Ethnic fractionalisation, migration and growth

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Abstract   This paper has the aim of contributing to the existing research by analysing two particular topics. First of all, we show that the model specifications by Alesina et al. (J Econ Growth 8:155–194, 2003), which connects high ethnic fractionalisation to lower growth via bad policy variables, cannot fully explain the negative ethnic fractionalisation effect of the 1990s Sub-Saharan African growth experience. Moreover, we show that the remaining negative effect of ethnic fractionalisation on growth in Sub-Saharan Africa in the 1990s is due to an increased importance of adverse governance. Second, and on a very different note, we empirically investigate if ethnic fractionalisation might have a positive effect in a nation which is ethnically diverse due to immigration. There is evidence that it is important to distinguish between these two different kinds of ethnic fractionalisation.

Keywords   Growth · Ethnic fractionalisation · Migration · Cross-country regression

1 Introduction

A wide range of studies have found robust evidence for the negative effect of high ethnic fractionalisation on long-run growth in a cross section of countries. This growth-diminishing effect of ethnic fractionalisation has been found to be operating through an adverse policy environment and the suboptimal provision of public goods (Easterly and Levine 1997; Easterly 2001a,b; Alesina et al. 2003). However, the channels through which ethnic fractionalisation has an impact on growth have been analysed only

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partially by these studies. Furthermore, the impact of ethnic fractionalisation on economic progress might be far more complex than the existing empirical studies would suggest. For this reason this paper intends to extend the existing analyses.

First of all, it seems reasonable and desirable to update the data set used by Alesina et al. (2003) into the 1990s to analyse the robustness of their results in a wider time range. Interestingly, we find a prevailing negative direct effect of ethnic fractionalisation on growth after the inclusion of the 1990s, despite the inclusion of policy control variables. Hence, we apply decade- and region-specific regressions, as well as a region-specific ethnic fractionalisation interaction term, in order to identify whether this result is driven by decade- or region-specific effects. We find that the growth-hampering impact of ethnic fractionalisation remains only in the 1990s and in Sub-Saharan Africa once the policy framework of Alesina et al. (2003) is controlled for. Moreover, we show that this 1990s effect vanishes if we implement the Kaufman–Kraay–Zoido-Lobaton-indicator of governance in the existing model framework of Alesina et al. The specific Sub-Saharan effect of fractionalisation, instead, shows an indirect effect via public investment on growth and not via governance *per se*. In line with recent research on violent conflict (Montalvo and Reynal-Querol 2005), we cannot confirm the hypothesis that the remaining negative impact of ethnic fractionalisation is due to violent conflicts. Thus, our results indicate that the original model specification by Alesina et al. (2003), which connects high ethnic fractionalisation to lower growth via bad policy variables, cannot fully explain the negative ethnic fractionalisation effect of the 1990s Sub-Saharan African growth experience.

In addition, it might be the case that the alleged negative effect of ethnic fractionalisation on growth, described above, is possibly mitigated by positive effects prevailing in multi-ethnic societies. In particular, there is a large body of literature which suggests that the existence of co-ethnic networks has a large positive impact on trade and, thus, on growth. The theoretical argument is that immigrants have an informational and trust advantage in arranging trade with their home countries over their local counterparts (Epstein and Gang 2000; Casella and Rauch 1997; Rauch 2001). Co-ethnic networks are also found to promote foreign direct investment (Tong 2005). Hence, we empirically investigate whether ethnic fractionalisation might be a positive factor in a nation which is ethnically diverse partially due to past immigration.[1] We find some indication that countries which are ethnically diverse due to past immigration can mitigate the negative impact of ethnic fractionalisation on growth. We are the first, to our knowledge, to distinguish between these two different kinds of ethnic fractionalisation in order to determine whether the result empirically indicates this multi-dimensionality of ethnic diversity. We find the positive effect, but we cannot confirm the trade and foreign direct investment hypothesis.

This paper is structured as follows: Sects. 2 and 3 will focus on the existing theoretical consideration and empirical research which has been produced so far. This is followed by a brief discussion of our data and methodology in Sect. 4. Then we shall

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[1] More specifically, we classify a country as an immigration country if it was characterised by settlement from a non-neighbouring country, forced or free, within the past 300 years and the descendants of foreign settlers constitute a significant part (at least 5%) of the population today.

present and discuss our results in Sect. 5. In Sect. 6 we identify potentially interesting future research questions and conclude.

2 Theoretical framework

There are two different strands of literature, one of which suggests that ethnic diversity is harmful to growth and another which suggests the opposite.

Zak and Knack (2001), for instance, argue that high ethnic diversity increases the social distance between groups, which in turn reduces the amount of trust in a society. Due to the significant information and enforcement problems in many (particularly risky) economic transactions, lack of trust will reduce the amount of beneficial economic transactions, increase transaction costs on monitoring and enforcement and will make some contracts impossible. A related insight emerges from the literature on 'social capital' which measures the number and intensity of social interactions and linkages between members of a society and has found that social capital is potentially conducive to economic development because it favours cooperation and reduces problems due to asymmetric information. The theoretical argument is that social capital is harder to establish between divided ethnic groups in a society.[2]

Furthermore, some authors argue that ethnic diversity increases the likelihood of conflict. Collier and Hoeffler (1998) model the likelihood of a civil war as a cost-benefit calculation of potential rebels. While ethnic diversity is likely to increase the incentive to incite rebellion due to grievances (perceived and actual) experienced by individual ethnic groups, having very large numbers of ethnic groups might make the coordination of a successful rebellion difficult. Thus, Collier and Hoeffler argue that civil wars are particularly likely in ethnically polarised societies, where a few ethnic groups vie for political control.

However, not only violent, but also political conflict has been hypothesised as a channel through which high ethnic diversity negatively influences economic growth. Alesina and Drazen (1991) suggest that groups may attempt to shift the burden of economic stabilisation and reform onto other groups when stabilisation has significant distributional implications. Even though it is agreed that stabilisation requires cuts in public expenditure to eliminate the budget deficit, the distribution of the allocation of the costs is not agreed upon. The process leading to stabilisation can therefore often be described as a war of attrition, which delays stabilisation and only ends when certain groups allow the others to decide on the allocation of the burden of the fiscal adjustment. More politically polarised countries will experience longer periods of instability. In the case that different ethnic groups are also strongly politically polarised then the model also applies in the context of ethnic diversity. Similar arguments are made by Easterly and Levine (1997), who argue that high ethnic diversity leads to poor policy choices. Governments either find it difficult to agree on painful economic reforms, attempt to shift the burden to other groups, or simply try to enrich themselves as they fear that their

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[2] However, the theoretical literature on social capital also suggests that social capital slows down the transition process of development between one stage and the next and is, therefore, bad for economic growth. See Banerjee and Newman (1998), Arnott and Stiglitz (1991).

tenure might be limited due to the strong resistance of other ethnic groups. Svensson (1998) develops a game-theoretic, rent-seeking model in which groups compete for common-pool resources. Even in a repeated interaction game cooperation might not be enforceable and the groups sustain their costly appropriation efforts.

In general, political regimes in ethnically diverse countries are often found to be more engaged in inefficient "identity politics" than in more efficient "performance politics". In the former situation, a political regime or party is supported not for its performance in terms of furthering prosperity, but for being led by people from the same group, while in the latter situation economic and political performance is rewarded. As most ethnically diverse countries are diverse at the national level and relatively homogeneous at the regional level, "identity politics" persist at the national level. With these politics people are reminded of differences and therefore an environment of low trust and cooperation is built and maintained. Collier (1998) argues that loyalty to ethnically based parties is often maintained irrespective of economic performance and the government delivers patronage to the loyalists rather than services to the median voter.

A further disadvantage of high ethnic diversity is that it is believed to reduce the provision of public goods. Alesina et al. (1999) formulate a model which links the heterogeneity of preferences across ethnic groups in a city to the amount and type of public goods the city supplies. A jurisdiction with two or more polarised groups (in the sense that these groups have preferences very far away from the median) would prefer to keep taxes low and deduct resources from the public good to private consumption. This results in a suboptimal provision of the public good which is then to the detriment of all.[3]

These theories may all lead to vicious cycles of high ethnic diversity, poor economic performance and greater ethnic identification as a result since marginalised groups will build up even stronger identities in the face of poor economic performance and their social exclusion (Akerlof and Kranton 2000).

On the positive side, Lazear (1999) was one of the firsts to show that diversity can increase productivity. This effect arises because workers with different cultural backgrounds and skills are complementary. There is, however, a trade-off between the productive benefits of diversity and costs that occur due to possible difficulties in communication. Alesina and Ferrara (2004) highlighted that the benefits of skill differentiation are more likely to be higher in more advanced and complex societies. Furthermore, ethnic or linguistic diversity which is due to immigration may improve trade opportunities for a country. Immigrants form ethnic networks between their home and host country (Casella and Rauch 1997). Girma and Yu (2000) provide evidence that the trade-immigration linkage is driven by the new information brought by immigrants about their home country and not so much by existing business connections and personal contacts with their home country. This would mean that ethnic networks enhance trade between dissimilar countries. Gould (1994) describes the positive effect ofco-ethnic networks as immigrants having links to their home country, which is like

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[3] It should be noted that other forms of social distance, such as high income inequality or a geographical segregation of groups that could be unrelated to ethnic diversity, could also deliver such a result.

a human-capital externality that enhances trade opportunities (most likely between developed and developing countries). Trade is enhanced by a decrease in transaction costs to trade. Furthermore, bilateral trade flows are positively affected by the preference of immigrants for home country products. Gould (1994) finds that the trade enhancing effect is the strongest in the export sector and only a relatively small community of immigrants is needed to exhaust this effect. A relatively large community, however, is needed to exhaust the positive trade effect in the import sector. Under world-wide free-trade regime countries may, however, enjoy the benefits of homogeneity and the diversity of production through international trade. Therefore, Alesina et al. (2000) argued that countries would prefer to be more homogenous in this case.

Similarly, ethnic diversity of a country increases the attractiveness of that country to immigrants who often migrate to countries with existing networks of immigrants of the same origin. This increases the efficiency and adaptability of the labour market to economic change, and to the extent that the skills of the immigrants complement the home country population, is likely to improve the growth performance of that country. Last, ethnic diversity might be seen as beneficial, because it increases the variety of products on offer in a country. As much of trade between rich countries is driven by such a taste for variety, there would logically be considerable benefit if such variety could be provided within one's own borders.

This paper aims to investigate the respective merits of the two theories on ethnic diversity in an empirical analysis to enhance our understanding of the possible multi-dimensionality of ethnic diversity with respect to economic growth. Many of the potential gains from diversity may be more pronounced in high-immigration countries, which might be in a particularly strong position to reap the possible benefits of ethnic diversity mentioned above. Moreover, countries with a long-standing immigration history are more likely willing to introduce institutions that mitigate the negative effects of diversity and manage to dissolve political battles over scarce resources more effectively, whilst simultaneously harnessing the potential benefits of complementary skills and co-ethnic trading networks. Hence, we hypothesis that there is possibly a different relationship between ethnic diversity and growth in countries with a long history of immigration.

3 Existing empirical investigations

The pioneering paper by Easterly and Levine (1997), as well as a follow-up study by Alesina et al. (2003) argue that ethnic conflicts in the political sphere reduce economic growth by leading governments to adopt inefficient economic policies and low public good provision. Using cross-country seemingly unrelated regressions (SUR) the authors show that the negative impact of ethnic fractionalisation operates via certain policy variables on growth. This link between ethnic diversity and the individual policy variable is further analysed by separate regressions which link ethnic fractionalisation significantly to the quality of policy and institutions. These identified channels have hurt Sub-Saharan Africa particularly, which had the highest measured fractionalisation and in turn had the lowest economic growth in the period of 1960–1990. For instance,

the negative coefficient of the ethnic variable of -0.019[4] implies that Uganda has 1.77% points lower annual growth in per capita income in the base line specification than South Korea which is merely due to different degrees of ethnic fractionalisation -0.002 in South Korea versus 0.93 in Uganda.

As noted in the previous section, other forms of social distance, especially income inequality could also lead to polarisation of interests between groups and therefore have identical implications for the economic performance in a country. Easterly (2001a,b) shows indeed that societies with a low class and income divide grow the fastest and the channels through which high ethnic diversity and high inequality have an impact on growth happen to be the same.

Moreover, extensions by Easterly (2001a,b) show that the negative impact of high ethnic fractionalisation can be mitigated by strong institutions which they measure using the data from the International Country Risk Guide. These indicators measure the strength of the rule of law, judicial independence, bureaucratic quality and protection of property rights. In countries with such strong institutions, the negative effect of ethnic fractionalisation on economic growth can be largely avoided (Easterly 2001a,b).

Ottaviano and Peri (2005), as well as Sparber (2007), find evidence that ethnic diversity boosts productivity. Using a panel model Ottaviano and Peri (2005) show that linguistic diversity increases wages of white U.S. born males that are 40–50 years old.

No empirical study has considered the relationship between migration and ethnic fractionalisation in a cross country setting so far. Several empirical studies find that immigrant links play an important role in determining bilateral trade flows. Gould (1994) shows that immigrants' ties to their home country play a key role in explaining bilateral trade flows of the U.S. Girma and Yu (2000) investigate the link between immigration and trade using U.K. data. They find evidence that immigration from non-Commonwealth countries has a significant trade enhancing effect. Both studies find a pro-import, but most importantly pro-export effect. Frankel and Romer (1999) find that trade has a robust and quantitatively large impact on income when controlling for the direction of causality.

Using a gravity model, Tong (2005) finds that Chinese networks, measured as the number of Chinese people in the country, are important correlate of bilateral foreign direct investment. She further investigates the mechanisms through which this co-ethnic network has an effect on cross-border investment. She finds that community enforcement of sanctions is important in countries with low bureaucratic quality. Furthermore, Chinese networks provide assistance in overcoming informational barriers.

4 Data and methodology

Since our first objective was to update and extend the analysis of Alesina et al., we used the same variables and extended the dataset where possible using the same data

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[4] See Table 2.

Table 1 Sample means of fractionalisation indices by region

	ELF	Ethnic	Language	Religion
Latin America & Carribean	0.265	0.405	0.179	0.442
Sub-Saharan Africa	0.651	0.658	0.652	0.496
Eastern & Central Europe	0.315	0.366	0.32	0.491
Western & Southern Europe	0.147	0.177	0.196	0.311
Middle East	0.244	0.453	0.33	0.346
East & South East Asia	0.306	0.353	0.457	0.462

Source: Alesina et al. (2003)
Note: ELF is Ethno-Linguistic Fractionalisation, constructed by Easterly and Levine (1997) using the Russian Atlas Narodov Mira

sources to include the 1990s. This was possible for all variables except telephones per 1,000 workers instead of which we introduced the variable telephones per 1,000 people.[5] We decided to focus our research on the ethnic fractionalisation variable "ethnic" only, which was constructed by Alesina et al. (2003). This is mainly due to the fact that we deemed it to be the most reasonable measure of ethnic fractionalisation available to date.

The variable "ethnic" is measured by a one minus a Herfindahl concentration index

$$\text{Fract}_j = 1 - \sum_{i=1}^{N} s_{ij}^2 \tag{1}$$

where s is the share of group i $(i = 1, \ldots, N)$ in country j. The index takes values from zero to one for each country. In practical terms, this index measures the probability that two randomly drawn individuals belong to a different ethnic group. The data to construct this index, i.e. the values for the group shares, are mainly taken from the Encyclopaedia Britannica (2001). A separate ethnic group is defined if there exist distinguishing linguistic and/or ethnic characteristics.

Table 1 shows the average fractionalisation measures of the different indices for the different regions of the world. Note that Sub-Saharan Africa displays the highest average index for all measures of fractionalisation. The index "ethnic" gives a more realistic picture of fractionalisation in Latin America than the ethno-linguistic measure (ELF) since this region is not primarily fractionalised linguistically but mostly due to ethnic groups.

Thus, our dataset is structured as a four-wave panel, which includes the time-invariant ethnic fractionalisation variable and past immigration dummy. In our empirical analysis we use the common methodology of SUR. This is for two particular reasons: First of all, it allowed us to be comparable with existing findings such as Easterly and Levine (1997) and Alesina et al. (2003). Second, and more important, a SUR displays a clear advantage over a OLS regression, including fixed and random effect panels, for this kind of growth regression analysis. In particular, this method allows for country random effects to be correlated across decades and thus yields more efficient

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[5] Source: WDI 2003, this variable displays a very high correlation with the original variable telephone per 1,000 workers. See Appendix Table 12.

estimators than the alternative methods mentioned above. In other words, the effects of the independent variables on growth are allowed to be correlated within a country specific framework over time, which is a clear advantage over standard OLS estimates, fixed or random panel. Furthermore, SUR seems clearly more favourable since it allows for a more detailed picture than a simple OLS where effects are averaged over a 30- or 40-year horizon. SUR, instead, assigns a regression to each of the four decades, analysing the impact of a specific variable measured at the start of each decade on growth whereby this impact may be specified to differ between the decades or not. Moreover, like OLS, SUR allows for a time-invariant correlation between the independent variable and growth, but the estimates are derived by incorporating decade specific correlations.

The model takes the following form:

$$\text{growth}_{it} = \sum_{t=1}^{N} \alpha_t + \sum_{j=1}^{N} \beta_{jt} X_{jit} + \sum_{j=1}^{N} \beta_{jt} Z_{ji} + u_{it} \tag{2}$$

Hence, growth is a function of a decade-specific intercept alpha, a vector of variables X which vary across time t and countries i, a vector of variables Z which vary only across countries plus an error term.

The second aim of this paper was to combine the two existing strands of literature concerning the possibly counteracting impact of ethnic diversity on economic performance. Thus, we needed to define what constitutes an immigration country in order to single out the alleged positive impact of ethnic diversity due to immigration. There are many possible definitions of the variable "immigration country". However, we are interested in countries which are ethnically heterogeneous according to our measure and this to a large part due to migration. A country like Argentina, for example, has a population consisting up to 97% of Spanish and Italian descendants. Our definition therefore classifies a country as an immigration country if it was characterised by settlement from a non-neighboring country, forced or free, within the past 300 years and if the descendants of foreign settlers constitute a significant part (at least 5%) of the population today. This variable is unsuspicious in regard to endogeneity. Data are taken from the CIA World Factbook, where the group share of ethnic groups and there origins are listed. Table 11 in the Appendix lists the countries included in this definition.[6]

To get a first idea, the methodology we used to test for different effects of ethnic diversity in immigration and non-immigration countries is a simple interaction term between the immigration Dummy and the variable "ethnic". The hypothesis being that, if a country is classified as an immigration country with a long history of immigration, we would expect a distinct positive or at least compensating impact of ethnic diversity on growth. We analyse the underlying mechanism of the distinct positive effect of the interaction term using SUR also.

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[6] However, we cannot prove whether co-ethnic networks exist in each of these countries.

5 Results

5.1 Extending the data set

Before we start to analyse whether ethnic diversity has a distinct effect on growth in immigration countries, we want to confirm and update the baseline analysis by including the 1990s. The results are noteworthy by themselves as they lend support to the original argument, namely, that high ethnic fractionalisation not only leads to an adverse policy environment, but also shows some differences. Table 2 shows the results of the updated data analysis. The first two columns in Table 2 reproduce the original findings of Alesina et al. with the difference that the variable "log telephones per worker" has been replaced by "log telephones per people" in regression (2).[7]

The adverse impact of ethnic fractionalisation on growth via the policy environment is shown when comparing regressions (1) and (2) of Table 2, as the inclusion of variables measuring the quality of the policy environment and public good provision renders the negative impact of "ethnic" to insignificance and strongly reduces the size of the coefficient.

If we now include data up to 1999, the following changes can be observed: First of all, if we concentrate on specification (3), it confirms and strengthens the original findings that ethnic fractionalisation has a negative impact on growth as the results remain almost unchanged in terms of magnitude and significance. However, the coefficient of the Dummy for Sub-Saharan Africa gains in magnitude and significance. This hints at the continuing diverging growth experience of this region, and the problem observed first by Easterly and Levine that the model cannot fully explain this diverging growth trend even though high ethnic diversity is one of the main characteristics of this region.

The significance and magnitude of the coefficients do not show much variation. It is interesting that schooling becomes insignificant once we include telephone per thousand people. One possible explanation is that physical and human capital infrastructure is highly correlated for all decades. In the 1960s the correlation coefficient between the level of schooling and telephones per thousand people takes a value of 0.83; for the 1990s it has increased to 0.89.[8]

However, the most important finding is, once we include data for the 1990s, that we find a remaining effect of ethnic fractionalisation on growth, even after the inclusion of the policy variables. The effect of ethnic fractionalisation remains significant at the 1% level in the 1990s if we do not restrict the coefficient to be the same across decades. This can be seen in regression (1) in Table 3. The effect of ethnic fractionalisation on growth in the 1990s is not mitigated by the inclusion of the policy variables.

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[7] To see the changes due to inclusion of this different variable in comparison with the original Alesina et al. results, see Appendix Table 12.

[8] Pritchett (1999) analyses why education has no significant influence on growth in a cross-country setting and suggests three different explanations. First of all, it might be the case that indeed schooling creates no human capital. Second, the marginal returns to human capital are falling rapidly where demand for educated labour is stagnant. Last, the institutional environments in many countries have been sufficiently perverse that the human capital accumulated has been applied to activities that served to reduce economic growth.

Table 2 Baseline regression

Variable	Dependent variable: growth rate 1960–1980, 1960–1999					
			Inclusion of 1990s			
	(1)	(2)	(3)	(4)	(5)	(6)
Dummy for the 1960s	−0.099 (−1.19)	−0.166* (−1.73)	−0.056 (−0.37)	−0.06 (−0.90)	−0.095 (−1.31)	−0.038 (−0, .47)
Dummy for the 1970s	−0.102 (−1.22)	−0.163* (−1.71)	−0.059 (−0.89)	−0.062 (−0.93)	−0.091 (−1.25)	−0.034 (−0.43)
Dummy for the 1980s	−0.122 (−1.46)	−0.179* (−1.88)	−0.079 (−1.20)	−0.082 (−1.23)	−0.109 (−1.49)	−0.051 (−0.64)
Dummy for the 1990s			−0.071 (−1.09)	−0.074 (−1.12)	−0.107 (−1.47)	−0.049 (−0.61)
Dummy for Sub-Saharan Africa	−0.007 (−1.53)	−0.013*** (−2.75)	−0.010*** (−2.50)	−0.011*** (−2.76)	−0.014** (−3.22)	−0.014*** (−3.10)
Dummy for Latin America & Caribbean	−0.018*** (−4.85)	−0.017*** (−4.46)	−0.015*** (−4.61)	−0.013*** (−3.98)	−0.011*** (−3.29)	−0.014*** (−3.89)
Log of initial income	0.038* (1.73)	0.067*** (2.76)	0.026 (1.60)	0.028* (1.69)	0.04** (2.19)	0.031 (1.61)
Log of initial income squared	−0.003* (−1.93)	−0.006*** (−3.66)	−0.002* (−1.94)	−0.002** (−2.06)	−0.003*** (−2.77)	−0.003*** (−2.70)
Log of schooling	0.013*** (3.11)	0.005 (0.96)	0.012*** (3.10)	0.011*** (3.04)	0.011*** (2.80)	0.003 (0.63)
Assassinations		−17.986* (−1.95)		−31.025*** (−3.16)	−23.228*** (−2.56)	−2.196** (−2.42)
Financial depth		0.011** (1.99)			0.016*** (3.34)	0.012** (2.30)
Black market premium		−0.015*** (−3.46)			−0.018*** (−4.81)	−0.016*** (−4.04)
Fiscal surplus/GDP		0.113*** (3.64)			0.102*** (3.64)	0.111*** (3.89)
Log of telephones per people		0.022*** (3.64)				0.019*** (3.31)

Table 2 continued

Variable	Dependent variable: growth rate 1960–1980, 1960–1999					
			Inclusion of 1990s			
	(1)	(2)	(3)	(4)	(5)	(6)
Ethnic	**−0.019*** (−2.96)**	**−0.0040 (−0.55)**	**−0.018*** (−3.22)**	**−0.019*** (−3.22)**	**−0.013** (−2.17)**	**−0.009 (−1.50)**
No. Obs.	264	179	356	349	267	257
Adj R^2	0.38	0.57	0.34	0.35	0.47	0.5

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level. The regressions above were also estimated constraining the number of observations to 257 as in specification(4). However, the results do not change significantly. Results provided on request

Table 3 1990s Effect

Variable	Growth rate 1960–1999
Dummy for the 1960s	−0.077 (−0.97)
Dummy for the 1970s	−0.070 (−0.89)
Dummy for the 1980s	−0.088 (−1.12)
Dummy for the 1990s	−0.079 (−1.01)
Dummy for Sub-Saharan Africa	−0.014*** (−3.20)
Dummy for Latin America & Caribbean	−0.014*** (−4.24)
Log of initial income	0.041** (2.14)
Log of initial income squared	−0.004*** (−3.30)
Log of schooling	0.004 (0.83)
Assassinations	−2.204*** (−2.51)
Financial depth	0.012*** (2.48)
Black market premium	−0.016*** (−4.23)
Fiscal surplus/GDP	0.117*** (4.21)
Log of telephones per people	0.020*** (3.69)
Ethnic 1960	0.001 (0.12)
Ethnic 1970	−0.007 (−0.78)
Ethnic 1980	−0.005 (−0.60)
Ethnic 1990	**−0.023*** (−2.55)**
No. Obs.	38;67;74;78
Adj R^2	0.11;0.36;0.47;0.18

Source: Own calculations
t-stats in parentheses *0.1,
**0.05, ***0.01 Significance
level

It seems likely that ethnic diversity has gained a bigger impact on growth in the 1990s.[9] To further validate the finding, we ran a separate regression for each decade to assess whether the impact of "ethnic" increased between the 1960s and the 1990s. The results indicate that this is indeed the case as the only decade in which "ethnic" has a negative significant impact, even after the inclusion of the policy variables, is the 1990s. For all other decades, the impact of "ethnic" in the extended regression is not statistically different from zero. The findings are shown in Table 4.

Moreover, we ran a completely unrestricted version of our SUR model, which means that we loosened the restriction that coefficients have to be the same across decades for all variables except the decade dummies. The results are shown in Table 9 in the Appendix. According to the adjusted R-squared, this model can explain growth variations the best. The regression clearly shows that policy variables have very distinct effects in different decades, that conditional β-convergence can only be found in two decades, and that ethnic fractionalisation has a sizeable impact on growth in the 1990s besides the policy variables. Therefore, we may well conclude that the model

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[9] It is, however, important to highlight that the sample size varies strongly between the decades. Only 38 observations are included for the decade of the 1960s. The result shows therefore that the significance of ethnic fractionalisation seems to be dependent on the inclusion of certain countries. Furthermore, it could be the case that a sample selection bias is introduced in the earlier decades because countries that cannot manage ethnic diversity adequately were omitted.

Table 4 Decade specific growth regression

Variable	Dependent variable: growth rate for noted decades							
	1960		1970		1980		1990	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dummy for the 1960s	−0.3644* (−1.72)	−0.2611 (−0.93)						
Dummy for the 1970s			−0.4914** (−2.76)	−0.4296** (−1.98)				
Dummy for the 1980s					−0.2014 (−1.61)	−0.1880 (−1.44)		
Dummy for the 1990s							−0.0376 (−0.23)	0.0652 (0.37)
Dummy for Sub-Saharan Africa	−0.0148 (−1.35)	−0.0198* (−1.68)	−0.0092 (−1.22)	−0.0066 (−0.88)	−0.0105 (−1.62)	−0.0123 (−1.77)	−0.0176*** (−2.36)	−0.0165*** (−2.10)
Dummy for Latin America & Caribbean	−0.0206*** (−3.10)	−0.0245*** (−3.04)	−0.0154*** (−2.49)	−0.0155*** (−2.28)	−0.0296*** (−5.59)	−0.0210*** (−3.63)	−0.0099* (−1.79)	−0.0073 (−1.06)
Log of initial income	0.1064* (1.91)	0.0899 (1.25)	0.1431*** (3.10)	0.1454*** (2.70)	0.0549* (1.72)	0.0643 (1.95)	0.0171 (0.43)	0.0040 (0.10)
Log of initial income squared	−0.0074* (−2.01)	−0.0070 (−1.50)	−0.0098** (−3.25)	−0.0119*** (−3.40)	−0.0036* (−1.74)	−0.0053*** (−2.43)	−0.0013 (−0.57)	−0.0013 (−0.56)
Log of schooling	0.0174** (1.96)	0.0127 (1.25)	0.0152** (2.10)	0.0058 (0.76)	0.0118* (1.74)	0.0040 (0.47)	0.0086 (1.09)	0.0015 (0.14)

Table 4 continued

Variable	Dependent variable: growth rate for noted decades							
	1960		1970		1980		1990	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Assassinations		51.937 (0.87)		−17.867 (−1.06)		−14.798 (−1.33)		−86.466** (−2.06)
Financial depth		−0.0003 (−0.03)		0.0054 (0.48)		0.0145 (1.63)		0.0097 (1.06)
Black market premium		−0.0180 (−1.07)		−0.0286*** (−2.75)		−0.0085 (−1.54)		−0.0211** (−2.19)
Fiscal surplus/GDP		0.0724 (0.56)		0.1988*** (2.82)		0.1339*** (3.33)		0.1758*** (2.49)
Log of telephones per people		0.0117 (0.84)		0.0395*** (3.89)		0.0212** (2.05)		0.0150 (1.11)
Ethnic	**−0.0069** **(−0.54)**	**0.0008** **(0.06)**	**−0.0256*** ** **(−2.35)**	**0.0048** **(0.41)**	**−0.0153*** **(−1.66)**	**−0.0008** **(−0.08)**	**−0.0120*** ** **(−2.44)**	**−0.0193*** **(−1.83)**
No. Obs.	38	38	88	67	94	74	92	78
Adj R^2	0.23	0.37	0.28	0.62	0.38	0.59	0.15	0.29

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level

proposed by Alesina et al. (2003) cannot account for all the growth variation due to ethnic fractionalisation, even after the inclusion of policy variables.

We tested several other models to explain the negative impact of ethnic fractionalisation on growth in the 1990s and found that good governance mitigates the influence of fractionalisation on growth as the inclusion of the Kaufman–Kraay–Zoido-Lobaton-indicator in our regression renders the variable "ethnic" insignificant (see Table 10 in the Appendix).[10] Ethnic fractionalisation may lead to inefficient "identity" politics instead of efficient "performance" politics (Collier 1998). The index measures governance in the dimensions graft, rule of law, voice and accountability, political instability and violence, government effectiveness, and regulatory burden. Governance seems to have gained importance for growth in the 1990s. This may partly be explained by the withdrawal of influence by the two superpowers from many regions of the world with the end of the Cold War. This increased importance of governance on growth is confirmed in Table 10 in the Appendix which shows that governance, as measured by KKZ, has only a significant influence on growth in the 1990s. Moreover, if we combine this results with Table 14 in the Appendix we see that high fractionalisation has a significant negative effect on good governance and thus an indirect effect on growth in the 1990s.

Furthermore, if the impact of ethnic fractionalisation is differing in the four decades, it might also differ between regions. The sample is, therefore, divided into two subgroups. As we do not have sufficient numbers of observations to analyse the model for Sub-Saharan Africa and Latin America separately, we combined both to one group including 85 countries. We compare this with "the rest of the world" including 75 OECD, Asian and some Arabic countries. The results are shown in Table 5. Strikingly, the results differ very much between the two subgroups. Considering Sub-Saharan Africa and Latin America, the impact of the variable measuring ethnic fractionalisation, however, remains significant only at the 10% level after the inclusion of the policy variables.

Contrarily, in the "rest of the world" the hypothesis of Alesina et al. and Easterly and Levine seems to explain the growth differences between countries rather well. Inefficient policies and low public good provision explain the diverging growth trends due to ethnic fractionalisation. In these regions it seems to be indeed the case that the transmission channel of high ethnic fractionalisation and its negative impact on growth can be explained by an adverse policy environment alone. Thus, the obtained results show that the negative impact of ethnic fractionalisation on growth above and beyond the policy control variables prevails only in the 1990s and in the regions of Sub-Saharan Africa and Latin America.

The above approach, however, faces the problem that few observations remain when restricting the sample to Sub-Saharan and Latin-American countries. In order to verify the findings we included an interaction term for ethnic fractionalisation in Sub-Saharan Africa. The results clearly show that the remaining negative impact of ethnic fractionalisation on economic growth is captured in the last interaction term for

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[10] Many observations are lost when including the governance index. We, therefore, ran the model without the governance variable for the same numbers of observation. Nothing changes. Ethnic fractionalisation remains significant in explaining growth.

Table 5 Sub-Saharan African and Latin American results

Variable	Dependent variable: growth rate 1960–1999			
	Africa and Latinam		Rest of the World	
	(1)	(2)	(3)	(4)
Dummy for the 1960s	0.127 (1.2)	−0.037 (−0.30)	−0.249*** (−2.58)	0.006 (0.05)
Dummy for the 1970s	0.125 (1.17)	−0.033 (−0.27)	−0.249*** (−2.58)	0.008 (0.06)
Dummy for the 1980s	0.099 (0.93)	−0.053 (−0.43)	−0.262*** (−2.72)	−0.005 (−0.04)
Dummy for the 1990s	0.12 (1.03)	−0.054 (−0.44)	−0.256*** (−2.68)	0.004 (0.03)
Log of initial income	−0.026 (−0.93)	0.03 (0.94)	0.076*** (3.21)	0.026 (0.86)
Log of initial income squared	0.002 (0.81)	−0.003 (−1.50)	−0.005*** (−3.63)	−0.004** (−2.06)
Log of schooling	0.011** (1.98)	−0.004 (0.54)	0.011** (2.25)	0.008 (1.54)
Assassinations		−24.819*** (−2.57)		−16.353 (−0.76)
Financial depth		0.036*** (2.33)		0.01* (1.84)
Black market premium		−0.015*** (−2.82)		−0.018*** (−2.87)
Fiscal surplus/GDP		0.113*** (2.84)		0.083* (1.95)
Log of telephones per people		0.022*** (2.48)		0.026*** (3.26)
Ethnic	**−0.014*** (−1.81)	**−0.016*** (−1.77)	**−0.019***** (−2.52)	**−0.001** (−0.063)
No. Obs.	181	105	175	114
Adj R^2	0.23	0.42	0.24	0.39

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level

ethnic fractionalisation in Sub-Saharan Africa in the regression presented in Table 6.[11] The variable "ethnic" which captures the residual effect of ethnic fractionalisation in general, is no longer statistically significant. The overall effect of the interaction term is on average −0.032,[12] which implies that the inclusion of the policy variables did not change the negative impact of ethnic fractionalisation on growth for Sub-Saharan African countries. These results confirm the hypothesis that the remaining negative impact of ethnic fractionalisation on growth, even after the inclusion of policy variables, is in particular a Sub-Saharan phenomenon.

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[11] We also tested for a Latin American*Ethnic interaction term; however, there was no specific Latin American impact.

[12] Which is the coefficient of the interaction term multiplied by the average ethnic fractionalisation in SSA (−0.049*0.658). However, this effect should be possibly interpreted jointly with the SSA effect, which is now positive, but is just below the 10% significance level (*p*-value = 0.1079). Then the overall effect becomes −0.017 of ethnic fragmentation in Sub-Saharan Africa. It is also generally interesting to note that the SSA dummy is almost statistically significantly positive which would imply a stronger than average growth in SSA once the effect of ethnic fractionalisation is accounted for.

Table 6 1990s and SSA effect

Variable	Growth rate 1960–1999
Dummy for the 1960s	0.029 (0.38)
Dummy for the 1970s	0.032 (0.41)
Dummy for the 1980s	0.015 (0.19)
Dummy for the 1990s	0.017 (0.23)
Dummy for Sub-Saharan Africa	0.015 (1.61)
Dummy for Latin America & Caribbean	−0.014*** (−4.39)
Log of initial income	0.015 (0.80)
Log of initial income squared	−0.002** (−2.04)
Log of schooling	0.003 (0.64)
Assassinations	−21.526** (−2.48)
Financial depth	0.011** (2.31)
Black market premium	−0.016*** (−4.30)
Fiscal surplus/GDP	0.105*** (3.85)
Log of telephones per people	0,022*** (4.08)
Ethnic	**−0.001 (−0.13)**
Ethnic × SSA	**−0.049*** (−3.40)**
No. Obs.	257
Adj R^2	0.53

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level

Given the above results, we wanted to test the hypothesis that violent civil conflicts could explain this decade- and region-specific effect of ethnic fractionalisation as existing research found already robust evidence that ethnic polarisation explains civil conflict (Montalvo and Reynal-Querol 2005).[13] This hypothesis is conceivable as conflict incidences increased substantially between the 1960s and the 1990s and are concentrated in particular in countries of Sub-Saharan Africa and Latin America, as confirmed by the Prio Database of the International Peace Research Institute Oslo.[14] However, our empirical results cannot support the hypothesis above because the influence of the violent conflict variables on growth is not significantly different from

[13] Even though civil conflict is better explained by ethnic polarisation than by ethnic fractionalisation, those two concepts are sufficiently correlated to control empirically if the inclusion of a violent conflict variables renders the impact of the ethnic fractionalisation variable above and beyond the inclusion of the policy variables on growth to insignificance.

[14] Prio Database of the International Peace Research Institute Oslo, www.prio.no. The database reports the crude measure of numbers of conflicts as follows: 82 incidences of violent conflict beginning in the 1960s (34 of which took place in Sub-Saharan Africa and Latin America), 87 in the1970s (33 of which took place in SSA and LA), 102 in the 1980s (30 of which took place in SSA and LA), jumping to 172 incidences at the beginning of the 1990s in the whole world (77 of which took place in SSA and LA). Even though this measure holds no information concerning the intensity and duration of violent conflict, it confirms the sheer fact that the incidences of civil conflict has increased dramatically in the 1990s and that they were mostly concentrated in Sub-Saharan and Latin America.

Table 7 SSA effect including investment and the Kaufmann, Kraay and Zoido-Lobaton-index

Variable	Growth rate 1960–1999	
Dummy for the 1960s	−0.055 (−0.83)	−0.124* (−0.17)
Dummy for the 1970s	−0.057 (−0.86)	−0.124* (−1.67)
Dummy for the 1980s	−0.077 (−1.16)	−0.140* (−1.88)
Dummy for the 1990s	−0.070 (−1.05)	−0.126* (−1.71)
Dummy for Sub-Saharan Africa	0.007 (0.81)	−0.004 (−0.28)
Dummy for Latin America & Caribbean	−0.015*** (−4.72)	−0.016*** (−4.93)
Log of initial income	0.026 (1.53)	0.048*** (2.58)
Log of initial income squared	−0.002** (−1.84)	−0.004*** (−3.15)
Log of schooling	0.011*** (2.96)	0.004 (0.85)
Kaufmann. Kraay and Zoido-Lobaton-index		0.012*** (4.08)
Ethnic	**−0.012* (−1.83)**	**0.004 (0.67)**
Ethnic × SSA	**−0.029** (−2.26)**	**−0.027 (−1.31)**
No. Obs.	356	282
Adj R^2	0.36	0.40

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level

zero, and the variable "ethnic" does not lose significance.[15] Thus, at least the variable specifications we used for violent civil conflicts cannot explain the remaining sizable negative effect of the ethnic fractionalisation variable on growth after the inclusion of policy variables in the 1990s or for Sub-Saharan Africa and Latin America.

Again the effect of ethnic fractionalisation in Sub-Saharan Africa is mitigated by the inclusion of governance in the restricted SUR model. The results are shown in Table 7 below.

To sum up, we find a remaining direct negative effect of fractionalisation on growth in the 1990s and in Sub-Saharan Africa. The specific 1990s and Sub-Saharan Africa effect of fractionalisation can be explained by bad governance and the consequential growth hampering effect.

5.2 Migration and ethnic fractionalisation

The second aim of this paper is to reconcile the two theoretical arguments of the different effects of ethnic fractionalisation and immigration on growth presented in the first part of this paper. So far we have argued empirically that fractionalisation of groups is problematic as it leads to conflicts of political nature, hampering growth. Now, we hypothesise that countries in which ethnic fractionalisation partially emerged because of immigration should also experience positive effects due to diversity and not

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[15] The results are not reported here. Data are from the Prio Database. Multiple definitions of violent civil conflicts were tested: minor-, intermediate civil conflict, civil war (internal and internationalised internal) and frequency in a decade. None of this specifications produced significant results.

only negative effects. We do not argue that in immigration countries, models which explain inefficient policies and low public good provision due to ethnic fractionalisation are no longer valid. We rather investigate whether positive effects of diversity also prevail in countries with long-settled immigrants and which effect dominates in a cross-country setting. Before turning to our empirical analysis of this issue, we would like to highlight some of our constraints in testing the hypothesis. First of all, to draw a clear definition of what constitutes an "immigration country", is less straightforward for our purpose. Second, the theory of co-ethnic networks is only tested superficially in our setting. Usually, the theory on co-ethnic networks is tested by analysing the relationship between the inflow of migrants and trade using panel data. Ethnic fractionalisation is assumed to be time-invariable.[16] The networks we look at have been in existence since a long time.

Utilising the new dataset, we tested whether there is a distinguished effect of ethnic fractionalisation on economic performance in countries which are ethnically diverse partly due to foreign settlement or migration. The argument being that those countries which display high ethnic diversity, partly due to foreign settlement or migration, might be capable to reap the benefits of such an increased diversity via increased trade.

Our results indicate that our hypothesis is validated to some extent (see Table 8). Countries created by foreign settlement or with high levels of immigration[17] seem to exhibit positive effects of ethnic fractionalisation on subsequent growth. The coefficient of the interaction-term implies that the negative effect of ethnic diversity on long-run growth is more than mitigated. In fact, there is small positive net-effect in immigration countries, again even if the policy variables which measure the quality of governmental policy are taken into account. The hypothesised channel of the co-ethnic trading network theory would ascribe the remaining positive effect on growth to trade.[18] However, we cannot confirm these trade channels, as we find no evidence of a positive relationship between ethnic diversity and trade in our immigration countries. Ethnic diversity in immigration countries is no significant determinant of foreign direct investments or exports.[19]

Thus, the remaining reason for the positive net effect of ethnic fractionalisation on growth in immigration countries is not entirely clear. However, we would hypothesise that the different positive effect of ethnic fractionalisation on growth does not solely operate over positive co-ethnic trading network in immigration countries, which might

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[16] However, any country that experienced massive waves of immigration would have seen significant changes in fractionalisation. The construction of a time-variable measure of fractionalisation is behind the scope of this paper.

[17] Our definition is that a country is classified as an immigration country if it was either created by settlement from abroad, forced or free, within the past 300 years and the descendants of foreign settlers or immigrants of non-neighbouring countries constitute more than 5% of the population today.

[18] Trade is defined as exports and imports as a share of GDP, which increased dramatically between the 1960s and 1990s in most countries and also displayed an increased variation between countries. However, both patterns of change cannot be explained by our time-invariant variable 'ethnic fractionalisation' which is assumed to be constant over the 40-year horizon. However, we would like to point out that a change in the ethnic index would require substantive migration flows and thus even if a time-variant variable "ethnic" would be generated, we would expect it to be characterised by none or little and very slowly change over time and thus would be most likely no suitable variable to explain rapid change in trade patterns.

[19] Results are not reported here, but are available on request.

Table 8 Past settlement, immigration, ethnic fractionalisation and growth

Variable	Dependent variable: growth rate 1960–1999		
	(1)	(2)	(3)
Dummy for the 1960s	−0.042 (0.60)	−0.042 (0.59)	0.015 (0.18)
Dummy for the 1970s	−0.045 (0.63)	−0.044 (0.61)	0.019 (0.22)
Dummy for the 1980s	−0.066 (−0.92)	−0.065 (−0.90)	0.001 (0.01)
Dummy for the 1990s	−0.060 (0.83)	−0.059 (0.81)	0.002 (0.02)
Dummy for Sub-Saharan Africa	0.000 (0.04)	−0.001 (0.29)	−0.004 (0.76)
Log of initial income	0.036** (2.01)	0.036** (1.99)	0.027** (1.29)
Log of initial income squared	−0.003** (2.44)	−0.003** (2.43)	−0.003 (2.31)
Dependency ratio	−0.047*** (3.93)	−0.043*** (3.58)	−0.034*** (2.63)
Log of schooling	0.007* (1.75)	0.007 (1.61)	0.000 (0.047)
Assassinations		−27.375**(2.48)	−21.426**(2.13)
Financial depth			0.016*** (2.90)
Black market premium			−0.018*** (4.29)
Fiscal surplus/GDP			0.119*** (3.81)
Log of telephones per people			0.015** (2.41)
Ethnic	**−0.029***** **(3.64)**	**−0.030***** **(3.79)**	**−0.019**** **(2.18)**
Immigration dummy	−0.019*** (3.39)	−0.017*** (3.11)	−0.014** (2.36)
Immigration*ethnic	**0.034***** **(2.71)**	**0.034***** **(2.76)**	**0.027**** **(2.03)**
No. Obs.	356	349	257
Adj R^2	0.36	0.37	0.50

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level. Note also that the Latinam dummy is left out because it is highly correlated with the immigration dummy

have been in existence for quite some time. In fact, we would hypothesise that the positive effect is also partially due to the fundamentally different setup of institutions in immigration countries and the willingness of most immigrants to productively engage and at least partly assimilate in their new home country. There is tentative evidence for such a hypothesis as the immigration country dummy shows a different, in fact positive significant correlation, with the quality of policy.[20]

To conclude this section, we find clear evidence that ethnic diversity in "immigration countries" has a positive growth enhancing effect, which counteracts the measured negative effect of ethnic fractionalisation. Thus, the net effect of ethnic fractionalisation in immigration countries on economic performance and growth is positive and very different from the negative effect of multi-ethnic societies which might be suffering from historically entrenched, possibly rival, ethnic fractionalisation due to post-colonial border drawing.

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[20] This is also in line with the findings of Acemoglu et al. (2001). (The results are not reported here, but would make for a interesting further paper.)

6 Conclusion and future research questions

In the end, it seems clear that the negative impact of ethnic fractionalisation on growth remains significant and robust for Sub-Saharan Africa if we include the 1990s in our empirical analysis following the Alesina et al. model. Interestingly, the transmission channels which explained how ethnic fractionalisation negatively affects growth, namely via the policy variables specified, is less prominent in the extended analysis, as ethnic fractionalisation remains a significant negative explanatory power in the growth regression for Sub-Saharan African countries even after the inclusion of the policy variables. Thus, the negative impact of ethnic fractionalisation on economic growth cannot fully be explained and there might be some other transmission channels which link high ethnic fractionalisation to poor growth performance than the ones investigated and specified so far. In particular, the different results of the different regions in the world suggest that Sub-Saharan Africa does not only face an adverse policy environment, but also that high ethnic fractionalisation remains an obstacle to growth, especially in the 1990s. We tried two different channels to explain this increased negative impact of ethnic fractionalisation on growth in the Sub-Saharan African setting of the 1990s, namely, a increased role of good governance as measured by the KKZ indicator and an increased number of violent conflicts. We managed to show that this increased negative impact of ethnic fractionalisation in the 1990s in Sub-Saharan Africa can be explained by the KKZ index which is a different measure of governance quality and confirms the hypothesis of growing importance of sound governance to facilitate growth. However, we could not confirm the hypothesis that an increasing number of incidences and severity of violent civil conflicts could explain the remaining negative impact of ethnic fractionalisation above and beyond the policy control variables.

Moreover, as already mentioned above, there might be a further conceivable transmission channel of high ethnic fractionalisation on growth, namely income inequality and especially segregation. Especially, if one considers a longer time horizon, very high income inequality, which might be a result of high ethnic fractionalisation and segregation in connection with badly designed institutions, might lead to a reduction in growth via the suboptimal provision and accumulation of factors of production, such as physical and human capital. This explanation gains validity especially in countries with imperfect markets. A further inquiry into this matter seems very much worthwhile, but rather difficult to facilitate due to the limitation of useable data sources.

Concerning migration, ethnic fractionalisation and growth, this paper suggests that there is a mitigating positive impact in countries which are characterised as settler or immigration countries. This gives some empirical validation to the co-ethnic network theory in a cross-country setting. Promising future research in this field should focus on the network enhancing trade effect of immigration in a country cross-section framework, in order to strengthen the argument above and confirm the case studies' findings on co-ethnic network theory in a wider setting. Moreover, it might be the case that the positive impact of ethnic fractionalisation on growth in immigration countries might be also partially due to due to the fundamentally different setup of institutions in immigration countries and the willingness of most immigrants to productively engage and at least partly assimilate in their new home country.

In conclusion, this paper confirms and strengthens the initial assessment that ethnic fractionalisation is one of the key proxies for a negative policy environment and subsequent poor growth performance. However, it also illustrates that our understanding of the impact of ethnic fractionalisation on growth is far from complete: other dimensions and transmission channels of ethnic fractionalisation on growth, in particular in Sub-Saharan Africa, seem to be present, namely, bad governance. Moreover, in settler or immigration countries ethnic fractionalisation is not necessarily a "problem", but possibly a growth-enhancing situation via co-ethnic trade networks. Furthermore, we put emphasis on the findings by Easterly (2001a,b) which show that democratic institutions and low inequality can resolve ethnic conflict in the political sphere. Thus, countries with high ethnic fractionalisation and a strong income-divide between groups face the danger, but not necessarily the consequences of growth retardation. Hence, the challenge ahead, in particular in Sub-Saharan Africa, is the full participation of all ethnic groups in the economic development process and the blurring of ethnic ties, which might be a way to overcome this serious obstacle in many developing countries.

Appendix

See Tables 9, 10, 11, 12, 13, and 14.

Table 9 Unrestricted SUR model

Variable	Dependent variable: growth rate 1960–1999	
	Coefficient	t-Statistic
Dummy for the 1960s	−0.267	−1.15
Dummy for the 1970s	−0.396**	−2.14**
Dummy for the 1980s	−0.167	−1.45
Dummy for the 1990s	0.103	−0.65
1960s		
Africa	−0.019**	−1.94**
Latin America	−0.024*	−3.68*
Log of initial income	0.091	1.54
Log of initial income squared	−0.007	−1.83
Log of schooling	0.013	1.50
Assassinations	46.595	0.94
Financial depth	0.0001	0.01
Black market premium	−0.0187	−1.34
Fiscal surplus/GDP	0.084	0.78
Log of telephones per people	0.011	0.99
Ethnic	**0.000**	**0.05**
Adj R^2	0.29	
Observations	38	

Table 9 continued

Variable	Dependent variable: growth rate 1960–1999	
	Coefficient	t-Statistic
1970s		
Africa	−0.005	−0.80
Latin America	−0.014**	−2.23**
Log of initial income	0.138*	2.92*
Log of initial income squared	−0.011*	−3.65*
Log of schooling	0.002	0.34
Assassinations	−22.564	−1.52
Financial depth	0.009	0.92
Black market premium	−0.028*	−3.06*
Fiscal surplus/GDP	0.197*	3.19*
Log of telephones per people	0.038*	4.25*
Ethnic	**0.002**	**0.21**
Adj R^2	0.51	
Observations	67	
1980s		
Africa	−0.012**	−1.98**
Latin America	−0.019*	−3.76*
Log of initial income	0.061**	2.09**
Log of initial income squared	−0.005*	−2.75*
Log of schooling	0.004	0.61
Assassinations	−21.280**	−2.19**
Financial depth	0.016**	2.02**
Black market premium	−0.009***	−1.82***
Fiscal surplus/GDP	0.121*	3.46*
Log of telephones per people	0.024*	2.63*
Ethnic	**−0.002**	**−0.22**
Adj R^2	0.48	
Observations	74	
1990s		
Africa	−0.01*	−2.63*
Latin America	−0.008	−1.34
Log of initial income	−0.005	−0.13
Log of initial income squared	−0.001	−0.42
Log of schooling	0.005	0.58
Assassinations	−72.156**	−1.99**
Financial depth	0.008	0.94
Black market premium	−0.020**	−2.28**
Fiscal surplus/GDP	0.165*	2.58*

Table 9 continued

Variable	Dependent variable: growth rate 1960–1999	
	Coefficient	*t*-Statistic
Log of telephones per people	0.015	1.25
Ethnic	**−0.018****	**−1.93****
Adj R^2	0.24	
Observations	78	
No. Obs.	257	

Source: Own calculations
*0.1, **0.05, ***0.01
Significance level

Table 10 Unrestricted SUR model including Kaufmann, Kraay and Zoido-Lobaton index

Variable	Dependent variable: growth rate 1960–1999	
	Coefficient	*t*-Statistic
Dummy for the 1960s	−0.325	−1.44
Dummy for the 1970s	−0.437**	−2.45**
Dummy for the 1980s	−0.277**	−2.37**
Dummy for the 1990s	0.135	−0.71
1960s		
Africa	−0.018***	−1.88***
Latin America	−0.015**	−2.17**
Log of initial income	0.116**	2.01**
Log of initial income squared	−0.010*	−2.59*
Log of schooling	0.011	1.40
Assassinations	56.408	1.27
Financial depth	0.026**	2.13**
Black market premium	−0.016	−0.92
Fiscal surplus/GDP	0.009	0.08
Log of telephones per people	0.021***	1.81***
Ethnic	**0.006**	**0.58**
Kaufmann, Kraay and Zoido-Lobaton-index	0.007	1.34
Adj R^2	0.38	
Observations	36	
1970s		
Africa	−0.011	−1.44
Latin America	−0.016*	−2.81*
Log of initial income	0.143*	3.14*
Log of initial income squared	−0.011*	−3.73*
Log of schooling	0.004	0.61
Assassinations	−18.421	−1.46
Financial depth	0.003	0.31
Black market premium	−0.035*	−3.95*

Table 10 continued

Variable	Dependent variable: growth rate 1960–1999	
	Coefficient	*t*-Statistic
Fiscal surplus/GDP	0.174*	3.04*
Log of telephones per people	0.031*	3.67*
Ethnic	**0.009**	**0.84**
Kaufmann, Kraay and Zoido-Lobaton-index	−0.002	−0.30
Adj R^2	0.52	
Observations	57	
1980s		
Africa	−0.019*	−2.92*
Latin America	−0.028*	−5.30*
Log of initial income	0.088*	2.94*
Log of initial income squared	−0.006*	−3.32*
Log of schooling	−0.004	−0.51
Assassinations	−19.084**	−2.32**
Financial depth	0.007	1.013
Black market premium	−0.008***	−1.68***
Fiscal surplus/GDP	0.099*	2.90*
Log of telephones per people	0.017**	2.02**
Ethnic	**−0.008**	**−0.84**
Kaufmann, Kraay and Zoido-Lobaton-index	0.004	0.77
Adj R^2	0.56	
Observations	63	
1990s		
Africa	−0.017**	−1.99**
Latin America	−0.010	−1.34
Log of initial income	0.054	1.18
Log of initial income squared	−0.004***	−1.68***
Log of schooling	0.013	1.24
Assassinations	−52.058	−1.42
Financial depth	0.002	0.28
Black market premium	−0.018	−1.34
Fiscal surplus/GDP	0.120***	1.68***
Log of telephones per people	0.004	0.30
Ethnic	**−0.016**	**−1.40**
Kaufmann, Kraay and Zoido-Lobaton-index	0.011***	1.73***
Adj R^2	0.22	
Observations	65	
No. Obs.	257	

Source: Own calculations
*0.1, **0.05, ***0.01
Significance level

Table 11 Immigration country definition

Countries included
Argentina
Australia
Bahamas
Bolivia
Brazil
Barbados
Brunei
Canada
Chile
Colombia
Costa Rica
Dominica
Dominican Republic
Ecuador
Fiji
Grenada
Guatemala
Guyana
Haiti
Honduras
Israel
Jamaica
Mexico
Malaysia
Namibia
Netherlands
New Zealand
Nicaragua
Panama
Peru
Puerto Rico
Paraguay
Singapore
El Salvador
Sao Tome and Principe
Suriname
Thailand
Trinidad and Tobago
Uruguay

Table 11 continued

Countries included
United States
United Kingdom
Venezuela
South Africa

Table 12 Comparison Alesina et al. with our results

Variable	Dependent variable: growth rate 1960–1989	
	1	2
Dummy for the 1960s	−0.233*** (−2.34)	−0.166* (−1.73)
Dummy for the 1970s	−0.227*** (−2.28)	−0.163* (−1.70)
Dummy for the 1980s	−0.243*** (−2.45)	−0.179* (−1.88)
Dummy for Sub-Saharan Africa	−0.017*** (−3.11)	−0.013*** (−2.75)
Dummy for Latin America & Caribbean	−0.015*** (−4.14)	−0.017*** (−4.46)
Log of initial income	0.081*** (3.23)	0.067*** (2.76)
Log of initial income squared	−0.007*** (−3.98)	−0.006*** (−3.66)
Log of schooling	**0.009*** (**1.85**)	**0.005 (0.96)**
Assassinations	−23.705*** (−2.58)	−17.985* (−1.95)
Financial depth	0.013** (2.12)	0.011** (1.99)
Black market premium	−0.018*** (−4.10)	−0.015*** (−3.45)
Fiscal surplus/GDP	0.165*** (4.45)	0.11*** (3.64)
Log of telephones per worker	0.006*** (2.41)	
Log of telephones per people		0.022*** (3.64)
Ethnic	−0.005 (−0.75)	−0.004 (−0.54)
No. Obs.	175	179
Adj R^2	0.56	0.57

Source: Own calculations

t-stats in parentheses *0.1, **0.05, ***0.01 Significance level

Table 13 Balanced panel robustness check

Variable	Dependent variable: growth rate 1960–1989			
	1	2	3	4
Dummy for the 1960s	−0.207 (0.079)***	−0.212 (0.078)***	−0.142 (0.074)*	−0.066 (0.075)
Dummy for the 1970s	−0.205 (0.079)***	−0.209 (0.078)***	−0.137 (0.074)*	−0.063 (0.075)
Dummy for the 1980s	−0.225 (0.079)***	−0.229 (0.078)***	−0.154 (0.074)**	−0.080 (0.075)
Dummy for the 1990s	−0.218 (0.079)***	−0.222 (0.078)***	−0.153 (0.074)**	−0.078 (0.075)
Dummy for Sub-Saharan Africa	−0.013 (0.004)***	−0.014 (0.004)***	−0.012 (0.004)***	−0.013 (0.004)***
Dummy for Latin America & Caribbean	−0.019 (0.003)***	−0.017 (0.003)***	−0.013 (0.003)***	−0.014 (0.003)***

Table 13 continued

Variable	Dependent variable: growth rate 1960–1989			
	1	2	3	4
Log of initial income	0.063 (0.020)***	0.065 (0.020)***	0.051 (0.018)***	0.038 (0.018)**
Log of initial income squared	−0.004 (0.001)***	−0.004 (0.001)***	−0.004 (0.001)***	−0.004 (0.001)***
Log of schooling	0.010 (0.004)**	0.009 (0.004)**	0.010 (0.004)**	0.003 (0.004)
Assassinations		−24.813 (9.871)**	−17.867 (8.968)**	−17.254 (8.751)**
Financial depth			0.017 (0.005)***	0.013 (0.005)***
Black market premium			−0.019 (0.004)***	−0.017 (0.004)***
Fiscal surplus/GDP			0.122 (0.029)***	0.129 (0.028)***
Log of telephones per people				0.01 (0.005)***
Ethnic	−0.018 (0.006)***	−0.018 (0.006)***	−0.013 (0.005)**	−0.009 (0.005)
No. Obs.	257	257	257	257
Adj R^2	0.60	0.61	0.69	0.70

Source: Own calculations

p-value in parentheses *0.1, **0.05, ***0.01 Significance level

Table 14 Indirect effect of fractionalisation on good governance

Variable	Dependent variable: KKZ-index	
	Coefficient	*t*-Statistic
Dummy for the 1960s	−1.153***	−3.60
Dummy for the 1970s	−1.292***	−3.95
Dummy for the 1980s	−1.467***	−4.44
Dummy for the 1990s	−1.673***	−4.89
Africa	0.147	1.18
Latin America	−0.323***	−3.34
Log of initial income	0.242 * **	6.70
Log of schooling	0.279 * **	4.19
Dependency ratio	−0.309*	−1.92
1960s		
Ethnic	**−1.071*****	**−5.58**
Adj R^2	0.63	
Observations	69	
1970s		
Ethnic	**−1.028*****	**−5.65**
Adj R^2	0.67	
Observations	71	
1980s		
Ethnic	**−0.929*****	**−5.07**
Adj R^2	0.66	

Table 14 continued

Variable	Dependent variable: KKZ-index	
	Coefficient	t-Statistic
Observations	72	
1990s		
Ethnic	**−0.802*****	**−4.06**
Adj R^2	0.63	
Observations	74	
No. Obs.	286	

Source: Own calculations
*0.1. **0.05. ***0.01
Significance level

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