Female labour market participation and economic growth

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Abstract: This paper investigates the impact of economic growth on the dynamics of gender inequality in the labour market. Economic studies suggest a positive impact of female labour market participation on growth but the impact of growth on women's labour market participation is not as clear. Recent cross-country studies assume that economic growth first lowers female labour market participation and then increases it in the long-run (the 'feminisation U') but do not give precise estimation results. This study tests the hypothesis of the 'feminisation U' based on a panel data set (combination of cross country and time series data) which allows to control for problems of endogeneity. The econometric analysis confirms the hypothesis of a 'feminisation U'. This indicates that it is not sufficient in the short-term to rely on the equalising effects of economic growth to increase the entry of women into the labour force. Active labour market policies are needed particularly in developing countries to promote women's labour market participation in the interest of overall economic growth.

Keywords: gender; labour market policies; economic growth; sustainable development.

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1 Introduction

There exists a series of theoretical arguments and empirical studies that investigate the impact of gender-specific disparities in employment on a country's macroeconomic growth in terms of GDP per capita. Economists today agree that the active participation of women in the work force positively contributes to growth. Concerning the inverse impact of growth on women's labour market participation, to date theoretical frameworks and empirical investigations do not offer a clear answer.

On the theoretical side, there exist two different approaches. Whereas the 'modernisation neoclassical approach' suggests a purely positive impact of growth on female labour market participation, the 'feminisation U' hypothesis suggests a convex impact, meaning that growth first lowers women's labour market participation and increases it only in the long-run. Most empirical cross-country studies assume the

'feminisation U' hypothesis, yet they do not yield precise results. The shortcoming of the present empirical results is mainly caused by endogeneity problems that are not sufficiently taken into account by the applied empirical methods.

Answering the question if growth unambiguously promotes female labour market participation or if growth also can lower female labour market participation is of scientific and political interest. The intuitive assumption that growth-promoting policies automatically encourage female labour market participation bears the risk to renounce implementing policies that empower women's status on the labour market. Yet, if one cannot trust the equalising effects of growth, female labour market participation will be less than its potential level. This leads to high economic costs not only for women, but for society as a whole, because gender-specific disparities in terms of labour market participation lower a country's growth performance and therefore reduce aggregate welfare.

Today, newly available data allows empirically testing the hypothesis of a 'feminisation U' based on a large macro panel data set (combination of cross-country and time-series data). This study tests the hypothesis of a 'feminisation U' based on panel data including observations of 184 countries from 1965 to 2005. The use of this data allows for two main improvements in comparison to the hitherto existing cross country studies. Firstly, the larger data set provides the opportunity to test for the robustness of the empirical findings by using different specifications of female labour market participation. Secondly, the longer time period provides a better control for endogeneity caused by an inverse causality between growth and female labour market participation. In order to limit the risk of obtaining biased estimation coefficients due to endogeneity, I use the data in an edited form and perform System-GMM estimations.

2 The impact of female labour market participation on economic growth

Economists today agree that gender-specific determinants have an important impact on growth. Recent theoretical and empirical studies suggest that women's labour market participation unambiguously promotes growth. The rising recognition of gender-specific growth determinants came with the evolution from exogenous to endogenous growth models. These models endogenised technological advancement by integrating education and labour market participation as growth determinants.

A model by Knowles et al. (2002) suggests that gender-specific disparities in education negatively impact a country's growth. When gender-specific differences in education are large, rates of return from education of women are higher than those from education of men due to falling marginal returns of human capital. Consequently, investments in women's education raise a country's capital stock and therefore promote macroeconomic growth.

Women's education also affects a nation's income in more complex ways: for example, it raises women's participation in employment and earnings and reduces women's fertility. Galor and Weil (1996) combine a growth model with endogenous labour supply of women and men with a household model that models a couple's choice between unpaid household activities and paid labour. They show that women's labour market participation provides the household with an additional income, which makes greater savings possible. The increase in savings raises the capital stock per worker and therewith increases output (feedback effect).

Consequently, the more women actively participate in the labour market, the faster a national economy grows. Klasen and Lamanna (2003) add that high levels of gender-specific discrimination in employment artificially restrict the 'talent pool' of a nation's labour force, because less qualified men push potentially highly qualified women out of the job market. As a result, the average available labour force within a national economy is kept artificially low (measured in units of productivity). This hinders a country's ability to be internationally competitive.

Empirical investigations, for example by Klasen (1999), prove the positive impact of women's labour market participation on growth suggested by theory. Klasen (1999) uses data that includes observations for 109 countries and the years 1960 to 1992. The endogenous variable, which is the change in the purchasing power parity (PPP) per capita, is estimated as a function of, among others, gender disparities in the labour force. The estimation results suggest that the gender disparities negatively impact a country's growth performance. Consequently, a reduction in gender disparities in labour market participation benefits not only women, but is also meaningful in economic terms.

3 The impact of economic growth on female labour market participation

Whereas economic theory and recent empirical analysis unanimously suggest that women's labour market participation contributes positively to growth, the reverse impact of growth on women's labour market participation is still much less clear, in theory as well as on the empirical side. Intuitively, one might assume a purely positive impact. If this assumption is proved right, pure growth promoting policies would automatically promote women's labour market participation, which in turn promotes growth. Yet, if the impact of growth on women's labour market participation can also be negative, pure growth promoting policies would be less effective because the reduction of women's labour market participation would slow down growth. In this case, further enhancement of women's labour market participation is necessary to ensure a country's economic advancement.

On the theoretical side, there are two different approaches explaining the impact of growth on female labour market participation. The first approach suggests a pure increase of female labour market participation across all stages of economic development ('modernisation neoclassical approach' based on Becker, 1957). The second approach suggests a convex impact of growth on female labour market participation ('feminisation U' hypothesis, based on Boserup, 1970).

The neoclassical approach suggests that any sort of discrimination can only be temporary. It is assumed that all sort of discrimination in the labour market cannot prevail in a competitive environment, because discrimination is not consistent with an agent's optimal behaviour that maximises income or utility. In the presence of capital owners or employers who prefer profits to prejudice, all workers will be employed and paid the same wage. Several studies adapted Becker's model to the case of gender discrimination in employment (Mincer, 1958; Krueger, 1963; Clark, 1991).

These studies treat male and female workers as two separate groups or sectors, as if they were separate countries in an international trade model. Discrimination is analysed under the assumption that the male sector has a higher ratio of capital to labour than the female sector. The model shows that a capital owner in the male sector who exports

capital (or imports labour) to the point where the marginal products of capital (and labour) are equal in both sectors maximises his income. Hence, capital owners in the men's sector who do not discriminate against women are better off than those who impose a tax in order to reduce imports of women's labour. If countries or sectors have to be competitive, gender disparities in employment decrease with increasing growth.

According to the 'modernisation neoclassical approach', persisting employment inequalities between men and women are due to differences in productivity (education and work experience) or due to a 'taste for discrimination' of capital owners or employers. A preference for discrimination acknowledges that existing gender gaps in employment may partly be due to the persistence of 'pure discrimination' (employment gap despite gender equality in education and qualification).

4 Female labour market participation and the stages of growth

Opposed to Becker, the 'feminisation U' hypothesis emphasises the vulnerability of women over the course of economic development. Boserup (1970) suggests that in early stages of development, growth first lowers female labour market participation and increases only at higher stages of development. The arguments behind the convex impact of growth on female labour market participation are best illustrated as three stages.

At stage one, countries are characterised by low income standards and a large agricultural sector. In these developing countries, women's labour market participation is high. Most women work on farms in home workshop production. They either pursue subsistence activities or work as contributing family workers or as self-employed workers. This activity 'at home' allows women to have children at the same time.

At the second stage, countries undergo a beginning economic growth process. Urbanisation and industrialisation polarise working activities of men and women and therefore increase gender differences in employment. Firstly, the reduction of the rural sector as well as the growing demand for labour mobility make it more difficult for women to combine family and work. Family networks weaken or dissolve and children become a barrier to women's wage employment.

Secondly, industrialisation and technological change lower the demand for low-skill workers relative to workers with technical and high level skills that are important to operate machines or computers. Men find work more easily in industrialised sectors than women, because they have privileged access to education and hence can adapt more easily to new production technologies. Men earn more now and are able to financially maintain the family on their own. Hence, urbanisation and industrialisation initially reduce female labour market participation, mainly due to structural change and an income effect. Boserup (1970) stresses that the polarisation and hierarchisation of men's and women's work roles in times of industrialisation also result from individual preferences of both employers and workers that become embedded in discriminatory practices within institutional arrangements.

During the industrialisation process, well paid job positions that offer career perspectives are still limited and only slowly become accessible to a broad mass of workers. Consequently, men tend to monopolise access to technological innovations and education in order to outstrip competitors. Moreover, women face labour restrictions due to their childcare responsibilities. This raises their relative labour costs, which leads to employers' preference for male workers. Goldin (1994) complements Boserup's

arguments by suggesting that women's decrease in paid work during a country's industrialisation process is reinforced by the existence of social norms that stigmatise married working women.

At the third stage, a country undergoes further economic development and female labour market participation rises. The exclusion of women from wage activities results in tight labour markets and in a rising demand for female workers. Competitive countries are urged to optimise their 'talent pool', and consequently, women receive more education and training. Employment opportunities for women increase, which raises women's opportunity costs of staying at home. Domestic labour becomes a commodity and fertility rates decline. Therefore, female labour market participation increases in the medium and long run, due to women's time lagged adaption to new qualification and requirement profiles of the labour market and a dominating substitution effect.

5 Tests of the 'feminisation U'

There exists a series of empirical studies that intend to verify empirically the 'feminisation U' hypothesis. Yet, none of them clearly prove the validity of the 'feminisation U' hypothesis, because measurement and estimation problems inhibit clear and universal conclusions. The hitherto existing empirical studies are based on cross country data (pooled data that cover a time period up to 15 years maximum) and hence focus on between-country variation only. Goldin (1994), for example, examines the impact of GDP per capita on the share of the labour force of 45 to 59-year old women. Data on the female share of the labour force comes from the United Nations WISTAT collection. The empirical regression in based on observations of 82 countries, registered in 1980.

Goldin (1994)'s regression results suggest that the female share of the labour force decreases with an increase in the percentage of men employed in the white-collar sector, indicating a negative income effect on women's labour market participation. Furthermore, the estimation results suggest that the female share of the labour force increases when female education levels are above seven years (secondary school level). This indicates a positive substitution effect on the female share of the labour force.

Yet, Goldin (1994)'s empirical estimation suggests rather than proves the U shaped function of the female share of the labour force with respect to GDP per capita. The regression model does not explicitly test the hypothesis of a convex impact of economic growth on the female share of the labour force, as GDP per capita is not modelled as exogenous variable. Hence, it is unclear at what levels of economic development the substitution effect dominates the income effect, which would lead to a turn in female labour market participation along the economic development path.

Cagatay and Özler (1995) propose an all-in-one estimation model with the female share of the labour force as endogenous and GNP per capita as exogenous variable. They estimate the impact of GNP per capita on the share of the labour force of 45 to 59-year old women, based on cross-country data that includes observations of 96 countries, pooled for 1985 and 1990. Data on the female share of the labour force comes from the World Bank databases.

In order to control for the U-shaped pattern of the female share of the labour force across the process of economic development, Cagatay and Özler (1995) include *logGNP*

and *logGNP²* as exogenous variables in the regression model. To confirm the hypothesis of a feminisation U, the estimated coefficient of *logGNP²* must be significantly positive as an indicator of the curve's convexity, which implies that there exists a minimum in the data. Cagatay and Özler (1995) affirm that the estimation results indicate that the 'feminisation U' hypothesis cannot be rejected at high levels of confidence in the sample, as indicated by the high 't' values of the positive *logGNP* coefficient and the negative *logGNP²* coefficient. Yet, in fact the significantly negative coefficient for *logGNP²* rejects the 'feminisation U' hypothesis, because it suggests a concave impact.

Goldin (1994)'s cross country study does not yield precise results to validate the 'feminisation U' hypothesis, and Cagatay and Özler (1995)'s cross country study provides contradictory findings. However, it would be premature to reject the 'feminisation U' hypothesis. Estimation results might be imprecise because of the limited time period of the used data. Furthermore, Cagatay and Özler (1995)'s estimation results suffer from measurement and estimation problems.

Measures of female labour market participation are subject to measurement errors, because female work is often informal and therefore unrecorded. In developing countries for example, still today the major part of women works informally in the agricultural and in the black market sector (c.f. Chen et al., 1999). Furthermore, non-paid work and independent work are rarely included in the statistics. This holds especially for women's subsistence activities in the agricultural sector in the third and second world. The UNDP (1995) shows that 66% of the female activities in developing countries are not captured by national accounts, compared to only 24% of male activities. Therefore, changes in the quantity and productivity of these activities can be measured only insufficiently (c.f. Waring, 1988; Klasen, 2002).

Furthermore, measures of female labour market participation are often not comparable across countries as definitions and measurement concepts of women's labour market participation differ (c.f. Bardhan and Klasen, 1999; Forbes, 2000). Measurements disaggregated by gender are often incomplete and inconsistent in terms of time, which leads to a gender bias in official statistics. Findings of the impact of growth on female labour market participation may therefore bias the true relationship.

6 Methodology and data

Apart from measurement errors, estimation problems merit more consideration. It is likely that Cagatay and Özler (1995) insufficiently address the problem of endogeneity, which exists due to the feedback effects between GNP per capita and the female share of the labour force. The two-way causality between the endogenous and exogenous variables suggests that the exogenous variables *logGNP* and *logGNP²* are actually endogenous, which leads to the fact that the exogenous variables are correlated with the error term in the regression model. Consequently, the OLS estimation method produces regression coefficients of *logGNP* and *logGNP²* that are biased and inconsistent.

The deficient empirical evidence of the impact of growth on female labour market participation represents an essential research gap. Empirical evidence for the 'feminisation U' hypothesis, which assumes that the impact of growth on women's labour market activities is not strictly positive, would suggest that an explicit enhancement of women's economic opportunities is advisable in order to increase a country's long term economic potential.

To empirically test the hypothesis of a 'feminisation U', further empirical methods that specially address endogeneity problems are needed. This is possible by using a newly available macro panel data set (combination of time-series and cross-country data), because the larger time dimension of the data allows editing data and applying general method of moments (GMM). These techniques raise the probability of obtaining unbiased and efficient estimation results. Furthermore, the new data availability provides the opportunity to test for the robustness of the empirical findings by using different specifications for female labour market participation, which limits the risk of biased estimates caused by measurement problems.

The test of the hypothesis of a 'feminisation U' is based on panel data including observations of 184 countries from 1965 to 2004. To see whether female labour market participation is a quadratic function of the log of gross domestic product (GDP) per capita, I estimate the following model:

$$FemaleLabourMarketParticipation_{it} = \beta_1 + \beta_2 \log \mathrm{GDP}_{it} + \beta_3 \log \mathrm{GDP}^2_{it} + \varepsilon_{it}$$

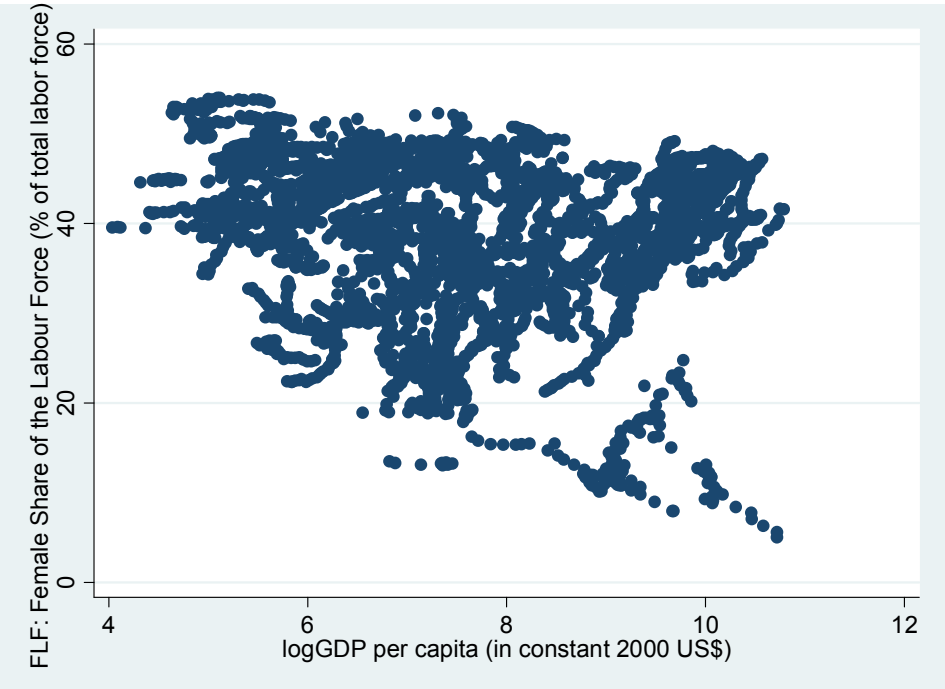
To confirm the hypothesis of a 'feminisation U', the coefficient β_3 must be significantly positive as an indicator of the curve's convexity, which implies that there exists a low point in the data area.

Two alternative empirical specifications are used for female labour market, the female share of the labour force (*FLF*) and the female activity rate (*FAR*). Both measures contain women aged 15 and older. Data on GDP per capita (in constant 2000 US$) and on *FLF* are drawn from the World Bank's World Development Index Data Base (2006). Data on GDP per capita cover the years 1965 to 2004 for 184 countries, and data on *FLF* cover the years 1980 to 2004 for 186 countries. Data on *FAR* are drawn from the ILO Laboursta Data Base (2007) and cover the years 1960 to 2005 for 171 countries.

7 Findings

The relationship between *FLF* and economic development based on the available panel data can be seen in Figure 1, which scatters *FLF* against *logGDP*. This suggests a U-shaped relationship between the two variables. On the left upper side we find countries that have a high *FLF* (around 50%) and at the same time low GDP per capita levels (sometimes under 200 US$). These observations are mainly from the 1980s and largely contain Sub-Saharan Africa countries like Burundi, Rwanda, Liberia, Ethiopia, Congo, Mozambique and Malawi. On the right upper side, we find countries that have both a high *FLF* (around 42%) and high GDP per capita levels (over 2000 US$). These observations are mainly from the 1990s and the years 2000–2004 and contain in big parts OECD countries. The lowest points of the figure, observations with a low *FLF* (under 25%) and medium-level income (between 1000 US$ and 2000 US$), are represented mostly by Latin American and North African countries, like Venezuela, Mexico, Ecuador, Morocco, Egypt, Tunisia and Algeria. The observations are mainly from the 1980s.

Figure 1 Female share of the labour force (*FLF*) against *logGDP* (see online version for colours)



Source: Own calculations

So far, these observations are in line with the 'feminisation U' hypothesis. Observations which are not in line with the hypothesis are the outliers in the bottom-right corner of Figure 1. Countries with high GDP levels and low *FLF* at the same time are oil exporting, Muslim countries of the Middle East, like the United Arab Emirates, Saudi Arabia, Qatar or Kuwait. These countries owe their high income levels in big parts to the export of natural resources and obtain a rent which is hardly produced by human capital. Other observations that do not fit into the U-shaped curve are those in the upper middle within the curve. These are, in parts, observations from the former Eastern Bloc countries and the years 1980 to 1995. Within this period, countries like Slovakia, Hungary or Poland had very high levels of *FLF* relative to their average level of GDP per capita, mainly due to area-wide affordable child care infrastructure.

For all estimations, the panel data is not used as it is, but in an edited form. For every country, there are five years for the observations of the endogenous variables on the left hand side and observations of the beginning year of the respective mean for the exogenous variables on the right hand side. This implies that lagged exogenous variables are used which responds to possible endogeneity. Based on the edited data, the analysis starts with a pooled OLS regression.

Yet, the estimated OLS-coefficients may be biased and inconsistent due to omitted variables. A one step System GMM estimator is used, which allows omitting unobserved variables that are constant over time (country-specific effects). Furthermore, the GMM method considers possible endogeneity by making orthogonal deviations in order to obtain instruments for the exogenous variables (based on Arellano and Bover, 1995;

Blundell and Bond, 1998). In addition, the System GMM specification differs from the OLS-estimation model by the presence of a lagged endogenous variable (*L.FLF* respectively *L.FAR*) among the exogenous variables, which allows controlling for the dynamics of adjustment.

Table 1 shows the estimation results. The first column shows the OLS-regression results for the *FLF*-specification, the second column shows the GMM-regression results for the *FLF*-specification, the third column shows the OLS-regression results for the *FAR*-specification and the fourth column shows the GMM-regression results for the *FAR*-specification.

Table 1 The impact of logGDP on female labour market participation

	FLF	*FLF*	*FAR*	*FAR*
	pooled OLS	*System GMM*	*pooled OLS*	*System GMM*
logGDP	–16.14***	0.752	–35.20***	–11.83*
	(–8.46)	(1.41)	(–7.22)	(–2.20)
logGDP²	0.994***	–0.0139	2.231***	0.758*
	(7.99)	(–0.41)	(7.16)	(2.29)
L.FLF resp. *L.FAR*		0.862***		0.650***
		(114.49)		(17.56)
constant	101.3***	1 166	175.0***	61.04**
	(14.31)	(0.55)	(9.43)	(2.83)
F	45.48		26.13	
Wald Chi²		16101.17		363.31
N	786	652	524	315
R²	0.1041		0.0911	
R² adjusted	0.1018		0.0877	

Notes: t statistics in parentheses

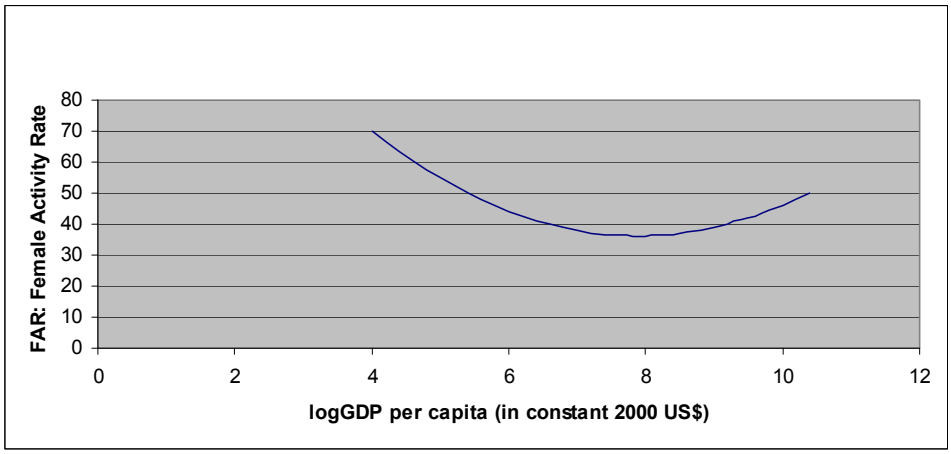
*p<0.05, **p<0.01, ***p<0.001

In all columns, the coefficient of *logGDP* is negative, and the coefficient of *logGDP²* is positive. Only the *GDP*-coefficients of the GMM-regression based on *FLF* as endogenous variable (column 2) are not significant. Nevertheless, the significant positive coefficients of *logGDP²* in columns 1, 3 and 4 give evidence for the validity of the 'feminisation U' hypothesis, as they indicate a low point in the data. As *logGDP²* is a function of *logGDP*, the two coefficients must not be interpreted separately. The impact of an increase of *logGDP* on *FAR* depends on the level of *logGDP*.

This finding is quantified based on the estimated coefficients of *logGDP* and *logGDP²* in the third column (OLS regression, *FAR*-specification). An increase of *logGDP* decreases *FAR* for small levels of *logGDP* (*logGDP*<7.89) and increases *FAR* from a higher level of *logGDP* on (*logGDP*>7,89). This leads to an U-shaped relationship between *FAR* and *logGDP*. To illustrate the U-shaped relationship between *FAR* and *logGDP* indicated by the estimated coefficients of *logGDP* and *logGDP²*, the accompanying *FLF* is calculated for every level of *logGDP* ranging between 4 and 10, which are the minimum and the maximum of *logGDP* according to the data. Figure 2

illustrates a clear U-shaped relationship between *FAR* and *logGDP* based on the estimated coefficients of column 3. The figure indicates that the minimum of the curve is located at a *logGDP*-value of 7.89, which is around 2.500 US$ per capita per year. *FAR* varies between 70% and 36%.

Figure 2 The impact of logGDP on FAR (based on OLS-regression results) (see online version for colours)



Source: Own calculations

The empirical analysis confirms a convex impact of GDP on female labour market participation. Nevertheless, the results should be interpreted with care because they depend strongly on the quality of the data. Measurement problems concerning female labour market participation, especially caused by women's widespread informal economic activities in developing countries, might bias the estimation results.

Furthermore, as the estimation model is limited to GDP as an exogenous variable, it does not control for the impact of other macro-level determinants on female labour market participation, such as, for example, education, fertility or institutional settings like family policies. As those determinants impact female labour market participation, it is difficult to isolate the impact of GDP on the labour market participation of women. The weak fit of the model for all estimation models also suggests that they do not capture individual impacts on female labour market participation very well. Moreover, the estimation model is limited to global measures of female labour market participation as an endogenous variable. Specific female employment patterns, for example part-time work, are not observed.

The limited data availability makes it difficult to provide an estimation model based on more specific data. In order to not significantly reduce the number of observed countries and time periods, it was necessary to use female labour market participation as the endogenous variable and GDP as the exogenous variable. Extending the estimation model could be a field of further research, although more specific data are only available for a subgroup of countries and years.

8 Conclusions

Despite the limitations of this estimation model, the analysis empirically proves the 'feminisation U' hypothesis. Previous cross country studies assume a convex impact of growth on female labour market participation, but provide inconclusive findings. Due to newly available panel data (a combination of cross-country and time-series effects), endogeneity problems are taken into account accurately for the first time in this study. Furthermore, the robustness of the findings is proved by using two specifications of female labour market participation.

The empirical evidence that economic growth lowers female labour market participation at the early stages of development is of economic and political significance. It suggests that in developing countries, economic growth promotes women's labour market participation only with active labour market policies to facilitate the entry of women. Growth-promoting policies in developing countries should be accompanied by policies to increase decent and productive work opportunities for women. Family-friendly policies will further prevent women from dropping out of the labour market. Otherwise women may not work or become stuck in low paid jobs in the informal economy with detrimental effects on overall economic growth.

References

Arellano, M. and Bover, O. (1995) 'Another look at the instrumental variable estimation of error-component models', *Journal of Econometrics,* Vol. 68, pp.29–51.

Bardhan, K. and Klasen, S. (1999) 'UNDP's gender-related indices: a critical review', *World Development,* Vol. 27, pp.985–1010.

Becker, G.S. (1957) *The Economics of Discrimination,* University of Chicago Press, Chicago.

Blundell, R. and Bond, S. (1998) 'Initial conditions and moment restrictions in dynamic panel data models', *Journal of Econometrics*, Vol. 87, pp.115–143.

Boserup, E. (1970) *Women's Role in Economic Development,* St. Martin's Press, New York.

Cagatay, N. and Özler, S. (1995) 'Feminisation of the labour force: the effects of long term development and structural adjustment', *World Development,* Vol. 23, pp.1889–1894.

Chen, M., Sebstad, J. and O'Connel, L. (1999) 'Counting the invisible workforce: the case of home-based workers', *World Development*, Vol. 27, No. 3, pp.603–610.

Clark, R. (1991) 'Controlling perspectives on women's access to prestigious occupations: a cross national investigations', *Social Science Quarterly*, Vol. 72, No. 2, pp.20–32.

Forbes, K. (2000) 'A reassessment of the relationship between inequality and growth', *American Economic Review,* Vol. 90, pp.869–887.

Galor, O. and Weil, D.N. (1996) 'The gender gap, fertility and growth', *American Economic Review,* Vol. 86, pp.374–387.

Goldin, C. (1994) 'The U-shaped female labour force function in economic development and economic history', NBER Working Paper no. 4707.

Klasen, S. (1999) 'Does gender inequality reduce growth and development?', World Bank Policy Research Report Working Paper Nr. 7, The World Bank, Washington, DC.

Klasen, S. (2002) 'Low schooling for girls, slower growth for all?', *World Bank Economic Review,* Vol. 6, pp.345–373.

Klasen, S. and Lamanna, F. (2003) 'The impact of gender inequality in education and employment on economic growth in the Middle East and North Africa', University of Munich Working Paper.

Knowles, S., Lorgelly, P.L. and Owen, P.D. (2002) 'Are educational gender gaps a brake on economic development? Some cross-country empirical evidence', *Oxford Economic Papers,* Vol. 54, pp.118–149.

Krueger, A. (1963) 'The economics of discrimination', *Journal of Political Economy*, October.

Mincer, J. (1958) 'Investment in human capital and personal income distribution', *Journal of Political Economy*, Vol. 70, No. 5, Part 2, pp.S50–S79.

UNDP (1995) *Human Development Report,* Oxford University Press, New York.

Waring, M. (1988) *If Women Counted,* Harper and Row, New York.