DISCUSSION PAPERS IN ECONOMICS

Working Paper No. 07-03

What Role Does Racial Integration Play in the Economic Performance of the (United) States? An Empirical Investigation Using Panel Data Analysis

Said Boakye
University of Colorado

October 10, 2007

Updated: April 28, 2008

Center for Economic Analysis
Department of Economics

University of Colorado at Boulder
Boulder, Colorado 80309

What Role Does Racial Integration Play in the Economic Performance of the (United) States?

An Empirical Investigation Using Panel Data Analysis

Said Boakye[1]**:** boakye@colorado.edu

Department of Economics, University of Colorado at Boulder

October 10, 2007

Abstract: It has been found empirically that social fractionalization limits economic growth and development. What has not been studied is the extent to which social integrative processes may ease these limitations and thus positively contribute to economic growth and development. Using a panel of the 48 contiguous U.S. states as a case study, this paper examines the role racial integration as measured by the percentage of interracial marriages plays in the determination of income per capita. I find that racial integration as measured by the percentage of interracial marriages is a significant predictor of income per capita across these states. To account for the problem of reverse causality and thus endogeneity, the number of decades the states have allowed interracial marriages by repealing antimiscegenation laws is used as instrument for interracial marriages for instrumental variable estimation. I also use the 1967 U.S. Supreme Court's decision, which overturned the antimiscegenation laws of the states that continued to have such laws as an exogenous event for difference-in-difference estimation.

JEL Classification**:** O18, O51

Keywords: Integration, interracial marriage, per-capita income

[1]I am grateful to Murat Iyigun for his advice and comments. I am also grateful to Charles deBartolome, Martin Boileau, Robert McNown and Anna Rubinchik for their useful comments. Thanks also go to Aaron Gullickson of the Department of Sociology, Columbia University for making available for me the data on interracial marriages he extracted from IPUMS.

1 Introduction

What are the main forces behind the economic performance of countries or regions of a country? Economists have long debated the answer to this question. Neoclassical economists, for instance, identified savings (and thus physical capital accumulation) and technological advancement as the main forces behind economic growth and development[2]. In the 1990s, much attention was paid to human capital accumulation as a source of economic growth and development (see, for instance, Mankiw, Romer and Weil (1992); Barro (1991); Becker, Murphy and Tamura (1990); etc.). Not much attention has been paid to social forces that may work in favor or against the economic performance of countries or regions of a country. Although economists like Easterly and Levine (1997), Knack and Keefer (2002), Alesina et al. (2003), etc. have found that ethnic divisions generally impede economic growth and development, no one has ever tried to quantify, in statistical terms, the extent to which social integration relaxes this impediment and thus positively contributes to economic growth and development. I therefore fill this gap by empirically investigating what role, and to what extent, social integration may play in the determination of income per capita. I use the 48 contiguous states of the U.S. as my case study. Thus, I investigate how differences in the levels of racial integration (or disintegration) among the U.S. states help explain the differences in the levels of economic development as measured by income per capita. By doing this, I at the same time test the empirical validity of the theoretical model I developed in Boakye (2007a)[3]. The

[2] See, for instance, Solow (1956), Cass (1965) and Koopman (1965).

[3] "Theory of Social Transformation, Political Transition and Economic Growth"

choice of the U.S. states for this work is mainly due to the availability of micro-level data provided by the U.S. Census Bureau, especially the historical sample data provided by the Minnesota Population Center, University of Minnesota.

Although economists like Barro and Sala-i-Martin (1992) and Carlino and Mills (1996) have found evidence showing convergence of per-capita incomes across the U.S. states, there continues to exist large inequalities of per-capita incomes among these states. For instance, in 2000, per-capita personal incomes in current 2000 dollars among the 48 contiguous U.S. states varied from the minimum of $21,005 to the maximum of $41,485, with the mean of $28,295.98 and standard deviation of $4,485.60. This means that the poorest state in per-capita personal income terms had only about half the income of the richest state in 2000. This inequality of per-capita incomes is against the backdrop of the strong open economy nature of the U.S. states, which is supposed to bring about factor price equalization (FPE) due to the free flow of goods and services as well as factors of production across these states. What, therefore, accounts for these income inequalities? As we shall see in section 5 of this paper, and as predicted by the theoretical model I mentioned above, differences in the levels of racial integration play important role in explaining these income inequalities.

Finding strong and significant causal link between racial integration and per-capita incomes across the states in the U.S. would mean that racial integration is not only a civil rights or political issue, but also an economic one. This would mean that allocating economic resources to implement policies aimed at achieving greater racial integration would have economic justification. This is not to say that economic justifi-

cation should be the only reason to push for greater racial integration. However, the point here is that economic justification would provide an added incentive to encourage policy makers at the state capitals to allocate more economic resources to ensure increased racial integration.

The analysis in this paper utilizes panel data regression on the 48 contiguous U.S. states from 1950 to 2000. The data are decennial values. This means that there are six time periods. Although I control for human capital, physical capital, taxes and population growth rates, the emphasis is on the extent to which differences in the levels of racial integration explain the differences in per-capita incomes. Like Furtado (2006), I consider the levels of interracial marriages as the measure of the degree of racial integration. I use only marriages between Blacks and Whites. However, I do not exclude individuals who are identified as Hispanic. That is, since I use the U.S. Census Bureau's general code for Whites, Whites here may include both Hispanic and non-Hispanic Whites. Also, I do not distinguish between residents who are U.S. citizens and those who are non-US citizens in the data. I should emphasize here that because census enumerators never asked for marriage licenses but considered couples to be married provided they reported that they were married, marriage here is a loosely defined concept.

To be able to emphasize the positive role played by racial integration in the determination of income per capita across these states, it is more appropriate to consider, at the same time, how a measure of social fractionalization limits per-capita incomes. I therefore include, as a regressor, a measure of social fractionalization, which I derived from the theoretical model. It is worth mention here that this re-

gressor is distinct from the levels of interracial marriages. In theory, this measure of social fractionalization results from political dynamic process, while the level of social integration as measured by the level of intergroup marriages results from social dynamic process. In the data, the correlation between the levels of interracial marriages and this measure of social fractionalization is only 0.24. As I explain in section 3, this measure of social fractionalization is not much different from the "ethnic fractionalization" measure used by Easterly and Levine (1997), Collier (2000), Alesina et al. (2003), Alesina and Ferrara (2005) and others. For this reason, the emphasis in this paper is not the effect of social divisions or fractionalization on economic outcomes but the role played by social integration as measured by interracial marriages in the determination of income per capita as I have already indicated.

The main challenge I face in this work is how to account for the problem of reverse causality and thus endogeniety. The reason is that one may argue that higher incomes create favorable environment for people to socially integrate, making per-capita personal incomes reversely cause interracial marriages leading to the problem of endogeneity. To account for the problem of endogeneity caused by reverse causality and possibly other factors, I first apply the system GMM estimation technique originally developed by Arellano and Bond (1991) and later perfected by Arellano and Bover (1995) and Blundell and Bond (1998). I also use the number of decades the states in the U.S. have allowed interracial marriages by repealing antimiscegenation laws (laws banning interracial marriages) as instrument for interracial marriages for an instrumental variable estimation. Additionally, in 1967 the U.S. Supreme Court overturned the antimiscegenation laws

of 16 states that continued to have such laws. I therefore use this U.S. Supreme Court's decision as an exogenous event for a difference-in-difference estimation. Results from all these estimation techniques show that the degree of social integration as measured by the levels of interracial marriages is a good predictor of income per capita across the states in the U.S. as the theory I have made reference to predicts.

The rest of the paper is organized as follows. Section 2 discusses related literature. Section 3 gives a quick review of the theoretical model. Section 4 discusses the empirical setup and the data for the analysis. Section 5 discusses the econometrics and the estimation results. Section 6 does robustness checks. And finally, section 7 concludes the paper.

2 Related Literature

The theoretical model the empirical work dwells on is related to three strands of economics literature. First, it relates to models that seek to explain the dynamic behavior of output per capital of countries (see, for instance, Solow (1956), Cass (1965), Koopman (1965),Romer (1986 and 1990), Lucas (1988) and Azariadis and Drazen (1990)) . However, this model differs from these other models in this literature by incorporating sociopolitical evolutionary process into economic choice process, while the other models in this literature generally concentrate on the nature of the production function and how it impacts the dynamics of per-capita output, while implicitly assuming similar social and political environments for countries. That is, these models fail to answer the fundamental question of how sociopolitical transformational process of countries affects the dynamic behavior of output per capita.

The second strand of literature that the theoretical model for the empirical work relates to is the literature on social conflicts (see, for instance, Grossman (1991), Acemoglu and Robinson (2001), Roemer (1995), Tornell and Velasco (1992)). Grossman develops a theory of insurrections that treats insurrection and its deterrence as activities that compete with production of goods. This model adopts a similar stand by arguing that allocating resources for political power struggle is inefficient and it decreases resources available for production. However, my model goes beyond this idea by showing how social integration helps minimize the amount of resources inefficiently allocated towards political power struggle. Acemoglu and Robinson model the complications created by the existence of different social groups in a country as the country undergoes political transition. The social groups in Acemoglu and Robinson's model are the rich who dislike democracy because of its redistributive effect, and the poor who want democracy. However, the social groups in my model are ethnic, racial or religious in nature and their objective is not either to democratize or not, but they struggle for power to advance their sociocultural or religious values or ideologies.

Third, the model is related to the models in the literature that links social fragmentation to economic performance of countries (see, for example, Alesina and Drazen (1991), Alesina and Spolaore (1997), Alesina, Baqir and Easterly (1999)). However, these models tend to take an indirect approach in linking social fragmentation to output per capita and economic growth. That is, these models generally link social fragmentation to issues like public goods provision and macroeconomic stabilization. However, my model takes a more direct approach in linking social fragmentation to the dynamics of output per-capital

and economic growth by showing how social dynamic process relaxes political complications created by social divisions thereby reallocating resources from inefficient use to efficient use (production) leading directly to economic growth and development.

On the empirical front, this paper is related to the empirical literature that studies the effects of social divisions on economic performance of countries (see, for instance, Easterly and Levine (1997), Collier (2000), Knack and Keefer (2002), Alesina et al. (2003), Alesina and Ferrara (2005), etc.). However, unlike these papers in this literature which only estimate the effect of social fractionalization on income per capita and economic growth, this paper goes beyond this by emphasizing and estimating the extent to which social integration positively contributes to economic development as measured by income per capita, even though, I estimate as well the effects of social fractionalization. I should emphasize here that not all the papers in this empirical literature find a universal negative relationship between social fractionalization and economic performance of countries. For instance, Collier (2000), in a cross-country study, finds that ethnic diversity has negative effects on economic performance of only countries without democracies but has no effects on economic performance of countries with democracies. He argues that democracies are able to create the necessary institutions to accommodate minorities thereby doing away with the damaging effects of ethnic fractionalization. This, in no doubt, is a very plausible explanation. However, the question that arises here is that if democracy solves the problems associated with ethnic fractionalization, why is it that countries in the developing world that have been found to be very socially fractionalized (see, for instance, Easterly and Levine

(1997)) do not create strong democracies to solve the problems associated with ethnic divisions thereby enhancing their economic growth and development? Is it because these countries do not see that strong democratic institutions are able solve the problems associated with social fractionalization? As I argued in Boakye (2007a), democracy is unable to flourish in socially fragmented societies at the initial stage of the country's formation, since the social groups (especially the minority groups) find it more attractive to deviate from the democratic principles dictating majority rule. This is due to the fact that the payoff from holding on to political power may be so high at the initial stage of the country's formation, since the groups may differ so much in their sociocultural or religious values or ideologies, which, in addition to consumption, are valued by individual group members. However, as the groups become socially integrated, the payoffs from holding on to political power start to diminish, and hence democratic institutions may start to develop. This means that as much as democracy may help consolidate the political development process and thus accelerate economic growth and development, the democratic institutional development itself is part of the broader sociopolitical transformational process.

3 Quick Review of the Theoretical Model[4]

Suppose that there are two groups of people (groups X and Z) which are exogenously put together to form one country[5]. The groups

[4]For detailed analysis of the theoretical model, see "Social Transformation, Political Transition and Economic Growth" by Said Boakye.

[5]This, in fact, is in conformity to what happened in practice to many countries after European colonization. For instance, the Akan tribal regions and the non-Akan tribal regions were joined together to form the Gold Coast (later changed to Ghana) by the British; the northern Arabs and the southern Black Africans were joined together to form Sudan; etc.

have the same population growth rates n, and have identical members such that x and z are representative members of groups X and Z respectively. At every t, each individual is endowed with H units of a composite resource. H can either be used to produce consumable commodity y (h) or used as the means for power struggle (m). Since Pareto efficiency requires that at every t $(h_t\ m_t) = (H\ 0)$, the size of m_t measures the level of economic inefficiency at every t. Production is assumed to be through the following technology: $y_t = \phi_t h_t$, where ϕ_t is the technology parameter, which is assumed to reflect the dynamics of global technology due to the assumed existence of technological diffusion. These groups come from different cultural, religious, etc. backgrounds. For this reason, they differ in their sociocultural or religious values or ideologies. Since in addition to consumption individuals derive utility from social status[6], which in this model is determined by the level of promoted or implemented sociocultural or religious values, each group would like to control political power or have as much political influence as possible so as to be able to use the state's machinery to promote its sectarian sociocultural or religious values. That is, $U_t^i = aC_t^i + bV_t^i$, $i = x, z$, where U is non-probabilistic utility function, C is consumption and V is the level of promoted sociocultural or religious values. Since a group promotes its sociocultural or religious values at the expense of the other group when in power, per-capita utility of a group is lower when the group is not in power, and it is higher when the group is in power. This brings about diversion of economic resources

[6]This utility specification in which individuals derive utility from both consumption and social status has been used by various economists. See, for instance, Pham (2005), van Long and Shimomura (2004), Corneo and Jeanne (2001), Rauscher (1997), Fershtmam et al. (1996), etc. These specifications follow Adam Smith's assertion in his "Theory of Moral Setiments" that human economic activities do not only aim at supplying neccessities of life (consumption) but also aim at attaining higher social status.

from production to political power struggle, leading to economic inefficiency, and thus retarding economic growth and development. I assume that in per-capita terms, the level of promoted or implemented sociocultural values (V_t^i) is equivalent to the government's per-capita lump-sum transfers (G_t^i). This means that, although I assume equal per-capita lump-sum taxation (τ), government redistribution creates discriminatory environment which creates the incentives for political power struggle, especially at the initial stage of the country's formation.

However, as the society undergoes social transformation and it thus becomes more and more socially integrated through family links due to inter-group marriages, which works through the Markov process, the incentive for the groups to adopt discriminatory practices against the rival group diminishes. This is because individuals are assumed to attach importance to the welfare of relatives, and for this reason group mixing through intergroup marriages makes discrimination against the other group become costly. This therefore start to reduce the amount of resources inefficiently allocated towards political power struggle. This means that these resources get reallocated towards production, which brings about economic growth and development. Yet the rate at which the economy can grow due to this social transformational process may differ from one country to another (or one region of a country to another), since the rate of social integration depends on the size of the probability that two individuals will intermarry, and the relative sizes of the two groups. And these key variables may differ from one country to another. Given that $P = \begin{bmatrix} r & q \\ q & r \end{bmatrix}$ $r, q > 0$, where r is the probability

that an individual will marry from his/her own social group, $q = 1 - r$ is the probability that an individual will intermarry and P is Markov transition matrix, I show in Boakye (2007a), which presents the entire model that this social integrative process results in the following inter-group marriage dynamics:

$$s_t^{im} = \tfrac{1}{2} - \tfrac{1}{2}(2r-1)^t \qquad (1)$$

Where s_t^{im} is the proportion of all marriages that are intermarriages. Since $\frac{1}{2} \leq r < 1$, $0 < s_t^{im} \leq \frac{1}{2}$ for $t \neq 0$. t is the time elapsed since the country's formation.

On the political front, each individual group member is assumed to contribute the same amount of H $(m_t^i, i = x, z)$ at every t for political power struggle so as to ensure higher utility through higher social status, which results from the use of political power to promote the group's sociocultural or religious values. The probability that a group is able to successfully acquire or defend political power is assumed to be $p_t^i = 1 - p_t^j = \frac{N_t^i m_t^i}{N_t^i m_t^i + N_t^j m_t^j} = \frac{(1+n)^t N_0^i m_t^i}{(1+n)^t N_0^i m_t^i + (1+n)^t N_0^j m_t^j} = \frac{N_0^i m_t^i}{N_0^i m_t^i + N_0^j m_t^j}$, $i \neq j$. N^i is the population size of group $i = X, Z$.

The social integrative process, which works through the Markov process and the political dynamic process interact with each other to yield the following optimization problems (constraints have already been substituted):

$$x: \quad Max \sum_{t=0}^{\infty} \beta^t \left\{ a(\phi_t h_t^x - \tau) + bG_t - \left[\frac{(H - h_t^z)}{(H - h_t^z) + R(H - h_t^x)} \right] bT(2r-1)^t \right\}$$

$$z: \quad Max \sum_{t=0}^{\infty} \beta^t \left\{ a(\phi_t h_t^z - \tau) + bG_t - \left[\frac{(H - h_t^x)}{\frac{1}{R}(H - h_t^z) + (H - h_t^x)} \right] bT(2r-1)^t \right\}$$

Where $T = 2\tau$, and τ is the per-capita lump-sum tax revenue of the government. $R = \frac{N_t^i}{N_t^j} = \frac{N_0^i}{N_0^j}$. β is the discount factor. These optimization problems yield the following resource allocation decisions in the equilibrium:

$$h_t^{x*} = h_t^{z*} = h_t^* = H - \left[\frac{R}{(1+R)^2}\right] \frac{b}{a\phi_t} T(2r-1)^t \qquad (2)$$

$$m_t^{x*} = m_t^{z*} = m_t^* = \left[\frac{R}{(1+R)^2}\right] \frac{b}{a\phi_t} T(2r-1)^t \qquad (3)$$

Substituting equation (2) into the production function yields the following dynamic process of output per capita.

$$y_t^{x*} = y_t^{z*} = y_t^* = \phi_t H - \left[\frac{R}{(1+R)^2}\right] \frac{b}{a} T(2r-1)^t \qquad (4)$$

Now, the more equal the relative sizes of N^x and N^z are, the greater the $\frac{R}{(1+R)^2}$ and thus the greater the size of the economic inefficiency m_t^*, and hence the smaller the output per capita y_t^*. This means that if one of the social groups is so small and the other is so big, political tension or friction is very small leading to limited economic consequences and vice versa, if we hold other factors constant. $\frac{R}{(1+R)^2}$ measures the degree of social fractionalization. $\frac{R}{(1+R)^2}$ is highly related to the "ethnic fractionalization" measure used by Easterly and Levine (1997), Collier (2000), Alesina et al. (2003), Alesina and Ferrara (2005), and others. The ethnic fractionalization (EF) measure used by these economists is a Herfindahl index defined as $EF = 1 - \sum_i^k s_i^2$, where s_i is the ratio of group i to the total population and k is the number of the ethnic

groups. EF is the probability that two individuals selected at random belong to two different ethnic groups. In fact, $\frac{R}{(1+R)^2} = \frac{1}{2}(1- \sum_i^2 s_i^2)$, which implies that these measures are not any different, except that $\frac{R}{(1+R)^2}$ assumes the existence of only two social groups. At first, the assumption of only two social groups may appear too strict. However, it is not that strict in practice. The reason is that if there are three or more social groups in a country, there becomes coalition formations at the political front. This means that additional social groups may not necessarily add to political tensions. In fact, so many social groups may even reduce political tensions thereby minimizing the negative impact of social fractionalization. This means that, as was recognized by Alesina and Ferrara (2005), the EF tends to overstate the negative effects associated with social fractionalization as the number of the social groups increases. Recognizing this, Daniel Posner (2004), in his measure of ethnic fractionalization, took into accounts actual political coalitions. However, the problem with this approach is that political alignments tend to switch around over time and are thus not permanent. $\frac{R}{(1+R)^2}$ ranges from 0 to 0.25. 0 means that one social group has no member, implying that there is only one social group. 0.25 implies that the two groups have the same population sizes – each group constitutes 50% of the total population.

Getting back to the above derived equations in the equilibrium, we can see that the bigger the probability that an individual will marry from his/her own group instead of intermarrying (thus the bigger the r and thus the smaller the q), the greater the intensity of power struggle or economic inefficiency m_t^*, and hence the smaller the per-capita output y_t^* at every t. The size of q (and for that matter r) is deter-

mined by the social distance between the two groups. That is, groups with different social characteristics tend to have smaller probability of intermarrying (small q or large r) and vice versa. Also, let us consider the following derivative.

$$\frac{\partial y_t^*}{\partial t} = H\frac{d\phi_t}{dt} - \frac{\kappa bTLog(2r-1)(2r-1)^t}{a} \geq 0 \qquad (5)$$

Where $\kappa \equiv \frac{R}{(1+R)^2}$ is the degree of social fractionalization. Dividing both sides of (5) by y_t^*, we get

$$g_y = g_y^{\phi} + g_y^h \qquad (6)$$

Where g_y is the total growth rate of output per capita. g_y^{ϕ} is the part of growth rate of output per capita attributable to technological change, and g_y^h is the part of growth rate of output per capita attributable to social transformation, which reallocates resources from inefficient use (m_t) to efficient use (h_t). Note that in the limit $m_t^* = 0$, implying that $g_y = g_y^{\phi}$ in the limit.

4 The Empirical Setup and The Data

4.1 The Empirical Setup

Equation (4) provides the foundation for the empirical model. From equation (1), we can derive r as follows:

$$r = \frac{1+(1-2s_t^{im})^{\frac{1}{t}}}{2} \qquad (7)$$

Substituting equation (7) into equation (4), we get

$$y_t^* = \phi_t H - \kappa \frac{b}{a} T(1 - 2s_t^{im}) \qquad (8)$$

From equation (8), we can derive the following derivatives:

$$\frac{\partial y}{\partial s^{im}} = 2\frac{T}{a} b\kappa \geq 0 \qquad (9)$$

$$\frac{\partial y}{\partial \kappa} = -\frac{b}{a} T(1 - s^{im}) \leq 0 \qquad (10)$$

From (9) and (10), we see that output (or income) per capita changes positively with the proportion of inter-group marriages and negatively with the degree of social fractionalization. (Henceforth, inter-group marriage will be called interracial marriage and social fractionalization will be called racial fractionalization to reflect the nature of the empirical analysis.). I therefore specify the baseline regression model based on (9) and (10) as follows:

$$rpcpi_{it} = \beta_0 + \beta_1 interr_{it} + \beta_2 racfrac_{it} + Z_{it}\boldsymbol{\gamma} + u_{it} \qquad (11)$$
$$i = 1, 2, .., 48; \;\; t = 1, 2, .., 6$$

where $rpcpi_{it}$ is real per-capita personal income of state i at time t. That is, I use per-capita personal income as the measure of income (or output) per capita. This means that $y = rpcpi$. $interr_{it}$ is

the percentage of total marriages in state i at time t that are inter-racial. $racfrac_{it} \equiv \kappa_{it} \equiv \frac{R_{it}}{(1+R_{it})^2} = \left[\frac{\frac{N_{it}^w}{N_{it}^b}}{\left(1+\frac{N_{it}^w}{N_{it}^b}\right)^2}\right]$ is the degree of racial fractionalization (in percentages) of state i in period t. N^w and N^b are respectively the sizes of population of whites and blacks in the sample. Z_{it} is the vector of control variables (human capital, physical capital, taxes and population growth rate) that affect per-capita income, and u_{it} is the error term. Based on (9) and (10), we expect β_1 to have a positive sign and β_2 to have a negative sign.

4.2 The Data

The data on per-capita personal income come from the Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce. However, these data are in nominal terms. Like Barro and Sala-i-Martin (1992), I deflate these nominal values for each state at every t using the national consumer price index provided by the U.S. Bureau of Labor Statistics. The reason is that there is no meaningful measure of state-specific price levels. This means that for the deflation to make sense, like Barro and Sala-i-Martin (1992), I have to assume that purchasing power parity holds for these states. If purchasing power parity does not hold, then there could be the problem of measurement error. However, since the national price index averages price levels across all the states, the hope is that if even purchasing power parity does not hold in practice for the U.S. states, the measurement error will not be so much, and will thus not pose much bias in the econometric estimates. The base year for the price indices

is 1982-1984.

Data on marriages, and on black and white populations, which were respectively used to construct the percentage of interracial marriages and the degree of racial fractionalization are from the Integrated Public Use Microdata Series (IPUMS) of the Minnesota Population Center, University of Minnesota (htpp://usa.ipums.org/usa/)[7]. Similar to Holtz-Eakin (1993) and Johnson and Takeyama (2003)[8], I use people with four-year college education (*college*) in each state as a percentage of total state population in the sample as the measure of human capital for each state at every t. Also, IPUMS is the source of this data. Another variable I control for is taxes. The variable "taxes" measures the tax burden, and it is total personal taxes (for both state and local governments) as a percentage of total state personal income. Data on taxes is from the personal tax accounts for the states prepared by the Bureau of Economic Analysis. Formal measures of physical capital are not available for the states for my sample periods. Because of this, I use electrical generation capacity[9] (kilowatts per 1000 population – "*kwptpop*") as a proxy for physical capital. Data on this come from the Statistical Abstract of the United States.

Before we go to the next section, let us consider the summary statistics. Table 1 presents the summary statistics of cross-state values of the variables for year 2000. From Table 1, we can see that for year

[7] In fact, the data on marriages was sent to me by Aaron Gullickson of the Department of Sociology, Columbia University who had used it for his paper "Black/White Interracial Marriage Trends, 1850-2000". Yet, IPUMS is still the source of his data. On this note, I am very much thankful to Aaron.

[8] As the measure of human capital, Holtz-Eakin (1993) and Johnson and Takeyama (2003) use fraction of population 25 years or older with a college degree. However, I use fraction (percentage) of entire population with a college degree as the measure of human capital. I do this because income is in per-capita terms.

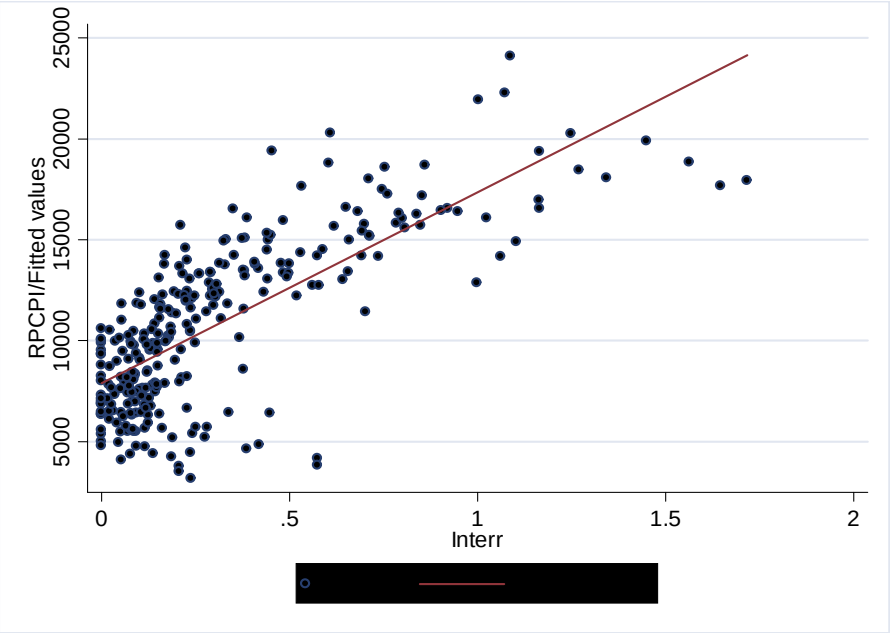
[9] As a robustness check in section 6, I use values for two periods (decades) of physical capital stock etimates in Munnell (1990).

2000, interracial marriages as a percent of total marriages *interr*, ranges from the minimum 0.224% to the maximum of 1.72%, with the mean of 0.839% and standard deviation of 0.371%. The degree of racial fractionalization, on the other hand, ranges from the minimum of 0.289% to the maximum of 23.37%, with the mean and standard deviation of 8.77% and 7.01% respectively (recall that the minimum value racial fractionalization can assume is 0, and the maximum value it can assume is 25%.). These values show that these social variables exhibit quite large variations across the states in the U.S. Figure 1 on the other hand depicts scatter plots of real per-capita personal income *rpcpi* and percentage of interracial marriages *interr* for the pooled data. We can see from this figure that there is clearly a strong positive relationship between *rpcpi* and *interr*.

Table1: Summary Statistics of Cross-state Values for Year 2000

Variable	Obs	Mean	Std. Dev	Min	Max
Nominal per-capita personal income	48	28298.98	4499.60	21005	41485
Real per-capita personal income (*rpcpi*)	48	16433.77	2613.00	12198	24091
Percent Interracial marriage (*interr*)	48	.839	.371	.224	1.72
Racial fractionalization (*racfrac*) (perc.)	48	8.77	7.01	.289	23.37
College (percent)	48	8.579	3.15	10.68	24.12
Taxes (percent)	48	1.77	1.23	.196	4.73
Electrical generation Capacity (*kwptpop*)	48	3438.38	1918.88	1141.95	12546.39
Population growth rate (*popgr*) (percent)	48	13.84	11.41	.550	65.35

Figure 1: Scatter Plots of *rpcpi* and *interr* for the Pooled Data



5 The Econometrics and The Estimation Results

This section discusses the various econometric approaches I used for the estimation, and the results associated with each approach. Again, equation (11) serves as the baseline model for all the regressions.

5.1 Benchmark Regression: Pooled OLS

Let us re-write model (11) as follows:

$$rpcpi_{it} = \beta_0 + \beta_1 interr_{it} + \beta_2 racfrac_{it} + \beta_3 college_{it} + \beta_4 taxes_{it} + \beta_5 kwptpop_{it} + \beta_6 popgr_{it} + \alpha_t + u_{it} \qquad (12)$$

Where all the variables are as already defined, except α_t, which is decade fixed-effects (decade dummies). I start in this section by applying a pooled OLS on model (12) as a benchmark regression. Table

2 presents the estimated coefficients of model (12) using pooled OLS. In the second column of Table 2, I estimate a restricted model in which only the percent interracial marriages ($interr$) and the level of racial fractionalization ($racfrac$) are the regressors (but with decade dummies). Even in this restricted model, racial integration as measured by the percentage of interracial marriages and the degree of racial fractionalization not only have the predicted signs but are also statistically significant at 1% significance levels. In column 3 of Table 2, I estimate an expanded model by controlling for all the other control variables, except the decade dummies. Interracial marriages and racial fractionalization continue to have the predicted signs, and are statistically significant at 1% and 5% significance levels respectively. And finally in column 4, in addition to controlling for all the other control variables as in column 3, I include the decade dummies. In this specification too, racial integration as measured by the percentage of interracial marriages and the degree of racial fractionalization have the predicted signs, and are statistically significant at 1% significance levels.

As has been found by writers like Mankiw, et al. (1992), Barro (1991), Holtz-Eakin (1993), etc., human capital is a very significant predictor of income per capita in this benchmark regression – *college* is statistically significant at 1% significance level in both the second and third specifications. *kwptpop* is statistically significant at 10% significance level in the second specification, but it is not significant in the third specification, even though it continues to have the correct sign in the third specification. *Taxes* is not statistically significant in any of the specifications. Even though population growth rate is statistically significant at 10% significance level in the third specification,

the positive sign suggests that neoclassical prediction of negative relationship between population growth rate and income per capita is not supported by this data. The likely explantion here is that people tend to move to states that are doing well economically due to the strong open economy nature of these states.

Table 2: Pooled OLS estimation results

Dependent Variable is real per-capital personal income			
Variable	Rest. Model	Exp. Model 1	Exp. Model 2
Constant	5860.39***	4685.82***	4812.65***
	(31.25)	(27.01)	(24.85)
Interracial marriage (*interr*)	4780.95***	1503.7***	1919.13***
	(7.95)	(3.45)	(3.59)
Racial fractionalization (*racfrac*)	−80.07***	−24.13**	−31.0***
	(−6.11)	(−2.51)	(−3.05)
College		642.00***	589.81***
		(20.44)	(10.18)
Taxes		26.98	−14.87
		(0.37)	(−0.20)
Electrical Gen. Capacity (*kwptpop*)		.086*	.022
		(1.84)	(0.37)
Population growth rate (*popgr*)		6.95	10.23*
		(1.06)	(1.65)
R^2	0.86	0.91	0.92
Number of Observations	288	288	288
Decade Dummies	Yes	No	Yes

Values in parentheses are t-statistics; Robust standard errors used

***, ** and * denote significance level at 1%, 5% and 10% respectively

Instrumental Variable Estimators

A major limitation of the pooled OLS is the assumption of exogene-

ity that is needed for its estimation results to make sense. That is, if the independent variables are not exogenous, the results presented in Tables 2 are biased. Yet, one may argue that higher incomes create favorable atmosphere for societies to integrate. That is, causality may run from income to interracial marriages – reverse causality. With the presence of reverse causality, we have the problem of endogeneity, which implies that the independent variables and the error terms in model (12) are correlated thereby biasing the estimates for the pooled OLS. To account for this endogeneity problem, I use two instrumental variable procedures to estimate model (13) below. Model (13) also accounts for fixed state-specific effecs or heterogeneity.

$$rpcpi_{it} = \beta_0 + \beta_1 interr_{it} + \beta_2 racfrac_{it} + \beta_3 college_{it} + \beta_4 taxes_{it} + \beta_5 kwptpop_{it} + \beta_6 popgr_{it} + \alpha_t + v_i + \varepsilon_{it} \qquad (13)$$

Where $u_{it} = v_i + \varepsilon_{it}$, ε_{it} is the true "white noise" and v_i is the fixed state-specific effects in u_{it}. In subsection 5.3, I apply the system GMM estimator. And in subsection 5.4, I instrument for interracial marriages using the number of decades the U.S. states have allowed interracial marriages by either repealing their laws prohibiting interracial marriages or by having such laws overturned by the U.S. Supreme Court (in 1967).

5.2 System GMM

I apply in this subsection the system GMM estimation approach originally developed by Arellano and Bond (1991) and later perfected by Arellano and Bover (1995) and Blundell and Bond (1988). This estimation approach is specifically designed to handle endogeneity problems in panel data with "small T, and large N", meaning few time

periods and many individuals. It also accounts for fixed effects, heteroskedacity and autocorrelation within individuals. The system GMM estimator relies on two sets of moment conditions. The first set of moment conditions involves using lagged levels of variables as instruments for the first differenced (or generally, the transformed) equations. This is the original Arellano and Bond (1991) approach, which is called "difference GMM". However, a problem with this is that lagged levels are usually poor instruments for the first differenced equations[10]. Arrellano-Bover/Blundell-Bond system GMM estimator therefore augments the difference GMM approach by including first differences as additional sets of instruments for the level equation to increase efficiency. However, the assumption needed here is that first differences of instrumenting variables are not correlated with the fixed effects. Table 3 presents the estimation results of model (13) using the system GMM estimator. In column 2 of Table 3, I consider the percentage of interracial marriages as the only endogenous variable, while I treat the rest of the regressors as exogenous variables. In column 3, I treat the percentage of interracial marriages and the degree of racial fractionalization as endogenous variables and the rest of the regressors as exogenous variables. Finally, in column 4, I treat all the regressors as endogenous variables. I use the following instruments for the endogenous variables. For the transformed equations, I use lagged levels dated t-2 and deeper of the endogenous variables as instruments. And for the level equations, I use first differences of endogenous variable dated t-1 as instruments. From these results, we can see that social integration as measured by the percentage of interracial marriages is

[10] See Arellano and Bover (1995)

statistically significant at 1% significance level for all the specifications. Also, the degree of racial fractionalization has the predicted signs in all the specifications, and it is statistically significant at 5% significance level for the first two specifications, and at 10% significance level for the last specification.

Table 3: System GMM Estimation Results

Dependent Variable in all specifications is real per-capital personal income			
Variable	Only *interr* as endog.	*interr*, *racfrac* as endog.	All as endog.
Constant	4812.2***	5041.34***	5059.73***
	(24.94)	(21.90)	(18.09)
interr	2606.99***	2522.60***	2432.2***
	(4.44)	(3.97)	(3.65)
racfrac	−41.39**	−57.15**	−41.22*
	(−2.23)	(−2.57)	(−1.72)
College	511.51***	524.19***	569.31***
	(6.95)	(7.38)	(6.81)
Taxes	22.19	25.93	−65.26
	(0.30)	(0.33)	(−0.39)
kwptpop	.023	−.0048	−.034
	(0.28)	(−0.05)	(−0.32)
popgr	15.17*	7.52	1.88
	(1.87)	(0.84)	(0.13)
Sargant test of O.R.	p-value: 0.00	0.00	0.00
A-B test for AR(2)	z: 1.21	1.56	1.76
No. of Obs.	288	288	288
Dec. Dummies	Yes	Yes	Yes
Instrument Count	25	38	90

Values in parentheses are t-statistics; Robust standard errors used

***, ** and * denote significance level at 1%, 5% and 10% respectively

5.3 Instrumenting the Percentage of Interracial Marriages by the number of decades the states have allowed interracial Marriages

In this subsection, I instrument the percentage of interracial marriages (*interr*) by the number of decades the states have allowed interracial marriages by either repealing their antimiscegenation laws or by having such laws overturned by the U.S. Supreme Court. Antimiscegenation laws are laws that were passed by the U.S. states to prohibit interracial marriages (or sometimes interracial sex) between whites and non-white racial groups, mostly blacks. Different states passed or repealed these laws in different years. However, there were seven states that never passed such laws. Also, there were sixteen states that did not repeal their antimiscegenation laws until these laws were overturned in 1967 by the U.S. Supreme Court. The table in the appendix presents this information in detail. The identifying assumptions for this instrumental variable estimation approach are as follows. First, since these laws made it very difficult for interracial couples to live as husbands and wives (even with our loose definition of marriage), the longer a state made the antimiscegenation law stay in books, the lower the level of interracial marriages and thus the lower the level of social integration, and vice versa. That is, the percentage of interracial marriages should be positively correlated with the number of decades the states have allowed interracial marriages. The second identifying assumption is that the enactment and repeal of these laws should not correlate with the error term in model (13). These imply that the number of decades the states have allowed interracial marriages is a good instrument for *interr*. In constructing the instrument, the

challenge I face is how I should deal with the states that never passed antimiscegenation laws and thus never had a year they repealed such laws. In order not to complicate things, I assume that these states (seven in number) were among the first states[11] to repeal antimiscegenation laws in 1780. Before I present the regression results for this instrumental variable estimation procedure, let us first look at Tables $4a$ and $4b$, which respectively present the average real per-capita personal incomes for year 2000 and the time-averaged (1950 - 2000) values of the following groups of states: 1) states that never prohibited interracial marriages, 2) states that ever prohibited interracial marriages by enacting antimiscegenation laws, 3) states that even though prohibited interracial marriages in the past but have allowed interracial marriages since at least 1887 by repealing their antimiscegenation laws, 4) states that even though prohibited interracial marriages in the past but repealed their antimiscegenation laws and thus allowed interracial marriages between 1948 and 1967, and finally 5) states that did not repeal their antimiscegenation laws until these laws were overturned in 1967 by the U.S. Supreme court. We can see from tables $4a$ and $4b$ that, on the average, there is a positive relationship between allowing interracial marriages early and real per-capita personal income. For instance, the average of year 2000 real per-capita personal income for the states that never prohibited interracial marriages is over $\$3,700$ greater than the average of those states that ever enacted laws in the past prohibiting interracial marriages. Of the states that ever prohibited interracial marriages, those states that allowed interracial marriages by repealing antimiscegenation laws before or in 1887 have higher average of

[11] Actually, the first and the only state to repeal antimiscegenation law in 1780 is Pensylvania.

year 2000 real per-capita personal income than the states that allowed interracial marriages at later years, etc.

Table 4a: Groups of states and their Average *rpcpi* (for year 2000 values)

Groups of States	Ave. *rpcpi* (for 2000)
Never prohibited interracial marriages (7 States)	$19,611
Ever prohibited interracial marriages legally (41 states)	$15,891
Antimiscegenation laws repealed before or in 1887 (11 states)	$16,931
Antimisceg. laws repealed between 1948 and 1967 (14 states)	$16,143
Antimiscegenation laws overturned in 1967 (16 states)	$14,956

Note: *rpcpi* for each state is the value for year 2000

Table 4b: Groups of states and their Average *rpcpi* (for time-averaged values)

Groups of States	Average *rpcpi*
Never prohibited interracial marriages (7 States)	$12,443.55
Ever prohibited interracial marriages legally (41 states)	$10,539.50
Antimiscegenation laws repealed before or in 1887 (11 states)	$11,307.00
Antimisceg. laws repealed between 1948 and 1967 (14 states)	$10,973.50
Antimiscegenation laws overturned in 1967 (16 states)	$9,632.10

Note: *rpcpi* for each state is the time-averaged (from 1950-2000) value

The results for the regression instrumenting the percent interracial marriages (*interr*) by the decades the states have allowed interracial marriages (*interrallowed*) are presented in Table 5. In columns 2 and 3, the variables are in levels, while in column 4, the variables are in first differences. That is, in columns 2 and 3, *interrallowed* instruments for *interr*, while in column 4, *interrallowed* instruments for first difference of *interr*. The difference between the specifications in collumns 2 and

3 is that column 2 does not include time dummies while column 3 includes time dummies. I apply within (fixed-effects) estimation approach to estimate both the levels and first differenced equations. We can see from Table 5 that, even after having been instrumented for, the percentage of interracial marriages as the measure of the level of racial integration across the U.S. states continues to be statistically significant at 1% significance level for the level regression with no decade dummies, at 10% significance level for the level regression with decade dummies, and at 1% significance level for the regression in first differences. Also, $racfrac$ has the predicted signs in all the specifications, and it is statistically significant at 5% significance level for the level regression with no decade dummies, and at 1% significance level for the regression in first differences.

Table 5: Instrumenting *interr* by *interrallowed* (using within estimation approach)

Dependent variable for the level regression is real per-capital personal income (*rpcpi*)

Dependent variable for the first difference regression is first difference of *rpcpi*

Variable	Levels	Levels	1st Diff.
Constant	5902.00***	6518.72***	1967.68***
	(10.11)	(5.72)	(9.29)
Interracial marriage (*interr*)	3677.88***	8697.17*	2446.93***
	(3.33)	(1.69)	(4.97)
Racial fractionalization (*racfrac*)	−192.07**	−436.99	−423.12***
	(−2.48)	(−1.49)	(−3.20)
College	514.23***	404.82***	−63.03
	(9.13)	(5.70)	(−0.96)
Taxes	94.82	.55	130.61
	(1.18)	(0.00)	(1.41)
Electrical Gen. Capacity (*kwptpop*)	.270***	.22	.16
	(3.54)	(1.13)	(1.57)
Population growth rate (*popgr*)	4.06	38.6*	5.84
	(0.51)	(1.88)	(1.05)
R^2	0.95	0.92	0.17 (betw.)
No. of Observations	288	288	240
Decade Dummies	No	Yes	No[12]

Values in parentheses are t-statistics

***, ** and * denote significance level at 1%, 5% and 10% respectively

[12]Including time dummies renders all the coefficients (including the constant) of the within regression in first differeces insignificant. The reason may be that there is already too much treatment of the fixed effects, since both the within estimator and the first difference estimator work to remove the same fixed effects.

5.4 Difference-in-Difference Estimator

As I pointed out above, in 1967 there were 16 states[13] that had not allowed interracial marriages by repealing their antimiscegenation laws. That is, the antimiscegenation laws of these 16 states were overturned in 1967 by the U.S. Supreme Court in the Loving v. Virginia case. Now, if interracial marriages as a measure of racial integration truly causes income, then per-capita personal incomes should increase in these states in response to this Supreme Court's ruling, which allowed interracial marriages in these states. In this subsection, I pursue this idea. That is, I try to find out if by allowing interracial marriages in these states, real per-capita personal incomes actually increased in response. The challenge here is the ability to correctly isolate the effects, if any, of this ruling on real per-capita personal income from the effects caused by other factors. To do this, I use a difference-in-difference estimation approach. First, I have to consider whether this U.S. Supreme Court's ruling can truly act as an exogenous experimental event. In fact, this ruling can indeed be considered to be exogenous, since the states affected had no choice but to comply with the ruling. Another major challenge for this difference-in-difference estimation approach is the ability to distinguish between the control group and the treatment group such that the control group did not experience the treatment the treatment group experienced. For this, I consider the 16 states whose antimiscegenation laws were overturned as the treatment group, and I consider the other states that had already repealed their antimiscegenation laws before this ruling to be the

[13] These 16 states exclude Maryland, which reapealed its antimiscegenation law in 1967 before the U.S. Supreme Court's ruling.

control group. The reason is that, since these other states had already allowed interracial marriages before the Supreme Court's ruling (most of them several years, if not decades, before), the ruling should not have any major additional impact on interracial marriages in these states. Finally, I control for the other regressors to make sure that I isolate, as much as I can, the possible effects of this exogenous permission of interracial marriages on real per-capita personal income. I therefore estimate the following model.

$$rpcpi_{it} = \beta_0 + \beta_1 treat_i + \beta_2 after_t + \beta_3 treat_i * after_t + \beta_4 racfrac_{it} + \beta_5 college_{it} + \beta_6 taxes_{it} + \beta_7 kwptpop_{it} + \beta_8 popgr_{it} + \alpha_t + u_{it} \qquad (14)$$

$treat$ in model (14) is a dummy variable with ones for the treatment group and zeroes for the control group. $after$ is also a dummy variable with ones for periods after the ruling and zeroes for periods before the ruling (for both the treatment and the control groups). And $treat * after$ is the multiplicative term of $treat$ and $after$. The coefficient of the variable of interest $treat * after$ measures the effect of the exogenous permission of interracial marriages by the U.S. Supreme Court's ruling on real per-capita personal income. Table 6 presents the result of this difference-in-difference estimation approach. Column 2 of Table 6 estimates model (14) with racial fractionalization ($racfrac$), while column 3 estimates the model without racial fractionalization. In both of these specifications, $treat * after$ is statistically significant at 1% significance level, implying that allowing interracial marriages significantly increased real per-capita personal incomes in the 16 remaining states that continued to prohibit interracial marriages. The sign on the degree of racial fractionalization ($racfrac$) switches in the

first specification from negative to positive, and it is statistically significant in the positve. This therefore prompted me to reestimate the model without it in column 3. Excluding $racfrac$ did not change the significance level of $treat * after$, although the estimated coeffiecient decreases from about \$760 to about \$700. Also, the explanatory powers (R^2) are about the same in both specifications.

Table 6: Difference-in-difference estimation results

Dependent Variable is real per-capital personal income		
Variable	With $racfrac$	Without $racfrac$
Constant	4987.45***	5125.49***
	(26.38)	(26.81)
$treat$	−1578.32***	−1157.43***
	(−5.30)	(−5.76)
$after$	1147.87	1354.74
	(1.33)	(1.55)
$treat * after$	759.55***	699.33***
	(2.61)	(2.62)
Racial fractionalization ($racfrac$)	36.53**	
	(2.57)	
College	624.09***	622.85***
	(11.66)	(11.44)
Taxes	−36.41	−33.3
	(−0.50)	(−0.45)
Electrical Generation Capacity ($kwptpop$)	.025	−.013
	(0.43)	(−0.21)
Population growth rate ($popgr$)	13.34**	13.68**
	(2.00)	(2.02)
R^2	0.93	0.92
No. of Observations	288	288
Decade Dummies	Yes	Yes

Values in parentheses are t-statistics; Robust standard errors used

***, ** and * denote significance level at 1%, 5% and 10% respectively

6. Robustness Checks

In this section, I check how robust some of the estimation results in section 5 are using different physical capital stock measure. So far, I have been using electrical generation capacity (kilowatts per thousand population – *kwptpop*) as a proxy for physical capital because formal measures of physical capital are not available for the U.S. states for the sample periods. However, in 1990, Alicia Munnell[14] provided estimates of physical capital stocks for the U.S. states. However, these estimates only cover yearly values from 1970 to 1986, while my data cover decennial values from 1950 to 2000 (6 periods). Yet, recognizing the importance of physical capital in the determination of income as found by cross-country empirical studies[15], I use values for 2 periods of these capital stock estimates: 1970 and 1980 values. With this, the number of observations decreases from 288 $(48 * 6)$ to 96 $(48 * 2)$.

6.1 Controlling for Munnell's Physical Capital Stock measure in the System GMM

In this subsection, I check the robustness of the system GMM estimator using Munnell's physical capital stock estimates as one of the control variables. That is, I estimate the following model using the system GMM.

$$rpcpi_{it} = \beta_0 + \beta_1 interr_{it} + \beta_2 racfrac_{it} + \beta_3 college_{it} + \beta_4 taxes_{it} + \beta_5 pcstock_{it} + \beta_6 popgr_{it} + v_i + \varepsilon_{it} \qquad (15)$$

$$i = 1, 2, .., 48; \;\; t = 1, 2$$

[14] In 1990, Alicia Munnell was Senior Vice President and Director of research at the Federal Reserve Bank of Boston.

[15] See, for instance, Mankiw, Romer and Weil (1992).

$pcstock_{it}$ is per-capita physical capital stock (both private and public estimated by Munnell (1990)) for state i in decade t. The rest of the variables in model (15) are same as before. I have omitted the decade dummies in model (15) because there are now only two periods. The instrument choice for the transformed equations and the level equations for the endogenous variables are the same as subsection 5.2. Table 7 presents the system GMM estimation results for model (15). In the first column, I consider the percentage of interracial marriages as the only endogenous variable. In the second column, I consider the percentage of interracial marriages and the degree of racial fractionalization as the endogenous variables. And in the third column, I consider all the regressors as endogenous. In all these specifications, racial integration as measured by the percentage of interracial marriages is statistically significant (at 5% significance level for the first specification and at 1% significance level for the remaining two specifications). The degree of racial fractionalization has the predicted signs in all the specifications, and it is statistically significant at 10% significance level in the third specification. *pcstock* is not statistically significant in any of the specifications here.

Table 7: System GMM (with *pcstock* as a control var.) Estimation Results

Dependent Variable in all specifications is real per-capital personal income			
Variable	Only *interr* as endog.	*interr*, $racfrac$ as endog.	All as endog.
Constant	6854.12***	6946.59***	8609.60***
	(11.35)	(8.56)	(7.23)
interr	5371.96**	13092.12***	9376.3***
	(2.58)	(3.03)	(3.57)
$racfrac$	−33.23	−10.69	−54.59*
	(−1.56)	(−0.26)	(−1.67)
College	290.108***	40.39	230.71*
	(3.72)	(0.27)	(1.82)
Taxes	127.35	254.21	−23.52
	(0.81)	(1.35)	(−0.08)
pcstock	.013	.030	−.046
	(0.65)	(1.00)	(−0.58)
popgr	22.27**	12.11	−7.82
	(2.56)	(0.99)	(−0.38)
Sargant test of O.R.	p-value: 0.00	0.00	0.00
No. of Obs.	96	96	96
Instrument Count	10	13	21
Values in parentheses are t-statistics; Robust standard errors used			
***, ** and * denote significance level at 1%, 5% and 10% respectively			

6.2 Munnell's Capital Stock as a Control Variable in the Second Instrumental Variable Regression

In this subsection, I reestimate the model that involves instrumenting the percentage of interracial marriages by the number of decades

the states have allowed interracial marriages. As a robustness check, I control for Munnell's per-capita physical capital stock estimates (instead of controlling for electrical generation capacity I have been using as a proxy for physical capital). Table 8 presents the results for this regression. Again, I use fixed-effects approach for this instrumental variable regression model. From Table 8, racial integration as measured by the percentage of interracial marriages is statistically significant at 10% significance level. That is, the statistical significance of the percentage of interracial marriages is robust to the Munnell's per-capita physical capital stock estimates (*pcstock*) as a control variable in this instrumental variable regression framework. Although the degree of racial fractionalization has the predicted sign, it is not statistically significant at the conventional significance levels. *pcstock* is statistically significant at 5% significance level here.

Table 8: Results for the IV Regr. that controls for pcstock (instead of kwptpop)

Dependent Variable is real per-capital personal income	
Variable	Coefficient estimate
Constant	7432.27***
	(3.04)
Percent Interracial marriage (*interr*)	10055.56*
	(1.69)
Racial fractionalization (*racfrac*)	−294.84
	(−0.88)
College	26.90
	(0.13)
Taxes	−26.33
	(−0.12)
Per-capita Capital Stock (*pcstock*)	.160**
	(2.51)
Population growth rate (*popgr*)	37.26***
	(2.69)
R^2	0.87
No. of Observations	96

Values in parentheses are t-statistics

***, ** and * denote significance level at 1%, 5% and 10% respectively

7. Conclusion

Using the U.S. states as a case study, I have empirically analyzed the role social integration as measured by the percentage of intergroup

marriages plays in the determination of per-capita personal income. The results clearly show that racial integration plays significantly positive role in the determination of per-capital personal income across the states in the U.S. I therefore emphasize here that racial integration is not only a civil rights or political issue, but it is also an economic one.

These findings, in fact, provide strong support for the theoretical model I developed in Boakye (2007a). As section 3 of this paper shows, I argue in that paper that one of the main reasons for economic under-performance of a country, or region of a country, is political tension that results from social fractionalization, which brings about wasteful use of economic resources for political power struggle leading to economic inefficiency and thus poor economic performance. Yet, the good news is that, over time the complexities created by the sociopolitical environment get eased through social integrative processes like intergroup marriages, which leads to economic growth and development.

Based on the findings in this paper, we can argue that African countries, for instance, that have been found to have very fractionalized societies[16] should embark on deliberate policies of achieving faster social integration at the domestic fronts in order to achieve accelerated economic growth and development. That is, generally, more aid may not be the best antidote to economic under-performance of the underdeveloped part of the world, but deliberate efforts to socially integrate the different ethnic groups that make up these countries. This will bring about productive use of domestic resources and thus economic growth and development. After all, I showed in the theory

[16] See, for instance, Easterly and Levine (1997)

that more resources in the hands of governments in socially fractionalized economies may lead to more economic woes, since they stimulate political power struggle and conflicts creating even more economic inefficiency and thus economic retardation.

Appendix: U.S. States and Antimiscegenation Laws – Year Enacted, year Repealed

State	Year Law Passed	Year Repealed (or overturned by the Sup. Court)
Alabama	1822	overturned in 1967
Arizona	1865	1962
Arkansas	1838	overturned in 1967
California	1850	1948
Colorado	1864	1957
Connecticut	Never passed the law	Never passed the law
Delaware	1721	overturned in 1967
Florida	1832	overturned in 1967
Georgia	1750	overturned in 1967
Idaho	1864	1959
Illinois	1829	1874
Indiana	1818	1965
Iowa	1839	1851
Kansas	1855	1859
Kentucky	1792	overturned in 1967
Louisiana	1724	overturned in 1967
Maine	1821	1883
Maryland	1692	1967
Massachusetts	1705	1843
Michigan	1838	1883
Minnesota	Never passed the law	Never passed the law
Mississippi	1822	overturned in 1967
Missouri	1835	overturned in 1967
Montana	1909	1953
Nebraska	1855	1963
Nevada	1861	1959
New Hampshire	Never passed the law	Never passed the law
New Jersey	Never passed the law	Never passed the law

Appendix: (Continued)

State	Year Law Passed	Year Repealed (or overturned by the Sup. Court)
New Mexico	1857	1866
New York	Never passed the law	Never passed the law
North Carolina	1715	overturned in 1967
North Dakota	1909	1955
Ohio	1861	1887
Oklahoma	1897	overturned in 1967
Oregon	1862	1951
Pennsylvania	1725	1780
Rhode Island	1798	1881
South Carolina	1717	overturned in 1967
South Dakota	1909	1957
Tennessee	1741	overturned in 1967
Texas	1837	overturned in 1967
Utah	1852	1963
Vermont	Never passed the law	Never passed the law
Virginia	1691	overturned in 1967
Washington	1855	1868
West Virginia	1863	overturned in 1967
Wisconsin	Never passed the law	Never passed the law
Wyoming	1913	1965

Source: LovingDay.org

References

Alesina, A., and E. La Ferrara, "Ethnic Diversity and Economic Performance" *Journal of Economic Literature (2005)*

Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat and R. Wacziarg, "Fractionalization" *Journal of Economic Growth (2003)*

Ananat, E., "The Wrong Side(s) of the Tracks: Estimating the Causal Effects of Racial Segregation on City Outcomes" *NBER Working Paper 13343 (2007)*

Annett, A., "Social Fractionalization, Political Instability, and the Size of Government" *International Monetary Fund Staff Papers (2001)*

Arellano, M., and S. Bond, "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations" *Review of Economic Studies (1991)*

Arellano, M., and O. Bover, "Another look at the intsrumental-variable estimation of error-components models" *Journal of Econometrics (1995)*

Barro, R., "Economic Growth in a Cross Section of Countries", *The Quarterly Journal of Economics (1997)*

Barro, R., and X. Sala-i-Martin, "Convergence" *The Journal of Political Economy (1992)*

Becker, G., K. Murphy and R. Tamura, "Human Capital, Fertility, and Economic Growth" *The Journal of Political Economy (1990)*

Blundell, R., and S. Bond, "Initial conditions and moments restrictions in dynamic panel data models" *Journal of Econometrics (1998)*

Bureau of Economic Analysis, Regional Economic Accounts, States Annual Estimates 1929-2006, U.S. Department of Commerce, Washington, D.C.

Carlino, G., and L. Mills "Testing neoclassical convergence in regional incomes" *Regional Science and Urban Economics (1996)*

Collier, P., "Ethnicity, Politics and Economic Performance" *Economics and Politics (2000)*

Corneo, G., and O. Jeanne, "On relative Wealth effect and Long-run Growth" *Research in Economics (2001)*

Eastebam, J., and R. Debraj, "On the Measurement of Polarization" *Econometrica (1994)*

Easterly W., and R. Levine "Africa's Growth Tragedy: Policies and Ethnic Divisions" *Quarterly Journal of Economics (1997)*

Fearon, J., "Ethnic and Cultural Diversity by Country" *Journal of Economic Growth (2003)*

Fershtman, C., K. Murphy, and Y. Weiss, "Social Status, Education and Growth" *Journal of Political Economy (1996)*

Fershtman, C., and Y. Weiss, "Social Status and Economic Performance: A Survey" *European Economic Review" (1998)*

Furtado, D., "Human Capital and Interethnic Marriage Decisions" *University of Connecticut, Department of Economics Working Paper 2006-3 (2006)*

Gullickson, A., "Black/White Interracial Marriage Trends, 1850-2000" *Journal of Family History (2006)*

Holtz-Eakin, D., "Solow and the States: Capita Accumulation, Productivity, and Economic Growth" *National Tax Journal (1993)*

Holtz-Eakin, D., and A. Schwartz "Infrastructure in a structural model of economic growth" *Regional Science and Urban Economics (1995)*

Johnson, P., and L. Takeyama "Convergence Among the U.S. States: Absolute, Conditional, or Club?" *Vassar College Economics Working Paper*

#50 (2003)

Keefer, P., and S. Knack "Polarization, Politics and Property Rights: Links Between Inequality and Growth" *Public Choice (2002)*

van Long, N., and K. Shimomura, "Relative Wealth, Status-seeking, and Catching up" *Journal of Economic Behavior and Organization (2004)*

Mankiw, G., D. Romer and D. Wiel "A Contribution to the Empirics of Economic Growth" *The Quarterly Journal of Economics*

Munnell, A., "How Does Public Infrastructure Affect Regional Economic Performance?" *Federal Reserve Bank of Boston (1990)*

Pham, T., "Economic Growth and Status-Seeking through Personal Wealth" *European Journal of Political Economy (2005)*

Posner, D., "Measuring Ethnic Fractionalization in Africa" *American Journal of Political Science (2004)*

Rauscher, M., "Conspicuous Consumption, Economic Growth, and Taxation" *Journal of Economics (1997)*

Roodman, D., "An Introduction to "Difference" and "System" GMM in Stata" *Center for Global Development Working Paper Number 103 (2006)*

Ruggles, S., M. Sobek, T. Alexander, C. Fritch, R. Goeken, P. Hall, and M. King "Integrated Public Use Microdata Series: Version 3.0 [machine-readable database]" *Minneapolis, MN: Minnesota Population Center [producer and distributor] (2004)*

Smith, A., "The Theory of Moral Sentiments" *(1759). Reprinted, Indianapolis: Liberty Fund (1982)*

Solow, R., "A Contribution to the Theory of Economic Growth" *The Quarterly Journal of Economics (1956)*