Immigrant Selection and Migrant Quality: Evidence from the US

Simone Bertoli[1]
Steven Stillman[2]

[1]Université Clermont Auvergne, CERDI, CNRS
[2]Free University of Bolzano

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Migrants' quality and immigration policies

Recipient countries are concerned with migrants' quality, which has been traditionally measured by the earnings upon arrival at destination.

"The broad interest in this subject is not surprising: the earnings that immigrants receive in destination countries [...] are an important indicator not only of their own success and performance, but also of their overall contribution to the host countries' economies" (Dustmann and Görlach, 2016).

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Selective immigration policies

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De jure and de facto selective policies

The United States do not currently implement de jure selective policies, i.e., a points-based system; nevertheless, immigration policies can be de facto selective along the same lines considered by a points-based system.

Policy-induced migration costs can be more difficult to overcome for low-educated than for high-educated potential migrants.

For instance, estimates reveal that time-equivalent migration costs are 2 to 3 times lower for Ecuadorian migrants with a college degree (Bertoli, Fernández-Huertas Moraga and Ortega, 2013).

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What are the effects of selective immigration policies?

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Which are the possible problems with points-based systems?

Points-based systems and the so-called brain waste

Mattoo, Neagu and Özden (2008) provide evidence of striking differences across origin countries in the probability that a high-educated immigrant holds a skilled job in the United States.

"[A] simple "points based system" might not be the ideal mechanism for choosing skilled migrants since similar points would be assigned to nominally identical degrees received in different countries where the quality of human capital differs considerably." (Mattoo et al., 2008).

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Migrants' quality depends on factors, such as ability and motivation, that are unobservable for immigration officers.

"[E]ducation accounts for only a small portion of the variance in earnings across workers, suggesting that the nature of selection in education attainment may not necessarily 'transfer over' to a more comprehensive measure of a worker's human capital." (Borjas, 2014).

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Migrants' quality and self-selection on unobservables (cont'd)

The empirical analysis by Aydemir (2011) reveals that selective immigration policies have improved the observable skills of the immigrants to Canada, but that immigrants admitted for their skills do not perform better on the Canadian labor market.

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What we do

This presentation combines two distinct pieces of work:

- A paper, written with Vianney Dequiedt and Yves Zenou, where we propose a purely theoretical analysis of this research question;
- An on-going research project with Steven Stillman where we analyze the ACS data for the US to generate some stylized empirical facts (not yet a direct test of the theoretical predictions);

What we do (cont'd)

The model depicts migrants' quality depends both on an observable characteristic (education) and on an unobservable characteristic (ability), and immigration policies can screen potential migrants only on the basis of the former.

The indirect influence of an increase in selectivity on self-selection on unobservables does not just weaken, but it can actually reverse the direct effects of the policy change when migrants are positively selected on ability.

What we do (cont'd)

The empirical analysis provides evidence for the US of the key role played by unobservables determining wages even for low-educated immigrants.

This determines a substantial overlap of the origin-specific distributions of wages for high- and low-educated immigrants.

Such an overlap is what can, according to the theoretical model, lead to perverse effects of selective policies on migrants' quality.

Relevant papers

- Migrants' selection (Borjas, 1987, Antecol et al., 2003; Chiquiar and Hanson, 2005; Jasso and Rosenzweig, 2009; Fernández-Huertas Moraga, 2011, 2013; Ambrosini and Peri, 2012; Biavasch and Elsner, 2013; Kaestner and Malamud, 2014).
  - Migrants' selection on education (McKenzie and Rapoport, 2010; Bertoli, 2010; Beine et al., 2011; Belot and Hatton, 2012; Beine and Salomone, 2013).
- Immigration policies and migrants' selection on education (Bellettini and Berti Ceroni, 2007, Docquier et al., 2008, Bertoli and Brücker, 2011; Bianchi, 2013; Bertoli and Rapoport, 2015). ▸ Holmstrom and Milgrom (1991)

Key features

- Two-country model.
- Agents can be either educated (e) or uneducated (u).
- Wages are remotely observable, and follow a log-normal distribution in the two countries.
- Utility-maximizing agents self-select into migration.
- The destination country can impose different migration costs π on agents with a different level of education.
- We consider increases in selectivity, i.e., increase in π^u and reduction in π^e, that do not alter the scale of migration.

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Wages

Wages for the entire population of the origin country follow $\ln(w_{ij}^l) = \mu_j^l + \epsilon_{ij}$, with $j = 0, 1$ and $l = u, e$, and

$$\begin{pmatrix} \ln w_{i0}^l \\ \ln w_{i1}^l \end{pmatrix} \sim \mathcal{N}(\boldsymbol{\mu}^l, \Sigma)$$

where $\boldsymbol{\mu}^l = \left(\mu_0^l, \mu_1^l\right)'$ and $\Sigma = \begin{pmatrix} \sigma_0^2 & \sigma_{01} \\ \sigma_{01} & \sigma_1^2 \end{pmatrix}$.

We assume a positive return to education in both countries, i.e., $\mu_j^e > \mu_j^u$, for $j = 0, 1$.

Self-selection into migration

Agents self-select into migration, facing time-equivalent migration costs $\pi^l = \ln(1 + C_i^l / w_{io}^l)$, where C^l represents the monetary equivalent of migration costs, which can be partly policy-induced.

A type-l agent migrates if:

$$\ln w_{io}^l + \pi^i \leq \ln w_{i1}^l$$

Probability of self-selection:

$$\Pr\left(\epsilon_{i2} \equiv \epsilon_{i1} - \epsilon_{io} > \mu_o^l + \pi^l - \mu_1^l\right) = \Phi(-z^l)$$

where $z^l = (\mu_o^l + \pi^l - \mu_1^l)/\sigma_2$.

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Migrants' wages

The assumption of bivariate normality implies that (Heckman, 1979; Borjas, 1987):

$$E\left[\ln w_{i1}^{l} | \epsilon_{i2} \geq z^{l}\right] = \mu_{1}^{l} + Q_{1}(z^{l})$$

where:

$$Q_{1}(z^{l}) = \gamma\lambda(z^{l}), \gamma = \frac{\sigma_{01}}{\sigma_{1}}$$

and $\lambda(z^{l})$ represents the Inverse Mills ratio: ▸ $\lambda(z^{l})$

$$\lambda(z^{l}) = \frac{\phi(z^{l})}{\Phi(-z^{l})}$$

Migrants' selection on unobservables

We say that type-l migrants are positively selected on unobservables if: ▸ Patterns of selection

$$Q_1^l \equiv E\left(\ln w_{i1}^l | \epsilon_{i2} \geq z^l\right) - E\left(\ln w_{i1}^l\right) = \gamma\lambda(z^l) > 0$$

Recall that:

$$\frac{\partial |Q_1^l|}{\partial \pi^l} = \frac{|\gamma|}{\sigma_2}[\lambda(z^l) - z^l]\lambda(z^l) > 0$$

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Migrants' quality

Migrants' quality $y(z^u, z^e)$ is a weighted average of the log wages for the two types of migrants:

$$y(z^u, z^e) \equiv \beta(z^u, z^e)\left[\mu_1^e + Q_1(z^e)\right] + \left[1 - \beta(z^u, z^e)\right]\left[\mu_1^u + Q_1(z^u)\right]$$

where, by the law of large numbers:

$$\beta(z^u, z^e) = \frac{\alpha\Phi(-z^e)}{\kappa(z^u, z^e)}$$

is the endogenous share of educated migrants, with $\kappa(z^u, z^e) \equiv \alpha\Phi(-z^e) + (1-\alpha)\Phi(-z^u)$ representing the scale of migration.

Iso-migration curves and selectivity

The function $z^e = g_k(z^u)$ gives the unique value of z^e such that $\kappa[z^u, g_k(z^u)] = k$, and it thus describes an iso-migration curve:

$$g_k(z^u) = -\Phi^{-1}\left[\frac{k - \Phi(-z^u)(1-\alpha)}{\alpha}\right]$$

We define a scale-preserving increase in selectivity as an increase in z^u along the iso-migration curve $z^e = g_k(z^u)$. Notice that:

$$\frac{\partial \ln \beta[z^u, g_k(z^u)]}{\partial z^u} = -\frac{\partial g_k(z^u)}{\partial z^u}\lambda[g_k(z^u)] > 0$$

▸ Iso-migration curve

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▸ Iso-migration curve

Increases in selectivity and migrants' quality

A scale-preserving increase in selectivity influences migrants' quality $y(\pi^e, \pi^u)$ through two distinct channels:

- it increases the share $\beta[z^u, g_k(z^u)]$ of educated migrants, whose log wages are drawn from a distribution with a higher unconditional expected value $\mu_1^e > \mu_1^u$.
- It modifies the intensity of selection for both educated and uneducated migrants.

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Non-monotonicity of quality along iso-migration curves

Migrants' quality is a non-monotonic function of z^u along any iso-migration curve whenever migrants are not randomly selected on unobservables. ▸ Proof ▸ Figure

Quality-maximizing policy

When migrants are positively selected on unobservables, an attempt to admit only educated migrants is detrimental.

The probability to migrate is higher for educated than for uneducated individuals is correspondence to the quality-maximizing policy $z^e = f(z^U)$. ▸ Quality-maximizing policy

The expected value of the log wage at destination is higher for educated than for uneducated migrants when migrants' quality is maximized. ▸ Proof ▸ Scale

The quality-maximizing policy equates the quality of the two types of migrants at the margin. ▸ Extensions

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From the theory to the data

The theoretical model assumes a positive return to education in both countries, i.e., $\mu_j^e > \mu_j^u$, for $j = 0, 1$.

A low return to education, i.e., small $(\mu_1^e - \mu_1^u)$, and a high variance in wages, i.e., high σ_1^2, at destination increase the overlap between the distribution of the log wages of educated and uneducated migrants, thus reducing the quality-maximizing degree of selectivity, and possibly producing perverse effects..

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The data

We draw our data from the American Community Surveys conducted between 2000 and 2014.
The ACS gives us information on:

- Country of birth;
- (Detailed) level of education;
- Age at immigration;
- Wage earnings;
- Weeks worked and usual number of hours worked.

Sample selection criteria

We restrict our sample to:

- Foreign-born (non-naturalized) men;
- aged below 65 at the time of the survey;
- aged 25+ at immigration (proxy for the country of education);
- not living in group quarters;
- arrived between 2 and 10 years before the survey;
- with positive wage earnings;

The size of our sample is 455,555 individuals.

Real hourly wages

We compute the hourly wage for each individual in the sample, and deflate them with the CPI-U.

We then run a regression of the log real hourly wage $\ln w_i$ on (a polynomial for) age, years since migration, years of education, and dummies for census region of residence, year of the survey and country of birth.

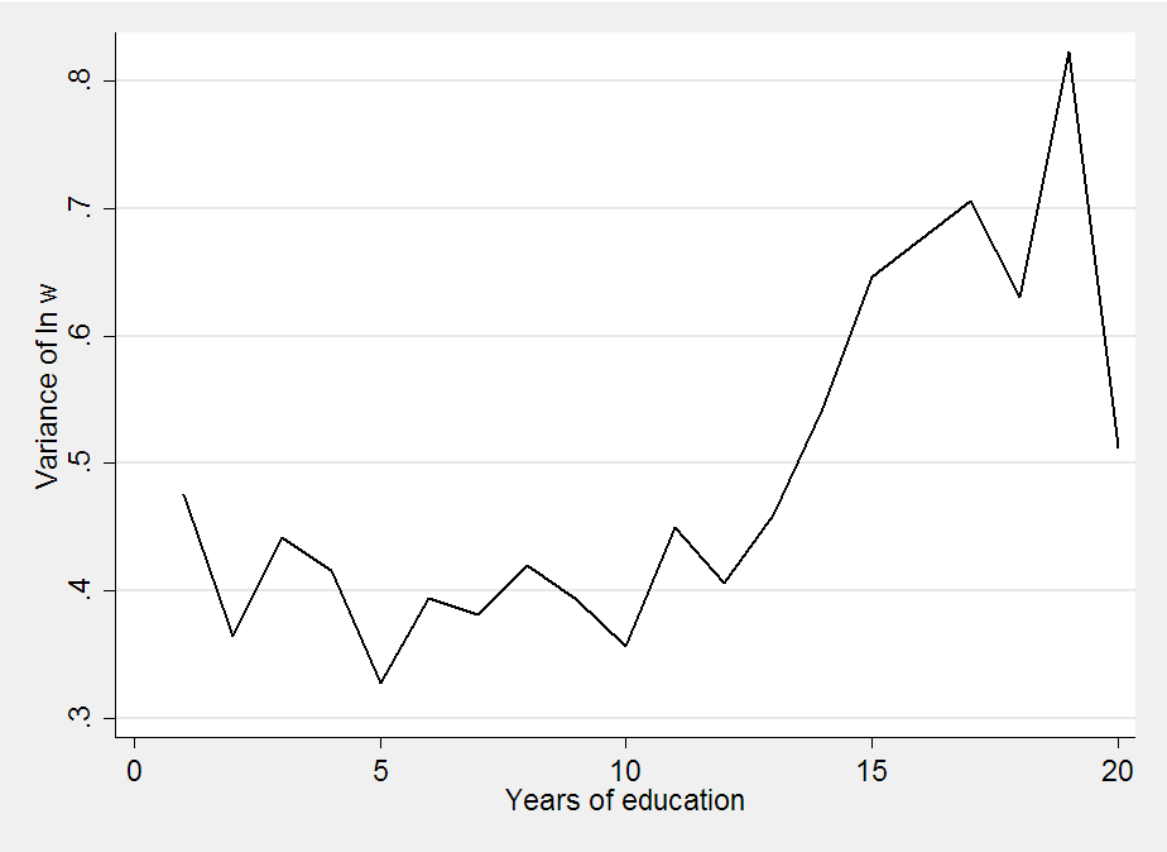
The estimated coefficients are used to get rid of the variability in $\ln w_i$ due age, years since migration, region of residence and year of survey. The remaining variability in $\ln w_i$ is due to education, country of birth and unobservables (including ability).

Variance of log wages for each level of education

For each level of education, we compute the variance of log wages, pooling immigrants from all origins together.

The variance is roughly constant until 13 years of schooling (high-school graduates), and it then increases, consistently with the idea that unobservables could matter more in the right-hand tail of the education distribution (see Chen, 2008).

Variance of log wages for each level of education (cont'd)



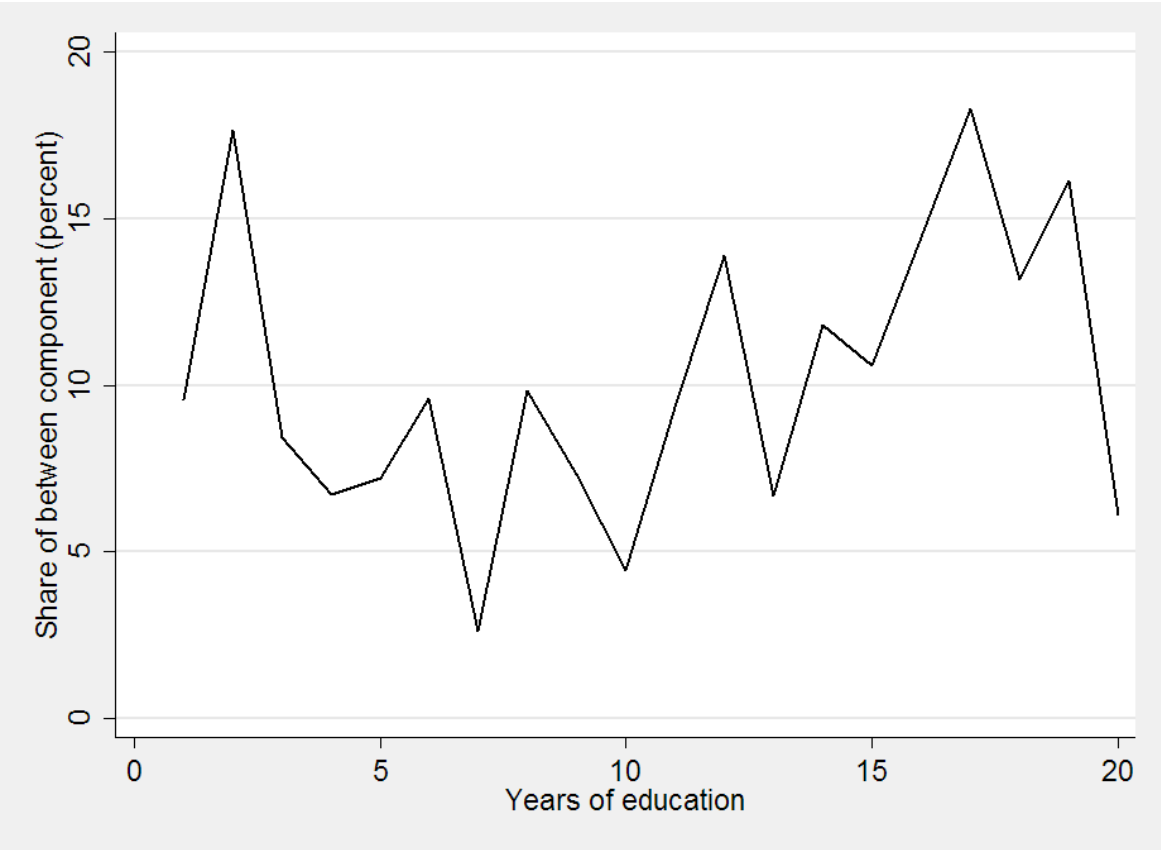
Between and within component

We then decompose the variance in the log wage in the between, i.e., across origin countries, and in the within component.

This decomposition reveals two main facts:

- The share of the between component in the total variance is highest for high-educated immigrants;
  - Heterogeneity in the real content of nominally equivalent levels of education (Mattoo et al., 2008).
- The between component explains, at most, 18 percent of the total variance: most of the variance is due to differences in unobservables within origins.

Between and within component (cont'd)



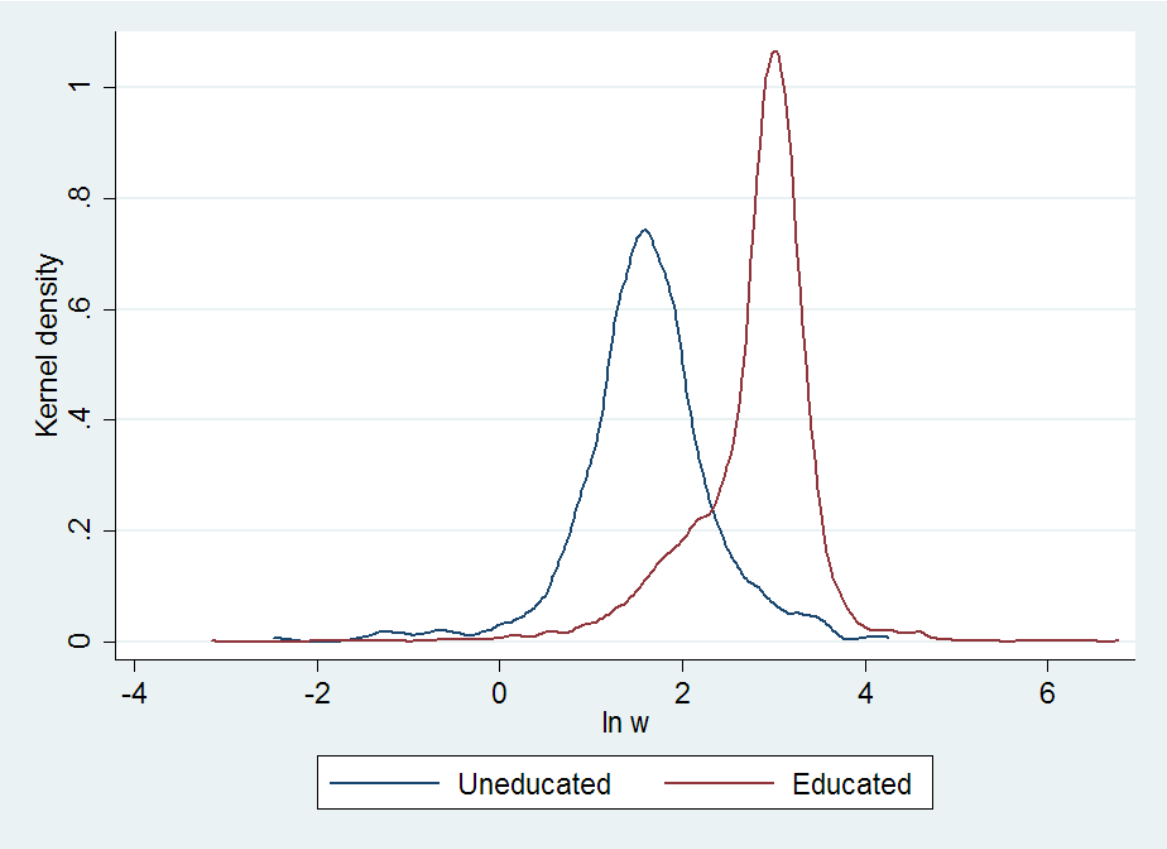
Educated and uneducated immigrants

We divide immigrants into two non-contiguous groups defined on the basis of their level of education (to be in line with the theoretical model):

- Educated;
  - At least 4 years of college education;
- Uneducated;
  - At most some high school (not completed);

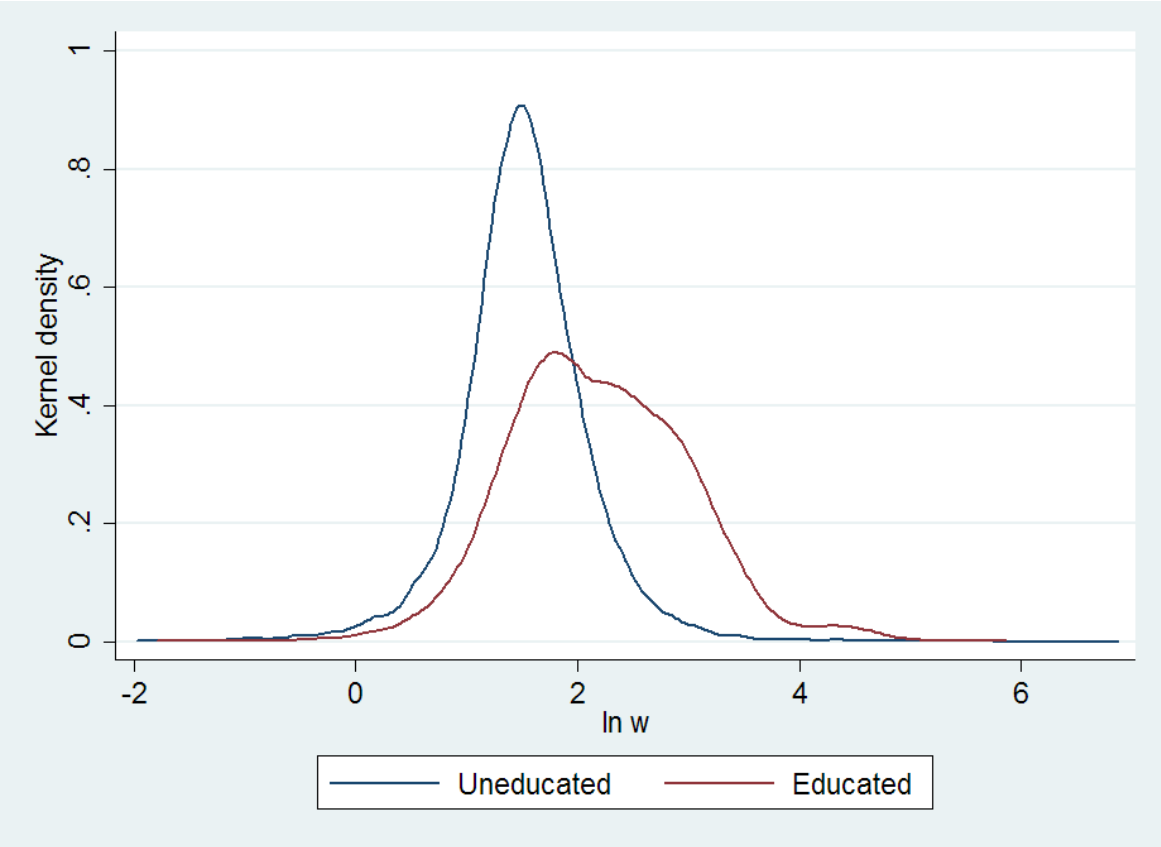
The difference in years of education between the two groups is at least 5 years: high-school graduates and individuals with up to 3 years of college education are excluded.

The two wage distributions for Indian immigrants



No of observations: 14,946.

The two wage distributions for Mexican immigrants



No of observations: 27,765.

Overlap in the distribution of log wages

We compute the probability p_j that a randomly drawn uneducated immigrant has a real hourly wage that is above a randomly drawn educated immigrant from the same country of origin j:

$$p_j \equiv \Pr(w_j^u > w_j^e)$$

Notice that:

- $p_j \approx 0$ if there is no overlap in the two distributions;
- $p_j = 50$ percent if the two distributions are identical.

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Overlap in the distribution of log wages for natives

We also compute the this probability for natives (using the same sample selection criteria):

$$p_{US} \equiv \Pr(w^u_{US} > w^e_{US})$$

The sample of 2,045,844 natives reveals that $p_{US} = 15.5$ percent. This gives us a useful reference point for immigrants.

Overlap in the distribution of log wages for immigrants

The probability p_j can be computed for 108 distinct countries of origin (with at least 50 educated and uneducated immigrants).

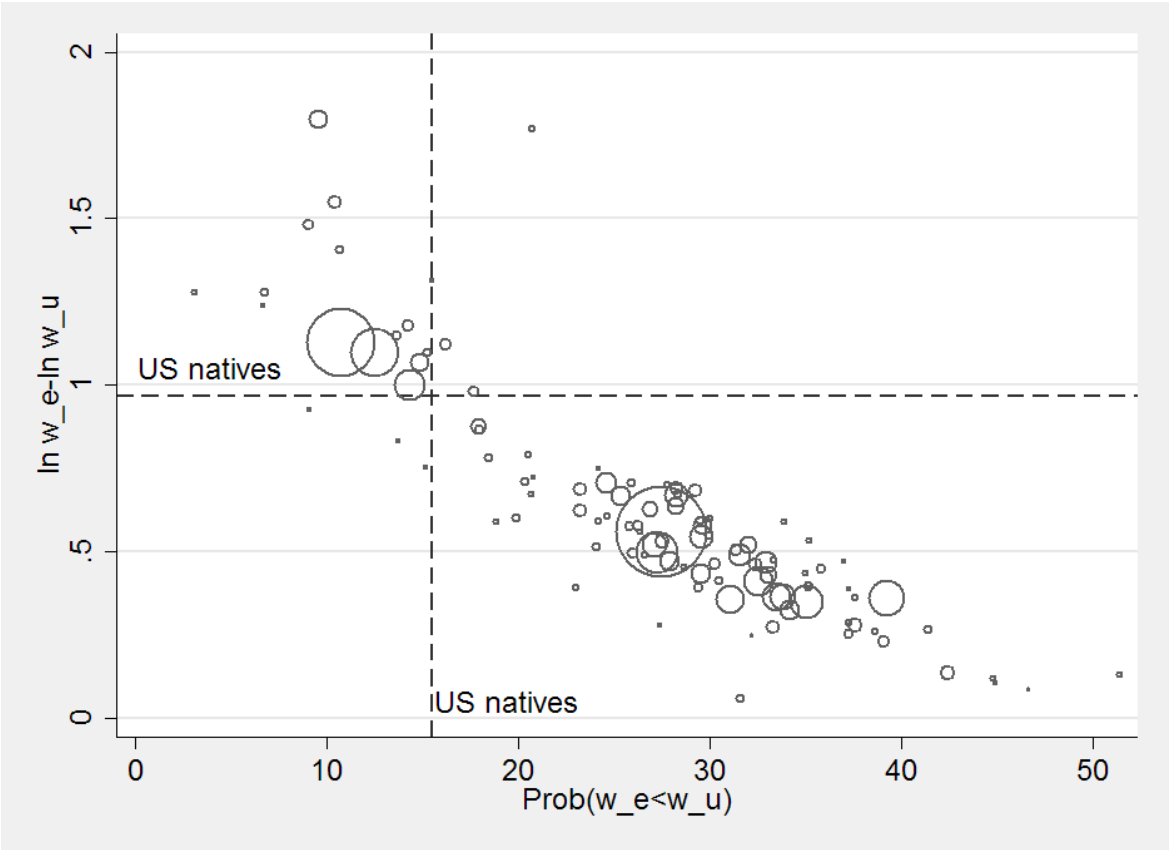
The average value of p_j stands at 28.0 percent, with a substantial variability across origin countries. For 90 out of 108 origin countries, $p_j > p_{US} = 15.5$ percent.

The substantial degree of overlap between the two distributions suggests that unobserved factors play a key role in determining immigrants' earnings at destination.

The probability p_j and the difference in log wages

The probability p_j is closely correlated with $\ln w_j^e - \ln w_j^u$ (thus suggesting that the variance in earnings due to unobserved factors is roughly constant across origin countries).

The probability p_j and the difference in log wages (cont'd)



The size of each circle is proportional to the number of observations.

The probability p_j and the difference in log wages (cont'd)

Most origin countries are characterized by small differences in real hourly wages between groups with remarkably different levels of education.

For 23 origin countries, a one-sided $t-$test does not reject at the 5 percent confidence level the null hypothesis that $\ln w_j^e - \ln w_j^u = 0$ against the alternative that $\ln w_j^e - \ln w_j^u > 0$.

The probability p_j and the share of educated immigrants

We computed the correlation ρ between p_j and the ratio between the number of educated and of uneducated immigrants for each origin.

We have that $\rho = 0.265$: a higher share of educated immigrants is associated with a larger overlap between the distribution of log wages for the two groups of immigrants.

Should we trust these numbers?

There are two major possible problems with the numbers that we have just provided, and these are related to:

- the imputation of missing wage data in the ACS;
- the legal status of the immigrants.

The imputation of missing wage data in the ACS

The overlap between the two wage distributions might just be a statistical artifact. Borjas (2015) has observed that:

- a large and growing share of immigrants in the ACS has missing wage data (e.g., above 30 percent of Mexican immigrants);
- the imputation procedure does not take into account the immigrant status, so most donors are US natives.

The share of imputed wage observations is substantially larger among (what we call) uneducated immigrants (28.8 against 13.9 percent).

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The imputation of missing wage data in the ACS (cont'd)

We computed again p_j using only the subsample of observations with non-imputed wages.

The average value of p_j declines from 28.0 to 25.0 percent, still around 10 percentage points above the corresponding figure for US natives.

The legal status of immigrants

The ACS enumerates foreign-born independently of their legal status. We follow Borjas (2016) to generate a proxy for the (likely) undocumented status of each individual in the sample.

▸ Undocumented status

The undocumented status is more frequent among uneducated workers, thus possibly depressing their wages. We then compute p_j using only the subsample of likely documented immigrants.

The average value of p_j increases from 28.0 to 29.1 percent.

Concluding remarks

When migrants are positively selected on unobservables, preventing uneducated agents from migrating never represents the quality-maximizing choice for the country of destination.

The relevance of individual characteristics that remain unobserved for immigration officers in explaining observed differences in earnings suggest that the scope for perverse effects of selective immigration policies could be more than a theoretical curiosity.

The expectation that a selective immigration policy could greatly improve the average quality of immigrants to the US might be ill-grounded.

Extensions ◂ Back

- Greater variance in quality of educated agents. ▸ Variance
- Heterogeneity in the preferences for migration. ▸ Heterogeneity
- An alternative informational structure, with wages that are only locally observable. ▸ Information
- We allow the destination country to provide better information to educated agents. ▸ Job in hand
  - Educated agents arrive "with a job in hand", i.e., wages are remotely observable only for them.

Our theoretical results are robust to the proposed extensions.

"Say it loud, say it clear: refugees are welcome here"

"The EU needs people, especially young and healthy workers. [...] And while EU countries may prefer to pick and choose their migrants, it's a good bet that refugees with the stamina and courage to flee their homes, face perilous sea crossings and exhausting over-land treks will prove to be highly motivated workers whose children will climb the ladder of economic success in their adopted countries–just as my grandparents and great-grandparents did in America."

(blogpost by Ellen A. Goldstein, World Bank's Country Director for the Western Balkans, posted on-line on September 17, 2015)

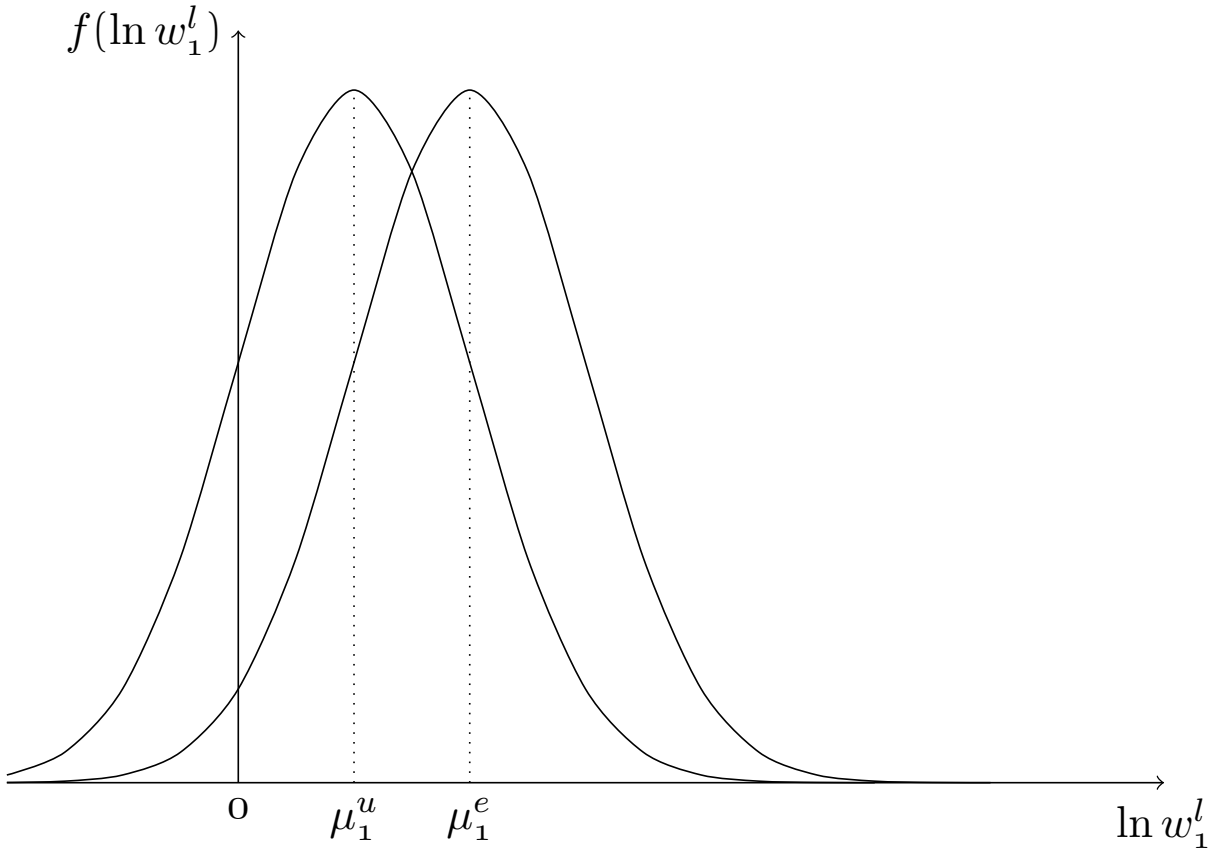
Holmstrom and Milgrom (1991) ◂ Back

This potentially perverse effect of selectivity on observables is reminiscent of results in the moral-hazard multitasking literature (Holmstrom and Milgrom, 1991).

A well-known result is that designing incentive schemes on easily observable tasks may lead the agent to reduce the effort tasks that are more difficult to monitor and may in the end hurt the principal.

(Unconditional) wage distributions at destination

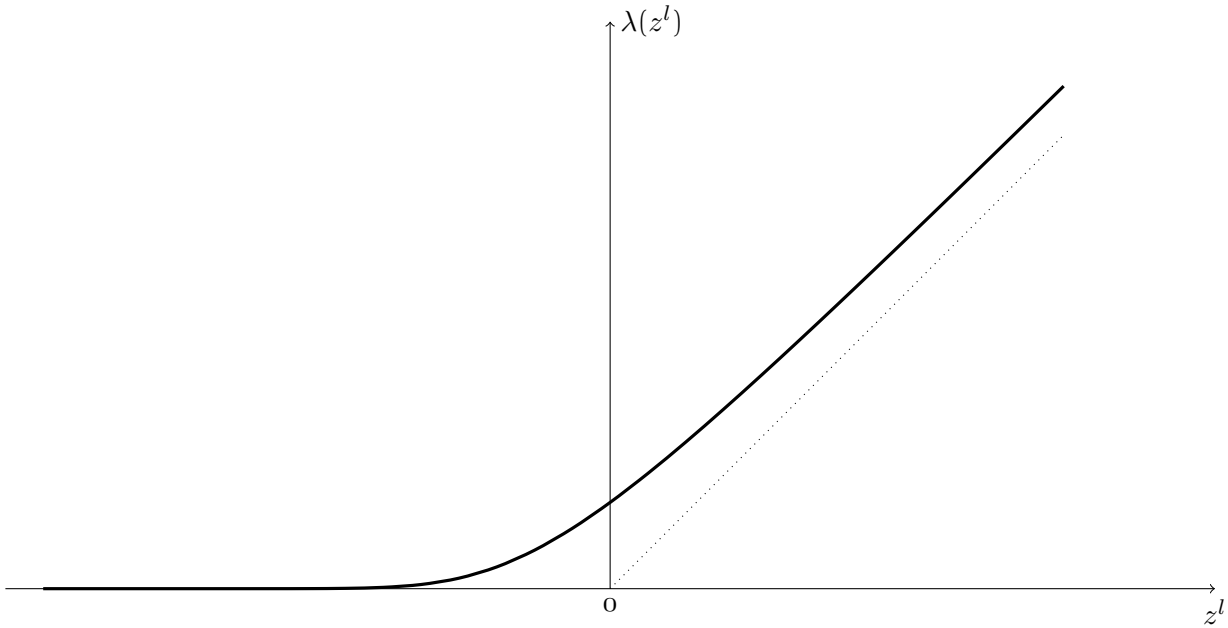
◂ Back



Note: the figure is drawn assuming that $\mu_1^u = 1$, $\mu_1^e = 2$ and $\sigma_1 = 1$.

Inverse Mills ratio

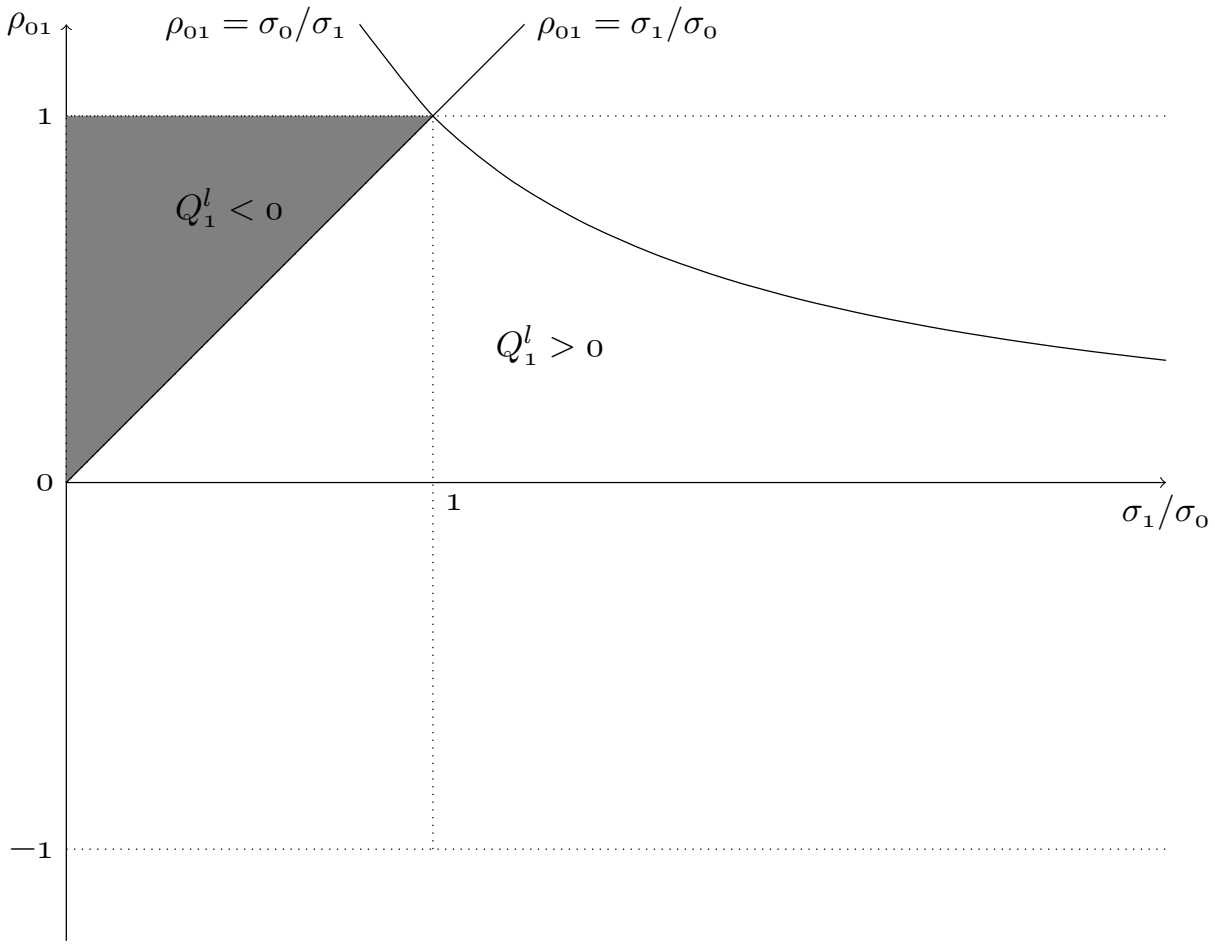
◂ Back



The Inverse Mills ratio is a contraction mapping, i.e., $\partial\lambda(z^l)/\partial z^l < 1$.

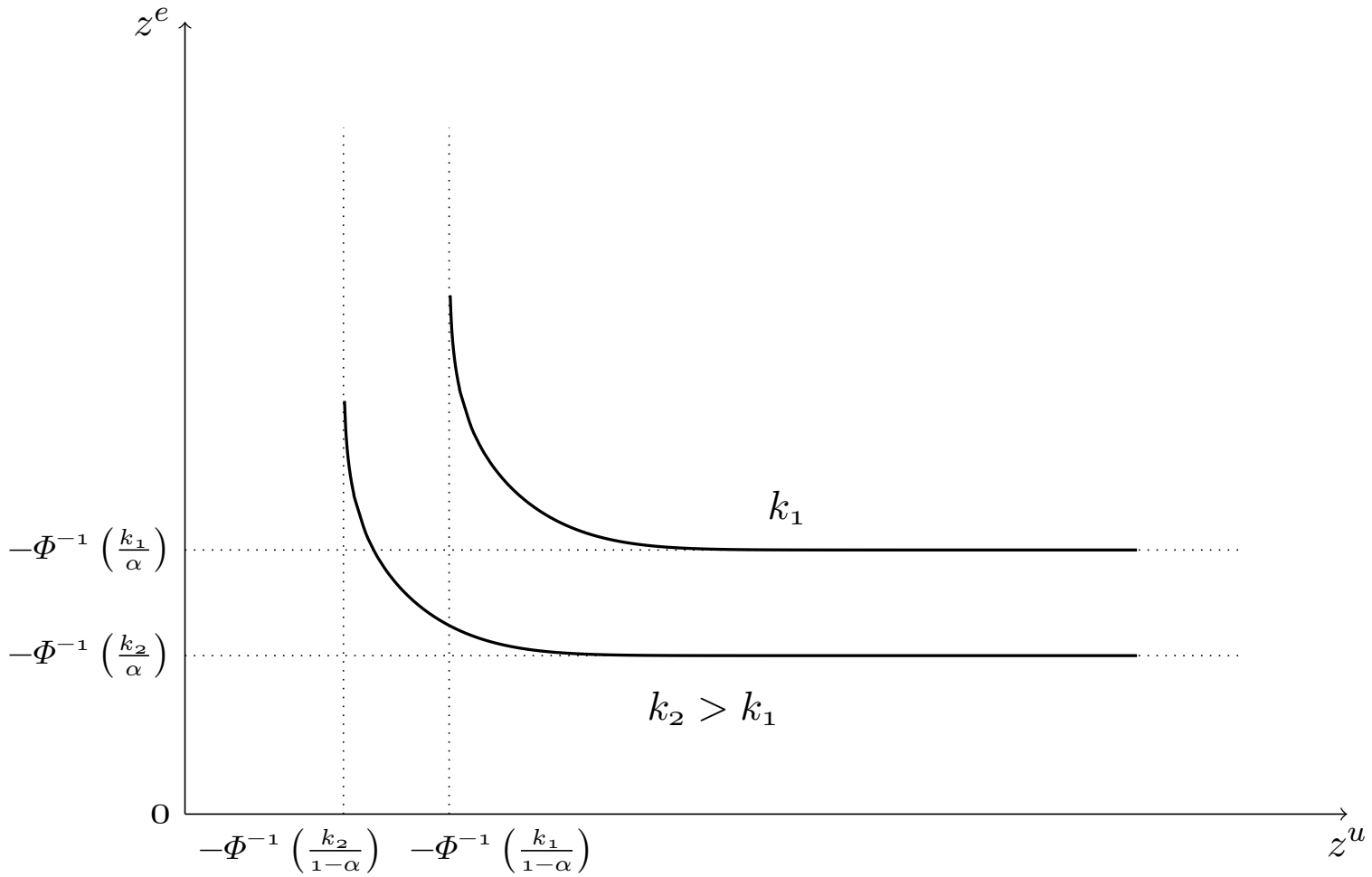
Patterns of selection on unobservables

◂ Back



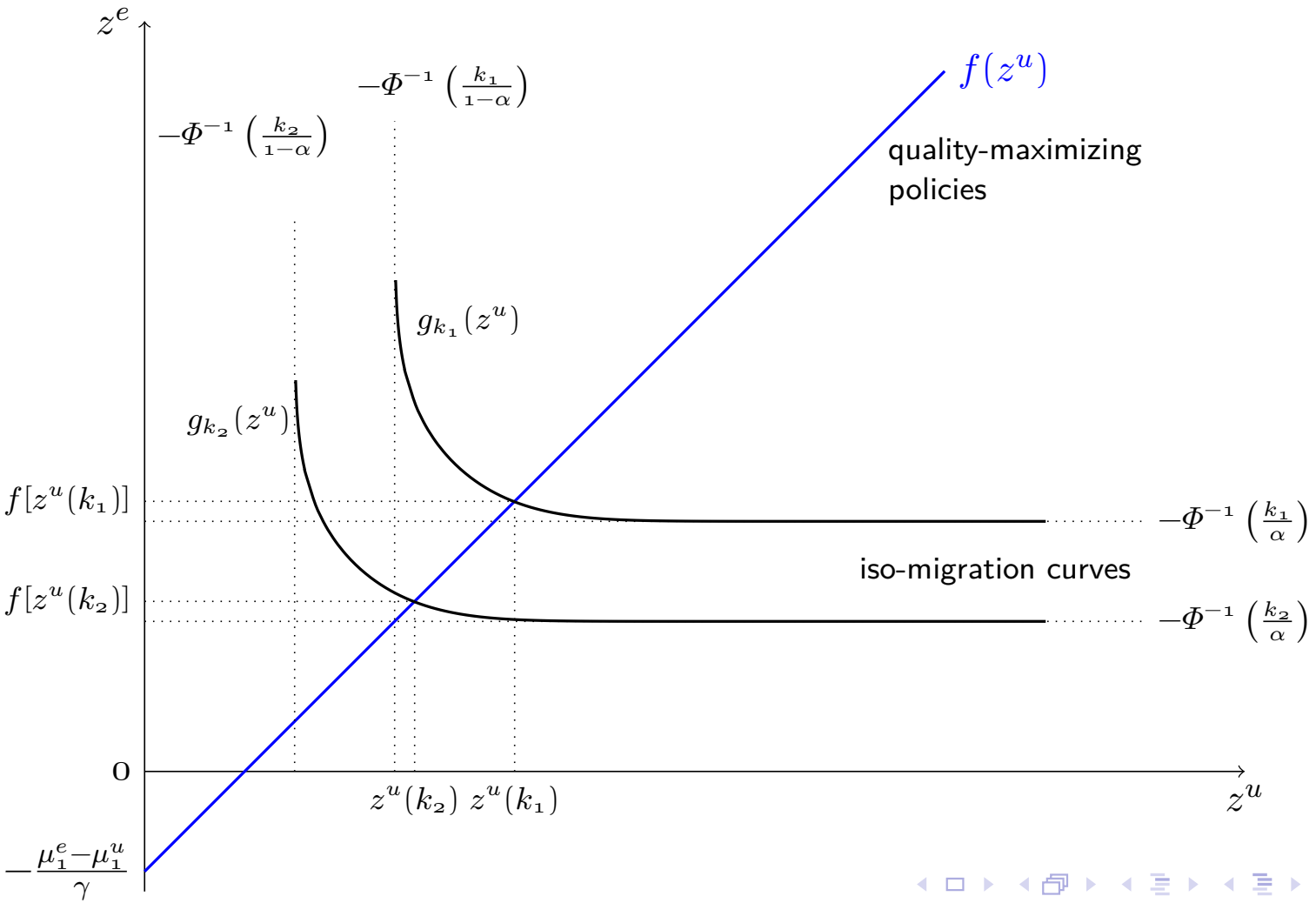
Iso-migration curves

Back



Quality-maximizing policy

Back



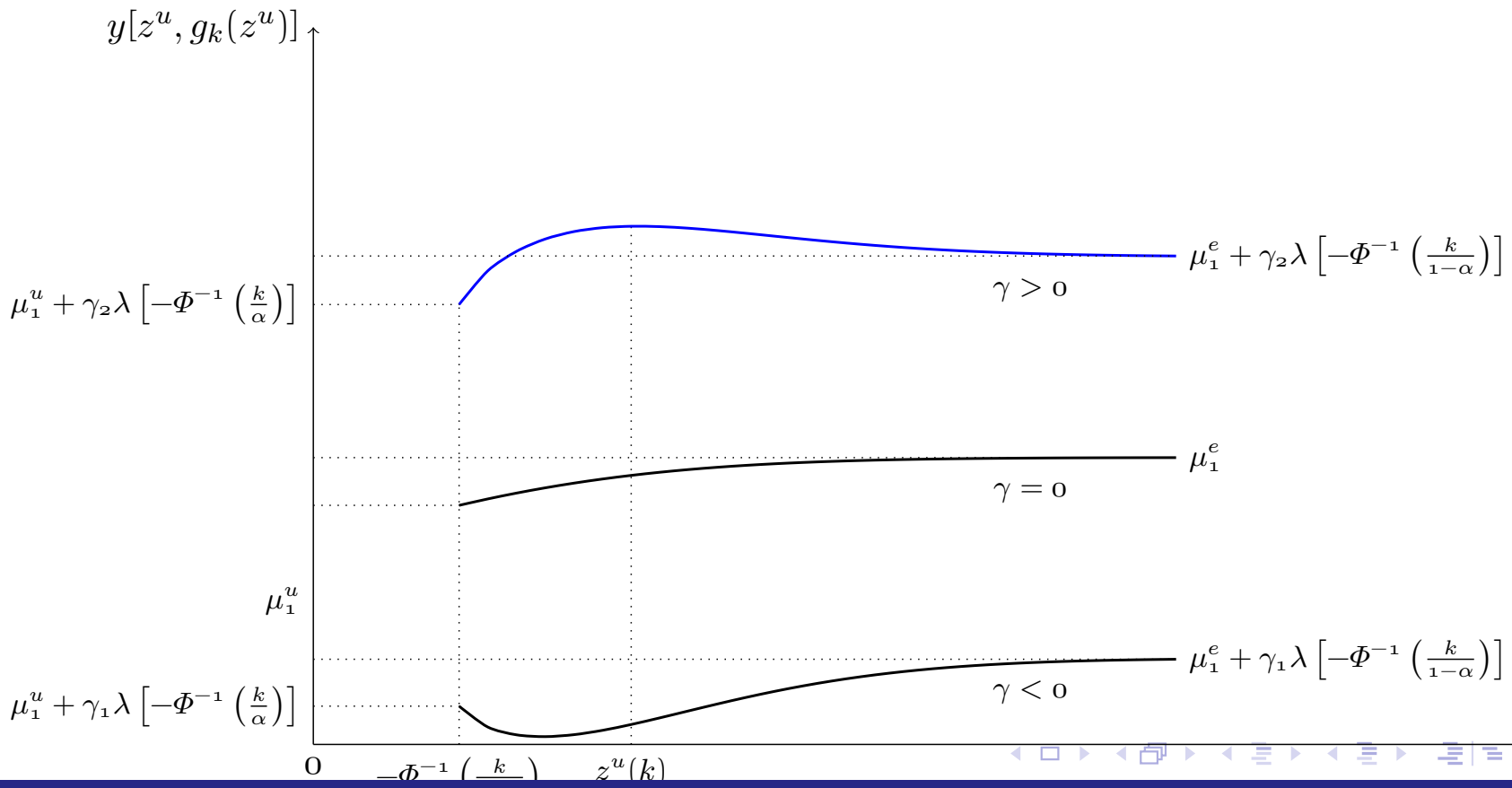
Proof of non-monotonicity

The partial derivative of migrants' quality with respect to z^u along an iso-migration curve is given by:

$$\frac{\partial y[z^u, g_k(z^u)]}{\partial z^u} = \frac{\partial \beta[z^u, g_k(z^u)]}{\partial z^u} [\mu_1^e + Q_1[g_k(z^u)] - \mu_1^u - Q_1(z^u)]$$
$$+\beta[z^u, g_k(z^u)] \left[\frac{\partial Q_1[g_k(z^u)]}{\partial z^u} - \frac{\partial Q_1(z^u)}{\partial z^u}\right] + \frac{\partial Q_1(z^u)}{\partial z^u}.$$

◂ Back

Scale-preserving increase in selectivity and migrants' quality



Proof of equality of wages (indifferent agents)

The condition that denotes the indifference between a domestic and a foreign job is $\epsilon_{i2} = z^l$. Bivariate normality implies that:

$$E\left(\ln w_{i1}^l | \epsilon_{i2} = z^l\right) = \mu_1^l + \gamma z^l$$

so that $E\left(\ln w_{i1}^e | \epsilon_{i2} = z^e\right) = E\left(\ln w_{i1}^u | \epsilon_{i2} = z^u\right)$ requires that:

$$z^e = f(z^u) \equiv z^u - \frac{\mu_1^e - \mu_1^u}{\gamma}$$

Back

Variations in the scale and quality-maximizing policy

An increase in the scale of migration that maximizes migrants' quality requires an identical reduction in z^e and z^u along the $z^e = f(z^u)$ curve; such a movement modifies the share of educated migrants.

The share of educated migrants that maximizes migrants' quality is a decreasing function of the scale of migration when migrants are positively selected on unobservables. Back

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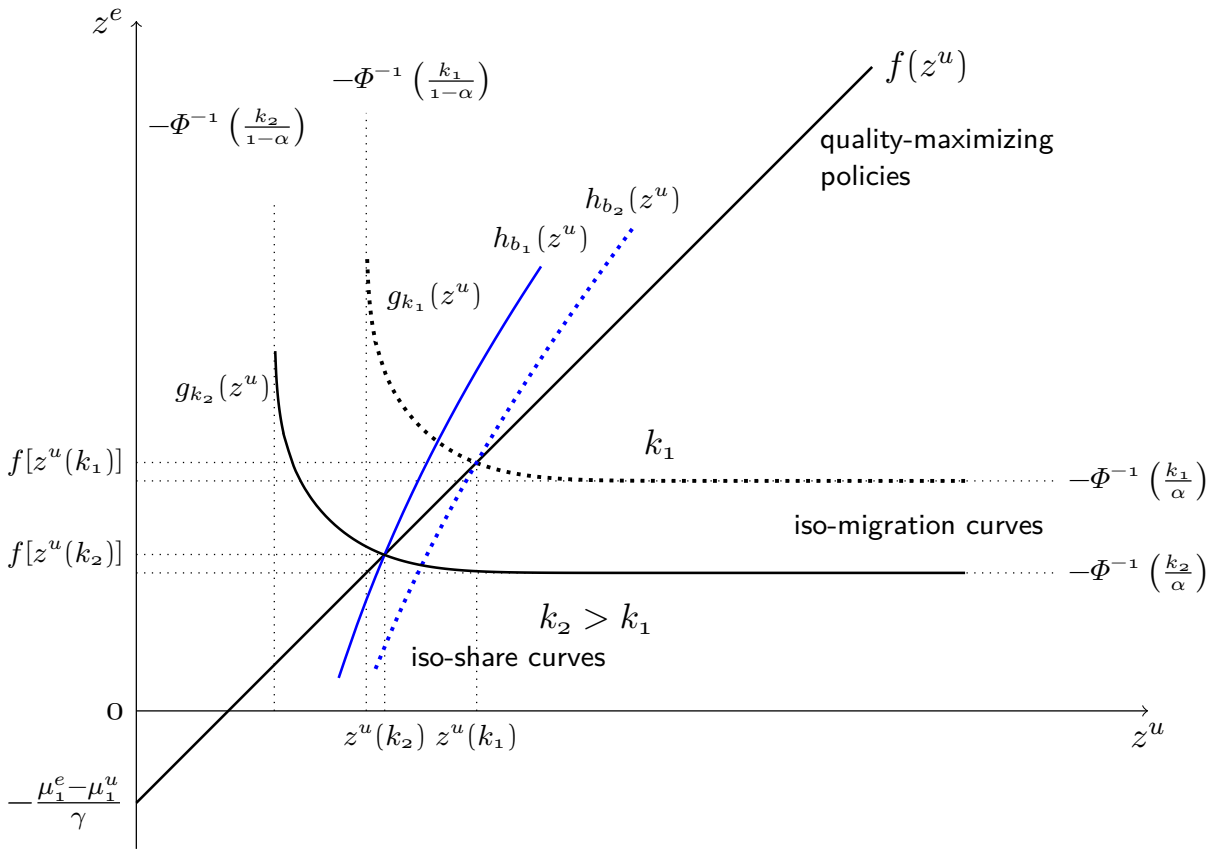
Optimal share of educated falls with scale of migration



▸ Proof ▸ Back

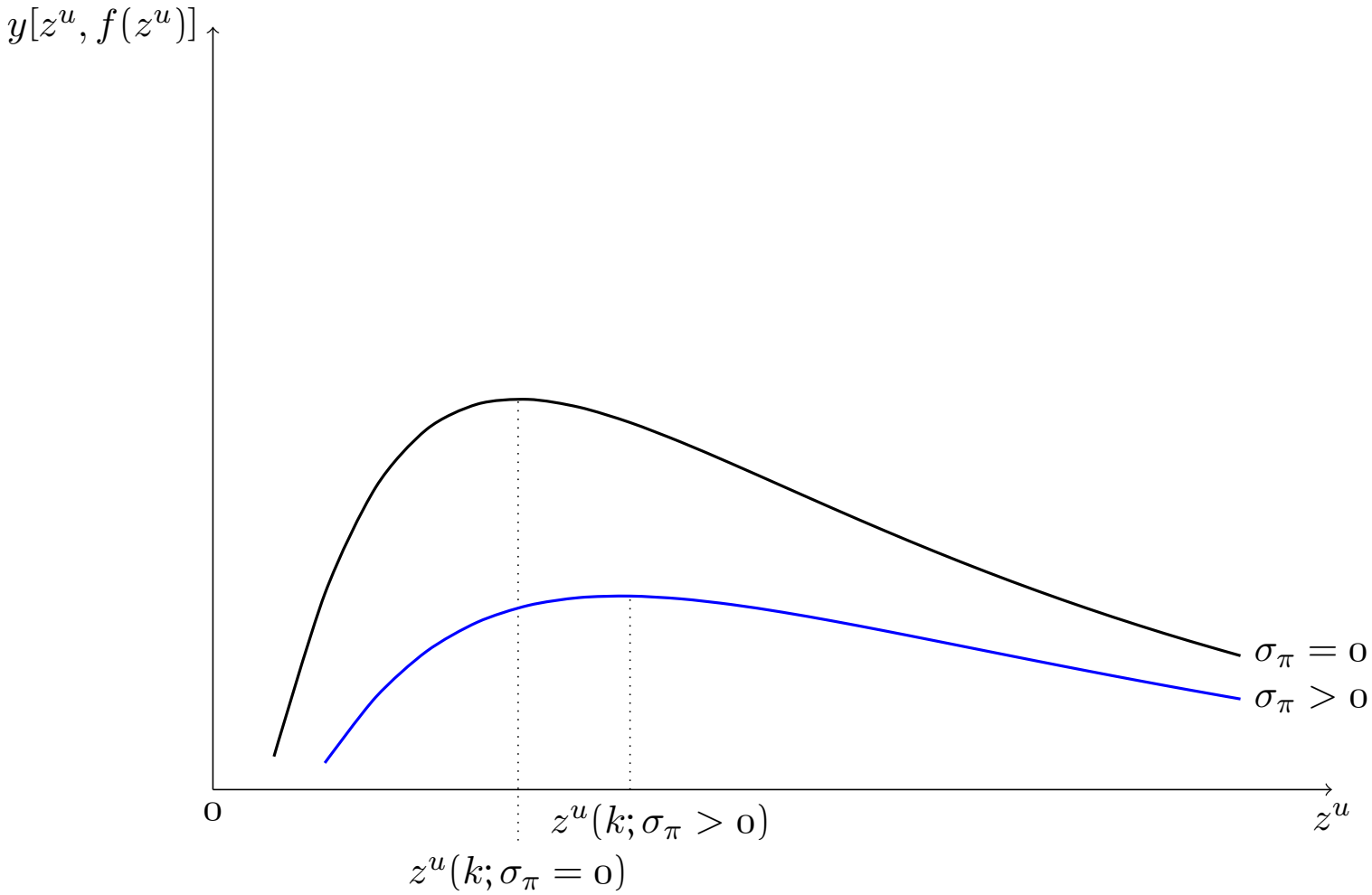
Heterogeneity in the preferences for migration

We can follow Borjas (1999) by assuming that time-equivalent migration costs π_i^l are determined by the realization of a normal random variable, i.e., $\pi_i^l = \mu_\pi^l + \epsilon_{i\pi}$, possibly correlated with ϵ_{i0} and ϵ_{i1}.

If $\sigma_{1\pi} < 0$, i.e., there is negative correlation between time-equivalent migration costs and wages at destination, then migrants can be positively selected on unobservables even if $\tilde{\gamma} \leq 0$.

Heterogeneity in the preferences for migration

◂ Back



Locally observable wages

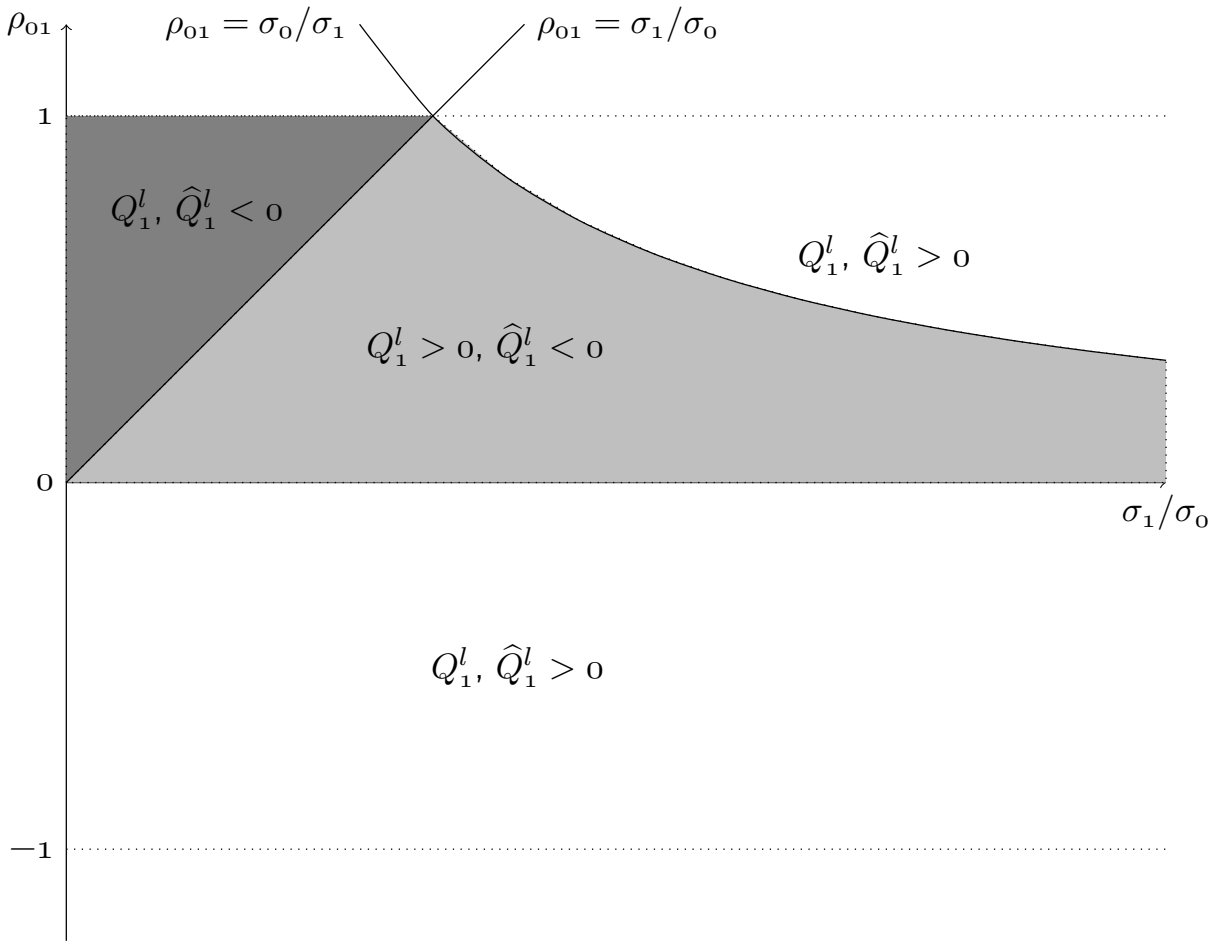
Back

We have assumed, as in Borjas (1987) that wages are remotely observable, so that the information set upon which the decision to migrate is taken includes the realizations of both ϵ_{i0} and ϵ_{i1}.

We also consider an alternative informational structure where wages are locally observable, i.e., only the realization of ϵ_{i0} belongs to the information set of the agents. Agents know the parameters that characterized the bivariate normal distribution of log wages, so that the realization of ϵ_{i0} conveys information on the expected value of the stochastic component of $\ln w_{i1}^{l}$.

Locally observable wages

◂ Back



Scale and the share of educated migrants

Deriving the iso-quality curve $h_b(z^u)$ yields:

$$\frac{\partial h_b(z^u)}{\partial z^u} = \frac{\lambda(z^u)}{\lambda(z^e)}$$

We have that:

$$\frac{\lambda(z^u)}{\lambda[f(z^u)]} > 1$$

where the inequality follows from the fact that migrants' quality is maximized for $z^e = f(z^u) < z^u$, and $\lambda'(z) > 0$. $h_b(z^u)$ is steeper than $f(z^u)$ when migrants' quality is maximized. Hence, an increase in the scale of migration induces a reduction in $\beta[z^u, f(z^u)]$, as $h_{b_2}(z^u) < h_{b_1}(z^u)$ with $b_2 > b_1$. Back

Educated migrants arriving with a job in hand

Selective policies could act not only on the cost side, as we have assumed so far, but also on the size of the information set upon which the decision to migrate is taken.

Borjas and Friedberg (2009) suggest that high-skilled immigrants who enter into the US with a H1-B visa have a higher quality, i.e., initial relative wage, as "arriving with a job in hand eliminates some of the initial labor market disadvantage of new immigrants".

We assume that wages are remotely observable for educated agents and locally observable for uneducated agents.

Educated migrants arriving with a job in hand

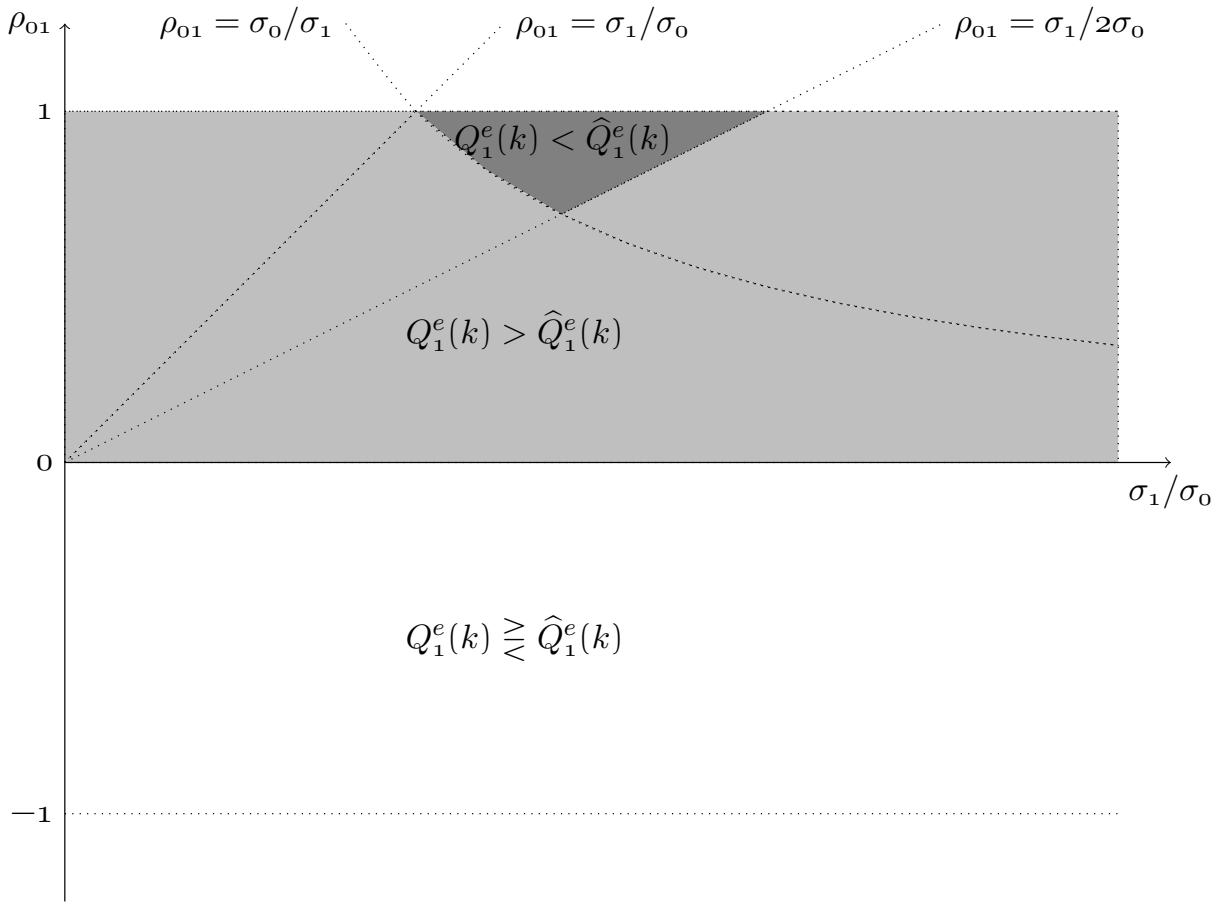
◂ Back

Providing better information to educated migrants produces, for a given scale of migration, an impact on migrants' quality that varies with the elements of the covariance matrix.

With different information sets, the pattern of selection on unobservables can be positive for educated and negative for uneducated agents, and this reinforces our argument, as the wages of both educated and uneducated migrants decline following a scale-preserving increase in selectivity.

Educated migrants arriving with a job in hand

Back



Variance in log wages

◂ Back

The empirical evidence suggests that the variance of (log) wages increases with education (Chen, 2008), i.e., ability plays a larger role in the determination of wages for better educated agents.

We relax the assumption that $\Sigma^e = \Sigma^u = \Sigma$, allowing for a greater variance in the wages of educated agents.

Migrants' quality still evolves non-monotonically along an iso-migration curve, and the curve representing optimal immigration policies in the (z^u, z^e) space becomes flatter, thus reinforcing Proposition 2, i.e., the optimal share of educated migrants declines with the scale of migration.

Likely documented immigrants ◂ Back

- A foreign-born is a likely documented immigrant if:
  - he or she arrived before 1980;
  - he or she is a citizen;
  - he or she receives Social Security benefits, SSI, Medicaid, Medicare, Military insurance;
  - he or she is a veteran or is currently in the Armed Forces;
  - he or she works in the government sector;
  - he or she resides in public housing or receives rental subsidies, or his or her spouse resides in public housing or receives rental subsidies;
  - he or she was born in Cuba (wet foot dry foot);
  - his or her occupation requires some forms of licensing;
  - his or her spouse is a legal immigrant or citizen