

Epstein, Gil S.; Mealem, Yosef

Working Paper

Interactions between local and migrant workers at the workplace

Working Paper, No. 2010-12

Provided in Cooperation with:

Department of Economics, Bar-Ilan University

Suggested Citation: Epstein, Gil S.; Mealem, Yosef (2010) : Interactions between local and migrant workers at the workplace, Working Paper, No. 2010-12, Bar-Ilan University, Department of Economics, Ramat-Gan

This Version is available at:

<https://hdl.handle.net/10419/96086>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

Interactions between local and migrant workers at the workplace¹

by

Gil S. Epstein

Bar-Ilan University, Israel and CReAM, London, IZA, Bonn

and

Yosef Mealem

Netanya Academic College, Netanya, Israel

July 2010

Abstract

In this paper we consider the interaction between local workers and migrants in the production process of a firm. Both local workers and migrants can invest effort in assimilation activities in order to increase the assimilation of the migrants into the firm and so by increase their interaction and production activities. We consider the effect, the relative size (in the firm) of each group and the cost of activities, has on the assimilation process of the migrants.

JEL Codes: D74; F230; I20; J61; L140

Keywords: Assimilation; Contracts; Ethnicity; Market Structure; Networks; harassment

¹ Financial support from the Adar Foundation of the Economics Department of Bar-Ilan University is gratefully acknowledged.

1. Introduction

Studies of minorities around the world show, with few exceptions, that they tend to earn wages substantially below those of comparable general workers (Altonji and Blank 1999, Blau and Kahn, 2006, 2007, Bhaumik, Gang and Yun, 2006). In part, this reflects a failure on the part of the minority group to undertake the effort to assimilate (Constant, Gataullina and Zimmermann, 2008). This failure can be caused in the face of high adjustment costs, such as inadequate language skills, intergenerational familial conflicts, and, in the case of immigrants, lack of knowledge about the host country's labor market (Chiswick and Miller, 1995, 1996, Bauer, Epstein and Gang, 2005, Epstein and Gang, 2009). On occasion, minority workers outperform the other workers (Chiswick, 1977, Deutsch, Epstein and Lecker, 2006).

Efforts of the migrants to assimilate and efforts by the local population to accept them and to bring them into line with the local population are made. Often, the locals are less than welcoming, blaming the newcomers for depressing wages and displacing current workers – i.e., causing unemployment. This presumption has very strong policy implications and is implicit, for example, in the calls for increased regulations about immigration that are heard worldwide. Yet, there is mixed evidence about the impact of minorities on wages and employment – it depends on whether they are substitutes or complement the current workers, with respect to the skills and other attributes which they bring to the labor market (Gang and Rivera-Batiz 1994, Gang, Rivera-Batiz and Yun 2002). Whether minorities actually lower wages and increase employment or not, the perception exists that they do. Because of this perception the majority may take active steps to discourage minority assimilation – discrimination, isolation, and so on (see Epstein and Gang, 2006, 2009).

Often the efforts of both parties are mediated through political institutions. These institutions exist in both the minority and majority worlds. They could be, for example, political parties, trade organizations, unions, or thugs. These are organizations which are able to overcome the free-rider problems individual members of each group have, in moving from the actions they desire to take, to actually taking them. Yet, while an organization's purpose may be to represent the members of their group, the interests of the organization and that of its members do not always coincide (see, for example, Alesina and La Ferrara, 2000, Anas, 2002, Dustmann, Fabbri and Preston, 2004, Kahanec, 2006, Lazear, 1999 and Epstein and Gang, 2009).

We are interested in why minorities are so often at a disadvantage relative to the majority. Assimilation efforts by the minority and the local population are elements which determine how well the minority does in comparison to the local population. We examine the consequences of increases in the numbers migrants, the local population and the relationship in the production function of the firm where both work. We construct a model in which there are two actors: the local working population and the migrants working at the same firm and their interaction within the firm, in terms of production.

Our study shows that the structure of the firm, the number of migrants and local population are curtailed for the assimilation process. Moreover the cost of investment is an important component and can be affected by incentives made by the employer or public policy. More specifically, we show that increasing the number of migrants in a certain firm will decrease the investment in assimilation activities by all workers both local and migrants. In general, we show that it is better for both the local worker and the migrant when the local workers will be in separate firms. However this is not always the case and many firms with migrants and locals working together exist. In this paper we consider the effects the size of the population of migrants and local workers have on the assimilation efforts of both types of workers. We also consider the effect the cost of investment in assimilation activities has on the assimilation process of the migrants in the firm.

2. The Model

Consider a firm which has both locals L ($L > 1$), and migrants, (foreign workers), F ($F > 1$). For simplicity, we assume that there is only one group of migrants. The efficiency/productivity level of the local workers and the migrants may not be identical. We normalize the efficiency level of local population workers to unity. The migrants' productive/efficiency level depends on two main factors: 1. the investment made by the migrant to assimilate, a , and 2. the effort invested by local worker to help the migrant assimilate into the working place, b . We assume that the production function has the following form:

$$(1) \quad X = f \left[L, \underbrace{F \left(\frac{a + bL^\alpha + 1}{\beta} \right)}_G \right]$$

where $G = F \left(\frac{a + bL^\alpha + 1}{\beta} \right)$ is the effectiveness of F migrant workers. Let us explain

this further. To assimilate *one* migrant worker each migrant invest a units for himself and each local worker invests b units. bL^α means that, despite the fact that each local worker invests b units in one migrant worker, the impact of L local workers on the assimilation of one migrant worker equals to bL^α . Note that $\alpha > 0$ is a marginal effect that L local workers have on the effective number of migrant workers. As α increases the local workers have a stronger impact on the assimilation of the migrants. If both the local workers and the migrants do not invest efforts for the assimilation of the migrants, the effectiveness of one migrant worker equals to $\frac{1}{\beta}$. Thus the

effectiveness of F migrants will equal to: $\left(\frac{a + bL^\alpha + 1}{\beta} \right)$. Therefore the term

$G = F \left(\frac{a + bL^\alpha + 1}{\beta} \right)$ represents the effective number of migrants working. It is

assumed that the production function has decreasing returns to scale and satisfies

$$f_G > 0, f_L > 0, f_{GG} < 0, f_{LL} < 0.$$

Let us consider a representative of the local workers and of the migrants. Each representative determines the optimal effort invested in the assimilation process. We assume that there is no free-riding and each worker invests according to the investment of the representative worker of their group. Denote by c the cost of investing one unit to assimilate by the migrant. d is the ratio between the costs of investment of the local worker and the migrant for each unit invested. Thus, the cost of one unit invested by the local worker equals: cd . For $d=1$ the cost of investment by the local worker and the migrant are identical. If d is smaller (greater) than the unit, the cost for the migrant is higher (lower) than that of the local worker. Since each local worker invests b units to help each migrant assimilate, the total effort invested by a local worker for F migrants would be bF .

It is assumed that the utility each worker obtains equals their wages (equaling the marginal productivity) minus the cost of investing in assimilation activities. The utility of a representative migrant will equal :

$$(2) \quad U^F = f_G \left(\frac{a + bL^\alpha + 1}{\beta} \right) - ca$$

The utility of a representative local worker will equal:

$$(3) \quad U^L = f_L + \frac{f_G \alpha b L^{\alpha-1} F}{\beta} - dc b F$$

Both the migrant and the local worker determine their investment in assimilation activities by maximizing the utility. The first order conditions for maximization of the utility of both the migrants and the local works with respect to a and b are given by:

$$(4) \quad U_a^F = \frac{f_G}{\beta} + \frac{f_{GG} F (a + bL^\alpha + 1)}{\beta^2} - c = 0$$

and

$$(5) \quad U_b^L = \frac{f_{LG} L^\alpha F}{\beta} + \frac{f_G \alpha L^{\alpha-1} F}{\beta} + \frac{f_{GG} \alpha b L^{2\alpha-1} F^2}{\beta^2} - dc F = 0$$

We assume that the second order conditions hold²

Denote by a^* and b^* the optimal investment in assimilation activities invested by the foreign workers and the local workers respectively (thus a^* and b^* are the outcome of the first order condition defined in (4) and (5)).

² The second order condition must satisfy: $U_{aa}^F = \frac{2f_{GG} F}{\beta^2} + \frac{f_{GGG} F^2 (a + bL^\alpha + 1)}{\beta^3} < 0$,

$U_{bb}^L = \frac{f_{LGG} L^{2\alpha} F^2}{\beta^2} + \frac{2f_{GG} \alpha L^{2\alpha-1} F^2}{\beta^2} + \frac{f_{GGG} \alpha b L^{3\alpha-1} F^3}{\beta^3} < 0$. Given this the Hessian

$H = \frac{f_{GGG} f_{GG} \alpha L^{2\alpha-1} F^4 (a + bL^\alpha + 1)}{\beta^5} + \frac{2(f_{GG})^2 \alpha L^{2\alpha-1} F^3}{\beta^4}$ is positive since we assume $U_{aa}^F < 0$ and

$f_{GG} < 0$. If we assume that $f_{GGG} = f_{LGG} = f_{LLG} = 0$ then the second order conditions hold. We will be making this assumption later on in the paper.

Let us now consider how the investment, of the different type of workers, changes the differing parameters which identify both the production and the cost functions.

We start by considering how a change in the number of migrants in the firm affects their own investment to assimilate.

$$(6) \quad \frac{\partial a^*}{\partial F} = -\frac{a^* + 1}{F} < 0$$

This result states that *increasing the number of migrants decreases the investment of each worker in assimilation activities.*

The reason for this result is twofold: 1. increasing the number of migrants, against the number of local workers, increases the proportion of immigrants in the firm and, as a result, the assimilation is not so curtailed with respect to production and wages, and 2. the total effect of assimilation affects the activities of the migrants, thus, as their numbers increase, each can decrease his/her efforts but the total investment could still increase.³

We would thus expect to see firms, with a large number of migrants, investing less effort in assimilation activities than a firm with a small number of migrants. A policy implication, in this case, could be to divide the migrants into as many firms as possible, in order to increase assimilation.

Let us now consider how an increase in the number of migrants affects the investment of the local population. We can verify that,

$$(7) \quad \frac{\partial b^*}{\partial F} = -\frac{b^*}{F} < 0$$

This result states that *increasing the number of migrants decreases the local workers' investment in each of the migrants.*

³ On different aspects of the optimal size of minorities and the size affect on society, see Gradstein and Schiff (2006) and Gradstein and Justman (2005) and Rapoport and Weiss (2003)

The main reason for this result is that increasing the number of migrants increases the local workers' marginal investment cost . This is true since each local worker invests efforts in assimilating each migrant and thus increases their marginal investment cost. Increasing the marginal cost decreases the investment in each migrant.

Let us now consider how an increase in the number of migrants affects the total investment made by each party: $(a^* F + Lb^* F)$. We can see that $\frac{\partial(a^* F)}{\partial F} = -1$ and $\frac{\partial(Lb^* F)}{\partial F} = L \frac{\partial(b^* F)}{\partial F} = 0$, which means that increasing F would decrease the total effort made by the migrants (the elasticity of a with respect to F is $\frac{\partial a^* F}{\partial F a^*} = -\left(\frac{a^* + 1}{a^*}\right) < -1$) but the total investment the local workers (or worker) invests in *all* the migrants is unchanged (the elasticity of b with respect to F is $\frac{\partial b^* F}{\partial F b^*} = -1$).

Thus, even though the effort invested by the migrants may decrease, the total investment of the local population will not change. However the effect it has on each migrant will decrease, since the number of migrants has increased.

Given that the third derivatives equal or are close to zero $f_{GGG} = f_{LGG} = f_{LLG} = 0^4$ (see Epstein and Gang, 2009) we obtain that the effect of a change in the number of local workers on the assimilation of the migrants and local workers can be written as follows:⁵

⁴ Since $f_{GG} < 0$ the second order conditions hold: $U_{aa}^F = \frac{2f_{GG}F}{\beta^2} < 0$, $U_{bb}^L = \frac{2f_{GG}\alpha L^{2\alpha-1}F^2}{\beta^2} < 0$

and the Hessian $H = \frac{2(f_{GG})^2 \alpha L^{2\alpha-1} F^3}{\beta^4}$ is positive.

⁵ When the third derivatives do not equal zero we get:

$$\frac{\partial a^*}{\partial L} = \frac{\left[\frac{f_{LG}L^{2\alpha-1}F}{\beta} + \frac{f_{LLG}L^{2\alpha}F}{\beta} + dcL^{\alpha-1}F(\alpha-1) \right] U_{aa}^F - \frac{f_{LGG}F(a+1)}{\beta^2} U_{bb}^L + \left[\frac{f_{GGG}\alpha L^{2\alpha-1}F^3(a+1)}{\beta^4} - \frac{f_{LGG}L^{2\alpha}F^2}{\beta^3} \right] \left[f_{LG} + \frac{f_{LGG}bL^\alpha F}{\beta} \right]}{H}$$

and

$$(9) \quad \frac{\partial a^*}{\partial L} = \frac{[f_{LG}L^\alpha + \beta dc(\alpha - 1)]FL^{\alpha-1}U_{aa}^F}{\beta H}$$

and

$$(10) \quad \frac{\partial b^*}{\partial L} = \frac{\left(-\frac{\alpha f_{GG}F}{L\beta^2}\right) \left[4L^{\alpha-1}F(\alpha - 1) \left(c - \frac{f_{GG}F(a+1)}{\beta^2}\right) + \frac{2f_{GG}bL^{2\alpha-1}F^2}{\beta^2} + \frac{f_{LG}L^\alpha F}{\beta}\right]}{H}$$

From (10) we can see that increasing the number of local workers in the firm will decrease their efforts ($\frac{\partial b^*}{\partial L} < 0$) if the two categories of workers are rivals, $f_{LG} < 0$,

and the marginal effect of L local workers on the effective number of migrant workers is less than one, $\alpha < 1$. Let us explain this result. If the two groups of workers are rivals, $f_{LG} < 0$, then increasing L will decrease the marginal productivity of the effective migrant worker (f_G decreases) but on the other hand increasing L will enhance the assimilation process of the migrants (L^α increases). But if $\alpha < 1$ then the former effect is stronger than the latter so that as a result the local worker will his/her decrease efforts. Given this, and given the fact that $\frac{\partial a^*}{\partial L} > 0$ if and only if

$f_{LG}L^\alpha + \beta dc(\alpha - 1) < 0$ (from (9)), we see that the migrants increase their efforts to compensate for the reduction of the local population.

Another sufficient condition for an increase in the local populations' efforts to assimilate the migrants is $d < L^{\alpha-1}$ (the proof is presented in Appendix 1). The results state that if the marginal effect of L local workers on the number of migrant workers is greater than one, $\alpha > 1$, and the cost of investment by the local population is

$$\begin{aligned} & -\frac{f_{GGG}L^{\alpha-2}F^3}{\beta^4} [f_{LG}\alpha L(a+1) + f_G\alpha(\alpha-1)(a+bL^\alpha+1)] \\ & - \left[\frac{f_{LLG}L^\alpha F}{\beta} + \frac{f_{GG}\alpha bL^{2\alpha-2}F^2(2\alpha-1)}{\beta^2} + \frac{f_G L^{\alpha-2}F\alpha(\alpha-1)}{\beta} \right] U_{aa}^F \\ & + \frac{f_{LGG}f_{GG}\alpha L^{\alpha-1}F^3(a-bL^\alpha+1)}{\beta^4} - \frac{f_{LG}f_{GG}\alpha L^{\alpha-1}F^2}{\beta^3} \\ & - \frac{2f_Gf_{GG}L^{\alpha-2}F^2\alpha(\alpha-1)}{\beta^3} + \frac{f_{LGG}f_{LG}L^\alpha F^2}{\beta^3} + \frac{(f_{LGG})^2 L^\alpha F^3(a+bL^\alpha+1)}{\beta^4} \end{aligned}$$

$$\frac{\partial b^*}{\partial L} = \frac{H}{H}$$

smaller than that of the migrants, $d < 1$, then increasing the local population will force the migrants to divert more efforts into their assimilation activities.

Let us now consider how the cost of investing in the assimilation efforts affects those made by both parties.

We start by analyzing the increasing cost of investment made by the local population only. We thus ask what would happen if d increases. The result is straightforward:

1. The investment by the migrants will increase: $\frac{\partial a^*}{\partial d} = -\frac{\beta^2 c L^{1-\alpha}}{f_{GG} \alpha F} > 0$.
2. The investment by the local population will decrease: $\frac{\partial b^*}{\partial d} = \frac{\beta^2 c}{f_{GG} \alpha L^{2\alpha-1} F} < 0$

The results show that increasing the cost, of the local population's investment, will decrease their efforts (substitution effect). However since their efforts have decreased the migrants must increase their efforts to compensate .

Now let us analyze the position when the cost of investment increases for both parties (an increase in c):

1. The migrants investment will increase if and only if ⁶ $\alpha L^{\alpha-1} < d$. If the cost of the local population is greater than that of the migrants, $d > 1$, and the marginal effect of L local workers on the effective number of migrant workers is not higher than one, $\alpha \leq 1$ then increasing both costs will force the migrants to increase their efforts in equilibrium.

⁶ $\frac{\partial a^*}{\partial c} = \frac{L^{1-\alpha} \beta^2}{f_{GG} \alpha F} \left[\frac{L^{\alpha-1} (f_{LGG} \beta L + 2 f_{GG} \alpha \beta + f_{GGG} \alpha b L^\alpha F)}{2 f_{GG} \beta + f_{GGG} F (a + b L^\alpha + 1)} - d \right]$ thus given that the third derivatives equal to zero $f_{GGG} = f_{LGG} = f_{LLG} = 0$ we get $\frac{\partial a^*}{\partial c} = \frac{L^{1-\alpha} \beta^2}{f_{GG} \alpha F} (\alpha L^{\alpha-1} - d)$.

2. The local population's efforts will increase if and only if⁷ $d < 0.5\alpha L^{\alpha-1}$.

From the results presented above, it cannot be that both parties will increase their efforts as a result of increasing costs. Moreover, increasing costs may increase or decrease the migrants' efforts as long as the local workers decrease theirs (if d is "high", namely $0.5\alpha L^{\alpha-1} < d$). In that case the natural effect, the substitution effect, of increasing the investment cost to the local workers would be a decrease in their efforts. However, with regard to the migrants, we get two contradicting effects. On the one hand, as shown above, increasing the cost to the local population will increase the effort of the migrants (effect 1). On the other hand, increasing the cost to the migrants will decrease their efforts (effect 2). Above, we have presented the condition which shows the effect that is stronger: if d is "high enough" $\alpha L^{\alpha-1} < d$ then the increased c has a "strong" effect on the cost to the local population and, as a result, the effect 1 is stronger than 2. If d is "high", $0.5\alpha L^{\alpha-1} < d$, but not high "enough", $\alpha L^{\alpha-1} > d$, then the increased c has a "weak" effect on the cost to the local population and so the effect 1 is weaker than 2.

We consider the result of the change in the parameter α (the marginal effect of the local population on the assimilation of the migrants). Increasing α means that the local workers have a stronger impact on the assimilation of the workers into the workplace.

Increasing α :

1. Decreases the efforts invested by the migrants $\frac{\partial a^*}{\partial \alpha} < 0$ ⁸.
2. Has an ambiguous effect on the investment made by the local population.⁹

$${}^7 \frac{\partial b^*}{\partial c} = \frac{\beta^2}{f_{GG}\alpha L^{2\alpha-1}F} \left[d - \frac{L^{\alpha-1}(f_{LGG}\beta L + f_{GG}\alpha\beta + f_{GGG}\alpha b L^\alpha F)}{2f_{GG}\beta + f_{GGG}F(a + bL^\alpha + 1)} \right] \text{ thus given that the third derivatives}$$

$$\text{equal to zero } f_{GGG} = f_{LGG} = f_{LLG} = 0 \text{ we get } \frac{\partial b^*}{\partial c} = \frac{\beta^2}{f_{GG}\alpha L^{2\alpha-1}F} (d - 0.5\alpha L^{\alpha-1}).$$

$${}^8 \frac{\partial a^*}{\partial \alpha} = \frac{\beta^2 c - f_{GG}F(a+1) + \beta^2 d c L^{1-\alpha} \ln L}{f_{GG}\alpha F}$$

The first result shows that as α increases, the local population plays a stronger role in the migrants' assimilation which depend more on the local workers activities rather than those of the migrants. Thus the effectiveness of the migrant's activities decreases and, as a result, they will decrease their efforts to assimilate. The second result demonstrates, that by increasing α , the local population, on the one hand, has to invest less, since their investment has a stronger effect, while on the other hand, each level of investment is more efficient in increasing assimilation. Therefore it is not clear which of the two effects is stronger.

Concluding remarks

In this paper we have considered the interaction between local workers and migrants in the production process of a firm. Both local workers and migrants can invest in assimilation activities in order to increase their interaction and production activities. The investment made by both type of workers increases the assimilation of the workers. Both have an incentive to invest in the assimilation process, however this causes costs on both sides.

Our study shows that increasing the number of migrants in a firm will decrease the investment of each worker, both local and migrant, in assimilation activities. We have shown some general conditions under which increasing the size of the local population in the firm will force the migrants to devote more effort to assimilation activities.

Increasing the local population's investment cost will decrease their efforts (substitution effect). However, since these efforts have decreased the migrants must increase theirs to compensate. On the other hand, it cannot be that both parties will increase efforts because of increasing costs to both local and migrant workers, in the same proportion. Moreover, increasing the cost to both parties, in the same proportion may increase or decrease efforts of migrants, as long as local workers decrease their efforts. The last result, concerning the migrants, can be explained by the following two contradicting effects. On the one hand, increasing the cost to the local population

$$9 \frac{\partial b^*}{\partial \alpha} = -\frac{\beta^2 c(d \ln L + L^{\alpha-1})}{f_{GG} \alpha L^{2\alpha-1} F} + \frac{a+1 - \alpha b L^\alpha \ln L}{\alpha L^\alpha} \cdot \frac{\partial b^*}{\partial \alpha} > 0 \text{ if } a+1 > \alpha b L^\alpha \ln L.$$

will increase the migrants' efforts. On the other hand, increasing the migrants' cost will decrease their efforts. Above we have presented the condition explaining which effect is stronger.

We considered the marginal effect caused to the local population because of the assimilation of migrants, α – increasing the marginal affect means that the local workers have a stronger impact on the assimilation of migrants into the workplace. The first result shows that, as α increases, the local population plays a stronger role in the assimilation and depends more on their own activities than on those of the migrants. Thus the effectiveness of the migrants' activities decreases and as a result they will decrease their efforts to assimilate.

As seen in the paper, the structure of the firm, the number of migrants and local population are curtailed for the assimilation process. Moreover the cost of investment is an important component and can be affected by incentives made by the employer or public policy.

References

- Alesina, A. and La Ferrara E. , 2000, Participation in Heterogeneous Communities, *Quarterly Journal of Economics*, (August), 847-904.
- Altonji, J. G. and R. M. Blank, 1999, Race and Gender in the Labor Market, in O. Ashenfelter and D.Card (eds.), *Handbook of Labor Economics*, vol. 3C, Elsevier Science B.V.:Amsterdam, 3143-3259.
- Anas, Alex, 2002, Prejudice, Exclusion and Compensating Transfers: The Economics of Ethnic Segregation, *Journal of Urban Economics*, 52 (3), 409-32.
- Bauer, Thomas, Gil S. Epstein and Ira N. Gang, 2005, Enclaves, Language and the Location Choice of Migrants, *Journal of Population Economics*, 18 (4), 649–662.
- Bhaumik, Sumon K., Ira N. Gang, and Myeong-Su Yun, 2006, Ethnic Conflict and Economic Disparity: Serbians and Albanians in Kosovo, *Journal of Comparative Economics*, 34(4), 754-773.
- Blau, Francine D. and Lawrence M. Kahn, 2006, The US Gender Pay Gap in the 1990s: Slowing Convergence, *Industrial and Labor Relations Review*, 60 (1), 45–66.
- Blau, Francine D. and Lawrence M. Kahn, 2007, The Gender Pay Gap, The Economists' Voice: Vol. 4 : Iss. 4, Article 5. Available at: <http://www.bepress.com/ev/vol4/iss4/art5>.
- Chiswick BR, Miller PW, 1995, The Endogeneity between Language and Earnings: International Analyses, *Journal of Labor Economics* 13: 246-288.
- Chiswick BR, Miller PW, 1996, Ethnic Networks and Language Proficiency among Immigrants, *Journal of Population Economics* 9: 19-36.
- Chiswick, B. R., 1977, Sons of Immigrants: Are They at an Earnings Disadvantage?, *American Economic Review*, Papers and Proceedings, 376-380.
- Constant, A., Gataullina L. and K.F. Zimmermann, 2008, "Ethnosizing Immigrants" *Journal of Economic and Behavioral Organization*, forthcoming.
- Deutsch, Joseph, Gil S. Epstein and Tikva Lecker, 2006, Multi-Generation Model of Immigrant Earnings: Theory and Application, *Research in Labor Economics*, 217-234.
- Dustmann, Christian, Francesca Fabbri, and Ian Preston, 2004, Ethnic Concentration, Prejudice and Racial Harassment of Minorities, CReAM Discussion Paper 05/04 (www.econ.ucl.ac.uk/cream/).
- Epstein, Gil S. and Ira Gang, 2006, "Ethnic Networks and International Trade", in Labor Mobility and the World Economy Federico Foders and Rolf J. Langhammer (ed), Springer (Berlin, Heidelberg), 85-103.
- Epstein, Gil S. and Ira Gang, 2009, Ethnicity, Assimilation and Harassment in the Labor Market, *Research in Labor Economics*, **79**, 67-90.
- Gang, Ira N. and Rivera-Batiz, Francisco, 1994, Labor Market Effects of Immigration in the United States and Europe: Substitution vs. Complementarity, *Journal of Population Economics*, 7, 157-175.
- Gang, Ira N., Francisco Rivera-Batiz and, Myeong-Su Yun, 2002, Economic Strain, Ethnic Concentration and Attitudes Towards Foreigners in the European Union, IZA Discussion Paper 578 (www.iza.org).

- Gradstein, Mark and Maurice Schiff, 2006, The Political Economy of Social Exclusion, with Implications for Immigration Policy, *Journal of Population Economics* 19(2), 197-446.
- Gradstein, Mark and Moshe Justman, 2005, The Melting Pot and School Choice, manuscript, *Journal of Public Economics*, 89, 871-896.
- Kahanec, Martin, 2006, Ethnic Specialization and Earnings Inequality: Why Being a Minority Hurts but Being a Big Minority Hurts More, IZA Discussion Paper 2050, (www.iza.org).
- Lazear, Edward P., 1999, Culture and Language, *Journal of Political Economy*, 107 (6, pt. 2), S95-S126.
- Rapoport, H. and A. Weiss, 2003, The Optimal Size for a Minority, *Journal of economic behavior and organization* 52, 27-45 .
- .

Appendix 1

$\frac{\partial a^*}{\partial L} > 0$ if and only if $f_{LG}L^\alpha + \beta dc(\alpha - 1) < 0$. Let us calculate the last expression

using the first order conditions

$$(A1) \quad U_a^F = \frac{f_G}{\beta} + \frac{f_{GG}F(a + bL^\alpha + 1)}{\beta^2} - c = 0$$

and

$$(A2) \quad U_b^L = \frac{f_{LG}L^\alpha F}{\beta} + \frac{f_G \alpha L^{\alpha-1} F}{\beta} + \frac{f_{GG} \alpha b L^{2\alpha-1} F^2}{\beta^2} - dcF = 0$$

From (A1) we get:

$$f_G = \beta c - \frac{f_{GG}F(a + bL^\alpha + 1)}{\beta}$$

and from (A2) we can extract the expression $f_{LG}L^\alpha + \beta dc(\alpha - 1)$:

$$f_{LG}L^\alpha + \beta dc(\alpha - 1) = \alpha \left(\beta dc - f_G L^{\alpha-1} - \frac{f_{GG} b L^{2\alpha-1} F}{\beta} \right)$$

Substituting f_G into the last equation:

$$f_{LG}L^\alpha + \beta dc(\alpha - 1) = \alpha \left\{ \beta dc - \left[\beta c - \frac{f_{GG}F(a + bL^\alpha + 1)}{\beta} \right] L^{\alpha-1} - \frac{f_{GG} b L^{2\alpha-1} F}{\beta} \right\}$$

$$f_{LG}L^\alpha + \beta dc(\alpha - 1) = \alpha \left\{ \beta dc - \beta c L^{\alpha-1} + \frac{f_{GG} L^{\alpha-1} F(a + 1)}{\beta} \right\}$$

Since $f_{GG} < 0$ we can see that $f_{LG}L^\alpha + \beta dc(\alpha - 1) < 0$ (which is equivalent to

$\frac{\partial a^*}{\partial L} > 0$) if $\beta dc - \beta c L^{\alpha-1} < 0$ which is the same condition as $d < L^{\alpha-1}$.

Bar-Ilan University
Department of Economics
WORKING PAPERS

- 1-01 **The Optimal Size for a Minority**
Hillel Rapoport and Avi Weiss, January 2001.
- 2-01 **An Application of a Switching Regimes Regression to the Study of Urban Structure**
Gershon Alperovich and Joseph Deutsch, January 2001.
- 3-01 **The Kuznets Curve and the Impact of Various Income Sources on the Link Between Inequality and Development**
Joseph Deutsch and Jacques Silber, February 2001.
- 4-01 **International Asset Allocation: A New Perspective**
Abraham Lioui and Patrice Poncet, February 2001.
- 5-01 **מודל המועדון והקהילה החרדית**
יעקב רוזנברג, פברואר 2001.
- 6-01 **Multi-Generation Model of Immigrant Earnings: Theory and Application**
Gil S. Epstein and Tikva Lecker, February 2001.
- 7-01 **Shattered Rails, Ruined Credit: Financial Fragility and Railroad Operations in the Great Depression**
Daniel A. Schiffman, February 2001.
- 8-01 **Cooperation and Competition in a Duopoly R&D Market**
Damiano Bruno Silipo and Avi Weiss, March 2001.
- 9-01 **A Theory of Immigration Amnesties**
Gil S. Epstein and Avi Weiss, April 2001.
- 10-01 **Dynamic Asset Pricing With Non-Redundant Forwards**
Abraham Lioui and Patrice Poncet, May 2001.
- 11-01 **Macroeconomic and Labor Market Impact of Russian Immigration in Israel**
Sarit Cohen and Chang-Tai Hsieh, May 2001.

Electronic versions of the papers are available at
http://www.biu.ac.il/soc/ec/wp/working_papers.html

- 12-01 **Network Topology and the Efficiency of Equilibrium**
Igal Milchtaich, June 2001.
- 13-01 **General Equilibrium Pricing of Trading Strategy Risk**
Abraham Lioui and Patrice Poncet, July 2001.
- 14-01 **Social Conformity and Child Labor**
Shirit Katav-Herz, July 2001.
- 15-01 **Determinants of Railroad Capital Structure, 1830–1885**
Daniel A. Schiffman, July 2001.
- 16-01 **Political-Legal Institutions and the Railroad Financing Mix, 1885–1929**
Daniel A. Schiffman, September 2001.
- 17-01 **Macroeconomic Instability, Migration, and the Option Value of Education**
Eliakim Katz and Hillel Rapoport, October 2001.
- 18-01 **Property Rights, Theft, and Efficiency: The Biblical Waiver of Fines in the Case of Confessed Theft**
Eliakim Katz and Jacob Rosenberg, November 2001.
- 19-01 **Ethnic Discrimination and the Migration of Skilled Labor**
Frédéric Docquier and Hillel Rapoport, December 2001.
- 1-02 **Can Vocational Education Improve the Wages of Minorities and Disadvantaged Groups? The Case of Israel**
Shoshana Neuman and Adrian Ziderman, February 2002.
- 2-02 **What Can the Price Gap between Branded and Private Label Products Tell Us about Markups?**
Robert Barsky, Mark Bergen, Shantanu Dutta, and Daniel Levy, March 2002.
- 3-02 **Holiday Price Rigidity and Cost of Price Adjustment**
Daniel Levy, Georg Müller, Shantanu Dutta, and Mark Bergen, March 2002.
- 4-02 **Computation of Completely Mixed Equilibrium Payoffs**
Igal Milchtaich, March 2002.
- 5-02 **Coordination and Critical Mass in a Network Market – An Experimental Evaluation**
Amir Etziony and Avi Weiss, March 2002.

- 6-02 **Inviting Competition to Achieve Critical Mass**
Amir Etziony and Avi Weiss, April 2002.
- 7-02 **Credibility, Pre-Production and Inviting Competition in a Network Market**
Amir Etziony and Avi Weiss, April 2002.
- 8-02 **Brain Drain and LDCs' Growth: Winners and Losers**
Michel Beine, Frédéric Docquier, and Hillel Rapoport, April 2002.
- 9-02 **Heterogeneity in Price Rigidity: Evidence from a Case Study Using Micro-Level Data**
Daniel Levy, Shantanu Dutta, and Mark Bergen, April 2002.
- 10-02 **Price Flexibility in Channels of Distribution: Evidence from Scanner Data**
Shantanu Dutta, Mark Bergen, and Daniel Levy, April 2002.
- 11-02 **Acquired Cooperation in Finite-Horizon Dynamic Games**
Igal Milchtaich and Avi Weiss, April 2002.
- 12-02 **Cointegration in Frequency Domain**
Daniel Levy, May 2002.
- 13-02 **Which Voting Rules Elicit Informative Voting?**
Ruth Ben-Yashar and Igal Milchtaich, May 2002.
- 14-02 **Fertility, Non-Altruism and Economic Growth: Industrialization in the Nineteenth Century**
Elise S. Brezis, October 2002.
- 15-02 **Changes in the Recruitment and Education of the Power Elites in Twentieth Century Western Democracies**
Elise S. Brezis and François Crouzet, November 2002.
- 16-02 **On the Typical Spectral Shape of an Economic Variable**
Daniel Levy and Hashem Dezhbakhsh, December 2002.
- 17-02 **International Evidence on Output Fluctuation and Shock Persistence**
Daniel Levy and Hashem Dezhbakhsh, December 2002.
- 1-03 **Topological Conditions for Uniqueness of Equilibrium in Networks**
Igal Milchtaich, March 2003.
- 2-03 **Is the Feldstein-Horioka Puzzle Really a Puzzle?**
Daniel Levy, June 2003.

- 3-03 **Growth and Convergence across the US: Evidence from County-Level Data**
Matthew Higgins, Daniel Levy, and Andrew Young, June 2003.
- 4-03 **Economic Growth and Endogenous Intergenerational Altruism**
Hillel Rapoport and Jean-Pierre Vidal, June 2003.
- 5-03 **Remittances and Inequality: A Dynamic Migration Model**
Frédéric Docquier and Hillel Rapoport, June 2003.
- 6-03 **Sigma Convergence Versus Beta Convergence: Evidence from U.S. County-Level Data**
Andrew T. Young, Matthew J. Higgins, and Daniel Levy, September 2003.
- 7-03 **Managerial and Customer Costs of Price Adjustment: Direct Evidence from Industrial Markets**
Mark J. Zbaracki, Mark Ritson, Daniel Levy, Shantanu Dutta, and Mark Bergen, September 2003.
- 8-03 **First and Second Best Voting Rules in Committees**
Ruth Ben-Yashar and Igal Milchtaich, October 2003.
- 9-03 **Shattering the Myth of Costless Price Changes: Emerging Perspectives on Dynamic Pricing**
Mark Bergen, Shantanu Dutta, Daniel Levy, Mark Ritson, and Mark J. Zbaracki, November 2003.
- 1-04 **Heterogeneity in Convergence Rates and Income Determination across U.S. States: Evidence from County-Level Data**
Andrew T. Young, Matthew J. Higgins, and Daniel Levy, January 2004.
- 2-04 **"The Real Thing:" Nominal Price Rigidity of the Nickel Coke, 1886-1959**
Daniel Levy and Andrew T. Young, February 2004.
- 3-04 **Network Effects and the Dynamics of Migration and Inequality: Theory and Evidence from Mexico**
David Mckenzie and Hillel Rapoport, March 2004.
- 4-04 **Migration Selectivity and the Evolution of Spatial Inequality**
Ravi Kanbur and Hillel Rapoport, March 2004.
- 5-04 **Many Types of Human Capital and Many Roles in U.S. Growth: Evidence from County-Level Educational Attainment Data**
Andrew T. Young, Daniel Levy and Matthew J. Higgins, March 2004.

- 6-04 **When Little Things Mean a Lot: On the Inefficiency of Item Pricing Laws**
Mark Bergen, Daniel Levy, Sourav Ray, Paul H. Rubin and Benjamin Zeliger,
May 2004.
- 7-04 **Comparative Statics of Altruism and Spite**
Igal Milchtaich, June 2004.
- 8-04 **Asymmetric Price Adjustment in the Small: An Implication of Rational Inattention**
Daniel Levy, Haipeng (Allan) Chen, Sourav Ray and Mark Bergen, July 2004.
- 1-05 **Private Label Price Rigidity during Holiday Periods**
Georg Müller, Mark Bergen, Shantanu Dutta and Daniel Levy, March 2005.
- 2-05 **Asymmetric Wholesale Pricing: Theory and Evidence**
Sourav Ray, Haipeng (Allan) Chen, Mark Bergen and Daniel Levy,
March 2005.
- 3-05 **Beyond the Cost of Price Adjustment: Investments in Pricing Capital**
Mark Zbaracki, Mark Bergen, Shantanu Dutta, Daniel Levy and Mark Ritson,
May 2005.
- 4-05 **Explicit Evidence on an Implicit Contract**
Andrew T. Young and Daniel Levy, June 2005.
- 5-05 **Popular Perceptions and Political Economy in the Contrived World of Harry Potter**
Avichai Snir and Daniel Levy, September 2005.
- 6-05 **Growth and Convergence across the US: Evidence from County-Level Data (revised version)**
Matthew J. Higgins, Daniel Levy, and Andrew T. Young , September 2005.
- 1-06 **Sigma Convergence Versus Beta Convergence: Evidence from U.S. County-Level Data (revised version)**
Andrew T. Young, Matthew J. Higgins, and Daniel Levy, June 2006.
- 2-06 **Price Rigidity and Flexibility: Recent Theoretical Developments**
Daniel Levy, September 2006.
- 3-06 **The Anatomy of a Price Cut: Discovering Organizational Sources of the Costs of Price Adjustment**
Mark J. Zbaracki, Mark Bergen, and Daniel Levy, September 2006.

- 4-06 **Holiday Non-Price Rigidity and Cost of Adjustment**
Georg Müller, Mark Bergen, Shantanu Dutta, and Daniel Levy.
September 2006.
- 2008-01 **Weighted Congestion Games With Separable Preferences**
Igal Milchtaich, October 2008.
- 2008-02 **Federal, State, and Local Governments: Evaluating their Separate Roles in US Growth**
Andrew T. Young, Daniel Levy, and Matthew J. Higgins, December 2008.
- 2008-03 **Political Profit and the Invention of Modern Currency**
Dror Goldberg, December 2008.
- 2008-04 **Static Stability in Games**
Igal Milchtaich, December 2008.
- 2008-05 **Comparative Statics of Altruism and Spite**
Igal Milchtaich, December 2008.
- 2008-06 **Abortion and Human Capital Accumulation: A Contribution to the Understanding of the Gender Gap in Education**
Leonid V. Azarnert, December 2008.
- 2008-07 **Involuntary Integration in Public Education, Fertility and Human Capital**
Leonid V. Azarnert, December 2008.
- 2009-01 **Inter-Ethnic Redistribution and Human Capital Investments**
Leonid V. Azarnert, January 2009.
- 2009-02 **Group Specific Public Goods, Orchestration of Interest Groups and Free Riding**
Gil S. Epstein and Yosef Mealem, January 2009.
- 2009-03 **Holiday Price Rigidity and Cost of Price Adjustment**
Daniel Levy, Haipeng Chen, Georg Müller, Shantanu Dutta, and Mark Bergen,
February 2009.
- 2009-04 **Legal Tender**
Dror Goldberg, April 2009.
- 2009-05 **The Tax-Foundation Theory of Fiat Money**
Dror Goldberg, April 2009.

- 2009-06 **The Inventions and Diffusion of Hyperinflatable Currency**
Dror Goldberg, April 2009.
- 2009-07 **The Rise and Fall of America's First Bank**
Dror Goldberg, April 2009.
- 2009-08 **Judicial Independence and the Validity of Controverted Elections**
Raphaël Franck, April 2009.
- 2009-09 **A General Index of Inherent Risk**
Adi Schnytzer and Sara Westreich, April 2009.
- 2009-10 **Measuring the Extent of Inside Trading in Horse Betting Markets**
Adi Schnytzer, Martien Lamers and Vasiliki Makropoulou, April 2009.
- 2009-11 **The Impact of Insider Trading on Forecasting in a Bookmakers' Horse Betting Market**
Adi Schnytzer, Martien Lamers and Vasiliki Makropoulou, April 2009.
- 2009-12 **Foreign Aid, Fertility and Population Growth: Evidence from Africa**
Leonid V. Azarnert, April 2009.
- 2009-13 **A Reevaluation of the Role of Family in Immigrants' Labor Market Activity: Evidence from a Comparison of Single and Married Immigrants**
Sarit Cohen-Goldner, Chemi Gotlibovski and Nava Kahana, May 2009.
- 2009-14 **The Efficient and Fair Approval of "Multiple-Cost-Single-Benefit" Projects Under Unilateral Information**
Nava Kahanaa, Yosef Mealem and Shmuel Nitzan, May 2009.
- 2009-15 **Après nous le Déluge: Fertility and the Intensity of Struggle against Immigration**
Leonid V. Azarnert, June 2009.
- 2009-16 **Is Specialization Desirable in Committee Decision Making?**
Ruth Ben-Yashar, Winston T.H. Koh and Shmuel Nitzan, June 2009.
- 2009-17 **Framing-Based Choice: A Model of Decision-Making Under Risk**
Kobi Kriesler and Shmuel Nitzan, June 2009.
- 2009-18 **Demystifying the 'Metric Approach to Social Compromise with the Unanimity Criterion'**
Shmuel Nitzan, June 2009.

- 2009-19 **On the Robustness of Brain Gain Estimates**
Michel Beine, Frédéric Docquier and Hillel Rapoport, July 2009.
- 2009-20 **Wage Mobility in Israel: The Effect of Sectoral Concentration**
Ana Rute Cardoso, Shoshana Neuman and Adrian Ziderman, July 2009.
- 2009-21 **Intermittent Employment: Work Histories of Israeli Men and Women, 1983–1995**
Shoshana Neuman and Adrian Ziderman, July 2009.
- 2009-22 **National Aggregates and Individual Disaffiliation: An International Study**
Pablo Brañas-Garza, Teresa García-Muñoz and Shoshana Neuman, July 2009.
- 2009-23 **The Big Carrot: High-Stakes Incentives Revisited**
Pablo Brañas-Garza, Teresa García-Muñoz and Shoshana Neuman, July 2009.
- 2009-24 **The Why, When and How of Immigration Amnesties**
Gil S. Epstein and Avi Weiss, September 2009.
- 2009-25 **Documenting the Brain Drain of «la Crème de la Crème»: Three Case-Studies on International Migration at the Upper Tail of the Education Distribution**
Frédéric Docquier and Hillel Rapoport, October 2009.
- 2009-26 **Remittances and the Brain Drain Revisited: The Microdata Show That More Educated Migrants Remit More**
Albert Bollard, David McKenzie, Melanie Morten and Hillel Rapoport, October 2009.
- 2009-27 **Implementability of Correlated and Communication Equilibrium Outcomes in Incomplete Information Games**
Igal Milchtaich, November 2009.
- 2010-01 **The Ultimatum Game and Expected Utility Maximization – In View of Attachment Theory**
Shaul Almakias and Avi Weiss, January 2010.
- 2010-02 **A Model of Fault Allocation in Contract Law – Moving From Dividing Liability to Dividing Costs**
Osnat Jacobi and Avi Weiss, January 2010.

- 2010-03 **Coordination and Critical Mass in a Network Market: An Experimental Investigation**
Bradley J. Ruffle, Avi Weiss and Amir Etziony, February 2010.
- 2010-04 **Immigration, fertility and human capital: A model of economic decline of the West**
Leonid V. Azarnert, April 2010.
- 2010-05 **Is Skilled Immigration Always Good for Growth in the Receiving Economy?**
Leonid V. Azarnert, April 2010.
- 2010-06 **The Effect of Limited Search Ability on the Quality of Competitive Rent-Seeking Clubs**
Shmuel Nitzan and Kobi Kriesler, April 2010.
- 2010-07 **Condorcet vs. Borda in Light of a Dual Majoritarian Approach**
Eyal Baharad and Shmuel Nitzan, April 2010.
- 2010-08 **Prize Sharing in Collective Contests**
Shmuel Nitzan and Kaoru Ueda, April 2010.
- 2010-09 **Network Topology and Equilibrium Existence in Weighted Network Congestion Games**
Igal Milchtaich, May 2010.
- 2010-10 **The Evolution of Secularization: Cultural Transmission, Religion and Fertility Theory, Simulations and Evidence**
Ronen Bar-El, Teresa García-Muñoz, Shoshana Neuman and Yossef Tobol, June 2010.
- 2010-11 **The Economics of Collective Brands**
Arthur Fishman, Israel Finkelstein, Avi Simhon and Nira Yacouel, July 2010.
- 2010-12 **Interactions Between Local and Migrant Workers at the Workplace**
Gil S. Epstein and Yosef Mealem, August 2010.
- 2010-13 **A Political Economy of the Immigrant Assimilation: Internal Dynamics**
Gil S. Epstein and Ira N. Gang, August 2010.
- 2010-14 **Attitudes to Risk and Roulette**
Adi Schnytzer and Sara Westreich, August 2010.

2010-15 **Life Satisfaction and Income Inequality**

Paolo Verme, August 2010.

2010-16 **The Poverty Reduction Capacity of Private and Public Transfers in
Transition**

Paolo Verme, August 2010.