The Labour Market Effects of Remittances *

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Abstract

The basic idea of the paper is as follows: remittances from migrants to their families have two opposing effects on the labour market of the source country. First they raise the income of the unemployed members back home. If we assume that wage income is taxed at a higher rate than income received by the unemployed, this will reduce the difference between the income of the employed and unemployed in the source country. According to standard matching models of unemployment this causes the unemployment rate to rise. The second effect is on investment in the source country. It is plausible to assume that many firms in the transitional economies and other countries supplying immigrants to the EU are credit constrained. Remittances available for investment will then relax these constraints and increase the level of capital stock. If the 'investment effect' outweighs the 'search income' effect, then remittances will have the effect of reducing the unemployment rate.

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Contents

1 Introduction

The impact of migration on both sending and receiving countries has long been a topic of debate. The purpose of this paper is to shed light on the relationship between remittances from international migration and imperfections in the job matching process. Thus we will analyse the impact of migration on the labour markets of the sending countries. Different forces can affect the way labour markets perform, especially when migration occurs between regions at different levels of development. On the one hand, migration from a less to a more developed area affects natives by introducing more competition in the labour market and by influencing the decision of entrepeneurs to offer new job opportunities. On the other hand, migration can affect the labour market prospects of the origin country through at least two channels. First, migration opportunities can influence the education decision of both migrants and stayers (Stark et al., 1998). Second, when migrants remit part of their earning to their families, they can affect the consumption, investment and employment decisions of stayers.

Many studies have focused on the effects of population flows on the economic prospects of natives (e.g. Borjas, 1994 and 1995), however, the impact of migration on the labour market in the home country has received far less attention. This literature is reviewed in the next section. This paper aims to redress the balance by focusing on the effects of migration through remittances (savings) on the labour market in the source economy. Evidence from 20 lower and middle income countries indicates that 3.46 % of GDP is equal to remittances. The basic idea is very intuitive, since migration opportunities can have two opposing effects. First, remittances from migrants to their family *raise* the income of the unemployed individuals back home. The increase in the outside option for the unemployed will cause the unemployment income to increase. But suppose some remittances are invested. Thus the net effect of remittances in the labour market of the home country is then far from obvious. In particular, we show that when firms are financially constrained, remittances can *decrease* the unemployment rate in the home labour market. Firms in

developing country often cite credit constraints as a major obstacles to investment. The constraint is particularly important for private enterprises but less so for state owned ones. Clearly the lack for investment funds heavily influences the process of economic development, and remittances (repatriated savings), together with foreign direct investment, are a possible way of relaxing these constraints. We therefore develop a dynamic labour matching model with capital and credit constraints. This gives us a useful theoretical framework to discriminate between 'productive' and 'unproductive' uses of remittances.

The paper is organized in the following way. Section 2 provides an overview of the theoretical and empirical literature on the effects of migration on the welfare of stayers. Section 3 introduces the basic model in which we explore the effect of remittances in labour markets where firms' level of investments is sub-optimal due to limits in their ability to finance new investment. Section 4 contains an empirical analysis of the relationship between remittances and unemployment. Finally, in section 5 we conclude.

2 Related Literature

A large literature has developed in recent years concerning the impact of international migration on both the home and host countries. Apart from a few exceptions (e.g. Davis and Weinstein, 2002), the general perception is that migration enhances the welfare of people living in the host country even if distribution effects can dominate. Borjas' partial analysis focuses on the impact of migrant flows on the wages of natives (Borjas 1994, 1995, 2001). He argues that the *immigration surplus*, which represents the increase in income of natives following immigration, is affected by the interplay of different factors such as the complementarities between natives and migrants and the mobility of migrants compared to natives. Levine et al. (2002) revisit the *immigration surplus* in a model with endogenous growth and find that the growth effects come to dominate the purely static effects of Borjas. From a different perspective, Ortega (2000) presents an interesting explanation of why migration can

lower the unemployment rate of natives. In a two-country labour matching economy where natives and migrants have different search costs, the author shows that natives are better off since they benefit from the boost in labour demand following the arrival of migrants.

However, the analysis of the effects of migration is far from complete if we do not take into account the effects of migration on the home labour market. For this reason, the relationship between migration and development in the sending economies requires a more detailed analysis. The most obvious effect that migration from Less Developed Countries (LDC) should have on the labour market in the home economy is that, in itself, migration should lower the unemployment rate by reducing the supply of labour. However, the relationship between migration and the labour market in the labour exporting country is far more complex than this. For instance, given that it is often the most skilled individuals who migrate, a brain drain could negatively affect the labour market of the labour exporting country, although more recent studies argue that the brain drain need not harm LDCs. For example, Stark et al. (1997, 1998) examine the notion that the gains from prospective migration may increase the human capital levels in the source country. They show how a positive employment probability in the host country provides an incentive to increase human capital formation because of higher returns to human capital overseas. Beine et al. (2001) outline the conditions under which a brain drain can be beneficial to the source economy. Domingues Dos Santos et al. (2000) also suggest that migration can improve the efficiency of the home country's labour market since migrants can diffuse back the knowledge they have obtained overseas and return migrants will bring both physical and human capital back with them. For the remainder of this section, however, we will mainly focus on literature that exists on the effect that remittances have on the labour market in the home country.

From a theoretical perspective, Djajic (1986) shows that stayers may benefit from migration if migrants send a sufficiently large amount of remittances back home.In addition to this positive perspective of migration, there may be other effects (since

a central feature of our model is the dual use of remittances and its effect on the home labour market). Below we relate the model to what is known empirically. First remittances from migrants to their families increase consumption demand in the home economy. Return migrants[1], spend their extra income in durable and non durable goods. At the same time, part of this remittance flows can be used in a productive way through direct investment in a project or through savings chanelled from the banking system.

Funkhauser (1992) notes that migration and remittances can have two effects on participation decisions on the home country's labour market. The loss of the migrant worker may mean that other household members, in particular females, enter the labour market. However, the receipt of remittances could reduce participation rates because of the income effect. He further suggests that high levels of remittance flows into local labour markets may increase aggregate demand and hence the demand for labour. To test each of these influences, he uses cross section data on individuals from El Salvador to estimate a labour force participation equation which includes whether a household member is a migrant and the predicted amount that households receive in remittances as explanatory variables.[2] He finds that having a household member abroad has a negative and significant effect on the participation decision of males and a negative but insignificant effect on the participation decision of

[1]As clarified in Rapoport and Docquier (2002): "At a macro level, there are only minor differences between remittances stricto sensu and repatriated savings upon return..... . The relevant questions are: How much income earned abroad is repatriated? And are the amounts repatriated being used for investment or consumption?" Therefore, we use the term "remittances" to cover both sources of income.

[2]Funkhauser (1992) estimates a probit model in which the dependent variable takes a value of 1 if the individual is working or looking for work and 0 otherwise. The other explanatory variables are the individual's age, education and marital status, the household's own non-wage income, the number of adults in the household, the number of children in the household, urban and regional dummies. The remittance variable is a predicted amount because the data are obtained from a survey undertaken in 1987 while the labour force data relates to a 1985 survey. Therefore the author has to predict the amount of remittances that households receive using only those household variables that can be identified both in the 1985 and 1987 surveys.

females. Furthermore, remittances have a negative and significant influence on the labour force participation of both males and females. However, the coefficient on the migrant in the household variable becomes positive in the participation equations for both males and females when the predicted level of remittances is also included. To proxy the effects of migrants on the local labour market, Funkhauser (1992) adds the proportion of migrants from the local labour market. he does not find that this variable exerts a significant influence on participation rates. He concludes that for males, the negative income effect from remittances dominates all other effects but for females the positive but small effect of the local labour market is enough to outweigh the negative remittance effect.

Further evidence that remittances act in a similar way to welfare payments is provided by Zachariah et al. (2001).[3] They report that the worker-population ratio was 55 per cent amongst non-migrant households in Kerala but only 31.6 per cent in households with an emigrant. They suggest that this finding may be caused by employment seekers from emigrant households being more selective with regards to their job match. Furthermore, they report unemployment rates of 20.8 per cent and 8.1 per cent for emigrant and non-emigrant households respectively. They conclude their section on the effect of migration on employment and unemployment with the comment "because unemployed persons belonging to emigrant households enjoy the financial support of the emigrant members, they are not in any hurry to get employed" (p. 55).

Galasi and Kollo (2002) survey previous studies on the effect of unemployment benefits on the incidence and duration of unemployment. The receipt of remittances can be thought of as similar to the effect of increasing unemployment benefits and hence the individual's replacement rate and their reservation wages. They note that there are some counter arguments to the commonly held view that an increase in benefits has detrimental effect on job search intensity, which hence causes a reduction in the probability of re-employment for workless individuals. Firstly, a longer job

[3]The survey consists of around 10,000 households in Kerala, India and was undertaken between March and December 1998.

search period can produce a better job by allowing individuals to find their most suitable match and also providing information about the markets for individuals who are not searching for jobs (Burtless, 1990). Secondly, Atkinson (1981) suggests that if an increase in the reservation wage as a result of more generous benefits also increases the number of job offers an individual rejects then this will increase the number of vacancies for other job seekers.

Galasi and Kollo (2002) also summarise the results of studies that attempt to measure the effect of changing unemployment benefit entitlement and rates in Hungary. Of most interest is a study by Galasi et al. (1999) which finds that an increase in reservation wages reduces job search intensity but this does not exert a significant influence on the probability of re-employment. The idea that unemployment benefits act as a safety net for the unemployed worker is theoretically explained in Marimon and Zilibotti (1999). The authors develop an equilibrium search matching model with two-sided and ex-ante heterogeneity to obtain a distribution of match productivity. An increase in unemployment benefits acts as a safety net and unemployed wait longer for better matches. They found that in an economy with higher unemployment benefits there will be a higher unemployment rate but also a better allocation of skills to jobs. The view that unemployment income as a positive effect on the average productivity is also shared by Acemoglu (2001). The author develops a model with homogeneous individuals where firms can open "good"[4] or "bad" vacancies and an economy with higher unemployment ends up with a better job's composition.

It is also important to explore exactly how remittances are used in the home country. The central issue here is whether there is a dual use of such resource transfers. On the one hand, studies have suggested that migration, through remittances, have a positive impact on consumption in the source country. This may increase the dependency and also have negative impact on the income inequality in the home country. Furthermore, if the majority of the money that is sent back is spent on

[4]Jobs with high capital intensity.

goods and services, then remittances could cause inflation which could lead to excessive wage claims. On the other hand, remittances can be equality enhancing and have a positive impact on the development of poor areas, especially if they are invested in productive activities.

Most studies have found that remittances are generally spent on consumer goods such as food and clothes as well as housing, although there is a debate over the extent to which they are used for productive purposes. Durand et al. (1996) report that 10 per cent of their sample of Mexican migrants to the US who reported that they sent remittances or brought savings back with them (82 per cent of their sample of 1501 migrants) spent at least some of the saved/remitted money (i.e. migradollars) productively. 14 per cent reported that they spent some of their migradollars on housing and the remaining 76 per cent reported that they spent the migradollars only on consumption.

Glytsos (1993) estimates that only 4 per cent of the estimated 14 billion drachmas sent migrant remittances to Greece in 1971 was invested in machinery and another 4 per cent was invested in small shops, compared with 63 per cent on consumption, 22 per cent on housing and 7 per cent on land. The amounts spent on housing and consumption were almost identical to the figures reported for Pakistan by Gilani et al. (1981). Using input-output analysis, Glytsos (1993) estimates that the multiplier effect associated with migrant remittances is 1.7 and this is found to vary between industries. Multiplier effects are estimated to be highest in the apparel and footwear, leather and electrical machinery industries and lowest in services. The author estimates the potential employment and capital effects of remittances amounted to around 74,000 new non-agricultural and non-public sector jobs and 8 per cent of installed manufacturing capacity.

Adams (1998) also finds that external remittances have an important impact on the accumulation of rural assets using Pakistani data and argues that the marginal propensity to invest transitory income is higher than it is for labour income[5].Rozelle

[5]He also finds that remittances from international migration have a much larger impact on the accumulation of physical assets (irrigated and rainfed land) than remittances from internal

et al. (1999) find that remittances help to loosen the constraints on crop production in rural China and also stimulate productivities. Furthermore, given that many LDCs are likely to face capital and liquidity constraints, these constraints can be eased as a result of the savings that are deposited by migrants or their families. Therefore despite the fact that only a small proportion of remittances may be invested directly by migrants or their families, remittances can be channelled into productive uses by the banking system.

Similarly, Mesnard (1999) finds that the majority of entrepreneurial projects in Tunisia started by return migrants were financed by their own savings, while Kule et al. (2000), summarise the results of two surveys carried out in Albania in 1998. The first of these was completed by around 1500 individuals about their migration experience (of whom just under a half had migrated), whilst the second contained questions which were directed towards firms. Both of these surveys contained information on remittances. The information provided in the first of the surveys suggested that over 50% of the remittance sent to Albania were used for consumption, 16% were saved in a bank, 7% were invested both in financial institutions and in property, and over 7% invested in business. The survey of firms indicates that around 17% of the capital required to establish a business came from remittances. This evidence suggests that remittances can been seen as a way to overcome credit-constraints in the source economy.

Leon-Ledesma and Piracha (2001) adopt a positive view of the relationship between migration and development by modelling the effects of short term migration on labour productivity. Remittances can be channeled into investments and increase productivity in the home economy. The authors study the impact of migration and remittances on employment performance of Central and Eastern European countries (CEECs). They claim that most of the CEECs migration is temporary and that the main sources of the migrant' savings from overseas are used productively in the home country. Their study is mainly an analysis of the effects of return migration

migration.

on the home country and their focus is on the contribution of return migration on investment and skill acquisition. This is captured by a term which measures the average product of labour. The impact of return migration is also explored by McCormick and Wahba (2001).The authors find that return migrants invest in projects and enterprise in their own country (Egypt). Their evidence suggests that both overseas savings, and the duration of stay overseas increase the probability of opening an enterprise. This is particularly true among literate returnees.

To the best of our knowledge, the literature on matching theory has been silent until now on the role of migration opportunities on the labour market performance in the home country. In section 3.1 we review Pissarides' basic model with capital. He assumes perfect capital markets and shows that the standard unemployment model (Pissarides, 2000) is unaffected by the introduction of capital. Firms choose the optimal level of investments and the introduction of new savings in the economy does not have any effect on the output produced by each firm. On the other hand, the introduction of credit-constraints generates new effects and creates a link between the literatures on matching theory and on the effects of remittances on labour exporting counties.

3 The Model: Remittances with Credit-Constrained Firms

3.1 The Basic Model with Capital Stock

Consider a worker living in a country characterized by unemployment due to search frictions in the labour market. He has the option to migrate and earn a safe return abroad which we assume is given. Since we focus on the effects of migration on the home labour market, we assume full employment elsewhere[6]. We do not model

[6]The full employment assumption is not restrictive. We can easily assume unemployment in the foreign country and argue that migrants have similar characteristics to natives. Under these assumptions, migration does not affect the labour market in the host country.

the migration decision of individuals and we assume that a fixed proportion of individuals migrate and remit back home[7]. These savings are used by the return migrant to increase his expected lifetime utility in his own country. Alternatively, we can think of a permanent migrant who remits his savings to the members of the family that decide to stay in the home country[8].

In a world with frictions it takes time to find a job. Trade is a decentralized economic activity and coordination failures together with imperfect information are essential elements of the trading process. The technology of meeting is summarized by a matching function which gives the number of matching in the economy as a function of inputs (i.e. the number of buyers and sellers). Matching functions reflect the fact that trading partners are not fully informed of each others' existence, because of horizontal heterogeneity in location, sectors of activity, type of skills, etc. Rationing arises in a world where individuals are imperfectly aware of their economic opportunities, from the stochastic nature of the matching process between partners.

The number of job meetings and matches is synthesized by the following matching function:

$$m = m\left(U, V\right)$$

This function is assumed increasing in both arguments and concave. For simplicity, we assume that the dimension of the market does not affect its performance, namely the function is homogeneous of degree one. The number of matches, taking place per unit time, is then summarized by the following function[9]:

[7]It is beyond the scope of this paper to model migration decision. In fact, the evidence shows that part of the income earned abroad is repatriated in the home economy and that the decision to remit is driven by different motives. See Rapoport and Docquier (2002) for a detailed survey of the motives to remit.

[8]Please refer to the previous section for the definition of repatriated income earned abroad.

[9]The matching function is a technical device that captures the frictions of the economy. It is possible to derive it from particular specifications of the meeting process. One of the first attempts to derive a matching function from agents' behaviour (microfoundations) analyses the effects of coordination failures in a labour market using the so called urn-ball model.

$$m = m(u, v)$$

Given the arrival of contacts, the individual transitions from an unmatched to a matched states are $q(\theta)$ for firms and $\theta q(\theta)$ for workers, with $\theta = \frac{v}{u}$ (i.e., the 'tightness' of the market).

The model includes four Bellman equations which summarize the dynamic problem that the demand and the supply side of the exchange face. The firm opens a vacancy, sustains search costs (c), and job creation takes place when the complementary partners meet and agree to a way to share the rents. Let V^F be the present-discounted value of expected profit from a filled job and V^V the corresponding value in the vacant case. Introducing the capital into the model, we follow Pissarides (2000) and let k be the capital stock per efficiency unit of labour. Then, given the wage bargaining process specified below, the value function for each job is given by:

$$rV^{F(nm)} = pf(k) - pk(r + \delta) - \bar{w} + \lambda(V^V - V^{F(nm)}) \tag{1}$$

for the job filled by an unemployed without savings or remittances (i.e. a household without a migrant for semplicity) and

$$rV^{F(m)} = pf(k) - pk(r + \delta) - w' + \lambda(V^V - V^{F(m)}) \tag{2}$$

for a job filled by a migrant or an unemployed that receives remittances from a migrant member of the family, where $\bar{w}$ is the wage for 'non migrants', w' is the post-migration wage (i.e. wage with savings or remittances), λ is the exogenous destruction rate of jobs and p is a productivity parameter. Moreover, $y = f(k)$ is the output produced by a firm, which uses k capital and a worker. The capital is lent at the market interest rate (r) and it is subject to the depreciation rate (δ) When the vacancy is open but the job is not filled, the firm does not hire capital and its asset value in the steady-state, V^V, satisfies the following Bellman equation:

$$rV^V = -c + q(\theta)\left[V^{F^e} - V^V\right] \tag{3}$$

where V^{Fe} is the expected value of a filled vacancy. If the firm has free access to financial markets offering finance at the interest rate r , then the maximization of V^F w.r.t k gives the standard result:

$$f'(k) = r + \delta \tag{4}$$

If $\bar{z}$ is the domestic support for the unemployed and z' is the unemployment income for the migrant, then the remaining value functions which summarize workers' asset value are:

$$rV^{U(nm)} = \bar{z} + \theta q(\theta)\left[V^{E(nm)} - V^{U(nm)}\right] \tag{5}$$

which expresses the market value for an unemployed without savings or remittances. The equivalent relation for the migrant unemployed (i.e return migrant or member of a family with a migrant) is:

$$rV^{U(m)} = z' + \theta q(\theta)\left[V^{E(m)} - V^{U(m)}\right] \tag{6}$$

where the asset value of the representative worker depends on the unemployment income and the probability to find a job.

Finally, the asset values for an employed worker are:

$$rV^{E(nm)} = \bar{w} + \lambda\left[V^{U(nm)} - V^{E(nm)}\right] \tag{7}$$

for the 'non migrant' and:

$$rV^{E(m)} = w' + \lambda\left[V^{U(m)} - V^{E(m)}\right] \tag{8}$$

for the 'migrant' worker.

As in Ortega (2000), we assume that firms are not able to discriminate *ex-ante* between an unemployed migrant and non-migrant since only information concerning the average characteristics of workers is available when the vacancy is opened. This implies that firms will open the same vacancy for the unemployed non-migrant and migrant. In the home economy,households with and without migrants will bargain two different wages. In particular, it is worth noting that the wage for migrants

will be higher than that of non migrants since they have a higher 'threat point' synthesised by U (expected discounted flow of income in absence of agreement)[10].

The expected value of a filled job depends on the proportion of 'migrants' and 'non migrants' in the population:

$$V^{F^e} = \alpha V^{F(m)} + (1-\alpha)\, V^{F(nm)} \tag{9}$$

where α is a function of the proportion of 'migrants' in the economy.

In equilibrium all firms enter the market until the expected present-discounted value from a vacant job is zero $\left(V^V = 0\right)$. By manipulating the two Bellman equations for the firms and the zero profit assumptions, we can determine the *job creation curve* JC:

$$p[f(k) - (r+\delta)k] - w_i - \frac{(\lambda + r)pc}{q(\theta)} = 0 \quad i = nm \text{ and } m \tag{10}$$

During the bargaining stage, the partners agree on a way to share the rents. Wages are determined as the solution to a Nash bargaining problem. Given that the firm surplus is equal to $V^F - V^V$, the wage is contracted by following the maximization problem:

$$w_i = \arg\max \left[V^E - V^U\right]^{\beta} \left[V^F - V^V\right]^{1-\beta} \tag{11}$$

where $0 \leq \beta \leq 1$ is the bargaining power of workers.

By solving the maximization problem, we obtain:

$$w^{(nm)} = (1-\beta)\,\bar{z} + \beta p\,(f(k) - (r+\delta))k + \theta c) \tag{12}$$

$$w^{(m)} = (1-\beta)\,z' + \beta p\,(f(k) - (r+\delta))k + \theta c) \tag{13}$$

Then, the average wage, w, to be paid in the source economy is obtained by formulating the bargaining problem in terms of expected wages:

$$w = (1-\beta)\,z + \beta p\,(f(k) - (r+\delta))k + \theta c) \tag{14}$$

[10]When an unemployed worker finds a vacant firm, he starts bargaining the wage taking into account his outside option , namely the expected discounted flow of income when unemployed.

with $z = \alpha z' + (1-\alpha)\,\bar{z}$.

The *job creation curve*, JC, is completed by substituting the *average wage curve*, WC, in the job creation condition:

$$(1-\beta)z + \beta p[f(k) - (r+\delta)k + c\theta] = p[f(k) - (r+\delta)k] - \frac{(r+\lambda)pc}{q(\theta)} \tag{15}$$

$$\Rightarrow pc\left(\beta\theta + \frac{(r+s)}{q(\theta)}\right) = (1-\beta)(y(k) - z) \tag{16}$$

To derive the equilibrium, the basic matching model with capital requires a dynamic equation describing the evolution of unemployment over time:

$$\dot{u} = s\,(1-u) - \theta q\,(\theta)\,u \tag{17}$$

In the steady state $\dot{u} = 0$ and the model is completed with the *Beveridge Curve* (BC):

$$u = \frac{\lambda}{\lambda + \theta q\,(\theta)} \tag{18}$$

Equations (4), (14),(15) and (18) give 4 equations in k, w,[11] θ and u. Then the definition $\theta = \frac{v}{u}$ (the 'labour market tightness' parameter) gives the vacancy rate and completes the equilibrium.

3.2 Credit Market Imperfections

Without some constraint on the ability to raise finance for investment, remittances can affect the unemployment income, but they would have no effect on the capital stock. Firms would choose the optimal level of capital stock (per efficiency unit of labour) at $k = k^*$ given by (3).

If capital markets are perfect, variations in the amount of remittances can positively affect the unemployment rate in the home country. At the same time, since remittances increase the option value for unemployed, an increase in remittances determines higher average wages.

However, the lack of formal channels to obtain credit that characterizes many developing countries can generate financial constraints for firms. We therefore assume

[11] The wage for migrants and non-migrants is obtained from (12) and (13).

that, for reasons lying outside the model, firms in the developing countries cannot raise finance up to satisfy their optimal choice of capital. With credit constraints $k < k^*$, remittances now play a dual role. First, they relax the constraints and enable the firm to get closer to its optimal capital stock. In figure 7, this causes the WC to swivel in an anti-clockwise direction and the JC curve shifts out. The net effect is to increase $\theta = \frac{v}{u}$. In figure 8, in (u, v) space, the JC curve swivels in an anti-clockwise direction causing v to rise and u to fall.

To see the 'investment effect' algebraically, we differentiate w.r.t. k the job creation condition (10) where $y = y(k) = p(f(k) - (r + \delta))k$ is output net of the cost of capital. We obtain

$$\frac{d\theta}{dk} = \frac{(1-\beta)[f'(k) - (r+\delta)]}{pc(\beta - (r+\lambda)q(\theta)^{-2}q'(\theta))} > 0 \tag{19}$$

since $q'(\theta) < 0$ and $f'(k) > r + \delta$ when $k < k^*$.

The second effect of remittances is to raise the search income (z). The 'search income effect' moves in the opposite direction since:

$$\frac{d\theta}{dz} = \frac{-(1-\beta)}{pc(\beta - (r+\lambda)q(\theta)^{-2}q'(\theta))} < 0 \tag{20}$$

Thus in figure 9 an increase in z determined by an increase in remittances rotates the WC curve in an anti-clockwise with the effect of increasing the wage and decreasing θ. In figure 10, the JC curve in the unemployment-vacancy space swivels in a clockwise direction as the unemployment income increases. The effect is a reduction in vacancies and an increase in the unemployment rate.

Suppose that variables θ, k and z refer to a post-migration state and in the pre-migration state they take values $\bar{\theta}$, $\bar{k}$ and $\bar{z}$. Then from the above JC relation, $\bar{\theta} > \theta$ implies that the investment effect outweighs the search income effect, and migration causes the unemployment rate to fall, iff the following condition applies:

$$y(k) - y(\bar{k}) = f(k) - f(\bar{k}) - (r+\delta)(k - \bar{k}) > z - \bar{z} \tag{21}$$

Equation (21) is the necessary and sufficient condition for migration to cause the unemployment rate to fall.

The model is completed by relating the income of the average unemployed worker in the source country, (z), to its earnings and the 'funding gap' $\left(k^* - \bar{k}\right)$ which is a measure of the degree to which the sending country is credit constrained. We also assume that migration can be temporary and that, when abroad, migrants save a certain proportion of their income which yields a income flow, $\widetilde{z}$ for when they return. Alternatively, $\left(\widetilde{z}\right)$ is the income flow from family members abroad. In the steady state this raises the income whilst searching to $\bar{z} + \widetilde{z}$ and the income whilst employed to $w + \widetilde{z}$. The return migrant or a member of a migrant family consumes this income flow when unemployed. For simplicity let us assume that only income from savings are taxed and they are taxed at 100%[12] With these assumptions the effect of the migration fund is to simply to raise the search income to $\bar{z} + \widetilde{z}$.

We now have an average tax stream in the economy equal to $(1-u)\tilde{z}$. A good use of this tax stream is to lend to firms and ease their credit constraints. Then in a steady state, per capita capital stock rises by $(1-u)\widetilde{z}/\delta = \tilde{k}$, say[13] until such a point where $k = k^*$. The complete model with migration now consists of the JC equation, the wage curve , the Beveridge curve and capital stock given by:

$$k = \bar{k} + (1-u)\widetilde{z}/\delta = \bar{k} + \tilde{k}, \quad \text{if} \quad \bar{k} + \tilde{k} \leq k^* \tag{22}$$

$$= k^*, \quad if \quad \bar{k} + \tilde{k} \geq k^* \tag{23}$$

and (21) becomes:

$$y(k) - y(\bar{k}) = f(k) - f(\bar{k}) - (r+\delta)(k - \bar{k}) > \widetilde{z} \tag{24}$$

The left-hand-side of (24) rises as the credit constraint becomes more severe and the marginal product of capital at the constrained level rises. It also rises if total factor productivity rises. The analysis above treats the pre-migration income for the unemployed, $(\bar{z})$, as independent of the wage rate. However, one might expect $\bar{z}$ to depend on the wage rate $\bar{w}$ through, for example, some indexed unemployment support. If we assume a proportional relationship then we rewrite the income of the

[12] A more realistic tax structure can be introduced, but we leave this for future work.

[13] Using $\dot{k} = -\delta k + i$ where i is investment.

unemployed as domestic support plus remittances; i.e., $z = \rho w + \tilde{z}$ with $\rho w + \tilde{z} < w$ and the replacement ratio $(0 < \rho < 1)$. Then the intersection of the WC and JC curves becomes:

$$pc\left(\beta\theta + \frac{(r+\lambda)[1-\rho(1-\beta)]}{q(\theta)}\right) = (1-\beta)[(1-\rho)y(k) - \tilde{z}] \tag{25}$$

with (24) now becoming:

$$(1-\rho)[y(k) - y(\bar{k})] > \tilde{z} \tag{26}$$

We can now summarise our results as a proposition:

Proposition

Migration with remittances has two opposite effects on the unemployment rate: (1) It increases the search income and the unemployment rate rises. (2) It relaxes the credit constraint facing firms, raising the capital stock towards its optimal level and reducing the unemployment rate. When remittance income is sufficiently high, the optimal capital stock is reached and any further increase only has effect (1). The condition for (2) to outweigh (1) is given by (24) **if domestic unemployment income is independent of the wage rate,** (w) **or by** (26) **if it is given by** ρw**, and this is more likely to hold if the credit constraint is severe and/or total factor productivity is high and/or domestic unemployment support is low.**

Figures 1 to 6 illustrate this proposition. In these simulations we assumed the second formulation above, $z = \rho w + \tilde{z}$, remittances are equal to $\xi\rho w$ and allowed the parameter ξ to increase from zero (no remittances as in the pre-migration state). We assumed the credit ceiling to be $\bar{k} = \eta k^*$, where $\eta \in (0, 1)$. Thus a low η signifies a severe credit constraint whilst η close to unity is a modest credit constraint. Details of the functional forms employed, the calibration and the resulting parameter values are given in the Appendix.

Figures 1, 2 and 3 give results for a very severe credit constraint, $\eta = 0.1$. Figure 1 shows the 'credit shortfall', $k^* - k$, falling as ξ increases. For $\xi \leq 1$, remittances are

never sufficient to ease the credit constraint entirely. Figure 2 shows the left-hand-side and right-hand-side of (26) as ξ increases. According to the proposition, the unemployment rate with remittances lies below that without remittances if $\xi < 0.75$. Figure 3 plots the labour market tightness parameter $\theta = \frac{v}{u}$ and the unemployment rate u, both as proportions. Thus unemployment falls until approximately $\xi = 0.3$, the point at which the difference between the left-hand-side and the right-hand-side of (26) is maximized. The unemployment rate then falls until around $\xi = 0.75$ when condition (26) is no longer satisfied. Beyond $\xi = 0.75$, migration with remittances causes unemployment to increase above its pre-migration level. Figures 4 to 6 give comparable results for a more moderate credit constraint, ($\eta = 0.5$). Figure 4 shows the 'credit shortfall', falling as ξ increases until at around $\xi = 0.7$ and remittances are sufficient to eliminate the credit constraint. From figure 5 we see that condition (13) is never satisfied and from figure 6, migration with remittances causes unemployment to rise monotonically from its pre-migration level.

4 Empirical Analysis

4.1 Data

In order to test the theoretical model of the effect of remittances on the unemployment rate of the home country, aggregate data have been collected for those countries where remittances constitute an important part of the economy. More specifically, countries were selected if remittances were at least 1% of GDP between 1996 and 2000. Each country in the dataset also has at least 7 observations on unemployment and remittances data. As a result of these restrictions we are left with 20 countries. However, given the lack of data on remittances, unemployment and some of the explanatory variables, we have an unbalanced panel[14].

[14]Further details of the dataset can be found in the data appendix.

Table 1.Descriptive Statistics for Countries in Dataset

	Remittances/GDP				Unemployment Rate			
	1970-2000		1996-2000		1970-2000		Correlation with remittances/GDP	
	$\bar{r}_{it}$	N	$\bar{r}_{it}$	N	$\bar{u}_{it}$	N	Level	Lag
Algeria	1.23	23	1.93	4	24.6	12	0.881***	0.855***
Barbados	2.09	14	2.72	5	15.7	25	-0.440	-0.466
Belize	4.18	17	2.75	5	12.4	7	0.225	-0.489
Columbia	0.66	31	1.03	5	11.1	26	0.322	0.004
Croatia	2.51	8	2.62	5	10.1	20	0.541*	-0.828**
Dominica R.	4.09	31	7.97	5	17.0	9	-0.786**	-0.980***
Ecuador	2.90	11	5.05	5	8.5	14	0.534*	0.575*
Egypt	6.67	31	4.19	5	6.1	27	-0.255	0.384*
Greece	2.25	25	1.85	5	8.2	21	0.273	0.192
Honduras	2.73	14	4.70	5	5.8	16	-0.588**	-0.579**
Jamaica	4.41	25	9.51	5	20.8	28	-0.695***	-0.637***
Mexico	0.90	21	1.24	5	3.5	21	-0.499**	-0.713***
Morocco	6.42	26	5.84	5	17.4	16	-0.565**	0.611**
Nicaragua	4.44	7	7.41	3	10.2	13	-0.888	-0.927**
Pakistan	4.31	31	2.07	5	4.6	21	-0.740***	-0.757***
Paraguay	0.87	19	2.09	5	5.8	15	0.646***	0.267
Peru	0.96	11	1.19	5	7.4	15	0.080	-0.095
Portugal	6.33	26	3.07	5	6.3	27	0.635***	0.598***
Sri Lanka	4.67	26	6.42	5	12.0	11	-0.792***	-0.840***
Turkey	2.36	27	2.32	5	8.8	19	0.472**	-0.575**
All Countries	3.46	424	3.74	5	10.4	366	0.016	-0.004

Notes: *** denotes Significant at 1% level, ** denotes Significant at 5% level, * denotes

Significant at 10% level. N is the number of observations available for each variable.

Before estimating econometric models of unemployment, it is useful to observe the importance of remittances to the countries that feature in the dataset and the extent to which these countries have suffered from unemployment. Table 1 therefore reports descriptive statistics on remittances and unemployment for the countries in the sample. It can be seen that the importance of remittances to these developing economies has generally increased over time, with remittances equivalent to a higher proportion of GDP in the 1996-2000 sub-period than it was for the entire period between 1970 and 2000[15]. However, this is not true of all countries, with remittances becoming relatively less important for countries such as Belize, Egypt, Greece, Pakistan, Portugal and Turkey in the latter sub-period. Remittances are most important to the Jamaican economy, where remittances are equivalent to almost 10% of the country's GDP.

Unemployment also varies considerably across the countries in the sample, with Algeria and Jamaica having experienced average unemployment rates in excess of 20%, whereas average unemployment was less than 5% in Mexico and Pakistan. The table also reports the correlation between remittances (as a percentage of GDP) and the unemployment rate for each of the countries. Overall, the positive and negative effects of remittances on unemployment more or less cancel each other out. However, the relationship varies substantially between counties, with a significantly positive correlation in some countries such as Algeria, Portugal and Turkey, whereas negative and significant coefficients are observed for the Dominican Republic, Jamaica, Morocco, Pakistan and Sri Lanka. Very similar results are obtained if the lag of remittances, rather than its level, is correlated with the current level of unemployment[16] .

[15]Data on remittances only starts to become available in the WDI from around 1970.

[16]Underemployment is also a major issue in many developing countries because their labour markets tend not to be efficient and they usually have a large informal sectors. For an analysis of underemployment in Trinidad and Tobago see Gorg and Strobl (2003). However, the underemployment rates they present for the four countries in our sample that feature in their international

4.2 Empirical Model

Because of the opposing effects that remittances are expected to have on the source country's labour market, as shown in previous sections, and the need to control for other influences on unemployment, it is necessary to test this relationship by estimating an econometric model. The following equation represents the general form of the model to be estimated:

$$u_{it} = \beta x_{it} + \delta r_{it} + \varepsilon_{it} \; i = 1, 2, \cdots, n; t = 1, 2, \cdots, T$$

where u_{it} denotes the unemployment rate in country i in period t and r_{it} the amount that country i receives in remittances in period t (as a proportion of GDP) x_{it} is a vector of regressors that represents other factors that are expected to influence the unemployment rate. The parameters β and δ will be estimated using fixed models because missing data do not allow more sophisticated panel models of unemployment to be estimated. For example, Nickell and Nunziata (2002) estimate Generalised Least Squares of unemployment in OECD countries from 1961-92, which allow for country specific first order serial correlation and heteorskedastic errors.

Data limitations severely constrain the explanatory variables that can be included in the econometric models. For example, few if any of the countries have information on the types of institutions (e.g. union density, centralisation of wage bargaining, tax wedges, employment protection, duration of benefits and replacement rates) that have been examined by recent studies of OECD unemployment (e.g. Blanchard and Wolfers, 2000; Nickell and Nunziata, 2002). Given these restrictions and the fact that countries in the sample are less developed than those in the OECD, more dated studies of OECD unemployment, which focus more on demand and supply factors i.e. the influence of economic shocks, as well as studies that analyse unemployment in individual developing countries have been used to inform which explanatory variables to include. These controls are now discussed.

comparison in Table 1 (Ecuador, Mexico, Paraguy and Turkey) suggest that the problem is small in these countries.

Bruno (1986) estimates a reduced form equation for unemployment, which is expressed as a function of the real wage gap and aggregate demand factors, namely the real money stock and the government fiscal deficit. Contractionary monetary or fiscal policies, to reduce inflation, will shift the aggregate demand curve inwards. For example, Bruno (1986) argues that a restrictive monetary policy, such as those followed by several OECD governments in the early 1980s, caused unemployment to rise. He includes two lags for each of the explanatory variables and estimates a pooled model in first differences for 8 countries for the period 1962-1982[17]. He finds that the lagged first difference of the real money supply has a negative and significant effect on unemployment but the difference lagged two periods is not significant (although it is positive). The lagged differences for real wages have a positive and significant influence on unemployment, whereas increases in the government deficit cause unemployment to fall.

McCullum (1986) also includes aggregate demand factors in his model of unemployment in 14 OECD countries between 1980 and 1984. The variables he uses are the percentage change in the narrowly defined money supply deflated by the GNP deflator minus the trend growth in the real money supply in the preceding period and the cyclically adjusted government budget balance as a percentage of GNP. He finds that the fiscal and monetary multipliers have their expected effects and estimates that a 1% increase in real money supply causes a 0.18% increase in output a year later. Nickell and Nunziata (2002) also include money supply shocks in their model of unemployment in 20 OECD countries between 1961 and 1992. A number of authors, including Nickell and Nunziata (2002), include the real interest rate as a shock factor.

Marquez and Pages (1997) examine the effect of trade liberalisation on unemployment using a panel of 18 Latin American and Caribbean countries which have at least 15 observations with complete information. Trade liberalisation is captured by four variables: openness, tariffs, the black market premium and a trade reform index.

[17]He also estimates the equation separately for the 8 countries.

Of these, they only find that the trade reform policies exert a significant influence and its effect is to increase unemployment but they also suggest that movements in and out of employment dominate the unemployment effects of the reduction in protection. McCallum (1986) also multiplies each of the explanatory variables in his model by the ratio of imports of goods and services to GNP for each country minus the mean value for all countries to indicate how much the estimated parameters are influenced by openness.

4.3 Results for Unemployment

Table 2 presents estimates of unemployment in developing countries. Three specifications of each model are estimated. The first specification includes the variables that Bruno (1986) includes in his analysis, together with remittances (each of these variables are initially entered just in levels) and lagged unemployment, which is included in eagc of the models estimated by Nickell and Nunziata (2002). The second specification includes the lagged values of these variables. Finally, the first specification is then augmented with the other variables that are discussed above, namely real interest rates and openess. Openness is included as a lag term because of the potential endogeneity between the level of openness and unemployment.

The coefficients attached to the remittance variables are negative and always insignificant in each of the specifications. When the lag of remittances is included, the coefficient attached to the level of remittances becomes far smaller, although the coefficient on the lag is also negative but insignificant. The coefficient attached to the lagged unemployment term is positive and also highly significant. The size of this coefficient in the fixed effects models is around 0.8, which is of similar magnitude to the estimates obtained by Nickell and Nunziata (2002).

In the first specification, the coefficient attached to the money supply variable is positive and significant, which is contrary to expectations and to the findings of Bruno (1986).

	1	2	3
r_{it}	-0.094	-0.014	-0.035
	(1.28)	(0.10)	(0.43)
r_{it-1}	-	-0.154	-
		(1.15)	
u_{it-1}	0.802	0.787	0.854
	(14.18)	(12.93)	(12.74)
m_{it}	0.042	0.044	-
	(2.80)	(1.06)	
m_{it-1}	-	-0.001	-
		(0.02)	
d_{it}	-0.021	-0.014	-0.007
	(0.76)	(0.037)	(0.19)
d_{it-1}	-	-0.008	-
		(0.21)	
w_{it}	0.008	0.022	-0.049
	(0.34)	(0.67)	(1.13)
w_{it-1}	-	-0.020	-
		(0.62)	
i_{it}	-	-	0.030
			(2.61)
o_{it-1}	-	-	-0.002
			(0.12)
Constant	0.407	0.878	2.576
	(0.39)	(0.74)	(1.50)
R^2	0.907	0.906	0.887
NT	183	174	142
N	15	15	14

Table 2. Fixed Effects Estimates of Unemployment in Developing Countries

Notes:

1. The explanatory variables in the table are as follows: m denotes the money supply as a percentage of GDP, d the budget deficit as a percentage of GDP, w denotes wages as a percentage of expenditure, e the exchange rate, i the real interest rate and o a measure of openess. See the data appendix for further details of the definitions and sources of these variables.
2. t-statistics in parentheses.
3. Some of the countries listed in Table 1 are omitted from the estimates because data were not available for certain variables e.g. there is no interest rate data for Pakistan or Turkey
4. Random effects estimates are similar.

The other coefficients are insignificant but they have the expected signs. In the second specification, the coefficient attached to the level of the money supply becomes insignificant. In specification 3, the money supply variable is replaced by the real interest rate and as expected an increase in real interest rates causes unemployment to increase, with this effect achieving significance at the 1 percent level. Unemployment does not appear to be affected by the degree of openness of a country, whilst the other variables apart from the lag of unemployment are insignificant.

4.4 Results for Investment

To further examine the relationship between remittances and the effect they have on relaxing credit constraints, Table 3 reports estimates for two different investment series. These three series are Private Investment and Gross Domestic Investment. Two specifications are estimated for each of the dependent variables, one which includes remittances and the other control variable, the real interest rate, in levels and a second where the lagged values of these variables are included.

Table 3. Fixed Effects Estimates of Investment in Developing Countries

	Private Investment		Gross Domestic Investment	
	1	2	1	2
r_{it}	0.342	0.619	1.291	1.470
	(2.20)	(2.44)	(9.54)	(5.69)
r_{it-1}	-	-0.443	-	-0.177
		(1.71)		(0.66)
i_{it}	-0.058	-0.083	-0.076	-0.078
	(2.28)	(2.48)	(2.87)	(2.50)
i_{it-1}	-	-0.023	-	-0.038
		(0.85)		(1.41)
Constant	14.581	14.225	19.322	19.694
	(13.97)	(15.65)	(31.58)	(28.27)
R^2	0.010	0.005	0.253	0.253
NT	168	152	250	231
N	16	15	18	18

In each of the specifications, and for each of the models, the explanatory variables have the expected signs and are usually significant. The effect of the current level of remittances on investment is particularly strong, providing support for the hypothesis that remittances ease credit constraints in developing countries. However, the lag of remittances has a negative influence on investment and capital, when included with the level, but this effect is not significant[18]. The equation for private investment provides the weakest findings with respect to both remittances and the real interest rate and the model is also a very poor fit. Therefore from the above results there appears to be a positive and fairly strong link between remittances and investment levels.

[18]The lag is positive and significant if the level is excluded

5 Conclusions

Given that migration and the remittances that accrue from such movements of people, are becoming an ever increasing as important aspect of the global economy, it is important to examine the impact of such flows. In this paper, the focus has been placed on the effect that remittances have on the source economy, in particular what is their impact on unemployment. It is argued that remittances have two opposing effects on unemployment in the labour exporting country. Firstly, unemployment could increase if remittances are seen by their recipients as providing some sort of welfare payment. Secondly, remittances could reduce credit constraints in developing economies and hence encourage firms to increase their investment levels. The overall effect on unemployment will depend on which of these effects dominates. The relationship between remittances and unemployment was tested using data from a panel of developing economies. It was found that remittances have a small negative effect on unemployment but this is not significant, thus suggesting that the investment and search income effects of remittances more or less cancel each other out. The effect of remittances on investment was also tested econometrically and the results indicate the investment effect receives strong empirical support.

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A Calibration

The complete model with remittances is summarised as:

$$BC \;:\; u = \frac{\lambda}{\lambda + \theta q(\theta)} \tag{A.1}$$

$$WC \;:\; w = (1-\beta)z + \beta p + c\theta] \text{ where} \tag{A.2}$$

$$z = \rho w + \tilde{z} \tag{A.3}$$

$$JC \;:\; p[f(k) - (r+\delta)k] - w - \frac{(r+\lambda)pc}{q(\theta)} = 0 \tag{A.4}$$

$$k^* \;:\; f'(k) = r + k \tag{A.5}$$

Thus require functional forms and possibly some parameter values for $q(\theta)$ (from $m(u,v)$) and $f(k)$, and values for the following parameters in the model: p, δ, λ, c, β, ρ, ξ and η. The functional form for the matching function, $m(u,v)$ is

$$m(u,v) = v\left[1 - exp\Big(-\frac{u}{v}\Big)\right] \tag{A.6}$$

and hence

$$q(\theta) \equiv \frac{m(u,v)}{v} = [1 - exp(-\theta)] \tag{A.7}$$

and for $f(k)$ we choose

$$f(k) = pk^{\gamma} \tag{A.8}$$

thus requiring the calibration of a new parameter, γ.

A.1 Calibration of λ

We calibrate λ to data observations of u, v (and hence $\theta = \frac{v}{u}$), denoted by $\hat{u}$, $\hat{v}$ and $\hat{\theta}$), respectively. Then from (A.1) we arrive at the calibrated value:

$$\lambda = \frac{\hat{u}\hat{\theta}q(\hat{\theta})}{1-\hat{u}} \tag{A.9}$$

A.2 Calibration of γ, β and c

To calibrate these parameters we use data for the composition output between wages, capital and the firm's economic rent. first write (A.4) as

$$pf(k) = w + p(r+\delta)k + (r+\lambda)\frac{pc}{q(\theta)} \tag{A.10}$$

which decomposes output into the wage plus capital costs plus the firm's rent, this last term being $(r+\lambda)J$, where J is the value of an occupied job. Suppose we have data on these components of output as shares of output; i.e., data on $\frac{(r+\lambda)J}{pf(k)} = \hat{R}$, say, $\frac{w}{pf(k)} = \hat{W}$, say, and $\frac{p(r+\delta)k}{pf(k)} = \hat{K}$, say.

Consider first the calibration of γ. We calibrate the model assuming no credit constraints. Then with our functional form (A.8) $k = k^*$ where using (A.5)

$$k^* = \left[\frac{\gamma}{r+\delta}\right]^{\frac{1}{1-\gamma}} \tag{A.11}$$

Hence we arrive at the familiar result that $\hat{K} = \frac{f'(k^*}{f(k^*)} = \gamma$. To compute k^* in the model we require δ and r, the latter being assume exogenous. We assume we have an microeconometric estimate of $\hat{\delta}$, the depreciation rate, and for $\hat{r}$, the interest rate.

Next consider the calibration of c. This is obtained from our definition of $\hat{R}$ as

$$c = \frac{q(\hat{\theta})\hat{R}f(k^*)}{(\hat{r}+\lambda)} \tag{A.12}$$

Since everything on the right-hand-side of (A.12) is calculated or observed at this point, we therefore have a calibrated value of c.

Finally we use (A.2) to calibrate β. Put $z = \rho w$ in the pre-migration state and assume we have data $\hat{\rho}$ for ρ. Let $y(k) = p(f(k) - (r+\delta))$ as in the main text of the paper.[19]. Then from the definition of $\hat{W}$ and (A.2) we obtain the calibrated value of β as

$$\beta = \frac{(1-\hat{\rho})\hat{W}pf(k^*)}{\left[y(k^*) + pc\hat{\theta} - \hat{\rho}\hat{W}pf(k^*)\right]} \tag{A.13}$$

Note that we can choose our units such that in this baseline calibration the productivity parameter $p = 1$.

A.3 Data and Calibrated Values

The following table gives our choice of estimates or observations and the resulting calibrated values used for the simulations in the paper.

[19]With optimal investment, $y(k^*) = p(f(k^*) - k^* f'(k^*))$ which is the marginal product of labour.

Data	
Parameter	Value
$\hat{u}$	0.10
$\hat{v}$	0.10
$\hat{r}$	0.03
$\hat{\delta}$	0.1
$\hat{\rho}$	0.3
$\hat{K}$	0.3
$\hat{R}$	0.05
Calibrated Parameters	
Parameter	Value
λ	0.072
γ	0.3
c	0.4512
β	0.5547

Table. Data and Calibrated Values

B Data Appendix

B.1 Definitions of variables and data sources

Unemployment Equation

Dependent variable

Unemployment rate = definition varies slightly by country but typically relates to the number of unemployed divided by the economically active population. Main source: International Labour Organisation (ILO). These data are used if there are any inconsistencies with the other sources, which include the World Bank's World Development Indicators (WDI), the International Monetary Fund's International Financial Statistics (IFS) and Turnham and Erocal (1990).

Explanatory variables

Remittances - Total amount of workers' remittances received in country as recorded in the Balance of Payment Statistics in current US$ as a percentage of GDP. Source: WDI

Money Supply - Money and Quasi M (M2) as a percentage of GDP. Source: Easterly-Sewadeh and WDI

Openness - Total trade as a percentage of GDP. Sources: Easterly-Sewadeh and Penn World Tables (PWT)

Fiscal Policy - Budget deficit as a percentage of GDP? Source: IFS

Labour Compensation - Wages and salaries as a percentage of expenditure. Source: WDI

Real interest rates - Nominal interest rate minus the inflation rate. Source: WDI

Investment Equation

Dependent variables

Private Investment as a percentage of GDP. Source: Easterly-Sewadeh.

Gross Domestic Investment as a percentage of GDP. Source: Easterly-Sewadeh

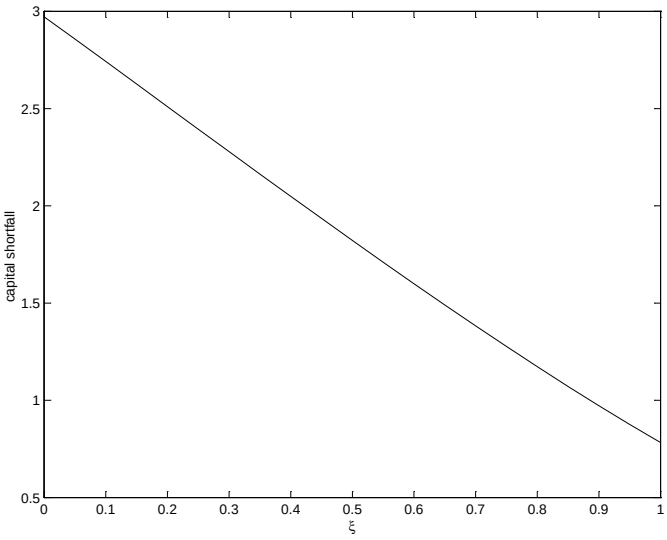
Explanatory variables

Remittances - Total amount of workers' remittances received in country as recorded in the Balance of Payment Statistics in current US$ as a percentage of GDP . Source: WDI. Real interest rates - Nominal interest rate minus the inflation rate. Source: WDI

NB:

Some of the data have been interpolated (mainly unemployment rates but also some of the explanatory variables, to a lesser extent) in order to achieve a reasonable sample size. The missing values were calculated as the mid-point of the values of the two surrounding years. On fewer occasions, the value for two consecutive missing years were interpolated.

Figure 1: **The Effect of Remittances on the 'Capital Shortfall' ($k^* - k$): $\bar{k} = 0.1k^*$.**



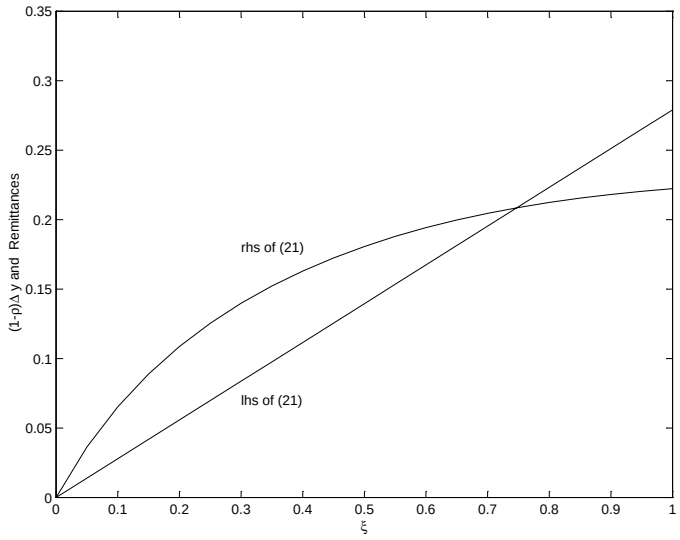
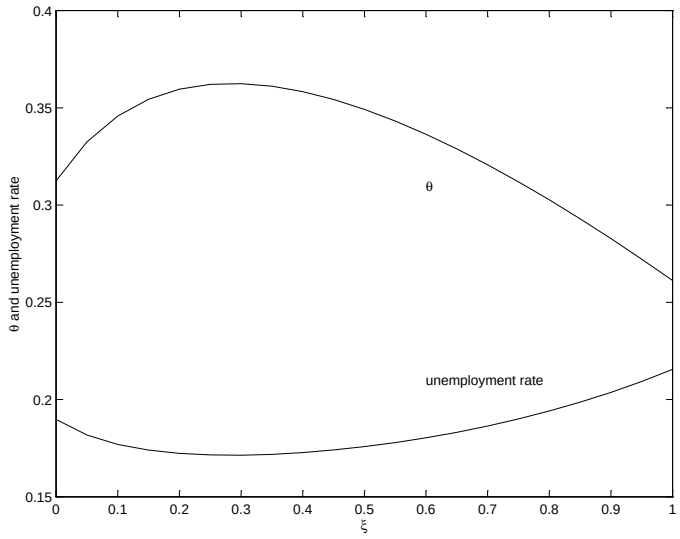


Figure 2: **The Effect of Remittances on Condition (26):** $\bar{k} = 0.1k^*$**.**

Figure 3: **The Effect of Remittances on the Unemployment and Labour Market Tightness:** $\bar{k} = 0.1k^*$**.**



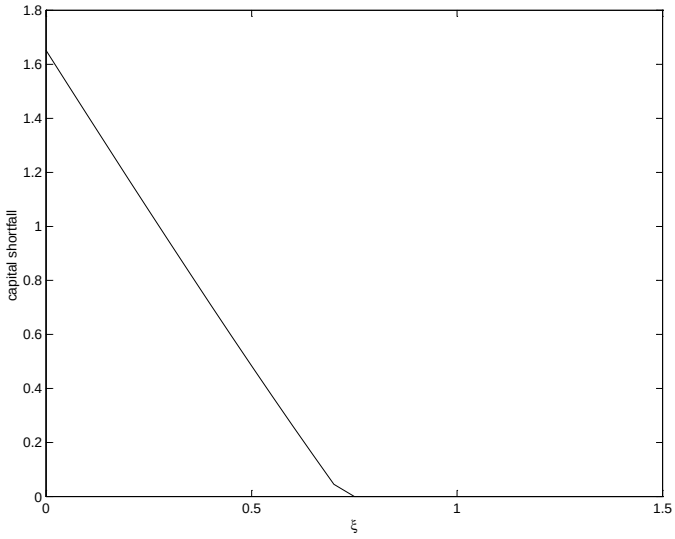


Figure 4: **The Effect of Remittances on the 'Capital Shortfall'** $(k^* - k)$**:** $\bar{k} = 0.5k^*$**.**

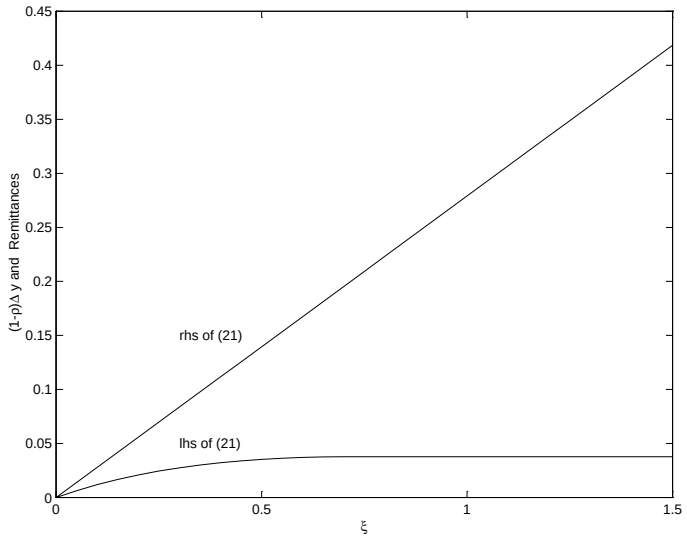


Figure 5: **The Effect of Remittances on Condition (26):** $\bar{k} = 0.5k^*$**.**

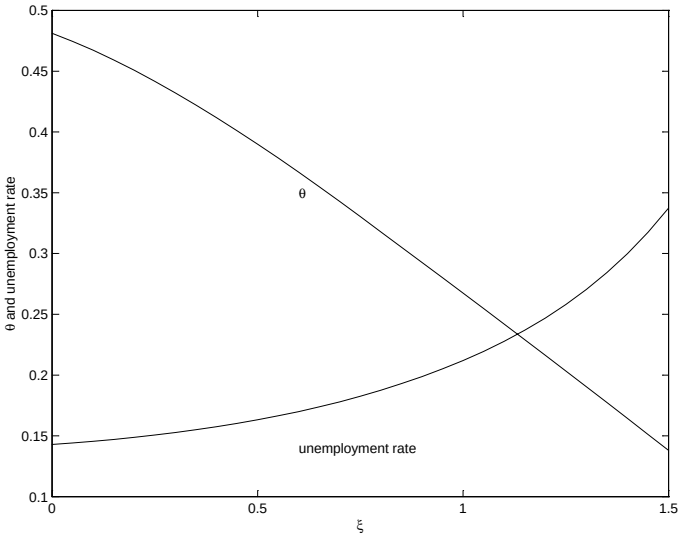


Figure 6: **The Effect of Remittances on the Unemployment and Labour Market Tightness:** $\bar{k} = 0.5k^*$**.**

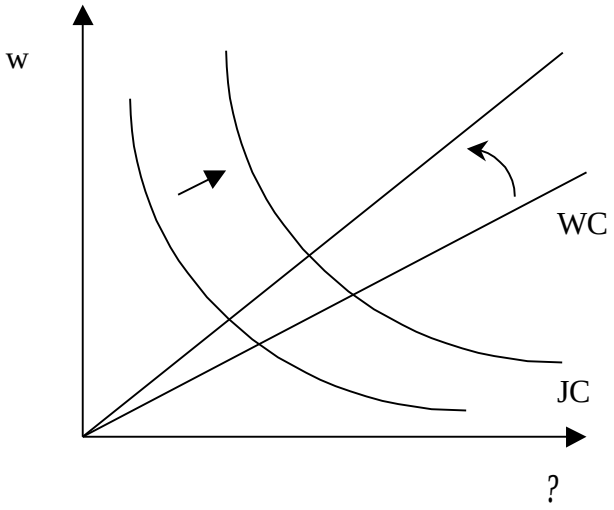


Figure 7: Effect of an increase of capital on labour market tightness

As "k" increases, the JC curve shifts out and the WC curve rotates in an anti-clockwise direction. The net effect is an increase in the labour market tightness,? .

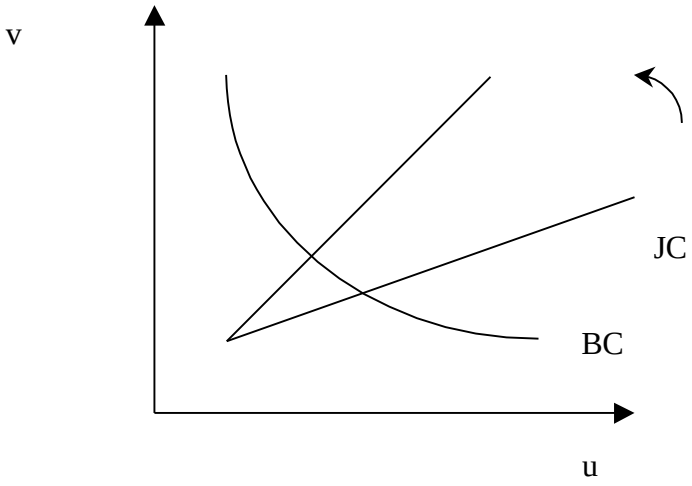


Figure 8: Effect of an increase in capital on unemployment and vacancy rate

When k increases, the JC curve rotates in an anti-clockwise direction. This implies a decrease in the unemployment rate and an increase in the vacancy rate .

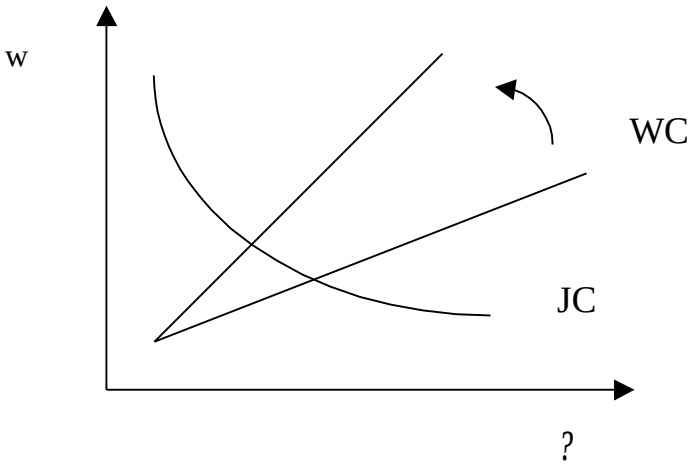


Figure 9: Effect of an increase in unemployment benefits on labour market tightness

The increase in z determined by an increase in remittances from migration opportunities rotates the WC curve in an anti-clockwise direction. This increases wages but reduces market tightness.

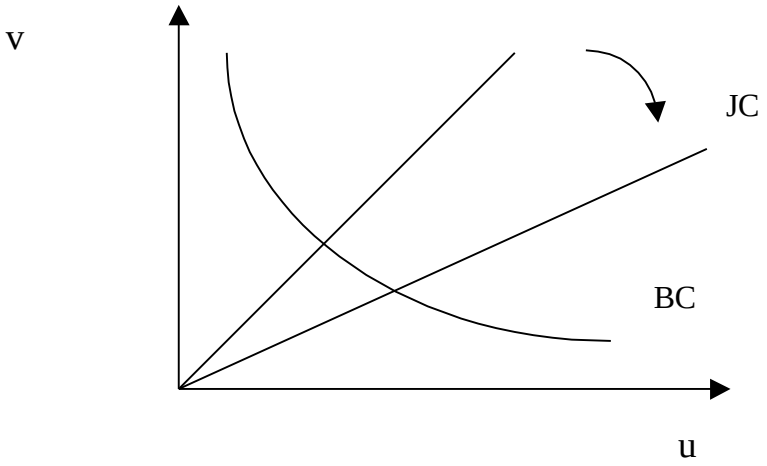


Figure 10: Effect of an increase of unemployment benefits on unemployment and vacancy rates.

The JC curve in the unemployment-vacancy space rotates in a clockwise direction as the unemployment income increases. The effect is a reduction in vacancies and an increase in the unemployment rate.