Globalisation, Gender and Growth

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Abstract

We consider the effect of globalisation on fertility, human capital and growth. We view globalisation as creating market opportunities for employment in less developed countries. We construct a specific model of household decision making, drawing on empirical observations in the development economics literature, and show that if the market opportunities produced by globalisation are for women then globalisation reduces fertility and increases human capital formation. If the opportunities are for men then fertility increases and human capital formation falls. We then show that globalisation that produces job opportunities for women increases growth and produces a better long run steady state than would prevail either without globalisation, or with globalisation that creates jobs only for men.

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1 Introduction

Globalisation is a term that is often used broadly and rather imprecisely. In this paper, we use it narrowly to describe the process by which capital flows to developing countries in order to set up factories that take advantage of low cost labour to produce goods that are then exported to developed countries. Opponents of globalisation often refer to these as "sweatshops" and regard them as uniformly bad.

The word "gender" occurs in the title because we want to distinguish between factories that use predominantly female labor and those that use predominantly male labor. We make this distinction because we believe that the gender employed in the sweatshops makes an important difference to the implications of the investment for economic growth and development. This in turn rests on an approach to the economics of the household based on models of intra-household conflicts of interest.¹ This view of households is becoming increasingly prevalent in economics, though it has by no means yet become the dominant paradigm.

We model the household as consisting of two individuals, one male, indexed m, the other female, indexed f. They have their own individual preferences that differ in important ways. Specifically, their utility may depend in general on their individual consumption, a household public good that we call the number of children or fertility,² and a household public good that we call the quality of children or human capital.³ We use empirical work in the development literature⁴ to guide our formulation of preferences. Accordingly, we assume that the male in the household has a stronger relative preference for consumption and a larger number of children than the female, while she puts more weight on child

¹For a recent survey of the literature see Apps and Rees (2008) chs 3,4.

 $^{^2\,\}mathrm{Throughout}$ we will ignore integer problems and treat the number of children as a real number.

 $^{^3\,\}mathrm{We}$ measure child quality with a real number.

 $^{^{4}}$ See for example Schultz (1990), Singh et al (1986) and Thomas (1990).

quality.

Pre-globalisation, m devotes all his time to working on the family farm, producing a good which is sold at a fixed market price. The female, f, divides her time between working on the farm and child care. We assume that m has higher farm productivity than f. They allocate their household resources over the consumption good and the household public goods by some decision process which could, but need not, take the form of bargaining. The central assumption we make about this process is that it results in a Pareto efficient allocation.⁵ The distributional outcome of the process is however assumed to be sensitive to the value of the outside options⁶ that the individuals have. We will make this more precise in the next section.

The basic story is very simple. Pre-globalisation, because of his higher productivity on the farm, m has more bargaining power within the household and therefore his preferences play the major role in determining the household allocation. This will be a (relatively speaking) high consumption, high fertility, low child quality equilibrium. Consider now the impact of globalisation. If this takes the form of investment that provides female jobs, then the female's bargaining power within the household increases due to the increase in the value of her outside option. This in turn moves the household allocation in the direction of her preferences, which means less consumption, fewer children, but higher child quality.

At this point we could draw upon the model of Galor and Weil (1996), who show how, in an overlapping generations growth model, declining fertility results in a higher capital labor ratio, faster economic growth and a steady state with

⁵Standard bargaining models, such as the Nash bargaining model (for applications in a household context see Manser and Brown (1980), McElroy and Horney (1981), Ott (1992), and the "separate spheres" bargaining model of Pollak and Lundberg (1993)) of course have this property. For a more general treatment on which the approach here is based, see Apps and Rees (1988).

 $^{^{6}{\}rm If}$ we were restriciting attention to Nash bargaining models we would label these "threat points".

higher per capita income and lower fertility. The present paper can be regarded as providing an alternative view of what drives this process: Female labouroriented globalisation works through the household allocation process in such a way as to reduce fertility and increase human capital.

If on the other hand, globalisation takes the form of investment that provides male jobs, then m will have increased bargaining power within the household. This results in increased consumption and fertility but lower child quality and human capital. In this case, the economy converges to a lower per capita income and higher fertility steady state equilibrium. Thus, we argue that the form that globalisation takes is crucial. If globalisation results in new jobs for females it will lead to higher levels of human capital and growth. We now go on to test the consistency of this story with a formal model.

2 The Household Model

2.1 Pre-Globalisation

To make the results as sharp as possible we assume quasi-linear utility functions of the form

$$u_f(x_f, n, q) = \varphi_f(x_f) + \phi_f(n) + q \tag{1}$$

$$\varphi_f'(x_f) > 0; \ \phi_f'(n) < 0 \tag{2}$$

$$u_m(x_m, n) = \phi_m(n) + x_m \tag{3}$$

$$\phi_m'(n) > 0 \tag{4}$$

where $x_f(x_m)$ is consumption by the female (male) member of the household, n is the number of children in the household and q is child quality over and above a basic quality level that we normalise at zero. These functions are chosen both to keep the model simple, and to express in a stark way the preference differences between the individuals in the household. If f were given an extra dollar of income and she could choose according only to her own preferences, she would use it to increase child quality, by buying better food, medication, schooling etc. This is captured by the quasi-linearity of the utility function, with her consumption x_f and fertility n having zero income effects. In addition, for f, more consumption raises utility while more children lowers it. On the other hand, if m receives extra income and he can choose how to spend it he increases his consumption. He derives no utility from child quality over and above the basic normalised level, but does have increasing utility in the number of children of this given quality.

We assume that farm output y is given by the concave and strictly increasing production function $h(t_f, t_m)$, where t_i is the time i = f, m spends in farm production. To reflect the fact that m has higher marginal and total productivity in farm production we assume that

$$h_f(t_f, t_m^0) < h_m(t_f^0, t_m)$$
 (5)

at all variable input levels $t_f = t_m \ge 0$ and all fixed input levels $t_f^0 = t_m^0 > 0$.

We assume a very simple child rearing technology:

$$n = ac \quad a > 0 \tag{6}$$

where c is the time f spends in child care.

Likewise, quality per child⁷ is given by:

$$q = bz \quad b > 0 \tag{7}$$

where z is an amount of the market good. That child care requires only female time while quality requires only the market good is of course a strong simplification but a useful one, and is not unreasonable.

⁷All children are assumed identical except for gender, and there is exactly n/2 of each gender in a family. This ignores for simplicity the evidence that there are very often gender differences in intra-household resource allocation in developing countries.

We assume that m spends all his time endowment T working on the farm, while f divides her time between farm work and child care, and so has the time constraint

$$t_f + c \le T \tag{8}$$

When the couple behave cooperatively, they pool their income from farm production, with p the exogenous world price of farm output, to give the budget constraint

$$\sum_{i=f,m} x_i + n(x_0 + \beta q) \le py \tag{9}$$

where $\beta \equiv 1/b$ and x_0 is a given basic consumption level per child.

We define the values of the outside options of the two household individuals on the assumption that the value of the outside option is determined by a noncooperative equilibrium.⁸ In this equilibrium, m chooses the number of children, provides for their basic consumption x_0 , works on the farm and keeps all the resulting output, while f looks after the children, and chooses child quality, where the expenditure on the latter, as well as her own consumption, have to come out of the revenue from her work on the farm. Moreover, working noncooperatively is less productive for each of them than working cooperatively. We still assume that m is individually more productive than f. This is expressed formally by the conditions on the individual production functions $g_i(.)$, which are again concave and strictly increasing

$$y_i = g_i(t_i) \quad i = f, m \tag{10}$$

with

$$h(t_f^0, t_m^0) > \sum_{i=f,m} g_i(t_i^0) \ all \ (t_f^0, t_m^0) \gg 0$$
(11)

$$g'_m(t^0) > g'_f(t^0) \quad all \ t^0 > 0$$
 (12)

 $^{^8}$ This is quite common in the bargaining literature. See for example Ulph (1988), Lundberg abd Pollak (1993) and Chen and Woolley (2001).

We find the noncooperative allocations by first solving for f's stand alone optimum

$$\max_{x_f,q} \varphi_f(x_f) + \phi_f(n^0) + q \quad s.t. \ n^0 \beta q + x_f \le pg_f(T - \alpha n^0) \tag{13}$$

where $\alpha \equiv 1/a$ and n^0 is the number of children chosen by m and so for f is exogenously given⁹. This problem yields an optimum utility level that we write as $v_f^{0,10}$

The corresponding problem for m is

$$\max_{x_m,n} x_m + \phi_m(n) \quad s.t. \; nx_0 + x_m \le pg_m(T) \tag{14}$$

Thus he achieves the utility level

$$v_m^0 = pg_m(T) - n^0 x_0 + \phi_m(n^0) \tag{15}$$

So, (v_f^0, v_m^0) represents the outside option values for f and m, respectively.

By assumption, there are gains from cooperation due to the higher efficiency of joint production. The couple must choose how to allocate these gains. For example, in return for a greater number of children m may make an implicit payment to f, in terms of consumption, that allows her to increase the quality of children as well as her own consumption. Thus, the members of the household could be implicitly trading consumption for fertility and child quality. The values of the outside options determine the implicit terms of this trade in equilibrium.

When the household behaves cooperatively, it chooses a Pareto efficient allocation in which each individual receives a utility value at least as large as the outside option. Thus, we formulate the problem as maximizing m's utility

⁹We assume that after using her time to look after these children f has at least enough time to work on the farm to supply her minimum subsistence needs. This could be imposed as an explicit constraint on m's problem.

 $^{^{10}}$ This is of course a function of p, but since we hold this constant throughout we ignore it here.

subject to a utility level for f

$$u_{f}^{0} = \psi(v_{f}^{0}, v_{m}^{0}) \ \psi_{f} > 0, \ \psi_{m} < 0 \tag{16}$$

and the household budget constraint. We do not require that f be held right down to her outside option value, so $u_f^0 \ge v_f^0$, but we do assume that any increase in $v_f^0(v_m^0)$ will increase (decrease) the utility level u_f^0 that she receives under the household decision process.¹¹ Thus the household solves the problem:

$$\max_{x_i,n,q} x_m + \phi_m(n) \tag{17}$$

$$s.t.\varphi_f(x_f) + \phi_f(n) + q \ge u_f^0 \tag{18}$$

$$\sum_{i=f,m} x_i + n(x_0 + \beta q) \le ph(T - \alpha n, T)$$
(19)

Note that the budget constraint implies that the marginal cost of a child is $x_0 + \beta q + ph_f \alpha$, consisting of the consumption per child, the cost of the child's quality, and the opportunity cost of the time f must divert from farm production to care for the child.

Carrying out the comparative statics on the solution to this problem¹² leads to the results that $\partial n/\partial u_f^0 < 0$, $\partial q/\partial u_f^0 > 0$. Thus, an increase in the value of f's outside option, in increasing the utility she gets at the household equilibrium, results in a fall in fertility and an increase in child quality, while an increase in m's outside option has the opposite effect. Thus far the model supports the intuitive story.

2.2 The Household Model with Globalisation

In this section we explore the impact that globalisation has on households by considering what globalisation does to the outside options of each member of the

 $^{^{11}}$ This will obviously be the case in standard bargaining models. For a general discussion of this formulation, which is equivalent to assuming that the household maximises a form of social welfare function increasing in the utility of its members, see Apps and Rees (2008) Chapter 3.

¹²See the Appendix for the details.

household. We begin by considering what happens when globalisation results in an outside labor market opportunity for f. Suppose that globalisation results in a job situation in which she can supply some given amount of labor time¹³ l_f^0 for a wage rate of w_f . This implies that her time constraint becomes

$$l_f^0 + t_f + c \le T \tag{20}$$

while m's remains unchanged. Her noncooperative allocation now results from solving the problem¹⁴

$$\max_{x_f, n, q} \varphi_f(x_f) + \phi_f(n) + q \quad s.t. \ n^0 \beta q + x_f \le pg_f(T - l_f^0 - \alpha n^0) + w_f l_f^0 \quad (21)$$

Denote her new outside option as $\hat{v}_f(w_f)$.

Note that in the new noncooperative optimum she will only choose to supply market labor if her utility is higher than in the previous noncooperative optimum. Thus the value of her outside option necessarily rises in that case.

Since m's non cooperative problem is exactly as before, the value of his outside option is unchanged. Therefore we have that, as a result of the outside market opportunity, the value of f's outside option rises relative to m's. Moreover, it is straightforward to show that

$$\hat{v}_f'(w_f) = \partial q / \partial w_f = l_f^0 > 0 \tag{22}$$

An increasing wage in the noncooperative equilibrium feeds directly into increasing child quality.

The household's resource allocation problem now becomes

$$\max_{x_i,n,q} x_m + \phi_m(n) \tag{23}$$

$$s.t.\varphi_f(x_f) + \phi_f(n) + q \ge \hat{u}_f \ge \hat{v}_f \tag{24}$$

 $^{^{13}}$ To assume endogenous labor supply complicates the model without really adding anything of substance. There is a fixed working day in the factory. ¹⁴ where of course it must be assumed that $\alpha n^0 + l_f^0 \leq T$

$$\sum_{i=f,m} x_i + n(x_0 + \beta q) \le ph(T - l_f^0 - \alpha n, T) + w_f l_f^0$$
(25)

Carrying out the comparative statics on the solution to this problem¹⁵ with respect to a change in the wage w_f shows that, unambiguously, $\partial n/\partial w_f < 0$, $\partial q/\partial w_f > 0$. Increasing the female wage rate, by giving her more bargaining power in the household, results in the household having fewer children of higher quality.

The first of these results is perhaps not quite so obvious, because an increase in the female wage increases household income and so could have an income effect on m's demand for fertility. However, in this model the fact that f's utility allocation improves at the optimum and that only child quality has an income effect for her leads to an increase in quality, and this raises the cost per child and therefore induces a fall in fertility demand. Moreover, as compared to the situation where she does not work on the outside market, she has a higher marginal value product of farm work, and so time spent in child rearing is more costly. Thus the substitution effect of increasing child costs outweighs the income effect of increasing household income, which in any case arises only for m.

So, we conclude that globalisation that results in female job opportunities results in fewer children of higher quality in the household. If we were to take the model in which m supplies labour l_m^0 to the market at a wage w_m , then these results are precisely reversed, since then m's outside option is improved, this reduces \hat{u}_f , and so the previous comparative statics results simply change sign - fertility increases and quality falls with a rise in m's wage.

¹⁵Again the details, which are routine, are given in the Appendix.

3 The Aggregate Growth Model

From the household model we conclude that fertility is a decreasing function and child quality or human capital an increasing function of the female wage rate paid on the post-globalisation labour market, while these relationships are reversed with respect to the male wage rate. This suggests that it should not be too difficult to put together an aggregate model that shows how the introduction of a labor market for women as a result of globalisation leads to a process of growing per capita income and a better steady state than that prevailing preglobalisation. It also leads to a better steady state than if globalisation takes the form of jobs for men. This we now show, in terms of a two-generation overlapping generations model.

Consider first the female labor market, recalling that individual labor supply is fixed at l_f^0 . Let H_t be the number of two-person households at time t and let n_t be interpreted as the number of *pairs* of children each household has at time t, where it is assumed that one of each pair is male, the other female. Then we have

$$H_t = n_{t-1} H_{t-1} \quad t = 1, \dots, \infty$$
(26)

with t = 0 the first period. We must assume that

$$w_0 l_f^0 > p \int_0^{l_f^0} h_f(T - l_f - \alpha n_0, T) dl_f$$
(27)

so that women choose to work at the new factory rather than on the farm. A sufficient condition for this would be

$$w_0 \ge ph_f(T - l_f^0 - \alpha n_0, T) \tag{28}$$

the factory wage is at least as great as f's marginal value product on the farm when she is employed at the factory. As we show below, under standard assumptions her wage at the factory will be increasing and her marginal value product on the farm will be decreasing over time, so as long as this condition is satisfied at the outset there will be no switch out of factory work.

The number of female workers at time t is H_t , and so total labour supply at t is

$$L_t = H_t l_f^0 \tag{29}$$

Let $q_t = q(w_{t-1})$ be the quality of a female worker at t, where this depends on the choice of quality made by the household at t-1, when the worker was a child. We have just seen that q'(.) > 0. For simplicity, assume that capital K, does not depreciate, and the production function is a standard linear homogeneous function

$$Y_t = S(q_t L_t, K_t) \tag{30}$$

with labour given in efficiency units. There is a given constant rate of return r, and a price of the output (in domestic currency) e, so that total wages are

$$W_t = eS(q_t L_t, K_t) - rK_t \tag{31}$$

and the wage rate is

$$w_t = W_t / L_t = es(q_t, k_t) - rk_t$$
 (32)

with k_t the capital/labor ratio. Then, since n_t is a decreasing function of w_t we can write $k_t = k(w_{t-1})$ with k'(.) > 0. Thus, we have

$$\frac{dw_t}{dw_{t-1}} = es_q q' + (es_k - r)k'$$
(33)

But the profit maximisation condition that the marginal value product of capital equal the rate of return implies that the second term drops out. Thus, the wage rate increases over time, in particular $w_1 > w_0$. There is then a unique steady state in this market if

$$\frac{d^2 w_t}{dw_{t-1}^2} = e s_q q'' + e q' s_{qq} < 0 \tag{34}$$

that is, if w_t is a strictly concave function of w_{t-1} . Given that $s_{qq} < 0$, a sufficient condition for this is that child quality be a concave function of the mother's wage rate, which seems to be a reasonable type of "diminishing returns" assumption.

Turning to the farm sector, per household output at t is given by

$$h_t = h(T - l_f^0 - \alpha n_t, T) \tag{35}$$

where it is assumed for simplicity that improving child quality does not effect farm productivity (the argument would be strengthened by having farm output increasing in child quality). Then since n_t is decreasing in w_t , we must have that per household output is increasing in w_t , and specifically

$$\frac{dh_t}{dw_t} = -h_f \alpha \frac{dn_t}{dw_t} \tag{36}$$

Declining fertility releases female labour time for farm work. Then, since the number of children in each farm family is falling over time while output per farm is increasing, per capita farm output must also be increasing. Thus, we have that per capita incomes from both female market work and farm output increase until the market wage rate reaches its steady state. Globalisation in the form of providing jobs for women is unambiguously welfare-improving for women and children. Whether it is so for men depends on the value of their increase in utility from consumption in relation to their loss in utility from having fewer children, where the latter is associated with the increased bargaining power of women within the household.

Turning now to the case in which globalisation creates only jobs for men, we have in fact a very Malthusian story. We can apply the above model, but with the key difference that now $q'(w_{t-1}) < 0$: The higher is the man's wage, the greater his power within the household, therefore the higher is fertility (and his consumption) and the lower is child quality. We therefore have from (33)

$$\frac{dw_t}{dw_{t-1}} = es_q q' < 0 \tag{37}$$

This therefore implies that $w_1 < w_0$ and the wage rate is falling over time. Moreover, since n_t is increasing, f's time input $T - \alpha n_t$ into farm production is decreasing, and so is this output. Thus household per capita income must be falling. There are two possible equilibria:

1. The factory wage falls until it would just pay m to switch back from the factory into farm production. This happens at the wage \tilde{w} (and corresponding fertility level \tilde{n}), where

$$\tilde{w} = p \int_{0}^{l_{m}^{0}} h_{m} (T - \alpha \tilde{n}, T - l_{m}) dl_{m} / l_{m}^{0}$$
(38)

since clearly m will not work in the factory for a lower income than he can generate on the farm with the same time input. This implies a minimum market wage that the firm will have to pay to retain its workers, and is the counterpart in this model of a Malthusian subsistence wage.

2. A steady state in which m works in the factory for a wage $w^* \in [\tilde{w}, w_0)$ that is constant over time and lower than that at which the factory opened.

INSERT FIGURE 1 HERE

Figure 1 illustrates these two types of "male equilibria", as well as the "female equilibrium", on the assumption that both types of globalisation are associated with the same opening wage w_0 . The steady state female wage converges to w_s^f while the steady state male wage converges either to the minimum required to keep the male worker employed, \tilde{w} or to the higher w_s^m .

4 Conclusions

We have developed a very simple model of how globalisation affects development. Our model focuses on how globalisation effects intra-household bargaining and the effects this has on economic variables. We find that globalisation that results in improved job opportunities for women leads to lower fertility and higher rates of human capital formation. If globalisation results in improved opportunities for men then the results are reversed. We embed these results in a very simple growth model and show that, with standard assumptions, globalisation that favors women leads unambiguously to higher growth rates and a better long run steady state than would exist either without globalisation, or with globalisation that creates jobs only for men.

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Appendix

Carrying out standard comparative statics analysis of the effect of a change in u_f^0 on n, with λ and μ the multipliers attached to the utility and budget constraints respectively, gives the result

$$\frac{\partial n}{\partial u_f^0} = \frac{\lambda \mu \beta \varphi_f''}{D} < 0 \tag{39}$$

where the sign follows from strict concavity of the utility function, and D > 0 is the determinant of the bordered Hessian matrix, with sign given by the second order conditions. For the effect on q we have

$$\frac{\partial q}{\partial u_f^0} = \frac{\lambda \varphi_f''(\mu \beta \ \phi_f' + \phi_m'' + \lambda \phi_f'' + \mu \alpha^2 p h_{ff})}{D} > 0 \tag{40}$$

Here the strict concavity of utility and production functions plays an important role, as does the assumption that f's marginal utility with respect to the number of children $\phi'_f < 0$. If this were positive, the sign could be indeterminate, there could be a reduction in quality of children in order to have more quantity, something we rule out by assumption. Denoting the utility level achieved by m at the solution of the household's problem by v_m , we have from the Envelope Theorem that

$$\frac{\partial v_m}{\partial u_f^0} = -\lambda < 0 \tag{41}$$

Thus an exogenous increase in f's outside option, in increasing her required utility level u_f^0 , makes her better off, m worse off, reduces fertility and increases child quality, while an increase in m's outside option has the opposite effect, *ceteris paribus*.

Next, carrying out the comparative statics analysis on the problem when fsupplies labour l_f^0 at wage rate w_f produces the results

$$\frac{\partial n}{\partial w_f} = \frac{\partial n}{\partial u_f^0} \frac{\partial \hat{u}_f}{\partial w_f} < 0; \quad \frac{\partial q}{\partial w_f} = \frac{\partial q}{\partial u_f^0} \frac{\partial \hat{u}_f}{\partial w_f} > 0; \tag{42}$$

and so fertility falls¹⁶ and quality increases with f's wage.

 $^{^{16}}$ Allowing labour supply to depend positively on $w_f,$ so that the wage becomes part of the marginal cost of a child, only strengthens this result.



Figure 1: Steady State Male and Female Wage