

Diverse Ethnic Preferences, Identifying Channels of Cooperation and Conflict and Labor Supply Outcomes

By

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Abstract

This paper uses a simple but strategic cooperative model with ethnic divisions to examine the effectiveness of policies and institutions in terms of the visibility of sharable benefits. It is shown that institutions such as legal property rights and democracy apparently engender labour supply and growth as against policies of control of corruption and reduction of income inequality. Interestingly, reducing income inequality does not emerge as a favorite because the benefits may go to higher income groups and to other groups. Controlling corruption again seems to be loaded with government regulation rather than economic freedom. These results are robust for several measures of ethnic diversity along with alternative endogeneity tests for ethnic diversity. Findings would bear important implications for further research in new growth economics while assessing the relative significance of policies and institutions as instruments of conflict resolution.

Keywords: Ethnic diversity, public policies, institutions, cooperation, labour supply, corruption, income inequality, democracy

1. Context and genesis

Olson (1965) argued that heterodox and complex societies see the rise of sectional conflicts that aim to grab public resources to their advantage. Alesina et al. (2016) discovered that ethnic fractionalisation can reduce the accountability of politicians, which in turn leads to less effective public goods provision, including the protection of forests. Easterly (2001) nevertheless found good quality institutions reducing such sectional conflicts of ethnic groups. Moreover, Haseth et al. (2023) found that homogenous societies showed the largest degree of a desire for a democratic society while increased fractionization and especially increased polarization is associated with a smaller desire. Bluedorn (2001) presents empirical evidence suggestive of democracy's positive role in reducing the negative growth effects of ethnic diversity. Endogeneity problems may, however, place inherent limitations on policy implications. We extend this literature of conflict and conflict resolution by comparing the effectiveness of policies and institutions in assuring the share of different ethnic groups by employing a simple but strategic cooperative model of ethnic groups in which redistribution of shareable surplus is the primary argument. For empirical verification of preference revelation for policies and institutions in this paper, reduction in income inequality and control of corruption are taken to represent economic and social policy and legal property rights and democracy are economic and political institutions, respectively.

We presume that the visibility of benefits to ethnic fractions emanating from the different channels of redistribution is vital and is expected to determine their share in the divisible pool that would dampen the adverse effects of ethnic diversity on labour supply decisions and economic growth. We invoke the economic theory of incomplete contracts in which unforeseen contingencies and lack of observability and renegotiation outlets may assume special significance in comparative sharing strategies (Maskin and Tirole, 1999; Tirole, 1999). It is probable that cooperative behavior may emanate if the benefits from policies and institutions are visible *ex post*. For instance, groups and communities may prefer public health institutions offering direct and greater benefits in the short run than educational policies yielding returns in the long run. What is instructive is that policy as against institutions is a law encompassing regulation, procedure, administrative action, incentive, or voluntary practice of governments and other institutions. As Mark Considine (2005) states, “Policy making can best be seen as a form of intervention into specific and social and cultural contexts, and not as an engineered solution to universal problems”. Policies therefore by construction are broad indicators of sharing possibilities and may not carry commitment devices to ensure their credibility. Institutions, on the other hand, are the formal and informal rules and norms that organise social, political and economic relations (North 1990). Institutions, thus, can be thought of as technologies that more visibly carry commitment and allow society

and individuals to engage in the pursuit of long-term goals, even in the face of changing circumstances (Aysan, 2005). Alesia and La Ferrara (2002) show that in American cities, individuals living in more racially fragmented communities have a lower propensity to trust other people, but they do not exhibit lower levels of trust towards institutions. So, in terms of visibility of benefits and in turn preference for channels, institutions may seem to be more effective than policies and deserve empirical verification.

This paper contributes to the literature at cross-country level in the following ways. First, we employ a simple cooperative labour market model of ethnic diversity in which the reduced form of the model shows that income-maximizing individuals would assign greater weight on sharing the surplus rather than individual wage bills. Unlike in the earlier studies with ad hoc choice of channels, an attempt is made in this paper to develop a formal labour market framework in which an account is taken of the possibility that individuals tend to behave differently as an individual unit of labour pool but may cooperate as a member of a group or community. Second, the identification of channels is based on an empirical verification of the relationships between ethnic diversity and channels and between channel and labour supply resulting in growth. Third, the behavioral dimensions are analyzed for developed and developing countries separately to ascertain whether levels of development get manifested in preference revelation. Fourth, different measures of ethnic diversity

are employed for aggregate sample and separately for developed and developing country samples. This works as robustness checks along with tests for endogeneity using innovative Lewbel (2012) technique and three-stage least squares (3SLS) method.

The rest of the paper is organized as follows. We first elaborate the cooperative model of ethnic divisions and growth with potential channels of transmission contributing to the sharing of the divisible pool and eliciting positive and negative response. The next part describes our empirical modelling and estimation strategy involving identification of channels and disentangling direct impact of ethnic diversity on growth from the total impact. A discussion of pooled OLS results emanating from various measures of ethnic fractionalization follows. Subsequently, sensitivity checks employing alternate country samples and simultaneous estimation methods (Lewbel and 3SLS) are conducted. Lastly, we conclude with some implications for policy and future research.

2. A simple model of cooperative behavior and ethnic conversance

In a cooperative framework, individuals in different groups and communities would compare the benefits and costs of social harmony and conflict and would like to ensure their economic position in the distributive politics and governance before taking economic or extra-economic decisions. Given the biological nature of the human resource, it can be assumed that humans are by nature cooperative in a group

subject to constraints, namely market forces and social factors. Rubin and Somanathan (1998) argue that pressures arising from conflict and competition between groups would have provided evolutionary incentives in the Darwinian sense for individuals to be able to cooperate in groups with others, which in turn depends on the ability to avoid cheating, or defection in a prisoner's dilemma setting. Furthermore, this selection pressure can explain human abilities to form large extra-familial and extra-ethnic groups utilizing skill differences for productive activity. Fearon and Laitin (1996) explain how in the spiral equilibrium in a game setting, the disputes between individuals are correctly expected to spiral rapidly beyond the two parties, and fear of this induces cooperation on the equilibrium path. Gangopadhyay and Nath (2001) discuss conditions for grand coalitions eliciting cooperation in a local legislative assembly represented by three diverse groups. The threat that two other groups may club together induces each group to converge and maximize the benefits through the provision of public goods.

Heyer et al. (2002) discuss the efficiency, equity and welfare dimensions of group behavior and growth and find that most obstacles to cooperation among groups stem from market forces resulting in adverse impacts on different ethnic groups and growth. Keefer and Knack (2002) argue that trust is more pronounced, *ceteris paribus*, when incomes are more equally distributed. Desmet et al. (2009) show that redistribution by the government is lower in countries having higher levels of

linguistic diversity, thereby emphasizing redistribution channel. Similarly, lower level of social trust is witnessed in more fractionalized societies; this effect however is less severe in higher income and non-African countries (Wang and Steiner, 2015). In an interesting paper, Alesina et al. (2016) documents that the negative correlation between ethnolinguistic fragmentation and development in previous works weakens considerably when we account for ethnic (income) inequality suggesting that it is the unequal concentration of wealth across ethnic lines which is detrimental for development rather than diversity *per se*. This would imply that the positive effects of functional policies and institutions may highlight the positive effects of skill, educational and cultural differences of human resources.

We employ the following cooperative framework to model the behavior of ethnic groups. Given the growth and labour supply function $Y = (L, K)$; $L = (y)$

where Y denotes total output, L and K are labor and capital respectively, and labor supply depends on y , that is, per labor income.

Following Laidler and Estrin (1989), it is postulated that in a cooperative environment, each member of the (ethnic) group is expected to maximize his/her income (y), that is,

$$\text{Max } y = w + (Y - wL - rK) / L$$

where w is wage rate, wL is wage bill, rK is share of capital, given rate of return, r and wage payment, w . After manipulation, we get

$$y = (wL + Y - wL - rK) / L$$

$$\Rightarrow (Y - rK) / L = s_i$$

where s_i is share of i^{th} individual in an ethnic group in total output. Now, for the supply of work effort to produce growth, wage rate is not relevant, it is sharing of total output that is more important. At the macro level, individual share will rise with ethnic group share (s_i^*) in total output and the following relationships will hold:

The total growth and labour supply effect of ethnic diversity, $EF^*(g)$ is now given by

$$EF^*(g) = EF(g) + s_i^* \cdot EF(g)$$

where $EF(g)$ is growth due to ethnic diversity of labour force, call it *direct effect*, $s_i^* \cdot EF(g)$ is *indirect effect* and represents growth due to channels determining shares of ethnic groups in total divisible pool. After controlling for $s_i EF$,

$$\partial g / \partial (EF) < 0$$

This would imply that if we ignore the ethnic group preference for redistribution through policies and institutions, the effect of heterogeneity on growth is negative.

The important relationships can be summarized as follows:

$$\partial g / \partial L > 0; \partial L / \partial (s_i * EF) > 0$$

$$\partial g / \partial (s_i * EF) > 0 < 0$$

The emerging implications of this model are empirically verified in the following sections.

3. Empirical strategy

The reduced form of the model is:

$$Gr_{it} = \alpha_1 + \beta_1 \ln Y_0 + \sum \phi_{1jit} X_{jit} + \theta_1 ETHNIC_i + \mu_{1it} \quad (1)$$

where Gr_{it} is average growth of real GDP per capita (at constant 2010 prices) of country in period t ; and $\ln Y_0$ is natural log (ln) of per capita income in the initial year of each five-year sub-period starting 1960 to 2014. Our sample includes 132 developed and developing countries including transition economies. The set of X variables that ethnic diversity does not use as transmission channels for growth include the ratio of investment to GDP (INV), years of schooling (ln SCHOOL), and the pool of economically active population (ln POPEa). ETHNIC is our measure of ethnic diversity which focusses on ethnic and linguistic fractions as well as cultural diversity. Since equation (1) does not include the transmission channels, the coefficient θ_1 captures the total effect of ethnicity on economic growth. It is worth noting at this stage that investment and schooling have been tested as potential transmission channels for ethnolinguistic fractionalization on growth without yielding significant results in the recent literature (Montalvo and Reynal-Querol, 2005; Gören, 2014). Conversely, these researchers find that polarization with inherent conflict dimension (not the focus of our paper) rather than fractionalization uses the channel of investment to reduce growth rate.

In the next stage, we augment the baseline equation with the transmission variables having additive impact on growth as follows:

$$Gr_{it} = \alpha_2 + \beta_2 \ln Y_0 + \sum \phi_{2jit} X_{it} + \theta_2 \text{ETHNIC} + \sum \pi_{kit} TC_{it} + \mu_{2it} \quad (2)$$

TC in equation (2) represents ‘k’ potential transmission channels for ethnicity. We consider legal structure and security of property rights (P_RIGHTS), transparency / control of corruption (C_CORR), democracy (DEM) and income distribution (EQUALITY). The coefficient θ_2 on ETHNIC captures the direct impact of ethnic diversity on growth. The aggregate indirect impact of ethnic diversity using the different transmission channels may be derived as the difference between the total impact (θ_1) and the direct impact (θ_2).

For the identification of transmission channels, there should be a significant association between the transmission channel and ethnic diversity, and a significant relationship between the transmission channel and growth. To test the first condition, for each channel, we estimate the following model hypothesizing that θ_3 is significantly different from zero.

$$TC_{it}^k = \alpha_3 + \beta_3 \ln Y_0 + \theta_3 \text{ETHNIC}_i + \mu_{3it} \quad (3)$$

To begin our empirical investigation, we use the ordinary least squares procedure with pooled data (POLS) to assess the validity and effects of the four channels of transmission. The channel variables in the growth equation are measured at the beginning of each sub-period to avoid the endogeneity problem. The estimation of

total effect from the baseline model (eqn. 1) spans over years 1960-2014. Due to long time horizon, ethnicity may be endogenous causing bias in the estimates. We address this problem in our sensitivity analysis using the 3-stage least squares (3SLS) method. Nevertheless, endogeneity of ethnic variable is less likely to affect our estimates of direct effect, that is, when all four transmission variables are included in the growth model. This is due to constrained observations on corruption starting from period 1995 onwards. As noted by Alesina et al. (2003), ethnic diversity is not likely to be endogenous as it changes in the long run. Moreover, Gershman and Rivera (2018) in their study on some African economies observe persistence of subnational ethnic divisions over time that appears unresponsive to regional economic performance.

We use various measures of ethnicity developed in literature to test the robustness of the results and ascertain whether some aspects of ethnic divisions e.g., ethnic vs. linguistic vs. cultural diversity matters more than others. Additional sensitivity tests include tackling endogeneity of investment in the growth model. The innovative Lewbel (2012) technique is employed to solve the identification problem in a structural model and endogeneity. Identification requires a heteroscedastic covariance restriction that is apparent in some panel data, simultaneous relationships or models involving measurement errors. The Lewbel approach resolves the identification issue by assuming heteroscedastic error terms. After defining

appropriate instrumental variables to formulate sample moment conditions, the parameters of interest are identified and estimated using the Generalized Method of Moments (GMM) technique. In another round of sensitivity check, we disaggregate ethnic effects according to the level of economic development of countries. These estimates would also provide interesting insight into whether channels in developing economies differ from those of high-income nations. Finally, 3SLS methodologies are employed to address the endogeneity of both investment and ethnicity. A comparison of growth impacts of ethnicity and important transmission channels emerging from all these approaches highlights the stability of our findings.

4.1 Variables used and sources of data

The variables used, sources of data and summary statistics are presented in Appendix A. We experiment 7 measures of diversity capturing ethnic, language and cultural dimensions, namely Montalvo-Querol (2005) ethnic fractionalization index (denoted as `m_ethfrac`); Alesina et al. (2003) measures of ethnic and language fractionalization (`al_ethnic` and `al_lang`, respectively); Fearon's (2003) ethnic fractionalization index (`fe_etfrac`) and cultural diversity index (`fe_cultdiv`) that uses a measure of the structural relationship between languages to take into account the cultural distance between groups; ethnolinguistic fractionalization in 1985 (`r_elf85`) from Atlas Mirova reported by Roeder (2001). As additional robustness test, we also use the Montalvo-Querol (2005) polarization measure (`m_ethpol`).

5. Empirical Results and Discussion

Legal structure and security of property rights

Panel B of Table 1 (estimation results with authors) shows a highly significant and positive impact of legal structure and security of property rights (P_RIGHTS) on growth in all regressions except the one where polarization is used as measure of diversity. Interestingly, the coefficients on ethnic fractionalization have reduced significantly to an average of -1.45 (as compared to -1.97, that is, the magnitude of the total effects. Similarly, coefficients on language diversity and cultural diversity are also lower: -1.32 and -1.21, respectively vs. the total effects of -1.46 and -1.38. Thus, the property rights channel appears in consonance with postulated expectation. In other words, the visibility of benefits looks clear and ethnic groups seem to consider this channel as an instrument that play an important role in sharing the divisible pool. The existence of this transmission mechanism obtains additional support from the identification test, where significant (negative) impact of all ethnicity measures on P_RIGHTS is evidenced. Ethnic divisions tend to reduce the effectiveness of property rights in attempts to extract rents for own groups. Nevertheless, higher level of property rights would foster a more cooperative environment between groups conducive to investment and economic growth due to perceptions of credible security of benefits, enforceable contracts (Keefer and Knack, 2002), increased cost of cheating and defection (Rubin and Somanathan,

1998), protection from ‘unfair’ market practices (Heyer et al., 2002), and equitable judgement from the judiciary. In such scenario, the adverse effects of ethnicity on growth are dampened substantially but not totally overpowered. Negative effect of ethnicity on growth persists in the presence of P_RIGHTS (Panel B). When the grand specification includes all four channels, property rights generally retain significance, while negative growth impact of ethnicity is greatly reduced or neutralized. Thus, the channel would seem valid and effective.

Participatory democracy

In Panel D of Table 1, the indirect growth impact of ethnic diversity using the democracy channel is investigated. As in the case of legal property rights, we obtain positive effect of democracy on economic growth in all specifications while ethnic diversity maintains a significant negative sign on its coefficients with an average magnitude of -1.59 for the ethnic fractionalization measures, -1.27 for language diversity and -1.35 for cultural diversity. In the augmented growth specifications in Table 2, the significance of the democracy channel on growth subsists. Reduced impact of ethnicity fractionalization on growth in the presence of democracy has also been evidenced by previous research (e.g. Collier, 1999, 2000; Alesina and Ferrara, 2005) although these studies do not formally test the identification condition establishing the validity of the channel. Predominantly significant impact of

ethnicity on democracy (4 cases out of 7) is obtained lending support to democracy as transmission mechanism.

It is generally perceived that embedded in democracy are institutional checks that constrain unconstitutional use of political powers, promote political competition, restrain rent seeking / corrupt behavior of officials and promote higher rule of law and enforcement of contracts. There is considerable evidence that democracy also improves the provision of public goods relative to an authoritarian regime possibly indicating higher levels of cooperation amongst groups and higher levels of rule of law in democratic environment (Olken, 2008; Keefer and Khemani, 2005). Some evidence moreover indicates that the growth dampening impact of ethnic diversity gets moderated if countries are at higher income level with diversified production structure (Alesina and La Ferrara, 2005), and if they are blessed with quality institutions, particularly participatory democracy (Collier, 2000; Easterly 2001; Alesina and La Ferrara, 2005). The latter finding however is subject to controversy. Bluedorn (2001), for instance, does not obtain strong evidence in support of the positive impact of democracy in ethnically diverse societies.

Control of corruption

Control of corruption (C_CORR) as potential channel for ethnicity does not emerge robustly as with the institutional routes. When adding C_CORR to the baseline model (Panel D of Table 1), significantly positive effect of transparency on growth

is evidenced in 4 out of 7 specifications ($m_{ethfrac}$, al_{lang} , r_{elf85} and m_{ethpol}). Interestingly, in first three of these growth regressions, the magnitude of the coefficient on ethnicity is substantially reduced as compared to total effects estimates in Panel A (Table 1). Elsewhere, both ethnicity and transparency are typically in significant. Nevertheless, identification tests conducted in Table 3 reveal general adverse impact of diversity on transparency. Moreover, while controlling all posited transmission channels, C_CORR shows weak but significant impact on growth (at 10-12%) in regressions 2-5. Altogether, we find some indication that groups may use the transparency channel to improve their share in divisible pool.

It is important to note that while rent-seeking is higher in countries with greater fragmentation, Yehoue (2007) empirically establishes that corruption occurs through ethnicity, which appears as a rent-extracting technology in a democratic society. Extending the model into a dynamic framework, the author finds that this technology of extraction operates only at the early stage of democracy and that its impact tends to phase out as democracy matures. Cerqueti et al. (2007) show that a non-linear relationship between fractionalization and corruption exists: corruption is high in homogeneous or very fragmented countries, but low where fractionalization is intermediate. Consequently, the relationship between fractionalization and growth rate is also non-linear: growth is high in the middle range of ethnic diversity, low in homogeneous or very fragmented countries.

Low effectiveness of the control of corruption channels in divided societies along ethnic lines can be attributed to coordination and cooperation problems with increased transaction costs. This would be compounded in countries with insufficient infrastructural development or supporting institutions, characterizing many developing countries. Thus, people may feel compelled to resort to corruption to reduce transaction costs (time) while conducting business even when reform measures are in force. The argument is that an inefficient bureaucracy may constitute an impediment to investment that some “speed” or “grease” money may help circumvent. In a nutshell, the “grease the wheels” hypothesis states that graft may act as a trouble-saving device thereby raising efficiency, and hence investment, and eventually growth (Méon and Sekkat, 2005). This situation may effectively emerge when government regulation acts as a drag on investment and enterprise. It may happen when reform actions by governments entail more regulation rather than provide incentives and facilitation. In a recent article, Holcombe and Boudreux (2015) argue that the regulatory state rather than productive or distributive state would be associated with corruption. In other words, control of corruption loaded with more regulation may be growth-retarding. The authors also argue that bigger size of government may give opportunity to engage in more corruption. Erickson and Hill (2007) discuss extensively the lack of effective corruption control measures

in many countries due to failure of implementing agencies with very few exceptions such as Singapore and Hong Kong.

Reducing income inequality

Table 1 (Panel E) tests for improved income redistribution as likely channel to mitigate the constraints posed by ethnic divisions on growth. Surprisingly, both ethnic divisions and income redistribution enter insignificantly in the growth models. The insignificance of equality channel persists in the expanded specifications including all the channels and where some measures of ethnicity display significant growth impact. Do these findings invalidate income redistribution as a transmission channel? To establish the effectiveness of income distribution policy as an important channel for improved ethnic income distribution, there should be significant positive links between them. From Table 3, robust significant negative association between the measures of ethnic fractions and income equality is obtained supporting Becker (1957) who argues that individuals generally have strong feelings of empathy toward their own group so that countries with greater degree of fractionalization would exhibit lower levels of redistribution.

While the evidence generally indicates a negative association between ethnolinguistic fractionalization and redistribution, this finding would appear sensitive to alternative measures of diversity (Desmet et al., 2009, 2012) and to the

inclusion of controls (Alesina et al., 2003). Sturm and Haan (2015) find that the impact of ethno-linguistic fractionalization is conditional on the level of economic freedom: a country with high degree of fractionalization will have less income redistribution, while capitalist countries with low degree of fractionalization have more income distribution. Alesina and Ferrara (2005) show how redistributive policies are deeply affected by racial politics. In more racially fragmented communities, people are less willing to redistribute income because the white majority feels that redistributive flows would favour a racial minority. Survey evidence suggests that those respondents who express attitudes less favorable to racial integration and are more averse to government intervention on redistributive matters. Moreover, Alesina et al. (2016) have obtained that ethnic income inequality is weakly correlated with the standard measures of income inequality (here Gini, for instance) and only modestly correlated with ethnolinguistic fractionalization, polarization, and segregation. The progressive distribution of total income across income groups does not ensure improved income distribution across ethnic groups. Given that income distribution in ethnically diverse societies does not significantly impact growth in our findings (Tables 1 and 2), we may derive the following possible messages: (i) overall improved income distribution may not be perceived as channel for containing uncooperative and counter-productive behavior by ethnic groups because these benefits may accrue to richer segments of ethnic groups (vertical

ethnic inequality), or (ii) income equality may not adequately reflect inequality between ethnic fractions (horizontal inequality). Our empirical results that redistribution policy is not significant in our estimations may therefore contribute to the contention that conventional channel of income redistribution may not be as effective as a targeted policy having visible linkages for reducing ethnic income inequality.

6. Accounting for level of economic development

The baseline and augmented growth models are re-estimated by applying the Lewbel methodology on sub-samples of developing economies (LDCs) and **developed** ones (DCs), identified according to World Bank 2016 classification. First, when analyzing growth impacts of ethnicity, we observe that (i) total effect of ethnicity in LDCs is significantly higher in magnitude than in aggregate/world sample and DCs; (ii) weak total effect of fractionalization prevails in DCs where language and cultural diversity do not appear to matter; (iii) estimated direct effect of all ethnicity measures in LDCs is significant (except polarization) and exceeds estimates in world sample; and (iv) all ethnicity variables in DCs do not display significant direct impact on growth. One can conjecture that greater sophistication in the operations of developed economies minimizes cultural, language and ethnic barriers to growth of output. Developing countries, on the other hand, face the brunt of economic and social costs posed by different fractions and political compulsions. Overall, findings generated

using the aggregate sample would appear to be driven significantly by the dominant relationships existing in LDCs.

As regards channels of transmission, property rights and democracy appear relevant in LDCs for moderating the economic and social costs due to ethnic fractions and improving their share in the divisible pool while transparency (reducing corruption and income redistribution are statistically insignificant. In upper-income nations, ‘P_RIGHTS’ predominates as transmission channel and effectively overpowers ethnicity effects. Interestingly, democracy loses its force in mitigating the negative effects on growth. Democracies may create more ethnic cleavages on the issue of public goods provision as competition between political groups increases (Eifert et al. 2010; Posner, 2004), which may find more relevance in developed countries. Contrary to the POLS findings, however, transparency does not seem to be significant growth promoting in all samples. Thus, control of corruption as a channel does not seem robust.

7. Robustness tests: Lewbel (2012) IV-GMM approach

Additional sensitivity checks on our results are conducted in three ways. First, we address the endogeneity of investment using the Lewbel (2012) IV-GMM approach. The attractiveness of this technique is that it tackles both endogeneity and identification issues in simultaneous systems by assuming heteroscedastic errors. The method identifies the structural parameters through imposing a heteroscedastic

covariance restriction on the disturbances that is a feature of many models of endogeneity or mismeasurement. Furthermore, the GMM technique is simultaneously capable of solving the endogeneity problem if sufficient additional instrumental variables are provided to create valid moment conditions. We use the Lewbel approach combining both internal and external instruments generated by STATA 15 econometric software to increase the predictive power of our instruments (Baum and Schaeffer, 2013; Baum and Lewbel, 2019) and obtain robust estimators. Second, we disaggregate the sample according to countries' level of income (developed and developing) in order to ascertain whether average behavioral patterns are evenly distributed across these samples. Here again Lewbel method is used, investment being endogenous. Third, we relax the assumption that ethnicity is exogenous. It is good to note that Lewbel technique cannot be applied in a simultaneous system with more than 2 endogenous variables. In this case, 3SLS estimators are generated assuming growth, investment and ethnicity are endogenous. Earlier estimates of total effect of ethnicity may be biased due to probable endogeneity of ethnic over the long-time horizon (over 3 decades). As noted earlier, estimates of direct effect would be less affected by endogeneity since the time horizon is conditioned by availability of information on all the channels, starting from 1995 onwards. Ethnic diversity in our analysis is typically measured close to year 2000 (Alesina et al., 2003; Fearon, 2003; Montalvo and Reynal-Querol, 2005)

except for ELF, which relates to year 1985. While we do not report the detailed 3SLS results due to space limitation, a synthesis of the results from all methods and relevant channels of transmission is undertaken.

7.2 Testing endogeneity of ethnicity and synthesizing the results

The estimates generated above would still be biased if ethnicity is endogenous in the system. To address this possibility, we develop a simultaneous system where growth, INV and ethnicity are endogenous. Growth models are as specified in Section 4. Investment is posited to be a function of growth, and a series of variables not included in the growth model, namely lagged investment and trade volume, initial tertiary education completion rate, latitude (absolute value) and terrain ruggedness. Determinants of ethnicity function include growth, regional dummies, land area (or share of arable land), and latitude. The full 3SLS results are not reported. What is more instructive is a comparison of total and direct ethnicity effects estimators generated by 3SLS, Lewbel and POLS summarized in Table 7 along with findings on significant transmission channels.

Table 8. Summary of ethnicity effects and channels by estimation method and income category

	m_ethfrac	al_ethnic	al_lang	fe_etfra	fe_cultdiv	r_elf85	m_ethpol	Sig. Channels
POLS: Aggregate sample								
TE	-2.01***	-2.68***	1.46***	-1.79***	-1.38**	1.39***	-0.60	P_RIGHTS, C_CORR (weak) & DEM
DE	-1.16**	-1.16**	-0.57	-0.66	-0.70	-0.86*	0.22	

**Lewbel IV GMM (INV
endog)
Aggregate**

TE	-1.97***	-2.62***	-	1.23***	-1.92***	-1.30**	-	1.25***	-0.63	
DE	-1.14**	-1.08**	-0.53	-0.79*	-0.71	-1.01**	0.15			P_RIGHTS & DEM
LDC										
TE	-1.77***	-2.73***	-	1.43***	-1.58***	-1.64**	-	-1.46**	0.47	
DE	-1.32*	-2.05***	-0.85*	-1.25**	-1.06*	-1.41**	0.22			P_RIGHTS & DEM
DC										
TE	-0.91	-1.50**	-1.16+	-1.40*	-1.18	-0.63	-1.03*			
DE	-0.22	1.04	1.29	0.53	0.58	0.25	-0.40			P_RIGHTS
3SLS (INV and ethnic diversity endogenous) Aggregate										
TE	-2.86***	-3.33	-	1.57***	-3.01***	-2.75***	-	3.26***	-3.20***	
DE	-1.12*	-1.23***	-0.79	-0.7	-0.81	-1.57**	-1.16			P_RIGHTS, C_CORR (weak) & DEM
LDC										
TE	-3.02***	-4.02***	-1.20**	-3.14***	-3.07*	-2.29**	-1.57			
DE	-1.70*	-1.68***	-0.75**	-1.08**	-1.03**	-	1.62***	-1.04		P_RIGHTS & DEM
DC										
TE	-2.28***	-3.15***	0.10	-2.80**	-2.58***	-	2.12***	-2.35***		
DE	0.61	1.32	1.95	-1.30	1.07	1.14	0.07			P_RIGHTS & DEM

Source: Computed. * p<0.10, ** p<0.05, *** p<0.01

Notes: Lewbel estimators assume investment is endogenous, 3SLS estimates produces estimates using structural models where both investment and ethnic diversity are endogenous. TE: Total effect; DE: Direct effect (controlling for all transmission channels).

In the world sample, irrespective of estimation procedure, significant total impact of ethnicity on growth is evidenced in all specifications, except the one with polarization. In the presence of potential transmission channels, the direct impact of ethnicity vanishes or is substantially reduced, depending on ethnic measures tested.

Conversely, LDCs are characterized by persistent direct negative growth impact of ethnicity. The magnitude of ethnicity effects in LDCs typically exceeds those in aggregate sample and DCs. Estimates of total effect in the latter are sensitive to estimation method and ethnic measures used. Overwhelmingly, however, ethnic fractions cease to have direct effect on growth in these high-income nations when controlling for the channel variables. Thus, the research findings at the aggregate (world) level seem strongly influenced by mechanisms existing in developing countries.

Coming to the transmission channels, in the world sample, irrespective of estimation strategy used, both property rights and democracy appear successful in dampening negative ethnicity impacts on growth. Interestingly, POLS and 3SLS estimates also indicate transparency as weak transmission mechanism (at low levels of significance and sensitive to ethnicity measures used) unlike the Lewbel approach. In LDCs, property rights and democracy are important channels for moderating economic and social costs due to ethnic fractions and improving their share in the divisible pool while transparency and income redistribution are statistically insignificant. In developed countries, property rights channel predominates (3SLS and Lewbel) and democracy is left behind. From the 3SLS findings, democracy loses its relevance in these nations as transmission channel.

8. Conclusion and some policy issues

The empirical results generated from our model structure establish that total effect of ethnic diversity on growth is invariably negative. While the direct and indirect effects bear positive sign, the magnitude of these effects is overwhelmed by the negative total effects. The channels that are expected to reduce the negativity of these effects differ in terms of their effectiveness as a sharing instrument. Legal property rights, democracy and control of corruption (weak) as institutional channels are effective but income redistribution as policy tool loses its significance in direct effect estimations. These results are firm after mitigating endogeneity problem and undertaking robustness tests. But while checking the endogeneity of investment in growth equation, the coefficient on control of corruption becomes insignificant. The institution of legal property rights and democracy comes out very clearly to show the visibility of benefits to ethnic groups having consequences for growth.

These findings may contribute to the contention that institutions are more effective than policies in conveying the visibility of benefits to ethnic groups. That is, policies seem to offer broad guidelines and institutions that are created to implement policies are close to the reality. The insignificance of control of corruption can be attributed to reform actions by governments that entail more regulation rather than provide incentives and facilitation. In other words, control of corruption loaded with more regulation resulting in failure of implementing agencies may be growth-retarding. Similarly, an overall improvement in income distribution may not ensure improved

income distribution across ethnic groups that would be necessary for cooperation and growth promoting outcomes. This would imply that lower strata of ethnic groups may not be connected to benefits, which reduces the effectiveness of redistribution channel.

It would appear from the above results that legal property rights channel outperforms that of democracy channel except in the case of groups categorized in terms of language differences. This finding would further imply that while democracy may tend to assure their share in divisible pool, its visibility is apparently lower than that of legal property rights. While property rights and democracy appear to satisfy this condition, control of corruption seems to be weak, and redistribution variable is insignificant. These results may be interpreted to mean that institutional channels (legal property rights and democracy) are apparently more effective than policy channels (redistribution and transparency). The general findings in this study would tend to support increased cooperation between groups in more democratic settings probably due to perceptions of greater and fairer opportunities in getting a share of benefits of the common pool. While political competition can accentuate ethnic divisions, the costs of strife are also higher in democracies in terms of loss of opportunities, trust and hence magnitude of expected gains. The upshot of the discussion is that visibility of benefits is greater in institutional channel than in

policy channel. Design of policies may be necessary but not sufficient conditions for engendering proactive labor supply decisions.

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Appendix

Table A.2.: Summary statistics and sources of data

Variable	Obs	Mean	Std. Dev.	Definition	Source of data
Growth	1,223	2.10	3.43	Real growth rate per capita (2010)	World Bank (2017) UN Statistics reproduced by Dahlberg et al. (2018)
INV	1,159	22.01	7.46	Share of investment in GDP.	World Bank (2017)
lnY0	1,190	8.23	1.55	ln Initial income	World Bank (2017)
ln PO _{Pea}	1,335	15.38	1.67	Economically active pop. ages 15-64	World Bank (2017)
lbl_asy15mf	1,335	1.59	0.72	ln average years of schooling	Barro and Lee (2013)
P_Rights	853	4.98	1.87	Legal Structure and Security of Property Rights. Index ranges from 0-10 where 10 measures highest “degree of judicial independence”, “trusted legal framework exists”, “protection of intellectual property”, “no military interference in rule of law”, and “integrity of the legal system”. (Years available: 1970 -2015).	Dahlberg et al. (2018)
C_CORR	390	45.48	23.35	Transparency International Corruption Perceptions Index. ranges between 10 (highly clean) and 0 (highly corrupt). (Years available: 1995 -2015).	Dahlberg et al. (2018)
DEM	1,266	1.40	7.50	Polity IV Project Level of democracy. Ranges from +10 (strongly democratic) to -10 (strongly autocratic). (Years: 1960-2017).	Dahlberg et al. (2018)
EQUALITY	522	59.51	9.58	Initial income equality (measured at/close to start of period). Computed as 100-Gini.	Computed from Gini reported in World Bank (2016)
m_ethfrac	1,150	0.44	0.28	Ethnic fractionalization	Montalvo and Querol (2005)
m_ethpol	1,150	0.51	0.24	Ethnic polarization	

al_ethnic	1,321	0.44	0.26	Ethnic fractionalization	Alesina et al. (2003)
al_language	1,283	0.38	0.29	Language fractionalization	
fe_etfra	1,256	0.45	0.27	Ethnic fractionalization	Fearon (2003)
fe_cultdiv	1,249	0.29	0.21	Cultural diversity	
r_elf85	729	0.45	0.28	Ethnic fractionalization	Roeder (2001)
					La Porta et al. (1999) and
Latitude	1,335	0.29	0.19	Latitude (absolute value)	CIA (2018)
					Barro and Lee (2013)
bl_lhc_15mf	1,335	4.31	4.92	Tertiary schooling completion rate	World Bank (2017)
ln Area	1,335	12.05	2.09	ln land area	
ln Arable					
land	1,335	2.26	1.20	ln share of arable land	
Tropical	1,335	39.40	44.79	Percent of country in tropics	Nunn and Puga (2012)
Rugged	1,335	1.24	1.09	Terrain ruggedness index	
LDC	1,335	0.66	0.47	Developing countries	Work Bank (2017)
UIC	1,335	0.34	0.47	Upper income countries	