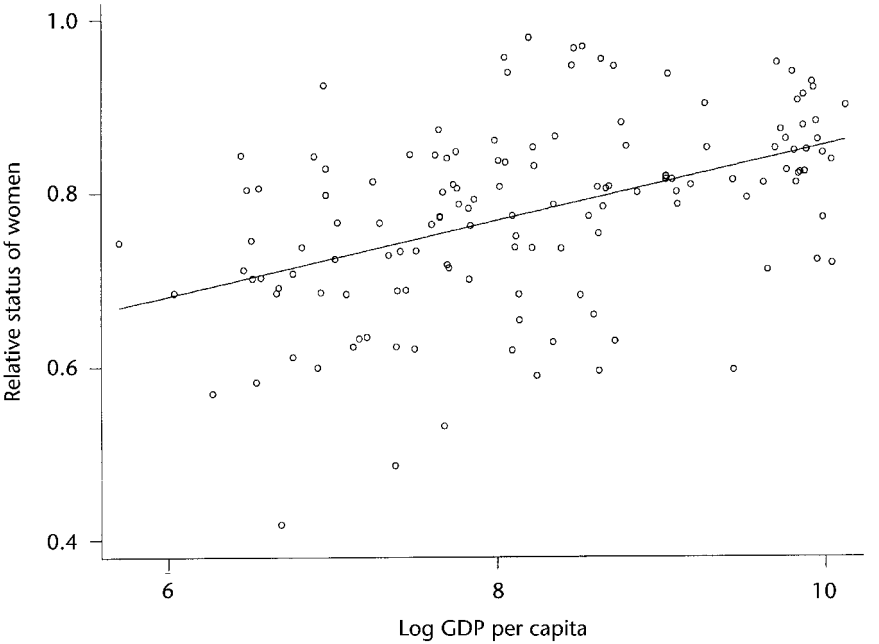

Figure 2 The correlation between the RSW and GDP per capita

one lower middle-income country (Algeria) and the low-income countries Egypt, Sierra Leone, Nepal, Chad, Mali, Pakistan, and Yemen.

The indices of life expectancy, income, and education that make up the RSW are shown in the first three columns of Table 2. The index of life expectancy is greater than one for all the top ten countries (except Jamaica) showing that women outlive men by more than the five-year global average in these countries. However, this is not the only reason for high RSW scores in the top ten countries: overall female educational attainment is higher than that of men and women's income share is more than 75 percent of men's income share. Hence women's achievements are higher than men's for the indicators of longevity, a healthy life, and knowledge and approaching men's for the indicator for the standard of living.

Female life expectancy exceeds male life expectancy by less than the expected five years in all countries that perform badly according to the RSW. Nepal and Yemen are notable as female life expectancy is only 81 and 84 percent, respectively, of male life expectancy. In all these countries women are likely to be "missing" from the population (Amartya K. Sen 1992) which suggests the female income share is less than 25 percent of the male income share for five of the ten countries and female literacy and education lags behind that of males in all countries. In Pakistan and Yemen, the female education rates are only about half those of the male education

Table 2 The Relative Status of Women (RSW)

Country	*Life expectancy (1)*	*Income (2)*	*Education (3)*	*RSW*
Best performers				
Estonia	1.151	0.790	1.024	0.978
Latvia	1.167	0.746	1.019	0.968
Russian Federation	1.182	0.721	1.023	0.966
Lithuania	1.149	0.723	1.023	0.956
Slovak Republic	1.091	0.794	1.005	0.954
Finland	1.059	0.788	1.029	0.949
Poland	1.090	0.767	1.009	0.946
Hungary	1.105	0.753	1.007	0.945
Sweden	1.013	0.822	1.010	0.939
Jamaica	0.988	0.768	1.088	0.938
Worst performers				
Yemen	0.837	0.180	0.452	0.485
Pakistan	0.922	0.209	0.478	0.531
Mali	0.918	0.231	0.573	0.569
Chad	0.924	0.325	0.513	0.582
Egypt	0.935	0.167	0.681	0.588
Algeria	0.938	0.149	0.712	0.594
Saudi Arabia	0.957	0.106	0.741	0.595
Nepal	0.811	0.542	0.460	0.598
Sierra Leone	0.875	0.515	0.461	0.611
Morocco	0.959	0.328	0.586	0.618

Notes: (1) ratio of female-to-male life expectancy index; (2) ratio of female income share to female population proportion; (3) ratio of female-to-male education index.

rates. For countries that have low RSW scores policy interventions that increase women's health and life expectancy, access to education, and income are needed.

Table 3 shows the countries for which use of the RSW improves their allocated ranked performance on gender equality most and least in comparison with the GDI (the full country data set is shown in Appendix 4). Use of the RSW results in substantial rank reversals. Vietnam moves from a rank of 91 according to the GDI to number 13 in the RSW ranking and the United Arab Emirates drops from 39th place in the GDI ranking to 99th place in the RSW ranking. Interestingly, some low-income countries in the Americas (Haiti and Jamaica) and in sub-Saharan Africa (Tanzania, Lesotho, Swaziland, and Madagascar) also score much better on gender equality when a straightforward relative measure is used.

The RSW thus provides a good indicator of gender equality that abstracts from absolute measures of development and thus provides new information. However, a high RSW score does not imply that a country's gender relations are ideal or that policy interventions that aim to change gender relations or advance the position of women are not necessary. For instance,

Table 3 The GDI and RSW compared: changes in country rankings

Country	*GDI rank− RSW rank*	*GDI rank*	*RSW rank*
Countries showing greatest improvement in ranking			
Vietnam	78	91	13
Tanzania	74	111	37
Haiti	67	112	45
Lesotho	62	101	39
Mongolia	61	83	22
Swaziland	57	84	27
Lithuania	53	57	4
Slovak Republic	51	56	5
Madagascar	51	56	63
Jamaica	50	60	10
Countries showing greatest deterioration in ranking			
United Arab Emirates	−60	39	99
Spain	−59	12	71
Greece	−53	22	75
Bahrain	−53	51	104
Algeria	−50	81	131
Libya	−49	73	122
Tunisia	−49	68	117
Egypt	−45	87	132
Saudi Arabia	−45	85	130
Costa Rica	−45	31	76
Iran	−45	75	118

the index does not capture some aspects of gender relations, such as gender-based violence. In addition, absolute levels of well-being in men and women remain important and are considerations in policy design. In some instances, a high RSW score may be the result of low scores for men and may thus point to the need to design policy interventions to advance the well-being of men. In many former Soviet Union and Eastern European countries a life expectancy index value of greater than one is due to high *male* mortality (e.g. through increased suicide rates and death from alcohol abuse and drug addiction), related to the human costs of economic and social transition. Apart from male suffering this also leads to increased pressure on women as they are left as single providers for families. Hence, the RSW needs to be contextualized in a wider range of country-specific qualitative and quantitative information.

These reservations also hold for using the RSW to chart a country's progress on gender equality over time. Recent research has shown that reductions in gender inequality in education, health, and wages have occurred in some countries due to falls in male indicators, rather than rises in female ones (Pauline Rose 1995). The RSW would improve under

such circumstances, so we reiterate that the RSW should be used in conjunction with other measures of well-being to judge changes in the human development situation of women in a particular country over time. Although improvements in the RSW imply that women and men share more equally the successes and disadvantages of a society, it must be borne in mind that this greater equality could have been gained at the cost of a lower overall standard of living and the associated social stresses that accompany it.

Our analysis above shows that it makes a large difference to the assessment of a country's performance if a relative measure of the position of women compared to that of men, rather than a weighted average of female-to-male achievement, is used to measure a country's performance on gender. Using a transparent relative measure of gender performance, based on the HDI indicators, several lower middle-income countries are ranked above the USA, the U.K., and Japan. Higher per capita income does not automatically translate into a high RSW ranking. However, before we can draw any policy conclusions about the RSW, we have to address the issue of whether the HDI indicators are the appropriate indicators to use to measure gender inequality.

4. AN ALTERNATIVE FRAMEWORK FOR MEASURING SOCIO-ECONOMIC GENDER INEQUALITY

Gender inequality in well-being manifests itself in many forms. Empirical evidence shows men earn more than women. Women have less access to assets such as land, natural resources, other physical assets, education, technology, and credit. They also experience an unequal burden, i.e. a higher workload, although the major part of this workload is invisible in economic accounts. *If* women participate in the labor market, they tend to occupy jobs of lower status and income. Women also tend to have less decision-making power or less autonomy, in both their households and communities and in the governing bodies of their states. In many societies, laws do not treat women as equal to men. Cultural beliefs and norms often imply that women are second-rank human beings. The physical integrity of women tends to be more in danger than that of men: women and girls are more vulnerable than men to domestic violence and to rape (UNDP 1995).

However, as we have argued above, the GDI does not adequately capture the extent of gender inequality. Hence, we wish to explore the possibility of constructing alternatives to the GDI. For the moment, we do not try to measure gender inequality in dimensions related to culture, the socialization of gender identity, autonomy, and power, although these factors are often important underlying causes for socio-economic inequality between

men and women. These factors are more difficult to measure, and could be integrated at a later stage.

Our current aims are:

- to identify those dimensions and indicators of inequality that are, alone or together, most appropriate for measuring socio-economic gender inequality at a given time;
- to classify these indicators according to causal links; and
- to identify dimensions and variables useful for measuring socio-economic gender inequality over time.

A complicating factor is that indicators that are appropriate for measuring the extent of the problem and identifying the causes of the problem at a specific time may not always be relevant for monitoring the effect of policies over time (see also Lucia C. Hanmer *et al.* 1997).

The starting point for our causal framework is the statement that human well-being, and also inequality of well-being, has a *stock* and a *flow* dimension. The former is measured in appropriate units, while the latter is measured in appropriate units *per unit of time*. In general, more access to stocks, or *assets* (e.g. land, education, health status), will increase flow aspects of well-being (e.g. income). At the same time, increased flows may lead to larger stocks, but we tend to think that the effect of stocks on flows is the more important causal relationship. For that reason, we start our discussion of variables by looking for appropriate flow dimensions of well-being, considering them to be the dependent variables in our causal framework.

a. Dependent variables

Among potential flow variables, income comes to mind first. However, the usual indicator for measuring income has several limitations. In order to establish income inequality by sex, we need to measure *actual disposable income* of men and women. This means, on the one hand, adding income derived from subsistence activities and household tasks, and on the other, subtracting income used for other members of the household (or the network of relatives). Since available statistics generally do not give data on nonmarket activities and on the intra-household distribution of income, the (formal) income variable has to be complemented by other variables.

It is well known that there is marked gender inequality in the division of subsistence activities, household tasks, and unpaid work in general, and that this inequality is a phenomenon of all societies (ILO 1992; UNDP 1995). The indicator with which this has been established is *time use*. The time used by men and women in different activities seems therefore an important variable for measuring gender inequality in well-being. This is also a flow variable, since we measure time spent per unit of time (a day or a week).

Case studies in several countries, particularly developing countries, have shown that the intra-household distribution of income and other household resources tends to be uneven. The main dimension in which this could be established is gendered indicators of *health*. Important variables are nutritional status or the intake of food. In low-income societies, food consumption is strongly related to actual disposable income. Nutrients intake, a flow variable, would be a suitable indicator. There is also a strong relation between nutritional status, and thus height, and food consumption (John Komlos 1994). The stock variable height can therefore also be used as an indicator, although "normal" differences between men and women should be taken into account. Differences in nutritional status have been shown to be important to explain the "missing women" in South Asia. Satish B. Agnihotri (1997), for example, states that the low proportion of women to men in the population of some Indian states arises from the differential access of women to food and health care. Other indicators of health status, such as micro-nutrient deficiencies and vaccination uptake, can also be used.

In sum, we think gender inequality at a certain point in time can be measured by the flow variable income, the flow variable time use, and health variables such as food intake (flow indicator) or height (stock indicator). These three variables are the dependent variables in the analysis of socio-economic gender inequality. Health indicators are especially important in low-income societies or in the low-income strata of the population in rich societies.

b. Independent variables

In general, we assume that *unequal access to assets* is an important cause for gender inequality in well-being. Assets that are relevant for gender inequality are land, other physical assets such as cattle or domestic utensils or tools, and education. However, we have to expand these assumptions in several directions. It is important to take into account unequal access to *all* public services, not only health and education, but also agricultural extension services, welfare services such as unemployment benefits, child care,[13] housing, and public infrastructure.

Some of these assets are available through the market, but others are not. Ingrid Palmer (1995) stressed the importance of male bias in cases where markets are absent; for example, in the public provision of infrastructure and services. New agricultural technology is directed to the work male farmers do, and not to the activities of female farmers, and trunk roads are widened while no roads are built into the hills to connect more households to the market, thereby allowing women to sell their products. In these non-market dimensions, the gender bias is not (only) expressed as discrimination in access to assets, but as an *inherent bias*: one relating to the type of asset available. Deborah Fahy Bryceson and Michael K. McCall (1997) give

some other examples of inherent biases. In Asia, public space is often synonymous with male space; hence, women feel uncomfortable negotiating access to assets which require entering government offices or banks and may be unable to do so. Even when new technologies are designed to reduce the drudgery of tasks undertaken by women, they are not necessarily free from male bias. Grain mills, water pumps, or community wood lots are often designed to operate on a village or community scale. However, in many cases women would be better served if these technologies were designed for use at the household level, as the time and opportunity costs of using village-level resources are high.

In addition to these assets, broadly defined as including government services, there are other assets that influence gender inequality in well-being. Land, other physical assets, credit, and employment are mostly distributed through markets. For these assets, inherent biases are less important, as different types of these assets are usually available at different market prices. The unequal access of men and women to these assets may thus have both a quantitative and a qualitative aspect. For example, regarding access to employment, women tend to be over represented in lower-paid and lower-status jobs with fewer career opportunities. In general, in countries where there is a "dual market" with "formal" and "informal" segments, women tend to have more access to the goods and services of the lower, informal segment (OECD 1994; Dina Vaiou and Maria Stratigaki 1997). The informal segment of the labor market offers less financial security, and worse primary and secondary labor conditions than the formal one. A similar phenomenon occurs in financial markets. Women tend to have less access than men to the formal credit market. They are hence more dependent on informal credit, where quantities are smaller and interest rates higher (Sharon Holt and Helena Ribe 1991; Thea Hilhorst and Harry Oppenoorth 1992; UNDP 1995). Furthermore, data show that in all the major developing regions of the world, on average, boys can expect to spend more years in school than girls (World Bank 1995). Girls and boys sometimes also have unequal access in qualitative terms to a government service like education. Drop-out rates vary by gender world-wide and within regions (Barbara Herz and Shahidur Khandker 1991).

Finally, it is important to search for causes of the unequal access. Following Barbara Krug (1997), we distinguish between a supply and a demand side of discrimination. Providers of goods and services (the supply side of the market) tend to discriminate against women. The causes on the supply side may include discriminating laws, traditions, norms, and beliefs in addition to vested interests and differences in power.

On the demand side, unequal access is caused by, or accepted out of necessity, because of the high costs involved or barriers to access stemming from other inequalities. Existing inequalities ensure that women participate in markets starting with fewer resources and thus on unequal terms of

participation (Ingrid Palmer 1992). For example, women's lower incomes and smaller rates of land ownership reduce the chances of their getting credit as they cannot offer collateral (Holt and Ribe 1991; Hilhorst and Oppenoorth 1992). With respect to high costs, we can distinguish between direct costs, opportunity costs, and transaction costs. In some cases, direct costs may be too high; for example, for health services. Opportunity costs are higher for women since women often have a greater responsibility than men for taking care of children and for family care in general. Palmer (1992) has typed this the "reproductive labor tax" on female participation in the labor market. But it can be applied to other markets, too. These opportunity costs make women less mobile, so that their threshold for participating in labor or credit markets is higher. Finally, transaction costs may be important, particularly exit costs, information costs, and search and scrutiny costs involved in searching for a less discriminating employer or husband (Krug 1997). A lack of information on available financial services has been shown to be a factor in reducing access to credit for women (Holt and Ribe 1991; Hilhorst and Oppenoorth 1992). On the demand side, culture, often transmitted through socialization, may also play a role, as may a lack of women's autonomy and/or physical oppression. For example, cultural perceptions about the relative importance of education for boys and girls and the gender division of labor can mean that girls miss more school days than boys (Herz and Khandker 1991).

Table 4 summarizes the causes and consequences of gender inequality in the different dimensions discussed above. The table does not explore in detail underlying causes for the inequalities identified, such as laws, culture, socialization, or power. It is important to bear in mind that these other factors not only have an impact on supply-and-demand factors of "unequal access," but also influence the "effects," the last column, directly. For example, research has shown that even after controlling for levels of the job, education, and experience, a gendered income gap persists.[14] And women can earn less than men even when they do the same job, or when they perform work of equal value (Jeanne de Bruijn 1997). Culture, and in particular gender identities, influence inequality in all dimensions and in all indicators. Although these causes are less amenable to policy intervention, there is some evidence that changing socio-economic variables may lead to changing gender identities (Jane Wheelock 1990), although no change is sometimes also an outcome (Arlie Russell Hochschild and Anne Machung 1989).

We now turn to the question of whether we can use the same indicators for measuring inequality over time, i.e. for monitoring the effects of policies. As a recent study on the measurement of poverty concluded (Hanmer *et al.* 1997), *assets* are important for assessing socio-economic well-being over time. For measuring gender inequality, we can say that if inequality is to be reduced over time, increased relative *flows* should lead to increased

Table 4 Gender inequality in different dimensions, causes and consequences

Dimension	*Inherent male bias*	*Access to: quantity*	*Access to: quality*	*Supply factors*	*Demand factors*	*Consequences*
Technology	Yes	Yes		Extension by men	Opportunity costs: time	Lower income Less time saving Less health
Housing, other infrastructure	Yes	Yes (safety reasons)			Costs	Lower income Less time saving Less health
Health services	Yes	Yes	Yes	Tradition	Costs, time	Less health Lower income
Education	Yes	Yes	Yes	Tradition	Costs, time	Lower income Less health
Other state services	Yes	Yes	Yes	Laws		Lower income Less health
Land and natural resources		Yes	Yes	Laws		Lower income Less time saving Less health
Other physical assets		Yes	Yes	Laws		Lower income Less time saving Less health
Employment		Yes	Yes: more informal labor, worse labor conditions, segregation	Discrimination	Lack of child care, lack of mobility	Lower income
Credit		Yes	Informal credit market, higher interest rate	Discrimination, lack of collateral	Less time to fulfill requirements	Lower income

relative *assets* holdings. It seems to be appropriate, therefore, to add land, physical assets, monetary savings, and the human capital asset education to the already identified (dependent) variables income, health, and time use.

In summary, we have proposed an alternative framework for measuring socio-economic gender inequality at a certain point in time. We think that our three dependent variables income, time, and health, taken together, do make for a valid assessment of this inequality. In addition, we think that our classification of independent variables constitutes a relevant scheme for searching for causal links and may be helpful in identifying policies for reducing gender inequality.

5. SUMMARY AND CONCLUSION

Producing a comparable measure of gender inequality for all countries matters, as such an index of gender inequality has both practical and theoretical relevance. First, governments that become aware of, and are publicly known for, a lack of gender equality in their countries, are more likely to carry out policies to reduce this inequality (e.g. Pakistan's recent efforts to increase female education). Second, there is also a theoretical interest in establishing such a measure of gender inequality, as it can be used to advance our understanding of the relationship between gender inequality and general welfare.

The UNDP's *1995 Human Development Report* took an important step toward developing such measures of gender inequality, constructing and publishing a GDI (Gender-Related Development Index) and a GEM (Gender Empowerment Measure). Here we have concentrated on socio-economic gender equality and on the relevance and validity of the UNDP's GDI. In our view, developing a measure of socio-economic gender inequality has three aims: (1) to identify the extent of inequality at a certain point in time; (2) to identify causes for inequality with a view to suggesting policies to reduce inequality; and (3) to monitor the impact of these policies over time. We found that the GDI cannot meet these aims for the following reasons.

First, the GDI combines a measurement of gender inequality with measures of absolute well-being. The GDI therefore has limited conceptual relevance. Second, the variables and indicators used for constructing the GDI are not always appropriate. Third, because the GDI focuses on measuring inequality at a certain point in time, it cannot consider dynamic relationships among variables and hence the possible causes of socio-economic gender inequality, which reduces its policy relevance.

To demonstrate the benefits of using an indicator that abstracts from the absolute level of well-being in order to measure gender equality, we constructed the Relative Status of Women (RSW) index. The RSW is based on the same indicators as the GDI (and the HDI), namely educational

attainment, longevity, and income. However, it is a relative measure that assesses the position of women compared to that of men. The RSW shows gender equality as being highest in Estonia and lowest in Afghanistan. Unlike the GDI, the RSW has only a weak correlation with per capita income and so it gives information about a country's level of development that is not captured by per capita income. We stress, however, that a high RSW does not imply that gender relations are ideal or that policy interventions that aim to change gender relations or advance the position of women are not necessary. And, as gender relations are socially specific and depend on history, ideology, and culture as well as material economic development, any final judgment of the greater progress in gender equality in one country vis-à-vis another has to be contextualized in more country-specific, qualitative, and quantitative information on both men and women. Notwithstanding a high RSW, a country may need policies to address women's position in spheres not captured by the RSW (e.g. gender-based violence), as well as policies designed to increase male life expectancy, educational attainment, or income-generating capacity.

In the last section of this paper, we developed a conceptual framework for measuring socio-economic gender equality. The framework is based on the notion that well-being at a certain point in time can be measured by (mainly) flow variables, but that stock variables are the determinants of this well-being.

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NOTES

[1] The following section draws heavily on Anand and Sen (1995: 4–7).

[2] However, a special case occurs when ε is set equal to one when,

$$\log (X_{ede}) = p_f \log X_f + p_m \log X_m$$

[3] Formally, if:

$\varepsilon = 0$ X_{ede} equals the population weighted arithmetic mean
$\varepsilon = 1$ X_{ede} equals the population weighted geometric mean
$\varepsilon = 2$ X_{ede} equals the population weighted harmonic mean
and
$\varepsilon \to \infty$ X_{ede} tends to the value of the lower achievement

[4] Population shares are used as weights. Hereafter, all means referred to in the text are weighted by the population share.

[5] Per capita GDP is measured in purchasing power parity (PPP) dollars and it is discounted to reflect the diminishing marginal utility of income (using the Atkinson formulation for the utility of income) if it is greater than the world average per capita income.

[6] For any component of the HDI the calculation is

$$Index = \frac{Actual\ x_i\ value - minimum\ x_i\ value}{Maximum\ x_i\ value - minimum\ x_i\ value}$$

The HDI maxima and minima values for per capita GDP and educational attainment are used in the GDI. For life expectancy an adjustment is made to reflect the fact that for biological reasons women's life expectancy at birth is longer than men's. A minimum value of 25 years and a maximum value of 85 years are used for life expectancy in the HDI. In the GDI a minimum value of 22.5 is used for male life expectancy whereas for female life expectancy a minimum value of 27.5 is used (see UNDP 1995: 130–2 for greater detail).

[7] The total wage bill is:

$$WL = W_f L_f + W_m L_m$$

where W stand for wages, and L for employment. The subscript f stands for female and the subscript m for male. We can calculate the share of wages (income) going to women by dividing both sides by $W * L$:

$$1 = W_f/W * L_f/L + W_m/W * L_m/L$$

The first term on the right-hand side is the female share in total income (UNDP 1995: 132).

[8] The income measure incorporated into the GDI, equally distributed income (Y_{ede}) is calculated as follows:

$$Y_{ede} = \bar{Y} \left[p_m \left(\frac{1}{p_m} y_m \right)^{1-\varepsilon} + p_f \left(\frac{1}{p_f} y_f \right)^{1-\varepsilon} \right]^{1/1-\varepsilon}$$

where: p_m and p_f is the proportion of males and females in the population; y_m and y_f is the male and female share of earned income; $\bar{Y}$ is income (GDP) per capita.

This is equivalent to calculating the harmonic mean of the population proportion weighted male and female income per capita, as given:

$$\bar{Y} = \bar{Y}_m + \bar{Y}_f$$

and

$$N = M + F \quad \text{and} \quad Y = Y_m + Y_f$$

where N is total population, M is total male population, F is total female population, Y is total income (GDP), and Y_m and Y_f is total income (GDP) accruing to men and women.

Hence men's income per capita is

$$\frac{Y_m}{P_m}\bar{Y} = \frac{\frac{Y_m}{Y}}{\frac{M}{M+F}}\frac{Y}{N} = Y_m$$

and an analogous calculation can be made for women's income per capita.

[9] In many countries this will not be the case as women have longer life expectancy even after biological differences in life expectancy are controlled for.

[10] See, for example, Diane Elson (1995), Carmen Diana Deere (1995), and Franziska Gassmann (1995).

[11] Take the case of Trinidad and Tobago where women make up 50 percent of the population but get only about 25 percent of total earned income. If we assume that men and women spend the same amount of time working, although the distribution of that time between the monetized and nonmonetized sectors of the economy may be quite different, implicitly the average returns to men's labor time is double the average returns to women's labor time. Hence,

$$\frac{w_f^*}{w_m^*} = \frac{Y_f}{p_f}$$

where w_f^* and w_m^* is the average returns to women's and men's labor time; Y_f is the proportion of total income earned by women and p_f the proportion of women in the total population. If the standard neoclassical assumptions hold and wage rate approximates for the rate of return to labor time, this equals the ratio of women's to men's average wages.

[12] The countries ranked in the top ten by the GDI are all high-income economies and those in the bottom ten all low-income economies (World Bank 1996 classifications used).

[13] With respect to child care, the relevant indicator is not unequal access, but the relative attention for child care provisions in public and private sector policies, compared to attention for other services.

[14] For the Netherlands, see for example a recent study by Cornelis Bartels and T. de Groot (1996). Their study of firms in commercial services concludes that women are paid less, even taking into account also the eventual higher costs involved in hiring women (higher turnover, child care for example).

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APPENDIX 1

Table A1 Components of the GDI

Country	*Life expectancy (female)*	*Life expectancy (male)*	*Female income share*	*Female adult literacy*	*Male adult literacy*	*Combined school enrollment ratio (female)*	*Combined school enrollment ratio (male)*
Greatest improvement							
Poland	75.7	74.4	39.3	99.0	99.0	76.4	74.4
Hungary	73.8	64.5	39.1	99.0	99.0	66.9	66.1
Slovakia	75.4	66.5	39.7	99.0	99.0	72.1	70.7
Czech Republic	74.9	67.8	40.5	99.0	99.0	69.0	67.6
Latvia	74.9	63.7	39.9	99.0	99.0	69.2	66.0
Russian Federation	73.6	61.7	38.4	98.7	98.7	69.7	67.3
Thailand	71.8	66.3	34.6	91.4	95.8	52.8	53.1
Estonia	74.8	63.8	39.5	99.0	99.0	72.0	68.9
Jamaica	75.8	71.0	38.6	87.9	79.4	64.6	64.5
Lithuania	76.0	64.9	38.1	98.4	98.4	67.5	65.6
Greatest fall							
Spain	80.5	74.6	18.6	98.0	98.0	88.7	83.0
United Arab Emirates	75.3	72.9	6.8	77.4	77.8	83.9	76.3
Bahrain	74.1	69.8	10.1	76.8	87.2	85.8	81.3
Saudi Arabia	71.4	68.4	5.3	46.3	69.9	49.3	55.0
Algeria	68.3	66.0	7.5	44.1	70.5	59.9	71.2
Costa Rica	78.6	74.0	19.0	94.4	94.2	65.7	67.9
Yemen Republic	50.6	50.1	9.2	26.0	50.0	22.5	65.2
Libya	65.0	61.6	7.5	57.4	85.8	66.4	66.0
Netherlands	80.4	74.4	25.2	99.0	99.0	86.5	89.4
Egypt	65.1	62.7	8.2	37.0	62.4	62.0	74.7

APPENDIX 2

Table A2 The Relative Status of Women (RSW) Index compared to the Human Development Index (HDI) and the Gender-Related Development Index (GDI). (Data sources UNDP 1995, 1996)

Country	*RSW*	*HDI*	*GDI*
Estonia	0.978	0.749	0.740
Latvia	0.968	0.820	0.806
Russian Federation	0.966	0.804	0.790
Lithuania	0.956	0.719	0.709
Slovak Republic	0.954	0.864	0.710
Finland	0.949	0.935	0.921
Poland	0.946	0.819	0.802
Hungary	0.945	0.855	0.835
Sweden	0.939	0.933	0.929
Jamaica	0.939	0.702	0.693
Czech Republic	0.936	0.872	0.853
Denmark	0.927	0.924	0.913
Vietnam	0.924	0.543	0.539
Norway	0.920	0.937	0.926
France	0.913	0.935	0.913
Australia	0.906	0.929	0.912
Barbados	0.902	0.906	0.884
United States	0.900	0.940	0.923
Japan	0.882	0.938	0.897
Thailand	0.880	0.832	0.811
Austria	0.877	0.928	0.887
Mongolia	0.872	0.578	0.572
New Zealand	0.872	0.927	0.906
Belarus	0.864	0.787	0.778
United Kingdom	0.861	0.924	0.884
Canada	0.860	0.951	0.927
Swaziland	0.860	0.586	0.566
Uruguay	0.853	0.883	0.837
Kazakhstan	0.852	0.740	0.732
Portugal	0.852	0.878	0.833
Bahamas	0.851	0.895	0.879
Belgium	0.849	0.929	0.885
Italy	0.848	0.914	0.856
Kyrgyz Republic	0.847	0.663	0.661
Hong Kong	0.845	0.909	0.843
Georgia	0.844	0.645	0.646
Tanzania	0.844	0.364	0.359
Armenia	0.843	0.680	0.677
Lesotho	0.842	0.464	0.454
Azerbaijan	0.840	0.665	0.661
Switzerland	0.837	0.926	0.869
Cuba	0.836	0.726	0.699
South Africa	0.835	0.649	0.622
Romania	0.831	0.738	0.726
Haiti	0.828	0.359	0.354

Table A2 Continued

Country	*RSW*	*HDI*	*GDI*
Netherlands	0.825	0.938	0.898
Singapore	0.824	0.881	0.833
Germany	0.823	0.920	0.883
Iceland	0.821	0.934	0.920
Malaysia	0.818	0.826	0.722
Venezuela	0.818	0.859	0.792
Argentina	0.815	0.885	0.766
Trinidad	0.815	0.872	0.809
Mauritius	0.814	0.825	0.740
Kenya	0.813	0.473	0.469
Brunei	0.811	0.872	0.808
Ireland	0.811	0.920	0.835
Nicaragua	0.810	0.568	0.544
Korea Republic	0.809	0.886	0.816
Panama	0.807	0.859	0.784
Sri Lanka	0.807	0.698	0.679
Brazil	0.807	0.796	0.739
Madagasca	0.806	0.349	0.346
China	0.805	0.609	0.601
Colombia	0.805	0.840	0.797
Myanmar	0.804	0.451	0.447
Guyana	0.801	0.634	0.604
Chile	0.801	0.882	0.767
Mexico	0.800	0.845	0.755
Central African Republic	0.798	0.355	0.346
Spain	0.794	0.933	0.898
Philippines	0.792	0.666	0.644
El Salvador	0.787	0.576	0.544
Turkey	0.786	0.711	0.680
Greece	0.786	0.909	0.853
Costa Rica	0.783	0.884	0.813
Lebanon	0.781	0.664	0.615
Indonesia	0.773	0.641	0.616
Botswana	0.773	0.741	0.723
Zimbabwe	0.772	0.534	0.525
Honduras	0.771	0.576	0.542
Kuwait	0.770	0.836	0.719
Comoros	0.765	0.399	0.391
Lao PDR	0.765	0.400	0.387
Ghana	0.763	0.467	0.459
Papua New Guinea	0.762	0.504	0.490
Fiji	0.753	0.853	0.734
Paraguay	0.749	0.704	0.649
Burundi	0.745	0.282	0.271
Zaire	0.743	0.371	0.364
Uganda	0.737	0.326	0.318
Peru	0.737	0.694	0.634
Dominican Republic	0.736	0.701	0.641
Ecuador	0.735	0.764	0.661

Table A2 Continued

Country	*RSW*	*HDI*	*GDI*
Cape Verde	0.733	0.539	0.517
Benin	0.733	0.327	0.311
Nigeria	0.728	0.400	0.380
Zambia	0.724	0.411	0.405
United Arab Emirates	0.722	0.864	0.792
Qatar	0.718	0.839	0.700
Maldives	0.717	0.610	0.599
Cameroon	0.713	0.482	0.455
Mozambique	0.711	0.261	0.245
Bahrain	0.711	0.866	0.726
Guinea-Bissau	0.707	0.297	0.281
Malawi	0.703	0.321	0.312
Angola	0.701	0.283	0.270
Bolivia	0.700	0.584	0.549
Niger	0.691	0.204	0.192
Senegal	0.688	0.331	0.314
Cote d'Ivoire	0.687	0.357	0.328
Togo	0.686	0.385	0.364
Ethiopia	0.685	0.237	0.227
Burkina Faso	0.685	0.225	0.211
Gambia	0.684	0.292	0.275
Guatemala	0.683	0.580	0.506
Tunisia	0.682	0.727	0.647
Iran	0.659	0.754	0.618
Iraq	0.653	0.599	0.486
Sudan	0.633	0.359	0.327
Bangladesh	0.631	0.365	0.336
Libya	0.628	0.792	0.633
Syrian Arab Republic	0.628	0.690	0.591
India	0.623	0.436	0.410
Mauritania	0.622	0.353	0.338
Guinea	0.620	0.306	0.286
Morocco	0.618	0.534	0.486
Sierra Leone	0.611	0.219	0.196
Nepal	0.599	0.332	0.308
Saudi Arabia	0.595	0.772	0.551
Algeria	0.594	0.746	0.596
Egypt	0.588	0.611	0.545
Chad	0.582	0.291	0.275
Mali	0.569	0.223	0.215
Pakistan	0.531	0.442	0.383
Yemen Republic	0.485	0.366	0.311
Afghanistan	0.417	0.229	0.196

APPENDIX 3

Table A3 Regression model: the Relative Status of Women (RSW) index regressed on logged per capita GDP (dependent variable: RSW)

Constant	*Log GDP per capita*	*Adj. R^2*	*N*
0.420 (6.00)	0.435 (6.98)	0.21	137

Note: t-statistics in parentheses.

APPENDIX 4

Table A4 Comparisons of country ranks by RSW and GDI

Country	*GDI– RSW*	*GDI*	*RSW*
Vietnam	78	91	13
Tanzania	74	111	37
Haiti	67	112	45
Lesotho	62	101	39
Mongolia	61	83	22
Swaziland	57	84	27
Lithuania	53	57	4
Slovak Republic	51	56	5
Madagascar	51	114	63
Jamaica	50	60	10
Estonia	45	46	1
Central African Republic	43	113	70
Kenya	43	98	55
Burundi	40	129	89
Russian Federation	37	40	3
Myanmar	36	102	66
Georgia	33	69	36
Latvia	33	35	2
Kyrgyz Republic	32	66	34
South Africa	31	74	43
Nicaragua	30	88	58
Poland	29	36	7
Uganda	28	119	91
Niger	28	137	109
Mozambique	28	131	103
Benin	27	123	96
Armenia	25	63	38
Azerbaijan	24	64	40
Angola	23	130	107
Comoros	22	105	83
Lao PDR	22	106	84
Kazakhstan	21	50	29
Guinea-Bissau	21	126	105
Burkina Faso	20	134	114
Ethiopia	19	132	113
Hungary	19	27	8
Zaire	19	109	90
Belarus	18	42	24
Cuba	17	59	42
El Salvador	16	89	73
Malawi	15	121	106
China	15	79	64
Ghana	14	99	85
Gambia	13	128	115
Czech Republic	12	23	11
Zimbabwe	12	92	80
Thailand	12	32	20

Table A4 Continued

Country	*GDI− RSW*	*GDI*	*RSW*
Guyana	11	78	67
Nigeria	11	108	97
Senegal	10	120	110
Honduras	9	90	81
Papua New Guinea	9	95	86
Sierra Leone	8	136	128
Romania	8	52	44
Côte d'Ivoire	6	117	111
Zambia	6	104	98
Malaysia	4	54	50
Sri Lanka	1	62	61
Lebanon	0	77	77
Barbados	0	17	17
Mali	−1	133	134
Finland	−1	5	6
Portugal	−1	29	30
Guinea	−1	125	126
Togo	−2	110	112
Cape Verde	−2	93	95
Indonesia	−2	76	78
Afghanistan	−2	135	137
Sudan	−2	118	120
Philippines	−2	70	72
Cameroon	−2	100	102
Uruguay	−3	25	28
Nepal	−5	124	129
Denmark	−5	7	12
Bangladesh	−5	116	121
Japan	−6	13	19
Chad	−6	127	133
Mauritius	−7	47	54
Austria	−7	14	21
Australia	−7	9	16
France	−7	8	15
Sweden	−8	1	9
Argentina	−8	44	52
United Kingdom	−9	16	25
Mauritania	−10	115	125
Hong Kong	−11	24	35
Norway	−11	3	14
Italy	−12	21	33
Bahamas	−12	19	31
Venezuela	−13	38	51
New Zealand	−13	10	23
Turkey	−13	61	74
Brazil	−14	48	62
Yemen Republic	−14	122	136
United States	−14	4	18
Belgium	−17	15	32

Table A4 Continued

Country	*GDI− RSW*	*GDI*	*RSW*
Panama	−19	41	60
Singapore	−19	28	47
Trinidad	−20	33	53
Peru	−20	72	92
Switzerland	−21	20	41
Paraguay	−21	67	88
Maldives	−21	80	101
India	−21	103	124
Iraq	−22	97	119
Brunei	−22	34	56
Dominican Republic	−22	71	93
Guatemala	−22	94	116
Bolivia	−22	86	108
Canada	−24	2	26
Mexico	−24	45	69
Chile	−25	43	68
Botswana	−26	53	79
Kuwait	−27	55	82
Colombia	−28	37	65
Pakistan	−28	107	135
Korea Republic	−29	30	59
Ecuador	−29	65	94
Germany	−30	18	48
Ireland	−31	26	57
Morocco	−31	96	127
Netherlands	−35	11	46
Fiji	−38	49	87
Syrian Arab Republic	−41	82	123
Qatar	−42	58	100
Iceland	−43	6	49
Iran	−43	75	118
Costa Rica	−45	31	76
Saudi Arabia	−45	85	130
Egypt	−45	87	132
Tunisia	−49	68	117
Libya	−49	73	122
Algeria	−50	81	131
Bahrain	−53	51	104
Greece	−53	22	75
Spain	−59	12	71
United Arab Emirates	−60	39	99