Development, Growth, and Labour Market Structure

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Abstract

Sir Arthur Lewis pioneered research at the interface of several topics, including growth, development and labour market structure. The current paper updates Lewis' analysis to take into account three themes that are prominent in modern economic analysis: technological progress, flexible wages, and capital constraints. The resulting model explores the relationships between economic and financial development, growth, and labour market structure, and aims to shed light on the widely observed phenomenon of cross-country and development-specific differences in employment structure – another of Lewis's themes. Novel econometric evidence finds a central role for both economic and financial development to explain these differences. As the model predicts, developing countries with lower per capita GDP, greater interest rate risk premiums, and larger agricultural sectors tend to be those with larger 'artisan' workforce shares, and smaller 'formal' labour market sectors in which firms employ wage-and-salary workers.

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1 Introduction

The productive research career of Sir Arthur Lewis culminated in many novel and important contributions to the theory of development and growth. Among these was his seminal article "Economic Development with Unlimited Supplies of Labour", published in the *Manchester School* in 1954. In that paper, Lewis analysed a model with three labour market groups – employers, wage workers, and external (mainly, but not exclusively, rural) workers – and explored the conditions under which growth will occur, and the effects of growth on labour market structure. This and Lewis's other contributions have resonated in the development literature ever since.

In the last half-century, economic thought has undergone a period of sustained change. With regard to the subject of growth and development, the economics literature now emphasises several pertinent factors that were not emphasised (although they were adumbrated) in Lewis' original writings. Three factors stand out in particular. First, there is now a near consensus among economists that capital accumulation is a less important determinant of economic growth than is technological progress (see, e.g., Burda and Wyplosz, 1997, Ch. 5). A second factor emphasised by modern economists is the temporal variability of real wages, even in sectors with apparently bountiful supplies of labour. While Lewis acknowledged that wage variability could occur, and real wages could increase outside the 'formal' production sector (1954, pp. 172–76), his primary focus was on fixed real wages since this most clearly facilitated the surpluses that capitalists needed to fund capital accumulation in his model. Third, recent contributions to the economics literature have placed greater emphasis on wealth and capital constraints in the development process, which Lewis largely ignored (see, e.g., Banerjee and Newman, 1993; Iyigun and Owen, 1999).

This paper builds on the sectoral classification of labour market structure pioneered by Lewis (1954), and incorporates it into a model that includes each of the above three themes. In this way, it offers a novel and contemporary analysis of the relationships between economic and financial development, growth, and labour market structure. The paper aims to shed light on the widely observed phenomenon of cross-country and development-specific differences in employment structure – a recurring theme in Lewis' work. This theme is connected to a topical current issue in development research – the link between entrepreneurship and development (Iyigun and Owen, 1999). This is because two of the sectors in our model can be interpreted in terms of 'entrepreneurs' and 'self-employed workers' – though we acknowledge that this might not always be a helpful distinction. The paper goes on to conduct an econometric exercise to identify the roles of economic and financial development for explaining changing labour market structures. The empirical results are consistent with the theoretical model, suggesting that Lewis' labour market classification continues to provide a fruitful basis for understanding economic development and growth in a modern context. They may also be of policy interest. For example, if governments in developing countries wish to intervene beneficially to smooth the social changes caused by development-led labour reallocation, then they first need to understand how development affects occupational choice and labour market structure. That is the subject of this paper.

The theoretical model is outlined in the next two sections. Because the model is fairly technical, we will now give a brief verbal outline. That way, readers who are only interested in the predictions of the model can jump straight to Section 3, where they are stated and discussed. Taking our cue from Lewis (1954), we consider an economy in which there are three 'occupations'. Individuals can work in a firm as a wage worker, or on their own account as a self-employed artisan (e.g., a smallholder farmer or petty trader), or – if they have enough initial wealth – as an employer. Individuals have heterogeneous initial wealth endowments. Low initial wealth restricts their choices about which of the three occupations they can join. Risk-averse individuals maximise expected utility. Risk is concentrated among employers and artisans. Unlike waged workers, agents in both of these occupations have to invest some (scarce) capital to generate income. Capital constraints drive a wedge between borrowing and lending rates, and the resulting interest risk premium reduces the equilibrium capital stock. It is well known that interest risk premiums are smaller in economies with more developed financial markets. So we go on to investigate the implications of financial development for labour market structure. We also study the effects of economic development in the form of technological improvements that enhance productivity and thereby increase national income.

The remainder of the paper is structured in the following way. Section 2 presents the model. Section 3 states the key theoretical results linking together economic development, financial development, and labour market structure. These results are summarised in two propositions. Section 4 discusses the econometric model specification and the data. Section 5 presents the empirical results, and Section 6 contains a brief conclusion.

2 The model

2.1 The nature of the occupations

Subject to their initial wealth, individuals choose between working as an artisan (a), as an employer who runs a firm (e), or as a waged worker in a firm (w). These categories correspond broadly, but not exactly, to what Lewis (1954) proposed. The main difference relates to what we call the 'artisan' group. In some parts of his discourse, Lewis referred to subsistence farmers rather than to artisans; but elsewhere he also includes within this sector casual labourers and petty traders (see, e.g., 1954, p. 189). Recent evidence actually suggests that the term 'subsistence sector' can be misleading when applied to many developing countries, so we eschew it here.[1] Instead, we use the appellation of 'artisans', which seems to describe more accurately the modern labour market status of these workers. An additional reason for doing this is to tie in directly with our empirical work, which emphasises the independent, or 'own-account' nature of this group. We return to this issue in the conclusion where the relationship between development and entrepreneurship is discussed.

Like Lewis (1954), we abstract from unemployment and population growth; and we normalise the workforce to unity. That is, $n^o + n^e + n^w = 1$, where n^j ($j = a, e, w$) are the proportions in each labour market group. These proportions will be endogenously determined within the model.

There is a single period planning horizon. All individuals possess the same strictly concave (risk-averse) utility function $U(R^j, h^j)$, whose arguments are financial returns R^j, and hours of work h^j. U is continuous and increasing (*resp.*, decreasing) in its first (*resp.*, second) argument, with $U(0, h^j) = 0$ and $U_{R^j}(0, h^j) = \infty$, $U_{R^j}(\infty, h^j) = 0$.[2] A capital endowment (wealth) x is distributed among the workforce with density function $g(x)$ and distribution function $G(x)$; $x \in \mathbb{R}^+$. Capital markets are imperfect: as is commonly observed in practice, borrowers pay a higher interest rate, r^b, than is received by lenders, $r < r^b$.[3]

Wage workers (i.e., those who choose w) have the same productivity, earning the competitive wage ω. They do not borrow money to set up a firm but work for others. Their problem can be stated as

$$\max_{h^w} U\left(R^w, h^w\right) \quad \text{subject to} \quad R^w = \omega h^w + rx\,.$$

Ignoring exogenous constraints on hours for simplicity and without loss of generality, it is easily established from the first order condition (FOC) $\omega U_{R^w} + U_{h^w} = 0$ that there exists a labour supply function $h^{w*} = h^w(\omega, x)$, with $h^w_x < 0$. The sign of h^w_ω depends on income and substitution effects, and is ambiguous in general.

Employers (i.e., those who choose e) produce a single good with an output price normalised to unity (as do individuals in a). Employers are price-takers with respect to ω, which is the real wage. Employer profits from production are given by

$$\pi^e(l, k^e, h^e) = [1-\psi][A^e f(l\overline{h}^w, k^e, h^e)] - \omega l\overline{h}^w \,,$$

where $f(\cdot,\cdot,\cdot)$ is a concave production function with three inputs that are all choice variables. Respectively, these are labour (the product of labour demand l and average hours supplied by workers, $\overline{h}^w$ (given)[4]); capital, k^e; and the employer's own labour input, h^e. A^e is a positive (technology) parameter; $\psi \in (0,1)$ is a random variable whose realisation is unknown before individuals choose occupations, and which captures price or output uncertainty, e.g., disruption to production by organised labour, social unrest, or unexpected inflation. Thus employers are risk-takers. Notice that labour costs $\omega l\overline{h}^w$ are also included on the RHS of $\pi^e(l, k^e, h^e)$; capital costs and opportunity costs of working elsewhere are dealt with below. We shall abbreviate $\pi^e(l, k^e, h^e)$ to π^e where there is no ambiguity.

The returns received by employers are

$$R^e = \pi^e + [x-k]\{\delta(x)r + \delta'(x)r^b\}\,, \tag{1}$$

where $\delta(x)$ and $\delta'(x)$ are two Kronecker deltas, taking values of zero or one depending on whether the employer is a lender, a borrower, or neither (see below for their definitions). R^e is the sum of profits plus investment income if the employer is a lender, or minus debt repayments if the employer is a borrower. Because of ψ, R^e is stochastic. An employer's problem is $\max_{l,k^e,h^e} \mathsf{E}\, U(R^e, h^e)$. The FOCs for optimal labour demand, l^*, and hours of labour supplied by employers, h^{e*}, are

$$\mathsf{E}\{1-\psi\}A^e f_{l\overline{h}^w} - \omega = 0 \tag{2}$$

$$\mathsf{E}\{[1-\psi]A^e f_{h^e} U_{R^e} + U_{h^e}\} = 0\,. \tag{3}$$

Of especial interest is the labour demand function $l^* = l(\omega, \overline{h}^w, k^e)$ derived from (2), with $l_\omega < 0$ and $l_{\overline{h}^w} < 0$. The sign of l_{k^e} is determined by the sign of the cross partial $f_{l\overline{h}^{w*},k^e}$, which is ambiguous *a priori*.

The derivation of optimal capital usage is more involved, and depends on whether the employer is a lender or a borrower. The FOCs under lender and borrower status are respectively

$$\mathsf{E}\{1-\psi\}A^e f_{k^e} - r = 0 \tag{4}$$

$$\mathsf{E}\{1-\psi\}A^e f_{k^e} - r^b = 0\,. \tag{5}$$

Denote the solutions of (4) and (5) by k^* and $k^{**} < k^*$ respectively. Lemma 1 follows directly; the proof of this and all subsequent lemmas and propositions appear in Appendix 1.

Lemma 1. *Employers endowed with wealth $x \geq k^*$ become lenders, those with $x < k^{**}$ become borrowers, and those with $k^{**} \leq x < k^*$ use all and only their endowment x in production.*

Lemma 1 implies that employers' optimal demand for capital function, $k^e(x)$, has the following shape. First it is flat in x (taking value k^{**}) up to $x = k^{**}$, then it rises one-for-one with x up to $x = k^*$, after which the function is flat again (with value k^*) for all $x \geq k^*$. In terms of (1) above, $\delta(x) = 1$ (with $k = k^*$) if $x \geq k^*$ and zero otherwise; and $\delta'(x) = 1$ (with $k = k^{**}$) if $x < k^{**}$ and zero otherwise. It can be shown that a similar result also emerges if individuals face a binding 'L-shaped' borrowing constraint á là Evans and Jovanovic (1989).

Artisans (who choose a) produce output using only their own labour and capital: their production function is $f(0, k^a, h^a)$. As Lewis (1954) observed, own-account producers of this kind can and do use capital. We assume that artisans are also subject to some uncertainty in production, but that this *may* be less than that faced by employers, e.g., because they operate on a smaller scale (see below) or are not prone to disruption by employees.[5] This possibility is captured by the parameter $0 < \theta \leq 1$ in the profit function $\pi^a(k^a, h^a) = [1-\theta\psi]A^a f(0, k^a, h^a)$, where ψ is the same random variable as above, and A^a is the technology parameter in a. Clearly, if $\theta = 1$ then individuals in both e and a face the same risk. Artisans have to solve $\max_{k^a,h^a} \mathsf{E}\,U(R^a, h^a)$, where $R^a = \pi^a + [x-k][\delta^a(x)r + \delta'^a(x)r^b]$. The solutions are analogous to the e case: the FOC for h^a yields an interior solution h^{a*}; and there exists a demand for capital function $k^a(x)$ with the same general structure as derived for e above, except that the two 'kinks' are at different capital levels k^{a**} and $k^{a*} > k^{a**}$. These capital levels are derived from analogous expressions to (4) and (5). Also analogous to above, we have $\delta^a(x) = 1$ (with $k = k^{a*}$) if $x \geq k^{a*}$ and zero otherwise; and $\delta'^a(x) = 1$ (with $k = k^{a**}$) if $x < k^{a**}$ and zero otherwise.

Lemma 2 establishes the relative locations of the two sets of kink points.

Lemma 2. *If at least some individuals strictly prefer e to a, then $k^{a*} < k^*$ and $k^{a**} < k^{**}$.*

It should be stressed that Lemma 2 is not an assumption about relative technological superiority in e. Rather, it is a logical pre-requisite for employers to be willing to hire costly labour and to bear greater risk as employers rather than choosing to work as artisans.

2.2 Occupational choice and equilibrium

An individual with endowment $\hat{x}$ is indifferent between w and a:

$$\mathsf{E}U\left(\pi^a(k^a(\hat{x}),h^{a*})+[\hat{x}-k^a(\hat{x})][\delta^a(\hat{x})r+\delta'^a(\hat{x})r^b],h^{a*}\right)$$
$$=U\left(\omega h^{w*}+r\hat{x},h^{w*}\right)\,. \tag{6}$$

If there is a mix of w and a workers, the following lemma holds.

Lemma 3. *In an equilibrium with a mix of waged workers and artisans, all individuals with $x<\hat{x}$ enter waged work, while those with $x>\hat{x}$ become artisans.*

Intuitively, the greater is the wealth endowment x, the relatively less important is the risky component of a payoffs, contributing to the sorting effect established in the lemma.[6] This effect is strengthened by the fact that any individuals in a who are not lenders can obtain a higher marginal return from $x>\hat{x}$ than they could in w, either from avoiding payment of $r^b>r$, or from receiving a higher marginal product of capital than r.

Next, observe that an individual with endowment $\tilde{x}$ is indifferent between e and a if

$$\mathsf{E}U\left(\pi^e(l^*,k^e(\tilde{x}),h^{e*})+[\tilde{x}-k^e(\tilde{x})][\delta(\tilde{x})r+\delta'(\tilde{x})r^b],h^{e*}\right)$$
$$=\mathsf{E}U\left(\pi^a(k^a(\tilde{x}),h^{a*})+[\tilde{x}-k^a(\tilde{x})][\delta^a(\tilde{x})r+\delta'^a(\tilde{x})r^b],h^{a*}\right)\,. \tag{7}$$

Analogous to earlier, if there are some individuals in each of e and a, the following lemma holds.

Lemma 4. *In an equilibrium with a mix of employers and artisans, all individuals with $x<\tilde{x}$ become artisans while individuals with $x>\tilde{x}$ become employers.*

This completes the derivation of the occupational structure of the economy.[7] We have

$$n = \begin{pmatrix} n^w \\ n^a \\ n^e \end{pmatrix} = \begin{pmatrix} G(\hat{x}) \\ G(\tilde{x}) - G(\hat{x}) \\ 1 - G(\tilde{x}) \end{pmatrix}, \tag{8}$$

and the average hours of work of waged workers is given by

$$\overline{h}^w = [G(\hat{x})]^{-1} \int_0^{\hat{x}} h^w(\omega, x) \, dG(x) \, .$$

It is instructive to investigate the role played by some of the model assumptions in generating this allocation of individuals between occupations. As the proofs of Lemmas 3 and 4 make clear, uncertainty is one important ingredient. Essentially, individuals in the riskier occupations require higher expected returns to make participation worthwhile (see also Parker, 1996, 1997). For example, it can be shown that a decrease in a-specific uncertainty θ increases $\tilde{x}$ and decreases $\hat{x}$, implying an increase in n^a at the expense of both n^w and n^e. The effects of a mean preserving spread in ψ (i.e., greater uncertainty) depend on θ. If θ is close to unity, greater uncertainty is of a similar scale for both types of producer, leading to a decrease in n^e and n^a and an increase in n^w (at a lower real wage, ω). Conversely, if θ is close to zero, only employers face greater uncertainty: n^e and n^w decrease, and n^a increases. Another important ingredient of the model is imperfect capital markets. As the proofs of Lemmas 3 and 4 demonstrate, this supports the role of uncertainty in partitioning the workforce, by generating greater returns from capital investment for those with greater wealth endowments.

Finally, we have:

Lemma 5. *There exists a positive, finite and unique equilibrium wage.*

As the proof of Lemma 5 shows, the wage adjusts to equilibrate the labour market between e and w workers. It varies with demand, unlike in the Lewis model, which can therefore be seen as a special case in this regard.

3 Theoretical results

In this section, we consider the effects of two different forms of development. They are (1) Exogenous technological change in either or both of the producer sectors, and (2) Financial development that reduces capital market imperfections, i.e., that decreases the borrower-lender interest premium $r^b - r$. The analysis below takes a somewhat different direction to that of Lewis (1954). Lewis analysed the case of capital accumulation through profits; and he did not study the effects of financial development directly, either. Modern economic thinking attributes a greater role to technological change than to capital accumulation, justifying our claim that this represents a useful extension of the original Lewis framework.

3.1 Exogenous technological change

It is customary to interpret the A^j parameters of the production functions as capturing the state of technology, being increasing functions of exogenous technological improvements. The following Proposition summarises the key results flowing from such improvements:

Proposition 1. *(i) A technological improvement confined to employers' production technology increases the number of employers and waged workers as well as the equilibrium wage, but decreases the number of artisans. (ii) A technological improvement confined to artisans' production technology decreases the number of employers and waged workers while increasing the number of artisans, and has ambiguous effects on the equilibrium wage. (iii) An identical technological improvement for both employers and artisans has the same effects as (i).*

Proposition 1 shows that the effects of technology-driven development depend on the sectors where the development occurs. For example, cases (i) and (ii) can be thought of as relating to sector-specific innovations, with employers or artisans being concentrated in the sectors so affected. Case (iii) on the other hand might reflect a general improvement in technology or infrastructure that can be exploited in all sectors of the economy.[8] The predictions of Proposition 1 contrast with those suggested by some previous writers, including Lucas (1978) and Calvo and Wellisz (1980), who both predicted the number of employers to shrink and the number of waged workers to increase as economies develop. In Lucas' model, economic development occurs through an exogenous increase in capital. In Calvo-Wellisz's, it occurs via exogenous growth in technological knowledge. In both of these models, individuals are assumed to differ with respect to their pre-determined abilities to exploit new opportunities afforded by development. For the most part, the differences between the predictions of these models and ours can be traced to a few key assumptions. In particular, the Lucas and Calvo-Wellisz models abstracted from uncertainty and assumed perfect capital markets; and they ignored own-account artisans altogether. This is despite the well-known empirical importance of risk, uncertainty and small business borrowing constraints; and despite the fact that in most countries, own-account artisan workers are much more numerous than employers are.

3.2 Financial development

As financial markets develop, lenders become better equipped for resolving information asymmetries that impart risk premiums to lending for new investment projects.[9] Below we explore the consequences of marginal reductions in r^b holding r $(< r^b)$ constant, i.e., of development that reduces the risk premium.

Proposition 2. *Financial development that reduces the financial risk premium (i.e., r^b relative to r) increases the number of employers and waged workers as well as the equilibrium wage, but decreases the number of artisans – provided that at least some employers have to borrow capital. Otherwise, financial development has ambiguous effects on labour market structure and the equilibrium wage.*

The effects of financial development are ambiguous only if employers and artisans have different levels of exposure to the high interest rate. But if at least some employers need to borrow funds (as seems likely), then Proposition 2 establishes that financial development will increase the size of the employer and waged worker groups at the expense of artisans. The reason is that a reduction in the borrowing rate increases the capital and labour hired by employers. The latter increases the wage and draws some workers out of own-account artisan activities and into the 'formal' waged labour market (see (6)). Thus in this case, financial development has similar effects to technological improvements that are not confined to artisans (see parts (i) and (iii) of Proposition 1). The growth of the employer and waged-worker class and the decline of the own-account artisan class accords with the historical evidence of Kuznets (1966), while contradicting the predictions from the Lucas (1978) and Calvo-Wellisz (1980) models discussed above.[10] The mechanism in Proposition 2 is closer in spirit to that of Banerjee and Newman (1993), who derived economic growth as an endogenous outcome of capital accumulation via savings and bequests. As wealth accumulates in the Banerjee-Newman model, greater collateral is available to draw out loans from the capital market, facilitating business entry. However, Banerjee and Newman did not analyse financial development of the kind considered in Proposition 2.

4 Specification, data, and estimation issues

4.1 Specification and data

The model developed in the previous sections was shown to generate an equilibrium employment share vector $n = (n^w, n^o, n^e)'$. The model also suggested a set of explanatory variables that are likely to be related to these shares. For our econometric specification, consider K explanatory variables, contained in X. Denote a single observation of X from a sample of T observations by X_i ($i = 1, \ldots, T$), and write the matrix of observations as $\mathbf{X}$. With J share equations, and the same explanatory variables entering each equation, $\mathbf{X}$ is of order $(JT \times JK)$. Denote a single observation of n by n_i, and the vector of observations by $\mathbf{n}$, which is order $(JT \times 1)$. We will estimate the multiple equation model

$$\mathbf{n} = \mathbf{X}\beta + \mathbf{u}\,, \tag{9}$$

where β is a $(JK \times 1)$ vector of coefficients, and $\mathbf{u}$ is the $(JT \times 1)$ matrix of disturbances. We assume $\mathbf{u} \sim N(\mathbf{0}, \mathbf{\Omega})$, where $\Omega = \Sigma \otimes \mathbf{I}_T$ is the variance-covariance matrix, Σ is the $(J \times J)$ matrix of contemporaneous covariances, and $\mathbf{I}_T$ is the $(T \times T)$ identity matrix.

One X variable suggested by the theoretical model is uncertainty. Because high inflation rates are usually more volatile, and because price volatility makes business planning difficult, inflation INF is used as a measure of uncertainty. If employers and artisans have similar exposure to uncertainty (i.e., in terms of the theory, if $\theta \approx 1$), then we predict a negative impact effect from INF on both of n^e and n^a, and a positive effect on n^w (see Section 2).

Second, the theory also suggests that technological progress may impact on workforce shares in a number of ways. Given the macroeconomic evidence linking the following variables together (see, e.g, Burda and Wyplosz, 1997, Ch. 5), real dollar GDP per capita, denoted by GDPC, is proposed as a proxy for the state of technology.[11] As Proposition 1 showed, the effects of this variable on employment shares depend on which sectors benefit most from technological changes. If the benefits are equally or mainly received by employers, then GDP per capita is predicted to be positively associated with employer and waged worker employment shares, and negatively associated with the artisan share. But if the artisans are the primary beneficiaries, then the opposite outcome is predicted.

Third, the model predicts that financial development in the form of a smaller interest risk premium, PREM, will increase employer and waged worker workforce shares at the expense of the artisan share in the realistic case where some employers are borrowers. For the purposes of empirical modelling, we define PREM as the difference between the (risky) borrowing rate and the (safe) deposit rate.

Despite some fairly restrictive data limitations, we were also able to include a few additional variables in the regressions. The proportion of the workforce that is female, FEMPR, was added in an attempt to control for cultural and socio-demographic aspects of occupational choice that were suppressed in our model. Also, the proportion of the workforce working in agriculture, AGPR, was included to control for the possibility that exogenous technological progress is qualitatively different in predominantly rural compared with industrialised economies. Here, we reiterate our earlier point that agriculture should not be equated literally with the artisan sector. As Lewis (1954) explained, not only does the 'informal' sector include non-agricultural petty traders as well as own-account farmers, but also it is possible for employers to invest in plantation agriculture alongside their industrial interests. Finally, there exists some limited and incomplete data on the proportion of workers involved in strikes, STRIKEPR, defined as the number of workers involved in strikes in a given year, divided by the total workforce. This variable may serve as an instrument for differential risk between employer and own-account artisan production (i.e., in terms of the theory, as an instrument for $\theta < 1$). If employers are vulnerable to strikes (unlike own-account artisans), then STRIKEPR should be associated with smaller employer and waged worker shares and a larger artisan share (see Section 2).

Thus for each of the share equations j, we estimate

$$\begin{aligned} n_{ij} &= \beta_{1j} + \beta_{2j} INF_{ij} + \beta_{3j} GDPC_{ij} + \beta_{4j} PREM_{ij} + \beta_{5j} FEMPR_{ij} \\ &\quad + \beta_{6j} AGPR_{ij} + \beta_{7j} STRIKEPR_{ij} + u_{ij} \, . \end{aligned} \tag{10}$$

The shares of own-account artisans, and employers, were measured as the proportions of a country's workforce that were self-employed on their own-account, and who run a business that employed others, respectively. An important pragmatic advantage of this measurement practice is that cross-country data are readily available. Data were obtained on these variables and all of the others described above for 34 countries over 1996–98. These 34 countries were the only ones for which data on all three employment groups were available in published form.[12] Our sample covers a wide variety of economies at various stages of development, which can be expected to facilitate relatively precise estimation of the regression coefficients. Evidence of the extent of variation in the sample data is presented in a table of summary statistics located in Appendix 2.

4.2 Estimation methodology

The matrix of observed explanatory variables $\mathbf{X}$ is the same in each of the three labour share equations. This simplifies the estimation considerably. OLS estimation of the coefficients of each separate equation is equivalent to GLS estimation of the system since

$$\begin{aligned} \hat{\beta}_{\mathrm{GLS}} &= \left[\Sigma \otimes (\mathbf{X}'\mathbf{X})^{-1}\right] [\mathbf{I}_T \otimes \mathbf{X}'][\Sigma^{-1} \otimes \mathbf{I}_T]\mathbf{n} \\ &= \left[\mathbf{I}_T \otimes (\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\right] \mathbf{n} = [\mathbf{X}'\mathbf{X}]^{-1}\mathbf{X}'\mathbf{n} = \hat{\beta}_{\mathrm{OLS}} \,. \end{aligned}$$

However, GLS estimation that takes the error structure into account is needed to obtain efficient estimates of the standard errors. We have

$$\mathrm{V}ar(\hat{\beta}_{\mathrm{GLS}}) = \Sigma \otimes [\mathbf{X}'\mathbf{X}]^{-1} \,.$$

An important feature of our regression specification is that the employment shares sum to unity for each observation. This implies the following cross-equation restrictions:

$$\sum_j \beta_{1j} = 1 \qquad \text{and} \qquad \sum_j \beta_{kj} = 0 \quad \text{for } k = 2, \ldots, K \,. \tag{11}$$

The variance-covariance matrix of $\mathbf{u}$ is singular; but estimation is performed in the usual way by dropping one of the equations from the estimation, and retrieving the coefficient estimates from (11) and their standard errors from the restrictions implied by the singularity of the error covariance matrix.

Hypothesis testing on cross-equation coefficients of the same explanatory variable can be performed using Hotelling's T^2 test, which is an exact (rather than an asymptotic) test. For example, suppose we wish to test the null hypothesis $H_0 : \beta_{kj} = 0 \; \forall j$, i.e., that the coefficients on the kth explanatory variable are equal to zero in each equation j. Define the scalar $S := T^{-1} \sum_{i=1}^{T} X_{ik}$, and the $(J \times 1)$ vector $\hat{\beta}_k := (\hat{\beta}_{k1}, \ldots, \hat{\beta}_{kJ})'$. Then Hotelling's T^2 test rejects H_0 iff

$$\hat{\beta}_k' \, \hat{\Sigma}^{-1} \, \hat{\beta}_k > \frac{J}{[T-J]S} F_{J,T-J}(\alpha) \,,$$

where $\hat{\Sigma}$ is the estimated residual covariance matrix, F is an F variate, and α is the significance level (see Malinvaud, 1980, pp. 230–31).[13]

5 Results

We estimated three versions of the econometric model, starting with a restricted set of regressors and the largest possible sample size, before adding extra variables for which less complete data were available. In addition to an intercept, the first regression, termed Model 1, has explanatory variables INF, PREM, FEMPR and AGPR. Model 2 adds GDPC, and Model 3 adds GDPC and STRIKEPR. Tables 1–3 contain the results for the various models, including coefficient estimates, GLS standard errors corrected for heteroscedasticity in each equation, and R^2.

Insert tables 1 and 2 about here

Table 1 presents the results for Model 1. In accordance with the theory, the inflation rate is negatively and significantly related to the employer workforce share. The coefficients on the inflation rate also take the expected signs in the other equations, although neither of them is individually significant. As predicted, the interest premium is significantly positively related to the proportion of artisans and significantly negatively related to the proportion of wage workers.[14] That is, financial development that decreases interest premiums appears to be associated with a reduction in the size of the artisan class, and growth in the size of the waged worker class. Furthermore, the interest premium variable has a greater impact (in terms of a one-percentage point increase) on artisan and waged worker employment shares than any other variable in Model 1. The other coefficient estimates show that females are relatively concentrated in waged work, and that more rural economies have higher rates of own-account artisan activity and lower rates of waged work.

The importance of financial development remains in evidence in table 2, which adds per capita GDP to the specification. Every coefficient remains qualitatively unchanged, while the predicted positive effect from inflation in the waged worker equation now becomes statistically significant. The observed effects from GDP per capita are positive in the employer and waged worker equations, and negative in the artisan equation. This is consistent with technological improvements that benefit employers no less than artisans. The results indicate that countries with higher living standards possess higher proportions of waged workers and firms (but the latter not significantly so), and lower proportions of artisans.[15]

Insert table 3 about here

The results for inflation in tables 1 and 2 suggested that greater risk reduces the attractiveness of both being an employer and an artisan. The purpose of including data on strike activity, in table 3, is to check whether differential risk (i.e., $\theta < 1$) exists between these types. If so, then (still controlling for inflation) one would expect to see a negative and significant effect from the proportion of strikes on the proportions of employers and waged workers, and a significant positive effect on the proportion of artisans. However, the results in table 3 show that none of the coefficients on the strike proportion variable are individually significant. Nor are they jointly significant using Hotelling's T^2 test, whose test statistic of 2.58 compares with a 5 per cent critical value of 2.75.[16] Thus the results indicate that differential sectoral risk does not appear to be an important factor in practice, although this is a tentative conclusion in view of the reduced sample size for Model 3. Finally, it is encouraging that, despite the restricted sample, similar coefficient signs and significance patterns are observed as in the first two models.

6 Conclusion

This paper has presented a model that extends the pioneering work of Arthur Lewis, by modifying and combining Lewis' three-sector labour market classification with several themes from modern economic analysis. The model generated several predictions about how economic and financial development interface with occupational structure. Our empirical results, based on a sample of cross-country data, not only confirmed the predictions of the theoretical model, but they also accorded a central role to both economic and financial development. Uncertainty and imperfect capital markets were found to be empirically important determinants of labour market structure, in accordance with the theoretical model. And, economic development that increases GDP per capita and financial development that reduces interest risk premiums both help to explain the larger waged worker workforce shares and smaller own-account artisan workforce shares that are observed in richer nations. These findings appeared robust to the inclusion of controls for gender and agricultural workforce composition.

One reason why the interface between labour market structure and growth is a topical issue is because of its natural linkages with entrepreneurship in a development context. For example, one could easily interpret 'employers' in our analysis as entrepreneurs, with 'artisans' capturing more of the non-entrepreneurial (and largely agricultural) self-employment sector. The rise of the former sector, and the decline of the latter, do seem to be a widely observed feature of many countries' development paths.

These findings might also be of interest to governments interested in encouraging entrepreneurship in developing countries. For instance, if governments in developing countries wish to intervene beneficially to smooth the social changes caused by development-led labour reallocation, then they first need to understand how development affects occupational choice. That has been a contribution of this paper. A particularly noteworthy result is that financial development appears to reduce the numbers of the most populous group of producers, namely those who work on their own-account. It contrasts with the view articulated in some places that more sophisticated lending practices that reduce borrowing rates can increase the number of small (usually own-account) businesses. Claims of this sort are sometimes made on behalf of Group Lending Schemes, which have occupied a prominent position in recent analyses of development and entrepreneurship. That view ignores the broader occupational choice effects analysed in this paper.

We conclude that the insights of Arthur Lewis' research remain highly relevant today, and continue to provide a useful basis for ongoing research. Of course, the modelling approach outlined in this paper could also be developed in several directions. For example, future work might relax our (and Lewis') simplifying assumption that workers and wages are homogeneous within broad labour market groups. And some of Lewis' other insights, especially regarding growth and fluctuations, and the international dimensions of development, might also be incorporated into the analysis in due course. At the same time, policy implications need to be traced out, perhaps by utilising Lewis' distinction between planning by direction and planning through the market. The challenge would be to achieve these goals while retaining the focus on the 'big picture' – something at which Lewis excelled. A project that achieved this would almost certainly succeed in extending the frontiers of development research.

Appendix 1: Proofs

A Proof of Lemma 1

Eq. (4) states that all individuals with $x \geq k^*$ should devote no more and no less than k^* to production. Any remaining endowment (i.e., $x - k^* \geq 0$) obtains a higher return from being invested. Hence all individuals with $x \geq k^*$ are lenders. The corresponding FOC for k^{**} states that all individuals with $x < k^{**}$ optimise by producing with capital k^{**}. This makes them borrowers. Individuals with $k^{**} \leq x < k^*$ cannot operate with k^* because they would need to borrow it; but at borrowing rate r^b they would desire k^{**}, not k^*. Therefore they will not borrow $[k^* - x]$. Nor will they lend $[x - k^{**}]$, since by (4) x realises a higher return if used in production than invested at r. Hence those with $k^{**} \leq x < k^*$ use all and only their x as productive capital. $\|$

B Proof of Lemma 2

For given x, (2) holds in e while the condition $\mathsf{E}[1 - \theta\psi]A^a f_{l^a \overline{h}^w}|_{l^a=0} - \omega \leq 0$ holds in a, where $l^a = 0$ is zero labour demand by artisans. But using (2) this implies by the concavity of the production function (i.e., $f_0 > [f_{l^a} | l^a > 0]$) that, for e technology to be used,

$$\mathsf{E}\{1 - \theta\psi\}A^a f_{l^a \overline{h}^w} - \mathsf{E}\{1 - \psi\}A^e f_{l\overline{h}^w} < 0$$

for any $l > 0$, i.e., that $\mathsf{E}\{1 - \psi\}A^e > \mathsf{E}\{1 - \theta\psi\}A^a$. This implies $A^e > A^a$. Then using (4) and its counterpart for a, it follows both from the concavity of the production function and from

$$\mathsf{E}\{1 - \psi\}A^e f_{k^*} = r = \mathsf{E}\{1 - \theta\psi\}A^a f_{k^{a*}}$$

that $k^* > k^{a*}$. The same argument establishes $k^{**} > k^{a**}$. $\|$

C Proof of Lemma 3

By Jensen's inequality $\mathsf{E}\,U(R^a, h^a) < U(\mathsf{E}\{R^a\}, h^a)$. Now as x increases above $\hat{x}$,

$$\mathsf{E}\,U(R^a, h^a) \to U(\mathsf{E}\{R^a\}, h^a) > U(\omega h^w + rx, h^w)\ ,$$

since the stochastic component becomes relatively less important as x increases. By the same argument, as x decreases below $\hat{x}$, $\mathsf{E}\,U\,(R^a, h^a)$ decreases relative to $U\,(\omega h^w + rx, h^w)$. Thus in all cases, individuals with $x > \hat{x}$ prefer a to w, and those with $x < \hat{x}$ prefer w to a. This is buttressed by the fact that if $x < k^{a*}$, then for those with $x = \hat{x}$

$$\frac{\partial \mathsf{E} R^a}{\partial x} \geq \frac{\partial R^w}{\partial x} = r\,.$$

Therefore any individuals with $x > \hat{x}$ also prefer a to w, because they get higher (equal if $\hat{x}+dx = k^{a*}$) expected returns there. ‖

D Proof of Lemma 4

Using Lemma 2, suppose first that $\tilde{x} > k^* > k^{a*}$, i.e., individuals with $x = \tilde{x}$ are lenders irrespective of occupation. Then analogous to the proof of Lemma 3, greater uncertainty in e ensures that as x increases above $\tilde{x}$ the LHS must exceed the RHS of (7). The same outcome occurs if $\tilde{x} \leq k^{a**} < k^{**}$ (i.e., individuals are borrowers irrespective of occupation). Another possibility is $k^{**} \leq k^{a*} < \tilde{x} \leq k^*$. In this case, the uncertainty mechanism above is buttressed by the fact that $x > \tilde{x}$ generates a higher return from x for non-borrowing and non-lending es than for lender as. The same is true if $k^{**} < \tilde{x} \leq k^{a*} < k^*$ (i.e., if individuals in this range are neither lenders nor borrowers in each occupation), since output is greater in e than in a (see Lemma 2). The same is also true for the one remaining possibility of $k^{a**} < \tilde{x} \leq k^{**}$, i.e., if individuals in e are borrowers but those in a are not. ‖

E Proof of Lemma 5

The equilibrium wage ω equates aggregate labour supply with aggregate labour demand:

$$\begin{aligned} G(\hat{x}) \quad = \quad & \phi(\tilde{x})[G(k^{**}) - G(\tilde{x})]l(\omega, \overline{h}^w, k^{**}) + \phi'(\tilde{x}) \int_{\max\{k^{**},\tilde{x}\}}^{k^*} l(\omega, \overline{h}^w, \\ & x)\, dG(x) + [1 - G(\max\{k^*, \tilde{x}\})]l(\omega, \overline{h}^w, k^*)\,, \end{aligned} \qquad (12)$$

where $\phi(\tilde{x}) = 1$ if $\tilde{x} < k^{**}$ and zero otherwise; and where $\phi'(\tilde{x}) = 1$ if $\tilde{x} < k^*$ and zero otherwise.

For any given $\tilde{x}$, the RHS of (12) is a continuous decreasing function of ω (by $l_\omega < 0$) whereas the LHS is a continuous increasing function of ω (since $G(\cdot)$ is an increasing function of $\hat{x}$, which in turn is an increasing function of ω by implicit differentiation of (6)). Suppose $\omega = 0$. Then by (2) the RHS of (12) is ∞, while the LHS of (12) is zero by inspection of the w FOC. Hence $\omega = 0$ is not an equilibrium. Suppose instead $\omega = \infty$. Then by (2) the RHS of (12) is zero, while the LHS is ∞ by (6) (and (7)). Thus $\omega = \infty$ cannot be an equilibrium either. But given the continuity and the signs of the derivatives of the two sides of (12) with respect to ω, a finite wage that satisfies (12) must exist. Given monotonicity of these functions, it is also unique. $\|$

F Proof of Proposition 1

(i) An increase in A^e does not affect $\hat{x}$ (see (6)), but it does affect $\tilde{x}$ via (7). Implicit differentiation of the latter yields

$$\frac{\partial \tilde{x}}{\partial A^e} = -\frac{\mathsf{E}\left\{[1-\psi]f(l^*\overline{h}^w, k^e(x), h^{e*})U_{R^e}\right\}}{\mathsf{E}\left\{U_{R^e}\frac{\partial R^e}{\partial x}\Big|_{x=\tilde{x}} - U_{R^a}\frac{\partial R^a}{\partial x}\Big|_{x=\tilde{x}}\right\}} < 0\,,$$

using Lemma 4 to sign the denominator positive. Therefore n^e increases by (8); and the demand for labour and hence ω increases by (12). The latter increases $\hat{x}$ (by implicit differentiation of (6)), so n^w increases while n^a decreases.

(ii) An increase in A^a has the following effects on $\hat{x}$ and $\tilde{x}$:

$$\begin{aligned}
\frac{\partial \hat{x}}{\partial A^a} &= \frac{-\mathsf{E}\left\{[\pi^a/A^a]U_{R^e}\right\}}{\mathsf{E}\left\{U_{R^a}\frac{\partial R^a}{\partial x}\Big|_{x=\hat{x}}\right\} - rU_{R^w}} < 0 \\
\frac{\partial \tilde{x}}{\partial A^a} &= \frac{\mathsf{E}\left\{[\pi^a/A^a]U_{R^a}\right\}}{\mathsf{E}\left\{U_{R^e}\frac{\partial R^e}{\partial x}\Big|_{x=\tilde{x}} - U_{R^a}\frac{\partial R^a}{\partial x}\Big|_{x=\tilde{x}}\right\}} > 0\,,
\end{aligned}$$

using Lemmas 3 and 4 to sign both denominators positive. From (8), a decrease in $\hat{x}$ and an increase in $\tilde{x}$ unambiguously increases n^a at the expense of both n^w and n^e. But the reduced supply and demand for labour has ambiguous effects on the market-clearing wage that solves (12).

(iii) We have $A^e \rightarrow A'^e$ and $A^a \rightarrow A'^a$ via the transformations $A'^e = \lambda A^e$ and $A'^a = \lambda A^a$, with $\lambda > 1$. From (i) and (ii) above, we have $\partial\hat{x}/\partial\lambda < 0$. The effect on $\tilde{x}$ is:

$$\begin{aligned}
\frac{\partial \tilde{x}}{\partial \lambda} &= -\frac{\mathsf{E}\left\{[1-\psi]A^e f(l^*\overline{h}^w, k^e(x), h^{e*})U_{R^e} - [1-\theta\psi]A^a f(0, k^a(x), h^{a*})U_{R^a}\right\}}{\mathsf{E}\left\{U_{R^e}\frac{\partial R^e}{\partial x}\Big|_{x=\tilde{x}} - U_{R^a}\frac{\partial R^a}{\partial x}\Big|_{x=\tilde{x}}\right\}} \\
&< 0\,,
\end{aligned}$$

the sign of the numerator following from greater productivity in e than a (Lemma 2), and the sign of the denominator following from Lemma 4. Therefore n^e increases by (8); and the demand for labour and hence ω increases by (12). This is true irrespective of the decrease in $\hat{x}$, which must therefore be offset by the increases in ω and n^w. ‖

G Proof of Proposition 2

By the envelope theorem, $k^j_{r^b}(x) = 0$ ($j = \{a, e, w\}$), so only direct parametric changes in r^b appear below. First, from (6) a change in r^b only affects w-a choices if ${\delta'}^a(\hat{x}) = 1$, i.e., if $\hat{x} < k^{a**}$. In this case, implicit differentiation of (6) yields $\partial\hat{x}/\partial r^b > 0$, i.e., a reduction in r^b decreases $\hat{x}$.

Second, implicit differentiation of (7) yields

$$\frac{\partial \tilde{x}}{\partial r^b} = \frac{-\mathsf{E}\left\{U_{R^e}\delta'(\tilde{x})[\tilde{x} - k^e(x)] - U_{R^a}{\delta'}^a(\tilde{x})[\tilde{x} - k^a(\tilde{x})]\right\}}{\mathsf{E}\left\{U_{R^e}\left.\frac{\partial R^e}{\partial x}\right|_{x=\tilde{x}} - U_{R^a}\left.\frac{\partial R^a}{\partial x}\right|_{x=\tilde{x}}\right\}} \geq 0\,.$$

The sign of this derivative is given by the sign of its numerator, which has the following explanation. By Lemma 1, there can be only three cases: (i) $\delta'(\tilde{x}) = {\delta'}^a(x) = 1$; (ii) $\delta'(\tilde{x}) = 1$ and ${\delta'}^a(\tilde{x}) = 0$; and (iii) $\delta'(\tilde{x}) = {\delta'}^a(x) = 0$. If (i), then by Lemma 1 $k^e(\tilde{x}) = k^{**} > k^{a**} = k^a(\tilde{x}) > \tilde{x}$. Then

$$\mathsf{E}\left\{U_{R^e}[\tilde{x} - k^{**}] - U_{R^a}[\tilde{x} - k^{a**}]\right\} < 0$$

and the above derivative is strictly positive. If (ii), then the numerator of this derivative becomes $-\mathsf{E}\left\{U_{R^e}[\tilde{x} - k^{**}]\right\} > 0$. If (iii) (i.e., no employers borrow capital), then by inspection the numerator of the derivative is zero.

Thus a reduction in r^b either (a) leaves unchanged or (b) decreases $\tilde{x}$. If (a) $\tilde{x}$ is unchanged and $\hat{x}$ decreases, then n^a increases at the expense of n^w and n^e by (8). But *if* $\hat{x}$ is unchanged (see the first paragraph of this proof), then the decrease in r^b has no effects at all. If (b) $\tilde{x}$ decreases, then n^e definitely increases, and so (by (12)) does the demand for labour n^w, and ω. This is true irrespective of any decrease in $\hat{x}$, which must therefore be offset by the increases in ω and n^w. ‖

Appendix 2: Sample Summary Statistics

The following summary statistics were computed from the sample. The number of observations is 98 in all cases except GDPC (for which it is 96) and STRIKEPR (for which it is 67). The text gives the sources of the variables and the country coverage.

Insert table 4 about here

Notes

[1]For example, evidence from a range of developing countries shows that average incomes in the 'informal' or 'artisan' sector often exceed those in the formal 'waged' sector. For evidence from Malaysia, see Blau (1985, 1986) and Teilhet-Waldorf and Waldorf (1983). For further evidence of this kind, see e.g., Chiswick (1976) and Bertrand and Squire (1980) for Thailand; Mazumdar (1981) for Kuala Lumpar; and House *et al* (1993) for Kenya.

[2]Here and henceforth, subscripts denote partial derivatives, curved brackets enclose arguments of functions, square brackets collect terms, and braces are used (where necessary) for the expectations operator E.

[3]For brevity, we do not analyse the sources of this capital market imperfection, taking it to be exogenously determined. One possible cause might be asymmetric information, whereby borrowers seeking to fund investment projects know more about their abilities than banks do (Parker, 2003). Naturally, other forms of capital market imperfection could be proposed, including Type I and Type II credit-rationing. However, the recent survey by Parker (2002) has shown that compelling evidence of credit rationing is actually very limited.

[4]Recall that these hours are heterogeneous, because they depend in part on x, as shown above. It is assumed that each employer is indifferent to the mix of worker hours, and workers match randomly with employers. An explicit expression for $\overline{h}^w$ is given in the next sub-section.

[5]This is not to deny that artisans might be more vulnerable to other covariant risks like bad weather.

[6]This result (and that of Lemma 4 below) does not change if there are binding capital constraints. Note also that Lemma 3 would still go through in the presence of risk in w as long as the risk is greater in a – as is generally assumed in the literature.

[7]Note that Lemmas 3 and 4 imply that we must have $\tilde{x} \geq \hat{x}$, so by transitivity there is no need to compare (expected) utilities in e and w. The proof is by contradiction. Suppose $\tilde{x} < \hat{x}$. According to Lemma 3, all individuals with $x < \hat{x}$ strictly prefer w to a; and by Lemma 4, all those with $x \leq \tilde{x} < \hat{x}$ strictly prefer a. But this contradicts Lemma 3. QED.

[8]Lewis (1954, p. 172) also recognised that artisans as well as employers might benefit from tech-

nological changes. He claimed that technological progress has similar effects to capital accumulation, though as Proposition 1 shows, this does not necessarily follow if technological change is distributed unevenly across sectors.

[9]See Morduch (1999) for evidence of how sophisticated lending practices designed to resolve information asymmetries have dramatically reduced borrowing rates in several developing countries.

[10]Schumpeter (1934) also predicted the rise of the large-scale employer at the expense of the artisan, although Schumpeter's work does of course belong to a very different (i.e., Austrian) economic tradition.

[11]Per capita GDP is also a convenient proxy because it is published for a large number of countries, enabling us to maximise the size of our sample. Note that unlike wealth (which is a stock) income is a flow, so GDPC should not reflect effects from the average capital endowment or wealth-based borrowing constraints.

[12]The countries are: Egypt, Colombia, Costa Rica, the Dominican Republic, Ecuador, El Salvador, Honduras, Jamaica, Mexico, Panama, Peru, Trinidad & Tobago, Israel, Singapore, Croatia, Czech Republic, Estonia, Hungary, Iceland, Ireland, Latvia, Lithuania, Poland, Slovakia, Slovenia, Japan, Denmark, Spain, Germany, Greece, Italy, Portugal, Australia and New Zealand. The data source for the employment shares and FEMPR, AGPR and STRIKE was the ILO's *Yearbook of Labour Statistics* (YLS). The source for all of the other variables was the IMF's *International Financial Statistics* (IFS). All of the variable definitions should be obvious, apart from PREM, which was defined as the difference between the risky borrower and safe deposit rates (lines 60p and 60l in IFS).

[13]We also computed Hausman-Wu statistics to test for the exogeneity of the explanatory variables in the regression specification. The results (available from the author in request) showed that exogeneity is supported, so we do not discuss this issue further below.

[14]While the coefficient in the employer equation has the 'wrong' sign, it is imprecisely estimated and insignificantly different from zero.

[15]Furthermore, per capita GDP has a more substantial impact on all employment shares than any other explanatory variable. The mean effect of a 1 per cent increase in GDP per capita on the vector of employment shares is $\Delta n = (\Delta n^w, \Delta n^o, \Delta n^e)' = (+0.2962, -0.3541, +0.0638)'$. Note incidentally that there is no evidence of collinearity between the explanatory variables in any regression. Principal

component analysis yielded eigenvalues of 2.3866, 1.1074, 0.6319, 0.4863 and 0.3878, with implied standardised variance contributions of 0.4773, 0.2214, 0.1264, 0.0973 and 0.0776, suggesting that none of the principal components can be dropped using a cut-off variance contribution of 5 per cent.

[16]The T^2 test applied to the other variables in the regression models indicated joint significance in every case. Detailed results are available from the author on request.

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Variables	Proportion of Employers	Proportion of Artisans	Proportion of Wage workers
Intercept	0.134**	0.230**	0.636**
	(0.030)	(0.081)	(0.074)
Inflation rate	−0.111**	−0.086	0.197
	(0.028)	(0.133)	(0.135)
Interest premium	0.023	1.319**	−1.342**
	(0.066)	(0.284)	(0.299)
Prop. female workers	−0.182**	−0.477**	0.659**
	(0.064)	(0.184)	(0.173)
Prop. agr. workers	0.021	0.397**	−0.418**
	(0.033)	(0.142)	(0.141)
R^2	0.246	0.489	0.530
No. observations, T	98	98	98

Notes: Coefficients with heteroscedasticity-robust standard errors in parentheses. Method of estimation: Generalised Least Squares (GLS: see text for details). * p-value less than 0.05; ** p-value less than 0.01

Table 1: GLS estimates of Model 1

Variables	Proportion of Employers	Proportion of Artisans	Proportion of Wage workers
Intercept	0.124**	0.274**	0.602**
	(0.032)	(0.086)	(0.076)
Inflation rate	−0.087*	−0.241	0.328*
	(0.028)	(0.133)	(0.135)
GDP per cap. (×1000)	0.513	−2.842**	2.329*
	(0.342)	(0.925)	(0.926)
Interest premium	0.052	1.193**	−1.245**
	(0.074)	(0.271)	(0.281)
Prop. female workers	−0.186**	−0.433*	0.619**
	(0.066)	(0.183)	(0.173)
Prop. agr. workers	0.041	0.302*	−0.343*
	(0.031)	(0.145)	(0.148)
R^2	0.265	0.533	0.559
No. observations, T	96	96	96

Notes: See table 1

Table 2: GLS estimates of Model 2

Variables	Proportion of Employers	Proportion of Artisans	Proportion of Wage workers
Intercept	0.108**	0.084	0.807**
	(0.037)	(0.073)	(0.068)
Inflation rate	−0.068	−0.393**	0.462**
	(0.044)	(0.109)	(0.111)
GDP per cap. (×1000)	1.031*	−3.341**	2.310
	(0.403)	(1.224)	(1.236)
Interest premium	0.094	1.461**	−1.555**
	(0.099)	(0.286)	(0.344)
Prop. female workers	−0.195*	−0.011	0.206
	(0.083)	(0.154)	(0.138)
Prop. agr. workers	0.109	0.525**	−0.635**
	(0.058)	(0.168)	(0.177)
Prop. strikes	0.003	0.150	−0.153
	(0.090)	(0.142)	(0.098)
R^2	0.278	0.641	0.669
No. observations, T	67	67	67

Notes: See table 1

Table 3: GLS estimates of Model 3

Variables	Mean	St. Dev.	Minimum	Maximum
Share of employers, n^e	0.0586	0.0309	0.0190	0.1820
Share of artisans, n^o	0.1701	0.1075	0.0100	0.4240
Share of wage workers, n^w	0.7713	0.1114	0.5090	0.9380
Inflation rate, INF	0.0579	0.0637	-0.0980	0.3100
Real GDP per capita (thousands of US dollars), GDPC	12.460	10.833	1.1150	37.792
Interest premium, PREM	0.0620	0.0347	0.0205	0.1890
Proportion of female workers, FEMPR	0.3966	0.0661	0.1850	0.5550
Proportion of agricultural workers, AGPR	0.1162	0.0778	0.0020	0.3070
Proportion of workers involved in strikes, STRIKEPR	0.0204	0.0446	0.0000	0.2875

Table 4: Summary statistics