No: 10–02

Bilkent University

MNEs and Wages: the Role of Productivity Spillovers and Imperfect Labor Market

Bahar Bayraktar Sağlam &
Selin Sayek

Discussion Papers

Department of Economics

Requests for papers/lists of papers in the Series can be addressed to:

Department of Economics
Bilkent University
06800 Ankara
Turkey

E-mail: bilecon@bilkent.edu.tr

To download an electronic copy of this paper and/or to get more information regarding the Department of Economics, please visit:
`http://www.bilkent.edu.tr/~economics`.

MNEs and Wages: the Role of Productivity Spillovers and Imperfect Labor Markets*

Bahar Bayraktar Saglam — Hacettepe University

Selin Sayek — Bilkent University

February 2010

Abstract

This paper provides a unifying framework allowing to study the wage implications of multinational enterprise (MNE) activities, pointing to the importance of controlling for labor market imperfections and productivity spillovers from foreign to local firms. The extent of labor market frictions and productivity spillovers influence how the absolute and relative local firm and foreign firm wages respond to increased foreign direct investment (FDI).

JEL Classification: F16, F23, J31

Keywords: FDI spillovers; wage spillovers; imperfect labor markets.

*Corresponding author: Selin Sayek, Bilkent University, Department of Economics, Ankara Turkey, sayek@bilkent.edu.tr, +90-312-290-1406. Bahar Bayraktar Saglam, sbahar@hacettepe.edu.tr. The authors owe thanks to the participants of the ASSET conference, October 2009.

1 Introduction

The increasing prominence of Multinational Enterprises (MNEs) in the worldwide production activities over the past decades has generated significant interactions between them and the local firms.[1] Productivity and wage spillovers from MNEs to local firms occur simultaneously, where the extent of both spillovers depend on each other. While the literature has focused on both spillovers independently, studies that take into account the possible interactions among the two spillovers are very few in number. Furthermore, in disentangling the labor market effects of increased foreign firm presence most of the studies have assumed perfectly competitive labor markets, ignoring possible frictions. In this paper we show the role played by both labor market frictions and productivity spillovers in the wage effects of FDI.[2]

Results point to the important role played by labor market imperfections and productivity spillovers, especially the complementarity between the local and foreign capital and how large the productivity spillovers are effectively. This theoretical finding contributes to the literature by providing an explanation for why wages, both absolute and relative, and their reactions to FDI differ in level across countries.

2 The model

The economy is populated by risk-neutral and infinitely-lived agents, a continuum of workers with the measure normalized to one, all discounting the future at rate r. There are two types of jobs, domestic (D) and foreign (F). The productivity in each firm is denoted by A_i, $i = D, F$. The amount of output

[1] We use the terms foreign firms and multinationals interchangeably.

[2] Barry et al (2005) also study the counteracting roles of productivity spillovers and labor-poaching activities of MNEs in generating wage spillovers with labor market frictions.

produced in the domestic and foreign jobs are:[3]

$$y_i = A_i k_i^{\alpha_i}, \qquad i = D, F \tag{1}$$

where k_i stands for capital. The level of technology in the domestic firms can increase with higher foreign firm presence due to possible productivity spillovers, $A_D = A k_F^{\gamma}$.[4] We model increased foreign firm presence as increased amounts of foreign capital used by foreign firms, k_F.

The revenue of each firm net of non-worker costs are:

$$R_i = p_i y_i - p_{ki} k_i, \qquad i = D, F \tag{2}$$

where p_i is the price of the final good produced by firm i.

Firms rent capital in a perfectly competitive market, where the optimal capital is determined by it being paid its marginal revenue product:

$$k_i = \frac{p_i}{p_{ki}} \alpha_i y_i \tag{3}$$

2.1 Matching

Job seekers and firms with vacant jobs are matched in pairs through an imperfect matching technology. The total flow of contracts between a job seeker and a firm is determined by a standard constant returns to scale matching function, $m\left(v_D + v_F, u\right)$ where v_i stands for the mass of firm type i vacancies, for $i = D, F$, and u is the mass of unemployed workers. η denotes the fraction of vacancies posted by domestic firms. The labor market tightness is denoted by $\theta = \frac{v_D + v_F}{u}$. The rate at which workers meet a job is $m(\theta)$.

[3] See Davidson et al (2008).
[4] See Barry et al (2005).

2.2 Firms

The value of employing a worker for each firm is J_i:

$$rJ_i = R_i - w_i - \delta J_i, \qquad i = D, F$$

w_i is wage. The job destruction rate is exogenous, δ.

The asset values of workers in each firm is:

$$rW_i = w_i - \delta(W_i - U), \qquad i = D, F \tag{4}$$

The asset value of unemployed workers, U, is:

$$rU = m(\theta)\left[\eta\left(W_D - U\right) + (1-\eta)(W_F - U)\right] \tag{5}$$

The values of vacancies V_i is:

$$rV_i = -c_i + \frac{m(\theta)}{\theta}\left(J_i - V_i\right), \qquad i = D, F$$

A firm who posts a vacancy must pay a recruitment cost of c_i, for $i = D, F$.

2.3 Wages

According to the generalized Nash bargaining solution wages are:

$$w_i = \beta R_i + (1-\beta) rU, \qquad i = D, F \tag{6}$$

where β is the bargaining power of the workers. Using equation (4) and (5), we can derive the asset

value of unemployed workers, rU, as follows:

$$rU = \frac{m(\theta)\beta\left[\eta R_D + (1-\eta)R_F\right]}{r+\delta+\beta m(\theta)}$$

Using equations (6) and (2) the local and foreign firm wages, respectively, are:

$$w_D = \beta(1-\alpha_D)P_D A_D k_D^{\alpha_D} + \frac{(1-\beta)m(\theta)\beta\left[\eta(1-\alpha_D)P_D A_D k_D^{\alpha_D} + (1-\eta)(1-\alpha_F)P_F A_F k_F^{\alpha_F}\right]}{r+\delta+\beta m(\theta)} \quad (7)$$

$$w_F = \beta(1-\alpha_F)P_F A_F k_F^{\alpha_F} + \frac{(1-\beta)m(\theta)\beta\left[\eta(1-\alpha_D)P_D A_D k_D^{\alpha_D} + (1-\eta)(1-\alpha_F)P_F A_F k_F^{\alpha_F}\right]}{r+\delta+\beta m(\theta)} \quad (8)$$

Equations (8) and (7) show that the wages paid are a weighted average of the value the worker generates for the firm and the reservation wage of the worker. That the wage determination does not solely depend on the marginal revenue product of the worker, as is the case in perfectly competitive markets, but also on the alternative average wage of the worker is a standard feature of the search models.

3 Results

Using equation (6) we are able to compare the levels and changes of the wages with and without labor market imperfections and productivity spillovers. Both local and foreign firms pay less wages when there are labor market frictions and more wages when there are productivity spillovers. The standard match requirement condition of search models requires that the total surplus is $W_i - U + J_i - V_i \geq 0$ This condition allows for the following ranking of absolute wages, where the superscripts stand for the

four cases defined in table 1: $w_F^1 = w_F^2 > w_F^4 > w_F^3$ for foreign firm wages and $w_D^2 > w_D^1$ and $w_D^4 > w_D^3$ and $w_D^2 > w_D^4$. The comparison of w_D^1 and w_D^4 depends on the existence of labor market imperfections which causes $w_D^4 < w_D^1$ and the existence of productivity spillovers which causes $w_D^4 > w_D^1$, where the final effect will depend on which effect outweighs. The model points to an important finding that wage spillovers from foreign firms depends not only on productivity spillovers but also on the labor market frictions and their interactions with these spillovers.[5]

Ranking relative wages across the four cases is also possible. For a given labor market friction level productivity spillovers create enough wage spillovers to result in a convergence between foreign firm and local firm wages, decreasing relative wages. Positive productivity differentials between the foreign and local firms, the persistence of these differences even after productivity spillovers and small productivity spillovers lead to the following relative wage ranking: $\frac{w_F^1}{w_D^1} > \frac{w_F^2}{w_D^2} > \frac{w_F^3}{w_D^3} > \frac{w_F^4}{w_D^4}$.[6] Our findings point to the importance of not only identifying the existence of productivity spillovers but knowing if the foreign capital will contribute much more to local firms than it does to foreign firms. It is not only the magnitude of spillovers that one should identify but also how foreign capital contributes to the local versus foreign firm, creating threshold effects when discussing the foreign firm premium.

As summarized in table 1 we are able to study four cases, each a combination of different labor market imperfections and productivity spillovers, allowing us to study the role of both factors in the wage effects of FDI.

FDI contributes directly to foreign wages via an improvement in the marginal revenue product of the worker in the foreign firm. This is independent of spillovers and frictions in the labor market. If there are productivity spillovers FDI improves the productivity of workers in the domestic firms and contributes to their wages as well. If there are however labor market frictions then the increase in both foreign firm wages and possibly local firm wages contribute to raising the reservation wages for

[5] Details are not provided due to space limitations.

[6] If the productivity spillovers are larger then the relative wage in case 3 is definitely larger than in cases 2 and 4, and 2 and 4 could even exchange ranks.

Table 1: Summary of findings

	1	2	3	4
Labor market imperfections	No	No	Yes	Yes
Productivity spillovers	No	Yes	No	Yes
$\frac{\partial w_F}{\partial k_F}$	> 0	> 0	> 0	> 0
$\frac{\partial w_D}{\partial k_F}$	$= 0$	> 0	> 0	> 0
$\frac{\partial \frac{w_F}{w_D}}{k_F}$	> 0	$\underset{>}{\leqq} 0$ if $\alpha_F \underset{>}{\leqq} \gamma$	> 0	$\underset{>}{\leqq} 0$ if $\alpha_D + \gamma - 1 \underset{>}{\leqq} 0$

all workers in the economy. Therefore, regardless of the extent of labor market frictions increased FDI contributes to increasing foreign firm wages as well as local firm wages.[7]

The effects on relative wages however requires a more comprehensive discussion.[8] Relative wages are shown to definitely increase upon increased FDI when there are no productivity spillovers. For a given level of labor market imperfections, the effects however depend on the complementarity between the local and foreign capital as well as the extent of productivity spillovers. Due to space limitations we only discuss case 4, the broadest case, in detail.

If the productivity spillovers are large enough, such that foreign and domestic capital implicitly show an increasing returns to scale, $\gamma + \alpha_D - 1 \rangle 0$, then the marginal revenue product of workers for domestic firms increase disproportionately more than those for foreign firms, reducing the foreign firm premium. If the domestic and the foreign capital provide a constant or decreasing returns to scale production for the domestic firm, $\gamma + \alpha_D - 1 = 0$ or $\gamma + \alpha_D - 1 \langle 0$, respectively, then the wage dispersion remains unchanged or increases, respectively. Results point to the importance of discussing the complementarity between domestic and foreign capital, and the productivity spillovers in any wage spillover debate.[9]

Therefore, even though labor market conditions play an important role in the determination of absolute wage levels in the economy it plays no role in how FDI affects relative wages. The effect of FDI on relative wages mainly depends on the complementarity of domestic and foreign capital, as well

[7] Except when both frictions and spillovers are inexistent, causing no effect of FDI on local firm wages.

[8] We are only interested in the sign of the relationship and not how the effects differ quantitatively across cases.

[9] This is in line with the recent discussion regarding the role of complementarity between capitals in the productivity spillover debate (Alfaro et al, 2010).

the respective role of foreign capital in domestic versus foreign production rather than on frictions in the labor markets.[10]

4 Conclusions

We able to show that both foreign and local firms pay higher wages when there are less labor market frictions and more productivity spillovers. The premium paid by foreign firms depends mainly on how large the productivity spillovers are, more so than on labor market frictions. FDI increases both local and foreign firm wages, with its relative contribution to the two wages depending on the complementarity between the local and foreign capital in the local production technology.

5 References

Alfaro, Laura; Chanda, Areendam; Kalemli-Ozcan, Sebnem and Selin Sayek, 2010. How Does Foreign Direct Investment Promote Economic Growth? Exploring the Effects of Financial Markets on Linkages. *Journal of Development Economics*, 91, 245-53.

Barry, Frank; Görg, Holger and Eric Strobl, 2005. Foreign Direct Investment and Wages in Domestic Firms in Ireland: Productivity Spillovers versus Labor-Market Crowding Out. *International Journal of the Economics of Business*, 12:1, 67–84.

Davidson, Carl; Matusz, Steven J. and Shevchenko, Andrei, 2008. Globalization and Firm Level Adjustment with Imperfect Labor Markets. *Journal of International Economics*, 75(2), 295-309.

[10]So far the analysis does not take into account the general equilibrium effects of a change in FDI which are also reflected in the vacancy postings, hence in θ and η. Solving for this general equilibrium case numerically shows the above results prevail, available upon request from the authors.