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A note on the macroeconomic consequences of ethnic/racial tension

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HIGHLIGHTS

- This paper aims to assess how changes in ethnic/racial tension (over time) affect economic growth in the short-run.
- Time-varying index of ethnic/racial tension.
- Results show that racial tension has detrimental effects on growth, and those effects are more pronounced during low growth periods.

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ABSTRACT

While many studies stressed the importance of ethnic fractionalization on long-term economic growth, neither ethnic fractionalization always leads to ethnic conflict nor the intensity of conflict is constant over time. To address this potential bias, we construct an ethnic/racial tension index by using the number of US news articles that contain certain keywords. Utilizing this index we test the predictions of a simple theoretical model in a Markov Switching framework which allows to identify the impact of ethnic/racial tension in different states of the economy. Consistent with our theoretical predictions, results show that the magnitude of the impact of ethnic/racial tension is larger during low-growth periods.

1. Introduction

Many previous studies argue that ethnic fractionalization may affect long-term growth through various channels. Montalvo and Reynal-Querol (2005) suggest that rent-seeking behavior of various ethnic groups causes reduced investment, as well as an increase in public consumption. Alesina et al. (1999) on the other hand show that ethnic heterogeneity leads to a decline in the production of public goods. Another strand of literature contend that ethnic fractionalization may result with low quality of institutions (Easterly and Levine, 1997; Keefer and Knack, 2002; Easterly et al., 2006).

One common feature of the aforementioned studies is the fact that they all proxy ethnic tension with either ethnic fractionalization, or ethnic polarization. By doing so, they assume that ethnic tension is a time-invariant variable, and ignore the possibility that ethnic tension can change over time. Collier (2000) on the other hand, suggests that ethnic polarization itself does not lead to conflict. Caselli and Coleman (2013) point out that ethnic conflict is by no means universal across ethnically heterogeneous societies: in many countries, ethnic groups coexist peacefully and the level of conflict is not constant over time.[1]

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[1] Esteban and Ray (2011) explain these cross-country differences with the role of income inequality.

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In this paper, we aim to assess how changes in ethnic/racial tension (over time) affect economic growth in the short-run. We start our investigation with a basic theoretical model à la Benhabib and Rustichini (1996), which predicts that the magnitude of the effect of ethnic/racial tension should be larger during low growth periods. Then, we construct an index of ethnic/racial tension by counting the number of articles published in the major newspapers in the United States that use certain keywords, and then find the percentage of news with negative connotation race-related articles in all race related stories. To our knowledge, ours is the first paper that constructs a time-varying index of ethnic/racial tension. Finally, we test our model's predictions within a Markov-Switching framework. Our results provide empirical evidence in favor of our theoretical model's predictions.

The layout of the paper is as follows. Section 2 describes the theoretical model of social conflict and its results. Section 3 outlines the econometric model, describes the data and presents the empirical findings. Section 4 summarizes and offers some concluding remarks.

2. Theoretical foundation

In this section, we provide a parsimonious version of the Benhabib and Rustichini (1996) model to study the effects of social conflict on economic growth. The social conflict concept in the model can refer to competition for resources among groups divided along any possibly differentiating dimension, such as ethnic, racial, religious, or political. In this paper we concern ourselves with ethnic/racial division, hence the social groups in the model correspond to the ethnic/racial groups we study in the empirical part.

Model society is made up of two social groups. These groups consume out of the aggregate output. As a proxy for the redistributive and expropriative activities of social groups, social conflict is represented as the possibility of appropriating resources for one's benefit, instead of cooperating for the social good. Model shows that the decision to cooperate or appropriate will depend on the level of wealth. Appropriation in the current period leads to retaliation in the next period and a total depletion of the capital stock. Hence, in high wealth periods players are less likely to defect since they have more to lose.

Two players in this appropriation game ($i = 1, 2$) can consume (c_i) out of the common resource pool ($f(k)$ where k is the capital stock) without an exogenous limit. Since the total demands of the groups can exceed the output level, we first specify an allocation rule as follows:

$$A_1(c_1, c_2, k) = \begin{cases} c_1 & \text{if } c_1 + c_2 \leq f(k) \text{ or } c_1 \leq f(k)/2 \\ f(k) - c_2 & \text{if } c_1 + c_2 \geq f(k) \text{ and } c_1 \geq f(k)/2 \geq c_2 \\ f(k)/2 & \text{if } c_1, c_2 \geq f(k)/2 \end{cases} \quad (1)$$

with a similar allocation rule $A_2(.)$ for group 2. It is possible that groups choose to appropriate as much as they can, which is called *fast consumption strategies* ($\bar{c}_1(k) = \bar{c}_2(k) = f(k)$), and deplete all output in one period. This will be a subgame-perfect equilibrium (SPE) and will constitute the punishment after a defection from cooperation. Hence the value of this SPE to player i is

$$v_i^D(k_0) = \sum_{t=0}^{\infty} \beta^t U_i(A_i(\bar{c}_1(k_t), \bar{c}_2(k_t), k_t)) = U(f(k_0/2)), \quad (2)$$

where β is the discount factor, k_0 is the initial capital stock and U_i is the instantaneous utility function for both players. Fast consumption strategies define the threat level in the trigger strategy. Therefore, any equilibrium would satisfy the following *individual rationality constraint*:

$$\sum_{t=0}^{\infty} \beta^t U_i(c^i{}_t) \geq v_i^D(k_0). \quad (3)$$

We also define the first-best (FBE) and second-best equilibria (SBE) in order to characterize the growth paths of the model economy. While a FBE requires the discounted utility of each player, $v^{FB}(k)$, to satisfy

$$v^{FB}(k) = \max_{c \leq f(k)/2} U(c) + \beta v^{FB}(f(k) - c), \quad (4)$$

a SBE satisfies a similar equation

$$v^{SB}(k) = \max_{c \leq f(k)/2} U(c) + \beta v^{SB}(f(k) - c), \quad (5)$$

subject to the incentive compatibility constraint, $v^{SB}(k) \geq v^D(k)$. If the FBE satisfies this constraint, it would be the equilibrium of the model. Otherwise, the SBE would be obtained where $v^{SB}(k) = v^D(k)$. Consumption levels and the growth path would be obtained accordingly.

As explained above, the possibility of a first-best equilibrium may depend on the level of wealth. Following Benhabib and Rustichini (1996), we use the following production and preference structure to illustrate the case where first-best growth rates are sustainable only at high levels of wealth and social conflict hurts the economy disproportionately at low wealth levels. The production function is

$$f(k) = \begin{cases} Ak & \text{if } k \leq 1 \\ A + B(k-1) & \text{if } k \geq 1,\ B/2 < 1 \end{cases} \quad (6)$$

with $A = 5/2$ and $\beta = 1/2$. The utility function is

$$U(c) = \begin{cases} c & \text{if } c \leq 1 \\ 1 + b(c-1) & \text{if } c \geq 1 \end{cases} \quad (7)$$

where we assume b is small: $B\beta < b < A\beta/2 < 1$. Given $A\beta > 1 > b\beta$, $k^* = 1$ and $c^* = 3/4$ are the steady-state capital stock and consumption levels for the optimal growth problem. We focus on the region $k \in [0.905, 1]$ where the economy converges to its steady state with positive growth.[2] Relative to the first-best equilibrium ($k \in [0.933, 1]$ and growth rate is 7.14%) where there is no social conflict, we can characterize two distinct phases: low-wealth/high-conflict and high-wealth/low-conflict phases. In both, first-best growth rates are not attainable since the incentive constraints bind. However, in the former one, the growth rate is lowered to near zero levels, whereas in the latter one, the growth rate declines to 2.9%. The Table 1 illustrates the phases and the growth rates of the economy in each phase.

The results show that the social conflict tends to have a bigger negative impact on the growth rate as the wealth level declines. The intuition is that high wealth levels imply a high cost of defection and makes appropriation less attractive to players. However, the consumption is low (and marginal utility is high) at low wealth levels, therefore consumption rates must be increased and saving/capital accumulation rates declined to avoid defection.

[2] For even lower levels of wealth, i.e. $k < 0.905$, model economy has negative or zero growth as noncooperative strategies dominate. Even though this is in line with our results that social conflict hurts the economy disproportionately at lower levels of wealth, it is an extreme scenario for developed economies and hence left out the discussion.

Table 1
Growth phases of the model economy and empirical results.

	k_0 region	Growth rate
Low-wealth/high-conflict phase	[0.905, 0.907]	0.18
High-wealth/low-conflict phase	[0.907, 0.933]	2.94

Descriptive statistics				
	Mean	Std. Dev.	Skewness	Kurtosis JB
Economic growth	0.170	0.636	−1.738	12.251 241.01
Ethnic/racial tension index	0.406	0.118	−0.777	3.967 43.35

Markov switching state dimension: Hansen test*		
Standardized LR test	One vs. two-states	Two vs. three-states
	4.886	0.319
$M = 0$	(0.002)	(0.601)
$M = 1$	(0.003)	(0.699)
$M = 2$	(0.005)	(0.715)
$M = 3$	(0.009)	(0.779)
$M = 4$	(0.012)	(0.821)

Maximum likelihood estimation results**			
Low phase growth rate		High phase growth rate	
μ^l	−1.416 (0.000)	μ^h	0.361 (0.000)
γ^l	−5.591 (0.000)	γ^h	−0.195 (0.060)
θ	−0.028 (0.035)		
σ	0.468 (0.000)		
p	0.797 (0.000)	q	0.993 (0.000)
Duration	4.51		73.13
LogLik	−241.153		
$LB_{(5)}$	6.883	$LB^2_{(5)}$	9.412

Note:
* The Hansen's standardized Likelihood Ratio test p-values are calculated according to the method described in Hansen (1992), using 1000 random draws from the relevant limiting Gaussian processes and bandwidth parameter $M = 0, 1 \ldots, 4$. Test results for the presence of a third state are also reported.
** Autocorrelation and heteroscedasticity-consistent standard errors are reported in brackets. $LB_{(5)}$ and $LB^2_{(5)}$ are respectively the Ljung and Box (1978) of significance of autocorrelations of five lags in the standardized and standardized squared residuals, standard errors are reported in brackets.

3. The econometric model

The regime-switching model Hamilton (1990) considered in this paper allows for periods of high economic growth and low economic growth, and is given by:

$$y_t = \mu(s_t) + \gamma(s_t)x_t + \theta z_{t-3} + \sigma\varepsilon_t,$$
$$\mu(s_t) = \sum_{i=l}^{h} \mu^{(i)}\mathbf{1}\{s_t = i\}, \quad (t \in \mathbb{T}) \tag{8}$$

where $y_t = (growth_t)$ and $x_t = (ethnic - tension_t)$. Given that s_t is unobserved, estimation of (8) requires restrictions on the probability process governing s_t; it is assumed that s_t follows a first-order, homogeneous, two-state Markov chain. This means that any persistence in the state is completely summarized by the value of the state in the previous period. Therefore, the regime indicators $\{s_t\}$ are assumed to form a Markov chain on $\mathbb{S}$ with transition probability matrix $\mathbf{P}' = [p_{ij}]_{2\times 2}$, where $p_{ij} = \Pr(s_t = j|s_{t-1} = i)$, $i, j \in \mathbb{S}$, and $p_{i1} = 1 - p_{i2}$ $(i \in \mathbb{S})$. Each column sums to unity and all elements are non-negative. It is also assumed that $\{\varepsilon_t\}$ and $\{s_t\}$ are independent. Also, note that the independence between the sequences $\{\varepsilon_t\}$ and $\{s_t\}$ implies that regime changes take place independently of the past history of $\{y_t\}$.

Furthermore, we control for monetary policy including in the conditional mean Eq. (8) the mutual fund rate, $z_t = (mutual\ fund_t)$.[3] Therefore, the parameters vector of the mean Eq. (1) is defined by: $\mu^{(i)}$ $(i = l, h)$ which are real constants; $\gamma = (\gamma^l, \gamma^h)$ and θ measure the impact of ethnic tension and interest rate, respectively. The parameter vector is estimated by maximum likelihood. The density of the data has two components, one for each regime, and the log-likelihood function is constructed as a probability weighted sum of these two components.

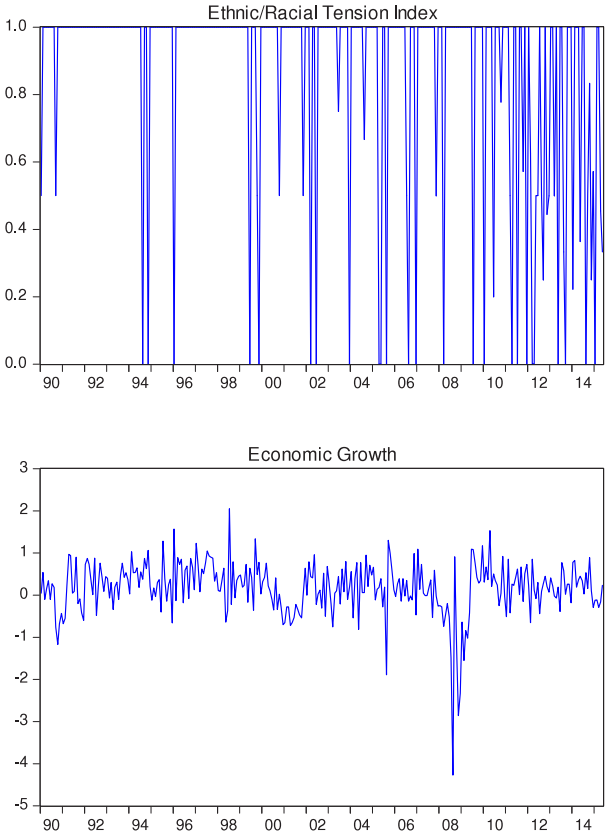

Fig. 1. Real economic growth and ethnic/racial tension index. Note: Real economic growth is proxied by change in industrial production. All news stories that included the words "African–American", "Hispanic" and "Race", which are race-related but not with a negative connotation, were counted. Then the number of stories that included the previous three words as well as negative connotation words "Crime, Discrimination, Illegal Immigration, Hate, Race, Tension and Violence" were counted. The ratio of latter to former is the ethnic/racial tension index. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

4. Empirical results

Monthly data for real economic growth (proxied by change in industrial production), short term interest rates and ethnic tension index over the period 1990:1–2015:5 (for a total of 305 observations) for the USA are employed. All economic data are from International Monetary Fund's International Financial Statistics (IFS). Data used for constructing the ethnic tension index are collected from Bloomberg. We first counted all news stories that included the words "African–American", "Hispanic" and "Race", which are race-related but not with a negative connotation. Then we counted the number of stories that included the previous three words as well as negative connotation words

[3] The literature on economic growth determinants has suggested a wide number of potential variables. Our approach was to compromise between a model reasonably parsimonious, in terms of number of variables used, and yet consistent with the relevant literature. Therefore, mutual fund rate was preferred.

"Crime, Discrimination, Illegal Immigration, Hate, Race, Tension and Violence". The ratio of latter to former is our ethnic/racial tension index and it is represented by the blue line in Fig. 1.[4] The share of negative news are particularly high after 2012 with the Trayvon Martin shooting (Feb 2, 2012), President Obama winning a second term in White House (Nov 6, 2012) and racially charged US presidential campaigns in 2015.

The null hypothesis of linearity against the alternative of Markov regime switching cannot be tested directly using a standard likelihood ratio (LR) test. We properly test for multiple equilibria (more than one regime) against linearity using the Hansen's standardized likelihood ratio test (1992). The value of the standardized likelihood ratio statistics and related p-values (Table 1) under the null hypothesis (see Hansen, 1992, for details) provides strong evidence in favor of a two states Markov mean regime-switching specification.

Maximum likelihood (ML) estimates are also reported in Table 1. The filter identifies two regimes associated to negative (-1.416) and positive (0.361) economic growth. The model appears to be well identified, parameters are significant and the standardized residuals exhibit no signs of linear or nonlinear dependence (Ljung–Box statistics for dependency in the first and second moment). The transition probabilities show a high persistency of the high state ($q = 0.993$) whereas periods of economic depression are less persistent ($p = 0.797$) and expected to last shorter (duration $=$ 4.5 months) In deriving the results, mainly two hypotheses are investigated: the effect of ethnic tension in periods of (i) low growth $\left(\gamma^l = 0\right)$ and; (ii) high growth $\left(\gamma^h = 0\right)$. From the results reported in Table 1 the following points are noteworthy. We observe a negative and significant effect running from ethnic tension index into economic growth. The effect is larger (smaller), in absolute value, in the cases of low (higher) growth with values equal to -5.591 and -0.195, respectively. The impact of ethnic tension related news when the economy is experiencing low economic growth is sensibly bigger (about twenty five times) than in the presence of high economic growth. Finally, the control variable considered is statistically significant and in line with our prior showing negative interest rate ($\theta = -0.028$) effects.

5. Conclusions

This paper analyzed how ethnic/racial tension as a time varying concept affects economic growth in the short-run. Consistent with our theoretical model, our empirical investigation that uses a novel measure of ethnic/racial tension shows that racial tension has detrimental effects on growth, and those effects are more pronounced during low growth periods.

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[4] Note that in all periods of our sample there is at least one race-related story. So when our index is equal to 0, it means there are some race-related news, but none of them include negative connotation keywords.