Does Industrialization Build or Destroy Social Networks?

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I. Introduction

Social networks affect a wide array of economic outcomes, ranging from informal credit and insurance to contracting and the provision of local public goods. Yet the process of creating and maintaining social networks remains poorly understood.[1] This article explores one facet of this issue, the relationship between industrialization and changes in social networks. We examine changes in social networks across Indonesian districts during 1985–97, a period of rapid industrial development in which real per capita income grew by an impressive 70% (World Bank 2002). In the absence of regionally disaggregated income data, we use manufacturing growth as a proxy for income growth throughout this article.

Social scientists have long been concerned with how industrialization and growing incomes affect social cohesion and networks. Polanyi (1944/1957, 129) expressed a pessimistic view of the effects of the nineteenth-century British Industrial Revolution, which had produced "social dislocation of stupendous proportions" and "wreaked havoc with [workers'] social environment, neighborhood, [and] standing in the community." Regarding Indonesia, Cribb and Brown (1995, 148–49) wrote that the economic boom and resulting large-

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[1] Contributions include Besley, Coate, and Lowry (1993), Greif (1993), Udry (1994), and Alesina, Baqir, and Easterly (1999).

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scale migrations led to "an increasingly rapid rate of corrosion of the long-standing social and moral ties which bound agricultural communities together," and contemporary antiglobalization writers echo related themes (Ciscel and Heath 2001). But not all researchers share this gloomy view of how economic development affects social interactions. For example, Putnam (1993, 180) claims that "networks of civic engagement contribute to economic prosperity and are in turn reinforced by that prosperity."

This article hopes to begin making sense of these conflicting views on income growth and industrialization. We use Indonesian household-, firm-, and village-level nationwide surveys to create a panel data set of 274 districts for the years 1985–97 and examine the relationship between changes in industrial development and changes in social networks measures. The data set contains a rich set of social networks measures that we divide into two broad categories outlined in the existing literature (Fukuyama 2000; Putnam 2000): the density of voluntary community associational activity and levels of trust and informal cooperation. In the empirical analysis, we include district fixed effects to capture time-invariant unobserved heterogeneity across districts as well as community geographic characteristics as explanatory variables in an attempt partially to control for other factors that could affect social networks. This is the first study to our knowledge to explore this question using panel data from nationally representative surveys. Examining patterns within a single country—with its shared survey instruments, legal framework, and institutions—eliminates many hard-to-observe factors that could bias cross-country regressions.

The empirical analysis yields two main results. First, despite the pessimistic predictions surveyed above, rapidly industrializing districts showed increases in the density of most measures of social interaction—including more nongovernmental credit cooperatives and community recreational groups, and a higher share of income spent on local festivals and ceremonies. Second, industrialization in nearby areas is associated with lower incidence of credit cooperatives and a decline in "mutual cooperation" as measured in surveys. One leading hypothesis is that the migration of millions of young Indonesians from rural areas to nearby factory jobs could have weakened social networks in the districts they left, while bolstering social interactions in rapidly industrializing areas.

Despite the inclusion of district fixed effects and detailed district controls, estimating the causal impact of industrialization remains a challenge due to the possibility of time-varying unobserved district characteristics that might drive changes in industrialization and changes in social interactions simultaneously, as well as potential endogeneity (causality running from changes

in social networks to industrialization). With these concerns in mind, the correlations we present both are novel and run against some major themes in the recent literature on social capital and economic development. In particular, our results suggest that social capital measures often change rapidly over short periods of time and that industrialization may be driving social interaction patterns at least in part, rather than the other way around.

In a companion article (Miguel, Gertler, and Levine 2005), we show that high initial levels of social interaction in an Indonesian district did not predict subsequent industrial development there during the same study period. That result, coupled with the finding here that rapidly industrializing districts had larger increases in community associational activity in Indonesia, appears to run against recent studies claiming that the observed correlation of social capital with economic development implies that social capital caused faster growth (Putnam 1993; Knack and Keefer 1997; Grootaert 1999; Narayan and Pritchett 1999). In contrast, our results suggest that the positive cross-sectional relationship between social interactions and income found in many settings may be equally likely to reflect the effect of industrial development on social networks rather than the other way around, although we admittedly cannot decisively reject either possibility with the data at hand.

Despite the richness of the data set that we have assembled, this remains a study of one country in one period, and the question of relevance for other societies is important. Indonesia is a rather special case because economic development took place in a setting where government ideology promoted community groups and mutual assistance. Nonetheless, important aspects of the Indonesian experience generalize. For example, the large-scale migrations that accompanied Indonesian industrialization—and which we argue may play a central role in determining the density of social interactions—have been a common feature of industrial development from the U.S. Great Migration to contemporary China, and the community mutual assistance groups on which we focus are found in most countries (Besley et al. 1993).

The limitations of Indonesian survey data are also a major concern because it is both difficult to measure informal social connections and plausible that formal organizations arise in part to substitute for informal ties eroded by the structural transformation during economic development. Nonetheless, we find that several social networks measures that do not rely on formal community group registration—for example, the proportion of household expenditures on ceremonies and festivities, and survey data on mutual cooperation—show patterns broadly similar to the formal community group data, suggesting that the main results are robust to alternative definitions of social interaction.

The remainder of the article is structured as follows. Section II discusses

the several dimensions of social networks in Indonesia that we study, as well as our measures of them. Section III describes some existing theories of economic development and social interactions. Section IV presents the econometric identification strategy, and Section V the empirical results. In Section VI, we return to the implications and limitations of the analysis.

II. Social Networks in Indonesia

In this section, we briefly describe our measures of each of the two broad categories of social interactions that we study. Our measures are found in a variety of data sources collected by Indonesia's Central Bureau of Statistics (BPS), including the Village Potential Statistics (PODES) community (*desa*) survey, the National Socio-Economic Survey (SUSENAS) and the Intercensal Population Survey (SUPAS) household surveys, as well as the Indonesian Family Life Survey (IFLS). The appendix describes the data sets.

Community Groups

The hundreds of languages spoken in Indonesia are a rough indicator of the cultural diversity of the archipelago. Despite this diversity, most of the many cultures of Indonesia have always been well known for their rich set of community-level groups.[2] Former President Suharto's New Order built on this tradition (as well as on the community- and neighborhood-level structures established by the Japanese during World War II) and mandated a large number of groups for each community (Grootaert 1999). On top of these government-sponsored groups, other community groups are common, often growing out of the ubiquitous informal rotating savings and credit associations (ROSCAs) called *arisan* in Indonesian. During the period we study, there was also a flowering of community groups sponsored by nongovernmental organizations (Eldridge 1995, 28). Eldridge (1995, 53) describes a typical Indonesian community self-help group: "Local income-generation programs operated by small local groups, either independently or in association with some larger [nongovernmental organization], are fairly pervasive in Indonesia, most commonly in the form of informal or formal cooperative enterprises, *arisan*, savings and loan groups, and credit unions. . . . Perhaps the most creative mode of income generation . . . is the revolving fund. This practice is commonly associated with small, informal cooperatives, which are often built on traditional-style associations such as *arisan*. . . . This process obviously depends on efficient organization and high levels of mutual support and reciprocity."

[2] For more on Indonesian community groups, see Lont (2000).

Such community credit groups have been cited as a key manifestation of social capital (Putnam 1993), and recent research by Anderson, Baland, and Moene (2003) confirms that strong local ties are essential for their success in practice. Beyond nongovernmental credit groups, we also obtained information on the number of state-led community credit groups (KUD), traditional arts groups, sports groups, youth groups, farmers groups (P3A), and religious institutions in Indonesian communities.

Informal Social Networks

Community group data capture relatively formal expressions of social networks. Yet it remains possible that industrialization is associated with a shift toward formal forms of cooperation, but not considerable changes in underlying social networks; for example, in a small village with rich networks, organized sports leagues may be unnecessary because neighborhood children already play together informally. To partially address such concerns about formal social network measures, we also analyze two proxies for informal social networks. While no single measure can adequately capture all one might mean by informal social networks, these measures, taken together, fill some of the gaps.

The first measure of informal social networks is the proportion of per capita expenditures on festivals and ceremonies from the SUSENAS household survey. Intuitively, communities with frequent festivals are likely to have closer social connections. Breman (2001, 261) argues that such expenditures are likely to be a good measure of underlying social networks in Indonesia because "the cycle of rituals and festivities . . . give meaning and articulation to the collective dimensions of [an Indonesian] locality."

The second measure is derived from the traditional customs and law (*adat*) module of the 1997 IFLS.[3] In 270 rural enumeration areas, village chiefs identified a local expert in *adat*, and these experts were asked to state whether a particular norm had held in traditional law and whether it remained common practice at the time of the 1997 interview. These responses are best thought of as the opinions of influential community members.[4] The *adat* survey instrument contains one question directly related to social networks, the extent of an "ethic of mutual cooperation" in the community, which takes on a value of one if there is cooperation and zero otherwise. Unfortunately, we lack true

[3] For more on IFLS, refer to Frankenberg and Thomas (2001).

[4] The selection process of *adat* respondents is not transparent (e.g., very few women were included). The "past" is also a vague concept, open to multiple interpretations. Finally, because only one person was interviewed per community, there is no way to validate their opinions. Nonetheless, this unique data set provides important insights into social change in Indonesia.

panel data on trust and cooperation and, thus, rely on retrospective information from the 1997 survey.

III. Theories of Income Growth, Industrialization, and Social Networks

In this section, we briefly outline three leading theoretical channels possibly linking industrialization and social networks: increased migration, rising incomes, and rising income inequality. (A formal model relating these factors is available on request from the authors.)

A. Migration

Migration can strain social ties for a variety of reasons (Schiff 1998). For example, out-migration threatens rotating credit groups if those who contribute money to the common fund today cannot be sure that they will be repaid in the future (Besley et al. 1993; Routledge and von Amsberg 2003). In the United States, DiPasquale and Glaeser (1999, 4) find evidence that renters spend less time joining social networks because they will not be around to reap the future returns. Out-migration also may weaken social networks because migrants tend to be drawn from the same demographic groups—the relatively young and well-educated in Indonesia—that are disproportionately members in social networks. Correspondingly, inflows of such individuals into industrializing areas may increase social network formation in migration-receiving areas.

However, in-migration may also erode networks if new migrants, who may be ethnically and linguistically distinct from current residents, find it more difficult to integrate into preexisting local community social networks. Members of the same ethnic (or religious) group are often more likely to interact frequently in social settings, which increases trust and cooperation, and reputations also spread quickly within tight-knit groups, allowing for more effective social sanctions. A number of studies find that self-reported trust in others and the provision of local public goods are lower in more ethnically diverse communities (Alesina et al. 1999; Alesina and La Ferrara 2000; Miguel and Gugerty 2004).

On the one hand, in-migration may also reduce social interactions through increased population density and urbanization, which are typically associated with greater anonymity. If a greater proportion of people work outside their urban neighborhood than work outside a rural village, dense overlapping social networks may never form. On the other hand, higher population density could also create the critical mass necessary for the existence of local collective institutions for relatively small groups (e.g., the Chinese in Indonesia). All

told, the effect of in-migration on the quality of social interactions is theoretically ambiguous.

B. Income Growth and Inequality

Income growth can theoretically have either positive or negative effects on social network formation. On the positive side, most of the benefits of social networks are probably normal goods.[5] Consistent with that fact, Eldridge (1995, 68) claims that households from the poorest strata of Indonesian society are less likely to participate in financial self-help groups than somewhat better-off families, and similarly, Glaeser, Laibson, Scheinkman et al. (2000, 816) present evidence from the United States that "trust is much higher among richer and well-educated individuals."

On the negative side, income growth may reduce social network formation and membership. Growing incomes make social sanctions less effective as individuals become less dependent on their community. Ligon, Thomas, and Worrall (2000) model how the wealthy may opt out of mutual insurance arrangements, weakening informal networks. These effects may be particularly salient when income inequality increases. Higher wages also increase the opportunity cost of time, which could reduce membership in time-intensive social network activities. Industrialization has long been associated with rising income inequality, and inequality may reduce social bonds between richer and poorer people if their sense of common identification diminishes (Levine 1993).

C. Theories of Reverse Causality

Some social networks could promote industrialization and income growth. Indeed, Putnam (2000) emphasizes that norms of reciprocity and trustworthiness are essential for economic growth and that dense social networks help maintain such norms. Networks of mutual obligation may also encourage entrepreneurship. For example, individuals may be more willing to undertake efficient but risky projects if there exists a strong community safety net. Informal financial institutions based on social networks, including rotating savings groups, may provide an important source of investment.

At the same time, an extensive literature suggests that traditional norms can impede economic development. For example, Geertz (1963) argued that traditional forms of Javanese social networks were likely to produce continued economic stagnation by stifling saving and investment. Intuitively, if one's

[5] However, at very high levels of income, certain goods and services conferred by social networks may be inferior goods (e.g., informal savings and credit associations).

social network shares in the return to an investment, the potential entrepreneur's return to hard work and savings is diminished (Platteau 2000).

IV. Empirical Methods

We estimate the relationship between changes in industrialization and changes in social networks measures using repeated cross sections of Indonesian communities and households. We focus on reduced-form models that do not separately identify each of the possible theoretical channels described above. Because the theoretical channels linking industrialization and social change are likely to interact in complex ways, the reduced-form specification is a reasonable empirical starting point, although we also examine the relationship between industrialization and several of the leading theoretical channels.

The reduced-form econometric model assumes that industrial development in a district, as measured by the proportion of manufacturing employment ($\text{Manufacturing}_{dt}$) and the level of industrial development in nearby districts (Nearby_{dt}), determines the current level of social networks:

$$\text{Social network}_{idt} = a_t + b_1\ \text{Manufacturing}_{dt} + b_2\ \text{Nearby}_{dt} + X'_{idt}c + Z'_{dt}f + u_d + e_{idt}. \quad (1)$$

The coefficient estimates of b_1 and b_2 are our primary focus. $\text{Social network}_{idt}$ denotes a measure of social networks, such as the number of community groups, in community i in district d at time t (in the household-level analysis, i refers to a household). For expositional clarity we drop the subscript denoting each type of social interaction here. The X_{idt} variables are characteristics of the community or household, while Z_{dt} are characteristics of the district that may affect social networks. The term a_t is a time indicator variable, and u_d is a common district fixed effect. Finally, e_{idt} is the idiosyncratic disturbance term.

Omitted variable bias is a serious concern in the cross-sectional regression: estimates of b_1 and b_2 using cross-sectional data will be biased if unobserved determinants of social networks (u_d) are correlated with industrial development. To the extent that unobserved district factors that affect social networks are persistent over time, adding district fixed effects addresses this source of bias. With two periods of data, which we have, this is closely related to a first-differences specification. We are unable to match communities or households across survey rounds for the PODES, SUPAS, and SUSENAS data sets, which leaves us with repeated cross sections rather than a true panel and forces us to use district fixed effects rather than community or household fixed effects.

However, despite the inclusion of district fixed effects, estimates of b_1 and b_2 will be biased if we omit time-varying variables that affect both industrial

development and social networks. For example, the construction of a major highway running through a district, electrification, or primary school construction could conceivably both increase investment in manufacturing and also affect the success of community organizations. Below, we find that neither roads, electricity, nor school construction robustly predict subsequent industrialization, partially ameliorating concerns over this potential source of bias. We also include community geographic controls in some specifications—including being landlocked, altitude, and village area—to address potential omitted variable bias by capturing factors that are common to regions that share certain geographic features. Nonetheless, we cannot completely rule out the possibility of bias because of other omitted time-varying factors, or because of endogeneity running from changes in social networks measures back to changes in industrialization, and this is an important limitation of the econometric analysis.

Unfortunately, convincing instrumental variables for district-level industrial development and social networks have been impossible to find, and a general characterization of the factors that led particular districts to industrialize while others stagnated remains elusive.[6] In our companion article (Miguel et al. 2005), we examine the relationship between initial density of social networks and subsequent industrial change. Using a variety of specifications and control variables, initial social networks measures are not significantly correlated with later industrialization. Although those results are not definitive and we recognize that alternative interpretations are possible, this does argue against severe reverse causality problems. That is, if the initial density of social networks does not predict industrial development, it is plausible that changes in social networks are not driving industrialization either.

Manufacturing in nearby districts may potentially generate a variety of spillovers on social networks. For example, migration to rapidly industrializing areas may weaken rural organizations in the migrant-sending regions, or individuals may adopt the "modern" attitudes and organizational forms originating in nearby industrial areas.[7] In the presence of mobility costs that limit migration across large distances, the proper measure of "nearby" industrialization may be among districts located within a certain distance of the district capital (we typically use 200 kilometers, although we also experimented with

[6] For example, by this period government investment policy no longer favored specific regions (Hill 1996).

[7] It is also possible that industrialization at the national (or even international) level leads to cultural change even in areas completely untouched by industry. In this case, the estimated effects from eq. (1) serve as lower bounds on true effects, because nationwide effects are captured in the year indicator variable.

other distances and found similar results), or for other districts in the same province. We use both in the empirical section and find that the correlation coefficient between both measures of nearby industrialization is high (0.75) and that the main empirical results are similar in either case. Note that the median district capital is located within 200 kilometers of 15 other district capitals.

We use data as close as possible to the years 1985–95 in order to examine comparable changes over roughly a decade for both the social networks and industrialization changes. We drop the former province of East Timor and the province previously known as Irian Jaya (before its recent division and subsequent name changes). We also combine districts that merged or split to reformulate them into the largest unit consistently defined from 1985 to 1995. The resulting data set contains complete industrialization information for 274 districts.

Disturbance terms may be correlated among nearby districts because of common policy choices, political leadership, weather, and ethnic or religious influences. We adjust standard errors to correct for this possibility in two ways and obtain similar standard errors with both methods. First, we allow for a common random effect across all communities (or households, depending on the specification) within the same province in a given year, using clustered standard errors. Second, we also allow disturbances to be correlated across districts as a general function of distance in certain specifications using the generalized method of moments estimator in Conley (1999).[8]

V. Results

A. Summary Statistics

Manufacturing employment as a share of the full-time economically active population (those unemployed or working over 20 hours per week) grew sharply from 6.3% to 13.1% between 1985 and 1995 (table 1). To control for possible changes in labor-force participation due to industrialization, we focus on the change in manufacturing employment as a share of total adults in the district in 1985, which also doubled from 3.3% to 6.7% (table 1, row 1). Manufacturing employment gains were large for both females and males. There were also major increases in per capita expenditures, education, and urbanization.

The map in figure 1 divides districts into three quantiles based on the extent of industrialization (measured by the percentage point change in man-

[8] Following Conley (1999), spatial standard errors are calculated with a weighting function that is the product of a kernel in each direction (North to South, East to West). The kernels start at one and decrease linearly until they are zero at 600 kilometers from the district capital, although results are robust to varying this cutoff (results not shown).

ufacturing employment) during 1985–95. The increase in manufacturing was fairly evenly spread around the archipelago, with high concentrations on Java, but also in Riau on Sumatra, West Kalimantan on the island of Kalimantan, and in parts of the outer islands. The correlation between the change in industrialization for a certain district with other districts in the same province was only 0.29, again suggesting a relatively even spread across regions.

On a national basis, nearly all measures of social networks were increasing during this period of rapid industrialization (the social networks summary statistics are presented in the tables below). For instance, the density of non-governmental credit cooperatives increased sharply from 0.092 to 0.168 per 1,000 population from 1986 to 1996; traditional arts groups showed a large increase over the period, from 17% of communities having such a group up to 26%; the density of mosques per capita also increased by over 30%; and the share of household expenditures on festivals and ceremonies increased by nearly 1.5 percentage points.

B. Channels Linking Industrialization and Social Interactions

Manufacturing growth is strongly associated with growth in per capita consumption: a 10 percentage point increase in manufacturing employment—approximately 2 standard deviations—increases per capita consumption by roughly 14% (table 2, regression 1). Given the well-known and strong relationship between industrialization and income growth, disentangling the effect of these two factors is difficult or impossible. Below we mainly focus on the reduced-form relationship between changes in social networks measures and industrialization because of the availability of disaggregated manufacturing employment data from nationally representative household surveys, but it seems likely that much of the effect is really working through income.

Local industrialization also predicts greater inequality of per capita consumption within districts, but the effect is modest: a 10 percentage point gain in manufacturing employment increases the 90/10 ratio by only 0.5 (regression 2), which is statistically significant but less than one-third of a standard deviation of the change in the 90/10 ratio during the study period.

Industrialization in other districts within 200 kilometers is associated with higher out-migration in the past 5 years (table 2, regression 3; p-value $<$ 0.10). Migration to distant parts of the archipelago was the exception rather than the rule during this period: over 50% of all out-migrants moved to other districts within the same province as their birth district, while only 7% of out-migrants were "trans-migrants" (settlers in a government program targeting remote nonindustrial areas). The in-migration results mirror those for out-migration, that is, industrialization in the local district predicts higher

TABLE 1
SUMMARY STATISTICS

Variable Description (Data Source)	1985–87 Mean (SD)	1995–97 Mean (SD)	1995–97 − 1985–87 Mean (SD)
Proportion of manufacturing workers among population ages 16–60 years, district average (1985, 1995 SUPAS)	.033	.067	.034
	(.030)	(.072)	(.051)
Proportion of manufacturing workers among population ages 16–60 years working at least 20 hours per week, district average (1985, 1995 SUPAS)	.063	.131	.068
	(.059)	(.145)	(.037)
Proportion of manufacturing workers among female population ages 16–60 years, district average (1985, 1995 SUPAS)	.020	.043	.023
	(.024)	(.055)	(.039)
Proportion of manufacturing workers among male population ages 16–60 years, district average (1985, 1995 SUPAS)	.046	.091	.044
	(.040)	(.094)	(.068)
Proportion of manufacturing workers among population ages 16–60 years, other districts within 200 km (1985, 1995 SUPAS)	.034	.064	.030
	(.015)	(.033)	(.019)
Proportion of manufacturing workers among population ages 16–60 years, other districts in province (1985, 1995 SUPAS)	.033	.067	.034
	(.016)	(.033)	(.020)
Monthly per capita expenditures (in 1985 rupiah), district average (1985 SUPAS, 1995 SUSENAS)[a]	11,437	24,541	13,104
	(2,837)	(8,676)	(7,118)
90/10 ratio of per capita expenditures in district (1985 SUPAS, 1995 SUSENAS)[a]	4.73	5.20	.47
	(.96)	(1.44)	(1.53)

Proportion of district residents who moved out of district in past 5 years (1985, 1995 SUPAS)	.039	.053	.014
	(.026)	(.030)	(.020)
Proportion of current district residents who moved into the district in past 5 years (1985, 1995 SUPAS)	.039	.049	.010
	(.041)	(.037)	(.025)
Primary and junior high schools, per 1973 school-age population (Ministry of Education)	.0029[b]	.0056[c]	.0026
	(.0018)	(.0031)	(.0014)
Proportion of district population living in noncoastal areas (1986, 1996 PODES)	.87	.90	.03
	(.17)	(.16)	(.05)
Proportion of district population living in high altitude areas, over 500m (1986, 1996 PODES)	.25	.24	−.01
	(.26)	(.24)	(.16)
Average village area in km^2 (1986, 1996 PODES)	13.21	12.99	−.23
	(24.45)	(22.90)	(22.22)
Average years of schooling attained among ages 18–49 (1985, 1995 SUPAS)	5.607	7.223	1.615
	(1.578)	(1.537)	(.543)
Proportion of district population living in urban areas (1985, 1995 SUPAS)	.272	.359	.087
	(.304)	(.310)	(.121)
Proportion of district population living in villages with access to electricity (1986, 1996 PODES)	.745	.941	.195
	(.186)	(.096)	(.152)

Note. SUPAS = Intercensal Population Survey, SUSENAS = the National Socio-Economic Survey, and PODES = Village Potential Statistics. Summary statistics are weighted by district population. Data sources are in parentheses.

[a] The 1997 figures are deflated with consumer price data from World Bank Global Development Network database. $US1 = 1,110.6 rupiah (1985).

[b] Value is for 1973–74.

[c] Value is for 1983–84.

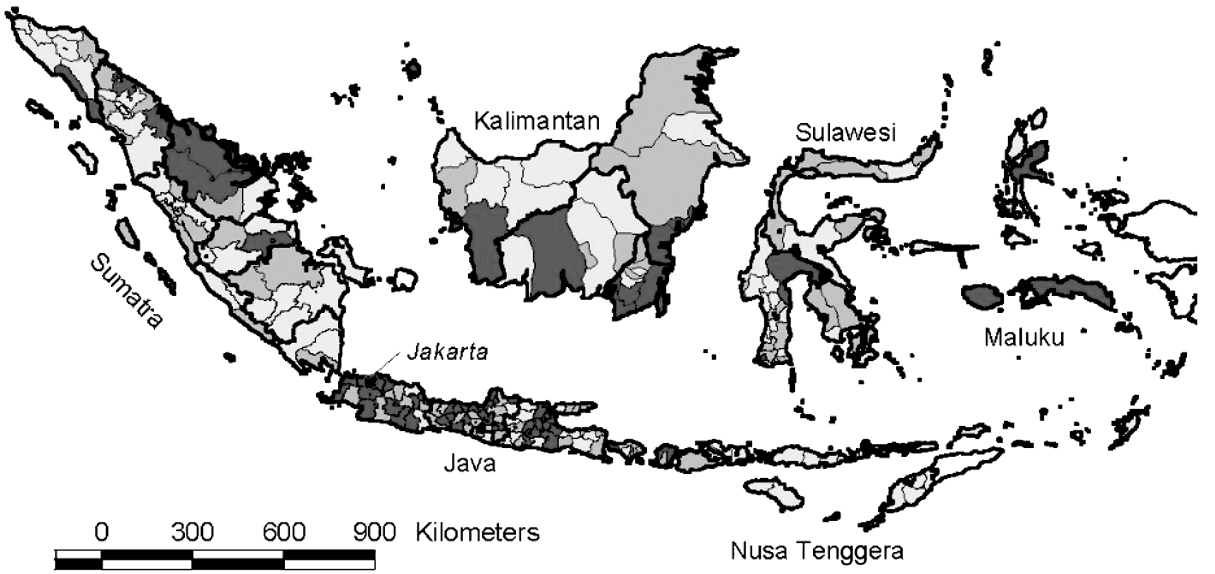

Figure1. Percentage change in the proportion of manufacturing workers 1985–95 among population ages 16–60 years, district averages, and Intercensal Population Survey. Light gray denotes the bottom third of districts in terms of percentage change in industrialization, gray denotes the middle third of districts, and dark gray denotes the top third of districts. The white areas of the map—East Timor and Irian Jaya—are excluded from the analysis.

TABLE 2

INDUSTRIAL DEVELOPMENT, MIGRATION, CONSUMPTION, AND INEQUALITY

	Consumption: Change Log Monthly Per Capita Expenditures (1985 Rupiah), District Average, Conley SE (1)	Inequality: Change 90/10 Ratio in Per Capita Expenditures, District Average, Conley SE (2)	Out-Migration: Change Proportion Who Moved Out of District in Past 5 Years, Conley SE (3)	In-Migration: Change Proportion Current Residents Who Moved into District in Past 5 Years, Conley SE (4)
Change of proportion of manufacturing workers among population ages 16–60 years, district average	1.44**	5.02**	−.00	.11**
	(.29)	(1.36)	(.02)	(.04)
Change of proportion of manufacturing workers among population ages 16–60 years, average for other districts located within 200 km	1.01	1.19	.20^{+}	−.50**
	(1.53)	(7.07)	(.11)	(.10)
Average road quality in district (1 = dirt, 2 = gravel, 3 = asphalt), 1986	.24**	1.34**	.016*	−.011
	(.05)	(.32)	(.007)	(.007)
Change (1973–74 − 1983–84) primary and junior high schools per 1973 school-age population	−12.2	210.1*	−.4	−4.6^{+}
	(17.2)	(87.3)	(1.5)	(2.4)
Island indicator variables	Yes	Yes	Yes	Yes
Landlocked, altitude controls	Yes	Yes	Yes	Yes
R^2	.38	.21	.14	.17
Observations (districts)	274	274	274	274
Mean of dependent variable	.76	.47	.01	.01

Note. Industrialization and migration data are from Intercensal Population Survey (SUPAS) 1985, 1995. Expenditure and inequality data are from the 1985 SUPAS and the 1995 National Socio-Economic Survey. Changes are over the period 1985–95. Road, landlocked, and altitude controls are from the 1986 and 1996 Village Potential Statistics. Schools data are from Duflo (2001). All specifications are ordinary least squares regressions corrected for spatial dependence using Conley standard errors.

$^{+}$ Significantly different than zero at 90% confidence.

* Significantly different than zero at 95% confidence.

** Significantly different than zero at 99% confidence.

in-migration, while industrialization in nearby districts (within 200 kilometers) predicts less in-migration (table 2, regression 4).

Unfortunately, in our data, individuals who leave home—to take a manufacturing job, for example—for up to 6 months may still be counted as household members in their original district. Thus our measure misses much temporary "circular migration," a salient phenomenon during our study period, particularly in rural Java (Breman 2001). The results would possibly be stronger if circular migration were captured in our data. Although probably less disruptive than permanent migration, even circular migration is likely to disrupt social networks if people invest less in social links with others who are only sometimes present in the community. Investments in social networks are further lowered because people cannot be assured that someone who leaves for a "temporary" factory job will in fact return as planned.

Microeconomic data from the SUPAS survey provide some summary information on the characteristics of migrants. The migration rate of young adults ages 16–29 years is the highest of all age groups (table 3, regression 1), and the migration of this age group is also most sensitive to both local and nearby industrialization (regression 2, where the 16–29 age group is the omitted age category, interaction terms not shown). We also find that females and those with more education were particularly likely to migrate. Cross-sectional evidence from the 1997 IFLS survey indicates that the characteristics that predict migration are also generally associated with community group membership (table 3, regression 3): individuals with more education, young and middle-aged adults (ages 16–49 years), and females were most likely to be members of community groups in that data. Note that this age pattern of social network involvement is consistent with the life cycle social capital investment hypothesis advanced by Glaeser, Laibson, and Sacerdote (2000) and Putnam (2000). Thus, these patterns suggest that it is plausible that local social interactions could be sharply affected by migration.

C. Industrialization and Community Groups

We next present the relationship between industrialization and community group outcomes over time. These specifications use the community as the unit of observation, with approximately 60,000 observations for each year (1986 and 1996), and also include community geographic controls to improve statistical precision. Industrialization is measured at the district level, and disturbance terms are clustered at the province-year level to capture correlated shocks across nearby districts.[9]

[9] We also examined data at the household level using the 1987 and 1997 SUSENAS sociocultural

TABLE 3

MIGRATION, GROUP MEMBERSHIPS, AND HOUSEHOLD CHARACTERISTICS

	Indicator for Individual Moved to Another District in Past 5 Years		Number of Community Group Memberships by Household in 1997
	(1)	(2)	(3)
District industrialization variables:			
Proportion of manufacturing workers among population ages 16–60 years	−.031^{+}	−.137**	
	(.019)	(.023)	
Proportion of manufacturing workers among population ages 16–60 years, other districts within 200 km	.082	.199^{+}	
	(.083)	(.108)	
Individual, household characteristics:			
Years of education	.0055**	.0056**	.0439**
	(.0003)	(.003)	(.0045)
Female	.0029**	.0028**	.341**
	(.0011)	(.0010)	(.082)
Married	.0010	.0005	
	(.0035)	(.0033)	
Ages 5–15 years	−.035**	−.035**	−.493**
	(.004)	(.004)	(.085)
Ages 30–39 years	−.031**	−.031**	.254**
	(.003)	(.003)	(.098)
Ages 40–49 years	−.049**	−.049**	.139
	(.004)	(.004)	(.118)
Ages 50–59 years	−.0049**	−.0049**	−.074
	(.004)	(.004)	(.126)
Ages 60+ years	−.0046**	−.0046**	−.285*
	(.004)	(.004)	(.131)
Interactions between individual characteristics and industrialization	No	Yes	No
Additional household characteristics	No	No	Yes
Other covariates:			
Year is 1995	.0047**	.0056*	
	(.0017)	(.0027)	
R^2	.04	.04	.12
Observations (individuals)	1,312,296	1,312,296	
Observations (households)			5,335
Mean (SD) of dependent variable:			
1985	.040	.040	
	(.195)	(.195)	
1995–97	.052	.052	.887
	(.222)	(.222)	(1.162)

Note. Migration and district-level industrialization data are from the 1985 and 1995 Intercensal Population Survey. Data on group memberships are from the 1997 Indonesia Family Life Survey. The household characteristics in regression 3 are household proportions (of females and individuals in certain age ranges), except for years of education, which is for the household head. The additional controls in regression 3 are an indicator for a female-headed household, years of education of the spouse, age of the household head and spouse, and the number of household members. All specifications are ordinary least squares regressions with district fixed effects. Standard errors are robust to heteroskedasticity, and clustering of disturbance terms at the (province × year) level are given in parentheses.

$^{+}$ Significantly different than zero at 90% confidence.

* Significantly different than zero at 95% confidence.

** Significantly different than zero at 99% confidence.

Credit Cooperatives

Industrialization within a district is associated with a significant increase in the density of credit cooperatives: a 10 percentage point increase in the proportion of adults working in manufacturing is associated with an increase of 0.014 credit cooperatives per 1,000 people, and this effect is significantly different from zero at over 90% confidence (table 4, regression 1). However, manufacturing growth in nearby areas—either districts located within 200 kilometers or other districts in the same province (regression 2)—is associated with a substantial decline in the density of credit cooperatives: a 2-standard-deviation increase, or 4 percentage points, in the proportion of manufacturing workers in other districts within 200 kilometers is associated with a decrease of nearly 0.06 in the number of nongovernmental credit groups per 1,000 people. Note that this decline cannot simply be an income effect alone since, as we showed in table 2, there is no significant relationship between nearby industrialization and consumption expenditure growth in Indonesia during the sample period. Large-scale migration remains a plausible explanation, consistent with the patterns in table 2.

The difference between local and nearby industrialization enters in positively and significantly different from zero at 99% confidence (table 4, regression 3). The results are robust to the inclusion of initial 1985 industrialization as an additional explanatory variable (results not shown). There is no clear pattern in the effects of female versus male manufacturing employment on the expansion of credit cooperatives and other community groups (results not shown).[10]

The effect of industrialization on the density of all credit cooperatives—the sum of both quasi-governmental (KUD) and nongovernmental credit cooperatives—is similar, with large negative effects of nearby industrialization on credit cooperative growth, although the positive effect of local industrialization becomes insignificant (table 4, regression 4, t-statistic = 1.1).

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module but do not focus on these results because of a number of data limitations, including changing group definitions across survey rounds, problems matching households between the sociocultural and "core" modules, and extensive missing data in 1987. In any case, results are broadly similar using these alternative data, although statistical significance is often weaker (regressions not shown).

[10] The coefficient estimate on the interaction term between local and nearby industrialization is negative and statistically significant, suggesting that the impact of being located near industrializing districts is compounded in rapidly industrializing areas, though the theoretical mechanisms underlying this result are not clear (results not shown). We also experimented with industrialization measures from the SI survey (described in app. A.E) as instrumental variables for the SUPAS manufacturing employment figures to address possible attenuation bias due to measurement error in the SUPAS measure, and this yields very similar results (results not shown).

TABLE 4
INDUSTRIALIZATION AND CREDIT COOPERATIVES

	Number of Nongovernmental Credit Cooperatives per 1,000 People			Total Number of Credit Cooperatives (Governmental and Nongovernmental) per 1,000 People
	(1)	(2)	(3)	(4)
Proportion of manufacturing workers among population ages 16–60 years	.142^{+}	.211**		.085
	(.080)	(.081)		(.076)
Proportion of manufacturing workers among population ages 16–60 years, other districts within 200 km	−1.295**			−2.042**
	(.225)			(.264)
Proportion of manufacturing workers among population ages 16–60 years, rest of province		−1.493**		
		(.214)		
(Proportion of manufacturing workers) − (proportion of manufacturing workers other districts within 200 km)			.225**	
			(.087)	
Village geographic controls:				
Village is noncoastal	.018**	.018**	.018**	.014**
	(.005)	(.005)	(.005)	(.005)
Village altitude above 500 m	−.033**	−.033**	−.033**	−.041**
	(.007)	(.007)	(.007)	(.007)
Village area, ha	−.95*	−.92*	−.96*	−1.27*
	(.042)	(.41)	(.41)	(.51)
Other covariates:				
Year is 1996	.108**	.117**	.074**	.146**
	(.005)	(.010)	(.008)	(.011)
R^2	.08	.08	.08	.08
Observations (communities)	128,778	128,778	128,778	128,778
Mean (SD) of dependent variable:				
1986	.092	.092	.092	.131
	(.264)	(.264)	(.264)	(.306)
1996	.168	.168	.168	.220
	(.413)	(.413)	(.413)	(.472)

Note. Village level data are from the 1986 and 1996 Village Potential Statistics. District level industrialization data are from the 1985 and 1995 Intercensal Population Survey. All specifications are ordinary least squares regressions with district fixed effects, except for regression 3, which does not have district fixed effects. Standard errors robust to heteroskedasticity, and clustering of disturbance terms at the (province × year) level are given in parentheses.

$^{+}$ Significantly different than zero at 90% confidence.

* Significantly different than zero at 95% confidence.

** Significantly different than zero at 99% confidence.

One potential concern is that industrialization might simply facilitate the use of formal financial institutions and erode informal credit even while net credit availability is unchanged. For example, the establishment of formal financial institutions, including microfinance institutions, may affect cooperatives. The most important national microfinance institution in Indonesia is the extensive BRI (Bank Rakyat Indonesia) network. If BRI disproportionately opened branches in poor districts located near industrializing areas, leading to a "crowding out" of credit cooperatives in these areas, this effect could potentially generate a spurious negative relationship between nearby industrialization and credit cooperatives density. However, in the 1997 IFLS data we find that the presence of a BRI branch is not significantly correlated with the number of local factories (results not shown), indicating that this hypothesized bias is unlikely to be large. Another important concern is that industrialization may be correlated with higher demand for credit from all sources. If true, we might expect this effect to be strongest for formal sources of credit. Nevertheless, the correlation between nearby industrialization and the total density of formal financial institutions was similarly near zero and statistically insignificant during this period (regression not shown). Thus, the drop in cooperatives in areas located near rapidly industrializing districts was not part of an overall decline in financial institution lending.

Another hypothesis that could potentially generate a spurious relationship between local industrialization and the density of credit cooperatives is that cooperatives replace informal *arisan* (the traditional ROSCAs common throughout Indonesia) at higher levels of income. However, the 1997 IFLS data indicate that Indonesian households with higher consumption per capita actually spend a larger fraction of their income on *arisan* rather than less (results not shown), which suggests that individuals in rapidly industrializing areas may have access to more credit through both informal and formal sources.

Other Community Groups

The results for other community groups are broadly similar to the cooperative results: local industrialization is typically associated with higher community group density, while industrialization in nearby districts is associated with lower community group densities or no change.[11] Local industrial change is associated with a significant increase in the existence of traditional arts groups, and nearby industrialization had a negative and nearly statistically significant (t-statistic = 1.6) effect (table 5, row 2). A 10 percentage point increase in local manufacturing employment is associated with a nearly 3 percentage point

[11] A supplementary appendix with robustness checks is available from the authors on request.

TABLE 5

INDUSTRIALIZATION AND COMMUNITY GROUPS

Dependent Variable	Coefficient Estimate on Proportion of Manufacturing Workers among Population Ages 16–60 Years	Coefficient Estimate on Proportion of Manufacturing Workers among Population Ages 16–60 Years, Other Districts within 200 km	No. of Observations (Communities)	Mean (SD) Dependent Variable, 1986	Mean (SD) Dependent Variable, 1993–96
1. Number of nongovernmental credit cooperatives per 1,000 people	.142^{+}	−1.295**	128,778	.092	.168
	(.080)	(.225)		(.264)	(.413)
2. Existence of traditional arts group in community	.270**	−.540	127,503	.173	.264
	(.077)	(.333)		(.143)	(.194)
3. Number of distinct types of arts and sports groups in community	3.00**	.47	127,503	.413	.419
	(.53)	(2.46)		(1.906)	(2.165)
4. Existence of scout youth group in community	−.028	.111	128,778	.793	.842
	(.066)	(.408)		(.405)	(.374)
5. Mosques per 1,000 people	.13	−.02	128,778	.84	1.14
	(.14)	(.83)		(.83)	(1.17)
6. Existence of a non-Muslim place of worship in community	.21**	−.75*	128,778	.335	.345
	(.08)	(.36)		(.472)	(.478)
7. Existence of a farmers' irrigation group (P3A) in community	−.372**	−.343	127,503	.385	.408
	(.121)	(.267)		(.487)	(.492)

Note. Village level data are from the 1986, 1993, and 1996 Village Potential Statistics. District level industrialization data are from the 1985 and 1995 Intercensal Population Survey. All specifications are ordinary least squares regressions with district fixed effects, as well as the village geographic controls, year indicator variable, and constant term as in table 4, regression 1. The farmers' irrigation group (P3A) regression also contains an indicator for whether the community is "rural," and this has the expected sign. The irrigation group arts group and sports group results are for 1986 and 1993, while the other group data are from 1986 and 1996. Standard errors robust to heteroskedasticity, and clustering of disturbance terms at the (province × year) level are given in parentheses.

$^{+}$ Significantly different than zero at 90% confidence.

* Significantly different than zero at 95% confidence.

** Significantly different than zero at 99% confidence.

increase in the probability that a community had an arts group. We also examine how industrialization is associated with community recreational groups more broadly by considering the total number of types of arts and sports groups in a community. Once again, local industrialization is associated with an increase in the number of types of groups in a community, although the effect of nearby industrialization is close to zero (table 5, row 3). However, neither local nor nearby industrialization is significantly associated with the existence of scouts youth groups (row 4).

Another major category of community groups is religious groups: the coefficient estimate on local industrialization is positive and the coefficient estimate on nearby industrialization is negative for both Muslim (table 5, row 5) and non-Muslim (row 6) places of worship, though only significant for non-Muslim places of worship.

The one clear exception to the pattern is for P3A. Rapidly industrializing districts had significantly fewer farmers' groups, and the point estimate on nearby industrialization is also negative and marginally significant. However, one should not expect such groups to expand in industrializing areas in any case, since irrigation is most important in predominantly agricultural settings, so this relationship presumably tells us more about changes in the sectoral mix than about changes in social networks or in community cohesion.

Above we posited that industrialization might affect social networks through its effects on in-migration, out-migration, income (or consumption) levels, and inequality. When these measures are included as additional explanatory variables, their coefficient estimates are consistent with the theories noted above: among the seven types of community groups we examine (excluding farmers' irrigation groups), five of seven coefficient estimates on in-migration are positive, five of seven coefficient estimates on out-migration are negative, five of seven coefficient estimates on consumptions are positive, and six of seven coefficient estimates on inequality are positive (results not shown). The results are not as clear when measures are added as additional regressors to the main specifications. Standard errors increase in that case, due to the high degree of correlation between industrialization and consumption expenditures. When industrialization and consumption expenditures are included simultaneously, in some cases this drives the coefficient estimate on industrialization to zero (e.g., for spending on festivals), sometimes industrialization remains statistically significant (for nongovernmental credit cooperatives), and for some outcomes both industrialization and consumption expenditures are significant (sports groups, regressions not shown), in this last case suggesting that both have independent effects on social interactions. Because of the inherent difficulty in interpreting these results, we focus on the reduced-form specification

below when we examine informal social networks measures, but once again manufacturing growth may be best thought of as a proxy for income growth.

D. Informal Social Networks Measures

Local industrialization is associated with significantly higher spending on "ceremonies and festivals" as a proportion of total household spending (at 99% confidence), and the results are robust to controls for respondent education, gender, and age, and also household size (table 6, regression 1).[12] Nearby industrialization is associated with less spending on ceremonies and festivals, though the effect is not statistically significant.

The second measure of informal social networks, and one that is arguably most closely related to the "trust" measures found in the social capital literature, is the opinion of village elders regarding the presence of an "ethic of mutual cooperation" both traditionally and in current practice. It is likely that "traditional practices" were set long before there was any meaningful modern industrial activity in Indonesia; thus, the level of 1995 manufacturing is roughly the first-difference in manufacturing employment since the informants were young, while the change in the ethic of mutual cooperation from the respondents' "traditional" period to 1997 is the first-difference in social networks. We find that local industrialization is not significantly associated with changes in mutual cooperation, but industrialization in nearby areas is associated with a decline in mutual cooperation at 95% confidence: a 4 percentage point increase (roughly 2 standard deviations) in the proportion of manufacturing workers in nearby districts is associated with a 2 percentage point decline in the probability that a community is characterized by mutual cooperation (table 6, regression 2), and the result is robust to an alternative measure of nearby industrialization (regression 3).

VI. Conclusion

The empirical results provide some additional insight into current debates on the role of social interactions and social capital in economic development. Most important, many researchers who have observed positive cross-sectional correlations between economic development and social networks have claimed that denser social networks promote economic development. While we cannot decisively rule out this possibility, our findings, taken together, suggest that considerable caution is warranted when interpreting cross-sectional correlations of this sort.

[12] Missing values in the 1987 SUSENAS data set reduce the sample to 201 of 274 districts, although note that these 201 districts contain 86% of the total national population.

TABLE 6
INDUSTRIALIZATION AND INFORMAL SOCIAL NETWORK MEASURES

	Share of Household Expenditure Spent on Ceremonies and Festivals	Change in Community "Ethic of Mutual Cooperation" between Tradition (*adat*) and Current Practice	
	(1)	(2)	(3)
Proportion of manufacturing workers among population ages 16–60 years	.010**	−.09	−.06
	(.003)	(.16)	(.15)
Proportion of manufacturing workers among population ages 16–60 years, other districts within 200 km	−.0045	.055*	
	(.051)	(.22)	
Proportion of manufacturing workers among population ages 16–60 years, rest of province			−.067*
			(.26)
Individual, household characteristics:			
Household head years of education	−.0000002		
	(.000043)		
Household head is female	.000026		
	(.00022)		
Household head age in years	.000046**		
	(.000006)		
Household size	.00019*		
	(.00009)		
Other covariates:			
Year is 1995	.0156**		
	(.0022)		
R^2	.11	.02	.02
Observations (households)	182,731		
Observations (communities)		270	270
Mean (SD) of dependent variable:			
1987	.0025		
	(.0076)		
1995	.0170		
	(.0327)		
Change 1997—"traditionally" (SD)		−.022	−.022
		(.148)	(.148)

Note. Expenditure data are from the 1987 and 1995 National Socio-Economic Survey (SUSENAS). Due to incomplete SUSENAS 1987 data, 73 districts were omitted from regression 1; these include all 29 districts in Kalimantan, all 37 districts in Sulawesi, all 5 districts in Maluku, as well as 2 districts in Nusa Tenggera. The data are unbalanced—only 37,789 household observations are from 1987. The ethic of mutual cooperation data are from the 1997 Indonesia Family Life Survey, which is available for 270 communities in 142 districts. Regression 1 is an ordinary least squares regression with district fixed effects and is weighted by sample weights. Standard errors are robust to heteroskedasticity, and clustering of disturbance terms at the (province × year) level is given in parentheses. Regression 2 includes a constant term, standard errors are robust to heteroskedasticity, and clustering of disturbance terms at the province level is given in parentheses.

$^{+}$ Significantly different than zero at 90% confidence.

* Significantly different than zero at 95% confidence.

** Significantly different than zero at 99% confidence.

In a companion article, we do not find that the initial density of social networks predicts subsequent industrial development in Indonesia (Miguel et al. 2005). However, in this article we find that increases in local industrialization are associated with denser social networks over time. Thus, while strong social networks may or may not be essential for achieving collective action, good governance, and improving human welfare more broadly, as some have argued, we find no clear evidence from Indonesia that they promoted economic development. This point relates to the critique in Sobel (2002) that existing work often confuses the causes and effects of social capital.

The results of this article provide a new perspective on Putnam's (1993) seminal research on Italy. Putnam's stylized facts are that Northern Italy today has a dense network of community groups and a prosperous industrial economy, while Southern Italy has relatively few groups and is poor. To sort out causality, Putnam employs historical evidence to argue that social capital has in fact been a key driver of economic and political development over the past centuries. However, as Putnam acknowledges, large-scale out-migration from Southern Italy to Northern Italy in the twentieth century, in response to differential rates of industrial development, may also have contributed to lower current levels of social capital in Southern Italy. This relationship is also what we argue might have also occurred in Indonesia during the 1980s and 1990s. The results from Indonesia also appear inconsistent with Putnam's finding that local social capital is historically determined and largely persistent through time. In fact, industrialization was associated with fairly rapid changes in social networks in only one decade in Indonesia.

All results must be interpreted with caution because, like Putnam's classic study, ours is only a case study of one set of regions within one nation in one historical period. Further empirical work, ideally utilizing longitudinal data sets and credible research designs, is needed before definitive conclusions can be drawn regarding the relationships among social interactions, social capital, and economic development.

Appendix

Data Sources

A. Village Potential Statistics

The PODES survey provides detailed information about the characteristics of villages and urban neighborhoods. We analyze the 1986 and 1996 PODES surveys (though variables relating to arts and sports groups come from the 1993 survey). Over 60,000 village heads or neighborhood leaders filled out the survey about their area in each year in all districts, excluding East Timor and Irian Jaya. In addition to the community group measures, we also use

PODES data on various geographic characteristics, including altitude, being landlocked, and community land area, as well as infrastructure characteristics, including road quality and access to electricity, in some cases.

B. National Socio-Economic Survey

The SUSENAS is an annually repeated cross section.[13] It surveyed between 20,000 and 50,000 households per year in the mid-1980s and approximately 200,000 households per year by the mid-1990s. The SUSENAS surveys the head of the household on the general welfare of each household member in areas such as school enrollment, health, and mortality. We focus on the 1987 and 1995 SUSENAS surveys. We rely on the 1995 SUSENAS for average household expenditures and district-level measures of household expenditure inequality. The 1987 and 1995 surveys contain information on per capita household spending on "ceremonies and festivals," which we use as a measure of informal social networks. The SUSENAS sample was selected to be representative for each of Indonesia's districts. Smaller districts were oversampled to improve statistical precision.

TABLE A1
SUSENAS SUMMARY STATISTICS (FOR TABLE 6)

Variable Description	1987 Mean (SD)	1995 Mean (SD)
Household head years of education	4.396	5.837
	(3.652)	(4.167)
Household age in years	44.15	45.00
	(13.88)	(14.21)
Household head is female	.137	.133
	(.344)	(.339)
Household size	4.564	4.211
	(2.114)	(1.912)
Observations	37,789	144,942

C. Intercensal Population Survey

The SUPAS are carried out every 10 years, in the midperiod between complete population censuses.[14] Households are interviewed to obtain information regarding issues such as education, fertility, mortality, and migration. We analyze the 1985 and 1995 SUPAS. The 1985 SUPAS covered 126,696 households and 605,858 individuals, while the 1995 survey covered 216,946 households and 948,380 individuals. Sampling rules generally follow those of the SUSENAS. The specific variables we use from SUPAS include residential mobility in the

[13] This section draws heavily on Surbakti (1995).

[14] Maya Federman kindly created several SUPAS variables for us.

past 5 years; average household expenditures (in 1985); district-level measures of household expenditure inequality (1985); and most important, the proportion of the adult population working in manufacturing occupations—our principal measure of district industrialization.

TABLE A2
SUPAS SUMMARY STATISTICS

Variable Description	1985 Mean (SD)	1995 Mean (SD)
Summary statistics for table 3:		
Years of education	4.391	5.795
	(3.583)	(4.015)
Age	27.28	29.06
	(17.76)	(17.95)
Female	.504	.504
	(.500)	(.500)
Married	.449	.482
	(.497)	(.500)
Observations	513,197	799,099

TABLE A3
INDONESIA FAMILY LIFE SURVEY SUMMARY STATISTICS (FOR TABLE 3)

Variable Description	1997 Mean (SD)
Household head years of education	5.61
	(4.35)
Proportion of household female	.514
	(.169)
Proportion of household ages 5–15 years	.256
	(.207)
Proportion of household ages 30–39 years	.169
	(.203)
Proportion of household ages 40–49 years	.124
	(.175)
Proportion of household ages 50–59 years	.103
	(.180)
Proportion of household age 60+ years	.119
	(.219)
Observations	5,335

D. The Indonesia Family Life Survey

The IFLS is a representative sample of 83% of the population of Indonesia as of late 1993, covering 13 of Indonesia's 27 provinces (Frankenberg and Thomas 2001). The smallest provinces and politically unstable regions—such as Irian Jaya and the former East Timor—were not sampled. Within households, different members were interviewed according to various selection criteria to ensure adequate numbers of older respondents. We use both cross-sectional

and retrospective information from the 1997 survey on over 7,224 households distributed across several hundred communities. In each community, the IFLS also interviewed an expert in local customs and laws (*adat*). We have *adat* information on 142 of the 274 districts we analyze, and these districts contain over two-thirds of Indonesia's 1985 population.

A possible concern with our focus on the number of community groups reported in the PODES, rather than individual group membership, in the analysis is whether village head reports correlate well with memberships reported by households. We examine this question using the second wave of the IFLS, which asked households about membership in 12 different types of community groups. The IFLS separately surveyed village heads and leaders of local women's groups about the presence of community groups, 10 of which were also included on the households' list. These groups include voluntary labor groups, community meetings, cooperative groups (of any kind), neighborhood improvement programs, neighborhood security organizations, drinking water systems, washing water systems, garbage disposal systems, contraceptive acceptors groups, and child development programs. We aggregated individual responses to the household level by summing the number of the 10 overlapping community groups in each household to which at least one household member belonged. The village leadership reports strongly predicted whether households belonged to groups, with an elasticity of roughly 0.4; that is, when the village head reported having 2 standard deviations above the average number of groups in the village, the average household belonged to roughly 0.5 more groups (p-value < 0.01) than average (2.0). Thus, village leader reports on the presence of community groups appear to be a valid proxy of individual group membership.

E. The Industrial Survey

The Annual Manufacturing Survey (*Survei Tahunan Perusahaan Industri Pengolahan* [SI]), conducted by the Industrial Statistics Division of BPS, is designed to be the complete annual enumeration of all manufacturing establishments with 20 or more employees from 1975 onward.[15] Although the SI and SUPAS have different definitions of manufacturing employment—the SI is an establishment survey, while SUPAS is a household survey—encouragingly, the SUPAS and SI manufacturing employment measures are correlated at 88% across districts in 1985. For the SI, establishments must have at least 20 employees, while the SUPAS has no size restriction; thus, the SUPAS definition is likely to be a better measure of industrialization since it captures small enterprises

[15] Garrick Blalock kindly created the SI variables for us.

and informal-sector employment. We thus focus on the SUPAS industrialization data in the analysis, although the results are largely robust to using the SI data (results not shown).

F. School Construction

We have district-level data from the Ministry of Education and Culture on the number of primary, middle, and high schools per school-aged child in both 1973–74 and 1983–84, the decade preceding our period of study, and use these data to predict subsequent industrialization.[16] Indonesia pursued a massive school construction program in the 1970s (Duflo 2001).

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