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Working Paper No. 423

IS MORE MOBILTY GOOD? FIRM MOBILITY AND THE LOW WAGE–LOW PRODUCTIVITY TRAP

by

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ABSTRACT

This paper explores the possibility that unregulated FDI flows are causally implicated in the decline in labor productivity growth in semi-industrialized economies. These effects are hypothesized to operate through the negative impact of firm mobility on worker bargaining power and thus affecting wages. Downward pressure on wages can reduce the pressure on firms to raise productivity in defense of profits, contributing to a low wage–low productivity trap. This paper presents empirical evidence, based on panel data fixed effects and GMM estimation for 37 semi-industrialized economies, that supports the causal link between increased firm mobility and lower wages, as well as slower productivity growth over the period 1970–2000.

Keywords: Foreign direct investment, productivity, capital mobility.

JEL Classification: F2, F16, O3

I. INTRODUCTION

This paper explores the effect of foreign direct investment (FDI) flows on wages and productivity growth in developing economies. Recent debates have focused on the effects of *inward* FDI on aggregate productivity. Inward FDI are assumed to affect productivity directly—via the introduction of new technologies, skills and best-practice management techniques, as well as frontier capital goods, and indirectly—through spillover effects to domestic firms.

Despite the potential positive effects of inward FDI on productivity, there is evidence of a global productivity growth slowdown, observable since the 1980s in many developing (and developed) economies (Pieper 2000; Singh 2000). Pieper (2000) finds for a set of developing economies, for example, that median labor productivity growth slowed from 1.2 percent annually from the mid-1970s–1984 to 0.2 percent in the period 1985–early 1990s.

Is there a link between FDI flows and the slowdown in productivity growth in developing economies? This paper seeks an answer to that question. In contrast to previous studies that focus on inward FDI, I also consider the possibility of negative effects of increases in *total* FDI, measured as the sum of the absolute value of inward and outward FDI on productivity growth, via the effect of FDI on wages. These linkages can be explained as follows. The growth of total FDI flows serves as an indicator of firm mobility in the context of labor immobility. Firm mobility may read by workers as a credible threat that firms are able relocate in the event of unacceptably strong wage demands on the part of labor. The increase in firm bargaining power, even if not acted on via firm relocation, can lead to slower wage growth. This in turn can reduce pressure on firms to innovate or adopt new technologies, leading to slower productivity growth than in an era of regulated FDI flows. Indeed, firm mobility, by holding down worker bargaining power and wages can make firms "lazy," leading to a low wage-low productivity trap.

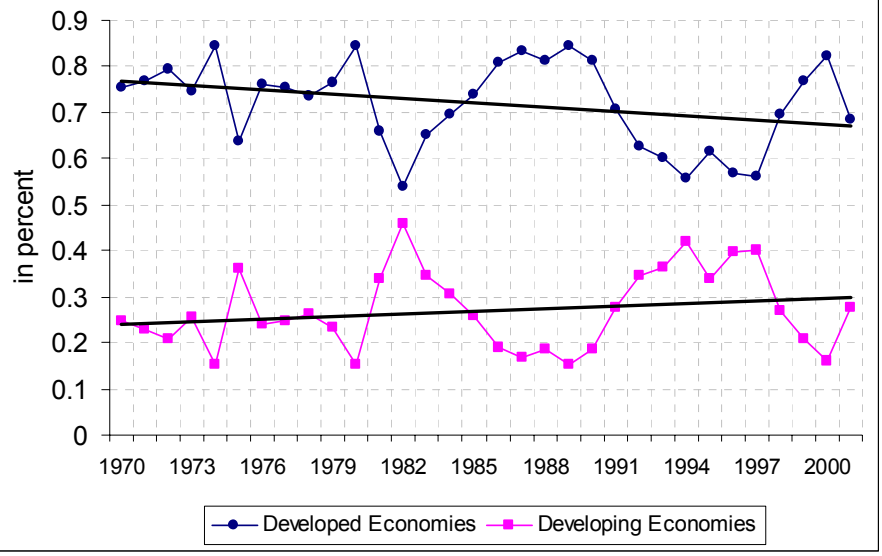
Increased bargaining power can also allow firms to shift to potentially less efficient but more profitable production processes. Evidence of this latter trend is reflected in the growing body of literature that documents the increasing reliance on subcontracting, home working, and contingent labor arrangements as a way to lower labor costs. Although such labor arrangements may permit firms to preserve or enlarge profits, slower labor productivity growth may also result.

A plausible hypothesis then is that increases in firm mobility are associated with negative effects on wage and productivity growth, a proposition this paper empirically investigates for a set of 37 semi-industrialized economies for the period 1970–2000. Using fixed effects and dynamic panel GMM estimation methods, we find evidence consistent with this hypothesis. Other factors less easily captured empirically, however, may play a role as well, such as macroeconomic stabilization policies, liberalization of financial flows, and privatization of previously publicly-owned firms. For that reason, detailed case studies would be a valuable next step for exploring country-specific factors the role of FDI in influencing trends in wage and labor productivity growth.

II. TRENDS IN FIRM MOBILITY

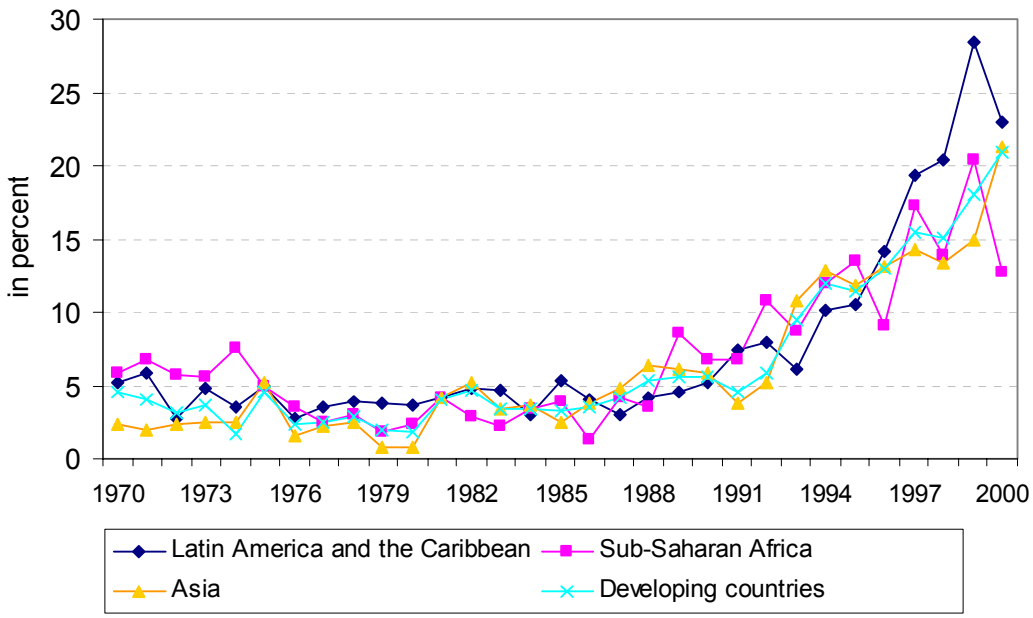
Before tracing the link between FDI, wages, and productivity, it is useful to consider FDI trends by region. Although most FDI flows to developed economies, the share of global inward FDI going to developing economies has seen a secular increase since 1970 (Figure 1). This trend has been variable and, in particular, industrial country recessions lead to abrupt declines in the share going to developing economies with a recovery of that share increasing during economic upturns. Outflows of FDI from developing economies have also increased due to financial market liberalization and the dismantling of the tools of industrial policy, which have made it more feasible for domestic firms, especially in semi-industrialized economies, to shift investment abroad.

Figure 1. Shares of FDI Inflows to Developed and Developing Economies



These trends are suggestive of an increase in firm mobility which can be measured as total FDI—the sum of absolute value of inward and outward FDI. Total FDI (as compared to inward or outward FDI alone) is an indicator of the degree to which firms have an enlarged set of choices for relocation in response to local cost conditions.[1] As a result, this variable, measured as a percentage of gross fixed capital formation, serves as a proxy indicator of capital's threat effect or fallback position in negotiations over wages, employment taxes, and other factors that affect firm profitability. That share in has been rising for most regions of the developing world (Figure 2).

Figure 2: Sum of Inward and Outward FDI as % of Gross Fixed Capital Formation, 1970-2000



III. DEBATES ON THE EFFECTS OF FDI

FDI is often prized as a means to stimulate growth in developing economies. As a result, there has been debate over the determinants of inward FDI as well as the impact of investment liberalization on developing economies. These debates are linked, heated, and as yet, unresolved. Two broad groups emerge in this debate.

One group of observers lauds the relaxation of constraints on corporate investment as a win-win outcome. MNCs profit from higher rates of return on investment that flexibility offers, and receiving countries benefit from employment creation, higher wages that MNCs have been

documented to pay, and productivity growth. Vehicles by which FDI promotes productivity growth include technology transfer, embodied in imported inputs or sold directly through licensing agreements, and skills and managerial diffusion as MNC employees migrate to domestic firms. Spillover effects on domestic firm productivity and economic growth are expected to be positive and significant, and there is evidence to support this view (Blomstrőm and Persson 1983; Chuang and Lin 1999; Zhu and Lu 1998). These arguments provide a tantalizing rationale for deregulation of FDI flows, given the evaporation of foreign aid and the instability of portfolio investment. On the basis of these arguments, countries have been enticed to grant liberal tax concessions and to make significant infrastructure investments to attract foreign capital.

Benefits may be limited, however, if foreign firms "crowd out" domestic firms, and if MNCs do not adopt frontier technology. Several studies cast doubt on the spillover effect argument, finding little evidence of domestic firm productivity growth as a result of inward FDI (Aitken and Harrison, 1999; Haddad and Harrison 1993; Braunstein and Epstein 2002). Aitken and Harrison (1999), in a micro-level study of Venezuelan firms provide evidence, for example, that domestic firms in sectors with more foreign ownership are less productive than firms in sectors with a smaller foreign presence.

Some macro-level studies that consider long-run trends in productivity growth also contradict the optimism about the benefits of unregulated FDI (Singh and Zammit 1995). Consistent with this view, Pieper (2000) finds cross-country evidence that labor productivity growth has slowed for a set of middle income developing economies from the mid-1970s to the early 1990s. Pieper notes that the slowdown in manufacturing productivity growth is of particular concern, given its role as a leading sector or engine of growth in the development process.

A second school of thought argues that increased FDI flows result in an augmentation of corporate power, and can contribute to downward pressure on wages as well as greater wage inequality in both developed and developing economies (Crotty, Epstein, and Kelly 1998). Blecker (1997) develops a series of heterodox (Kaleckian) models to investigate the implications of increased firm mobility. A distinct feature of these models is that workers' wages can be affected by firms' threat to relocate, even if they do not move.

In one of the earlier studies on threat effects, Brofenbrenner (1997) provides evidence that unionization efforts in the U.S. have faltered in the face of threats from U.S. firms to relocate to

Mexico, after the signing of NAFTA. The threat effect was found to be significantly higher in "mobile" industries such as communications and labor-intensive manufacturing industries with easy entry and exit (e.g., garments, food processing). Further, in only 3 percent of cases did firms actually follow through on their threat effect after a union election—suggesting that simply the expansion of corporate power through investment liberalization is sufficient to hold down wages.

Several more recent empirical studies of developed economies also find evidence of a negative effect of firm mobility on wages (Choi 2001, 2003; Gopinath and Chen 2003; Harrison and McMillan 2004). For Latin America, Paus and Robinson (1998) find evidence that inward FDI had a positive effect on wages only for the period 1968-87, and not thereafter. While the study refers only to inward FDI, it does suggest that there may be a threshold for the effect of firm mobility on bargaining power to register negative effects on wage growth.

Evidence that this kind of threat (real or actualized) has held down wages is also found in the case of Taiwan's female-dominated manufacturing industries in the 1980s and 1990s. There, liberalized FDI flows in the early 1980s led to an increase in the share of total FDI in investment, with econometric evidence pointing to the negative effect of total FDI on female wages, contributing to a widening gender wage gap. Conversely, in South Korea, where FDI flows continued to be restricted, female wages rose faster than men's and the gender wage gap narrowed (Seguino 2000).

Rodrik (1997) posits that the result of increased firm mobility is a flattened labor demand curve since firms have more "substitutes" to domestic labor. Because the labor supply curve has not become correspondingly steeper (workers do not have similarly expanded employment options), bargaining power has shifted in favor of firms, particularly those in mobile industries.

III. THE LINK BETWEEN FDI, FIRM MOBILITY CAPITAL, AND PRODUCTIVITY

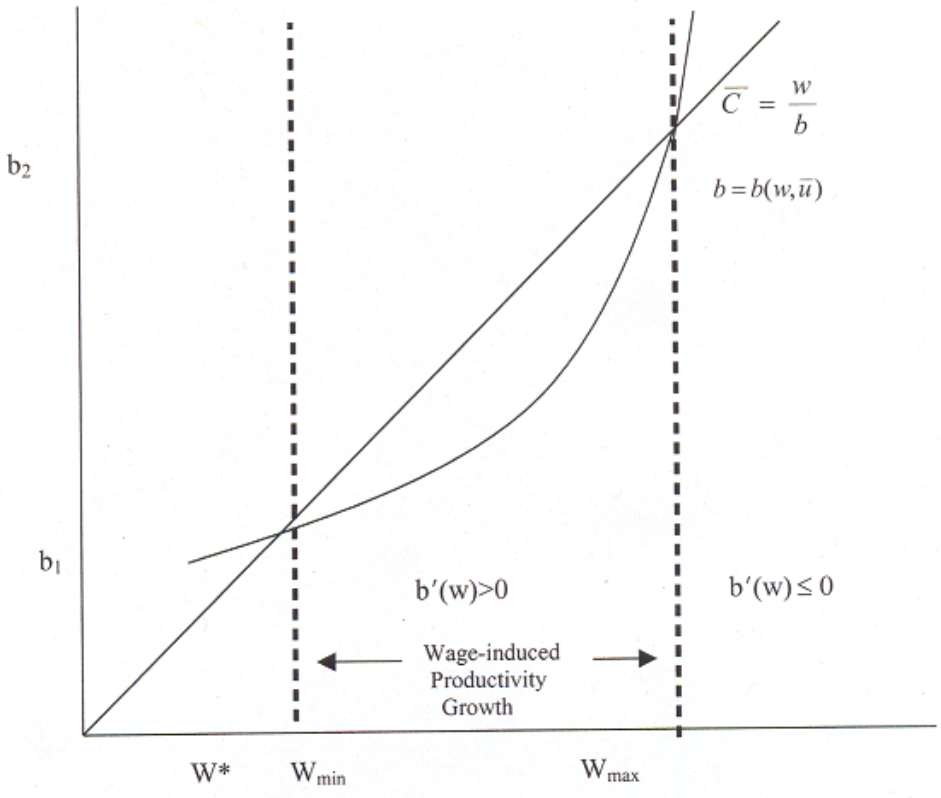
Debates about the effects of FDI on wages and productivity growth in developing economies have rarely intersected although they are plausibly linked.[2] A potential problem is increased bargaining power may lead firms to shift to a cost-cutting strategy that emphasizes lower wages rather than technology investments. Downward pressure on wages then can lead to slower productivity growth. This argument implies that, within some range, an increase in wages can have a beneficial effect on productivity growth since it induces firms to adopt new technologies

that save on labor and thus raise profits. Conversely, downward pressure on wages may slow the rate of productivity growth.

The positive effect of wages on productivity growth may have technological limits. Firms that reach the technology frontier, for example, may find themselves unable to respond to higher wages by adopting new technologies, production processes, or organization that raise labor productivity. At that juncture, higher wages translate into permanent increases in unit labor costs, resulting in higher prices and a decline in demand and employment. To stimulate productivity growth then, wages must be neither too high nor too low, staying within a band in which it is feasible for firms to respond by raising productivity.

Figure 3 portrays this relationship, where *b* is labor productivity and *w* is the nominal wage. *w** is a subsistence wage below which wages cannot biologically fall for sustained periods of time. Wages within the range between the vertical thick dotted lines ($W_{MIN} \rightarrow W_{MAX}$) have a positive effect on productivity growth via the stimulus for firms to innovate in order to restore profitability. The ray along the origin denotes constant unit labor costs ($\overline{C}$).

Figure 3.- Wage Band: Wage-Induced Productivity Growth



The notion that higher wages stimulate productivity growth is an old one. This wage-push dynamic reflects the technologically progressive character of capitalism that Marx referred to—the drive for profits forces firms toward the technology frontier. Switching to a more technology-intensive production process induces a decline in labor costs as labor productivity rises—that is, unit labor costs fall. The reward for investment is higher profits per unit of goods sold. Marx did not discuss the conditions under which firms might choose this response over others (say, relocating to a lower wage site or simply discontinuing production). Investment is, after all, risky and profit realization more uncertain under some conditions than others. For example, it is more likely that investments that rely on adoption of a new technology a will be undertaken when product demand is relatively stable, and by firms in countries that are not yet at the technology frontier. Even if technology limits have been reached, other types of investments are imaginable—in worker skills and in process innovation that depends on improved organization, with "just in time" processes an example. This suggests that the relationship between labor productivity and wages is positive over some relevant range of wages and, depending on the industry, may be linear, logarithmic, or strictly concave.

Seguino (1999–2000) provides empirical evidence of a positive relationship between wages, investment, and productivity growth for South Korea in the period 1975-95. Wages provided a stimulus to invest, facilitated by restrictions on foreign direct investment as well as the state's ability to discipline capital through its control over loanable funds. Firm access to subsidized credit and tax reductions was contingent on meeting export and investment targets. Achievement of those goals was constrained, however, by state guidelines that permitted wages to rise. Firms responded to wage hikes by adopting technological upgrades. This served to keep prices low so as to remain competitive in export markets and gain access to tax incentives and subsidies, while the social benefit of this industrial strategy was rapid productivity growth. To see this, the price equation for manufacturing goods can be written:

$$P = (1+\tau)w\lambda$$

where P is price, τ is the mark-up over unit costs, λ is the labor coefficient (the inverse of labor productivity). Higher wages can either push firms to raise P or, as happened in South Korea, profits will be squeezed (τ falls) if firms are to meet export targets. Alternatively, to overcome the profit squeeze while maintaining market share (P is constant), firms can invest in order to lower λ. In this case, wages lead rather than lag productivity growth.

Marquetti (2004), using cointegration and Granger causality tests, finds evidence that causality runs from wages to labor productivity for the U.S. over the period 1869–1996, and for a set of 38 countries in the period 1965–90. He argues that these results corroborate the conception that increases in real wages drive profit-seeking capitalists to raise labor productivity as their main weapon to defend their profitability. Focusing on the effects of wage inequality, Rogers and Vernon (2002) determine that inequality in the bottom half of the wage distribution has a detrimental effect on productivity performance, perhaps because this provides weak incentives for firms to reorganize production when low wages are possible.

If then industries are operating within the feasible range for technology or process improvements, pressures that slow wage growth can also attenuate productivity growth. The growth of corporate bargaining power, insofar as it has a negative effect on wages, can be expected to slow capital's efforts to raise productivity since the pressure to evade a profit squeeze is attenuated.

Another channel through which mobility can slow wage and productivity growth is through firm fragmentation or "disintegration." This refers to a production strategy designed to reduce costs through downsizing and outsourcing as firms externalize what were once internal components of the production process, evident especially in labor-intensive manufacturing and communication industries (Arndt and Kierzkowski 2001; Balakrishnan, 2002; Sayeed and Balakrishnan 2002).[3] Feenstra (1998) notes though that outsourcing even of intermediate goods is increasing.

Globalization may contribute to this trend insofar as financial liberalization reduces a firm's time horizon, leading to emphasis of short-term as opposed to long-term profits. Under such conditions, shifting production to more vulnerable segments of the workforce with lower labor productivity could be preferable to making more long-term technology-intensive investments. This might especially be true if firms believe that available technological upgrades will reduce their mobility and thus bargaining power.[4]

Subcontracting frequently implies a shift to informal labor arrangements with workers employed on a temporary basis by small peripheral firms, sometimes as industrial home workers.[5] Subcontracted workers employed in small establishments are not covered by labor regulations such as rules on minimum wages, benefits, or safety standards. The result is that flexible workers have less bargaining power, and thus lower wages and fewer benefits than formal sector workers.[6]

The trend toward informalization is pronounced in manufacturing industries in low and middle-income countries. In Latin America, for example, the fastest growing part of the labor force is informal or temporary and part-time work, and it now represents 47.9 percent of work in urban areas (cited in Benería 2002). Charmes (2000) notes that informal sector work as a percentage of non-agricultural work is increasing in all regions of the developing world and is even higher in Asia and Sub-Saharan Africa (63.0 percent and 74.8 percent respectively in 1999) than Latin America. A notable phenomenon has been the increase of subcontracting in a number of Asian economies in the post-crisis period. Although there was evidence of the shift to informal employment even before the Asian crisis (Ghosh 2001), many large employers in labor-intensive industries have subsequently laid off workers and contracted out work to small subcontracting firms as a cost-cutting measure in the post-crisis period (Balakrishnan 2002).

On net, this strategy can lead to lower labor costs since the larger firms are relieved of wage payments during periods of slack demand. Moreover, as Sayeed and Balakrishnan (2002) point out, outsourcing allows firms to externalize part of their capital and operational costs. Monitoring is carried out by the smaller firms or subcontractors, which may themselves subcontract portions of production to home workers who are paid a piece rate and thus self-monitor.

These trends may be linked to the growth of firm mobility. Increased corporate bargaining power has contributed to a gradual process of deregulation of labor markets, a contraction of the welfare state, and a decline in union strength that undermine worker bargaining power. These conditions allow firms to reduce reliance on full-time year-round workers with benefits and shift production outside the firm to smaller units that rely on flexible labor with cheap wages and low-cost monitoring due to reliance on a piece rate system. Further, capital mobility, which is a reflection of a cross-border production strategy, can be a factor in the tendency toward firm disintegration since it puts not only workers but also firms in competition with low-cost producers from other countries, pushing firms to outsource as a production method.[7]

Outsourcing and subcontracting also allow firms or dominant players in buyer-driven global commodity chains to circumvent the regulatory environment. Heintz (2003: 11) argues that the global commodity chain reflects a flexibility in sourcing decisions that "mimics the effect of capital mobility, by limiting the scope for subcontractors to raise production costs without triggering a loss of economic activity." Firm mobility can thus be a proxy for the expansion of the global commodity chain which sets up a highly competitive environment in

which competition among producers in developing countries compete to keep unit labor costs low. The tenuousness of contracts, short production runs, as well as thin profit margins to those low on the commodity chain lead small firms to compete on the basis of low wages rather than productivity-enhancing investments.

Subcontracting firms are likely to rely on informalization as a way to lower labor costs if investments in new technologies are destined to soon become obsolete, if macroeconomic conditions and in particular product demand conditions are uncertain, if styles change frequently (and thus production is characterized by small batch runs). Each of these contributes to the uncertainty that a firm may not realize the full benefits of its investment before the equipment becomes obsolete, thus slowing the adoption of new technologies that raise productivity. Further, increased reliance on informal work arrangements has led to negative effects on skills, workers' commitment to employers, and increased job turnover (Cappelli 1999).

À la Marglin (1974), while profitable, this corporate strategy may not be efficient. Capital mobility empowers firms to cut a new deal with workers that cuts costs by lowering wages and reducing overhead and monitoring costs. As long as these costs fall more than productivity, unit labor costs decrease, making this a profit-maximizing strategy by firms. In this scenario, capital mobility can be seen as leading to a trap—capital mobility holds down wage growth, reducing the pressure on firms to raise productivity and, as a result, productivity growth stagnates.

IV. THE TRAP: MOBILITY-REPRESSED PRODUCTIVITY GROWTH

We can think of firm mobility as a bargaining power variable, one that, when increased, leads to a decline in wage and therefore productivity growth. The decline in productivity occurs either because firms face less pressure to make productivity-enhancing investments or because deregulation of FDI allows firms to adopt a strategy to lower wage costs by outsourcing. Firm disintegration can lower productivity because production occurs in smaller units with fewer resources to upgrade.

To consider this dynamic more formally, we develop here the framework for estimating the effect of firm mobility on wages and then on productivity growth. Changes in wages may be the result of supply or demand shifts, as well as structural factors that influence employer bargaining power. Conventional labor demand and supply curves provide the framework for

deriving a wage determination equation. Writing a labor demand function in first differences yields:

$$dN = -adW + dD \tag{1}$$

where N and W are employment and wages respectively measured in natural logarithms, D is a vector of exogenous variables that shift demand for labor, d is the difference operator, and α is the elasticity of labor demand. Similarly, labor supply is

$$dN = edW + dS \tag{2}$$

where S is vector of exogenous variables that shift labor supply, and e is the elasticity of labor supply with respect to wages. Solving these equations simultaneously for dW yields:

$$dW = \frac{(dD - dS)}{a + e} \tag{3}$$

Incorporating the role that bargaining power plays in wage determination, a reduced form expression for wage determination is:

$$dW = (dD, dS, \zeta) \tag{3'}$$

where ζ represents employer bargaining power, such as firm mobility.

Productivity growth can be specified as a Kaldorian technical progress function where manufacturing labor productivity growth is a positive function of the rate of growth of capital insofar as it embodies new technology.[8] Following Verdoorn's Law, we also posit a close positive relationship between growth of manufacturing productivity and output, capturing the effect of economies of scale and capacity utilization on productivity. Productivity growth then can be expressed as:

$$\hat{b} = \phi_o + \phi_1 g + \phi_3 u \tag{4}$$

where $\hat{b}$ is the growth rate of labor productivity, ϕ_o is autonomous technical progress, g is the growth rate of the capital stock (K), and u the growth rate of output. Independent variables exert a positive effect on productivity growth.

The growth rate of the capital stock can be specified, following the previous discussion, as an increasing function of wages and output growth (the accelerator effect):

$$I / K = g = g_o + g_1 W + g_2 u \tag{5}$$

where $I = dK/K$, and g_0 is animal spirits, that is, exogenous factors influencing the growth of the capital stock.

Productivity growth then is a function of wages and output, via the effect on the rate of growth of the capital stock, and output growth also has an independent effect on productivity growth through scale and capacity utilization effects:

$$\hat{b} = \phi_o + \phi_1 g(W,u) + \phi_2 u \qquad (4')$$

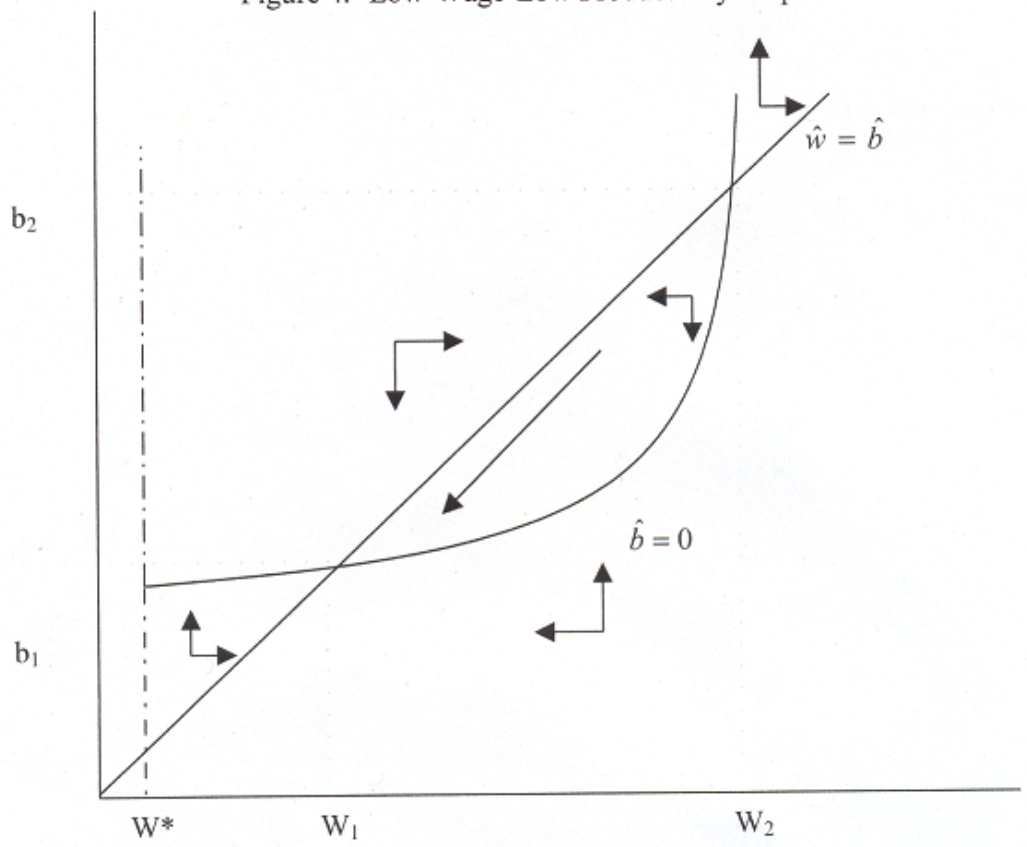
and from (3) and (4), $\hat{b}'(W(\zeta,u)) > 0$ and $\hat{b}''(W(\zeta,u)) < 0$.[9]

We can use this information to graphically depict the low-wage low-productivity trap, shown in Figure 4. Productivity growth rises with wages, holding *u* constant. This is a non-linear function, indicating that while higher wages can stimulate investment that raises productivity, technology gains may at some point be exhausted, at which juncture higher wages have a smaller and eventually (though not shown here) negative effect on investment and thus productivity growth. This non-linearity gives rise to multiple equilibria as is shown by plotting unit labor costs, defined as $C = \left(\frac{W}{b}\right)$, in *b x W* space, based on an expression for the growth of unit labor costs:[10]

$$\hat{C} = \hat{W} - \hat{b} \qquad (6)$$

where $\hat{C}$ is the growth rate of unit labor costs, which depends positively on the growth rate of wages and negatively on the growth rate of labor productivity. This relationship is reflected in the ray from the origin along which wage and productivity growth are equal, and thus unit labor costs are constant.

Figure 4.- Low-Wage-Low Productivity Trap



As in Figure 3, the point *W** reflects a subsistence wage below which wages cannot biologically fall, (or, alternatively, it may reflect the mandatory minimum wage). Note that the two equilibria reflect identical unit labor costs. The phase paths indicate that the equilibrium at the higher level of wages and productivity is a saddle point.[11]

Starting from that point, any downward pressure on wages (due to, say, pressures of globalization to reduce wages or make jobs more flexible) will result in a new equilibrium at a lower level of wages and productivity, which is stable node. Once wages and productivity have fallen to the lower level, there are no endogenous forces that could move them back to their higher level. That is, unless there is an exogenous shift in some variable that would raise wages from W_1 to W_2, wages do not rise and there is thus no pressure on firms to innovate.

V. DOES MOBILITY AFFECT WAGES? EMPIRICAL SPECIFICATION AND DATA

As the preceding analysis implies, factors that reduce worker bargaining power vis-à-vis capitalists can lower wages and, as a consequence, slow productivity growth. I explore these relationships by testing the hypothesis of a negative effect of capital mobility on wages in this section, followed by a test of the effect of firm mobility on manufacturing labor productivity growth in Section VI. Analyses rely on panel data for 37 semi-industrialized economies (see Table A.1 in the appendix for the country sample and Table A.2 for the variable names, abbreviations, and sources) for the period 1970–2000. Such countries should have ample room to react to wage increases by adopting new technologies but are also increasingly exposed to the downward pressure on wages of increasing firm mobility. Should mobility have a negative effect on wages and productivity, it is likely to be more pronounced in labor-intensive industries where wage costs are a larger share of total costs. I test this hypothesis by comparing the effect of firm mobility on sectoral (manufacturing) productivity to its effect on several important labor-intensive industries—wearing apparel, footwear, leather and electrical machinery.[12]

Empirical Specification: Firm Mobility and Wages

Based on equation (3'), the following empirical wage model is estimated

$$d\ln W_{it} = \gamma_o + \gamma_1 dP_{it} + \gamma_2 d\ln LF_{it} + \gamma_3 GDPD_{it} + \gamma_4 dSED_{it} + \gamma_5 FDI_{it} + \upsilon_{it}. \qquad (7)$$

where $dlnW_{it}$ is the change in log average wages paid in country i at time t. dP is the rate of inflation; LF is labor force; and $GDPD$ is the logarithmic deviation of GDP from trend (to capture shifts in labor demand and unemployment),[13] SED is the proportion of the population with a secondary education (to capture changes in worker productivity), and FDI is foreign direct investment as a share of gross fixed capital formation, measured alternatively as total FDI and disaggregated into inward and outward FDI. The error term υ_{it} has three components:

$$\upsilon_{it} = \mu_i + \psi_t + \varepsilon_{it},$$

respectively, country-specific and time effects and a normally distributed error term.

To account for the country and time specific effects in the error term, equation (7) is estimated as a fixed effects model with a time trend. Estimation of this equation raises some econometric problems. For example, wage growth can contribute to deviations in GDP from its

long-run trend and thus GDPD may be endogenous. One solution is to use a generalized method of moments (GMM) estimator, proposed by Arellano and Bond (1991) in which lagged levels of the dependent variable and lagged independent variables are employed as instruments. Inclusion of the lagged dependent variable is beneficial since it can control to a large extent for omitted variables. Dynamic panel estimators, however, raise concerns especially for small samples (Kiviet 1995). Given this, the results reported below are for both techniques to test for robustness of the findings.

Data

Wages are calculated from UNIDO's Industrial Statistics Database which gives data on total wages and employees by 3-digit ISIC industry. The data are thus annual average worker earnings. This represents a weakness in the data since hours of work are not accounted for with the result that wages per hour may differ from annual earnings. The data for size of the labor force, female share of the labor force, prices, and GDP are largely self-explanatory. No data on percentage of the population with a secondary education exist solely for the manufacturing sector, hence the average share of population 15 and over with a secondary education is used.[14]

Firm mobility is measured as total FDI (or inward and outward FDI), using UNCTAD's database.[15] It is useful to be clear about what this variable does and does not measure. For purposes of data categorization, FDI is defined as the increase in the equity position of a foreign firm that holds more than 10 percent of the shares of a host country firm. There are several important measurement concerns with these data. The first is that FDI data lump together mergers and acquisitions (M&A) and "greenfield" investment. Thus, FDI may represent either purchase of an existing company (mergers and acquisitions) or greenfield investment (new factory.) While mergers and acquisitions represent a transfer of existing assets, greenfield FDI involves making new capital assets available to the host country firm. There has been a surge in M&A, especially in the late 1990s, much of which has gone to purchase public enterprises in the case of Latin America. If FDI data are used to capture the effect of new investments, results may be ambiguous due to the "noise" created by the inclusion of M&A. However, this may not pose a problem for this study since increases in M&A, almost always publicly announced and reflecting increased foreign control of domestic firms, can affect workers' perceptions of their bargaining power.

Of greater concern is the possible mismeasurement of FDI in countries that are tax havens—that is, countries that offer an environment conducive to individuals and corporations seeking to hide their assets and business activities from government authorities of their home countries. Taking this into account, to test for robustness, regressions are run on the full sample and for a reduced sample of countries which excludes those identified by the OECD (2000) as tax havens—Barbados, Cyprus, Jamaica, and Mauritius.[16]

A word of caution about cross-country data analyses is in order. As anyone who has worked with cross-country data knows (particularly for developing countries where resources for data collection are constrained), at best the empirical results are suggestive. Heavy reliance on the size of coefficients is ill-advised. However, panel data analysis where presumably data collection methodologies are consistent over time within countries can be informative, especially if the results are robust to alternative specification and estimation methods.

Econometric Results from Wage Regressions

The results from the fixed effects (FE)[17] and GMM models are presented in Table 1 for the manufacturing sector, and in Tables 2 and 3 for four 3-digit manufacturing sub-sectors. The dependent variable is nominal wage growth. Regression results are reported with capital mobility measured as total FDI, and then disaggregated into inward and outward FDI. The generalized method of moments (GMM) estimator proposed by Arellano and Bond (1991) is used, where lagged levels of the dependent variable and lags of the independent variables are used as instruments for the equation in first differences. Lagged values (*t-2*) are used as instruments for the deviations from GDP trend growth, which is assumed to be endogenous, are also used.

In the manufacturing sector as a whole (Table 1), equations 1-4 give the results from the full sample. The effect of log deviations of GDP from its trend on nominal wage growth is not significant. Increases in the share of the population with secondary education do not have a significant effect on wage growth except in GMM estimations for the full sample, and here the sign is unexpectedly negative. This is not surprising and reflects the difficulty noted in the literature of establishing a consistent significant positive effect of education on macroeconomic outcomes. Also, if other factors not captured in the model lower worker bargaining power, improvement in education may not translate into higher wages. Inflation has a positive and significant effect on wage growth in all cases. Labor force growth exerts a negative effect on

wages, indicating that expansion of the labor pool held down wage growth. The coefficient is significant only in the case of the GMM regressions.

The coefficients on total FDI are negative and significant in all regressions, but the size of the coefficient is twice as large in the GMM model as in the FE model. Disaggregating total FDI into inward and outward FDI shows that each has a significant negative effect on wage growth, but the size of the effect of outward FDI is larger than inward FDI. Wald χ^2 tests on the sum of the FDI coefficients are significant at 1 percent level in all regressions (the null hypothesis that the sum of the coefficients is equal to zero is rejected). Further, again we see that the coefficients on the FDI variables are larger in the GMM estimations.

The larger coefficient on outward FDI is to be expected if workers interpret the outflow of investment as a threat to the security of employment and therefore attenuate wage demands (although we will see that in other regressions, inward FDI has a stronger negative effect on wages in sub-industries). The fact that both inward and outward FDI are statistically significant suggests they exert independent effects on wages. The positive coefficient on the lagged dependent variable is in line with other empirical studies of dynamic wage equations.

Equations 5-8 give the results for the reduced sample. The estimated coefficients on FDI are similar in size and significance to those in the full sample, suggesting that the results in equation 1-4 are not driven by inclusion of tax havens in the sample. Coefficients on remaining independent variables are also quite similar to the full sample results.

To consider the possibility that the results are being driven by omitted variables correlated with wage growth, the regressions in Table 1 were re-estimated adding female share of the labor force as an explanatory variable. An argument for inclusion of this variable is that female workers have less bargaining power than men, and their increased participation in paid labor can depress wage growth. In most cases (results not reported here), the coefficient on this variable is negative but insignificant. Its inclusion does not substantively alter the sign or size of the FDI variables.

Table 1: Fixed Effects and GMM Regression Results on Determinants of Wage Growth

Dependent Variable: Nominal Wage Growth in Manufacturing Sector

	FULL SAMPLE				REDUCED SAMPLE			
	Fixed Effects		GMM		Fixed Effects		GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log deviations GDP growth	0.033	0.045	-0.041	-0.273	0.038	0.050	-0.055	-0.036
	(0.48)	(0.68)	(0.18)	(0.12)	(0.59)	(0.80)	(0.23)	(0.15)
Total FDI as	-0.063		-0.145		-0.077		-0.159	
	(2.52)***		(2.67)***		(2.69)***		(2.95)***	
Inward FDI		-0.041		-0.083		-0.063		-0.096
		(1.51)		(1.91)*		(2.31)**		(2.13)**
Outward FDI		-0.150		-0.212		-0.159		-0.217
		(3.83)***		(3.21)***		(3.98)***		(3.28)***
Secondary Education	-0.487	0.471	-1.032	-1.003	0.093	0.094	-0.107	-0.065
	(1.14)	(1.13)	(1.86)*	(1.79)*	(0.82)	(0.89)	(0.19)	(0.12)
GDP Deflator	0.028	0.028	0.026	0.026	0.027	0.027	0.026	0.026
	(2.88)***	(2.88)***	(2.43)**	(2.40)**	(2.91)***	(2.91)***	(2.42)***	(2.39)***
Labor force growth	-1.191	-1.256	-1.999	-2.013	-1.423	-1.471	-2.037	-2.059
	(1.12)	(1.17)	(2.62)***	(2.65)***	(1.34)	(1.37)	(2.60)***	(2.61)***
Wage growth$_{t-1}$			0.461	0.469			0.461	0.469
			(4.83)***	(4.86)***			(4.87)***	(4.90)***
Σ of inward and outward FDI		-0.191		0.295		-0.222		-0.313
Wald χ^2 on In and Out FDI		17.29		12.72		21.49		13.40
		(p<0.000)		(p<0.001)		(p<0.000)		(p<0.000)
Observations	673	685	637	645	591	603	560	568
Number of Countries	33	33	33	33	29	29	29	29
R-squared	0.604	0.607			0.661	0.669		

Notes: Absolute value of t statistics in parentheses. * significance at 10% level; ** significance at 5% level; *** significance at 1% level. FE columns report robust standard errors. The Sargan test of over-identifying restrictions indicates that the GMM instruments are valid; the null hypothesis of no serial correlation in the errors is not rejected. Equations 3-4 and 5-8 treat deviations of GDP from trend as endogenous.

Table 2 gives results from the full sample for four labor-intensive manufacturing industries. Firms in these industries are likely to be more mobile than firms in more capital-intensive industries due to fewer sunk costs and firm investments in training. As a result, the threat effect may be larger in such industries. It is empirically challenging to detect these effects, however, because FDI data are not available at the 3-digit industry level.

Nevertheless, the results indicate that FDI exerts a negative effect in three of these sub-sectors—wearing apparel, footwear, and leather—but there is no discernible effect in the electrical machinery industry, except of outward FDI in the FE model. The strongest negative effects are in the wearing apparel industry, where the coefficient on total and disaggregated FDI is significantly negative and comparable in size to those in the manufacturing sector as a whole. The results from the reduced sample (Table 3) indicate that the negative effect of firm mobility on wages in wearing apparel are also apparent to varying extents in footwear, leather, and electrical machinery.

Table 2: Full Sample Fixed Effects and GMM Regression Results on Determinants of Wage Growth in Labor-Intensive Manufacturing Sub-Sectors

Dependent Variable: Nominal Wage Growth

	WEARING APPAREL				FOOTWEAR			
	Fixed Effects		GMM		Fixed Effects		GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log deviations GDP growth	0.044	0.055	-0.058	-0.058	0.059	0.060	-0.095	-0.058
	(0.65)	(0.82)	(0.34)	(0.34)	(0.65)	(0.69)	(0.51)	(0.33)
Total FDI	-0.064		-0.120		-0.037		-0.113	
	(2.52)***		(2.14)**		(1.13)		(2.21)**	
Inward FDI		-0.041		-0.062		-0.060		-0.027
		(1.53)		(1.42)		(0.16)		(0.46)
Outward FDI		-0.152		-0.225		-0.095		-0.082
		(3.82)***		(3.41)***		(1.45)		(0.96)
Secondary education	-0.472	-0.458	-1.030	-0.993	-0.176	-0.220	-0.477	-0.562
	(1.09)	(1.08)	(1.83)*	(1.73)*	(0.45)	(0.52)	(1.13)	(1.29)
GDP Deflator	0.032	0.032	0.029	0.029	0.042	0.042	0.030	0.029
	(2.55)***	(2.56)***	(2.66)***	(2.62)***	(2.68)***	(2.69)***	(2.76)***	(2.72)***
Labor force growth	-1.044	-1.104	-2.137	-2.138	0.527	0.585	-1.831	-1.827
	(0.98)	(1.03)	(2.42)***	(2.43)***	(0.63)	(0.71)	(1.32)	(1.38)
Wage growth$_{t-1}$			0.444	0.453			0.251	0.249
			(5.76)***	(5.81)***			(2.05)**	(2.02)**
Σ of inward and outward FDI		-0.193		0.297		-0.155		-0.109
Wald χ^2 on In and Out FDI		17.41		11.21		1.63		0.76
		(p<0.000)		(p<0.001)		(p<0.202)		(p<0.392)
Observations	653	665	616	624	638	651	602	611
Number of Countries	33	33	33	33	32	32	32	32
R-squared	0.606	0.607			0.349	0.352		

Notes: Absolute value of t -statistics in parentheses. * significance at 10% level; ** significance at 5% level; *** significance at 1% level. FE columns report robust standard errors. The Sargan test of over-identifying restrictions indicates that the GMM instruments are valid; the null hypothesis of no serial correlation in the errors is not rejected. GMM estimations treat deviations of GDP from trend as endogenous.

Table 2: Full Sample Fixed Effects and GMM Regression Results on Determinants of Wage Growth in Labor-Intensive Manufacturing Sub-Sectors (continued)
Dependent Variable: Nominal Wage Growth

	LEATHER				ELECTRICAL MACHINERY			
	Fixed Effects		GMM		Fixed Effects		GMM	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Log deviations GDP growth	0.147	0.165	0.195	0.222	0.068	0.088	-0.095	-0.084
	(1.64)*	(1.91)*	(1.31)	(1.54)	(0.89)	(1.16)	(0.46)	(0.42)
Total FDI	-0.026		-0.048		-0.017		0.001	
	(1.26)		(1.24)		(0.26)		(0.11)	
Inward FDI		-0.016		-0.028		0.001		-0.037
		(0.91)		(0.83)		(0.03)		(0.83)
Outward FDI		-0.045		-0.105		-0.109		-0.072
		(1.34)		(2.07)**		(1.01)		(0.72)
Secondary Education	0.127	0.108	-0.918	-0.855	0.699	0.703	-0.202	-0.198
	(0.30)	(0.26)	(1.19)	(1.09)	(1.57)	(1.63)*	(0.42)	(0.41)
GDP Deflator	0.035	0.036	0.019	0.019	0.046	-0.046	0.032	0.033
	(2.64)***	(2.65)***	(2.39)**	(2.38)**	(3.75)***	(3.75)***	(6.21)***	(6.19)***
Labor force growth	1.030	1.015	-0.646	-0.688	1.380	1.351	-1.204	-1.249
	(2.11)**	(2.06)**	(0.84)	(0.91)	(1.53)	(1.51)	(1.23)	(1.27)
Wage growth$_{t-1}$			0.377	0.378			0.235	0.233
			(5.36)***	(5.37)***			(3.42)***	(3.42)***
Σ of inward and outward FDI		-0.061		-0.134		-0.110		-0.109
Wald χ^2 on In and Out FDI		3.40		6.91		0.75		1.09
		(p<0.067)		(p<0.008)		(p<0.386)		(p<0.296)
Observations	663	676	625	634	628	637	595	602
Number of Countries	33	33	33	33	31	31	31	31
R-squared	0.537	0.536			0.428	0.431		

Table 3: Reduced Sample Fixed Effects and GMM Regression Results on Determinants of Wage Growth in Labor-Intensive Manufacturing Sub-Sectors
Dependent Variable: Nominal Wage Growth

	WEARING APPAREL				FOOTWEAR			
	Fixed Effects		GMM		Fixed Effects		GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log deviations GDP growth	0.050	0.060	-0.068	-0.063	0.056	0.064	0.594	0.668
	(0.76)	(0.95)	(0.38)	(0.35)	(0.093)	(0.68)	(0.91)	(1.06)
Total FDI	-0.078		-0.136		-0.049		-0.132	
	(2.73)***		(2.27)**		(1.42)		(2.63)***	
Inward FDI		-0.063		-0.072		-0.126		-0.065
		(2.34)**		(1.601)		(1.791)*		(0.98)
Outward FDI		-0.016		-0.231		0.207		-0.186
		(3.93)***		(3.53)***		(01.74)*		(1.97)**
Secondary Education	0.117	0.118	0.119	0.186	-0.069	0.025	-0.365	-0.574
	(0.96)	(1.04)	(0.20)	(0.33)	(0.37)	(0.66)	(0.77)	(1.11)
GDP Deflator	0.030	0.031	0.029	0.029	0.040	-0.040	0.029	0.029
	(2.95)***	(2.59**	(2.65)**	(2.61)***	(2.64)***	(2.64)***	(2.67)***	(2.65)***
Labor force growth	-1.293	-1.338	-2.175	-2.185	0.635	0.651	-1.202	-1.371
	(1.20)	(1.24)	(2.41)**	(2.42)**	(0.74)	(0.81)	(0.82)	(0.93)
Wage growth$_{t-1}$			0.446	0.454			0.226	0.223
			(5.92)***	(5.96)***			(1.77)*	(1.75)*
Σ of inward and outward FDI		-0.079		-0.293		0.081		-0.252
Wald χ^2 on In and Out FDI		21.38		12.13		0.69		3.29
		(p<0.000)		(p<0.001)		(p<0.404)		(p<0.070)
Observations	571	583	539	547	584	585	571	581
Number of Countries	29	29	29	29	29	29	29	29
R-squared	0.604	0.661			0.364	0.361		

Notes: Absolute value of t statistics in parentheses. * significance at 10% level; ** significance at 5% level; *** significance at 1% level. FE columns report robust standard errors. The Sargan test of over-identifying restrictions indicates that the GMM instruments are valid; the null hypothesis of no serial correlation in the errors is not rejected. GMM estimations treat deviations of GDP from trend as endogenous.

Table 3 (continued): Reduced Sample Fixed Effects and GMM Regression Results on Determinants of Wage Growth in Labor-Intensive Manufacturing Sub-Sectors

Dependent Variable: Nominal Wage Growth

	LEATHER				ELECTRICAL MACHINERY			
	Fixed Effects		GMM		Fixed Effects		GMM	
	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Log deviations GDP growth	0.175	0.175	0.234	0.256	0.073	0.075	-0.200	-0.189
	(1.83)*	(1.84)*	(1.51)	(1.71)*	(0.88)	(0.92)	(0.93)	(0.91)
Total FDI	-0.041		-0.038		-0.167		-0.014	
	(1.75)*		(0.90)		(2.94)***		(0.26)	
Inward FDI		-0.072		-0.014		-0.074		-0.042
		(2.21)**		(0.37)		(1.01)		(0.83)
Outward FDI		0.003		-0.113		-0.479		-0.066
		(1.04)		(2.24)**		(2.37)***		(0.64)
Secondary Education	0.720	0.741	0.174	0.273	1.003	0.746	0.230	0.109
	(1.76)*	(1.80)*	(0.27)	(0.44)	(1.69)*	(1.61)	(0.04)	(0.22)
GDP Deflator	0.032	0.033	0.019	0.019	0.045	0.045	0.031	0.031
	(2.63)***	(2.63)***	(2.42)**	(2.44)**	(3.78)***	(3.77)***	(6.36)***	(6.35)***
Labor force growth	0.967	1.016	-0.579	-0.627	1.429	1.361	-1.289	-1.316
	(1.92)**	(2.01)**	(0.74)	(0.79)	(1.52)	(1.46)	(1.27)	(1.29)
Wage growth$_{t-1}$			0.379	0.378			0.265	0.2.63
			(5.35)***	(5.36)***			(3.89)***	(3.84)***
Σ of inward and outward FDI		-0.069		-0.127		-0.553		-0.108
Wald χ^2 on In and Out FDI		1.53		6.30		8.79		1.02
		(p<0.214)		(p<0.012)		(p<0.003)		(p<0.319)
Observations	583	591	570	579	567	571	549	556
Number of Countries	29	29	29	29	28	28	28	28
R-squared	0.565	0.561			0.439	0.442		

These results are consistent with the proposed argument that changes in firm mobility produce psychological effects on workers that cause them to attenuate wage demands. This effect may in fact swamp the potentially positive pressure of tight labor markets on wages. The "traumatized worker" effect noted by Chair of the Federal Reserve Bank Alan Greenspan in the late 1990s that held down wage growth in the U.S. appears to be in evidence in a number of countries.[18]

VI. CAPITAL MOBILITY AND PRODUCTIVITY GROWTH: EMPIRICAL RESULTS

The negative effect of firm mobility on wages is hypothesized to reverberate on productivity growth. To examine directly the relationship between foreign direct investment and labor productivity growth, we estimate the following equation:

$$d \ln b_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 u_{it} + \upsilon_{it} \qquad (8)$$

where $d\ln b$ is the growth rate of labor productivity, β_o is exogenous technical progress when independent variables are measured at their mean, u is aggregate demand, captured by growth rate of GDP, and υ_{it} again has three components—country-specific and time effects, and a normally distributed error term.

A FE estimator is used on equation (8). However, due to the possible endogeneity of the growth rate of GDP, a GMM dynamic panel estimator which removes fixed effects by first differencing the data is also employed. A further benefit of the GMM estimator is that it permits inclusion of the lagged dependent variable on the right-hand side to capture omitted variable effects. Instruments are lags of the dependent variables and GDP growth and firm mobility.

Measurement and data issues were discussed in the previous section with the exception of labor productivity. Labor productivity is measured as annual valued-added of output in constant terms relative to employment. Raw data for these variables were obtained from the UNIDO 2002 Industrial Statistics Database. It would have been preferable to have data on annual hours worked, rather than merely the number of workers. This would have allowed us to calculate labor productivity per hour, rather than on an annual basis. In that sense, these results should be viewed cautiously.

Econometric Results

The first two columns in Table 4 show the FE results for the full sample. GDP growth exerts a positive and significant effect on productivity growth, consistent with the Verdoorn hypothesis. Total FDI has a negative effect on productivity growth, significant at the 10 percent level, while FDI disaggregated into inward and outward FDI have opposite signs and are not statistically significant. The adjusted R^2s are quite low, especially as compared to the wage regressions, which may be explained by the substantial variation in year-to-year productivity growth rates.

Columns 3 and 4 show the full sample GMM results. Coefficients on GDP and total FDI are significant (although only at the 10 percent level for FDI) and larger than in the FE models. In particular, a 1 percentage point increase in total FDI leads to 0.158 percentage point decline in productivity growth, while GDP growth increases of 1 percentage point are associated with a 0.635 point increase in the productivity growth rate. Inward FDI exerts a significantly negative effect on productivity growth while outward FDI, though negative, is not significant. Nevertheless, a Wald test on the sum of the coefficients on inward and outward FDI holds at the 10% level. Notably, the sum of these coefficients is similar in magnitude to that on total FDI. Results from the reduced sample (columns 5-8) are similar, but the coefficients on outward FDI are not significant and the inward FDI effect is negative and significant in the GMM estimation.

Table 5 provides full and reduced results for sub-sectors (with total FDI only). The negative effect of FDI on productivity growth is evident in wearing apparel, footwear, and leather. Significance varies by estimation method with FDI exhibiting a more consistently significant negative effect in the GMM estimations. It should be recalled, however, that while the GMM estimates include a lagged dependent variable that captures effects of omitted variables, there are some concerns about the reliability of the standard errors in small samples.

Table 4: Fixed Effects and GMM Regression Results on Determinants of Productivity Growth
Dependent Variable: Labor Productivity Growth

	FULL SAMPLE				REDUCED SAMPLE			
	Fixed Effects		GMM		Fixed Effects		GMM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP Growth	0.269	0.278	0.636	0.518	0.287	0.298	0.306	0.447
	(3.66)***	(3.86)***	(3.03)***	(2.75)***	(3.60)***	(3.80)	(4.18)***	(2.13)**
Total FDI	-0.045		-0.158		-0.038		-0.355	
	(1.91)*		(1.70)*		(1.62)*		(1.69)*	
Inward FDI		0.001		-0.153		0.001		-0.043
		(0.08)		(2.69)***		(0.02)		(2.22)**
Outward FDI		-0.037		-0.037		-0.028		-0.202
		(1.15)		(0.57)		(0.88)		(0.86)
Productivity growth$_{t-1}$							-0.122	-0.109
							(1.94)**	(1.75)*
Σ of inward and outward FDI		-0.036		-0.190		-0.027		-0.246
Wald χ^2 on In and Out FDI		1.32		3.62		1.00		1.32
		(p<0.350)		(p<0.057)		(p<0.317)		(p<0.249)
Observations	762	783	773	792	683	699	660	670
Number of Countries	37	37	37	37	33	33	32	32
R-squared	0.225	0.155			0.237	0.162		

Notes: Absolute value of t statistics in parentheses. * significance at 10% level; ** significance at 5% level; *** significance at 1% level. FE columns report robust standard errors. The Sargan test of over-identifying restrictions indicates that the GMM instruments are valid; the null hypothesis of no serial correlation in the errors is not rejected. Equations 3-4 and 7-8 treat the growth rate of GDP as endogenous.

Table 5: Full Sample Fixed Effects and GMM Regression Results on Determinants of Productivity Growth in Labor-Intensive Manufacturing Sub-Sectors

Dependent Variable: Labor Productivity Growth

	WEARING APPAREL				FOOTWEAR			
	Fixed Effects		GMM		Fixed Effects		GMM	
	Full	Reduced	Full	Reduced	Full	Reduced	Full	Reduced
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP Growth	0.271	0.437	-0.402	-0.418	0.561	0.569	-0.105	-0.261
	(2.72)***	(3.21)***	(2.12)**	(2.12)**	(4.43)***	(4.12)***	(0.59)	(1.27)
Total FDI	-0.028	-0.034	-0.091	-0.036	-0.067	-0.073	-0.233	-0.233
	(0.87)	(-0.94)	(2.12)**	(-0.61)	(1.21)	(1.28)	(1.92)**	(2.25)***
Productivity growth			-0.229	-0.230			-0.253	-0.230
			(5.26)**	(6.75)***			(3.72)***	(6.75)***
Observations	759	678	750	634	704	747	705	614
Number of Countries	37	33	36	32	34	31	34	30
R-squared	0.073	0.060			0.042	0.039		

Notes: Absolute value of t statistics in parentheses. * significance at 10% level; ** significance at 5% level; *** significance at 1% level. FE columns report robust standard errors. The Sargan test of over-identifying restrictions indicates that the GMM instruments are valid; the null hypothesis of no serial correlation in the errors is not rejected. GMM estimations treat the growth rate of GDP as endogenous.

Table 5: Fixed and GMM Regression Results on Determinants of Productivity Growth in Labor-Intensive Manufacturing Sub-Sectors
(continued)
Dependent Variable: labor Productivity Growth

	LEATHER				ELECTRICAL MACHINERY			
	Fixed Effects		GMM		Fixed Effects		GMM	
	Full	Reduced	Full	Reduced	Full	Reduced	Full	Reduced
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GDP growth	0.138	0.082	-0.413	-0.234	0.312	0.344	0.344	-0.242
	(0.86)	(0.48)	(1.37)	(0.95)	(2.74)***	(2.89)***	(1.18)	(1.63)*
Total FDI	-0.079	-0.038	0.113	0.083	0.024	0.042	0.042	0.092
	(2.14)**	(0.05)	(0.88)	(0.65)	(0.39)	(0.62)	(0.67)	(1.21)
$Productivity_{t-1}$			-0.444	0.458			-0.133	-0.224
			(3.19)***	(6.15)***			(1.38)	(6.76)***
Observations	717	674	740	648	761	707	761	668
Number of Countries	36	32	35	31	36	32	36	32
R-squared	0.044	0.065			0.303	0.085		

Exploring the low explanatory power of the FE models, I estimated the fixed effects model, allowing for country-specific intercepts on the mobility terms which permits the effect of total FDI on productivity growth to vary by country. This does not improve the explanatory power of these models. In another set of FE regressions (not reported here), I incorporated a dummy on Asian economies interacted with the mobility variable to test whether the effects of FDI on productivity differ substantially from other countries in the sample due to efforts to link FDI to industrial strategies. The coefficient on the interaction term was positive, but not significant.

In sum, in most cases, the coefficient on FDI is negative, even if not significant. Statistical significance is most consistent in wage regressions, especially at the manufacturing sector level in both the full and reduced samples. The negative effect of FDI on productivity is also in evidence at the manufacturing sector level with both FE and GMM estimation methods. GMM results indicate that the effect of FDI on productivity growth in sub-industries is negative, with FE method producing much weaker evidence of such an effect.

While the results are consistent with the hypothesis of a low wage-low productivity trap, we might want to be cautious due to measurement problems and the possibility of omitted variable bias in the FE regressions. For example, while we control for that portion of investment induced by wages, we do not have a variable that measures "animal spirits" from equation (5) above. This works in the opposite direction of the mobility variable on labor productivity, however, and thus it is not likely that the mobility variable is capturing the effect of that omitted variable.

Another concern is that the FDI data are "noisy" at the sub-sector level in that they do not allow us to separate out vertical from horizontal FDI. It would have been useful to do so, since it is likely that the threat effect of FDI on wages is more palpable in industries engaged in vertical FDI. Since these are largely export industries, they tend to be even more sensitive to wage increases than industries with a high degree of horizontal FDI. Horizontal FDI, more frequent in capital-intensive industries, is propelled by the desire to gain access to domestic markets for which trade access might be restricted. In such industries (e.g., autos in China), entry and exit is more costly and time-consuming and so mobility is reduced. Even apart from factor intensity of production, these firms are not likely to respond so negatively to higher wages since presence in the domestic economy is essential for sales. With regard to empirical analysis, of course, this is a moot point, since we don't have data to separate out the two types of FDI.

The noisiness of the data relates also to the inclusion of merger and acquisition data in FDI, although that is not so much of a problem as it may seem. Here we are not trying to measure the impact of gross fixed capital formation *per se* but rather the power of firms to respond to negative profit conditions in local economies, and the arresting effect of that power on wages. Nevertheless, given these results, it is more prudent to surmise simple associations between FDI, wages, and productivity rather than any stronger conclusions.

Table 6 summarizes the results from the wage and productivity regressions for the manufacturing sector, focusing on the effects of FDI on each of these variables. The negative effects of FDI are most robust on wages, and in the disaggregated regressions, outward FDI has a more significant negative effect than inward FDI as might be expected. FDI also exerts a negative effect on productivity growth, although here the coefficients on total FDI are significant only at the 10 percent level, while in the disaggregated regressions using GMM estimation, inward FDI exhibits a negative significant effect on productivity. These results are robust to the sample used.

Despite the consistency of these results, it is possible that FDI is proxying for other factors that are causing a downward pressure on wages and productivity. Contemporaneous macro-level policies, such as widespread privatization may be at fault. Increased uncertainty and volatility associated with financial liberalization may also be at play. In the case of productivity growth, because technological transformation is more complex than suggested here, the inclusion of additional variables such as spending on R&D would be necessary for greater confidence in these results. The paucity of data on such variables limits the extent to which cross-country analysis can be used to explore these issues. For that reason, detailed case studies of particular countries and industries would be valuable for exploring these empirical issues.

Table 6. Summary of FDI Effects on Wage and Labor Productivity Growth:
Fixed Effects and GMM Estimation

	Wage Growth		Productivity Growth	
	FE	**GMM**	**FE**	**GMM**
Full Sample				
Total FDI	—***	—****	—*	—*
Inward FDI	—	—*	—	—***
Outward FDI	—****	—***	—	—
Reduced Sample				
Total FDI	—***	—***	—*	—*
Inward FDI	—**	—***	—	—**
Outward FDI	—***	—***	—	—

VII. CONCLUSIONS

The benefits of liberalization have been touted and, in particular, the host country rewards of liberalized investment have been advanced as a powerful reason for governments to create conditions amenable to foreign capital such as flexible labor. To date, some studies have provided evidence, albeit inconclusive, that inward FDI might promote productivity growth since foreign firms bring with them later vintage technology which can spillover to promote productivity growth in the rest of the economy. But liberalization also brings with it increased firm bargaining power. That increased power could limit wage growth, attenuating the salutatory pressure that higher wages put on firms to innovate and increase efficiency that can restore profits.

There is thus a potentially positive dynamic between wages and productivity growth: within some band, we can expect higher wages to push firms to innovate and increase productivity. If capital mobility reduces wage pressures, however, the push for firms to innovate also declines, leading to slower productivity growth.

The evidence presented here is consistent with that hypothesized dynamic and suggests that investment liberalization, instead of raising living standards, could lead to slower wage growth. The evidence provided also shows evidence of a negative effect of FDI on manufacturing productivity growth. Pieper's (2000) finding that negative productivity growth

rates in the industrial sector are strongly associated with negative productivity growth rates in the economy as a whole, suggests that the determinants of productivity growth rates in this sector are of great concern for economy-wide well-being.

To the extent FDI has a negative effect on wages and productivity, they are not meant to be an indictment of FDI or to imply that it has unambiguously negative effects for semi-industrialized economies. The results suggest, however, that there can be a low wage-low productivity trap that countries can fall into, should capital gain too much bargaining power vis-à-vis workers.

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NOTES

[1] This variable is not, however, an accurate measure of resources available for gross fixed capital formation. This is because FDI flows are measured as the sum of equity capital, reinvested earnings, and loans from the parent company to the host country affiliate, in firms in which the parent company owns a share in excess of 10 percent. In fact, FDI is actually a source of corporate finance, rather than a specific use of that finance, and thus does not necessarily imply expenditure on fixed assets.

[2] An exception is Barry, Gőrg, and Strobl (2001) who investigate the effect of FDI on wages and productivity in Ireland. They find a negative effect on wages and productivity but only for domestic exporters, with no effect on non-exporting firms.

[3] Feenstra (1998) provides evidence of the simultaneous integration of goods markets through trade liberalization and disintegration of production as manufacturing and services activities carried out in developed economies are combined with those performed in developing economies.

[4] I am indebted to James Heintz for this point.

[5] Standing (1989) refers to this process as "global feminization" whereby jobs have become increasingly flexible—lacking in job stability or security and with little possibility for promotion. Gender plays a role since women are more likely to be inducted into the flexible slots. Whether it is because they have less bargaining power than men or because their aspiration wages are lower due to socialization of inferior status, they are arguably less likely to resist low wages and poor work conditions.

[6] See Roh (1990) and Carr, Chen, and Tate (2000) for comparisons of wages of home-based or informal sector workers and formal sector workers. For the U.S., see, for example, McCrate (2003).

[7] This is not just a developing country phenomenon. Sweatshops in the garment industry have been on the rise in both the U.S. and Britain in recent years, for example (Fernandez-Kelley and Sassen 1993; Kabeer 2000).

[8] Kaldor (1966), it will be recalled, posited the existence of a "technical progress" function whereby the rate of growth of capital positively affects rate of growth of labor productivity (albeit at a diminishing rate), because of embodied technical progress.

[9] This may be considered a special case of the more general relationship between wages and productivity, since the positive effect of wages on investment and thus productivity only holds over some range in which new technologies are available for adoption. As a result, the derivative could be positive or negative, based on structural conditions in the economy. At some point wages will be too high to stimulate investment, due to more profitable outside options or the unavailability of technological innovations that raise productivity. (Otherwise, the assumption of a strictly positive effect of wages on productivity would imply a stagnationist or wage-led macroeconomy. I am grateful to an anonymous referee for this point).

[10] A more complete equation for unit labor costs would include a measure of monitoring costs, overhead distributed per unit of goods, and other benefits. We simplify in this analysis, but in other contexts, it may be useful to expand unit labor costs to include these additional variables.

[11] Formally, considering the Jacobian matrix of the system (4) and (6), local stability requires a positive determinant or ($k_2 b_u - k_1 b_w > 0$) where k_1, k_2 are reaction coefficients. Holding u constant, this implies that b_w must be positive. The saddle point occurs when $\hat{b}$ is steeper than $\hat{C}$.

[12] Electrical machinery includes assembly of consumer electronics, but this industry produces more sophisticated goods. As a result, over time, the industry has become less labor-intensive, particularly in some of the higher income semi-industrialized economies such as South Korea and Taiwan.

[13] Unemployment data are missing for many countries in this sample, and for that reason, GDPD is used as a proxy. A positive deviation from trend implies a fall in unemployment that should result in upward pressure on wages.

[14] Growth in average years of educational attainment was also used, with similar results, although more frequently, this variable was insignificant.

[15] Many studies use IMF FDI data but there were significantly more missing observations in that data set for which reason I relied on the UNCTAD data.

[16] Hong Kong's FDI data is also suspect, but for a different reason. A substantial amount of FDI recorded for Hong Kong is diverted to China. To test for the robustness of the results, Hong Kong was excluded from the sub-sample in a set of regressions (not reported here), and the results were broadly similar to those obtained from the reduced samples.

[17] In FE regressions, country-specific fixed effects are omitted for convenience.

[18] Greenspan made this observation in response to the observation that while the U.S. economy grew rapidly in the 1990s and unemployment fell, wages were rising very slowly. This has led to a rethinking of the so-called natural rate of unemployment concept, or at a minimum, has led to downward revisions of the NAIRU.

Appendix

Table A.1 Sample

Region	Countries covered
Sub-Saharan Africa	Cameroon, ***Mauritius***, Senegal, South Africa
Mediterranean	***Cyprus,*** Greece, Portugal, Egypt, Morocco, Tunisia, Turkey
Latin America and Caribbean	Argentina, ***Barbados***, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, El Salvador, ***Jamaica***, Mexico, Panama, Peru Trinidad and Tobago, Venezuela
South and East Asia	China, Hong Kong, India, Indonesia, Rep. of Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan

Note: FDI data for those countries in bold italicized print are reported to suffer from distortions—either because of evidence the country serves as a tax haven, or because FDI funds are recorded there, but destined for another country (Hong Kong). For that reason, a reduced sample is used in the econometric analyses, with those countries omitted from that sample.

Table A.2 Variable List and Data Sources

Variable	Description	Source
B	Productivity Growth (for manufacturing and selected sub-industries)	UNIDO (INDSTAT 3, 2003). (calculated from data on value added and no. of employees by author)
FDI	Total (and inward and outward) FDI as % gross fixed capital formation	UNCTAD Division on Investment, Technology, and Enterprise Development's FDI data and UNIDO (INDSTAT 3, 2003). for gross fixed capital formation.
FSHLF	Female share of labor force	World Development Indicators
GDPD	Logarithmic deviations of GDP from trend	GDP data from World Development Indicators. (Logarithmic deviations are author's calculations)
LF	Labor force growth	World Development Indicators
P	GDP deflator	World Development Indicators
SED	Share of population 15+ having completed secondary education	Barro and Lee (2000)
U	Growth rate GDP	World Development Indicators
W	Average sector wage	UNIDO (INDSTAT 3, 2003 and 2004).