OVERSEAS EMPLOYMENT AND REMITTANCES
TO A DUAL ECONOMY

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Abstract

Overseas employment has become more commonplace, and the remittances have increased in similar proportions. For poor countries, remittances often substantially influence domestic expenditures and real exchange rates. We study overseas employment, remittances and domestic underemployment in a simple general equilibrium model with a non-traded good and minimum wage. The influence of population growth, rural productivity, and family altruism are examined. If remittances per migrant exceed domestic productivity then multiple equilibria may occur exhibiting high or low overseas employment. We discuss how the equilibrium with highest overseas employment conditionally Pareto dominates the other equilibria, and analyse policy co-ordination.
Migration generally leads to important gains for the sending country, primarily through remittances. Because international wage differences are so large, the amounts remitted are often a multiple of what the migrants could have earned at home - about double in the case of Filipino and Korean emigrants, for example."

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Voluntary remittances from emigrant workers are a major influence upon welfare and real exchange rates in many less developed countries. Between 1980 and 1991 official estimates of world remittances increased from US $ 43.3 billion to US $ 71.1 billion, and by the end of this period remittances comprised about 9% of world trade in services. Official nominal net remittances from workers overseas for more than one year, from developed to developing countries rose from $21 to $31 billion between 1980 and 1989, and amounted to over half the total value of official development assistance in 1988. These figures exclude informal remittances, which are not easily measured, but the studies available - for example, Choucri (1986); Russell (1986) - suggest that "official" remittances comprise less than half total transfers (which include consumer durables) to developing countries. In some countries the share of official remittances in GDP is high. These include Portugal (8.3%), Morocco (6.5%), Turkey (3.9%), Egypt (10.6%), Jordan (14%), Pakistan (4.8%), Bangladesh (3.8%), and several small countries in Latin America, Africa and the Caribbean. The ratio of official remittances to exports ranges between 25 and 50 percent, in Egypt, Bangladesh, Sudan, Portugal, Pakistan, Sri Lanka, Greece and Turkey, (Swamy (1981); World Bank (1995)). While there is evidence that remittances per head decline as migrants become integrated into host-economies - for example, Funkhouser (1995) - the increasing level of overseas employment suggests that the influence of remittances on the foreign exchange markets LDCs

1 See Russell (1992).
is likely to persist. In contrast, theories of international migration and domestic resource allocation in LDCs have largely neglected the implications of remittances.\textsuperscript{11}

This paper provides a simple model of resource allocation and real exchange rates in a small less developed country, when international migration and remittances are endogenous. Since labour market distortions and under-employment are important features of many low wage countries, we also include a minimum wage. Our model is related to two previous approaches. One theme begins with the observation that in the familiar two good small open economy model, emigration does not influence the utility of remaining residents - for example, Bhagwati and Rodriguez (1975). Following Rivera-Batiz (1982) (1984) (1986) several authors examine how exogenous migration, in a model with one traded and one non-traded good, results in the remaining residents experiencing welfare losses unless remittances exceed a crucial level - Djagic (1986); Lundahl (1985); and Kirwan and Holden (1986).\textsuperscript{4} In these models emigration may reduce welfare for remaining residents because migrants no longer purchase non-traded goods in the origin economy, so that the gains from interaction that would have arisen, provided migrants have different factor endowments to remaining residents, do not occur. We build upon these general equilibrium models by making

\textsuperscript{2} For exceptions, see Kirwan and Holden (1986), Lundahl (1985), Rivera-Batiz (1986) and Djagic (1986), who study remittances, resource allocation and welfare in a trade model, but with exogenous migration and full employment.

\textsuperscript{3} Early studies of the "brain drain" - for example, Grubel and Scott (1966), Bhagwati and Hamada (1974), and Bhagwati and Rodrigues (1975) - do not analyse remittances. "Dual Economy" models of unemployment and public policy, featuring various domestic distortions, also do not capture remittances. Recent studies of migration - for example Eithier (1985) - exclude remittances. Various micro models of migration and remittances -for example Stark (1991) and Lucas and Stark (1985) - have been discussed and estimated, but do not consider the general equilibrium allocation issues discussed here.

\textsuperscript{4} Neary (1989) studies a similar model without remittances and shows that an increase in immigration to a country producing a non-traded good can increase the nominal and real wage in the affected country.
international migration endogenous. This draws upon a second literature - see, for example; Djajic (1989); Djajic and Milbourne (1988); Lucas and Stark (1985); Faini (1994); Hoddinott (1994); and Funkhouser (1995) – which explores migration and remittances choices, but within partial equilibrium models. Combining these two approaches within a simple general equilibrium framework enables us to examine the determinants of international migration, urban under-employment and the allocative consequences of remittances, population growth, rural sector productivity enhancement etc. This produces several hypotheses to shape future empirical work. The model also offers insight into the political economy of policy towards international migration, and the economic reasons why the levels of overseas employment have been found to be volatile.

We study an LDC from which skilled workers may freely migrate to a large high wage country. There is an exogenous quota of overseas employment for unskilled workers. Skilled workers who remain in the developing country join a jobs competition and earn either a 'high' minimum wage producing traded goods, or take unskilled jobs. As in other recent contributions to the migration literature - for example, Stark (1991) - the decision taking unit is the household, comprising a worker and her dependants. The household maximises a utility function to decide whether the worker should emigrate and, conditional upon wages, a remittance to dependants who remain in the origin economy.

A natural assumption to make in models of international migration is that workers who

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5 Russell and Teitelbaum (1992), in World Bank Discussion paper No.160, provide a lucid account of the increasingly volatile nature of migrant flows, illustrating their political and economic context.

6 This assumption was analysed by Harris-Todaro (1970) and was first discussed in the brain-drain literature by Bhagwati and Hamada (1974), in the context of exogenous migration without remittances.
choose overseas employment must purchase some non-traded goods in the destination economy, given the geographic separation of markets. We assume non-traded goods produced domestically are a perfect substitute in the utility function to those produced overseas – for example, a hamburger, or bus ride - so that migration is influenced in a simple way by the relative price of non-traded goods in the two economies. We assume that the price of non-traded goods is higher in the high wage country, so that the constraint that migrants purchase some non-traded goods in the destination country is a binding constraint. In this model, overseas employment is jointly determined with the real exchange rate: increased migration results, ceteris paribus, in higher aggregate remittances, and lower domestic production, which generally changes both total domestic expenditure, and the relative price of non-traded goods (the real exchange rate) in the source economy. The real exchange rate has allocative consequences resembling a "Dutch disease" effect,7 altering the incentive to migrate, and preferred level of overseas employment.8

We use the model to study the comparative statics of an economy producing traded and non-traded goods, with a minimum wage distortion, and with workers who may migrate and remit. We show how (i) population shocks may lead to disproportionate increases in overseas employment, (ii) societies in which families have integrated decision taking may have greater and more variable overseas employment levels, (iii) the joint analysis of migration and real exchange rates helps to explain why overseas employment might fluctuate

7 It is usual to refer to a "Dutch disease" effect if within a traded goods sector a booming industry generates substantial foreign exchange revenues and thus currency appreciation, - Corden and Neary (1982), and Corden (1984). Remitted factor earnings also provide foreign exchange, instigate currency appreciation, and reallocate resources towards the non-traded goods sector.

8 While there is much less empirical analysis of the impact of remittances upon exchange rates than of the effects of natural resources, evidence of the significant impact of remittances on Egyptian exchange rates and the relative price of traded goods is provided by Shafik (1994).
sharply in response to various shocks, and (iv) an increased overseas employment quota for unskilled workers might lead to an even larger voluntary emigration of skilled workers and an improved quality mix of international migrants.

For certain parameter values, the LDC modelled here exhibits multiple steady state equilibria (ME), in which the equilibrium exhibiting the highest level of overseas employment conditionally Pareto dominates the other equilibria. The potential inefficiency of overseas employment arises from a "participatory externality" as follows: to decide whether to supply labour at home or overseas, the household compares the indirect utility resulting from the domestic and overseas price vectors, but disregards that working overseas changes the number of consumers of, and total demand for, domestic non-traded goods, and thus the returns to factors specific to the origin economy. In this model the total value of these returns increase with higher spending on domestic non-traded goods. If remittances per migrant exceed (are less than) their foregone productivity in the domestic economy, then domestic spending increases when more workers migrate, and there is a resulting positive (negative) externality when an additional worker is employed overseas. If all overseas earnings are spent in the origin economy, the migration externality is eliminated since in this case the worker migrates overseas, if and only if, this increases her wage in the domestic currency, which is exactly the migration criterion which maximises domestic expenditure and welfare.

The multiple equilibria arises from a related dynamic mechanism: if remittances per migrant exceed her marginal product in the source economy, then higher emigration increases the net demand for, and equilibrium price of, non-traded goods; but at a higher price level, domestic real wages are lower, which increases the equilibrium supply of emigrants. Thus overseas employment is determined by the intersection of two curves - reflecting goods and labour market equilibria - both of which have positive slopes in overseas employment - price
of non-traded goods space if remittances exceed the domestic wage. The equilibrium with highest overseas employment Pareto dominates since if remittances exceed foregone domestic productivity, migration creates a positive externality and the highest equilibrium level of skilled migration will create the greatest gains for factors specific to the economy. While this model does not necessarily generate ME, it does imply that parameter shocks can produce large changes in overseas employment. Our model belongs to the literature on coordination failures, and in particular those models in which the gains to entering a market depend on the number of other participants - see especially, Diamond (1982), and Chaterjee and Cooper (1989). In our model, even though overseas prices are exogenous, the gains from migration vary with the number of migrants from the small economy. The “multiplier” features of these models also apply to emigration and can produce large fluctuations in overseas employment.

This paper is arranged as follows. The basic features of the model are described in Section 2, and Section 3 summarises the nature of the equilibria. Section 4 discusses the comparative statics of the model, exploring the sensitivity of international migration, the real exchange rate, the queuing for 'good' jobs by educated workers and the urban/rural allocation of labour, to changes in population, rural sector productivity, an overseas employment quota for uneducated workers, and the extent to which migration decisions in the household are 'individualistic', by placing a high relative weight on the worker's utility. Section 5 presents some empirical evidence, and Section 6 some brief conclusions.

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Since households disregard the cost of living in the countries to which their physical assets migrate, capital mobility does not raise the same issues.
2. An Economy with Overseas Workers Who Remit

2.1 Overview

Consider a world consisting of a small country (Agraria) which produces a traded good at a price set in the rest of the world (Eurica) and also a non-traded good. In Agraria, traded goods may be produced by (i) educated labour and capital, or by (ii) a low productivity linear technology using identically either educated or uneducated labour. We think of the former as urban manufacturing, and the latter as a rural technology using unlimited supplies of land. Non-traded goods are produced using identically educated or uneducated labour and a sector-specific factor, which is thought of as urban land. Capital is internationally immobile. Eurica is endowed with more capital and as a result (i) educated and uneducated labour receive a higher wage in Eurica, and (ii) the exogenous price of an identical non-traded good to that in Agraria is also greater.\(^\text{10}\) Eurica is assumed to be a large country so that wages and prices in Eurica are exogenous, in this model of migration from Agraria.

There are \(T\) households in Agraria. Each has one worker and dependants. A fraction \(k\) of the workers are educated. Households maximize welfare, which is a function of the utility of a) the worker, and b) dependants. Dependents remain in Agraria. Households first choose whether the worker will supply labour at home or overseas; conditional upon the location and earnings of the worker, an intra-family transfer is chosen; finally the worker and dependants choose whether to spend on traded or non-traded goods. Migrant workers buy

\(^{10}\) Evidence provided by Kravis, Heston and Summers (1982) suggests that it is reasonable to assume that non-traded goods prices are higher in high wage countries.

\(^{11}\) While the autarky price differences between the two economies arise here due to unequal capital allocations and capital immobility, the assumption of different and immobile technologies between countries gives an identical outcome.
non-traded goods overseas.

The labour market works as follows. Educated labour may migrate from Agraria at any time, but there exists a quota for uneducated workers. Every period educated workers living in Agraria compete for a limited number of high domestic wage positions, with the unsuccessful either migrating overseas or taking unskilled work. Workers overseas can only compete for high wage jobs in Agraria after working for one period in unskilled work in Agraria. For skilled workers the equilibrium expected present value of household welfare from remaining in Agraria after not obtaining a high wage job is equal to the expected present value of migrating to Eurica and earning an overseas wage in perpetuity. Uneducated workers accept overseas quota places if offered, and otherwise migrate freely between the rural linear traded and urban non-traded sectors.

The output markets work as follows. Once the intra-family transfer has occurred workers and dependants spend a fraction of income on non-traded goods. All dependants, and those workers located in Agraria, purchase non-traded goods in Agraria, and the price of non-traded goods adjusts to clear markets. Since there is no saving and households are assumed to meet their budget constraint, the traded goods market also clears. The endogenous variables in the model are the price of non-traded goods (real exchange rate); the allocation of educated labour to the overseas, manufacturing, and non-traded sectors; and the allocation of uneducated labour who have not received an overseas quota place, to the rural (tradeable), urban non-traded sector. The model is now described more precisely.

2.2 Production and Labour Demand

Agraria has an urban sector which produces traded and non-traded goods as follows:

(i) Output of traded goods is related to inputs by a production function which is linear
homogenous and twice differentiable, \( F = f(E_F) \), where \( E_F \) is the employment of educated labour. There are diminishing returns to \( E_F \) because of sector specific capital. Since the output price is the numeraire, and the wage for educated labour is institutionally fixed at \( \bar{w} \), the firm chooses \( E_F \) to maximize: 
\[
f(E_F) - \bar{w} E_F.
\]

\[
E_F = E(\bar{w})
\]  

(ii) Non-traded goods are produced using educated and uneducated labour, \((E_I, N_I)\) which are equally productive, and paid the same wage, \(w\). The wage and the price of non-traded goods, \(p\), are endogenous. We assume diminishing returns to employment due to a sector-specific factor (say, land) and a linear homogenous twice differentiable production function, \(Ag(E_I + N_I)\). Employment is chosen to equate the marginal product of labour to the market wage.\(^{12}\)

\[
w = pAg(E_I + N_I)
\]  

(iii) The rural sector in Agraria produces traded goods, using labour and unlimited land. Each worker produces \(\alpha\) units of output per period. Thus at an equilibrium, the rural wage, \(w_A\), is given by \(w_A = \alpha\).

2.3 Labour Markets

The \((1-k)T\) uneducated workers are employed in the non-traded \((N_I)\), rural traded \((N_A)\), or overseas \((N_M)\), sectors.

\[
N_I + N_A + N_M = (1-k)T
\]

\(^{12}\) We assume that the potentially unemployed work in the informal sector, (possibly at low wages) which appears plausible given the absence of unemployment benefits in LDCs. (For a similar approach see Cole and Sanders (1985)).
In each period \( \bar{N}_M \) quota overseas are offered at wage \( v \) and accepted. Appendix 1 discusses the parametric restriction implied by this condition. Uneducated workers who do not work overseas are employed either in the rural or informal sector. Migration between the rural and urban non-traded sector by uneducated workers ensures that \( w = w_A = \alpha \). Using (2), the internal migration equilibrium condition implies

\[
\alpha = p'Ag(E_I + N_I) \quad (4)
\]

Educated workers are employed in the formal sector, \( E_F \); informal sector \( E_I \); or abroad \( E_M \). Thus

\[
E_F + E_I + E_M = kT \quad (5)
\]

Formal jobs in the source economy offer wage \( \bar{w} \), and informal jobs wage \( w, \) \( w < \bar{w} \). Educated workers earn \( v_E \) in Eurica. Migration is decided on the basis of household welfare. Profits in the formal and informal sectors, \( \pi_f, \pi_i \), may be written \( \pi_f(w) \) and \( \pi_i(p, \alpha) \),

where \( \bar{w}, p, \) and \( \alpha \) are exogenous variables. There are no profits in the rural sector.

2.4 Household Welfare and Intra-family Transfers in Agraria

Households contain a worker who earns \( y \), and dependants who do not sell labour services but produce \( \alpha \) units of goods consumed by the household. \( \square \) Households make group decisions about (i) whether the worker should be located overseas, and (ii) an intra-family transfer \( \tau \),

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13 Although remittances are modelled as flowing to dependants, a very similar formulation is found if workers without dependants may choose to work overseas for one "period" and save in order to retire to the source economy in a "second period". Djajic (1989) examines the migrant’s choice of leisure and consumption in the host and destination economies, but in a partial equilibrium context.
to the dependant group, which remains in Agraria. The worker and dependants spend their incomes according to their preferences, on traded and non-traded goods. Households maximise, $U$, 

$$ U = [V_w(y - \tau, p_w)]^\epsilon [V_d(\alpha + \tau, p)]^{1-\epsilon} \tag{6} $$

which is a Cobb-Douglas function of $V_w$ and $V_d$, the indirect utility functions of the worker and dependent group; $p_w$ is the price of non-traded goods for the worker; $p$ and $p_o$ are the prices of non-traded goods in the origin and overseas economies. The traded goods price is one. If the worker migrates, $p_w = p_o$; if the worker remains in Agraria, $p_w = p$. For educated (uneducated) overseas workers, $y = v_e(v)$; for educated workers in a source economy regulated job $y = \bar{w}$; for other Agrarian employees, $y = \alpha$.

We may think of the educated worker choosing both (i) whether to migrate, and, (ii) the intra-family transfer, $\tau$, to maximise (6). This maximisation is solved by first calculating the optimal household transfer $\tau^*$, conditional upon whether the worker migrates, and then substituting the appropriate values of $(y, p_w)$, the worker's income, $y$, and price of non-traded goods, $p_w$, into the maximand for family welfare to determine whether welfare, $u$, is higher if the worker is employed overseas.\textsuperscript{14} To proceed in this way, and assuming utility is linear in income, the indirect utility functions $(V_w, V_d)$ are multiplicatively separable in prices and income, and can be written $V_w = (y - \tau)h(p_o); V_d = (\alpha + \tau)h(p)$. Overseas workers choose $\tau$ to maximise household welfare

\textsuperscript{14} Alternatively (6) may be seen as the basis of a household decision which the worker faithfully executes.
Thus at an optimum \((l - e)(y + \hat{\alpha}) = \hat{\alpha} + \tau^*\), so that the optimal remittance \(\tau^*\), for a household with an educated overseas worker, \(y = v_e\), is

\[
\tau^* = (l - e)v_e - e \hat{\alpha}
\]  

To establish \(\tau^*\) for uneducated migrants, formal and informal sector workers, substitute \(y = v, \bar{w}\), and \(\alpha\), respectively. The optimal remittance in (7) is similar to that derived by Lucas and Stark (1985), and Faini (1994), being an increasing function of the overseas wage, a decreasing function of the earnings of the dependant group, and a decreasing function of the share of income accruing to the worker. If the dependant group benefited from remittances from capital instead of labour earnings, then in (7) it would set \(e = \sigma\), since with capital the only source of household welfare is the utility of the dependant group. In this case \(\tau^* = v_e\), total factor earnings overseas. We now describe the emigration decision for educated workers.

### 2.5 International Migration for Educated Workers

Formal sector jobs, paying \(\bar{w}\), are allocated randomly between eligible educated workers, who comprise those who worked in Agraria's urban sector in the previous period. This eligibility constraint captures the idea that formal sector jobs require local search/rent-seeking. Educated workers who are not offered a formal sector job may emigrate and work...

\[\text{Faini (1994) presents empirical evidence for five Mediterranean countries, showing that recipients' income attracts a persistently negative influence upon remittance levels.}\]
during the period, but if they wish to return to Agraria, must work in the non-traded informal sector for one period before competing for formal jobs. It follows that the worker will emigrate if the present value of family welfare when employed overseas, is greater than that when the worker earns the subsistence wage for one period, and then enters the domestic competition for a formal job. Once overseas she will adopt an identical criterion to decide whether to return. To examine the implications of this, define $U^*(\cdot)$ as instantaneous household welfare, as a function of current earnings, when the worker makes the optimal transfer to dependants. The educated worker migrates if

$$\frac{U^*(v_e)}{1-\delta} > U^*(w) + \frac{\delta}{1-\delta} \left[ q \left( U^*(w) + (1-q) U^*(w) \right) \right]$$

where $q = \frac{E(w)}{kT - E_M}$, the probability that an educated worker is offered a formal job; and $\delta$ is the discount rate. Using the household welfare function, (6), and the expression for the optimal remittance (7), we can show that the stock of educated emigrants is in equilibrium if

$$\text{mm: } (v_e + \alpha) \left( \frac{h(p_e)}{h(p)} \right)^\gamma = \alpha + \delta q (\bar{w} - \alpha) + \alpha$$

(8)

The RHS gives the value of expected total household income per period if the educated worker remains in the domestic labour market after not being offered a job at $\bar{w}$; whereas the LHS gives the total earnings for a household with a migrant worker, weighted by the relative price of consumption goods overseas. The endogenous variables in (8) are the domestic price of non-traded goods, $p$, and the probability of being offered a job in the formal sector, $q$.

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16 We assume that household welfare when the educated worker is employed at wage $\bar{w}$ in the formal sector is greater than that when the worker is employed overseas, at wage $v_e$. For otherwise all educated workers would migrate. This restriction imposes a constraint on underlying parameter values that is discussed in Appendix 1.
which is endogenous because employment overseas, $E_m$ is endogenous. An increase in $p$ increases the cost of living in Agraria thereby increasing the incentive to locate the worker overseas, where she will consume non-traded goods. Thus at higher domestic prices, in equilibrium $q$ must rise sufficiently - educated workers leave ‘bad jobs’ in Agraria’s non-traded sector and emigrate - to bring equation (8), labelled mm, into balance.

It is important to note that the smaller is $e$, the weight on the worker in the family welfare function, the more the household disregards international differences in the cost of living and maximises expected total money income in locating the educated worker; this is because the ratio of overseas to home prices is only relevant to the utility of the worker. If family earnings were to arise from overseas capital, so that $e = 0$, capital is located where it maximises expected earnings. (In this case the possibility of multiple Pareto-ranked equilibria is eliminated.) Labour mobility differs from capital mobility because it results in household expenditure on overseas non-traded goods, so that factor mobility is sensitive to the relative cost of living between countries. We now close the model by describing the goods market equilibrium.

2.6 Equilibrium in the Goods Market

The supply of non-traded goods is determined as follows. The equilibrium employment condition, (4), implicitly determines informal sector employment

$$E_r + N_I = \phi \left( \frac{PA}{\alpha} \right) \quad \phi' > 0 \quad (9)$$

Thus the value of non-traded output, $S(p)$, is given by
\[ S(p) = pA \left( \phi \left( \frac{pA}{\alpha} \right) \right) \quad g' > 0, g'' < 0 \]  

where \( S \) is an increasing function of only one endogenous variable, \( p \). Now consider the demand for non-traded goods. We assume that households have identical CES preferences for non-traded/traded goods. If the proportion of resident income spent on non-traded goods is \( \beta(p), where \beta > 0 and \beta' < 0 \), (in the Cobb-Douglas case, \( \beta' = 0 \)) the demand for non-traded goods is

\[ \beta(p)(F + S(p)) + \alpha N_A + \tau^E E_M + \tau^\tau N_M) \]  

Where \( F \) and \( S \) are the value added of traded and non-traded goods, respectively; \( \tau^E E_M + \tau^\tau N_M \) is remittance income, and \( \alpha N_A \) is the value of rural sector output. If there is no saving and total expenditure is equal to national income, then equilibrium in the non-traded goods market will also ensure equilibrium in traded goods. Combining (10) and (11) gives the goods market balance condition

\[ S(p) = \hat{\beta}(F + \tau^E E_M + \tau^\tau N_M + \alpha N_A) \]  

Where \( \hat{\beta} = \beta/(1 - \beta) \). Summary. The model given by equations (1) (3) (4) (5) (8) and (12), explains the sectoral allocation of each type of labour, and the price of non traded goods (\( E^E, E^M, E^I, N^E, N^I, \) and \( p \)). Fortunately it reduces to a recursive system since the emigration equilibrium condition, (8) is a function of only two endogenous variables, \( E^M \) and \( p \); and equilibrium in the goods market (12), is a function of three endogenous variables; \( E^M, p \) and \( N^A \). If \( N^A \) is substituted out of (12), then we may use the resulting equation, (13) with (8) to determine \( p \) and \( E^M \). To eliminate \( N^A \) we use (3), (5) and (9), to define informal employment,
\( N_A = T - N_M - E_F - E_M - \phi \left( \frac{pA}{\alpha} \right) \), which if used in (12) gives

\[
gg : \quad \tilde{S}(p) = F + (\tau^* - \alpha)E_M + (\tau_N^* - \alpha)N_M + \alpha(T - E_F(w)) \tag{13}
\]

where \( \tilde{S}(p) = \frac{S(p)}{\beta(p)} + \alpha \phi \left( \frac{pA}{\alpha} \right) \) and \( \tilde{S}' > 0 \)

The values of \( \tau^*, \tau_N^* \) are given by (7). Equations (8) and (13) determine emigration, \( E^M \), and the price of non-traded goods, \( p \). The "under-employment" of skilled workers in non-traded sector jobs, \( E_I \), is equal to a constant, \( kT - E_F(w) \), less overseas skilled employment, \( E_M \); and thus changes in "under-employment" are equal and opposite to changes in \( E_M \). Total employment in the non-traded sector is determined by \( p \), which given the exogeneity of \( E_F \), thereby determines total urban employment.

3. Multiple Equilibria

The major features of the model can be found by solving equations (8) and (13) which give equilibrium conditions in the markets for overseas employment and goods - for \( E_M \) and \( p \) - and then examining the properties of the solution. Fig.1a describes a locus of equilibrium points in (\( p, E_M \)) space for each expression. The locus for (13) gives equilibrium points in the goods markets and is labelled gg. Provided remittances per educated migrant exceed the domestic productivity of educated workers who accept informal sector work, \( \tau > \alpha \), curve gg has positive slope.\[\text{To see this, totally differentiate equation (13) to give}\]

\[\frac{d\tau^*}{dE_F} = \frac{\tau - \alpha}{F \beta(p)} \quad \tilde{S}(p) + \alpha \phi \left( \frac{pA}{\alpha} \right) \]

\[1^7\text{The productivity of educated workers who remain in the source economy is determined by the free mobility of uneducated workers between the rural and urban informal sectors. We cannot, in general, sign the second derivative of gg.}\]
This property is critical for the results below and the underlying intuition is as follows. An extra educated migrant reduces employment in the non-traded sector by one which, ceteris paribus, causes the sector to employ one additional worker from the rural sector. This reduces Agraria's output by $\alpha$. However, if $\tau > \alpha$, an extra migrant and her remittances generates greater domestic expenditure than the foregone domestic output reduces expenditure, and since $\beta > 0$, also creates an excess demand for non-traded goods. Thus if $\tau > \alpha$, in a goods market equilibrium, a higher $E_M$ is associated with an increased $p$.

Is it likely that $\tau > \alpha$ in the LDCs mentioned in the Introduction? We have examined the evidence for Egypt. As estimates for remittances are unreliable, we have constructed a plausible range using both official Egyptian and IMF statistics. Egyptian estimates for 1988 suggest annual official remittances of about £E1,800 per migrant but this is thought to be a serious underestimate with knowledgeable observers suggesting as much as £E13,000. Alternatively we may use the IMF estimate of total remittances, and divide by the estimated number of migrants which gives £E2,212. In contrast, the annual wage of an agricultural worker in 1988 was £E1,600, less than our lowest estimate for remittances. Thus the Egyptian evidence suggests that it is of practical use to investigate the case where $\tau > \alpha$.

The condition giving equilibrium international migration, equation (8), describes the price of Agraria's non-traded goods which, at each level of overseas employment, leaves households with an educated worker indifferent to whether she is employed overseas. This curve, $mm$, in $(p, EM)$ space is upward sloping, as in Fig. 1a. This arises because an increase in $E_M$, results in educated workers remaining in Agraria having a greater probability of a formal job offer, so that households with educated workers in Agraria are better off whilst
those with overseas workers have unchanged welfare; to offset this requires higher prices in Agraria. If the non-traded price is at or below $p^\mu$ in Fig. 1a, there is no overseas employment since the cost of living in Agraria is sufficiently low to deter educated workers from migrating given the overseas and domestic wages. Employment overseas is unchanging along mm; and also along the vertical axis below $p^\mu$, in which case $E^\mu = 0$.

By choice of parameter values, three types of equilibria can be produced. These are drawn in Figs. 1a, 1b, and 2. In Fig. 1a there is a single intersection of the two equilibrium conditions at $(E^*_M, p^*)$. For $E^\mu$ above $E^*_M$, say $E''_M$, the goods market clears at a domestic price $p^\circ$, which is below that needed to persuade $E''_M$ to work overseas. In Fig. 1b both equilibrium conditions are met only at $(0, p^1)$. At this point households will not send educated workers overseas since the cost of living in Agraria is sufficiently low, $p^1 < p^\mu$.

In Fig. 2 we describe the case where there are more than one possible equilibria. Equilibria $E_1$ and $E_4$ are similar to that discussed in Fig. 1b. While we have not presented a theory of dynamics, the equilibria $E_2$ are probably unstable. For example, at overseas employment levels below $E^*_M$ the goods market clears at a price below that which would

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18 We can show that $mm$ is convex if preferences are Cobb-Douglas. Using equation (8), the two endogenous variables are $p$ and $E_M$ since $q = \frac{E_k(W)}{kT - E_M}$. If preferences are Cobb-Douglas, then $h(p) = p^\beta$ where $\beta$ is the weight on non-traded goods. Totally differentiating (8) gives $\frac{dp}{dE_M} = k_1 \cdot \frac{p^{1-\beta}}{(kT - E_M)^2} > 0$ where $k_1$ is a positive function of parameters in the model.

$$\frac{d^2 p}{dE_M^2} = k_1 \frac{(kT - E_M)(1 - \beta \epsilon) p^{\beta \epsilon}}{(kT - E_M)^3} + 2 \frac{p^{1-\beta}}{(kT - E_M)^2}$$

which is positive, since all the terms are positive given that $\alpha < \beta$, $\epsilon < 1$, and $kT \geq E_M$. 

support the assumed overseas employment level. This encourages overseas workers to return to the domestic economy, and as a result remittances fall, driving down the domestic queues. Thus $E_3$ is an equilibrium, together with $E_4$ and $E_1$.

If $\tau < \alpha$ the curve $gg$ is downward sloping, so that only a single equilibrium exists. Thus remittances must exceed foregone output in Agraria for $ME$ to arise.

What are the comparative welfare consequences of $ME$? We can show that the "higher" overseas employment equilibrium gives reduced welfare for all working households, but greater welfare for households owning the fixed factor in the non-traded sector. To see this, first note that profits in the non-traded sector are higher at $E_1$, being an increasing function of $p$ and independent of $EM$; profits in the traded goods sector are constant in money terms along $mm$ and are fixed by $\bar{w}$. The utility of working households adopting an optimal transfer is $\left(1 - e^{y_w} \right) e^{\gamma} \left( y_w + \alpha \right) h(p)$, where $y_w = \nu$ or $\alpha$ for the uneducated depending upon whether she has acquired a quota place. This is diminishing in $p$, and thus lower at $E_1$ than $E_3$. Finally, by a similar argument, the utility of households with educated workers is also lower at $E_1$ than $E_3$. This is most easily observed by noting that a north-easterly movement along $mm$ from $E_3$ to $E_1$ increases domestic prices, which reduces the utility of a household with an overseas worker $y_w = \nu$. However educated households are identical and free to migrate overseas, thus the expected utility of all households with educated workers is lower at $E_1$ than $(0, p_0)$. Since the point $E_3$ offers lower non-traded goods prices, and identical queues for formal sector jobs as $(0, p_0)$ the point $E_3$ offers higher utility to households with educated workers. Thus $E_3$ dominates $E_1$ for educated workers. This argument holds for all pairs of equilibria, and not only those involving zero migration, $E_3$. 

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It follows, therefore, that the model can generate an "overseas employment trap", at points such as \( E_1 \) or \( E_4 \), in which there is no tendency for the level of overseas employment to fall even though less overseas employment is more favourable to both educated and uneducated labour: high overseas employment generates increased remittances, high domestic expenditure, and high non-traded goods prices; a high domestic cost of living encourages more to work overseas. This distributionally unattractive equilibrium could be corrected with a tax on migrant labour which would raise \( mm \), the equilibrium price of non-traded goods for every level of overseas employment. At a suitably high tax, equilibrium is restored at a point such as \( p_1 \) in Fig. 1a. There is, however, a superior policy. The government might co-ordinate the equilibrium at \( E_1 \) by regulating the price for non-traded goods, tax the profits of the non-traded goods sector, and compensate working households for the loss of welfare associated with higher overseas employment at \( E_1 \). We can show the following

**PROPOSITION 1.** If remittances per migrant exceeds the domestic wage so that ME may occur, then comparing any two competitive equilibria, that with higher overseas employment Pareto dominates that with less overseas employment provided the government is able to tax profits in the non-traded goods sector and appropriately distribute the proceeds to working households, and capitalists in the manufacturing sector. If remittances per migrant are less than the domestic wage then there is a unique competitive equilibrium and international migration exceeds the social optimum.

From the definition of \( U \) and (7), the utility of working households which make an optimal transfer to dependants is 
\[
(1 - e^h) e^{\lambda e} (y_{w} + \bar{\alpha}) h(p),
\]
where \( y_{w} = \alpha \) or \( v \) for uneducated
workers, and \( v_e \) for educated workers. Thus as wages and traded goods prices are
exogenous, households at the high overseas employment equilibrium, \( E_1 \), require
compensation only for higher prices of non-traded goods. Similarly for capitalists in the
manufacturing sector which has constant money profits \( \pi_f(\bar{w}) \). The change in profits in the
non-traded sectors, if non-traded goods prices are higher, can be written as

\[
\Delta \pi = (p_I - p_0) G_0 + \hat{\pi}
\]

where \( G_0 \) is the initial level of non-traded output. The second term \( \hat{\pi} \) is a strictly positive
amount, since supply is not perfectly inelastic, and \( \hat{\pi} \) reflects the producer surplus on the
incremental output induced by higher prices. Thus the capitalists in the non-traded sector will
prefer \( E_1 \) even if taxed \( (p_1 - p_0) G_0 \). However, to prefer higher overseas employment we have
shown that each other type of household requires, at most, compensation equal to the price
increase multiplied by their original bundle of non-traded consumption. Thus all types of
households require less compensation in total than the increased cost of the initial bundle of
non-traded goods, which in turn is less than the increase in profits. The argument holds for
any pair of equilibria, and not only those in which the lower overseas employment is zero.

The multiplicity of equilibria in our model, follows from the possibility that the real
wage for educated workers in Agraria may be negatively related to the number of educated
migrants. This occurs if remittances are greater than the productivity of educated workers in

\[\text{The utility of households with educated workers participating in Agraria's labour market will have the same expected utility as those with overseas workers by the free migration condition. It follows that the expected utility of households with educated workers is ex ante independent of where the worker is located.}\]
Agraria, \( \tau > \alpha \), so that demand for non-traded goods rises with emigration. If the government were to co-ordinate the outcome \( E_1 \), with emigration of educated workers, with the appropriate tax/subsidy compensation package for those remaining then it would co-ordinate the outcome \( E_1 \). However the co-ordination of a high migration outcome such \( E_1 \) is likely to prove politically difficult\(^{20}\) since before compensation real wages in Agraria for both educated and uneducated workers are lower at \( E_1 \).

Consider now the case where \( \tau < \alpha \) so that domestic demand falls with emigration (gg is downward sloping) and there exists a single equilibrium. At this equilibrium educated workers are indifferent to a small reduction in migration, given non-traded good prices. However, by the argument offered in the preceding paragraph, an equilibrium with a marginal increase in the demand for and prices of non-traded goods in Agraria is a potential Pareto improvement. Thus a small reduction in migration and movement along gg in a north-westerly direction to clear goods markets will provide a Pareto improvement if rents to the non-traded fixed factor can be taxed and redistributed.

4. Comparative Statics

PROPOSITION 2. If remittances per head, \( \tau \) exceed origin country labour productivity, \( \alpha \), then:

(i) An increase in population will cause a rise in skilled overseas employment (reduction in domestic under-employment) exceeding the increase in skilled population. Total

\(^{20}\) The distortion introduced by the minimum wage is not crucial to the construction of the M.E. It is straightforward to construct a market clearing version of this model in which (i) \( mm \) remains upward sloping - a higher domestic price level will prompt more overseas employment until the marginal product of labour is sufficiently increased; and (ii) the slope of gg may be positive depending upon the scale of remittances, and intersect \( mm \) from above or below.
Employment in the urban sector will rise.

(ii) An increase in overseas quota for unskilled workers will cause an increase in skilled migration, possibly increasing the emigrant quality mix. Total employment in the urban sector will increase.

(iii) An increase in the weight on dependants in the household welfare functions will cause increased emigration and an increase in the size of the urban sector.

(iv) An increase in rural labour productivity has ambiguous effects on overseas employment and total employment in both the urban and rural sectors.

The proofs are presented in Appendix 2, and discussed below.

(i) Population growth. Equations (8) and (13) imply that both the mm and gg curves are shifted, by an increase in population, T. Establishing the sequence of consequences is made easier if we first consider the migration equilibrium condition, mm. While all incremental uneducated workers can be absorbed in the rural sector at constant money wage, all of the additional educated workers locate overseas and the mm curve shifts to the right by \( k \Delta T \). (This is depicted in Fig. 3.) This arises because the overseas demand for educated workers is infinitely elastic, whereas additions to the pool seeking a fixed number of formal jobs reduce the utility from entering the home labour market. Before goods markets clear, the economy moves between points a and d in Fig. 3. The increase in overseas employment by \( k \Delta T \) subsequently increases remittances, which if gg is upward sloping, increases the demand for, and price of, non-traded goods. This effect generates a movement from d to b in Figure 3. However at this increased cost of living further emigration is prompted since b is to the left of m:mm, and eventually the economy reaches an equilibrium at c.

An increased population, T, also increases the demand for non-traded goods directly
as rural sector incomes increase. Thus, from (13) gg shifts upwards to g1g1. This prompts a rise in domestic prices and initiates additional migration of educated workers. At point f, overseas employment is increased by an amount in excess of the increased population of educated workers. The greater are remittances per head, the greater is the slope of gg, and the greater is the "multiplier effect" of a population shock on overseas employment. An economy without endogenous emigration would experience proportionately greater employment growth in the constant returns rural sector. The higher price of non-traded goods creates more jobs in that sector, which are filled by uneducated migrants from the rural sector.

(ii) How do overseas quotas for uneducated workers influence the "brain drain"?
Suppose the number of quota places for uneducated workers, \( \overline{N_M} \), is increased. The level of quota places does not directly affect the migration decision for educated workers, so that equation (8) and the mm curve are unaltered. However, the uneducated workers who secure these new quotas each make remittances, \( \tau_N \). Since the quota places are filled by reducing the number of workers in the rural sector using the low productivity technology there is a reduction in the demand for non-traded goods from this loss of income, \( \alpha \) per emigrant. If \( \tau_N > \alpha \) there is a net increase in demand for non-traded goods - g0g0 shifts to g1g1 - which drives up the domestic price level, as in Fig. 4. This prompts an increase in emigration by educated workers, and less under-employment of educated workers in Agraria. Thus migration of the two groups is complementary. Furthermore an increased quota for the uneducated may improve the quality mix of emigrants to Eurica: the two curves gg and mm may be arbitrarily close in slope, so that a small shift in one can produce a large change in the
equilibrium overseas employment of educated workers. Finally, we observe that the increased price of non-traded goods increases employment in that sector, and thus total urban employment.

(iii) The distribution of household income, e. How do overseas employment and the size of the informal sector vary with the extent to which migration decisions reflect household, rather than individual migrant welfare? The share of family income accruing to the worker is given by the parameter e. We consider the 'natural' case of the overseas country being more prosperous and with higher prices for non-traded goods.

If e is reduced, then using (8), mm shifts to the right. This is because the family is less influenced, in locating the worker, by the high prices that the overseas educated worker must pay for non-traded goods, and focuses more on the higher earnings overseas that are available to be remitted. A reduction in e also increases the share of family income accruing to dependants and the flow of remittances, which from (13), in turn shifts the gg curve upwards as dependants in the source country increase expenditure on non traded goods. These two shifts reinforce each other and increase both the stock of overseas migrants and the price of non-traded goods, as given in Fig. 5. This suggests that both emigration and the total size of the urban sector may be higher if households make group decisions.

(iv) Agricultural Sector Productivity. A "Green Revolution" in the agricultural sector has an ambiguous outcome. An increase in productivity, $\alpha$, will increase the wage paid in the non-traded goods sector and ceteris paribus, from equation (8), reduce the stock of overseas workers since accepting a subsistence job is now more attractive. This shifts the mm curve to the left in Fig. 6. The higher real wage in the agricultural sector carries three implications for
It increases the supply price of labour to the informal sector and, depending on the elasticity of labour demand, reduces the supply of informal sector output, increasing \( p \). It also increases domestic expenditure and the demand for non-traded goods, which also raises \( p \) at each level of \( E^m \). Finally, the overall expenditure effect is diminished because remittances are reduced to partially offset the increased domestic wage. Thus the \( gg \) curve shifts to the left. The outcome for \( p \) and \( E^m \) is ambiguous. This may be contrasted with a model without emigration, in which an increase in rural productivity, \( \alpha \) with exogenous rural output prices, would enhance rural employment.

5. Empirical Evidence

Our purpose in this Section is to relate the model to what is known empirically.

(i) A central feature of our model is the endogenous determination of aggregate remittances and migration in a household decision. The model implies that remittances rise with income overseas \( (V_e,V) \); fall with income accruing to dependants, \( \hat{\alpha} \); increase with the weight placed upon dependants in determining the worker’s choices, \( e \); and rise proportionately with the number of migrants. This approach and its implications are well supported in the literature. Various authors provide evidence for the view that migration and remittances, are best thought of as maximising household welfare – either because the individual worker is altruistic or is embraced within a household’s self enforcing contract – for example, Rampel (1981), Stark (1980, 1991), Lucas and Stark (1985), Banerjee (1984), Hoddinott (1994), and Funkhouser (1995). Thus Hoddinott (1994) finds evidence that in Kenya remittances are affected by both (i) a potential threat to reduce parental bequests, as measured by parental land holdings per adult son, and (ii) migrant earnings. Stark and Lucas (1985) give evidence of how in Botswana, families owning drought sensitive assets received...
particularly large remittances during a drought, suggesting insurance for households with drought sensitive assets.

In a study of the two large out migrations from Latin America, Funkhouser (1985) shows how migrants with higher earnings potential remit more, and that remittances to Nicaragua are reduced the lower is the origin household income. Hoddinott (1984) also discusses how remittances increase with migrant earnings, and are greater if the non-migrating household head is a widow, which may indicate greater income dependency. Elbadawi and Rocha (1992) in a pooled cross-section/time series model of remittances to individual LDCs finds support for the hypothesis that aggregate remittances to individual countries are proportional to the stock of migrants.

(ii) A key aspect of our model is that remittances, by increasing origin country expenditure, also increase the relative price of non-traded goods. While there is relatively little macro evidence concerning the effects of remittances on real exchange rates, there are empirical studies of a similar phenomena - the Dutch disease - and various micro studies which suggest that remittance expenditure has this effect. One of the few studies of the effects of remittances - and other windfall earnings, for example, oil revenue - on the real exchange rate is Shafik (1994). The essence of her findings is to illustrate the considerable appreciation, followed by depreciation in the Egyptian real exchange rate, as the value of windfall earnings rose and declined in the 1980’s. This is summarised in Figure 6. Haque, Husain and Montiel (1994) construct and estimate a macro model in order to show how remittances have enabled the Pakistan economy, 1974-87, to grow rapidly with low inflation and without a balance of payments crisis. Evidence for the impact of windfall natural resource earnings on the real exchange rate is discussed by Neary and van Wijnbergen eds. (1986).
Several micro studies have found that a large share of remittances are used to purchase non-traded goods. This frequently occurs in the form of housing - for example Martin (1991) and Adams (1991), who found that 22% of remittances to rural Egypt were spent on real estate. Investments in education and health, which appear primarily non-traded goods, have also been significant - for example Condé et al (1986). A further indication of the relative price and consequent sectoral adjustments that the demands arising from remittances can induce is found in the rapid doubling of employment in construction during the Egyptian real exchange rate ‘bubble’ of 1980-86 described by Shafik (1994).

Few studies exist of whether the provision of remittances and the subsequent adjustments, have enabled regions or entire countries to achieve an equilibrium with a substantially higher level of development. One by Glytsos (1990) studies two regions the Macedonia and Thessalia regions of Greece which before emigration (early 1960's) were comparable in many economic respects, except per capita income, which was higher in Thessalia. Ten years later, the combination of migration and remittances to Macedonia had closed a 16% income gap. Economic historians have explored the impact of out migration and remittances on the mountain communities of Europe, with some supporting the view that remittances played a major role in their economic development - for example, Siddle (1997).

Our model provides several hypotheses regarding the determinants of overseas employment, the endogenous skill quality mix, and the influence of remittances, that arise in a macro framework, and provide a basis for future empirical work.

6. Concluding Comments
Remittances have a substantial impact on the macro economy of many small countries. This paper analyses international migration and the source country allocation of labour when
migrants make remittances and exchange rates are endogenous. We discuss how overseas employment may be persistently less than is socially optimal if domestic wages are low relative to remittances per head: low overseas employment leads to low domestic demand and a low cost of living; a low domestic cost of living supports an equilibrium where few have an incentive to work overseas. The equilibria with socially too low a level of overseas employment also have too high a level of underemployment of educated labour in ‘bad jobs’ in the origin economy. Working households, which have lower utility at an equilibrium with higher prices of non-traded goods, can be potentially compensated by redistributing the increased profits in the non-traded sector.

A coordinator might unlock the potential social gains from higher overseas employment, but unfortunately labour would not politically choose the potential Pareto optimum unless the "co-ordinator" also possessed the power to effect re-distributive taxation. Thus if remittances are large, government policy towards emigration must be carefully constructed if the Pareto superior outcome is to be achieved. The strategic problem of carefully combining domestic policy towards distribution with that towards overseas employment, may be important in inhibiting the construction of coherent policies towards overseas employment.

The joint analysis of remittances and emigration helps to explain the political concerns that levels of overseas employment might fluctuate sharply in response to various shocks. Thus, "multiplier" type effects cause an increase in the source country population of mobile workers to result in an even larger increase in overseas employment; similarly, an increased quota for unskilled workers might lead to an even larger emigration of educated workers in an improved quality mix of international migrants.

We have discussed how societies in which families have integrated decision taking
may have greater and more variable overseas employment levels. This is because workers in family networks may migrate even when high overseas prices discourage individual migration, since overseas earnings, if partially remitted, command higher buying power in a low cost of living country than if spent overseas. Secondly, greater integration of the family may increase remittances from a given migrant stock, which (i) increases the domestic demand and the price of non-traded goods, thereby encouraging more emigration; and (ii) increases the sensitivity of overseas employment to various parameter shocks.
Appendix 1

The condition that workers always accept a formal sector domestic job offer, follows from an inequality similar to the migration condition (a):

\[
\frac{H^*(v_e)}{1-\delta} < H^*(w) + \frac{\delta}{1-\delta} \left[ q H^*(w) + (1-q) H^*(w) \right]
\]

then educated workers prefer a formal job to emigration. The condition that uneducated workers always accept an overseas job, if awarded a quota place, is

\[
(\nu + \hat{\alpha}) \left( \frac{h(p_o)}{h(p)} \right) < w + \hat{\alpha} - \delta(1-q)(w - \alpha) \quad (A1)
\]

Meeting conditions (A1) and (A2) is obtained under a weaker set of assumptions the greater is \(\hat{\alpha}\). If \(\hat{\alpha} = 0\) then combining (A1) and (A2) gives \(I - q < \frac{w - \alpha v_e}{\delta(w - \alpha)}\)

A necessary condition for this inequality to hold is \(\frac{w}{\alpha} > \frac{v_e}{v}\)

This condition is requires that wage inequality is proportionately less great in the more developed economy which is a plausible restriction. (See 1995 World Development Report, Ch.6.)
Appendix 2

Equations (8) and (13) determine $p$, the price of non traded goods, and $E_M$, overseas employment. Using the definition of $q$ in (8) gives

$$mm: (kT - E_M) \left[ (\nu + \alpha) \left( \frac{h(p_o)}{h(p)} \right)^\nu - (\alpha + \alpha) \right] = E_f \delta (\bar{w} - \alpha)$$

From (13) we have

$$gg: \frac{S(p)}{\hat{\beta}(p)} + \alpha \lambda \phi \left( \frac{pA}{\alpha} \right) = F(\bar{E}_f) + (\tau^* - \alpha)E_M + (\tau^*_N - \alpha)\bar{N}_M + \alpha(T - \bar{E}_f)$$

where $\tau^*_N = (1 - e)V - e\alpha$, $\tau^*_N = (1 - e)V - e\alpha$, and $\bar{E}_f = E_f(\bar{w})$.

The square bracketed terms in equations (8) and (13) are positive, and are labelled $\alpha_0$ and $\alpha_1$ respectively. Totally differentiating each equation we have

$$A \begin{bmatrix} dE_M \\ dp \end{bmatrix} = [J] \begin{bmatrix} d\alpha \\ d\tau \\ d\bar{N}_M \\ de \end{bmatrix}$$

$$A = \begin{bmatrix} a_1 \\ (\alpha - \tau) \\ \alpha \frac{a_2}{S} \end{bmatrix}$$

$$J = \begin{bmatrix} [kT - E_M - \delta\bar{E}_f] \\ (T - \bar{N}_M - \bar{E}_f - E_M) - S_\alpha \alpha \frac{a_2}{S} \alpha (\tau_N - \alpha) \\ a_4 \end{bmatrix}$$

where $a_1 = -(\nu + \alpha) \left( \frac{h(p_o)}{h(p)} \right)^\nu + (\alpha + \alpha) > 0$ (since RHS of (8) is > 0)

$a_2 = (kT - E_M) \ (\nu + \alpha) \left( \frac{h(p_o)}{h(p)} \right)^\nu \left( \frac{-eh'(p)}{h(p)} \right) > 0$ (since $h'(p) < 0$)

$a_3 = [E_M (\nu + \alpha) + \bar{N}_M (\nu + \alpha)] < 0$ (using (7))
\[ a_4 = (kT - E_M)(v + \hat{\alpha}) \left( \frac{h(p_0)}{h(p)} \right) \ln \left( \frac{h(p_0)}{h(p)} \right) > 0 \quad (\text{since } p_0 > p \text{ and } h' < 0) \]

Since equations (8) and (13) have potentially multiple intersections A may have either sign. Here we concentrate on the stable intersections where gg cuts mm from above and A < 0. The following comparative statics may then be derived:

\[ \frac{dE_M}{dT} > 0 \quad \frac{dE_M}{dN_M} > 0 \quad (\text{provided } \tau_\infty > \alpha) \]

\[ \frac{dE_M}{de} < 0 \quad \frac{dE_M}{d\alpha} < 0 \]
References


Fig. 1a. Goods & Labour Market Equilibrium
Fig. 1b. A Single Equilibrium at (0,P)
Fig. 2. *Multiple Equilibria*
Fig. 3. The Effects of an Increased Population, $T$
Fig. 4. The Effects of an Increased in the Employment Quota for the Unskilled, $\overline{N_m}$
Fig. 5. The Effects of a Reduced Weight on Worker Utility in Household Welfare.
Fig. 6: Egyptian Remittances and the Relative Price of Non-Traded Goods

Notes:  
- □ The price of services relative to the price of capital imports
- + The price of services relative to the price of all imports
- ● Remittances as a % of GDP