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Abstract: For the first time in Indonesia, we jointly analyse several economic statistics and ethnic diversity indicators at national and local levels. Nationally, we find very high levels of economic inequality, measured from household asset values or consumption expenditure. In contrast, the levels of ethnic diversity, while non-negligible, are much lower, whether they reflect fractionalization, polarization, or horizontal inequity based on individual living standards. All horizontal inequity indicators surged after the Asian economic crisis. Horizontal inequity based on education is much lower and decreasing. Finally, we provide tentative explanations of local horizontal inequity in regressions that show a mixed pattern of socioeconomic influences.

1 Introduction

1.1 Ethnic diversity and community activities

Ethnic diversity is at the core of the fabric of society in many countries. As a consequence, it is likely to structure various socioeconomic activities, especially at local levels. Measuring and analysing better the local dimensions of ethnic diversity is therefore of paramount importance. This is our objective in this paper in the case of Indonesia.

In less developed countries, ethnic opposition and cooperation often take place locally through networks. This is of notable importance because in contexts in which the state and markets are deficient, community groups may provide local public goods and services, ensure mutual assistance, help mitigate adverse shocks that individuals face, assist in collective decision-making, and even contribute to local investment. For instance, in the absence of formal credit and insurance markets, networks of mutual assistance may allow for productive investments and mutualization of income shocks. Finally, information dissemination and political decisions often take place within local ethic networks. For all of these processes, social and political issues are likely to occur when there are local coordination issues between different ethnic groups.

However, there is also growing evidence that ethnic diversity may be noxious to social organization in general. For example, Fearon and Laitin (2003) find that post-Cold War civil wars are not more likely in more ethnically diverse countries. Comparing a Tanzanian district to a Kenyan district, Miguel (2004) shows that local ethnic diversity leads to fewer public goods in Kenya but not in Tanzania. More specifically, Miguel and Gugerty (2005) find in rural western Kenya that ethnic diversity is associated with lower and worse school and water facilities. Banerjee and Somanathan (2007) report that in India in the 1970s and 1980s an equalization trend in favour of disadvantaged social groups had a moderate negative influence on social fragmentation. In an experiment in a slum in Kampala, Habyarimana et al. (2007) show that public goods provision is helped by co-ethnic people using cooperative strategies, while non-co-ethnic people do not. In Senegal and Burkina-Faso, Arcand and Fafchamps (2012) find that people who are closer geographically, have similar wealth and household size are more often associated in community groups. Finally, in Colombia, Attanasio et al. (2012) show that close friends and relatives often participate in the same risk-pooling group. Ethnic favouritism (De Luca et al. 2015; Hodler and Raschky 2014) seems to be another feature of the divisions across ethnic groups. Finally, Desmet et al. (2012) exhibit the impact of linguistic cleavages on political economy outcomes.

A dimension of diversity that is crucial is the opposition between ethnic groups. Following the seminal article by Esteban and Ray (1994), ethnic polarization has often been found to be a decisive factor in conflicts and poor coordination among ethnicities. For example, Montalvo and Reynal-Querol (2005b) find that ethnic polarization reduces investment and increases government consumption and civil conflict. In the cases in which characteristics of individuals can be observed, ethnic inequalities have been found to matter a lot, as pointed out by Esteban et al. (2012). All these issues call for details measurement of ethnic diversity.

1.2   Measuring ethnic diversity

The right measure of ethnic diversity to include in empirical studies is somewhat unclear. Fractionalization, originally introduced by Herfindhal (Hirschman 1964), is a popular measure. Besides, several variants have been proposed in the literature (e.g. Bossert et al. 2008). Using country-level data, Sturm and De Haan (2015) find that the impact of ethnic fractionalization on income distribution is conditional on the level of economic freedom. Chadha and Nandwani (2016) find a strong connection between overall inequality and low ethnic fragmentation at the district level in India for the years 1987–2012.

Diverse definitions of fractionalization indices have been used, although it seems that the variants do not yield fundamentally different correlations with socioeconomic phenomena. Beyond seminal papers, Alesina et al. (2003) consider new measures of ethnic fractionalization for most countries. On the whole, they rather confirm previous results in the literature about the impact of fractionalization on growth and government quality, although with a few differences. In his turn, Fearon (2003) proposes a new nomenclature of ethnic groups for 160 countries. He reports how the resulting fractionalization variable differs from using the typical ethno-linguistic definition. Posner (2004) defines ethnographic groups by accounting for whether they engage in political competition. Wimmer (2008, 2013) goes as far as attempting to identify the process of boundary-making for ethnic groups. Finally, from a more general point of view, Kranton (2016) reflects on how to define individual identities, including ethnic identities, and their relationship with behaviour norms. In this paper, after a few tries, we choose to stick with the classic definition of fractionalization, while completing it with polarization and horizontal inequity indicators.

Indeed, as we discuss later, other measures such as ethnic Gini or polarization indices have been employed to investigate the impact of ethnic diversity on socioeconomic country-level variables (e.g., Alesina et al. 2016; Esteban et al. 2012). Looking at different periods may also be useful. Anderson et al. (2012) examine the extent of decreasing or growing polarization in lifetime gross domestic product (GDP) per capita over time. Neumann and Graeff (2013) extended polarization indices to multivariate distributions, albeit warning against sensitivity of social science results to the chosen method.

1.3   Mechanisms

Measurement is not enough. If we want to be able to interpret the correlations of ethnic diversity indicators with socioeconomic variables, we need some notions about what the mechanisms of action of ethnic diversity are, and what the possible correlates of ethnic diversity are locally. Some socio-economic roles of ethnic diversity may be the very cause why different groups locally associate, or not, one another. Some recent research on this suggests some lines of approach. Using country-level data, Wimmer et al. (2009) claim that violent conflict is not necessarily the consequence of ethnic diversity as such, but rather stems from specific ethnic configurations, including the way ethnic elites share power. von Hau and Singh (2014) further review the literature on public good provision, which is depleted by ethnic fractionalization, by eliciting three kinds of mechanisms: collective action by ethnic groups; actions and perceptions of other collective actors; and institutional change. Gisselquist et al. (2016), using district-level data from Zambia, investigate the mechanisms behind the negative relationship between ethnic diversity and public good provision and welfare outcomes, and the conditions in which it can be reversed. They find an occurrence of a positive instead of negative relationship with some welfare outcomes.

In these conditions, more emphasis on analyses incorporating local competition across ethnic groups, and local horizontal inequity, which can be a consequence, may yield more profound understanding of the social and economic mechanisms at work. Rivalry between competing ethnic groups is a salient feature of social and economic life in most countries. It may result in high levels of horizontal inequity that may interact with purely economic inequalities, as well as with various decisions of economic agents.

More specifically, horizontal inequity may interact in many ways with social and economic environments, with positive and negative consequences. On the one hand, horizontal inequity is connected to ethnic diversity, which may imply greater variety of skills and endowments, and thereby may contribute to increasing productivity through complementarity and specialization of human factors and higher innovation. On the other hand, horizontal inequity and ethnic fragmentation may lead to badly targeted policies, suboptimal investment in public goods, and even ethnic violence and segregation. In general, government quality and social harmony have also been found to be harmed by horizontal inequity.

In turn, mechanisms have been suggested also for the other measures of ethnic diversity. For example, ethnic polarization may contaminate economic and social policies through rent-seeking, and may generate corruption and inefficient policies. It has been found in the literature that ethnic fragmentation is negatively correlated with depletion of development outcomes, from production to education and public goods. It is also empirically associated with ethnic conflicts and segregation.

Of course, economic inequality itself, without ethnic dimensions, has also positive and negative effects on diverse social and economic dimensions of societies, and this has been well studied. Typically, greater inequality generates more crime, investment-deterring taxes, and educational glass ceilings. On the bright side, greater inequality may foster incentives for innovation and entrepreneurship.

1.4 Pooling diversity measures

Faced with the complexity of the presumed interactions of socioeconomic phenomena with ethnic diversity, it would make sense to distinguish among them by measuring different dimensions of ethnic diversity together. For example, polarization may better capture potential for conflict while fractionalization may better explain free-riding issues.

Accordingly, Montalvo and Reynal-Querol (2005a) find that polarization is a significant and positive determinant of civil wars. They also report that polarization and fractionalization, at country level, are little related. As a matter of fact, for high levels of diversity the correlation of polarization and fractionalization can be quite low. Using data from 46 countries, Baldwin and Huber (2010) show that economic inequality, ethnic fractionalization, cultural fractionalization, and between-group inequality differ greatly in practice, with only between-group inequality being significantly and negatively associated with public goods provision.

With three indicators, using a sample of 138 countries over the years 1960–2008, Esteban et al. (2012) show that ethnic polarization, ethnic fractionalization, and ethnic Gini index are all significant correlates of conflict. These results are consistent with the theoretical model in Esteban and Ray (2011), in which when group cohesion is high, polarization (respectively fractionalization) affects conflict if the prize is public (respectively private), while ethnic Gini affects conflict under low group cohesion.

Alesina et al. (2016) also examine between-ethnicity inequality across countries. They find horizontal inequity to be negatively correlated with development as measured by light intensity measured from space. They also find that the well-established negative association of ethnic fragmentation and polarization with development outcomes in the literature fades away when accounting for horizontal inequity that remains solely significant in their data. This suggests that this is the distribution of income and assets among ethnic groups that may matter for growth, instead of just the respective size of these groups.

One feature of most studies in the literature is that they are based on data at relatively aggregated levels (countries, homelands, regions). In contrast, we work at the village level in a large country, which should provide a finer measure of horizontal inequity issues.

1.5   In Indonesia

Let us now turn to previous work about group-based inequality in Indonesia. Mancini (2005), using district-level data, finds that local horizontal inequality in child mortality is positively associated with ethnic violence. Violence among ethnic groups is more frequent under low economic development and high religious polarization. In contrast, Mancini finds that economic inequality and ethnic fractionalization have no impact on violence.

Stewart et al. (2010) examine the definition of horizontal inequity based on social, economic, political, and cultural status. They propose to use measures of group inequality with population weighting such as GGini, GCov, and GTheil, which we discuss below. Using data from Indonesia, they find a high correlation across these three measures, albeit a low correlation with the economic Gini coefficient.

Chen (2010) finds that after the 1997–98 economic crisis in Indonesia, religious intensity, a form of group identity, is associated with insurance after the occurrence of harmful economic shocks. Muller and Vothknecht (2013), for the years 1997 and 2000, exhibit the interactions of violent environments with ethnic characteristics. They find that one consequence of violence is general depression of participation in community activities, except in ethnically polarized villages, where a violent context stimulates participation. Beyond contexts of violence, the results raise the question of the role of ethnic diversity in community activity development in Indonesia. Muller and Vothknecht (2016) provide benchmark estimations for the correlation of many socioeconomic variables with activity participation, including ethnic fractionalization and polarization variables. Even though they do not deal with ethnicities, Alatas et al. (2016) show the importance of local network relationships for implementing policies in Indonesian villages, in their case pro-poor targeting programmes. It seems likely that some of these network interactions follow ethnic lines.

In this paper, using household and community panel data from Indonesia, we study horizontal inequity, ethnic fractionalization, polarization, and economic inequality. First, we estimate and analyse ethnic diversity and economic inequality statistics at the village level. Second, we investigate how local inequality and diversity across groups and social classes are correlated with economic variables and economic inequality. Third, we examine the correlates of horizontal inequity at the village level.

Section 2 presents the Indonesian data. In Section 3 we explain our statistical strategy. In Section 4 we discuss our estimation results. Section 5 concludes.

2   The context and the data

2.1 Indonesia

Indonesia is a large lower-middle income country with a GDP per capita of US$3,630 in 2014 (most recent available safe statistics). Its huge population of 254 million inhabitants, among whom about 11 per cent are poor, enjoys an average life expectancy at birth of 64 years.

Most Indonesian islands are made of an imbroglio of groups, castes, villages, tribes, religious groups, clans, and production associations that connect inhabitants together through implicit social contracts. These contracts ensure solidarity, but also bring many constraints. Individuals who neglect their social duties may be excluded from the community. For example, people who do not give expected presents or do not carry their share of collective work may lose access to diverse social and economic, formal or informal, institutions; or, as in Bali, they may be deprived of cremation at their death. Social rights and social duties typically depend on hierarchical parental positions.

As a matter of fact, family and religious values remain the moral basis of the Indonesian society, with special deference to ancestors, elders, and family heads. The village is the fundamental social unit that embodies the traditional and modern solidarities, which are often regulated by customs.

Accordingly, the 2001 Decentralization Laws transferred most public and social decision-making to local institutions.[1] The 1999 Regional Autonomy Law had already split up the decision-making power of the provinces (33 provinsi) and the districts (kabupaten) into smaller administrative units, spurring the autonomy of communes and villages (62,000 kota). Some objectives pursued through these laws were higher efficiency and more equitable distribution of resources. As a result, village communities emerge as the relatively autonomous foundation of the whole administrative edifice.

2.2 Survey data

We use data taken from the IFLS, a longitudinal household and community survey (Strauss et al. 2004), which represents 83 per cent of the Indonesian population.[2] For reasons of information availability, we use the second (IFLS2 in 1997), the third (ILFS3 in 2000), and the fourth waves (ILFS4 in 2007) of the IFLS.

The sample includes 13,303 respondents for 1997, 15,770 respondents for 2000, and 20,929 respondents for 2007. Many individuals can be observed in several rounds, which allows for panel data analyses. The community survey offers data on the characteristics of the 311 communities. An IFLS community/village is a randomly drawn enumeration area.[3] The nationally representative sampling frame was the one also used for the 1993 SUSENAS National Household Survey. A community includes 200–300 households.

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[1] Kartasasmita and Stern (2016) analyse Indonesia's political economy during the unfolding of the 1997 crisis and up to the present.

[2] The IFLS covers Java, the provinces of North, West, and South Sumatra, and Lampung on Sumatra, the islands of Bali and Nusa Tenggara Barat, and finally South Sulawesi and South Kalimantan. The least densely populated regions and the provinces in violent conflict, Aceh, Malukku, and East Timor, were not surveyed because of cost efficiency and security motives.

[3] As a simplifying shortcut, we often call it a 'community' or a 'village' in this paper, although some of these areas are urban or peri-urban.

3   The Statistical Strategy

Our statistical strategy is in three stages. First, we need to specify ethnic diversity measures, one of our main interests. We perform a descriptive analysis of these variables in Indonesia, notably in terms of economic horizontal inequity and educational horizontal inequity. Second, we examine the correlations of these measures with economic variables at the village level. Finally, we estimate regressions that exhibit correlates of horizontal inequity at the village level.

Our investigation is based on estimating diverse indicators of ethnic diversity that have been proposed in the literature. We now state their definition. The estimation of these national-level and village-level ethnic diversity indicators is based on the survey sub-samples in each village. Although these sub-samples were drawn randomly, and are therefore representative, they may involve some small sampling variations that are not accounted for in the estimation. However, since we have more than 300 observations of villages at each survey round, and about 60 interviewed individuals in most villages, we expect these random variations to be smoothed out and not to substantially affect the analysis.

The Herfindahl index of *ethnic fragmentation* (*EH*) (Hirschman 1964) is one of the first formulae proposed for capturing ethnic diversity:

$$EH = 1 - \sum_{i=1}^{n} s_i^2 \qquad (1)$$

where s_i is the size of the ith largest ethnic group in the community. EH corresponds to the probability that two randomly drawn individuals belong to different groups.

The index of *ethnic polarization* (*PQ*) proposed by Reynal-Querol (2002), is:

$$PQ = 4 \sum_{i=1}^{n} s_i^2 (1 - s_i) = 1 - 4 \sum_{r=1}^{R} ((0.5 - sr)/0.5)^2 \qquad (2)$$

where s_i is the relative size of the ith largest ethnic group and n is the number of ethnic groups in the community. Ranging between 0 and 1, a higher value of the *PQ* index indicates a more ethnically polarized community, with *PQ* equal to 0 for an ethnically homogeneous community and *PQ* equal to 1 for a community with two ethnic groups of the same size.

Several group-inequality indicators are also estimated. They are typical inequality measures that are computed (nationally or in each village) by using the mean consumption per-adult-equivalent for each group. Alternatively, we also consider the mean education level (among individuals over 14 or over 24) for each group.

Let m_r be the mean of the variable y in group r, m its global mean, and s_r the population share of group r. Let sqrt() be the square root operator. The sums $\sum_r$ and $\sum_s$ run over all the R ethnic groups. Then, the *group-weighted coefficient of variation* (GCOV) is:

$$GCOV = (1/R) \, \text{sqrt}(\sum_r S_r \, (m_r - m)^2) \qquad (3)$$

The *group-weighted Theil index* (GTheil) is:

$$GTheil = \sum_r s_r \, (m_r/m) \ln(m_r/m) \qquad (4)$$

The *group-weighted Gini coefficient* (GGini) is:

$$\text{GGini} = \left(\sum_r \sum_s s_r s_s \lvert m_r - m_s \rvert\right)/(2m) \tag{5}$$

We now turn to our empirical results.

4 Empirical results

4.1 Descriptive statistics

Levinson and Christensen (2003) propose a nomenclature including more than 300 ethnic groups in Indonesia. The village and local communities are the social basis of all these groups, even though the groups have different languages, cultures, and histories. The largest ethnic group are the Javanese (41 per cent of the total), who live mostly in Java but also on other islands. The Malay, Sundanese, and Madurese are other important groups. Other ethnic groups are small, such as the Chinese who account for less than 1 per cent of the population. Although ethnic group definition may be debatable, we are constrained to using the information available in the IFLS questionnaire, which is basically related to languages. Therefore, our definition of ethnic group is that proposed by the Indonesian administrators of the survey.

Individual ethnicity information is obtained from IFLS4 (collected in 2007–08). Since no information on ethnicity is available from IFLS3, we assume stable ethnic composition of villages between years for our analyses. This implies that the changes in ethnic composition caused by migration and other demographic changes are neglected.

Economic inequality is a major issue in Indonesia, with our national estimated Gini coefficient of assets from 0.64 to 0.68 across the survey rounds, and all the more so with the concentration of wealth in Jakarta in contrast to destitute peripheral regions. The economic Gini coefficient of the household equivalent consumption is also high, between 0.42 and 0.60, depending on the years. In contrast, the Gini coefficient of number of education years is relatively low at around 0.19. Local inequality may also be a problem, but it has been less studied. In general, the within-village asset inequality, as measured by the Gini coefficient, is substantial.

Table 1 (a–d) shows the distribution of individuals by ethnic groups and diverse horizontal inequity statistics. The Javanese and Sundanese groups account for nearly half the surveyed sample of individuals. The large number of ethnic groups recorded illustrates the diversity of the ethnic situation in Indonesia.

Table 1a: Ethnic groups in the 2007 sample

Ethnicity	Number of observations	Percentage
Jawa	8,737	41.87
Sunda	2,556	12.25
Bali	988	4.73
Batak	690	3.31
Bugis	841	4.03
Tionghoa	151	0.72
Madura	699	3.35
Sasak	933	4.47
Minang	1,058	5.07

Banjar	669	3.21
Bima-Dompur	434	2.08
Makassar	289	1.39
Nias	71	0.34
Palembang	58	0.28
Sumbawa	107	0.51
Toraja	118	0.57
Betawi	749	3.59
Dayak	7	0.03
Melayu	236	1.13
Komering	20	0.10
Ambon	11	0.05
Manado	2	0.01
Aceh	22	0.11
South Sumatera	609	2.92
Banten	64	0.31
Cirebon	501	2.40
Other	246	1.18
Total	*20,866*	*100*

Source: author's calculations, based on data from the IFLS.

Table 1b: Measures of horizontal inequality based on living standards

	Year	Ethnicity	Religion	Region	Gender	Rural/urban	Capital/others
GCOV	1997	0.170	0.118	0.240	0.0283	0.317	0.238
	2000	0.152	0.0867	0.187	0.0156	0.271	0.208
	2007	0.419	0.358	0.443	0.0427	0.331	0.302
GGini	1997	0.0774	0.0181	0.116	0.00997	0.108	0.0355
	2000	0.0595	0.0120	0.0820	0.00551	0.0946	0.0301
	2007	0.150	0.0659	0.205	0.0151	0.116	0.0438
GTheil	1997	0.0135	0.00457	0.0250	0.000200	0.0245	0.0117
	2000	0.00992	0.00247	0.0145	0.000061	0.0181	0.00904
	2007	0.0609	0.0341	0.0781	0.000457	0.0272	0.0179

The living standard variable = per-adult-equivalent consumption expenditure; total adult population.

The considered religions are: Muslim, Catholic, Protestant, Hindu, other. The regions are: Bali, Jakarta, Jawa Barat, Jawa Tengah, Jawa Timur, Lampung, North Sumatera, Nusatenggara Barat, South Kalimantan, South Sumatera, Sulawesi Selatan, West Sumatera, Yogyakarta.

Source: author's calculations, based on data from the IFLS.

Table 1c: Measures of horizontal inequality based on years of education, population 15 years and older

	Year	Ethnicity	Religion	Region	Gender	Rural/urban	Capital/others
GCOV	1997	0.120	0.0516	0.112	0.113	0.244	0.0818
	2000	0.0482	0.0546	0.100	0.101	0.231	0.0761
	2007	0.0964	0.0416	0.0880	0.0846	0.189	0.0645
GGini	1997	0.0535	0.0106	0.0564	0.0399	0.0837	0.0121
	2000	0.0482	0.0112	0.0478	0.0359	0.0806	0.0110
	2007	0.0403	0.00843	0.0425	0.0299	0.0666	0.00935

	Year	Ethnicity	Religion	Region	Gender	Rural/urban	Capital/others
GTheil	1997	0.00749	0.00100	0.00561	0.00320	0.0145	0.00155
	2000	0.00586	0.00112	0.00445	0.00259	0.0177	0.00134
	2007	0.00467	0.000660	0.00347	0.00178	0.00893	0.000976

Source: author's calculations, based on data from the IFLS.

Table 1d: Measures of horizontal inequality based on years of education, population 25 years and older

	Year	Ethnicity	Religion	Region	Gender	Rural/urban	Capital/others
GCOV	1997	0.141	0.0653	0.120	0.154	0.270	0.0729
	2000	0.127	0.0673	0.112	0.146	0.257	0.0757
	2007	0.108	0.0500	0.103	0.117	0.224	0.0768
GGini	1997	0.0639	0.0136	0.0557	0.0543	0.0920	0.0104
	2000	0.0571	0.0142	0.0493	0.0515	0.0892	0.0106
	2007	0.0474	0.0104	0.0510	0.0413	0.0788	0.0109
GTheil	1997	0.0102	0.00159	0.00650	0.00591	0.0177	0.00123
	2000	0.00823	0.00168	0.00564	0.00531	0.0162	0.00132
	2007	0.00598	0.000963	0.00475	0.00342	0.0124	0.00136

Source: author's calculations, based on data from the IFLS.

Horizontal inequity calculated from individual consumption levels (per-adult-equivalent consumption expenditure) is far from extreme, but not non-negligible. For ethnic Gini coefficients of living standards, it reaches about 8 per cent in 1995, 6 per cent in 2000, and 15 per cent in 2007. The huge surge in 2007, after the economic crisis, is found for all horizontal inequity indicators. In general, the trends of horizontal inequity are the same for all horizontal inequity indicators (GCOV, GGini, and GTheil), but also for other group-inequality indicators based on the following groups: religion, region, gender, rural/urban, and capital/others. We do not comment on them further.

Interestingly, a different picture emerges when examining instead group-inequality statistics based on the number of education years. In that case, the group-inequality levels are low, whether the considered populations are the individuals of 15 years and older, or of 25 years and older. This result may reflect the impact of mandatory education laws over time in Indonesia, which act as levellers of education levels across ethnic groups, as well as across other groups. Even more, a slight trend in equalization can be observed between 1997 and 2007. For example, for the Gini coefficient of education inequality, we obtain for 15 years and older: 5.3 per cent in 1997, 4.8 per cent in 2000, and 4.0 per cent in 2007. For 25 years and older this is: 6.4 per cent, 5.7 per cent, and 4.7 per cent, respectively.

Using aggregate data from the 1995 census at district level, while excluding Java and some conflict areas, Mancini (2005) computes horizontal inequity indicators in Indonesia. He finds a Gini coefficient of income of 0.36, an ethnic GCOV for income of 0.13, and an ethnic GCOV for education of 0.10. Although the data and the variables are different, it is comforting to find a similar gap in our results between the Gini coefficient of economic inequality and the horizontal inequity estimates.

Ethnic fragmentation is about 0.25, while ethnic polarization reaches 0.40. These latter two variables, which portray the stable ethnic demographic composition of villages, vary little across years.

4.2. Correlations

As Stewart et al. (2010) point out, the chosen horizontal inequity indicators are very correlated in Indonesia. They report that the linear correlation coefficients of GGini and GTheil, across districts for different religion groups in 1995 and 1990, each about 91 per cent for education and 80 per cent for per capita income; the respective linear correlation coefficients of GGini and GCov corresponds to 0.99 per cent and 86 per cent. We recover the same pattern of high correlation at village level, which justifies using only the GGini index in the following.

Let us now consider the correlation between all these economic and ethnic variables at the village level. First, the correlations fluctuate slightly over time, and are generally lower in 2007. When considering together, across villages, all the correlation coefficients of all ethnic diversity and economic inequality or economic mean indices, a certain dichotomy emerges between economic statistics and ethnic diversity variables. Mean living standards have a clear link with mean asset levels, with a correlation coefficient that varies between 0.32 in 2007 up to 0.50 in 2000. The correlations of the mean levels of living standards or assets with the Gini coefficient of inequality of assets are much lower, except in 2000 when it reaches 0.30 with the mean level of assets. On the other hand, the linear correlation coefficient of fragmentation and polarization indices is very high, at 0.90. Horizontal inequity is also relatively highly correlated with polarization (0.40 in 1997, 0.43 in 2000, 0.44 in 2007) and with fractionalization (0.35 in 1997, 0.45 in 2000, 0.48 in 2007).

Note, however, that there are still some notable correlations between some economic statistics and some ethnic diversity variables. If we choose a minimum threshold of 0.3 for the coefficient of correlations, we find no notable relationship between these types of variables in 1997, while in 2007 the horizontal inequity indicator appears to be related to the mean per-adult-equivalent consumption (0.47) and to the economic Gini coefficient based on assets (0.36). In 2000, this is the mean per-adult-equivalent consumption that is related to the three ethnic diversity indices with respective correlation coefficients equal to 0.41 with horizontal inequity, 0.39 with fractionalization, and 0.33 with polarization. The other correlation coefficients amid all these variables are smaller.

Because of these high levels of correlation between these indicators, one may think that part of the findings in the literature dealing with the determinants of socioeconomic outcomes may attribute exaggerated weight to the influence of some included diversity indicators, while they may in fact reflect the effect of some excluded diversity indicators.

Tables 2 and 3 report descriptive statistics for the variables used in the estimation or describing the context, respectively at individual and village levels. The analysis is restricted to individuals aged 14 years old or more. The studied population is young and have heterogeneous education levels, with more than half having no or only primary education, while two-fifths obtained some amount of secondary education. The figures largely reflect the complex Indonesian educational history. Nowadays, nine years of education are compulsory, and children therefore enjoy six years of primary education and three years of secondary education. In total, secondary education lasts for six years (three years in junior high school and three years in senior high school). Higher education varies with the chosen specialty and lasts about four additional years; this affects only 6 per cent of individuals. In practice, this pattern is only approximate since some students may follow accelerated learning programmes while others take some classes twice. We do not observe

the actual number of years of education in this survey. Instead, we impute this variable in using the number of years of the completed education level for each individual.

Table 2: Descriptive statistics for individuals

Variable	Obs.	Mean	Std dev.	Min.	Max.
Sex	49,997	0.460	0.498	0	1
No education	49,740	0.105	0.307	0	1
Junior high school	49,740	0.171	0.377	0	1
Senior high school	49,740	0.231	0.421	0	1
Higher education	49,740	0.0634	0.243	0	1
Private worker	49,995	0.210	0.407	0	1
Self-employed	49,995	0.291	0.454	0	1
Unpaid family	49,995	0.112	0.315	0	1
Government job	49,995	0.0450	0.207	0	1
Work hours	49,997	3.03	2.74	0	11.2
Ln monthly income (in 1,000 Rp.[a] 2000 Prices)	49,989	6.54	6.24	0	19.8
Married	49,997	0.682	0.465	0	1
Head's spouse	49,997	0.646	0.478	0	1
Age head	49,997	0.597	0.490	0	1
Low expenditure	48,604	0.276	0.447	0	1
High expenditure	48,604	0.210	0.407	0	1
Rel. rank asset	49,997	0.550	0.283	0.0166	1
Farm household	49,997	0.426	0.494	0	1
Business household	49,997	0.446	0.497	0	1
Female head	49,997	0.126	0.332	0	1
Household size	49,997	6.35	2.84	1	38
Suffer shock	49,997	0.210	0.407	0	1
Moved	49,997	0.0924	0.289	0	1
Rural	49,997	0.530	0.499	0	1
Total population	49,642	0.920	1.36	0.0207	23.6
Village ln asset	49,997	17.3	0.778	15.1	21.3
Gini asset	49,881	0.529	0.117	0	0.885
Gini × rank	49,881	0.291	0.167	0	0.885
Jakarta	49,997	0.0759	0.264	0	1
Jawabarat	49,997	0.150	0.357	0	1
Jawatimur	49,997	0.153	0.360	0	1
Nusatbarat	49,997	0.0668	0.249	0	1
Sulawesisel	49,997	0.0522	0.222	0	1

[a] Exchange rate in 2000: US$ = ~3,000 IDR.

[b] As assessed by the interviewer.

Source: author's calculations, based on data from the IFLS.

Table 3: Village means

	1997	2000	2007
Age	35.7	36.2	38.7
	(3.31)	(3.63)	(3.52)
Gender	0.438	0.452	0.472
	(0.087)	(0.078)	(0.055)
Age of head	0.607	0.614	0.592
	(0.160)	(0.147)	(0.124)
Farm households	0.321	0.377	0.346
	(0.324)	(0.349)	(0.348)
Business households	0.388	0.507	0.471
	(0.208)	(0.211)	(0.195)
Female heads	0.124	0.128	0.145
	(0.104)	(0.102)	(0.092)
Household size	6.03	6.37	6.75
	(1.13)	(1.25)	(1.37)
Household shocks	0.340	0.274	0.0788
	(0.190)	(0.174)	(0.197)
Migrants	0.011	0.0234	0.197
	(0.0829)	(0.077)	(0.363)
Equivalent consumption (1000 rupiah)	99.48	73.5	143.0
	(92.49)	(37.0)	(212.0)
Rural	0.421	0.417	0.389
	(0.494)	(0.492)	(0.485)
Population (thousands)	1.13	.989	1.13
	(2.06)	(1.09)	(1.65)
Village average asset	8.09e+07	4.63e+07	5.41e+07
	(1.59e+08)	(4.42e+07)	(5.79e+07)
Village Gini of assets	0.520	0.535	0.558
	(0.136)	(0.124)	(0.112)
Ethnic Gini	0.0963	0.105	0.160
	(0.113)	(0.111)	(0.169)
Ethnic fragmentation	0.248	0.247	0.247
	(0.244)	(0.243)	(0.244)
Ethnic polarization	0.399	0.396	0.396
	(0.361)	(0.361)	(0.360)
Jakarta	0.115	0.112	0.112
	(0.320)	(0.316)	(0.316)
Jawabarat	0.163	0.164	0.145
	(0.370)	(0.371)	(0.352)
Jawatimur	0.144	0.145	0.145
	(0.352)	(0.352)	(0.352)
Nusatbarat	0.0514	0.0516	0.0516
	(0.221)	(0.221)	(0.221)
Sulawesi	0.0514	0.0516	0.0516
	(0.221)	(0.221)	(0.221)
No. observations	311	311	311

Standard deviations in parentheses.

Source: author's calculations, based on data from the IFLS.

About two-thirds (68 per cent) of the studied individuals are married. Although relatively poor, more than half of these individuals are employed, mostly in the informal private sector and formal private sector. One-third of the surveyed individuals are self-employed, while one-fifth are employed in the private sector. Few of them enjoy a job in the public sector (4.5 per cent),

while a non-negligible number work in the informal sector as unpaid family workers (11 per cent). Slightly more than half of the individuals live in rural areas, and they are spread across all surveyed provinces.

The descriptive statistics at the village level and village means, for the sample of 311 villages, are consistent with the individual descriptive statistics. The mean Gini coefficient of village inequality of assets is very high (0.52 to 0.56, depending on years) and little concentrated among villages. Conversely, the mean of village-level Gini coefficient of horizontal inequity, based in per-adult-equivalent consumption, is much lower (0.096 to 0.161) and much more dispersed, with a coefficient of variation above 1 in every survey year. The means of village-level polarization (0.396 to 0.399) and village-level fractionalization (0.247 to 0.248) are substantial and agree with the aggregate national estimates. However, substantial differences between villages occur in that respect also, as shown by a coefficient of variation of about 1.

In general, most of the variables used are characterized by relative stability across years and substantial dispersion across villages, which augurs well for their use in econometric estimation. We now turn to such estimations.

4.3   Correlates of horizontal inequity

Few authors have attempted to explain ethnic diversity as such. However, Michalopoulos (2012) explains the determinants of ethnic linguistic diversity within and across countries, with an emphasis on its geographical origin, measured by land quality and elevation.

Table 4 shows the results of panel regressions of the ethnic Gini coefficient of inequality over a broad set of village-level regressors. There are two specifications: fixed-effect and random-effect estimators. The result of the Hausman test for the common set of coefficients, with a p-value of 0.70, implies that the random-effect specification for panel regressions is preferred to the fixed-effect estimator. As a consequence, we mostly comment on the more efficient random-effect results.

Table 4: Panel fixed-effect and random-effect regressions of horizontal inequity at community level

Variables	FE	RE
Proportion female	−0.0802	−0.104*
	(0.081)	(0.058)
Proportion farm households	−0.0431	−0.0744***
	(0.036)	(0.016)
Proportion business households	−0.00333	−0.0127
	(0.028)	(0.020)
Proportion female heads	−0.127**	−0.150***
	(0.056)	(0.043)
Mean household size	0.0244***	0.0242***
	(0.0057)	(0.0037)
Proportion shocked	−0.0337*	−0.0309*
	(0.018)	(0.016)
Proportion migrants	0.0263	0.0348**
	(0.016)	(0.015)
Mean per-adult-equivalent consumption	0.000323***	0.000334***
	(0.000028)	(0.000026)
Mean asset value	−7.12e−11	−1.12e−10***
	(6.81e−11)	(4.15e−11)
Total population	−0.00156	0.0010756

	(0.0036)	(0.002703)
Constant	0.0124	0.0400
	(0.052)	(0.039)
Number of communities	311	311

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: author's calculations, based on data from the IFLS.

Explaining horizontal inequity is hard. Many attempted covariates, which are village-level variables, have non-significant coefficients in both specifications. This is the case for the percentage of business households, proportion of migrant households, rural dummy variable, or total population of the village, for example. We now comment on the significant coefficients only.

The proportion of females in the surveyed persons within the village is negatively related to horizontal inequity, as is the proportion of female household heads. Although mechanisms are elusive at this stage of data analysis, it seems that female presence, including in power positions, may be more conducive to equity among ethnicities. Another demographic characteristic seems to be important: household size. The bigger the households in the village, the higher the horizontal inequity.

There seems to be some connections between horizontal inequity and the prosperity of the village, although it is unclear which precise mechanisms they may correspond to. An agricultural orientation of the village, measured by the proportion of farming households, appears to be negatively associated with horizontal inequity. The mean per-adult-equivalent consumption and the mean level of assets are significantly correlated with horizontal inequity, respectively positively and negatively. At the 10 per cent level, the percentage of households having suffered a severe shock seems to have a positively effect on horizontal inequity.

5   Conclusion

In this paper we examine ethnic diversity in Indonesia. At the national level, we find high levels of economic inequality, measured from household asset values or consumption expenditure. In contrast, the levels of ethnic diversity, while non-negligible, are much lower, whether they reflect fractionalization, polarization, or horizontal inequity based on individual living standards. We observe a surge of all horizontal inequity indicators after 2007, following the economic crisis. Horizontal inequity indicators based on education levels are much lower and decreasing, suggesting that education laws in Indonesia act as levellers across ethnicities as well as across other groups.

At the village level, ethnic diversity variables are rather strongly correlated, as are the economic variables of mean wealth or economic inequality. Weaker, but still salient, links remain between those economic and ethnic variables.

Finally, we provide tentative explanations of local horizontal inequity in regressions that show a mixed pattern of socioeconomic influences. Among intriguing correlates related to lower horizontal inequity are the local presence of female individuals and female heads, or the proportion of farm households. Conversely, areas with higher mean living standards are generally associated with higher levels of horizontal inequity.

Better understanding of horizontal inequity is important for policy. As a consequence of the 1997 financial crisis and the global slowdown in economic activity, the living standards of the poor and vulnerable households in Indonesia slumped in the studied period. In an attempt to alleviate these shocks, the Indonesian government implemented reforms, including stabilization plans, which severely impacted poverty, inequality, and other social dimensions. Equity of policies across ethnic groups is a crucial issue in this context.

Dhalber et al. (2012) have shown that generating these policies may be a challenge even for purely income-distributive policies. This is because preferences for redistribution may follow ethnic divisions, as also noted by DasGupta and Kanbur (2007). As a matter of fact, extreme ethnic divisions may even generate violent conflict, as analysed by Esteban and Ray (2011). Clearly, more research is needed to disentangle these complex interactions and to free the analyses of simplifying prejudiced policy conclusions.

For example, diverse policies should be investigated for transfer systems, eliciting the gains in reducing tensions across ethnic groups. Added to a growing sensitivity in Indonesia to corruption issues, this situation increases the political demands of populations for fairer and more efficient policy dealing with community and ethnic issues.

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