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## Returns to Returning

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# **Returns to Returning**

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## Abstract

We examine the labor market performance of return migrants using the Hungarian Household Panel Survey. Two distinct selection issues are considered in the estimation of the earnings equation; we implement a natural method using MLE. The result that there is a "premium" to work experience abroad for women is robust across the models we considered. For men, the return to working abroad is not generally significant.

Earlier versions of the paper were presented at the Association of Comparative Economic Studies, Chicago, January 1998, the CEPR Conference, "European Migration: What Do We Know?," Munich, November 1997, and at a conference on the Consequences of International Migration on Developing and Transition Economies, Program in Economic Policy Management, Department of Economics, Columbia University, February 27, 1997. The manuscript has benefitted from discussions with conference participants, and with Alan Barrett, Thomas Bauer, Roger Klein, Christoph Schmidt, Frank Vella and Yoram Weiss. We also thank the two journal referees.

## ***1. Introduction and Background***

In return migration, the migrant, after spending some time in a host country, returns to his or her country-of-origin. Some migrants work until retirement in the host country, and then retire to their home country. Some return to their home country and participate in the labor market. This latter group of return migrants is the focus of this paper.

In this paper we focus on the relevance of the return migrants' experience abroad for earnings generation in the home country. We study return migration to Hungary, one of several Central and Eastern European countries undergoing transition into a market economy. A second goal of this paper is to implement a natural method for using maximum likelihood estimation (MLE) when one needs to account for at least two sources of selection bias. This implementation has been introduced earlier by Blank (1990). We present and employ this implementation in a simple, tractable way, which is easily reproducible in similarly structured problems.

The theory of return migration generally examines the phenomena as part of life-cycle planning. In this framework, return migration is part of optimal decision making and is related to the savings behavior of migrants, their investment in human capital acquisition in the host country, and the relative wage differences between the host and home country (see, for example, Djajic and Milbourne (1988), Galor and Stark (1991)). In most of the existing models return migration of individuals is achieved by assuming that the marginal utility of consumption is higher in the home country than in the host country (see Djajic and Milbourne (1988), Dustmann (1997b), Hill (1987), and Stark, Helmenstein and Yegorov (1997)). Alternative motives for return migration are developed by Dustmann (1997a) who assumes that relatively high returns to human capital investments made in the host country are responsible for return migration, and by Stark (1995) who models return migration as the result of employer's learning about the skills of temporary migrants.

The empirical literature has largely studied return migration from the host country

perspective, examining the determinants of which migrants leave and when, the skills of the return migrants versus those who stay, and host country policies toward the migrants (Borjas and Bratsberg (1996), Dustmann (1996), Schmidt (1994)). Recently, Barrett and Trace (1998) and Cohen and Haberfeld (1998) have examined, in detail, the selectivity of return migrants. Bauer and Gang (1998) have analyzed the duration of migration abroad.

During the post-1989 transition period there have been a small number of return migrations by people who left their countries for the West.<sup>1</sup> These return migrants are motivated by either desires to retire in their home country, or to take advantage of new opportunities accorded by Hungary's transition to a market economy. These return migrations are part of an overall trend of increasing international migration movements during the 1980s until about 1992 from East to West (or South to North) of migrant workers, asylum seekers and political refugees (See OECD (1992)).<sup>2</sup>

Perhaps of all the transition economies, Hungary is the most prepared to tackle the challenges of a market economy. It had committed itself to the establishment of a market-oriented economy (albeit a socialist one) as early as 1964. The *New Economic Mechanism* adopted in 1968 was one of the most radical programs of reform from Soviet style central planning. It underwent successively more aggressive revisions in the 1980s. Gorbachev's glasnost and perestroika would further encourage the Hungarians to move toward a market oriented economy in the mid-1980s. However, against this background of gradual reform, Hungary remained not fully integrated into the global economy partly because of her trade links with the former Soviet block countries. In 1986, about

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<sup>1</sup>According to official Hungarian statistics, about 121,000 Hungarians emigrated between 1963 to 1988 (see OECD (1992) and about 19,000 returned to Hungary between 1973-1991 (about 34% returned in the last three years alone). Similar re-migrations are observed in Poland and in the Czech and Slovak Republics.

<sup>2</sup>This trend leveled off around 1993 as host countries adopted policies to better control migrant flows. For example, some countries tightened requirements for family reunification and/or imposed quotas on immigration (See OECD (1995)).

57% of Hungarian exports went to these countries and about 52% of her imports were from these countries (see OECD (1991)). Hungary's close links with the former Soviet block countries prevented her from establishing unrestrained relationships with the West.

Hungary has been moving toward full integration to the global economy. By 1990, Hungarian exports to former Soviet block countries declined to about 32% and her imports from this set of countries dropped to about 34% of her total imports (see OECD (1991)). There were some 3917 joint ventures (valued at around \$900 million) with foreign partners in 1990 alone (see OECD (1991)), with as much as 14%-33% of total investment originating from foreign sources in 1991-1994 (see Borish and Noel (1996)). A movement toward full integration into the global economy may make it possible for people who have been "exposed" to the West to receive a wage premium. In this paper we consider "exposure" to the West in a way that enables one to derive a premium in the labor market, as whether the person has worked abroad in the past. Foreign work experience may (i) indicate a person's possession of the necessary skills that can facilitate trade with the West, (ii) increase the success probability of joint ventures with Western companies, or simply (iii) demonstrate that they have been exposed to the "western" way of doing things.<sup>3</sup>

Two selection issues arise as we investigate whether there is a wage premium to foreign work experience in an economy undergoing transition and integration to the global economy. First, those who go abroad may be a self-selected group. For example, they may have done better (or worse) during the transformation phase regardless of whether or not they had gone abroad. In addition, we face the standard labor force participation (usually, working or not working) selection issue in any wage estimation problem. We are interested in finding the "true" premium to foreign work

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<sup>3</sup>This argument is related to the literature on immigration and trade. For example, Gould (1996) tests and finds evidence that immigration increases foreign market information (that is, it decreases the transaction costs of trade), thereby increasing U.S. trade with immigrant source countries. Using a similar argument, it is not unlikely that return migrants can also facilitate Hungarian trade with their former host countries.

experience, i.e., the return to having been abroad not compounded by these selection factors. We handle these two selection issues and the earnings equation estimation jointly, by implementing a tractable and easily reproducible maximum likelihood estimation.

In the next section we discuss the data that we use in detail. In section 3, we review the econometric issues and models we consider in this paper. Results are analyzed in section 4. Section 5 concludes.

## ***2. Data***

We use the Hungarian Household Panel Survey (HHPS), a unique data set collected by the Social Research Informatics Centre, Budapest University of Economics. The first wave of the survey was drawn in 1992 (see Sik (1995) for a description). In 1993 and 1994, a question on whether an individual has lived or worked in a foreign country was included; we draw our sample from these two years. We restrict our sample to those individuals who are in their working "life," that is, those between 18 and 65 years old in 1994. Out of 3145 individuals, 167 were identified as having worked abroad. In this paper, the terms migrant, return migrant and going abroad, are interchangeable.

Table 1 contains the means of the variables used in the analysis, for all observations and for those who are working. The wage variable is monthly earnings from a person's main job (natural log of monthly earnings in forints). Marital status, family status and Budapest at 14 are equal to one for those who are married, heads of household and are living in Budapest at age 14, respectively. The size of the family a person belongs to and the number of children less than six in the family are also considered. Training takes a value of one if an individual has gone through some job-related training in the past year. If a person receives benefits, such as an office car, medical care, or life/pension insurance, the variable benefits takes on the value one. A series of industry dummy variables is defined. An individual's employment status is controlled for by the introduction of dummy variables

for when the individual is self-employed and when the job held is non-manual. Information on the nationality of the company a person works for is also available: the variable `HungarianOwned` has the value one if the individual works for a fully-Hungarian owned company. An individual can work for a company owned exclusively (`FullGovOwned`) or partly (`PartGovOwned`) by the government. We have information on whether the individuals gained their foreign experience in OECD countries (e.g., Austria, Australia, Canada, Denmark, England, Germany, Italy, Japan and Sweden, and U.S.), or in non-OECD countries (e.g., Africa, Czech Republic, Poland, Romania, and Slovak Republic).

For each variable we test the null hypothesis that the mean for those who have been abroad is equal to the mean for those who have not been abroad. Using all observations, for both men and women, those who have been abroad have significantly more years of education and more of them lived in Budapest when they were 14 years old. Men who have been abroad are significantly older than men who have not been abroad.

Using the sample of those currently employed, for both men and women, those who have been abroad have significantly larger earnings than those who have not been abroad; further, those who have been abroad are more educated. A larger percentage of those who have been abroad are currently in Budapest (`BudapestNow`). Though not significant, men's work experience (actual years working) is larger for those who have been abroad. A larger percentage of men who have been abroad are employed in education-related occupations. Alternatively, a smaller percentage of men who have been abroad work in construction and other industries (food, textile and other light industries); a smaller percentage of men who have abroad work for a fully-Hungarian owned business. There are no significant percentage differences in women's choice of industry; a significantly larger percentage of those who have been abroad work in non-manual occupations and a smaller percentage work for fully Hungarian owned firms. Finally, relatively more women who have been abroad have received some form of training in the past year.

Besides comparing the characteristics of those who have been and those who have not been abroad by gender, two observations can be made by comparing men and women. First, there is a clear difference in the type of industry men and women enter. Relatively more men are in the state sector, and in heavy and construction industries; while relatively more women are in health and school services and trade and personal services (such as financial services, tourism, etc.).<sup>4</sup> Second, men and women differ in their choice of destination countries. Under half of the women in our sample have been to OECD countries; the rest to non-OECD countries. Men clearly preferred OECD countries-- 63% of them have been to an OECD country.

Migration by women is typically complicated by the fact they *may* have migrated unintentionally with their husbands.<sup>5</sup> Our data set allows the identification of whether the return migrants belong to the same family upon returning to Hungary.<sup>6</sup> Interestingly, about a quarter of women who have been abroad are married to men who have been abroad. However, there is only one working woman who belongs to the same family as a male return migrant.

### ***3. Econometric Issues and Models***

Several issues need to be considered in estimating whether experience abroad provides a "premium" for people's earnings after returning to the home country. Our view is that the going abroad decision (migration) is an investment in "experience gathering." Re-migration to Hungary provides the migrant an opportunity to reap the benefits (if any) of experience abroad. Moreover, the

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<sup>4</sup>This distribution is not an artifact of the data that we use. It is consistent with data from the International Labour Organization that identified women to hold a significant percentage of trade and personal services jobs (see Hubner, Maier, and Rudolf (1993)).

<sup>5</sup>We thank one of the referees for pointing this out.

<sup>6</sup>Although the return migrants may belong to the same family upon returning, we do not know if they migrated as a family. In other words, we can identify family membership during the survey year, not the formation of families.



size of the earnings "premium" may vary by the host country the return migrants have visited.<sup>7</sup>

We consider a semi-log specification for the earnings equation,

$$Y = X \beta + D \alpha + e, \quad (1)$$

where  $Y$  is the natural-log of monthly earnings,  $\beta$  and  $\alpha$  are coefficient vectors and  $e$  is the stochastic term; matrix  $X$  includes variables on personal characteristics, and matrix  $D$  includes dummy variables accounting for foreign experience.

The estimates of equation (1) from ordinary least square (OLS) may be inconsistent. The inconsistency occurs due to two selections: a working selection and a migration selection. The selection into working or not is a well-studied problem.<sup>8</sup> In addition, those who have been abroad may be more (or less) productive persons regardless of the foreign experience. The error term in the earnings equation is related to both the working decision and the migration decision. To address these selection issues, we introduce two index functions,

$$LFP^* = Z\gamma + v \quad (2)$$

$$ABROAD^* = Q\theta + \zeta \quad (3)$$

where  $\gamma$  and  $\theta$  are vectors of coefficients and  $v$  and  $\zeta$  are stochastic terms.

Equations (2) and (3) are decision functions for working and migration, respectively.  $LFP^*$  and  $ABROAD^*$  are unobservable. Nevertheless, we do observe the dichotomous variables  $LFP$  ( $LFP = 1$  if  $LFP^* > 0$ , and  $LFP = 0$  otherwise) and  $ABROAD$  ( $ABROAD = 1$  if  $ABROAD^* > 0$ , and

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<sup>7</sup>We would also like to consider how long the return migrants were working abroad and the year they returned. These would lead to varying periods of re-assimilation and influence the observed effect of experience abroad on earnings. Unfortunately, the data set does not contain this information. We also do not have pre-migration information on individuals. Nor do the data inform us about what skills are learned abroad or the particular work experience abroad.

<sup>8</sup>Correction for the bias that arises due to workers' self-selecting themselves into work is standard for women, but not for men. However, the men in our sample have a working rate of 54%, while the women have a working rate of 48%. This is very low for prime-aged males, so considering the work decision for males here is appropriate.

ABROAD = 0 otherwise).

The effects of decisions of participation and migration on earnings can be estimated using either Heckman's two-step method with double selection ("Heckit") or maximum likelihood estimation (MLE). Heckit has been widely used when there is only one selection rule (see Heckman (1979)). Though we can extend Heckit to get 'consistent' estimators in the presence of double selection, Heckit becomes very cumbersome when the number of selection rules is more than one.<sup>9</sup>

It is because the formulae for the computation of self-selection correction terms (so-called  $\lambda$ 's) become complicated and the burden of computing corrected standard error becomes enormous. The burden of computation can be relieved by assuming that two selections are not correlated (Fishe, Trost and Lurie (1981)). However, this is often too strong an assumption.

MLE is an attractive method when there are double selections (e.g., see Blank (1990)). However, it has only been infrequently employed, perhaps because of these two reasons: 1) researchers have gotten used to the two-step procedure and like to see the  $\lambda$ 's included and interpreted; and 2) since the likelihood function typically varies from specification to specification, many researchers feel more comfortable with a standard approach and form. Here we offer an MLE implementation that is tractable and easily reproduced in problems with a similar structure. The likelihood function is relatively simple when the stochastic terms are assumed to follow a multivariate normal distribution. The earnings equation and the two decision functions are estimated jointly using MLE. The procedure accounts for the possible correlation of participation and migration decisions with earnings. The endogeneity of the participation and migration decisions are ignored by OLS (see Heckman (1978) and Moffitt (1983), p. 1030). The obtained estimators are not only consistent, but also have other desirable properties of MLE (they are asymptotically efficient and normally distributed).

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<sup>9</sup>See Fishe, Trost and Lurie (1981), Ham (1982), and Tunali (1986).

The likelihood function is given as follows:<sup>10</sup>

$$\begin{aligned}
 L = & \prod_{P,A} \Pr(v > -Z\gamma, \zeta > -Q\theta, e = Y - X\beta - D\alpha) \\
 & \prod_{P,NA} \Pr(v > -Z\gamma, \zeta \leq -Q\theta, e = Y - X\beta) \\
 & \prod_{NP,A} \Pr(v \leq -Z\gamma, \zeta > -Q\theta) \\
 & \prod_{NP,NA} \Pr(v \leq -Z\gamma, \zeta \leq -Q\theta)
 \end{aligned} \tag{4}$$

where P, NP, A, and NA are labor market participant, labor market non-participant, individual has been abroad, and individual has never been abroad, respectively. The likelihood function shows the contribution of individuals who are working and have been abroad (P, A), individuals who are working and have never been abroad (P, NA), individuals who are not working and have been abroad (NP, A), and individuals who are not working and have never been abroad (NP, NA).

By maximizing the likelihood function, we get estimators of the index functions (participation and migration decision functions,  $\gamma$  and  $\theta$ ), the earnings function ( $\beta$  and  $\alpha$ ), and variance and correlation coefficients.<sup>11</sup> The estimation is implemented using the SAS NonLinear Programming procedure (SAS Institute, 1997).

Matrix X in equation (1) includes variables on personal characteristics. Whether the person is currently living in Budapest or not is included to account for earnings differential across locations. Typical human capital variables (education, training, and experience) are expected to raise earnings. We include the variable benefits to account for the possibility that earnings and additional job "quirks" are substitutes. A series of industry specific dummy variables are also included, with trade and personal services (e.g., financial services, tourism, etc.) as the reference category. Two dummy

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<sup>10</sup>The functional specification is given in the Appendix.

<sup>11</sup>For identification purposes, the variance of  $v$  and  $\zeta$  are normalized to 1.

variables on employment status are included to control for whether self-employed individuals or non-manual job workers have higher earnings than the manual job workers. We include two dummy variables related to firm characteristics: whether the firm the individual works for is wholly Hungarian owned or not (*HungarianOwned*), and whether the firm is owned exclusively or partly by the government.

We capture the effects of foreign migration experience on earnings by introducing dummy variables on migration in matrix D. In one specification, we have only one dummy variable capturing whether an individual has foreign experience or not. In the other specification, we introduce two dummy variables to account for the host country: OECD and non-OECD countries.<sup>12</sup> The reference category in the two specifications is not having been abroad. The coefficients for experience abroad are of great interest. If positive, then there is a premium to experience abroad. On the other hand, a negative coefficient indicates that the experience gathering had negative effects on performance in the domestic labor market. If what gathered abroad are "skills," a negative effect may imply that skills acquired abroad may be non-transferable, and that time away from the domestic labor market has hurt the worker.

The matrix Z in equation (2) includes, age, educational attainment, marital and family status, the size of the family and the number of children below 16 years old. Age and its square term are included to test the notion that probability of work rises with age only up to a point, and then declines. Investments in formal education are made with expectations of higher future earnings, so higher levels of education should increase the probability of working. Marital and family status are

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<sup>12</sup>In an earlier version of the paper, we also distinguished between European and non-European OECD destination countries in addition to non-OECD countries. However, as pointed out by a referee, given the relatively small number of individuals who went to non-European OECD countries, the data are not rich enough to warrant such distinction. We have therefore made our categorization into OECD versus non-OECD countries. The results that we present in the next section are qualitatively similar to our original specification.

also controlled for in the work status equation. The coefficients for the size of the family and the number of children below 16 years old are expected to be positive.

The matrix  $Q$  in the abroad equation above includes age, educational attainment and the locality in which an individual was raised.<sup>13</sup> Intuitively, younger individuals are more likely to go abroad and return migrate because they potentially have a longer life span during which to reap any returns from work experience abroad. However, since we do not know when the decision to migrate was made, the data only allows us to assess who might have migrated at some point in time. In this context, the coefficient for age is expected to be positive since older individuals have had more opportunities to decide to migrate.<sup>14</sup> Budapest at 14 is included to capture differences in the propensity to migrate and return migrate between those living in the capital and those living elsewhere. More educated individuals may have lower moving costs since they can gather information on job availability, etc., much more efficiently (see Schwartz (1973)). Moreover, education may bring an opportunity to go abroad, and, in some cases, allow for additional years of education for those who went abroad. However, the additional years of education an individual *may* undertake while abroad is dependent on the number of years of education he or she has when the migration decision was made.

#### ***4. Analysis of Results***

OLS estimates for men and women and the results are presented in the first columns of Tables 2 and 3, respectively. Here we consider the specification in which a single dummy variable

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<sup>13</sup>We excluded marital and family status, family size and the number of children from the migration equation (they are included in the labor market participation equation) because these pertain to changeable characteristics. For example, a person's marital status during the decision to go abroad may not be the same as we observe from the data in 1994. We do not have pre-migration information on those variables.

<sup>14</sup>We thank an anonymous referee for pointing this out.

captures whether an individual has foreign experience or not. The results indicate that the difference in earnings between men who have been abroad and men who have not been abroad is not statistically significant. Women who have been abroad earn about 25% more than those who have not been abroad.<sup>15</sup> However, the OLS estimates do not measure the true effect of migration on earnings because of the two self-selection issues we discussed in the previous section. We use maximum likelihood estimation to find the parameter estimates for the earnings equation. The MLE procedure also provides estimates for the coefficients of the two selection functions. These MLE are presented in columns 2 to 4 of Tables 2 and 3. Column 2 shows parameters of the earnings function, and columns 3 and 4 show coefficients for the labor market participation and migration choice equations.<sup>16</sup>

For both men and women, increased years of schooling and being in Budapest at age 14 significantly increases the probability of going abroad. The effect of education is larger for women than for men, while being in Budapest at age 14 is larger for men than for women. Age is significant for men but not for women.

The decision to work for men is positively related to age, being married, being the head of the household, and increased schooling. Neither family size nor number of children is significant. For women, larger family size and more children under 6 years of age is negatively related to working. The other results on women are similar to those for men.

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<sup>15</sup>These percentages are calculated following Kennedy's (1981) suggestion that the percentage change in semilog models when the independent variable is a dummy is  $\exp[\beta \cdot 0.5 V(\beta)] - 1$ , where  $\beta$  is the estimated coefficient and  $V(\beta)$  is the variance of  $\beta$ . All dummy variable coefficients are converted using this formula and these values are used in the discussion.

<sup>16</sup>The MLE results are very robust. We estimate the models with (presented in this paper) and without industry dummy variables for the full sample, and with/without industry dummy variables for the subsample excluding self-employed. We also estimate these models for those aged 25 or more to avoid the effects of education decision. The results of these tests can be obtained from the authors upon request.

Our estimates of the earnings equation using maximum likelihood are different from those using OLS. For men, the MLE coefficient on foreign experience is smaller than the OLS coefficient. MLE shows that some of the positive effects of going abroad on earnings in the OLS reflect the effect of self-selection into going abroad. This may be due to unmeasurable personal factors that make the return migrant's productivity higher (consequently earnings are larger). The finding implies that those who have been abroad would earn higher earnings even if they have not been abroad. The coefficient for the abroad variable for men is statistically insignificant. It is possible that skills acquired abroad have some wage premium, however, the lost "contact" of having gone abroad may have caused lower wages because of less chance for building networks, etc. These two opposing effects may have canceled each other out.

For women, the MLE coefficient on having been abroad is larger than the OLS coefficient. One explanation of the larger MLE coefficient estimate can be found from the negative correlation between unobserved characteristics in the earnings and migration equations in Table 3. Women who have been abroad may lack some desirable unobserved earnings capabilities, and this is not captured in the OLS estimates. However, by going abroad they acquire other characteristics (e.g., foreign experience) which the labor market rewards in the form of higher earnings. The earnings premium for women who have foreign experience is not only statistically significant at the 1% level but the coefficient is economically large. Female return migrants earn a premium of 40%.

Though we do not have a definitive answer why women who have foreign experience receive such a large premium, we do not find it surprising either. The period covered by the analysis is during the early stage of the transformation process. While this period was characterized by falling output, income and employment (see Kattuman and Redmond (1997)), knowledge about how "Western" economies operate is valuable. There is some anecdotal evidence that as Hungary moved toward a more open economy, women are, relative to men, negatively affected. This is because they

have more tenuous connection to their jobs (see Weil (1993)), hence are underpaid (relative to men with the same qualifications). Women who have not been abroad may have received wage cuts; those who have been abroad may have "skills" that are more sought after in an economy undergoing transition to a market economy, and, hence, do not experience wage cuts (or experience smaller cuts). The "premium" that we observe may have two components: 1) a premium from "skill" acquired abroad and, 2) women with foreign experience have not suffered from wage cuts during the transition phase.

Regarding the other coefficient estimates from maximum likelihood estimation, both men and women currently living in Budapest earn at least 13% more than those in other locations; for each additional year of education, earnings are at least 5% higher and each additional year of experience translates to at least a 1% premium, *ceteris paribus*. Not surprisingly, men in construction earn 39% more than those in the base industry trade and personal services (e.g., financial services and tourism, etc.); those in utilities and heavy industries earn 20% more. Those in other industries (e.g., food, textile, and other light industries) earn 15% more. On the other hand, women in health, school and other industries earn significantly less than those in trade and personal services. The effects range from 9% to 10%. Everything else the same, those working for wholly Hungarian owned firms earn significantly less-- men by 28% and women by 25%. As pointed out in section one, our data are taken from a period when Hungary embarked on full integration to the global economy and the period is characterized by significant joint ventures with foreign firms. Workers in foreign-owned firms might have higher skills that we, as researchers, cannot observe and/or firms with some foreign ownership may be willing to pay higher wages to attract the "best" in the workforce.

Surprisingly, individuals working for partly government owned firms earn about 12% more than those in fully privately owned firms. The ability of these types of enterprises to pay higher wages perhaps indicates some advantage to not fully privatizing formerly state owned enterprises.



Some government ownership allows a firm to take advantage of established partnerships with similar firms while some private ownership ensures the development of more efficient operations. It should be noted that Hungary did not embark on massive privatization of government owned enterprises during the early 1990s. Instead, it followed a gradual approach. It created the "...State Property Agency (SPA) to sell firms at full value to cash paying buyers, many of them foreign firms, either on the stock market, in open auctions, or after negotiations with the SPA. " (Rosser and Rosser (1996), p. 322). This approach, demanding full value, suggests that those privatized during the period are those with potential. An alternative explanation is that partly government owned firms are paying their employees a premium to discourage the "best" ones from leaving and joining either the newly set up enterprises or those fully privatized.

To better understand the source of the wage premium for women having gone abroad, instead of using a binary variable for experience abroad, we differentiate the host countries by introducing two dummy variables for host "regions." Our maxtix D now includes two dummy variables to account for differences in how alternative host countries affect earnings in Hungary. The two dummies account for when an individual has been to an OECD country and for when an individual has been to a non-OECD country. The reference "region" is not having gone abroad. The likelihood function, equation (4), still has four components; however, the error term in the first component of the likelihood function should be adjusted accordingly. Maximizing this "revised" likelihood function gives us the estimates of all coefficients in the three equations simultaneously.<sup>17</sup> The results of this estimation are in Tables 4 and 5.

From the MLE estimates, we find that the coefficient estimates are similar to those when host

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<sup>17</sup>Ideally, we would like to have index functions accounting for which regions migrants go to. Data limitations prevent this. However, we can differentiate in the earnings part of the likelihood function between host regions, while accounting for selection using a generalized "gone abroad" specification.

countries are not differentiated. Focusing on the foreign experience variable, we again find that men earn no wage premium over those who have not been abroad. Women who have been to OECD countries earn a 67% premium over those who have not been abroad. It is not surprising to find that the non-OECD coefficient is insignificant. As we argued in section one, in the context of an economy undergoing transformation and full integration to the global economy, foreign work experience in OECD countries might have a higher wage premium. This could be a premium for actual skills learned, knowledge of foreign language or exposure to Western work ethic. Returns to foreign experience are driven by the rewards to women who went to OECD countries.

## ***5. Conclusion***

We address the issue of the returns to foreign experience, asking what difference foreign experience makes to the earnings of those return migrants who enter the labor force once back in Hungary. Using the Hungarian Household Panel Survey, we find that there are large differences in the returns to foreign experience across gender and among host countries in which the experience occurred. Two distinct selection issues are considered in the estimation of the earnings equation. Rather than using the Heckman's two-step technique, we implement a maximum likelihood estimation. MLE is easy to implement owing to the progress of inexpensive and high speed computing, and allows us jointly to account for our two selection issues in our earnings estimation. Indeed it is surprising to us that this is not the preferred methodology.

Two factors may be behind the result why foreign experience matters for women and not for men. First, there is a clear dichotomy in the types of industry men and women enter. The results suggest that the types of industries men enter (e.g., heavy industries and construction) do not offer any wage premium for foreign experience; while the industries women enter are exactly those industries where foreign experience matters (e.g., financial services). Second, say there is wage

premium to having gone abroad, the insignificant abroad coefficient for men suggests that "lost" contact through having gone abroad may have resulted in lower wages. These opposing effects lead to an insignificant abroad coefficient.

## Appendix

The stochastic terms ( $v$ ,  $\zeta$ ,  $e$ ) follow a joint normal distribution with mean zero and the following variance-covariance matrix:

$$\Sigma = \begin{bmatrix} \sigma_v^2 & \sigma_{v\zeta} & \sigma_{ve} \\ & \sigma_\zeta^2 & \sigma_{\zeta e} \\ & & \sigma_e^2 \end{bmatrix},$$

where  $\sigma_v^2$  and  $\sigma_\zeta^2$  are normalized to 1.

The likelihood function for non-participants is simply the bivariate distribution of  $v$  and  $\zeta$  with correlation coefficient  $\rho_{v\zeta}$ . For participants, the likelihood function can be factored into the conditional distribution of  $v$  and  $\zeta$  given  $e$ , and marginal density of  $e$ . Conditional means of  $v$  and  $\zeta$  given  $e$  are denoted as  $\mu_{v|e}$  and  $\mu_{\zeta|e}$  respectively, and computed as follows:

$$\begin{aligned} \mu_{v|e} &= \rho_{ve} \frac{\sigma_v}{\sigma_e} e, \quad \text{and} \\ \mu_{\zeta|e} &= \rho_{\zeta e} \frac{\sigma_\zeta}{\sigma_e} e, \end{aligned}$$

where  $\rho_{ve}$  and  $\rho_{\zeta e}$  are correlation coefficients between  $v$  and  $e$ , and between  $\zeta$  and  $e$ .

The conditional variance and covariance of  $v$  and  $\zeta$  given  $e$  are denoted as  $\sigma_{v|e}^2$ ,  $\sigma_{\zeta|e}^2$  and  $\sigma_{v\zeta|e}$  respectively. The correlation coefficient between  $v$  and  $\zeta$  conditional on  $e$  is denoted as  $\rho_{v\zeta|e}$ .

They are computed as follows:

$$\begin{aligned}\sigma_{v|e}^2 &= \sigma_v^2(1 - \rho_{ve}^2), \\ \sigma_{\zeta|e}^2 &= \sigma_\zeta^2(1 - \rho_{\zeta e}^2), \\ \sigma_{v\zeta|e} &= (\rho_{v\zeta} - \rho_{ve}\rho_{\zeta e})\sigma_v\sigma_\zeta, \text{ and} \\ \rho_{v\zeta|e} &= \frac{\sigma_{v\zeta|e}}{\sigma_{v|e}\sigma_{\zeta|e}}.\end{aligned}$$

The likelihood function is given as follows:

$$\begin{aligned}L = & \prod_{P,A} \Psi\left(\frac{Z\gamma + \mu_{v|e}}{\sigma_{v|e}}, \frac{Q\theta + \mu_{\zeta|e}}{\sigma_{\zeta|e}}, \rho_{v\zeta|e}\right) \cdot \frac{1}{\sigma_e} \cdot \phi\left(\frac{Y - X\beta - D\alpha}{\sigma_e}\right) \\ & \prod_{P,NA} \Psi\left(\frac{Z\gamma + \mu_{v|e}}{\sigma_{v|e}}, -\frac{Q\theta + \mu_{\zeta|e}}{\sigma_{\zeta|e}}, -\rho_{v\zeta|e}\right) \cdot \frac{1}{\sigma_e} \cdot \phi\left(\frac{Y - X\beta}{\sigma_e}\right) \\ & \prod_{NP,A} \Psi\left(-\frac{Z\gamma}{\sigma_v}, \frac{Q\theta}{\sigma_\zeta}, -\rho_{v\zeta}\right) \\ & \prod_{NP,NA} \Psi\left(-\frac{Z\gamma}{\sigma_v}, -\frac{Q\theta}{\sigma_\zeta}, \rho_{v\zeta}\right)\end{aligned}\tag{4'}$$

where  $\phi$  and  $\Psi$  are the standard univariate normal density and the standard bivariate normal distribution function.

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Table 1. Average Values of the Variables

Variables	Men		Women	
	Not Been Abroad	Been Abroad	Not Been Abroad	Been Abroad
Sample Size, all observations	1387	111	1591	56
Age	39.23	42.97*	41.01	40.84
Education	10.08	11.69*	10.03	12.75*
Marital Status	0.645	0.775*	0.647	0.607
Family Status	0.683	0.856*	0.194	0.304
Family Size	3.609	3.523	3.417	3.161
Children < 6	0.259	0.198	0.245	0.179
Budapest at 14	0.105	0.306*	0.121	0.286*
% working	52.63	68.47*	47.71	64.29**
Sample Size, those working	730	76	759	36
Age	37.48	41.21*	37.61	39.44
Education	10.86	11.83*	11.03	13.31*
Marital Status	0.722	0.829**	0.669	0.639
Family Status	0.796	0.882	0.216	0.361
Family Size	3.659	3.737	3.436	3.167
Children < 6	0.322	0.197	0.159	0.167
Budapest at 14	0.130	0.329*	0.163	0.250
Natural Log Monthly Earnings	9.739	9.930*	9.481	9.883*
BudapestNow	0.158	0.263**	0.184	0.417*
Years working	19.49	22.21**	19.17	17.47
Benefits	0.663	0.671	0.706	0.722
Training	0.112	0.145	0.141	0.306*
Heavy Industry	0.181	0.250	0.099	-
Construction	0.066	0.145**	0.018	-
Other Industries	0.119	0.039**	0.149	0.083
Utilities	0.108	0.053	0.054	0.083
Health	0.040	0.026	0.129	0.222
School	0.045	0.118*	0.166	0.250
State	0.099	0.079	0.099	0.056
Other services	0.121	0.105	0.059	0.111
Trade	0.116	0.118	0.184	0.194
Agriculture	0.105	0.066	0.042	-
Self-employed	0.101	0.079	0.054	-
Non-manual	0.249	0.355	0.462	0.722*
FullGovOwned	0.334	0.368	0.408	0.500
PartGovOwned	0.152	0.132	0.152	0.083
HungarianOwned Firm	0.971	0.895*	0.980	0.917*
OECD	-	0.632	-	0.444
Non-OECD countries	-	0.368	-	0.556

Note: For both males and females, the null hypothesis tested is that the mean of those been abroad is equal to that of those who have not been abroad. \* and \*\* imply that the null is rejected at the 1% and 5% level of significance, respectively.

Table 2. Effects of Migration on Earnings, Men

	OLS		MLE			
	Log Earnings		Log Earnings		Choice of Labor Market Participation	Choice of Migration
Constant	8.924*	(0.135)	9.190*	(0.155)	-3.600* (0.389)	-3.026* (0.242)
Age					0.134* (0.019)	0.009* (0.003)
Age <sup>2</sup> /100					-0.205* (0.023)	
Marital Status					0.203*** (0.106)	
Family Status					0.803* (0.118)	
Family Size					-0.008 (0.032)	
Children < 6					0.010 (0.079)	
Budapest at 14						0.561* (0.127)
BudapestNow	0.150*	(0.042)	0.149*	(0.043)		
Education	0.064*	(0.009)	0.054*	(0.010)	0.131* (0.016)	0.103* (0.019)
Years working	0.021*	(0.005)	0.011** (0.005)			
Yrswrk <sup>2</sup> /100	-0.033* (0.011)		-0.009 (0.012)			
Benefits	0.015 (0.038)		0.012 (0.040)			
Training	0.041 (0.050)		0.032 (0.037)			
Heavy Industry	0.193* (0.060)		0.188* (0.059)			
Construction	0.333* (0.073)		0.331* (0.084)			
Other Industries	0.145** (0.066)		0.138** (0.065)			
Utilities	0.196* (0.068)		0.189** (0.075)			
Health	-0.079 (0.092)		-0.073 (0.077)			
School	-0.020 (0.086)		-0.019 (0.090)			
State	0.073 (0.068)		0.067 (0.066)			
Other services	0.169* (0.062)		0.166** (0.077)			
Agriculture	-0.028 (0.066)		-0.031 (0.066)			
Self-employed	0.160** (0.062)		0.150*** (0.087)			
Non-manual	0.130* (0.049)		0.134* (0.048)			
HungarianOwned	-0.327* (0.084)		-0.327* (0.090)			
FullGovOwned	-0.021 (0.038)		-0.018 (0.037)			
PartGovOwned	0.062 (0.047)		0.059 (0.040)			
Abroad	0.038 (0.052)		0.011 (0.074)			
$\sigma_e$			0.428* (0.020)			
$\rho_{ue}$			-0.352* (0.072)			
$\rho_{\zeta e}$			0.030 (0.047)			
$\rho_{u\zeta}$			0.039 (0.075)			
Adj. R <sup>2</sup>	0.269					
F-stat	15.134					
N	806				1498	

Note: The numbers in parentheses are the standard errors.

\*, \*\* and \*\*\* mean statistically significant at 1%, 5% and 10% respectively.



Table 3. Effects of Migration on Earnings, Women

	OLS		MLE			
	Log Earnings		Log Earnings		Choice of Labor Market Participation	Choice of Migration
Constant	8.748*	(0.126)	8.663*	(0.162)	-4.636* (0.367)	-3.821* (0.367)
Age					0.240* (0.021)	0.006 (0.005)
Age <sup>2</sup> /100					-0.338* (0.026)	
Marital Status					0.280** (0.109)	
Family Status					0.424* (0.129)	
Family Size					-0.057*** (0.034)	
Children < 6					-0.712* (0.085)	
Budapest at 14						0.262*** (0.154)
BudapestNow	0.126*	(0.036)	0.122*	(0.034)		
Education	0.062*	(0.008)	0.064*	(0.009)	0.111* (0.015)	0.153* (0.027)
Years working	0.021*	(0.004)	0.025*	(0.006)		
Yrswrk <sup>2</sup> /100	-0.037*	(0.011)	-0.047*	(0.014)		
Benefits	0.083**	(0.033)	0.088*	(0.034)		
Training	0.049	(0.040)	0.050	(0.041)		
Heavy Industry	-0.025	(0.054)	-0.026	(0.056)		
Construction	-0.005	(0.106)	-0.005	(0.089)		
Other Industries	-0.086***	(0.047)	-0.089**	(0.045)		
Utilities	-0.060	(0.066)	-0.062	(0.070)		
Health	-0.097***	(0.052)	-0.102**	(0.047)		
School	-0.097***	(0.051)	-0.099**	(0.048)		
State	-0.056	(0.055)	-0.060	(0.057)		
Other services	-0.074	(0.062)	-0.073	(0.080)		
Agriculture	0.080	(0.074)	0.078	(0.091)		
Self-employed	0.022*	(0.069)	0.022**	(0.094)		
Non-manual	0.124*	(0.039)	0.125*	(0.040)		
HungarianOwned	-0.291*	(0.091)	-0.288*	(0.081)		
FullGovOwned	-0.042	(0.035)	-0.044	(0.035)		
PartGovOwned	0.125*	(0.042)	0.122*	(0.043)		
Abroad	0.227*	(0.065)	0.344*	(0.106)		
$\sigma_e$			0.366*	(0.016)		
$\rho_{ue}$			0.155	(0.128)		
$\rho_{\zeta_e}$			-0.153***	(0.092)		
$\rho_{u\zeta}$			0.008	(0.103)		
Adj. R <sup>2</sup>	0.330					
F-stat	19.646					
N	795				1647	

Note: The numbers in parentheses are the standard errors.

\*, \*\* and \*\*\* mean statistically significant at 1%, 5% and 10% respectively.

Table 4. Effects of Migration on Earnings, Men with Host Countries

	OLS		MLE			
	Log Earnings		Log Earnings		Choice of Labor Market Participation	Choice of Migration
Constant	8.919*	(0.135)	9.188*	(0.155)	-3.599* (0.389)	-3.025* (0.242)
Age					0.133* (0.019)	0.009* (0.003)
Age <sup>2</sup> /100					-0.205* (0.023)	
Marital Status					0.203*** (0.106)	
Family Status					0.804* (0.118)	
Family Size					-0.008 (0.032)	
Children < 6					0.011 (0.079)	
Budapest at 14						0.561* (0.127)
BudapestNow	0.148*	(0.042)	0.147*	(0.044)		
Education	0.064*	(0.009)	0.054*	(0.010)	0.131* (0.016)	0.103* (0.019)
Years working	0.021*	(0.005)	0.011** (0.005)			
Yrswrk <sup>2</sup> /100	-0.033* (0.011)		-0.009 (0.012)			
Benefits	0.015 (0.038)		0.012 (0.040)			
Training	0.042 (0.050)		0.034 (0.037)			
Heavy Industry	0.191* (0.060)		0.186* (0.060)			
Construction	0.330* (0.073)		0.327* (0.084)			
Other Industries	0.145** (0.066)		0.138** (0.065)			
Utilities	0.195* (0.068)		0.188** (0.075)			
Health	-0.079 (0.092)		-0.073 (0.077)			
School	-0.022 (0.086)		-0.021 (0.090)			
State	0.076 (0.068)		0.071 (0.066)			
Other services	0.169* (0.062)		0.166** (0.077)			
Agriculture	-0.026 (0.066)		-0.029 (0.065)			
Self-employed	0.159** (0.062)		0.149*** (0.087)			
Non-manual	0.129* (0.049)		0.133* (0.048)			
HungarianOwned	-0.325* (0.084)		-0.325* (0.091)			
FullGovOwned	-0.019 (0.039)		-0.016 (0.037)			
PartGovOwned	0.064 (0.047)		0.061 (0.040)			
OECD	0.074 (0.065)		0.049 (0.096)			
Non-OECD countries	-0.022 (0.082)		-0.060 (0.101)			
$\sigma_e$			0.429* (0.020)			
$\rho_{ue}$			-0.356* (0.072)			
$\rho_{\zeta_e}$			0.033 (0.048)			
$\rho_{v\zeta}$			0.038 (0.075)			
Adj. R <sup>2</sup>	0.269					
F-stat	14.487					
N	806				1498	

Note: The numbers in parentheses are the standard errors.

\*, \*\* and \*\*\* mean statistically significant at 1%, 5% and 10% respectively.

Table 5. Effects of Migration on Earnings, Women with Host Countries

	OLS		MLE			
	Log Earnings		Log Earnings		Choice of Labor Market Participation	Choice of Migration
Constant	8.757*	(0.126)	8.663*	(0.160)	-4.634* (0.368)	-3.817* (0.365)
Age					0.239* (0.021)	0.006 (0.005)
Age <sup>2</sup> /100					-0.338* (0.026)	
Marital Status					0.281* (0.109)	
Family Status					0.425* (0.129)	
Family Size					-0.057*** (0.037)	
Children < 6					-0.713* (0.085)	
Budapest at 14						0.257*** (0.153)
BudapestNow	0.125*	(0.036)	0.121*	(0.034)		
Education	0.061*	(0.008)	0.063*	(0.009)	0.111* (0.015)	0.153* (0.027)
Years working	0.022*	(0.004)	0.025*	(0.006)		
Yrswrk <sup>2</sup> /100	-0.038*	(0.011)	-0.049*	(0.014)		
Benefits	0.087*	(0.033)	0.091*	(0.033)		
Training	0.048	(0.040)	0.049	(0.042)		
Heavy Industry	-0.023	(0.054)	-0.024	(0.056)		
Construction	-0.001	(0.105)	-0.001	(0.089)		
Other Industries	-0.084***	(0.047)	-0.087***	(0.046)		
Utilities	-0.056	(0.066)	-0.059	(0.071)		
Health	-0.095***	(0.052)	-0.100**	(0.047)		
School	-0.092***	(0.051)	-0.094***	(0.048)		
State	-0.053	(0.055)	-0.058	(0.058)		
Other services	-0.080	(0.062)	-0.079	(0.077)		
Agriculture	0.082	(0.073)	0.080	(0.091)		
Self-employed	0.222*	(0.069)	0.225**	(0.094)		
Non-manual	0.123*	(0.039)	0.124*	(0.040)		
HungarianOwned	-0.298*	(0.090)	-0.295*	(0.077)		
FullGovOwned	-0.039	(0.035)	-0.041	(0.035)		
PartGovOwned	0.125*	(0.042)	0.122*	(0.043)		
OECD	0.417*	(0.095)	0.523*	(0.150)		
Non-OECD countries	0.078	(0.085)	0.188	(0.115)		
$\sigma_e$			0.364*	(0.016)		
$\rho_{ue}$			0.167	(0.131)		
$\rho_{\zeta e}$			-0.141	(0.100)		
$\rho_{u\zeta}$			0.009	(0.103)		
Adj. R <sup>2</sup>	0.336					
F-stat	19.251					
N	795				1647	

Note: The numbers in parentheses are the standard errors.

\*, \*\* and \*\*\* mean statistically significant at 1%, 5% and 10% respectively.