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Aspects of Informalization and Income
Distribution in Developing
Countries: A Modified Specific Factors Approach

by

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## Abstract

This paper explores aspects of increased informalization in developing countries with the help of a modified specific factors model with a fixed nominal wage in the formal sector, which is assumed to have a "lighthouse" effect on the informal sector wage. Both sectors produce a tradable good each, with informal sector production being embedded in international production networks. Comparative dynamic exercises that attempt to simulate recent economic developments in many developing countries yield plausible results, and suggest various channels for increased informalization. Contrary to standard sticky wage models, wage suppression in the formal sector leads to informalization. Changes in factor endowments create a conflict of interest between the owners of capital in the two sectors, unlike the canonical specific factors model where the conflict is between the owners of capital and labor. Finally, factors that lead to informalization are also likely to result in greater inequality in income shares between labor and capital *even* with nominal wages that are fixed and equal between the two sectors.

# 1   Background and Introduction

Data from a number of developing countries have indicated a widespread trend toward greater informalization of economies.[1] The growing share of the informal sector at the expense of the formal sector raises serious questions and concerns. Moreover, given the increasing integration of developing countries into world markets, and the growing penetration of market-based transactions in these economies, the trend towards informalization is perhaps surprising. Such integration has often been accompanied by efforts to limit public spending and investment, to encourage private (foreign and domestic) investment to substitute for it, and to enhance external competitiveness by limiting wage growth and/or inflation, and through exchange rate targeting. Furthermore, increasing inequality, both between owners of capital and workers, and between skilled and unskilled workers in many developing countries provides prima facie evidence undermining the predictions of the standard Stolper-Samuelson theorem, and suggesting the existence of counteracting forces that have acted to increase the share of profits in national income.[2] A growing body of literature recognizes the role that the weakening position of labor unions has played in this development. This paper attempts to construct a partial explanation of these trends with the help of a modified two good, three factor specific factors (or Ricardo-Viner) model. The canonical form of the model takes commodity prices as exogenously given. Changes in factor prices are then determined by commodity price changes and changes in (specific or mobile) factor endowments.[3] Our model, on the other hand, assumes an exogenous (internationally determined) price for informal sector output, a nominal wage determined by the labor contracts signed in the formal sector, and an endogenously adjusting price of formal sector output. The idea is to derive possible explanations for increasing informalization and profit shares, in a general equilibrium framework, by capturing more closely the actual conditions that may prevail in the short to medium-run in many developing countries.

The last few decades have brought widespread vertical disintegration in international production networks.[4] Much of this disintegration has involved expanded segments of what is

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[1] See Blunch *et al.* (2001), Heintz and Pollin (2003), and Ghose (2003) for a detailed discussion.

[2] See Arbache *et al.* (2004) and Harrison (2002), for example.

[3] The influence of factor endowments on factor prices of course distinguishes the specific factors model from the canonical $2 \times 2 \times 2$ Heckscher-Ohlin model.

[4] This phenomenon is also sometimes called slicing of the value chain, outsourcing, vertical fragmentation,

often called the informal sector. The informal sector, which employs a substantial proportion of workers in many developing countries, is broadly defined as the relatively less organized and less regulated sector of the economy in which minimum wage laws and other forms of regulation are either completely absent or weakly implemented.[5] Multinational commodity supply chains and production-sharing arrangements have significantly re-shaped the nature of the informal sector, large parts of which produce intermediate inputs or final goods for international markets, either directly or through transnational corporations (TNCs) searching the globe for "flexible" low cost labor. In many developing countries, a large share of the workforce in key export industries, including textiles, sportswear, garments, and electronics, work in export processing zones or even from their homes under informal employment arrangements.[6] Thus, to the extent that informal production chains operate in increasingly competitive conditions, it is plausible to assume that these respond strongly to international price signals, either directly or through TNC intermediation. In other words, in an increasingly competitive environment, small-scale suppliers operate under conditions approximating perfect competition, and vie for increasing shares of global production networks as price-takers.[7]

# 2   A Modified Specific Factors Model

Consider a developing country with two *tradable* goods-producing sectors, a formal sector (F) and an informal sector (I). The formal sector produces tradables mainly for domestic markets while the informal sector produces for international production chains, where it is a price-taker.[8] We have already briefly discussed the plausibility of these assumptions. Some more discussion of their relevance may be appropriate at this point. A major portion of the rural workforce in many developing countries has traditionally been involved in the provision of what are typ-

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delocalization, and fragmentation.

[5]We avoid here the controversies surrounding the precise definition of the term "informal sector."

[6]See, for instance, Carr and Chen (2002).

[7]A related consequence of such a scenario is that informal sector workers compete for jobs and wages not only with other informal sector workers in the country, but also with informal sector workers across the globe.

[8]An alternative way to interpret this set-up would be that while informal sector producers indulge in local currency pricing (LCP), formal sector producers indulge, to a lesser or greater extent, in producer currency pricing (PCP). This distinction reflects the greater market power – and hence the room to price discriminate across destination markets – that the former are assumed to have, owing to the more differentiated, higher value-added nature of their product.

ically seen as non-tradable goods and services, largely related to agriculture. However, many of these activities are shifting towards tradable sectors. For example, within agriculture itself, production is shifting from subsistence crops to exportable cash crops. Moreover, many of the goods and services previously deemed non-tradable are increasingly becoming tradable. Furthermore, many developing countries are witnessing a major population shift from rural areas to semi-urban industrial areas with heavy concentrations of "unregulated" workforces involved in manufacturing activities for export-oriented international production chains (the maquiladora sector in Mexico, and the vast urban slums neighboring Shanghai are two widely cited examples). As Ghose (2003, p. 75) points out, "it is true that, in most [developing] countries, much of the incremental employment of low-skilled labour in *export-oriented* industries has been outside what we have called the regulated sector" (emphasis added).[9] The fact that a significant proportion of workers in the informal sector are involved in non-tradable activities limits the scope of our model. However, to the extent that as noted above, the informal sector at an aggregate level is increasingly shifting towards the production of export-oriented tradables, and considering that some of the increase in the size of the informal sector in recent years is attributed to a shift of the labor force from import-substituting formal activities to export-oriented informal activities, our simplifying assumption appears to be a useful abstraction.[10]

Production in either sector involves two factors, capital and labor. While labor is mobile between the two sectors, capital is specific to each sector. This assumption reflects the stylized fact that in the short to medium run, labor is more mobile than capital *within* a country.[11] Firms have heavy fixed investments in infrastructure, machinery, and tools which are costly and time-consuming to uproot and remove from one sector to the other at short notice. Production functions for each sector are characterized by the typical neoclassical properties of substitutability between, and diminishing returns to, factors and homogeneity of degree one in factor inputs (constant returns to scale). The supply of economy-wide factor endowments is assumed to be

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[9]Note that the formal sector, on average, is very likely to have a greater proportion of skilled workers than the informal sector, at least in the traditional sense of the terms "skilled" and "unskilled." Also, we should point out that the unregulated sector as defined by Ghose (2003) does not exactly correspond to the way the informal sector is sometimes defined.

[10]See Ghose (2003) for some more specific evidence and case studies for some developing countries including India, Mexico, and China.

[11]Such an assumption would be dubious if applied to international factor mobility.

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perfectly inelastic in the relevant time frame for all factors.

Workers in the formal sector sign contracts which fix their nominal wage in the short-run. Workers in the informal sector, on the other hand, have flexible wages, which, due to labor mobility and "demonstration effects" are influenced by wages in the formal sector. In other words, wages in the formal sector have what has sometimes been called an "Efeito Farol" or "lighthouse effect" (Maloney and Nuñez, 2003) on wages in the informal economy.[12] The latter characteristic, along with the assumption of perfect labor mobility, ensures (nominal) wage equalization between the two sectors.[13] Assuming that perfect competition characterizes markets for the informal sector product leads to the implication that a change in the commodity price translates into an equivalent weighted average change in factor prices in that sector. Formal sector firms, on the other hand, sell more sophisticated differentiated products in domestic and international markets, and have some market power in the sense that the price of their output adjusts endogenously in response to changes in factor returns.

These assumptions combined with that of full employment of all resources imply that our stylized economy can be described by a system of six equations:

$$a_{FL}W_F + a_{FK}R_F = p_F \tag{1}$$

$$a_{IL}W_I + a_{IT}R_I = p_I \tag{2}$$

$$a_{FL}X_F + a_{IL}X_I = \bar{L} \tag{3}$$

$$a_{FK}X_F = \bar{K} \tag{4}$$

$$a_{IT}X_I = \bar{T} \tag{5}$$

$$W_F = \bar{W} = W_I \tag{6}$$

where $a_{ij}$ ($i = F, I$, and $j = L, K, T$) is the unit factor requirement for factor $j$ in sector $i$, $W_i$ is the nominal wage in sector $i$, $\bar{W}$ is the nominal wage negotiated in the formal sector, $R_i$ are the respective returns on capital in the two sectors, $p_i$ are the prices of formal and

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[12]This assumption, which to some extent goes against the grain of dualist perspectives on the informal sector is quite plausible. See Fajnzylber (2001) and Lemos (2004), for example. Maloney and Nuñez (2003) actually found the effect of minimum wage legislation to be much stronger for the informal sector than the formal sector for some Latin American countries.

[13]Nominal wages need not equalize between the two sectors for our results to hold. One could easily incorporate a constant and positive formal sector premium (arising from entry barriers such as differentials in average skill levels) without qualitatively affecting most of our analysis.

informal output, $\bar{L}$, $\bar{K}$, and $\bar{T}$ are the supplies of labor, formal sector capital, and informal sector capital, respectively, and $X_i$, are the respective quantitative outputs. Note that, due to factor substitutability, the unit factor requirements are functions of factor prices. More precisely, $a_{ij} = a_{ij}(\bar{W}, R_i)$. However, we express these in their abbreviated form to avoid clutter. Substituting equations (4) - (6) into equation (3), yields:

$$\frac{a_{FL}}{a_{FK}}\bar{K} + \frac{a_{IL}}{a_{IT}}\bar{T} = \bar{L} \tag{7}$$

Next, totally differentiating equations (1), (2), and (7), expressing the variables in growth forms using Jones' algebra, and assuming for simplicity that the elasticities of factor substitution are symmetrical within the two sectors (that is, $\sigma_{FL} = \sigma_{FK}$ and $\sigma_{IL} = \sigma_{IT}$), yields the following system of equations after considerable manipulation:

$$[\theta_{FK} + \sigma_{FK} - 2\theta_{FK}\sigma_{FK}]\hat{R}_F - \hat{p_F} = -[1 - \theta_{FK} - \sigma_{FK} + 2\theta_{FK}\sigma_{FK}]\hat{\bar{W}} \tag{8}$$

$$[\theta_{IT} + \sigma_{IT} - 2\theta_{IT}\sigma_{IT}]\hat{R}_I = -[1 - \theta_{IT} - \sigma_{IT} + 2\theta_{IT}\sigma_{IT}]\hat{\bar{W}} + \hat{p_I} \tag{9}$$

$$[2\lambda_F\sigma_{FK}]\hat{R}_F + [2\lambda_I\sigma_{IT}]\hat{R}_I = 2[\lambda_F\sigma_{FK} + \lambda_I\sigma_{IT}]\hat{\bar{W}} + \hat{\bar{L}} - \lambda_F\hat{\bar{K}} - \lambda_I\hat{\bar{T}} \tag{10}$$

where $\theta_{ij} > 0$ is the output share of factor $j$ ($j \neq L$) in sector $i$, $\sigma_{ij} \geq 0$ is the elasticity of factor substitution between labor and factor $j$ in sector $i$,[14] $\lambda_i$ denotes the proportion of total labor employed in sector $i$, and the circumflexes denote rates of growth or percentage changes.

The logical working of the model now becomes clear. Given the exogenously determined price of informal sector output, equation (9) determines changes in returns on capital in that sector. The full employment and formal sector commodity market conditions in turn determine changes in returns on capital and price of output in the formal sector via equations (8) and (10). To put things slightly differently, nominal wage growth in the formal sector is determined by institutional factors such as the bargaining power of unions and minimum wage legislation. Changes in returns on capital, on the other hand, are jointly influenced by technological conditions, the institutionally determined rate of nominal wage growth, and changes in factor endowments. The price of formal sector output is set in a domestically competitive

[14]Or,

$$\sigma_{ij} = \frac{\partial a_{ij}}{\partial(\bar{W}/R_F)}\frac{(\bar{W}/R_F)}{a_{ij}}$$

product market. The informal sector is a relatively passive part of global production networks. The returns on capital in this sector are influenced by international prices and the domestic institutional considerations that determine nominal wage growth in the formal sector.

The formal solutions to the system defined by equations (8) - (10) can be written as:

$$\hat{R}_F = -\frac{1}{\Delta}\left[2\lambda_I\sigma_{IT}\hat{p}_I - \Omega_T(\hat{\bar{L}} - \lambda_F\hat{\bar{K}} - \lambda_I\hat{\bar{T}}) - 2(\lambda_I\sigma_{IT} + \lambda_F\sigma_{FK}\Omega_T)\hat{\bar{W}}\right] \tag{11}$$

$$\hat{R}_I = \frac{1}{\Delta}\left[2\lambda_F\sigma_{FK}(\hat{p}_I - (1-\Omega_T))\hat{\bar{W}})\right] \tag{12}$$

$$\hat{p}_F = \frac{1}{\Delta}\left[\Omega_K\Omega_T(\hat{\bar{L}} - \lambda_F\hat{\bar{K}} - \lambda_I\hat{\bar{T}}) - 2\lambda_I\sigma_{IT}\Omega_K\hat{p}_I + 2(\lambda_F\sigma_{FK}\Omega_T + \lambda_I\sigma_{IT}\Omega_K)\hat{\bar{W}}\right] \tag{13}$$

where $\Delta = 2\lambda_F\sigma_{FK}\Omega_T > 0$, $\Omega_K = \theta_{FK} + \sigma_{FK} - 2\theta_{FK}\sigma_{FK}$, and $\Omega_T = \theta_{IT} + \sigma_{IT} - 2\theta_{IT}\sigma_{IT}$. Thus, while changes in returns on capital in the formal sector depend on changes in the institutionally-determined wage, the (international) price of informal sector output, *and* factor endowments, changes in returns on capital in the informal sector only depend on the former two, and are independent of changes in factor endowments.[15] Moreover, it can be demonstrated, using equations (3), (4), (5), (11), and (12) that:

$$\hat{X}_F - \hat{X}_I = \hat{\bar{K}} - \hat{\bar{T}} + \frac{\sigma_{IT}}{\Omega_T}\left(1 + \frac{\lambda_I}{\lambda_F}\right)(\hat{\bar{W}} - \hat{p}_I) + \frac{1}{2\lambda_F}(\hat{\bar{L}} - \lambda_F\hat{\bar{K}} - \lambda_I\hat{\bar{T}})) \tag{14}$$

Finally, turning our attention to the distribution of income *shares* rather than the respective returns, the profit and wage shares of total nominal national income can be defined as, $Y_R = p_1X_1 + p_2X_2 - \bar{W}L$ and $Y_W = \bar{W}L$, respectively. Using these definitions yields, after considerable manipulation, the following expression for change in relative income shares:

$$\begin{aligned} \hat{Y}_R - \hat{Y}_W &= \rho_F\left\{\hat{\bar{K}} + \hat{\bar{W}} + \left(1 + \frac{\Omega_K}{\sigma_{FK}}\right)\left[\frac{1}{2\lambda_F}(\hat{\bar{L}} - \lambda_F\hat{\bar{K}} - \lambda_I\hat{\bar{T}}) + \frac{\lambda_I\sigma_{IT}}{\lambda_F\Omega_T}(\hat{\bar{W}} - \hat{p}_I)\right]\right\} \\ &+ \rho_I\left\{\hat{\bar{T}} - \frac{\sigma_{IT}}{\Omega_T}(\hat{\bar{W}} - \hat{p}_I) + \hat{p}_I\right\} - (\rho_F + \rho_I)(\hat{\bar{W}} + \hat{\bar{L}}) \end{aligned} \tag{15}$$

where $\rho_i$ is the ratio of the nominal output in sector $i$ to total nominal profits.

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[15]Thus, profits in the informal sector are not influenced by labor or capital movements.

# 3  Effects of Changes in the Nominal Wage, Factor Endowments and World Prices

As mentioned earlier, enhancing external competitiveness and attracting FDI through curtailing wage and price inflation, maintaining competitive real exchange rates, reducing public spending, and relaxing labor laws has been part of the menu of priorities for many developing country policy makers in recent decades. This section carries out comparative dynamic exercises to explore some of these issues.

Suppose the policy makers in our country decide to make the economy more attractive to foreign investors by taking various measures to lower the nominal wage. Such measures could include weakening labor unions and lowering the legislated minimum wage, among other possibilities.[16] The lower wage seeps through to the informal sector, where workers are now forced to live with lower wages.

The formal expressions for these and other results are reported in the appendix. A decline in the nominal wage results in a decline in the returns on formal sector capital (more on this rather counter-intuitive result below), and in the price of the formal sector output. Moreover, the former decline is real in terms of both goods. The (real and nominal) returns on capital in the informal sector, however, rise. The effect on wages is interesting. A decline in the nominal wage reduces the real wage in terms of the informal sector good but increases it in terms of the formal sector good! Thus, the effect of wage suppression on workers is ambiguous, and depends on their consumption patterns. If, for instance, the formal sector produces relatively sophisticated consumer electronics while the informal sector produces "low-tech" manufactures such as textiles and garments, workers may experience a decline in actual purchasing power even while they can now afford more of the former. Thus, formal sector owners of capital lose the most from wage suppression. To the extent that wage suppression is designed to increase formal sector competitiveness, it achieves its objective, even though there may now be less incentive to invest in the formal sector (and more in the informal sector). Informal sector owners of capital and foreign consumers are the only unambiguous beneficiaries from a policy of wage

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[16]See, for example, UNCTAD (2003).

suppression. Ironically enough, formal sector capitalists end up being the only unambiguous losers, although domestic labor is also likely to experience a decline in real income.

A look at the factor incomes indicates a variant of the *magnification effect* that holds in the $2 \times 2 \times 2$ (i.e., two factors, two commodities, two countries) case. Changes in the economy-wide nominal wage are trapped between commodity price changes, which in turn are bound by changes in the returns on capital in the two sectors. In other words:

$$\hat{R}_I > \hat{p}_I > \hat{\bar{W}} > \hat{p}_F > \hat{R}_F$$

A decline in the formal sector wage leads to a temporary gap between wages in favor of the informal sector. As workers migrate to that sector, capital is left with less labor in the shrinking formal sector. At the new equilibrium, the capital-labor ratio, and thus the marginal product of capital is lower in the formal sector. This, combined with the fall in the price of the formal sector product constitutes a double whammy for formal sector capital. The informal sector, on the other hand, expands following a fall in the formal sector wage. The higher labor-capital ratio in this sector translates into higher real returns to owners of capital. Thus, on the one hand, a change in the fixed nominal wage in the formal sector creates a conflict of interests between owners of capital in the two sectors, with the effect on workers being ambiguous, albeit likely negative. On the other hand, however, it can be shown that the effect on the distributional *shares* of profits and wages in total national income is ambiguous, and is more likely to favor capital, the higher the initial share of informal sector output ($\rho_I$) in total national output.[17] Intuitively, this is because, as explained earlier, while a decline in nominal wage growth lowers output and prices in the formal sector (hence lowering total returns on capital), it also raises output and returns on capital in the informal sector. Thus, an economy with a high initial share of informal sector output in national GDP is likely to see the profit share of national income rise at the expense of the wage share. In terms of distributional shares, and to the extent that owners of capital in the two sectors overlap, the main conflict is between owners of capital and labor, rather than amongst the former.[18]

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[17]The effect also depends on the relative distribution of labor between the two sectors, the output share of each factor in the informal sector, and the elasticity of factor substitution in the informal sector.

[18]This may also be seen as a short vs. medium-term issue. If returns on factors is the overwhelmingly dominant concern for the respective factors in the ultra short-run, the starkest conflict of interests is between the two sets of owners of capital. If, on the other hand, factor share-related concerns dominate over the medium-term, the

What happens to the proportion of total output that is produced in the formal sector? A decline in the institutional wage in the formal sector leads to greater informalization of the economy, both in terms of the proportion of the national workforce employed in the informal sector and the proportion of national output produced in that sector. This prediction of our model, which is in sharp contrast with typical two-sector models that predict that a wage decline in the formal sector would lead to an *increase* in formal sector employment, may be a better reflection of reality in developing countries. A decline in the mandated formal sector wage leaves workers with few options in the absence of a working unemployment insurance system, and is likely to push many workers into the informal sector.

Figure 1 presents a modified version of the figure typically used to illustrate the textbook specific factors model. The horizontal axis represents the total labor endowment while the vertical axis measures the value marginal physical product of labor ($VMP_L^F$ and $VMP_L^I$ for the formal and informal sectors, respectively). The downward sloping convex curves reflect diminishing returns to labor at given commodity prices. The output of the formal sector increases as we move from left to right while that of the informal sector increases in the other direction. A decline in the formal sector nominal wage from $\bar{W}_0$ to $\bar{W}_1$ leads to greater informalization of the economy, along with the other consequences that have already been discussed.

Now suppose trade and investment liberalization, and related market-oriented reforms lead to increased investment in the informal sector. In other words, capital accumulation accelerates in this sector as domestic and international investment flows in. It can be shown that:

$$\hat{R}_I(=\hat{p_I}=\hat{\bar{W}}=0) > \hat{p_F} > \hat{R}_F$$

Greater investment inflows into the informal sector result in a decline in the real returns on capital in the formal sector. At the same time, the formal sector becomes more price-competitive. Informal sector profits are not affected, unlike in the traditional version of the specific factors model. Owners of informal sector capital *and*, as long as their consumption of the formal sector product is non-zero, labor in general experience a rise in their real income. The initial impact of investment inflows is to raise the relative wage in the informal sector, which

conflict is between owners of the two factors of production.

attracts labor into the sector until the wage falls to its initial level in the new equilibrium.[19] Thus, in this scenario, there is no tension between the owners of informal sector capital and labor. However, owners of capital are likely to gain as a whole in terms of distributional shares if the informal sector has a high initial share of national output.[20] Further informalization of the economy occurs.

Next, suppose that the government reduces its investment in the economy. This may be due to austerity-related budget cutting and/or the need to run primary budget surpluses. Proceeding from the plausible assumption that an overwhelming proportion of public investment is in the registered formal sector, it can be shown that:

$$\hat{R}_F > \hat{p_F} > \hat{R}_I (= \hat{p_I} = \hat{\hat{W}} = 0)$$

A deceleration in public investment in the formal sector results in a fall in the real income of *all* the participants in the economy except for the owners of capital in the formal sector. Moreover, the formal sector becomes less competitive. In terms of factor shares, the result does not depend, unlike the other cases, on the initial share of the informal sector in total national output.[21] Instead, the direction of the result entirely turns on the elasticity of factor substitution in the formal sector. Assuming a relatively low elasticity, as seems plausible for a typical developing country, implies that a deceleration of investment leads to an increase in the profit share of national income. Again, the result in terms of sectoral allocation of resources is a higher level of informalization of the economy.

Consider next the consequences of a favorable external terms of trade shock that affects the informal sector product, leading to greater informalization of the economy. The price of the formal sector good adjusts downwards.[22] Workers in general may gain or lose depending on the relative magnitudes of the price movements and on their patterns of consumption. Owners of capital in the informal sector gain unambiguously in terms of both nominal and real returns,

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[19]Or in other words, an increase in capital invites an offsetting increase in labor in the informal sector so that the relevant marginal products are unchanged in the new equilibrium.

[20]Other factors that influence changes in relative distributional shares include the initial output share of factors in the formal sector, the relative proportions of labor employed in the two sectors, and the elasticity of factor substitution in the formal sector.

[21]This is because the returns on capital in the informal sector are independent of changes in investment in the formal sector.

[22]Thus, the *overall* external terms of trade may become less or more favorable as a result of the shock.

while owners of capital in the formal sector lose unambiguously, again in both real and nominal terms. However, the profit share of national income is likely to increase if the initial share of the informal sector in national output is high.[23] It can be demonstrated that:

$$\hat{R}_I > \hat{p_I} > \hat{\hat{W}} > \hat{p_F} > \hat{R}_F$$

Finally, suppose that there is net outward migration of the mobile factor, i.e., labor. Alternatively, the rate of growth of the labor force declines. It can be demonstrated that:

$$\hat{R}_I(= \hat{p_I} = \hat{\hat{W}} = 0) > \hat{p_F} > \hat{R}_F$$

Emigration of the labor force benefits everyone left behind in terms of real returns, with the exception of the owners of capital in the formal sector. The formal sector becomes more price-competitive. Again, the effect on distributional shares is likely to benefit capital if the initial share of the informal sector in national output is high.[24]

A few words are in order about the role of the elasticity of factor substitution in the informal sector. Take an extreme case first. Consider a scenario where the factor market in the informal sector has in-built rigidities that are extreme enough so that the elasticity of substitution between factors is zero. In this case, a decline in the institutional wage does not hurt owners of either factor in the formal sector in terms of the formal sector good. However, both factors still lose in terms of the informal sector good, while owners of capital in the informal sector gain in terms of both goods.[25] The formal sector becomes more competitive in terms of price.

A more realistic scenario would involve some factor substitution, although considering that we are analyzing a developing economy, not much. Suppose $0 < \sigma_{IT} < 1$. It can be demonstrated that the higher the elasticity of factor substitution in the informal sector, the greater the loss in real income that the owners of capital in the formal sector suffer, and the smaller the gain in real income that their counterparts in the informal sector experience following measures

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[23]The other factors that influence changes in relative factor shares of national income in this case include the initial output share of factors in the two sectors, the relative proportions of labor employed in the two sectors, and the elasticity of factor substitution in the two sectors.

[24]Other factors that influence changes in relative distributional shares include the initial output share of factors in the formal sector, the proportion of labor employed in the formal sector, and the elasticity of factor substitution in the formal sector.

[25]It can also be shown that the greater the initial share of the latter in informal sector income, the smaller their gain.

to suppress the nominal wage in the formal sector.[26] Moreover, the greater the elasticity of factor substitution, the greater the drop in the price of the formal sector good, and hence the greater the increase in worker purchasing power in terms of formal sector output. This suggests that while owners of capital in either sector would benefit from low elasticities of factor substitution, workers would benefit from more flexible substitution! This counterintuitive result becomes comprehendible once we recall that capital in either sector is immobile, and that factor substitution in our context therefore, essentially implies the freedom for labor to move between sectors. If the institutional wage falls, workers would prefer to avail of the greater demand for their labor while working in the (temporarily) more remunerative sector.

# 4    Concluding Remarks

Considering that domestic factor mobility is much more impaired in developing countries than in industrialized countries, the specific factors framework provides a potentially better approximation to the short-run than the canonical Heckscher-Ohlin framework with perfectly mobile factors. This paper has analyzed a modified version of the specific factors model with three factors (two specific and one mobile) and two tradable goods, one produced each in the formal and informal sectors. The specific factors model in its usual form assumes flexible, market-clearing wages. However, this may not be a good assumption for formal sector markets in developing countries where wage stickiness due to institutional and other factors present in the organized sector is a widespread phenomenon, especially in the short- to medium-run. Indeed, there have been some recent signs of wage suppression in developing countries, either through direct policy interventions or through more indirect mechanisms leading to a weakening of labor's bargaining position. Moreover, there is evidence that wages in the formal sector do influence wages in the informal sector. Finally, the canonical specific factors model assumes exogenously determined commodity prices, which may be a better assumption for an informal sector that is integrated into global production networks than for a formal sector that is less integrated, and produces relatively more sophisticated goods with a higher value-added content.

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[26]Notice that the term $\sigma_{ij}/\Omega_j$ that frequently appears in the appendix is increasing in the elasticity of factor substitution in sector $i$.

Our modified model attempts to take into account these features to construct one possible explanation for the growth of the informal sector and the share of profits in total national income, which have coexisted in recent decades with increasing integration with global trade and production networks in many developing countries. The price of the informal sector good is assumed to be exogenously given, while that of the formal sector good is endogenously determined by commodity and factor market conditions. The nominal wage of formal sector workers is determined by short-run contracts that are agreed upon in the context of existing institutions such as labor unions. This then sets the wage in the informal sector through what has sometimes been called a lighthouse effect.

Several interesting results emerge from our comparative dynamics exercises. For example, nominal wage suppression makes the formal sector more competitive internationally but promotes informalization of the workforce. Thus, contrary to the predictions of most conventional models, lower wages in the formal sector reduce employment in that sector. Moreover, to the extent that investment follows the profit rate, increased competitiveness will coexist with less investment in this sector. Informalization of the workforce can also occur as a result of a decline in public spending, a rise in investment in the informal sector, emigration of the workforce, and a negative shock to the terms of trade between the formal and informal sectors.

Turning to the real returns on the respective mobile and specific factors, wage suppression creates a conflict of interests between owners of capital in the two sectors. Workers are likely to lose in real terms, although they could gain if their consumption is skewed towards the formal sector good. In other words, nominal wage growth is trapped between the two prices, which in turn are trapped between the returns on capital in the two sectors. Unlike the standard specific factors model, a conflict of interest also arises between the two sets of owners of capital if relative investment in the two sectors changes. The effects of a favorable (external) price shock in the informal sector are similar to those of wage suppression in the formal sector. A positive price shock tends to increase both nominal and real inequality between owners of informal sector capital and workers more sharply then in the standard specific factors model. The change in inequality in real terms following changes in the growth rates of factor supplies depends on consumption patterns, and is likely to be much less than is the case in the standard version.

Finally, focusing on distributional shares, our comparative dynamic exercises demonstrate that reduction in public investment, increased FDI inflows into the informal sector, wage suppression, positive terms of trade shocks in favor of the informal sector, and (even) emigration are likely to benefit the owners of capital in countries that have a large share of informal sector output in national GDP.

In short, changes in factor endowments create a conflict of interest in terms of real returns between owners of capital in the two sectors, as does a change in the exogenously given price of the informal sector good or the institutionally set nominal wage in the formal sector. To the extent that the two sets of owners of capital overlap, various developments or shocks that lead to shifting of resources from the formal to informal sector simply involve a transfer of profits from one source to another, making the formal sector more competitive internationally while reducing worker bargaining power via greater informalization of the workforce. To the extent that such a shift in profits coincides with increased informalization, and relatively stable nominal wage growth, owners of capital are likely to see their share of national income increase in countries with large informal sectors. Interestingly enough, this distributional shift in favor of capital occurs even in the absence of a wage differential between the two sectors.

# A    Appendix

Effects of a change in the formal sector nominal wage

$$\hat{R}_F = \left[1 + \frac{\lambda_I \sigma_{IT}}{\lambda_F \sigma_{FK} \Omega_T}\right] \hat{\hat{W}} \tag{16}$$

$$\hat{R}_I = -\left[\frac{1}{\Omega_T} - 1\right] \hat{\hat{W}} \tag{17}$$

$$\hat{p_F} = \left[1 + \frac{\lambda_I \sigma_{IT} \Omega_K}{\lambda_F \sigma_{FK} \Omega_T}\right] \hat{\hat{W}} \tag{18}$$

$$\hat{R}_F - \hat{p_F} = \left[\frac{\lambda_I \sigma_{IT}(1 - \Omega_K)}{\lambda_F \sigma_{FK} \Omega_T}\right] \hat{\hat{W}} \tag{19}$$

$$\hat{X}_F - \hat{X}_I = \left[\frac{\sigma_{IT}}{\Omega_T}\left(1 + \frac{\lambda_I}{\lambda_F}\right)\right] \hat{\hat{W}} \tag{20}$$

$$\hat{Y}_R - \hat{Y}_W = \left[ \rho_F \frac{\lambda_I \sigma_{IT}}{\lambda_F \Omega_T} - \rho_I \left( 1 + \frac{\sigma_{IT}}{\Omega_T} \right) \right] \hat{\bar{W}} \tag{21}$$

Effects of a change in investment in the informal sector

$$\hat{R}_F = -\frac{\lambda_I}{2\lambda_F \sigma_{FK}} \hat{\bar{T}} \tag{22}$$

$$\hat{R}_I = 0 \tag{23}$$

$$\hat{p}_F = -\frac{\lambda_I \Omega_K}{2\lambda_F \sigma_{FK}} \hat{\bar{T}} \tag{24}$$

$$\hat{R}_F - \hat{p}_F = -\frac{\lambda_I}{2\lambda_F \sigma_{FK}} [1 - \Omega_K] \hat{\bar{T}} \tag{25}$$

$$\hat{X}_F - \hat{X}_I = -\left[ 1 + \frac{\lambda_I}{2\lambda_F} \right] \hat{\bar{T}} \tag{26}$$

$$\hat{Y}_R - \hat{Y}_W = \left\{ -\rho_F \left[ 2(1 - \theta_{FK}) + \frac{\theta_{FK}}{\sigma_{FK}} \right] \frac{\lambda_I}{2\lambda_F} + \rho_I \right\} \hat{\bar{T}} \tag{27}$$

Effects of a change in investment in the formal sector

$$\hat{R}_F = -\frac{1}{2\sigma_{FK}} \hat{\bar{K}} \tag{28}$$

$$\hat{R}_I = 0 \tag{29}$$

$$\hat{p}_F = -\frac{\Omega_K}{2\sigma_{FK}} \hat{\bar{K}} \tag{30}$$

$$\hat{R}_F - \hat{p}_F = -\frac{1}{2\sigma_{FK}} [1 - \Omega_K] \hat{\bar{K}} \tag{31}$$

$$\hat{X}_F - \hat{X}_I = \frac{\hat{\bar{K}}}{2} \tag{32}$$

$$\hat{Y}_R - \hat{Y}_W = \left[ 2 - \frac{1}{\sigma_{FK}} \right] \rho_F \theta_{FK} \frac{\hat{\bar{K}}}{2} \tag{33}$$

Effects of a change in the labor supply

$$\hat{R}_F = \frac{1}{2\lambda_F \sigma_{FK}} \hat{\bar{L}} \tag{34}$$

$$\hat{R}_I = 0 \tag{35}$$

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$$p\hat{}_F = \frac{\Omega_K}{2\lambda_F\sigma_{FK}}\hat{\hat{L}} \tag{36}$$

$$\hat{R}_F - p\hat{}_F = \frac{1}{2\lambda_F\sigma_{FK}}[1 - \Omega_K]\hat{\hat{L}} \tag{37}$$

$$\hat{X}_F - \hat{X}_I = \frac{1}{2\lambda_F}\hat{\hat{L}} \tag{38}$$

$$\hat{Y}_R - \hat{Y}_W = \left\{\rho_F\left[\frac{1}{2\lambda_F} + \frac{\Omega_K}{2\lambda_F\sigma_{FK}} - 1\right] - \rho_I\right\}\hat{\hat{L}} \tag{39}$$

Effects of a change in the price of informal sector output

$$\hat{R}_F = -\frac{\lambda_I\sigma_{IT}}{\lambda_F\sigma_{FK}\Omega_T}\hat{p}_I \tag{40}$$

$$\hat{R}_I = \frac{1}{\Omega_T}\hat{p}_I \tag{41}$$

$$p\hat{}_F = -\frac{\lambda_I\sigma_{IT}\Omega_K}{\lambda_F\sigma_{FK}\Omega_T}\hat{p}_I \tag{42}$$

$$\hat{R}_F - p\hat{}_F = -\frac{\lambda_I\sigma_{IT}}{\lambda_F\sigma_{FK}\Omega_T}[1 - \Omega_K]\hat{p}_I \tag{43}$$

$$\hat{X}_F - \hat{X}_I = -\frac{\sigma_{IT}}{\Omega_T}\left[1 + \frac{\lambda_I}{\lambda_F}\right]\hat{p}_I \tag{44}$$

$$\hat{Y}_R - \hat{Y}_W = \left\{-\rho_F\frac{\lambda_I\sigma_{IT}}{\lambda_F\Omega_T}\left(1 + \frac{\Omega_K}{\sigma_{FK}}\right) + \rho_I\left(1 + \frac{\sigma_{IT}}{\Omega_T}\right)\right\}\hat{\hat{p}}_2 \tag{45}$$

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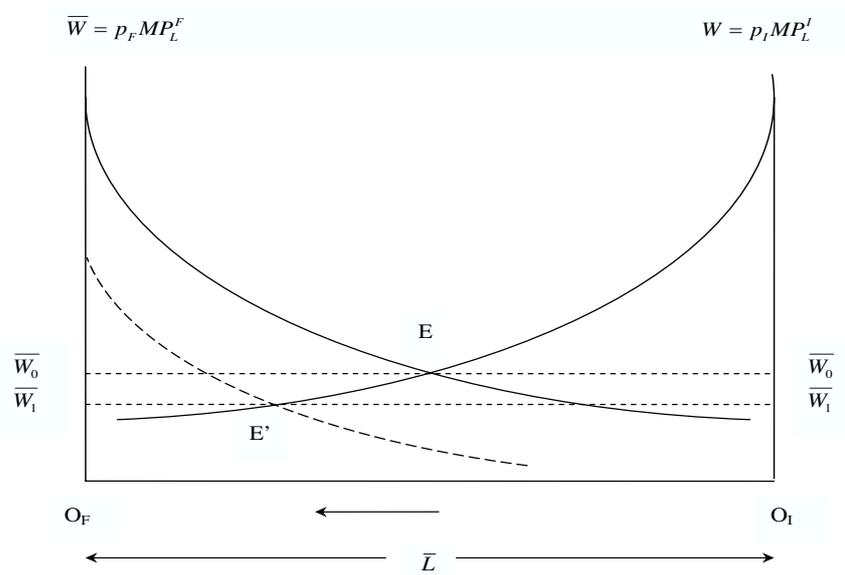
$\overline{W} = p_F MP_L^F$

$W = p_I MP_L^I$

E

$\dfrac{\overline{W}_0}{\overline{W}_1}$

$\dfrac{\overline{W}_0}{\overline{W}_1}$

E'

$O_F$

$O_I$

$\overline{L}$

Figure 1: A decline in the formal sector nominal wage from $\bar{W}_0$ to $\bar{W}_1$ leads to greater informalization of the economy.