Inter-Ethnic Redistribution and Human Capital Investments[**]

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Abstract

This article analyzes income redistribution in the inter-ethnic context. The model shows that redistribution in favor of less prosperous ethnic minorities raises fertility among the unskilled minority recipients, lowers fertility among the contributing local skilled, slows human capital accumulation, and reduces the per-capita output growth. The analysis also demonstrates that income redistribution, although financed by taxes levied on the skilled, generates a mechanism that, via its disincentive effect on human capital investment, works strongly against another weak segment of society – the local unskilled. This may contribute to a better understanding of economic reasons for antipathy toward minorities, especially, among less educated.

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1. Introduction

This article analyzes income redistribution in the inter-ethnic context. It demonstrates that redistribution in favor of less prosperous ethnic minorities, although financed by taxes levied on the skilled, generates a mechanism that, via its disincentive effect on human capital investment, works strongly against another week segment of society – the local unskilled. The paper suggests that, without referring to the popular racial argument, the very existence of such redistribution may provide a purely economic explanation for inter-ethnic tensions broadly observed in modern societies. The work establishes the indirect effect of redistribution on the incentives of the local majority poor who are not directly involved in redistribution as contributors or recipients. This negative effect of the redistribution on the local poor may contribute to a better understanding of economic reasons for antipathy toward minorities among less educated segments of the local population.

The paper discusses the issue in the context of a growth model with endogenous fertility building on Dahan and Tsiddon (1998) and Azarnert (2004). The basic idea may be stated as follows. Consider an economy populated with two groups of local people: a group of the less prosperous unskilled and a group of the wealthier skilled. Along with the local population, the country contains an unskilled minority group. Suppose that minority unskilled earn lowest incomes. To compensate them for insufficient incomes, the minority unskilled receive financial support financed by taxes levied on the wealthier local skilled. The local unskilled, who earn lower wages than the skilled, are exempt from taxation, but, if they invest in human capital, they join the skilled and start paying taxes. This directly reduces their potential after-tax incomes and discourages them from acquiring human capital. Provided that children are viewed as a normal good for agents that belong to each group, income redistribution raises fertility among the unskilled minority recipients and lowers fertility among the contributing local skilled. When the number of skilled people grows slower, so does the total stock of human capital. This in turn reduces the output growth and the rate of increase in the return to human capital, via a human capital externality. This decline in the rate of increase of the pre-tax gross income of the skilled also negatively affects the lucrativeness of investment in human capital for the unskilled. As a consequence, the switch of the local poor to the skilled

status is postponed and as a result they are unnecessarily trapped in poverty for a longer period of time.

The model rests upon the following observations that have been largely supported by empirical evidence:

(1) *Over-representation of several minorities among welfare beneficiaries.*

The over-utilization of public assistance by immigrant minorities has been well documented by extensive research. For evidence from the United States, Germany, and Scandinavia see, for example, Borjas (1994; 1999), Borjas and Hilton (1996), Riphahn (2004), Hansen and Lofstrom (2003), Nannestad (2004), among many others. Thus, for example, findings suggest that a migrant family with three children that came to Germany in 1997 and stay there for ten years receives a net benefit totaling about EUR 120,000. Likewise, in the case of the US, a non-white immigrant with less than high school education is typically a net fiscal burden that can reach as high as approximately US$ 100,000 in present value, when the migrant's age on arrival is between 20 – 30 years (Razin and Sadka 2004). In Germany, the fraction of minority immigrants among income support recipients has exceeded their share in the total population already since, at least, 1980.[1] In Denmark, during the 1990s, an increase in the amount of non-Western immigrants was associated with a sharp increase in the amount of net transfers from native Danes to the public sector.[2] In his survey of the literature that amassed during the last 15 years, Nannestad (2007) concluded that most of the existing research supports the conclusion that immigration flows with the average characteristics of the immigration into Western welfare states of the last 15 to 20 years tend not to be to the advantage for the natives, while advantageous for immigrants.

Evidence from continental Europe also demonstrates that European-born descendants of non-white immigrants, as a rule, fail to assimilate to the local labor market

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[1] For example, in 1996, the share of minority immigrants among income support recipients reached 25.8%, while their share in the total population was lower than 10%. In Western Germany, between 1991 and 1996 an increase in the amount of minority immigrants was associated with an increase in real expenditures on income support by 141% (Riphahn 2004). It is also noteworthy that since 1994 these statistics exclude expenditures on asylum seekers. Ethnic German immigrants from Eastern Europe are considered in these statistics as German nationals.

[2] Net transfers from native Danes to public sector in Dkr (1997 prices) per person increased from 14900 in 1991 to 24500 in 1998 (Nannestad 2004, table 2). The first estimate of the fiscal impact of immigration in Denmark published in December 1997 shows that the net cost of non-Western immigrants amounted to 11.3 bill. Dkr in 1995 (Nannestad 2007, note 27).

standards and exhibit very high welfare dependency (e.g. Nannestad 2004 and references therein).[3] As a consequence, in Europe, a considerable fraction of people who belong to ethnic minorities do not even participate in the labor market, and among those who are formally in the labor force, unemployment is much higher than that among the natives.[4] Moreover, the use of public employment for the purpose of disguised income redistribution toward disadvantaged minorities has been observed as well (Alesina et al. 2000).

  (2) *Differences in skills and economic outcomes between different ethnic groups.*

The existence of large wage differentials between different ethnic groups even after standardizing for observed skills has been well documented (e.g., Borjas, 1994, 1999, among others). Within this context, Borjas (1994, p. 1714) concludes that "current immigration in the US and in many other countries is setting the stage for ethnic differences in economic outcomes that are likely to be a dominant feature of labor market in these countries throughout the next century". The importance of ethnicity in the process of human capital accumulation has also been well established (e.g., Borjas, 1992). More specifically, lower educational success of several minorities has been broadly documented as well. For example, Light and Strayer (2006) find that the US minorities, although are more likely than observably equivalent Whites to attend colleges, posses fewer favorable unobserved factors and as a result are less likely than their White counterparts to complete college. Riphahan (2003) finds that in Germany schooling successes of second-generation, German-born Turkish immigrants lag behind those of natives, so that a group as a whole fails to assimilate to native educational standards and increasingly falls behind. Huge gap in educational achievements between natives and second-generation nonwestern immigrants has been broadly observed in Denmark as well (e.g., Nannestad 2004 and references therein). In addition, less educated minorities also demonstrate higher fertility levels as compared to locals.

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[3] As Borjas and Hilton (1996) report, in the US, in the early 1990s, as compared to native American Whites, native American Hispanics and blacks were more likely to participate in some welfare program 3 and 4 times, respectively.

[4] Thus, for example, as Nannestad (2004) reports, in Denmark more than 50% of nonwestern immigrants and their descendants were outside the labor force in 2001. The most striking are the figures for Somalians and Palestinians, for whom labor market participation rates were only 14 and 26 percent, respectively. Accordingly, during 1985 – 2001, among immigrants and their Danish-born descendants unemployment was at least 3 times higher than that among native Danes.

This paper is chiefly related to the following three strands in the literature: (1) attitudes of natives toward minorities, (2) endogenous fertility and growth, (3) redistribution and growth.

Within voluminous recent literature on ethnic diversity and its negative economic consequences, the present paper is close in spirit to the studies that analyze the formation of opinion and attitudes of natives toward minorities. In recent years, following dramatic changes in the pattern of international migration, research on race-related attitudes of native intensified (see, e.g., Dustmann and Preston (2001) for a list of recent empirical studies). Looking at cross-country survey data and at individual countries, these recent studies, such as, for example, Bauer et al. (2000), Dustmann and Preston (2001; 2006; 2007), Scheve and Slaughter (2001), Gang et al. (2002), O'Rourke and Sinnott (2006) among others, separate racial and economic components of such attitudes and demonstrate the importance of both economic and non-economic factors in determining negative sentiments toward minorities that are on the rise in recent years.

Leaving aside the important non-economic factors, such as, for instance, cultural and national identity concerns, in determining attitudes toward minority groups with largely different cultural background,[5] the present paper concentrates on purely economic reasons behind negative sentiments among natives toward ethnic minorities, either already settled, or still increasing their share in population through further immigration. It enriches this strand of the literature by establishing the novel channel through which the redistribution in favor of less prosperous ethnic minorities negatively affects the local poor, although they do not directly finance this redistribution.

The particular explanation provided in this paper can not serve as the major economic reason for the existence of the antipathy toward minorities. Another more straightforward explanation is that the antipathy may exist simply because the minority group receives income support while the majority unskilled group does not. But I believe that, in view of the growing importance of this issue, all explanations that can contribute to a better understanding of the reasons for the existence of the inter-ethnic antipathy in the society can serve in conjunction.

Voluminous growth literature with endogenous fertility has flourished recently.[6] A prominent example is Galor and Weil (2000) who assumed that a rise in the rate of technological progress increases the rate of return to human capital, inducing parents to substitute child quality for child quantity. In this model, as in Galor and Weil (2000) as well as in Galor and Moav (2002) among many others, technological progress brings about an increase in the return to education, eventually inducing the poor to invest in education and switch to the skilled status. Income redistribution, however, makes this process slower and unnecessarily keeps the local poor in poverty for a longer period of time.

Among other related studies, Moav (2005) explores the joint determination of fertility and education and offers an explanation for the persistence of poverty. In his model, the price of child quantity relative to that of child quality increases with an individual's labor income. As a result, the poor have a comparative advantage in child quantity, whereas the rich (educated) have a comparative advantage in the child quality. Dahan and Tsiddon (1998) show that the offspring of the unskilled parents find it lucrative to invest in human capital and then to decrease their optimal fertility only once the net income gap between the educated and the uneducated becomes high enough. De la Croix and Doepke (2003) concentrate on the fertility differential between the rich and the poor. They conclude that inequality affects economic growth negatively since poor parents who tend to have many children and provide little education have an impact on the future society's human capital that is larger than their current fraction in the population. Azarnert (2004) introduces an analysis of interactions between income redistribution, fertility and growth in an economy that operates in a global environment. Unlike previous studies in this context that do not consider inter-ethnic interactions, this work illustrates the important role of income redistribution in the determination of fertility differentials between different ethnic groups.

A key issue in models that deal with redistribution and growth is whether more redistribution is beneficial or detrimental to investment and accumulation. In Alesina and

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[5] The findings of recent empirical studies, e.g., Dustmann and Preston (2001), Gang et al. (2002), demonstrate that increasing concentration of ethnic minorities in local neighborhoods leads to more hostile attitudes toward minorities among the natives.

Rodrik (1994) and Person and Tabellini (1994), taxes reduce growth by decreasing the net return on capital. Galor and Tsiddon (1997) argue that an economy that prematurely implements a policy designed to enhance equality in the distribution of income may be trapped unnecessarily at a low-output equilibrium without ever reaching prosperity. Orazem and Tesfatsion (1997) discuss the disincentive effect of income redistribution on children's schooling effort. Banerjee (2004) argues that a proportional tax on human capital reduces human capital investment even if it is then redistributed as a lump-sum educational subsidy. Azarnert (2004) concentrates on the effect of income redistribution on growth through the demographic channel. The present paper adds a multiethnic context and contributes to the existing literature on redistribution and growth by further investigation of the demographic implications of income redistribution that this strand of literature has yet to integrate. It also establishes the indirect effect of redistribution on the incentives of the group that is not directly involved in the redistribution as contributors or recipients. On the society-wide level, the analysis suggests that reductions in the burden of redistribution in favor of less prosperous ethnic minorities may help to slacken the negative pressure on educational incentives among the locals thereby increasing the supply of skilled labor and stimulating economic growth.

The particular type of redistribution policy proposed in this paper does not represent the full set of possible redistributive policies and the economic question in this paper is not to define an optimal policy. Resting on the evidence on participation of minorities in the welfare state, I study the consequences of income support to unskilled minorities, which is the particular type of the policy that is being broadly practiced in many developed countries.

Finally, in Section 3, I extend the analysis toward subsidizing school costs instead of income. I show that an introduction of new incentives for the minority unskilled to become skilled, meaning that the minority unskilled will become skilled before than in an economy without redistribution, can be achieved in two ways: First, directly and straightforward, the minority school costs can be subsidized. Alternatively, an educational subsidy can be provided to the majority unskilled. In this case, the earlier

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[6] See Galor (2005) for a survey. Additional references can be found in Azarnert (2006; 2008). Cigno (2006) provides a renegotiation-proof constitutional theory of fertility.

switch of the majority unskilled to the skilled status will increase the aggregate stock of human capital and, hence, the wages in the skilled sector, thus bringing closer the day when the minority unskilled will decide to acquire human capital. Moreover, such redistributive policy is easier to implement, since, as has been argued in the literature, in multiethnic societies, taxpayers are less likely to resist public educational expenditures, when they finance education of children from their own ethic group (e.g. Poterba 1997). And in the end, such policy will also be for the benefit of the minority unskilled.

2. The Structure of the Economy

Consider an overlapping-generation economy in which agents live for two periods and capital flows freely at a fixed world interest rate r. In the first period of life, agents are children: each consumes a fixed quantity of his parents' time. Children can either perform simple tasks (unskilled work) or invest in human capital. In the second period of life, they either benefit from higher income if they invest in human capital or work as unskilled workers for lower pay. In either case, they decide on the number of their offspring, become parents, and spend time bringing up their children. For simplicity, assume that agents consume only in the last period of life.

Suppose the economy is populated with two groups of people: a local majority group and an ethnic minority group, which comprises immigrants and their descendants who are ethnically different from the local population. Suppose that initially all minority individuals are unskilled. Suppose the minority unskilled earn less than the local unskilled. To compensate them for insufficient incomes, the minority unskilled receive financial support financed by taxes levied on the wealthier local skilled. The local unskilled, who earn lower wages than the skilled, are exempt from taxation, but, if they invest in human capital, they join the skilled and start paying taxes. The offspring of the minority unskilled who choose invest in human capital join the skilled and give up the subsidy. When the offspring of the minority unskilled become skilled, the redistribution ends.

2.1. Production

In period $t+1$ production of the same aggregate output is performed in two sectors. The unskilled produce using a linear technology and no capital:

$$Y_{t+1}^u = w^u L_{t+1}^u + w^m L_{t+1}^m, \tag{1}$$

where L_{t+1}^u is the number of the local unskilled workers in period $t+1$ and L_{t+1}^m is the number of the minority unskilled. The wage of a local unskilled worker is fixed at w^u, the wage of the minority unskilled worker is w^m, and $w^m < w^u$.

The lower wages of the minority unskilled may result either from their lower productivity relative to the local unskilled, or from a discrimination against them in the labor market. For any reason, if they receive a tax-financed income support to compensate them for lower incomes, the effect is the same, and this paper is about the effect, not about reasons.

Production in the skilled sector uses two factors of production – capital and efficiency units of labor. The total number of efficiency units E in this sector is a weighted average of E^s, E^{us} and E^{ms}, where the weights are the numbers of *s*-individuals (skilled children of local skilled parents), *us*-individuals (skilled children of local unskilled parents), and *ms*-individuals (skilled children of the minority unskilled parents). I also assume that the skill premium for a child of a local skilled parent is higher than that for a child of a local unskilled parent, and that the skill premium for a child of a local unskilled parent is higher than the skill premium for a child of a minority unskilled parent. More specifically, when investing in human capital, the child of a skilled parent obtains E^s efficiency units, while the skilled child of a local unskilled parent obtains E^{us} units of efficiency, and the skilled child of an unskilled minority parent obtains only E^{ms} units of efficiency ($E^s > E^{us} > E^{ms}$).

There are many explanations for this parental lead in education: informal education, cultural aspect, the time spent searching for a job or quality of the match. Whatever the reasons, the empirical significance of the parental effect has been widely documented (see, e.g., Becker and Tomes (1986), Altonji and Dunn (1996), Rubinstein and Tsiddon (2004), among others). Lower educational success of several minorities (e.g., Riphahn 2003; Nannestad 2004; Light and Strayer 2006), as well as the existence of

large intergenerationally transmitted (e.g. Borjas 1992) wage differentials between different ethnic groups (e.g. Borjas 1994, 1999) has also been well documented.

The production function in the skilled sector is thus

$$Y_{t+1}^s = A_{t+1}K_{t+1}^\alpha E_{t+1}^{1-\alpha}, \tag{2}$$

where $E_{t+1} = L_{t+1}^s E^s + L_{t+1}^{us} E^{us} + L_{t+1}^{ms} E^{ms}$, A_{t+1} is the level of technology, and L_{t+1}^j is the total number of j-type adult individuals in the economy in period $t+1$.

In a world where capital is free to flow at the rate of interest r, the return to one unit of efficiency in the skilled sector equals:

$$w_{t+1}^s = \frac{dY_{t+1}^s}{dE_{t+1}} = A_{t+1}(1-\alpha)\left(\frac{\alpha A_{t+1}}{r}\right)^{\frac{\alpha}{1-\alpha}}. \tag{3}$$

Suppose technological progress is a function of a past society-wide stock of human capital. To capture this effect, assume A is a function of the aggregate level of human capital in the economy in the previous period, $A_{t+1} = A(E_t)$.[7] Since human capital per educated person is fixed by construction of this model, an aggregate change comes out of an increase in the population of educated persons only, which is a Kremer-type assumption; $A(\cdot) > 0, A'(\cdot) > 0, A''(\cdot) < 0$.

2.2. Tax-Transfer Scheme

In this economy, the minority unskilled earn less than the local unskilled. To compensate for insufficient incomes, the minority unskilled receive an income support financed by taxes levied on the wealthy local skilled. To specify the tax-transfer scheme, the following is assumed:[8]

A1. *In period $t+1$, there is one common tax rate τ levied on the skilled.*

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[7] The assumption that productivity depends on the aggregate level of human capital has been made to simplify dynamics. Under alternative assumption that productivity depends on the average level of human capital, the positive contribution of the skilled individuals to the human capital stock can be diluted by the growing number of the unskilled. Tamura (1996) first identified the possibility of dilution effects from differential fertility in human capital spillover models. Azarnert (2009) provides a recent model, in which productivity depends on the average level of human capital in the society.

[8] The impact of tax-benefit system on fertility has been well documented empirically. See, e.g., Whittington et al. (1990), Whittington (1992), Zhang et al. (1994), Gauthier and Hatzius (1997), Milligan (2005).

A2. *The proceeds are distributed proportionally to the number of the unskilled minority recipients.*

The scheme specified above yields that the sum of transfer an adult unskilled individual receives in period $t+1$ is

$$\varphi_{t+1} = \frac{\tau w_{t+1}^s (E^s L_{t+1}^s + E^{us} L_{t+1}^{us})}{L_{t+1}^m}. \tag{4}$$

where L_{t+1}^s is the number of skilled taxpayers (L^{us} is positive at the date when the offspring of the local unskilled switch to the skilled status and is meaningless otherwise), L_{t+1}^m is the number of unskilled minority recipients, and τ is the rate of tax.

In this model the rate of tax is exogenous, but it can be easily endogenized as, for instance, in Azarnert (2004) where the tax is determined by the opportunities for the skilled taxpayers abroad. It can be also assumed that in the starting period the rate of tax is set in such a manner, so as to ensure that the total income of the minority unskilled, including the sum of transfer (φ_{t+1}), does not exceed the labor income of the local unskilled.

Given the assumption that all individuals in the minority group are alike, the redistribution will be abolished at a moment when children of the minority unskilled will find it profitable to invest in human capital and switch to skilled status.

2.3. *Utility Maximization*

Regardless of ethnicity, agents derive utility from consumption in the second period of life and from the number of their living children. There is no uncertainty. The utility function of an individual born at time t is[9]

$$U_t = (1-\beta)\ln(C_{t+1}) + \beta \ln(N_{t+1}), \tag{5}$$

where C_{t+1} is second-period consumption and N_{t+1} is the number of living children.[10]

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[9] The results of the paper depend on this particular utility function. However, provided that children are viewed as a normal good, regardless of the particular type of the utility function, taxation leads to a reduction in fertility, while income support increases fertility.

[10] Since the parental effect exists in human capital, a parental care for the well being of their offspring is not necessary in this context.

Individuals in this economy are classified as: (1) *s*, the skilled offspring of the local skilled parents, (2) *u*, the local unskilled, (3) *us*, the skilled offspring of the local unskilled parents, (4) *m*, the minority unskilled, and (5) *ms*, the skilled offspring of the minority unskilled.

An individual's lifetime income is allocated between consumption and childrearing. The cost of rearing children is measured in terms of work time foregone, at δ per child. Given the tax-transfer scheme, as specified in Section 2.2, with the lifetime income (I_{t+1}^j) as given in Eq. (9), the budget constraint for each type of individuals is respectively:

$$
\begin{aligned}
&C_{t+1}^s + \delta N_{t+1}^s E^s w_{t+1}^s (1-\tau) = I_{t+1}^s, &&C_{t+1}^{us} + \delta N_{t+1}^{us} E^{us} w_{t+1}^s (1-\tau) = I_{t+1}^{us}, \\
&C_{t+1}^u + \delta N_{t+1}^u w^u = I_{t+1}^u, &&C_{t+1}^{ms} + \delta N_{t+1}^{ms} E^{ms} w_{t+1}^s = I_{t+1}^{ms}. \\
&C_{t+1}^m + \delta N_{t+1}^m w^m = I_{t+1}^m,
\end{aligned}
\tag{6}
$$

Each individual maximizes his utility subject to his budget constraint. He has two decision variables: consumption and the number of children. For each generation *t*, the optimal level of each choice variable is

$$
C_{t+1}^j = (1-\beta) I_{t+1}^j, \quad j = s, u, m, us, ms,
$$

$$
\begin{aligned}
&N_{t+1}^s = \frac{\beta}{\delta E^s w_{t+1}^s (1-\tau)} I_{t+1}^s, &&N_{t+1}^{us} = \frac{\beta}{\delta E^{us} w_{t+1}^s (1-\tau)} I_{t+1}^{us}, \\
&N_{t+1}^u = \frac{\beta}{\delta w^u} I_{t+1}^u, &&N_{t+1}^{ms} = \frac{\beta}{\delta E^{ms} w_{t+1}^s} I_{t+1}^{ms}. \\
&N_{t+1}^m = \frac{\beta}{\delta w^m} I_{t+1}^m,
\end{aligned}
\tag{7}
$$

Using Eq. (7), the (indirect) utility function at the optimum is

$$
\begin{aligned}
&U_t^s = \ln(I_{t+1}^s) - \beta \ln(\delta E^s w_{t+1}^s (1-\tau)) + \varepsilon, &&U_t^{us} = \ln(I_{t+1}^{us}) - \beta \ln(\delta E^{us} w_{t+1}^s (1-\tau)) + \varepsilon, \\
&U_t^u = \ln(I_{t+1}^u) - \beta \ln(\delta w^u) + \varepsilon, &&U_t^{ms} = \ln(I_{t+1}^{ms}) - \beta \ln(\delta E^{ms} w_{t+1}^s) + \varepsilon \\
&U_t^m = \ln(I_{t+1}^m) - \beta \ln(\delta w^m) + \varepsilon, \\
&\text{where } \varepsilon \equiv \beta \ln(\beta) + (1-\beta) \ln(1-\beta).
\end{aligned}
\tag{8}
$$

2.4. *Investment in Human Capital*

Each individual has one unit of time in each period of life. It can be used either for education or work. As specified in Section 2.1, there exists a wedge in the return to

investment in human capital $(E^s > E^{us} > E^{ms})$ that is assumed to be sufficiently large. Since the parental effect in human capital is assumed to be strong enough and the rate of tax is assumed to be not too high, the offspring of skilled parents always invest in education. The offspring of unskilled parents decide in the first period whether or not to invest in human capital. An individual who chooses to invest in education spends all his working time in the first period of life at school and pays for that education a constant fraction of the gross skilled wage $h = \theta w^s$. There are no restrictions on borrowing at a fixed interest rate r. In the second period an adult individual works as a skilled worker, earning w^s per one unit of efficiency he obtained. As long as the redistribution exists, a local skilled individual pays a fraction τ of his labor income in taxes. A local individual who does not invest in human capital engages in unskilled labor in both periods of his life and earns w^u each period. A minority individual who does not invest in human capital engages in unskilled labor each period, earns each period w^m and receives income support (φ) in the second period. A minority agent who invests in education spends all his time at school in the first period, pays θw^s for that education, earns w^s per each unit of efficiency in the second period and gives up the subsidy.

Given the tax-transfer scheme, as specified in Section 2.2, for individual born at period t, the whole lifetime income in terms of second period is one of the following forms:

$$I_{t+1}^s = E^s w_{t+1}^s (1-\tau) - \theta w_t^s (1+r), \qquad I_{t+1}^{us} = E^{us} w_{t+1}^s (1-\tau) - \theta w_t^s (1+r),$$
$$I_{t+1}^u = w^u (2+r), \qquad\qquad\qquad I_{t+1}^{ms} = E^{ms} w_{t+1}^s - \theta w_t^s (1+r). \qquad (9)$$
$$I_{t+1}^m = w^m (2+r) + \varphi_{t+1},$$

According to Eq. (8), for each generation t, the utility is, correspondingly:

$$U_t^s = \ln\{E^s w_{t+1}^s (1-\tau) - \theta w_t^s (1+r)\} - \beta \ln\{\delta E^s w_{t+1}^s (1-\tau)\} + \varepsilon,$$
$$U_t^u = \ln\{w^u (2+r)\} - \beta \ln\{\delta w^u\} + \varepsilon,$$
$$U_t^m = \ln\{w^m (2+r) + \varphi_{t+1}\} - \beta \ln\{\delta w^m\} + \varepsilon, \qquad (10)$$
$$U_t^{us} = \ln\{E^{us} w_{t+1}^s (1-\tau) - \theta w_t^s (1+r)\} - \beta \ln\{\delta E^{us} w_{t+1}^s (1-\tau)\} + \varepsilon,$$
$$U_t^{ms} = \ln\{E^{ms} w_{t+1}^s - \theta w_t^s (1+r)\} - \beta \ln\{\delta E^{ms} w_{t+1}^s\} + \varepsilon.$$

As long as $U_{t+1}^u > U_{t+1}^{us}$, children of local unskilled parents decide to remain unskilled. Once this inequality is reversed (or turned into equality), children of local

unskilled parents choose to become skilled. Correspondingly, as long as $U_{t+1}^{m} > U_{t+1}^{ms}$, the offspring of the minority unskilled choose to remain unskilled.

2.5. *Fertility Choice*

From Eq. (7), for a given tax rate τ, one can calculate the number of children per parent. Denoting by N_{t+1}^{j} the number of offspring of a parent born in period t, where $j = s, u, m,$ *us, ms*, these numbers are

$$N_{t+1}^{s} = \frac{\beta}{\delta} \left[1 - \frac{\theta w_{t}^{s}(1+r)}{E^{s} w_{t+1}^{s}(1-\tau)} \right], \tag{11}$$

$$N_{t+1}^{us} = \frac{\beta}{\delta} \left[1 - \frac{\theta w_{t}^{s}(1+r)}{E^{us} w_{t+1}^{s}(1-\tau)} \right], \tag{12}$$

$$N_{t+1}^{u} = \frac{\beta}{\delta}(2+r). \tag{13}$$

Fertility choice of unskilled minority individuals depends on the transfer payments they receive. Given Eq. (4), it is

$$N_{t+1}^{m} = \frac{\beta}{\delta} \left((2+r) + \frac{\tau w_{t+1}^{s}(E^{s} L_{t+1}^{s} + E^{us} L_{t+1}^{us})}{w^{m} L_{t+1}^{m}} \right). \tag{14}$$

As I show below in Section 2.6, at some point it becomes lucrative for the offspring of the minority unskilled to give up their subsidy and switch to skilled status. Given the tax-transfer scheme, as specified in Section 2.2, at this moment taxation is abandoned. Hence, fertility for *ms*-individuals is

$$N_{t+1}^{ms} = \frac{\beta}{\delta} \left[1 - \frac{\theta w_{t}^{s}(1+r)}{E^{ms} w_{t+1}^{s}} \right]. \tag{15}$$

Accordingly, reproduction rate of the local skilled parents comes back to its natural level:

$$N_{t+1}^{s} = \frac{\beta}{\delta} \left[1 - \frac{\theta w_{t}^{s}(1+r)}{E^{s} w_{t+1}^{s}} \right]. \tag{16}$$

Comparing the number of offspring for all of the groups in the case without redistribution and the corresponding numbers of offspring in the case under discussion, one can compute fertility gaps that appear due to redistribution.[11]

Whereas the 'under-fertility' among the local skilled of the skilled or unskilled ancestry is

$$\Delta N_{t+1}^{j} = \frac{\beta}{\delta}\left[\frac{\tau\theta w_{t}^{s}(1+r)}{E^{j}w_{t+1}^{s}(1-\tau)}\right], \quad \text{where } j = s, ms, \tag{17}$$

the 'over-fertility' among the minority unskilled is

$$\Delta N_{t+1}^{m} = \frac{\beta}{\delta}\left(\frac{\tau w_{t+1}^{s}(E^{s}L_{t+1}^{s} + E^{us}L_{t+1}^{us})}{w^{u}L_{t+1}^{m}}\right). \tag{18}$$

The main result of this section is thus immediately clear. Redistribution policy in favor of the minority unskilled, financed by taxes levied on the local skilled, raises fertility among the minority recipients and lowers fertility among the contributing local skilled. Moreover, as shown in Eq. (17), since $E^{s} > E^{us}$, the under-fertility among local skilled whose parents were unskilled is higher than the under-fertility among local skilled whose parents were skilled.

2.6. The Dynamic Path

In order to examine the dynamic behavior of the economy, I first characterize the process of human capital accumulation. Next, since $E^{us} > E^{ms}$, I analyze the behavior of the corresponding groups consecutively.

2.6.1. Step1: Human Capital Accumulation Dynamics

Consider first the dynamics of human capital accumulation. Provided that children are viewed as a normal good, once the redistribution starts, taxation lowers fertility among the contributing skilled. When the number of skilled people grows slower, so does the

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[11] In the absence of redistribution ($\varphi = 0$), fertility among the unskilled minority individuals is $N^{m} = (\beta/\delta)(2 + r)$.

total stock of human capital. Given the structure of the skilled sector (Eq. 3), this in turn reduces the growth of the return to one unit of efficiency, w^s.[12]

2.6.2. Step2: The Offspring of Local Unskilled Parents

In contrast to the offspring of the local skilled who always invest in education, the offspring of the local unskilled do not invest in human capital as long as the following inequality holds:

$$E^{us}w_{t+1}^s(1-\tau) - \theta w_t^s(1+r) < (2+r)w^u\left(\frac{E^{us}w_{t+1}^s(1-\tau)}{w^u}\right)^\beta . \tag{19}$$

Once this inequality is reversed (or turns into equality), children of local unskilled parents choose to switch to skilled status.

As one can immediately observe, their decision depends on the taxes levied on the skilled. Re-arranging Eq. (19), the necessary and sufficient condition for the offspring of the local unskilled to invest in human capital and switch to the skilled status is

$$\left(E^{us}w_{t+1}^s(1-\tau)\right)^{1-\beta} - \frac{\theta w_t^s(1+r)E^{us}}{(E^{us}w_{t+1}^s(1-\tau))^\beta} \geq (2+r)(w^u)^{1-\beta} . \tag{20}$$

Notice that in any period $t+1$ the RHS of the above inequality is fixed and the LHS is decreasing in τ and increasing in w_{t+1}^s.

If the return to one unit of efficiency (w^s) increases with time (Step 1), whereas the rate of tax (τ) is fixed, the LHS of Eq. (19) increases with time. It ensures that the increasing LHS of Eq. (20) will once exceed the fixed RHS of that equation. This intersection between the LHS and the RHS of Eq. (20) specifies the point where inequality (19) turns into equality. This point is crucial in the story. When inequality (19) is reversed, the offspring of the local unskilled find it lucrative to invest in education, acquire human capital, and switch to the skilled status. The redistribution policy, however, postpones the date of the switch.

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[12] An assumption that $\beta > \delta\left(1 - (\theta w_t^s(1+r)/E^s w_{t+1}^s(1-\tau))\right)^{-1}$ ensures that the population of the skilled grows over time and thereby rules out the possibility of negative growth.

The negative effect of the redistribution in favor of the minority individuals on the local unskilled is double. First, taxation decreases their potential after-tax income in the skilled sector thereby directly reducing the profitability of investment in human capital. Second, through its negative effect on the aggregate human capital stock, it decreases the rate of growth in the return to efficiency labor thereby distorting the very mechanism that eventually makes the acquisition of human capital lucrative for the offspring of the unskilled parents.[13]

This effect of the redistribution in favor of minorities may thus provide a purely economic explanation for inter-ethnic tensions observed in modern societies without referring to the popular racial argument. Moreover, although the burden of taxation is not levied on the unskilled, the effect of redistribution on the offspring of the local unskilled is in a sense stronger than the effect on the offspring of the skilled, who by assumption always acquire education. This may contribute to a better understanding why the negative sentiments toward several minorities are particularly strong among less prosperous segments of the local population, as has been widely established empirically (e.g., Bauer et al 2000; Scheve and Slaughter 2001; Dustmann and Preston 2001; 2006; 2007; O'Rourke and Sinnott 2006).

2.6.3. Step3:   The Offspring of Minority Unskilled Parents

Proceed now to the offspring of the minority unskilled. As long as the following inequality holds, they do not invest in human capital:

$$E^{ms} w_{t+1}^s - \theta w_t^s (1+r) < \left(w^m (2+r) + \varphi_{t+1} \right) \left(\frac{E^{ms} w_{t+1}^s}{w^m} \right)^\beta . \tag{21}$$

Once this inequality is reversed (or turns into equality), children of the minority unskilled parents choose to switch to skilled status.

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[13] Moreover, given the optimal fertility choice among the skilled (Eq. 11), if the tax rate is higher than $\hat{\tau} = 1 - (\beta \theta w_t^s (1+r) / ((\beta - \delta) E^s w_{t+1}^s))$, taxation may turn the growth of the return to efficiency labor to negative, thereby forcing the offspring of the local unskilled to remain unskilled forever.

As one can immediately observe, their decision directly depends on the transfer payments they receive. From Eq. (21), the critical value of the subsidy sufficiently high to prevent them from switching to skilled status is

$$\varphi_{t+1}^{crit} = \left(E^{ms} w_{t+1}^s - \theta w_t^s (1+r)\right) \left(\frac{E^{ms} w_{t+1}^s}{w^m}\right)^{-\beta} - w^m (2+r). \tag{22}$$

If the return in the skilled sector (w^s) grows over time (Step 1), Eq. (22) implies that the critical value of the transfer that prevents the minority unskilled from acquiring education increases with time.

Consider now the behavior of the transfers they actually receive. In Section 2.5 it has been shown that the number of the minority recipients increases faster than the number of the contributing local skilled. If the rate of increase in w^s is not too fast, transfer payments per capita must thus go down until the point when it becomes lucrative for the unskilled to acquire education, switch to the skilled status and increase the tax base.[14] Thereafter, due to the higher fertility among the minority recipients, the per-capita transfers decrease again. Therefore, at some point the transfers they actually receive and the critical value of the subsidy (Eq. 22) must intersect. At this point, when the offspring of the minority unskilled choose to acquire education, the redistribution is abolished and the economy returns to the undistorted growth path.

Proceed now to the dynamics of the minority fertility. Because the minority's over-fertility is a result of the redistribution, it follows the same dynamic path as the transfer payments do. Namely, at the point when the redistribution starts, the minority fertility becomes higher than its natural rate and remains higher until the end of the redistribution, although it declines along with the per-capita transfers. At the same time, fertility among the contribution local skilled is lower than its natural level. The fertility gaps disappear only once the redistribution is abolished.

3. Subsidizing School Costs

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[14] Notice that a single jump of the transfers up due to a momentary switch of all local unskilled to skilled status is a result of the assumption that all local unskilled individuals are alike. Imposing some moderate heterogeneity in the *u*-group will replace this peak with a high constant segment.

This section extends the analysis toward an alternative redistributive policy: subsidizing the school costs. Suppose that income support is not provided ($\varphi = 0$) and instead the school costs are subsidized. Suppose also that the subsidy covers the full cost of acquiring education ($(\theta w^s (1+r))$).

If the minority school costs are fully subsidized, from Eq. (21), the minority unskilled do not acquire human capital as long as:

$$E^{ms} < \frac{w^m}{w_{t+1}^s}(2+r)^{1/1-\beta}. \tag{23}$$

Therefore, even in the extreme case, when the costs of education are fully subsidized, the wage in the skilled sector (w^s) should be high enough to induce the minority unskilled to acquire human capital.

Likewise, from Eq. (19), if their costs of schooling are fully subsidized, the local majority unskilled do not acquire human capital as long as:

$$E^{us} < \frac{w^u}{w_{t+1}^s}(2+r)^{1/1-\beta}. \tag{24}$$

Comparing inequalities (23) and (24), it is easy to see that, if the wedge between E^{us} and E^{ms} is large enough, while the gap between w^u and w^m is not too large, the local unskilled will decide to acquire human capital earlier than the minority unskilled. This condition holds as long as:

$$E^{us} - E^{ms} > (w^u - w^m)\frac{(2+r)^{1/1-\beta}}{w_{t+1}^s}. \tag{25}$$

Therefore, to speed up the transition of the unskilled to the skilled state, an optimal educational policy should concentrate on subsidizing the schooling costs of the local poor. In this case, the earlier switch of the majority unskilled to the skilled status will increase the aggregate stock of human capital and, hence, the wages in the skilled sector (w^s), thus bringing closer the day when the minority unskilled will decide to acquire human capital. Moreover, such redistributive policy is easier to implement, since, as has been argued in the literature, in multiethnic societies, taxpayers are less likely to resist educational subsidies, when these subsidies go to children from their own ethic

group (e.g. Poterba 1997). And in the end, such policy will also be for the benefit of the minority unskilled.

4. Conclusion

This article analyzes income redistribution in the inter-ethnic context. I have used a growth model with endogenous fertility to show that income redistribution in favor of less prosperous ethnic minorities raises fertility among the unskilled minority recipients, lowers fertility among the contributing local skilled, slows human capital accumulation, and reduces the per-capita output growth. The analysis also demonstrates that income redistribution, although financed by taxes levied on the wealthier local skilled, generates a mechanism that works strongly against another weak segment of society – the local unskilled.

The negative effect of redistribution on the local unskilled is double. First, taxation directly decreases their potential after-tax income in the skilled sector. Second, it reduces the rate of increase in the return to efficiency labor thereby distorting the very mechanism that eventually makes the acquisition of human capital lucrative for the offspring of the unskilled parents. As a consequence, the switch of the local poor to the skilled status is postponed and as a result that they are unnecessarily trapped in poverty for a longer period of time.

This may a better understanding of purely economic reasons for the existence of antipathy toward minorities, especially, among less educated segments of the local society. On the society-wide level, the analysis also suggests that reductions in the size of redistribution helps to slacken the negative pressure on educational incentives among the locals thereby increasing the supply of skilled labor and stimulating economic growth. In addition, subsidizing the school costs for the majority unskilled may indirectly be for the benefit of the minority unskilled as well.

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