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Abstract

The standard growth theory predicts that allowing for labor mobility across regions would increase the speed of convergence in per capita income levels and that migration has a negative causal impact on regional growth rates. Although the empirical literature has uncovered some evidence for the former implication, the latter has not been verified empirically. This paper provides empirical evidence for the negative causal impact of migration on provincial growth rates in a developing country with a high level of internal migration that is characterized by unskilled labor exiting rural areas for urban centers. We utilize instrumental variables estimation method with an instrument unique to the country examined and also control for provincial fixed effects.

JEL Classification Codes: O40; R23; C23

Keywords: Regional convergence; Regional growth; Internal migration; Fixed effects; IV estimation

1 Introduction

Empirical investigation of economic convergence across countries and regions has generated an extensive literature.[1] Yet, few of these studies examine the impact of internal migration on the speed of convergence across regions within a country and on regional growth rates. According to standard neoclassical theory with diminishing returns to factors of production, allowing labor

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[1]This literature was initiated by the seminal work by Barro and Sala-i-Martin (1991).

mobility across regions would increase the speed of convergence in real income per capita.[2] Not recognizing the contribution of migration on the speed of convergence would yield an overestimate of the β-coefficient. In fact, Barro and Sala-i-Martin (BS, for short) (1991, 2004) in their analysis of the impact of migration on convergence in the U.S., in European countries, and across Japanese prefectures find that after controlling for migration, the β-coefficient decreases in most cases. In-migration has also a negative causal impact on growth rates of per capita income, as predicted by the standard neoclassical theory. Still, in the studies mentioned above, BS find no evidence of a significant causal impact of migration on regional growth rates for the developed countries they consider.[3] However, in developing countries, where migration is generally in the form of unskilled labor from low-income agricultural regions moving into wealthier urban areas, we would expect the impact of internal migration on regional growth rates and convergence to be stronger.

In our study, we test these implications of the standard neoclassical growth theory regarding the impact of migration on regional growth rates and convergence across provinces in Turkey. We use a 2SLS estimation method as migration is endogenous and also account for provincial fixed effects. We use an instrument that is peculiar to Turkey, which signifies whether a province is under state of emergency or not during certain time periods, along with another instrument, population density, which is commonly used in other convergence studies instrumenting for migration.

Our estimation results indicate clear evidence for the negative causal impact of migration on regional growth rates. This is the first empirical study, to our knowledge, that provides such evidence. The distinction of our results is likely to emerge from two facts: First, the compositional structure of internal migration is different in Turkey than that in developed countries studied by BS. Most migrants in Turkey are low skilled agricultural workers exiting the rural sector for employment in urban areas.[4] Secondly, the level of migration in Turkey has been higher.[5]

[2] This holds true under the assumption that labor is homogenous. However, if immigrants to richer economies have higher human capital than average, convergence might slow down, and even divergence could occur. (See Reichlin and Rustichini, 1998).

[3] In a similar study for Swedish counties, Persson (1994) fails to find a significant negative impact of internal migration on growth rates.

[4] While 62.5 percent of the Turkish labor force was employed in agriculture in 1980, only 36 percent remained in agriculture in 2000.

[5] While the absolute value of annual net migration rates for the U.S. states averaged at 5.41 percent between 1990 and 2000 according to the US Census data; the same value for Turkish provinces was 6.94 percent.

2 Data and Descriptive Statistics

The data used in this study cover all 67 provinces in Turkey for the 1975-2000 period. The pieces of information that are used are real gross provincial product (GPP) per capita, net internal migration rates, provincial population densities, and state of emergency status. Real GPP per capita series for the period 1975-1986 are obtained from Karaca (2004) and for the period 1987-2000 from TURKSTAT.[6] Provincial net internal migration rates in 5-yearly intervals are obtained from TURKSTAT. Provincial population densities are also obtained from TURKSTAT and are used as instruments for net migration rates. Another instrument used is the state of emergency status. With the late 1980s and early 1990s, due to increased political instability and compromised security in Eastern and Southeastern Anatolian regions, state of emergency was declared in some of the provinces in these regions. State of emergency status of a province was instrumental for out-migration not only because it made that province a less attractive place to live and to earn a living, but also because migration from rural areas was encouraged and at times forced by authorities. Since this migration was for the most part a consequence of the political objectives of the government rather than pure economic incentives, we can safely presume that it was independent of the growth performances in provinces.

Table 1 presents some descriptive statistics for these variables. Real GPP per capita across provinces and across time displays significant variation in Turkey. In fact, the ratio of the largest real GPP per capita to the lowest is about 18. Net migration rates are quite high; the 5-yearly net migration rate was lower than minus 15 percent for one province and higher than 10 percent for another. Population density also varies remarkably across provinces in Turkey. The ratio of the population densities between the most densely and the most sparsely inhabited provinces in our panel is more than 100.

Table 1 <insert here>

Figure 1 displays the relationship between cumulative migration and growth rates of the 67 provinces between 1975 and 2000. The scatter plot suggests a positive relationship between migration and growth, which is contrary to the prediction of the standard theory. This could arise due to the endogeneity of migration. Growth rates also influence migration as people migrate to high-growth provinces. This illustrates the problem with an ordinary least squares (OLS) estimation

[6] After 1990, 14 new provinces were formed in Turkey by splitting some of the original 67 provinces. Therefore, all relevant data for the original provinces after 1990 were recalculated incorporating data from the new provinces.

method in examining the impact of migration on growth rates.

Figure 1 <insert here>

3 Estimation and Results

The structural growth equation, as shown in BS (2004), establishes a relationship between initial per capita real income and the growth rate:

$$(1/T)\log(y_{it}/y_{i,t-T}) = a_i - [(1-e^{-\beta T})/T)]\log(y_{i,t-T}) + u_{it} \tag{1}$$

Above, T is the time interval, y_{it} is the time t per capita real income in region i and coefficient β stands for the speed of convergence. a_i varies across regions due to differences in production technology and preferences, which can not be measured.

We could estimate the above equation using the cross-sectional data we have for 67 provinces. However, in that case we would not be able to account for the differences in a_i across provinces. This would result in an omitted variable bias because the level of real GPP per capita is likely to be correlated with the provincial fixed effects. Controlling for the provincial effects is only possible by employing the panel structure of the data; therefore, we set $T = 5$.

The below equation shows the above equation in reduced form. Here, d_i is a dummy for province i. We also add net migration rate (m_{it}) to the reduced form equation:

$$(\text{growth rate})_{it} = \alpha_0 + \alpha_1(\text{real GPP per capita})_{it} + \alpha_2 m_{it} + \sum_{i=2}^{67} \alpha_{3i} d_i + u_{it} \tag{2}$$

An identification problem with the above equation is that migration is potentially endogenous because growth rates could also affect migration levels. To test the endogeneity of migration rate, we conduct a Hausman test and, in fact, find very strong evidence for endogeneity of migration in the above equation (p-value < 0.001). Therefore, in order to identify the causal impact of migration on the growth rate, we need a source of exogenous variation in migration. Hence, we use an instrumental variable (IV) estimation method in which our instruments are state of emergency status and population density of provinces.

The key requirement of the IV approach is that the instruments be uncorrelated with the error term of the structural equation. Since our model is over-identified, we can test if some of the instruments are correlated with the structural error using the test of over-identifying restrictions. The test result, Hansen's J-statistic, is 0.229 (p-value = 0.632). Therefore, our instruments pass the over-identification test.

The $\beta-$convergence parameter is found from the estimated value of the reduced form parameter α_1 using the relationship as given in equation (3). Delta method is used to calculate the standard errors.

$$\alpha_1 = (1 - e^{-\beta T})/T \tag{3}$$

Table 2 presents our estimation results from three different specifications. The specification in the first column does not include migration rate and this is our benchmark case to examine the impact of migration on the $\beta-$coefficient. The specification in the second column includes net migration rate; however, it is not instrumented. The last column presents the results of our 2SLS estimation. Inclusion of net migration rates decreases the $\beta-$coefficient. However, this drop is much more pronounced when net migration rate is instrumented. The rate of convergence of per capita incomes to their steady-state levels falls from 6.2 percent to 4.3 percent per year.[7] This is in line with the theory as migration speeds up convergence, holding migration constant we find a lower estimate of convergence parameter. This is similar to the findings of BS (1991, 2004). In their IV estimates, nevertheless, the drop in the $\beta-$coefficient is not as marked.

The impact of migration on regional growth rates turns out be insignificant in the OLS estimation; this result concurs with the findings of BS. What is different from their results, though, is the impact of net migration on growth rates in the 2SLS estimation. Even after they instrument for migration rates, for no country in their study do BS find a negative impact of net migration on growth rates as the standard neoclassical model predicts. On the other hand, our 2SLS estimates for Turkey for the 1975-2000 period indicate a clear empirical verification of this prediction. The net migration rate has a negative coefficient that is significant at 1 percent level. Moreover, the magnitude of the migration coefficient in the 2SLS estimation, -0.0025, is significantly larger than that in the OLS estimation, -0.0001.

Table 2 <insert here>

4 Conclusion

For a developing country with high migration rates and persistent regional disparities in per capita income, we find strong empirical evidence for the negative causal impact of migration on regional growth rates. Moreover, controlling for migration in the growth equation decreases the β-coefficient remarkably.

[7] We find a higher β-coefficient than BS report because we use fixed effects. Islam (1995) and Caselli et al. (1996) also find much higher β-coefficients using fixed effects.

That migration has a strong impact on both regional growth rates and on the speed of convergence in Turkey is likely to arise from two aspects of migration in Turkey that are different from other countries studied in the related literature. First of all, the level of migration is considerably higher in Turkey. However, it is not only the level that is different but also the composition of migration. Migration within Turkey is largely characterized by the flow unskilled workers from rural to urban areas. Hence, the increase in the speed of convergence across regions is reinforced by the fall in average skill level of migrant receiving, initially richer regions.

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Table 1: Descriptive Statistics

	Obs	*Minimum*	*Mean*	*Maximum*	*Stan. Dev.*
GPP per capita (TL, 1987 prices)	335	245,375	1,062,300	4,012,403	599,169
Growth Rate (%)	335	-6.14	1.62	11.56	2.84
Net Migration Rate (%)	335	-15.17	-1.95	10.03	4.07
Population Density	335	15	79	1630	135.7
State of Emergency Status	335	0	0.0687	1	0.253

Table 2: Estimation Results

	Net Migration Excluded (OLS)	*Net Migration Included (OLS)*	*Net Migration Included (2SLS)*
Beta	0.0619***	0.0611***	0.043***
	(0.0107)	(0.011)	(0.020)
Migration		-0.0001	-0.0025***
		(0.00012)	(0.0010)

*** significant at 1 percent level. Values in parantheses are standard errors. The number of observations is 335.

Figure 1: Net Internal Migration and Growth Rates (%, 1975-2000)