The Impact of Social Ties and Third-Party Enforcement on Collective Action and Growth

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Abstract[*]

Exploiting a unique empirical setting, 1,000 vendors in 90 traditional food markets in Lima, we document that historic social ties among market founders are associated, decades later, with stricter formal (third party) enforcement of market rules, more collective action, and the greater resilience of market sales to the entry of modern supermarkets. Markets with stronger historic ties make larger investments in market infrastructure, provide more services to market vendors, and exhibit more regular payment of dues. They also experienced higher growth over the period 2007–2017, following the entry of modern supermarkets. Formal enforcement appears to be a key mechanism through which social ties induce greater collective action: the component of formal enforcement that is explained by historic social ties is even more strongly correlated with collective action and growth. In contrast, differences in informal social enforcement are not correlated with any market outcomes. Neither is it the case that formal rules and governance structures can account for these results: these are identical across markets.

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Introduction

Is the formal enforcement of rules—the "rule of law"—essential to solve the collective action problems that societies confront? If it is, why do some societies exhibit stronger rule of law than others? Evidence from a novel empirical setting, 90 self-governing traditional markets in Lima, Peru, sheds light on these longstanding questions. Markets that exhibit third-party, centralized enforcement of market rules supply more public goods to members. They also grew faster over the period 2007–2014, following the entry of modern supermarkets into the Lima retail food market. For idiosyncratic reasons, exogenous to the economic circumstances of markets, the founding vendors of some markets came from the same informal neighborhoods, allowing them to forge stronger social ties. Markets with stronger social ties exhibit greater third-party enforcement of market rules and collective action, and their sales are more resilient to the competitive shock posed by the entry of supermarkets.

None of these effects can be accounted for by differences in formal rules and governance structures: the formal *enforcement* of rules varies substantially across groups with identical formal rules. Nor do informal, peer-to-peer enforcement mechanisms matter: stronger informal enforcement is not associated with more public goods or faster growth.

These results build on pathbreaking research that has linked traumatic historic experiences, such as tropical disease, slavery and forced labor, to the rule of law, public good provision and incomes centuries later. Scholars point to the disruptive effect of historical circumstances on institution-building to account for their long-run consequences, but they have lacked data to explicitly identify these mechanisms. The Lima markets yield evidence of social ties, the first direct measures of third-party enforcement, and precise, comprehensive measures of the collective goods that markets have managed to provide. These permit direct estimates of the relationships among social ties, enforcement, public good provision and growth.

Three key findings emerge from the work. Prior research has shown reduced-form effects from historic shocks (e.g., disease, slavery, forced labor) on current outcomes. We also demonstrate reduced form effects, flowing from substantially less traumatic circumstances: formal enforcement of rules, collective action and growth are all higher in markets where founders enjoyed social ties strengthened by the distinctive historic experience of urbanizing informal settlements.

Second, formal, third-party enforcement is highly correlated with cooperative behavior and growth. In markets, just as in other settings (such as states and countries), rules of behavior can be formal (laws and regulations) or informal (social norms). They can be enforced formally, through third parties to which group members delegate

enforcement authority (government) or informally (through the decentralized application of social sanctions by group members). Markets all have boards elected by the vendors who collectively own the market. We contrast markets that respond to infractions of market rules with formal enforcement actions by the board of market rules, with markets that either do nothing or rely on the informal, decentralized application of social pressure. Markets with greater formal enforcement capability exhibit greater investment in market infrastructure; more extensive provision of collective services (security, cleaning, etc.) to vendors; and more regular payment of market dues by vendors.

Finally, third, we isolate that component of third-party enforcement that is correlated with stronger historic social ties. This component is also significantly correlated with the provision of collective services.

Lima contains more than 1,000 popular markets, each governed by rules enforced internally by the owners of the market stands. The markets vary with respect to the public goods they provide, from lighting and roofing to paved walkways; the degree to which they apply sanctions to owners who do not contribute to public goods; and the social origins of the founding vendors. Engineering studies of the 90 markets in the sample allow us to exactly quantify the change in market infrastructure from 2007–2017. Surveys of market administrators identify the collective services that markets provide to vendors and the difficulties that markets have in collective dues from vendors. In addition, surveys of almost 1,000 vendors in the sample markets yield direct measures of enforcement: whether the response to three typical violations of market rules is informal and social (pressure from other vendors) or formal (sanctions imposed by the market's board of directors). Vendors also provided the information that allows us to examine growth over the period 2007–2017.

Finally, interviews with board members also provided historic information about potential social ties among markets' founding vendors. In some cases, the founding vendors all came from the same small informal settlement (*urbanización*), giving them the opportunity to build social ties among themselves. Informal settlements required significant collective action by members in order to obtain or self-provide community public goods and to protect the settlement from incursion by other settlers or by the state. If founding vendors came from the same small settlement, they were therefore more likely to exhibit stronger social ties with each other. Founding vendors from different or large settlements did not have these same opportunities. Markets in which most founding members were from the same small *urbanización* exhibit more successful collective action and stronger formal market enforcement thirty years later.

The empirical setting addresses two challenges that confront work on institutions and development. One is unobserved heterogeneity among units of analysis (villages,

regions, countries) that might give rise to spurious correlations between institutions that support the rule of law or collective action and the production of public goods. The potential for heterogeneity rises when the units of analysis are more complex and varied and less is known about them. The traditional food markets we examine are engaged in a homogeneous economic activity with identical production functions and essentially the same formal statutes. They are all collectively managed by the vendors who own the market stands. They operate in similar neighborhoods in the outer areas of Lima and experienced common economic shocks—the entry of supermarkets—around 2007. Their external environment is identical: the same national and local political and legal institutions govern them. At the same time, because we trace the evolution of institutions and decision making over a more recent time span, we have data on more characteristics (more observables), reducing the scope for spurious correlations due to unobserved effects.

The other challenge is the lack of data regarding enforcement and the cooperative behavior that enforcement should encourage. Prior research showing that variations in contract enforcement and the rule of law account for differences in countries' development outcomes has relied on expert observers' assessments of these institutional concepts. Evidence on cooperative behavior has typically been partial, reflecting the availability of data regarding some dimensions of collective decision making but not others. For this analysis, we were able to collect data suggestive of social ties among market founders; vendor reports of the extent to which third-party, centralized sanctions are used to promote cooperative behavior; and information on essentially all the actual collective decisions that markets make.

The next section of the paper describes in more detail questions raised by the literature that this analysis attempts to answer. The following section describes the historical and institutional context surrounding traditional food markets in Lima. We then turn to the mechanisms we track; the characteristics of the sample; the quantitative and qualitative instruments we used to gather information from the food markets; the details of the main variables in the analysis; and the econometric models and techniques applied for the analysis. The final sections of the paper present the results of the quantitative analysis and discuss their implications for research on the role of institutions in development.

Social Ties, Third-Party Enforcement and Cooperative Behavior
North (1981) argued that institutions to enforce contracts and limit government predation are essential for growth. Knack and Keefer (1995) provided empirical evidence for this using subjective indicators of contract enforcement and the rule of law. Acemoglu,

Johnson and Robinson (2001) underline the causal effects of institutions on growth by exploiting the first indication that historical circumstances—in their case, circumstances that gave rise to high settler mortality—could influence institutional outcomes generations later. Dell (2010) examines the causal effect of difficult historical circumstances on current collective action, showing that colonial-era forced labor requirements imposed on indigenous communities in Peru suppressed public good provision in those same areas 300 years later. Nunn and Wantchekon (2011) shed light on one possible mechanism from forced labor to less collective action: in areas of East Africa that experienced significant incursions by slavers, inter-personal trust was significantly lower 150 years later.

Together, these contributions demonstrate that difficult historical conditions yielded worse outcomes generations or centuries later. They argue that these conditions disrupted the ability of individuals to resolve collective action problems and curb opportunistic behavior. The analysis here explicitly ties together the various links in this causal chain for the first time, using novel direct and objective measurements of social ties, the rule of law and collective action. We link the rule of law explicitly to social ties and demonstrate the contribution that rule of law makes to collective action and growth. We show that the pathway from social cohesion to public good provision passes through the ability of a collective to formally enforce group norms.

A substantial literature has investigated the role of the informal or decentralized enforcement of norms in economic development. Ostrom (1990) finds that diverse groups, ranging in size from 50 to 15,000 people, cooperate, often without centralized, third-party institutions, to limit free riding in the management of renewable common pool resources. Benham and Keefer (1991) describe how the formal governance structures of worker-owned firms align the incentives of current and future workers and prevent under-investment. (Knack and Keefer (1997) show that trust and norms of civic mindedness were associated with faster economic growth at the country level. Dell and co-authors (2010, 2017) show that exogenous historical differences in institutions significantly affect contemporary cooperative behavior (public good provision at the village level), and incomes. One potential mechanism for these long run effects is that the historic institutional arrangements promoted or disrupted the informal enforcement of cooperation.

This work implies that social or informal enforcement promotes development by sustaining cooperative behavior in the provision of public goods and reducing opportunistic behavior in exchanges between members of society. However, substantial research hints at the limits of social enforcement as an engine of cooperative behavior and points to the potential importance of third-party enforcement. Sethi and Somanathan

(1996) conjecture that third-party enforcement might be necessary if there are fixed costs of monitoring behavior. Bendor and Mookherjee (1987) similarly conclude that decentralized (peer-to-peer) enforcement does little to encourage cooperative behavior in the absence of *perfect* monitoring, and that a combination of decentralized and centralized, third-party enforcement mechanisms could yield the most cooperative behavior. Laboratory evidence presented in Fischbacher and Gächter (2010) indicates that even though most people are inclined to cooperate, their desire to contribute less than others eventually undermines collective action. Andreoni and Gee (2012) report the results of laboratory experiments concluding that third-party sanctions may elicit more cooperative behavior than decentralized, peer-to-peer sanctions. Fehr and Gächter (2000) show that third-party punishment reduces free riding.

Evidence from this real-world setting demonstrates that third-party enforcement is indeed associated with greater cooperative behavior. Just as important, however, is the finding that markets that rely most on third-party, centralized punishment are also those where social ties are strongest. These are precisely those markets where one might expect the application of decentralized social pressure to be most efficacious in securing cooperative behavior. However, it is the threat of formal and not informal punishment that drives better outcomes in these markets. We therefore contribute to research on the role of social norms in development by documenting that social ties enhance the use of third-party, centralized sanctions.

Why, though, might stronger social ties promote the use of third-party sanctions? Greif, Milgrom and Weingast (1994), Weingast (1997) and Greif (2005) point to a fundamental concern: third parties capable of enforcing individuals' obligations may also abuse their authority. A wealth of experimental evidence (e.g., Fehr and Fischbacher 2004) concludes that third party, centralized punishment schemes elicit more cooperative behavior when they are regarded as fair and legitimate. Kosfeld and Rustagi (2015), looking at the management of forest commons in Uganda, conclude that the fear of abuse of authority is well-founded: some leaders do punish indiscriminately (see also Baldassarri and Grossman, 2011 and Hilber, et al., 2014). Cinyabuguma, Page and Putterman (2005) similarly show that arbitrary punishment authority undermines cooperative behavior. Not surprisingly, then, subjects in the laboratory experiments of Markussen, Putterman and Tyran (2014) prefer informal (decentralized, peer-to-peer) sanctions to hierarchical, third-party sanctions. Fear of abuse of authority may also underlie the results in Cobo-Reyes, Katz, Markussen and Meraglia (2019), who find that individuals who can move between groups are more likely to prefer formal sanctions.

This work implies, and we document in Peruvian markets, that social ties among group members should enhance members' willingness to accept third party enforcement.[1]

In sum, our findings advance in two ways previous research on institutions, collective action and development. First, we demonstrate directly that third-party enforcement institutions are strongly associated with collective action and growth. Markets with third-party enforcement invest more in common infrastructure, provide more collective services and grow faster. Second, markets with historically stronger social ties among members are more likely to use third-party enforcement institutions, consistent with the role that social ties play in reducing the risks of indiscriminate punishment.

Traditional Markets in Peru: Origins, Governance, and Legal Framework

The retail food sector in Peru is still dominated by traditional markets. These are responsible for 60 percent of retail food sales in the country, and nearly 70 percent in Lima. A recent market census (the Censo Nacional de Mercados de Abasto) identifies 1,232 markets in Lima, supporting 100,000 families (CENAMA, 2016). More than 2.7 million families use the traditional markets, according to the 2017 National Household Survey (ENAHO, 2015). These markets present an ideal empirical context to investigate the joint effects of centralized, third party enforcement institutions and social ties on cooperative behavior and economic growth.

The economic success of markets depends in part on their ability to undertake collective actions that have significant effects on customer demand for market services: cleaning and security, and the maintenance and construction of such infrastructure as perimeter walls, flooring, lighting, roofing, entryways, and passageways. Market vendors must agree on the need for these services, prioritize them, assign quotas to each market stand to finance them, collect those quotas, and execute the projects.

Owners cannot rely on outside enforcement of the obligations of market vendors to the markets. Peru exhibits substantial informality and low confidence in formal state institutions.[2] According to various estimates, the informal economy comprises as much as 40 percent of the gross national product of Latin American countries, and 56 percent of total employment (Gómez and Morán, 2012). Peru occupies one of the top positions

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[1] Research by Charnysh (2019) depicts a more complicated relationship between social ties and local institutions. The research focuses on Polish communities that were re-settled by more and less ethnically heterogeneous populations following World War II. After the war, the more homogeneous communities were more successful in providing local public goods – namely, volunteer fire brigades. However, following the transition to democracy and a market economy, the more heterogeneous communities collected higher tax revenues and hired more municipal guards.

[2] Indeed, the study is feasible precisely because traditional markets cannot easily appeal to external enforcement institutions in Peru, such as the courts or municipal authorities. If they could, internal variations in governance would be offset by appeals to external institutions.

in this regard, with as much as 60 percent of its gross national product located in the informal economy and 87 percent of firms classified as informal in the 2013 census of the informal economy (INEI, 2013). The 2015 *Latinobarómetro* survey reports that around 65 percent of all Latin Americans mistrust state institutions generally, and the judicial branch specifically. In Peru, the rates of mistrust are 10 percentage points higher.

In addition to the informality that generally pervades economic relationships in Peru, the markets confront specific obstacles to using Peruvian state institutions to resolve internal conflicts. In the parts of Lima where the sample markets are located, settlers (usually immigrants from elsewhere in Peru) invaded vacant areas and established new settlements. They set aside part of the invaded land to allow for the subsequent establishment of a market. Although most markets eventually received formal municipal recognition, the land occupied by markets is not necessarily alienable (the markets cannot unilaterally sell the land); owners of market stands do not have titles to their stands that could be defended in Peruvian courts; and, in the rare cases when the market board of directors has been duly registered and is therefore recognized by external authorities, the high costs and unpredictability of using the courts render this option a practical impossibility. The enforcement of intra-market rules therefore depends entirely on the market's own internal institutions.

Most traditional markets in Lima (74 percent) operate under one of two legal regimes, vendor associations or cooperatives. Both assign the rights to market stands to individuals, but the market itself is the property of all the vendors as a group. The markets have essentially identical formal decision-making rules and institutions, established in written statutes and presided over by a board of directors. The directors, who are elected among the vendors every two or three years, usually in a rotating fashion, act as market administrators themselves.[3] The written statutes dictate the responsibilities of the markets' boards of directors, how boards are elected, as well as when and how general assemblies of vendors are convened.

The boards make and enforce decisions about the services and infrastructure of the market, principally janitorial and security services and infrastructure maintenance and upgrades (flooring, roofing, lighting, etc.). They can impose sanctions on market vendors who transgress market rules, for example by failing to pay market fees. We describe markets where this is most likely to happen as exhibiting the formal (third-party) enforcement of market rules. The alternative enforcement mechanism is decentralized social pressure.

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[3] Specialized managers hired as market administrators are a rarity.

According to the data in the market census CENAMA (2016), markets rely mostly on vendor fees (around 75 percent of market income, distinct from the income of the individual vendors). Most fees are fixed, monthly payments, but some are extraordinary payments set by the market's board of directors—and approved by the general assembly—to finance larger one-off expenditures. Markets may also earn income from renting vacant stands and charging fees for use of the public restroom.

The collective effort required to finance market infrastructure is significant. One way to see this is to examine the difficulties markets have in persuading vendors to pay monthly fees. All 90 markets have ordinary monthly fees. They report that 17 percent of vendors do not pay their fees regularly. Most market also collect extraordinary fees periodically. For instance, more than 40 percent of the markets in the sample levied extraordinary fees during the year 2016. Of the vendors who should pay these fees regularly, 22 percent do not.

The Homogeneity of Markets and Vendors

Earlier research demonstrates the impact of historical circumstances on current policy and economic variables. Our analysis begins with similar comparisons: markets in which market founders were likely to exhibit stronger social ties historically are significantly more likely to use formal enforcement mechanisms, invest in public goods and provide services to vendors. We then move beyond these reduced form relationships to identify a series of correlations that illuminate underlying mechanisms. In many empirical settings used to study institutions the units of observation are large and heterogeneous (e.g., countries). This heightens concerns that empirical associations identified by the analysis are driven by unobserved differences across the units. Compared to institutional analyses in which countries or regions are the units of analysis, the traditional markets we examine are significantly more homogeneous and unobserved differences among them are less likely to account for the correlations we observe.

Unlike residents of cities, regions or countries, market vendors are engaged in nearly the same economic activities and serving almost identical customers. Countries, regions or cities differ in their vulnerability to the occurrence of historical events, such as conquest or disease. Since we observe the markets at their origin, we can also exclude the possibility of spurious correlations driven by unobserved inter-market differences prior to the period in which our analysis begins. Countries, regions or cities also differ in their geographic relationship to each other, complicating the interpretation of correlations of current outcomes with historic circumstances. The focus on markets located within metropolitan Lima significantly mitigates geographic heterogeneity. The markets are also homogeneous with respect to their interactions with the state. For example, markets are

similar with respect to the number of inspections that they reported from the municipality, Office of Civil Defense or the Ministry of Health.

To reinforce the homogeneity of our units of analysis, we not only select markets from the same metropolitan area, but we focus on markets from more peripheral neighborhoods. Both the area and population of metropolitan Lima have grown rapidly in the last 40 years, from around 5 million to around 10 million inhabitants and from around 300 to 600 square kilometers. The sample markets are in the semi-periphery of the area, where neighborhoods are socio-economically very similar.

Among those markets, we further select those neighborhoods with multiple popular markets that were exposed to a similar economic shock, namely the entry of supermarkets, which have recently expanded across the Lima metropolitan area. After identifying all supermarkets that had entered Lima since 2007, we then created the sample of markets using the 2016 National Census of Markets (CENAMA, 2016), which contains 1,293 markets with 102,067 vendors. The traditional market census (CENAMA) revealed 406 markets that were within 2.5 kilometers of supermarkets that had entered since 2007. Figure 1 depicts all 2.5 kilometer zones.

From this group, we dropped 55 traditional markets for which the supermarket was a recent entrant (2013–2015), to ensure that the duration of exposure to supermarkets was more homogeneous across the sample traditional markets. A key focus of the study is to examine the contribution of governance to growth from 2007–2017. Hence, 40 markets that were created after 2007 were dropped from the sample of 351. Very small markets, those with 20 or fewer market stands, confront distinct collective action challenges. There were 62 of these and they were dropped from the sample, leaving 249.[4] The census indicated that 14 of the markets in the remaining sample of 289 markets were actually "shopping centers" owned by a company; these confront no collective action issues and were dropped as well.

The remaining 235 markets were then examined to identify those that had unique geographic advantages that reduced competition from other markets—markets that were separated from others by barriers such as rivers, hills or highways. There were 25 of these and they were dropped from the sample. This left a group of 210 markets that were similarly exposed to the entry of supermarkets and had similar growth opportunities from 2007 onwards. All but one are in peripheral parts of the city that experienced substantial

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[4] There were some discrepancies between the CENAMA data used to construct the sample and actual market conditions. For example, it turned out that one of the markets in the sample had only 10 market stands, contrary to the CENAMA data. All others, however, met the sample selection criteria. Results are robust to deleting this market from the estimates.

population growth over the last 35 years; indeed, in some cases these areas of the city were uninhabited 35 years ago.

Figure 1: Traditional Markets around Supermarkets Established since 2007 in Metropolitan Lima
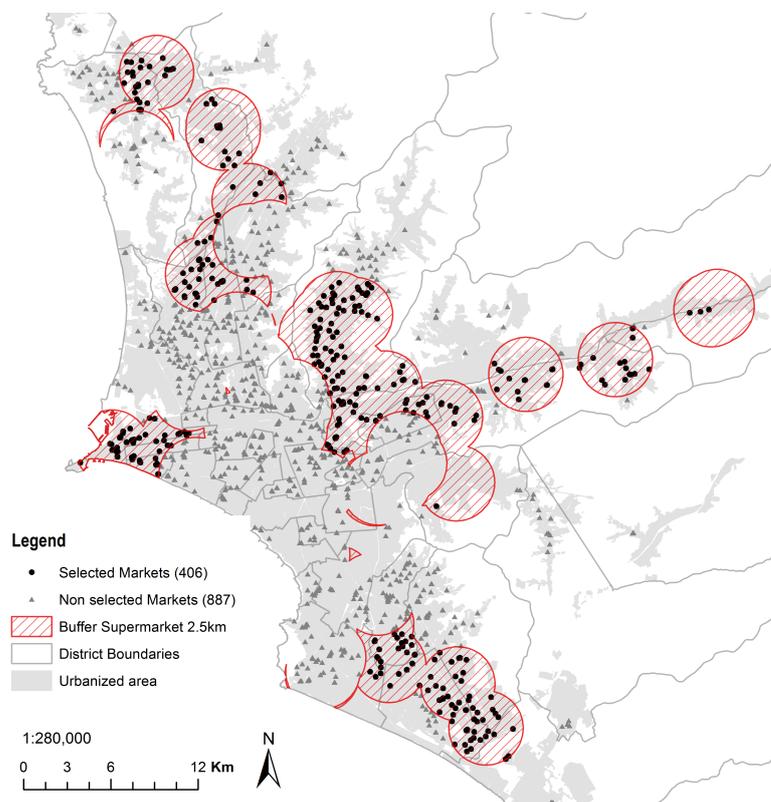
From the 210 markets remaining, we identified 90 in 20 "neighborhoods", such that the markets within the neighborhoods were closer to each other than to any other market outside of the neighborhood. The neighborhoods are in the five clusters circled in Figure 2.

Despite their homogeneity, unobserved differences among markets in the sample could nevertheless exist. For example, those from southern Peru settled in southern Lima and those from the center and north in northern Lima. These variations could affect both the rule of law inside popular markets (the willingness of boards to impose sanctions on rule violations) and their willingness to invest in market infrastructure.[5] We therefore

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[5] On the one hand, supermarkets might be a competitive threat. On the other, they might also attract new customers to traditional markets: supermarkets draw customers from a further distance, but households also frequently split their shopping between supermarkets and traditional markets – for example, because of a belief that traditional markets offer fresher produce. Goldman and Hino (2005) and Goldman, Krider and Ramaswami (1999) argue that traditional markets may be more efficient in satisfying consumer preferences for perishable foods, and that in any case there are variations across customer groups (e.g., due to cultural

control for 20 neighborhood or zone fixed effects; correlations are based on within-neighborhood variation.

Figure 2: Study Market Locations
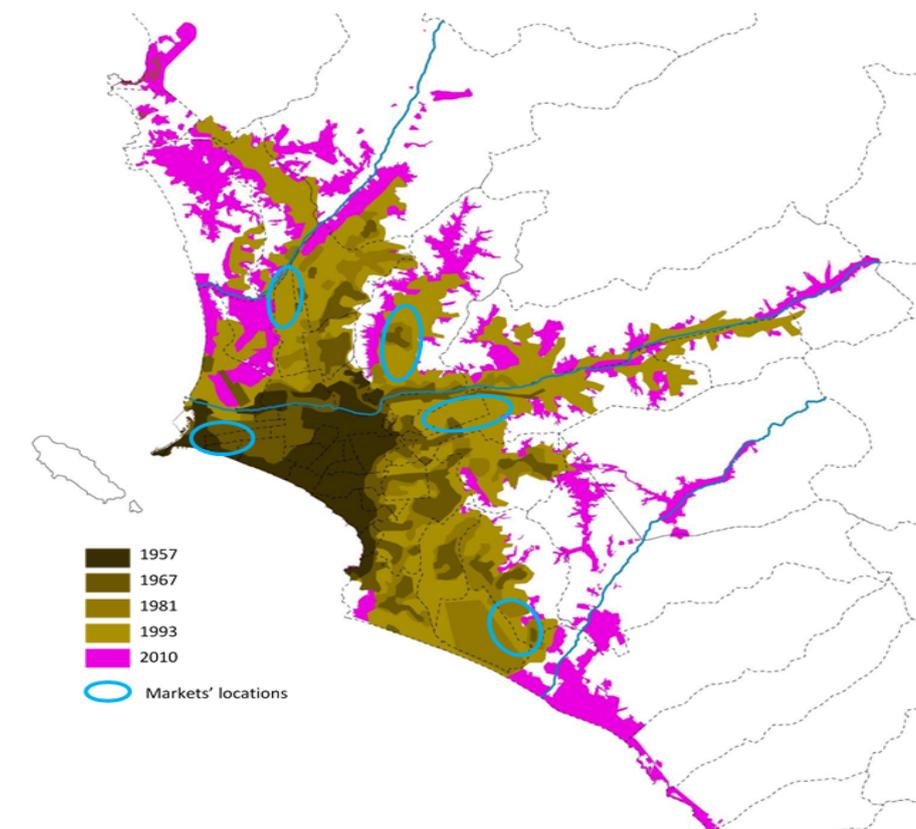
Although they would be categorized in the same economic sector in a census of firms, market vendors specialize in different product categories (e.g., meat versus dry goods). This might lead them to have different demands for market infrastructure and different opinions regarding the decisions of the boards of directors, the application of centralized sanctions, and the growth of their businesses. For example, butchers are more capital intensive (e.g., require refrigerated display cases) than vegetable and dried goods vendors. However, within the categories of butchers or dried goods vendors, stands are practically indistinguishable on observables. In market-level regressions, we control for differences in the product composition of markets. In vendor-level growth regressions, effects are identified based on within-category variation in sanctions and sales growth.

Identifying Social Ties

Formal enforcement mechanisms involve the delegation of sanctioning authority by market vendors to the board of a market. Social ties between founding vendors reduce the risk to vendors that the board will abuse the authority that has been delegated to it.

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differences) with respect to preferences for purchasing perishable food items in traditional markets.

Hence, we expect such social ties to be associated with stronger formal enforcement mechanisms and, moreover, that the component of formal enforcement that is explained by social ties to be significantly correlated with public good provision by markets.

We asked current market board members about the founding vendors of the market—the original vendors who came together to form the market. In 80 percent of the markets, board members indicated that these founders knew each other prior to establishing the market. However, in many fewer markets, founders also came from the same settlements (*urbanizaciones*) in the outskirts of Lima. We know the geographic size of these settlements.

In the context of Peruvian urban development in the 1980s, common residency in the same settlement created unusual opportunities to strengthen social ties. Around ninety percent of the markets in our sample were established in neighborhoods that were occupied before the construction of urban infrastructure, from streets and lighting to schools. Residents generally lacked property rights to their plots. In informal neighborhoods, as in traditional markets, lacking state recognition or access to state services of any kind, inhabitants had no choice but to engage in collective action to lay out a plan for the settlement (the placement of lots); to gain access to electricity, water, schools, roads and sidewalks; and to lobby for and receive state recognition at the neighborhood and individual levels. De Soto (1986, 29-30) emphasizes that neighborhood organizations also assumed responsibility for the administration of justice in the neighborhood.

Neighborhood assemblies and leaders (*dirigentes*, typically elected) directed the "self-construction" of the neighborhood (Holland, 2017; Espinoza and Fort, 2017; Dosh, 2010; Calderón, 2005, Manguin and Turner, 1978; Powell, 1970). The *dirigentes* acted as the first instance and the assembly as the second instance to resolve issues such as non-compliance with contracts to rent or sell property, or family disputes surrounding property ownership.[6]

Compared to residents of established urban areas, therefore, residents of these settlements had more and larger collective challenges to address, from the provision of infrastructure to the defense of informal property rights. They had more opportunities to interact to resolve collective challenges that founding vendors from different or large settlements would not have had. The specific history of urban settlement in Lima therefore makes it likely that founders from the same neighborhoods brought stronger social ties to the organization of the traditional food markets than founders from different

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[6] Prior experience as a *dirigente*, specifically, could be valuable for a market founder. However, in only 16 markets in our sample (nine with strong social ties, seven with weak) report having had any director who had also been a settlement *dirigente*.

urbanizaciones. Dunning (2009) presents evidence precisely consistent with this conclusion. In four Latin American cities, including Lima, he finds that individuals who illegally occupied land for urban settlement were more likely to participate subsequently in another organization aimed at solving a collective dilemma. This persistence was particularly strong in Lima.

In the analysis below, we assume that markets benefit from stronger social ties among founding vendors if at least half of the original founders, enough to constitute a majority of decision makers, were from the same settlement. Since the size of the settlement may affect the likelihood that any two founders from the settlement will interact, attenuating social ties, we also specify that the settlement from which the founders came have an area no larger than 80 hectares.

Eighty hectares corresponds to the catchment area of an average market's customers. We surveyed customers in all 90 markets in our sample. Ninety-three percent lived within 10 blocks of the market and 58 percent within five blocks. A Lima block is about 80 x 80 meters, 0.8 hectares, implying a catchment area of 200 hectares for those who live within 10 blocks and 50 hectares for those who live within five blocks. A settlement of 80 hectares has a radius of 6.3 blocks, encompassing more than 70 percent of the client base.[7]

The variable *Social Ties* is therefore equal to one in a market where at least 50 percent of the founding vendors were co-residents of a settlement that was no larger than 80 hectares in area.[8] Key results are not sensitive to alternative thresholds, however.[9]

The *Social Ties* variable measures the opportunity that market founders had to build social ties. Information from our survey of market vendors suggests that the opportunity was realized. In markets where *Social Ties* is one, 48 percent of respondent vendors said that other vendors could generally be trusted and 75 percent said that

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[7] Evidence from outside Peru also points to the link between the 80 hectares threshold and social ties. Sampson and Graif (2009) interviewed 8,782 Chicago residents and asked them to draw their self-defined neighborhood—that is, where they routinely interact with others for socialization, shopping, work and recreation. The mean neighborhood contained an area of 25 blocks, each block 200 x 100 meters, or 50 hectares. The 80 hectares threshold therefore equates, in Chicago, to an area of 40 blocks. The midpoint of a 40-block is 3.6 blocks from the edge. This is only 0.8 blocks more than the distance from midpoint to edge of a 25-block area.

[8] An alternative measure of the strength of social ties would vary continuously with the size of the settlement and the fraction of founders from the settlement. However, a continuous relationship is difficult to identify with 90 markets in the sample, particularly since we lack any information about the functional forms that translates settlement size to social ties or the fraction of founders to confidence in board decisions.

[9] For example, the preferred specification in Table 4, in column 7, is robust to a wide range of alternative thresholds for the construction of the measure of socials: for any percentage of co-founders from 40 to 60 percent, and any size settlement from 40 to 105 hectares. Using the strictest definition (60 percent and 40 hectares) 20 markets are classified as exhibiting social ties; using the loosest definition (40 percent and 105 hectares), 39 markets exhibit social ties.

members of the board of directors could be trusted. Among markets where *Social Ties* is zero, the corresponding figures were 34 and 65 percent. The differences are highly significant (*p*< .001). Similarly, the administrators of markets with social ties reported that 12 and 14 percent of their vendors irregularly paid their ordinary and extraordinary dues, respectively. In the other markets, these rates were 20 and 27 percent, respectively. The latter difference, 27 versus 14 percent, is significant at *p*<.10.

Nevertheless, a possible concern with the *Social Ties* variable is that its components, particularly the size of the settlement, capture historic features of markets other than social ties that might affect long run market performance. One is that the size of a settlement might be related to the economic prospects of a market. However, the survey of market customers provides reassurance that the size of a settlement at the time of market founding is exogenous to subsequent economic outcomes of a market. Customers freely shop at markets in neighboring settlements and the catchment area of markets, between 50 and 200 hectares, substantially exceeds the median size of settlements, 38 hectares. All results are robust to controlling for the size of settlement.

Another is that founding vendors whose social ties were based on their joint efforts to organize an informal settlement might have gained managerial or other experience that they then employed in the food market. However, nearly all founders came from some informal settlement; they differ only in whether they came from the same informal settlement. The opportunity to have gained experience in the struggle to urbanize would have been invariant across founders.

Finally, the assignment of social ties to markets might have been non-random and differed in unobserved ways from markets without social ties. However, interviews with market and settlement founders and the circumstances of peri-urban settlement in Lima 35 years ago support the assumption that the assignment was "as if random" and therefore exogenous to market outcomes thirty years later. They report that in these relatively desolate areas, the primary concern that families had was to earn some income. They set up their individual stands in areas where they thought they could earn the most, conditional on distance from their home and the presence of other stands (in turn weighing the tradeoff between the larger customer base in an area with more stands against the heightened competition they would confront). Whether other stands were owned by individuals from their settlement was not a consideration. Owners of stands coincidentally located close to each other subsequently made the decision to constitute a market.

Sample

The data come from 90 traditional food markets in Lima, Peru, where we collected information from board members (*dirigentes*), market administrators and customers and nearly 1,000 vendors. Vendors were randomly selected. Eighty percent of the vendors were the owners of the market stands; 20 percent rented the stands but were able to respond to the institutional questions that we posed. This division was identical in markets with and without social ties. On average, 46 percent of the stands were owned by founding owners of the market. This figure was balanced across neighbor-founded and other markets: forty-eight percent of respondent stands in non-neighbor markets; this figure was 45 percent for markets founded by neighbors. An additional 15 percent of respondents were family members of a founding director.

We collected data on vendor and stand characteristics, sales and number of customers, and perceptions about the competition and of internal market governance, from an average of approximately 11 vendors in each market (976 in total). Focus groups with directors in each market yielded further information on market characteristics, the origins of the vendors, market income and recent investments (90 in total).

Randomly selected customers (1,350) were also surveyed about their own characteristics, perceptions of the markets and supermarkets, and the environment around the market (e.g., crime). However, in the current analysis, customer data are only used to establish the catchment area of the markets. In addition, we hired a safety engineer who evaluated the infrastructure and equipment of each market, allowing us to measure the quantity and quality of these.

Variable Construction

Three variables are essential for the analysis: investments in market infrastructure over the period 2007–2017, formal enforcement of market rules, and changes in market economic performance from 2007 to 2017. This section describes each of these and how they were constructed, ending with a description of other control variables and a summary of all the variables used in the analysis.

Enforcement of Market Rules

The degree to which governments formally enforce rules is a longstanding measurement challenge. It is incorrect simply to count observed enforcement episodes or the number of sanctions issued by authorities (market administrators and boards). In equilibrium, markets with high enforcement capacity might have no actual enforcement episodes; vendors anticipate punishment and refrain from committing infractions.

Instead, we asked vendors how they expected the market to respond if vendors committed three specific, serious breaches of market rules. "What happens if a vendor does not want to contribute so that the market can pay for an activity that improves the market?"; "What happens if a vendor in this market swindles other market vendors?"; and "What happens if a vendor in this market neglects the appearance or cleanliness of his stand?" Respondents then indicated whether they expected no sanction; social pressure by other vendors; or a formal, third-party sanction by the board, ranging from an admonition to one of three material sanctions: fines; temporary closure of the stand; or expulsion from the market.

We investigate whether markets that are more capable of formal enforcement are better able to provide market infrastructure and collective services to market vendors. One measure of formal enforcement capacity is the percentage of respondents who indicated that the board would respond with any of the four board sanctions to an infraction, including admonition. However, vendor fears of abuse of authority should be greatest in the case of tangible and costly penalties. We therefore also investigate a second measure, the percentage of respondents who said the board would respond to an infraction with a fine, temporary closure or expulsion.

Table 1: Perceptions of Market Punishments, by Social Origins of Markets

	Non-payment of market assessments		Swindles other vendors		Fails to maintain neat and clean premises	
	No social ties	Social ties	No social ties	Social ties	No social ties	Social ties
Nothing happens	13%	7%	45%	31%	12%	2%
Other vendors apply a little pressure	2%	1%	1%	1%	3%	1%
Other vendors apply a lot of pressure	5%	6%	5%	3%	6%	4%
The board admonishes the violator	38%	32%	35%	41%	62%	62%
The board fines the violator	**38%**	**50%**	**7%**	**13%**	**15%**	**30%**
The board closes the violator's stand temporarily	**3%**	**1%**	**4%**	**6%**	**1%**	**1%**
The board expels the violator	**1%**	**1%**	**3%**	**5%**	**0%**	**0%**
Total	**100% (738)**	**100% (238)**	**100% (731)**	**100% (232)**	**100% (738)**	**100% (232)**

Vendors infer market enforcement from their knowledge of the market rules, their interaction with Board members and other vendors, and from their personal knowledge regarding the impositions of sanctions. That information is heterogeneous across both infractions and vendors. To reduce noise in the enforcement indicator, we therefore construct the measure by, first, calculating for each infraction the percentage of market

respondents who say that the board would react to the infraction by imposing any of the four actions. Second, we average these percentages across the three infractions.

Most respondents—an average of 73 percent across the 90 markets—indicated that the board would respond with some sanction, while 20 percent said that there would be no response at all to an infraction, and only seven percent thought that the response would consist of some level of social pressure from other vendors. Of the 73 percent, most indicated that the response would be an admonition; in the average market, 29 percent said that the board would impose a material sanction in response to an infraction; 45 percent pointed to an admonition.

Table 1 summarizes the responses to the questions from markets with and without social ties among founding vendors. Vendors in markets with founders with social ties are significantly less likely to say that "nothing will happen", the first row. They are similar with respect to the imposition of social, non-material sanctions. Among material punishments, by far the most common is a fine. Markets with social ties were significantly more likely to indicate that the board would impose a fine on the violator of market rules.

Market Infrastructure, Services and Dues Compliance

The primary collective action challenge confronting traditional markets is the construction of market infrastructure. Less challenging, but still requiring that markets raise money from vendors, is the provision of collective services, such as security, lighting and cleaning. Prior research examining how history and institutions solve collective action problems focuses on larger jurisdictions, countries or regions within countries, where information on public good provision is incomplete and demand for public goods is heterogeneous across jurisdictions.

We have data on *all* public goods that markets provide. Specifically, we can fully characterize both the stock and changes in the stock of the physical infrastructure of the all the markets in the sample. Traditional markets in Lima exhibit identical production functions and therefore confront a common menu of possible infrastructure investments. This allows us to construct scores for market infrastructure that are strictly comparable across markets, allowing us to accurately distinguish markets with respect to the stock of infrastructure and infrastructure investments over the period 2007–2017.

We do not need to rely on market records of how much markets spent on infrastructure. This is key, since even when budgetary expenditures on public goods are available, these can be a noisy and even biased proxy for actual public good provision. As Keefer and Knack (2007) argue, the translation of expenditures into infrastructure varies systematically with the institutional quality of countries: when institutions are weak, high levels of rent seeking drive up infrastructure costs.

To create a comparable score of infrastructure stock and investment across markets, we employed a safety engineer who, first, identified the 20 types of infrastructure that enter into market production functions, ranging from the perimeter wall to roofing and lighting to flooring and sanitation. The engineer then identified the discrete choices regarding each type of infrastructure that markets could make. Flooring, for example, could be dirt, cement or tile. Roofing could be open air or zinc. Finally, for each level and type of infrastructure, the engineer developed cost estimates for a benchmark market – how much it would cost the benchmark market to install the particular level and type of infrastructure (e.g., 500,000 soles to install a cement floor, 1,000,000 to install a tile floor). The weight of an infrastructure type and level is then its cost divided by the total cost to the benchmark market of having the highest level of infrastructure across all infrastructure types.[10]

To establish the score for the stock of infrastructure in 2017, the engineer evaluated which type and level of infrastructure each market had, multiplied these by the corresponding weights, and summed them. To establish the score for the stock in 2007, we interviewed the market's board members to find out what investments they had made since 2007, asked them what infrastructure levels were present prior to the investment, and through this process determined what stock of infrastructure types and levels were present in 2007. The weights were again applied, yielding the 2007 score. Infrastructure investment in each market, 2007–2017, is the difference between the 2017 and 2007 scores. Market infrastructure improved significantly over the period: the 2017 score is approximately 30 percent larger than the 2007.

In addition to detailed information on market infrastructure, we also collected information on the market provision of collective services (security, cleaning, water, electricity, and disinfection). All these services are vulnerable to the collective action dilemma: individual vendors can make themselves better off by free riding on the contributions of the other vendors. In interviews, the administrators of each market indicated whether the market paid for the various services. For each service, we constructed a dummy variable equaling one if the market provided the respective service. The services index used in the analysis below is average of the five service dummy variables.

Markets that are better able to solve the collective action problems of vendors should also be better able to collect dues from members. Interviews with market administrators yielded data on this, as well. All markets have ordinary monthly *cuotas* or

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[10] If the benchmark market would have had to spend 10,000,000 soles to instand the highest levels of all infrastructure (tile floors, zinc roofs, etc.), then the weight assigned to a tile floor (which costs 1,000,000 soles) would be .10. The weight assigned to a cement floor would be .05, and a dirt floor would be 0.0.

dues, to cover recurrent expenditures. We asked each market administrator what percentage of vendors reliably pay their ordinary monthly dues. The analysis below shows that this variable is also related to enforcement capacity.

Market Performance

The market infrastructure variable discussed above is exactly and objectively measured and is the dependent variable in our core estimates. Substantial theory and prior research predict that enforcement institutions should also be associated with economic growth. However, market vendors are small, usually informal enterprises, with significant unpaid family employment, erratic bookkeeping and a reticence to discuss finances with outsiders. Income data are therefore not available for traditional markets in Lima. Vendors are willing to report the number of customers that visited their stands, however. We collected this information from merchants, asking, "How many customers do you have on average, on a weekend day, for example on Saturday?" and, "Ten years ago, how many customers did you have on average, on a weekend day, for example on Saturday?"

Under what conditions is the growth in customer numbers a reasonable proxy for income growth? Unobserved variations in capital, labor, and product type and quality render measures of sales almost useless as measures of income or productivity in manufacturing enterprises. Within the retail sector, however, sales are also a noisy proxy for income and productivity. Indicators such as the number of customers are recommended for use in analyzing the profits and productivity of retail enterprises (e.g., the Bureau of Labor Statistics; Manser, 2005; and Gronroos and Ojasalo, 2004).

In the canonical discussion of the economics of the retail sector, Oi (1992) observes that shoppers' time is a key input in the production of distributional services: a transaction is consummated after shoppers' time has been invested in searching for the right product and price. Variations across retailers in their expenditures on inventory and advertising can reduce shopper time costs and potentially increase the prices that retailers can charge, yielding productivity differences across retailers. Retail productivity varies depending on whether shoppers make small purchases frequently or large purchases occasionally. In the former case, more frequent customer visits raise costs and lower productivity either indirectly, because customers queue, or explicitly, as vendor staffing costs increase.

However, even compared to other types of retail establishments, the traditional markets in Lima are exceptionally homogeneous on all these dimensions. Vendors in traditional markets use little capital, the production processes of market stands are essentially identical within product categories, and the products themselves are the

same. They have similar inventories and engage in the same levels of local advertising (essentially zero). Vendors in traditional food markets cater to customers who make small purchases frequently. Under these conditions, the number of customers and weekend sales, controlling for the physical size of the market stand and its category, are an accurate proxy for income.

To show formally the conditions under which the number of customers is an accurate proxy for the profits of a market stand, assume as in Oi (1992) that profits are described by $\pi = (P(R) - P_W)X - C(X, N) - P_R R$, where P is the retail price of the goods, including the premium that customers pay for services R provided by the retailer to making shopping more efficient or pleasant; P_W is the wholesale price of goods X, C are the costs of handling the goods, which rise in the quantity of goods and in the number of customers N, and P_R is the price of customer services. Assume that services provided to the consumer, R, are embodied in market infrastructure (lighting, roofing, etc.), and that the cost of providing those services is the same across markets.

In our data, we observe N and R. Our argument is that if market stand i experiences faster growth in the number of customers N than market stand j from 2007 to 2017, then it must be the case that profits in stand i have also grown faster. To see the conditions under which this is true, recall that customers across traditional markets shop in the same way, making small, frequent purchases. Total goods sold can therefore be expressed as the volume of goods per customer, $\bar{x}$, times the number of customers. We can then rewrite profits as $\pi = (P(R) - P_W)\bar{x}N - C(\bar{x}N, N) - P_R R$. Totally differentiating, $\partial\pi = \frac{\partial P}{\partial R}\bar{x}N\partial R - \partial P_W\bar{x}N + \partial N\left((P - P_W)\bar{x} - \frac{\partial C}{\partial X}\bar{x} - \frac{\partial C}{\partial N}\right) - \partial P_R R - P_R \partial R$.

Under what conditions, then, does $\partial N_i > \partial N_j$ necessarily imply $\partial\pi_i > \partial\pi_j$? Assume first that two markets have the same initial infrastructure R and number of customers $(N_i = N_j)$, and recall that market stands in traditional markets confront the same cost structure and wholesale goods prices, and consumer shopping behavior: P_W and $\bar{x}$ are the same for both markets. Then $\frac{\partial C}{\partial X}\bar{x}$ and $\frac{\partial C}{\partial N}$ are also the same in the two markets. The difference in growth rates is then given by $\partial\pi_i - \partial\pi_j = \left(\partial N_i - \partial N_j\right)\left((P - P_W)\bar{x} - \frac{\partial C}{\partial X}\bar{x} - \frac{\partial C}{\partial N}\right) + \left(\partial R_i - \partial R_j\right)\left(\frac{\partial P}{\partial R}\bar{x}N - P_R\right)$ and it follows necessarily that $\partial\pi_i > \partial\pi_j$ if $\partial N_i > \partial N_j$, controlling for differences in ∂R.

What if the two markets initially differ in their level of sales, $N_i > N_j$? In this case, it might be that $\partial\pi_i > \partial\pi_j$ because of an unobserved increase in retail margins that benefits the larger market more. Alternatively, costs may be non-linear in the number of customers. In this case, the same increase in the number of customers, $\partial N_i = \partial N_j$, yields

a larger marginal increase in costs in the larger market. However, after controlling for initial N, it is again the case that $\partial N_i > \partial N_j$ necessarily implies $\partial \pi_i > \partial \pi_j$.

Finally, what if two markets differ initially in their initial level of market infrastructure, $R_i > R_j$? In this case, stands in market i can charge more for their goods, $P(R_i) > P(R_j)$, so a given increase in the number of clients will have a larger impact on their profits. Controlling for the initial level of market infrastructure, however, it is again the case that $\partial N_i > \partial N_j$ necessarily implies $\partial \pi_i > \partial \pi_j$.

Reflecting the general technological shift in the retail food industry away from traditional markets, on average respondents reported a 13 percent decline in the number of customers over the period 2007–2017. The average masks considerable variation across markets in different parts of the city. Twenty-seven percent of the sample markets are in the north (Callao) and northeast (Los Olivos and Puente Piedra). Most vendors in these markets reported a decline in the number of customers. Among markets in the center of the metropolitan area (Ate, El Agustino and Santa Anita), about 10 percent of the total, vendors reported a large *increase* in customer numbers (74 percent). In the northeast (San Juan de Lurigancho), 37 percent of merchants reported an increase in the number of customers and in the south (Villa El Salvador and Villa María del Triunfo) 51 percent reported increases. Despite our systematic efforts to control for common shocks, there appears to be variation across areas of the city that might be driven by differences in neighborhood shocks. We therefore report estimates that control for neighborhood fixed effects, as discussed above.

Other control variables

Table 2 summarizes all the variables in the analysis. All regressions except those looking at vendor sales growth use market-level data. In most cases, baseline specifications control only for zone fixed effects. Additional specifications control for market level characteristics. The final set of controls capture respondent characteristics that might, for example, inject noise into the enforcement measure, which is based on information provided by vendors.

Market variables capture other determinants of collective action inside a market, other than social ties and enforcement. The number of vendors with voting rights and the number of market stands describe a long-documented factor in collective action, the size of the group. Market age varies, from 10 to 88 years. This may yield differences across markets with respect to the initial capital stock, which may have depreciated more in older markets. The strength of social ties may also change over time.

There might also be period-specific effects that affect the decision to open markets and the subsequent evolution of their governance and economic decision

making. Few markets were founded in the same year, so it is not possible to control for year fixed effects. However, controls include dummy variables that distinguish markets according to which quartile of the age distribution of markets they belong. That is, results are identified based on within age-quartile differences across markets.

In addition to social ties among founding vendors, other initial conditions might have had long run effects on governance, market investment and sales growth. Interviews with market directors provided information on the degree to which the settlement around the market was established or consolidated. An area exhibited "low" consolidation if they reported that the settlement had few dwellings of generally precarious construction and no public services. "High" consolidation implied that the settlement was mostly populated, with more solidly constructed homes, and access to public services. "Medium" levels of consolidation lay between these two.

Lima has grown through a process in which vacant land is occupied by informal settlements that eventually become formalized. Nearly all the neighborhoods in which our sample markets are located lacked formal legal status when they were established. However, some were occupied through invasion (settlers squatted on land, typically state-owned, with no prior authorization or purchase agreement); in others, settlers purchased agricultural land (though they neither sought nor received permission to urbanize that land). The legal status of the neighborhoods in which markets are established can affect both their internal governance and their sales growth. We therefore control for whether markets were established in neighborhoods that were settled by invasion (squatting on the land) or not (the variable takes on a value of zero if invasion, one otherwise).

Because of diminishing returns to capital, countries or firms with larger capital stocks at the beginning of a period invest less subsequently, all else equal. Initial differences in capital are less problematic in the case of traditional food markets, where capital plays a small role in the production of individual vendors. However, the infrastructure of markets themselves is key: poorly lit markets with uneven or non-existent pavement, where stands are more exposed to the elements, will benefit less from positive demand shocks than markets initially well-endowed with infrastructure. As the earlier discussion makes clear, we carefully measure market infrastructure, both in 2007 and 2017, and control for the initial (2007) stock of infrastructure.

Market-level controls also include measures of the presence of supermarkets and other traditional markets in the area. The 2008 economic census, *Censo Nacional Económica 2008*, allowed us to count the number of commercial establishments within 0.5 kilometers of the market. The index of supermarket competition is constructed by measuring the distance from the traditional market to the nearest supermarket, where

supermarkets that are 200 meters away or less receive a weight of 1; those between 200 and 500 meters receive a weight of 0.8; 500 and 1000, 0.4; 1500 and 2000, 0.3; and finally, between 2000 and 2500, 0.2. Because the sample of traditional markets were chosen from zones 2.5 kilometers in diameter around a new supermarket, no traditional market is less than 2500 meters from a supermarket. The index of competition from traditional markets is constructed similarly, but with an upper distance of 1000 to 1600 meters.[11]

Vendors in traditional markets specialize in fruits, vegetables, dry goods (canned foods, rice, etc.), chicken, meat, or other food products (such as fish) or non-food products (such as sundries). Differences in products sold affect inventory practices, the need for capital equipment (refrigerated display cases, electric meat grinders, etc.), and the sensitivity to competition (personal contact with the butcher might matter more than with the dry goods vendor, and customers might prefer supermarkets for some types of products over others). In all market-level regressions, we control for the fraction of stands in each category, using data from CENAMA.

The final market-level control is whether markets were, at their origin, organized by product category. The most efficient physical layout of markets is to group together stands that sell similar products, recalling the earlier discussion of Oi (1992) that begins with the observation that customer time is one output of the retail shopping experience. Since changing market layouts is costly, the initial choice of market layout can have long-term consequences. Moreover, markets with strong social ties were somewhat more likely to have been laid out by category of products, 47 percent compared to 38 percent of those markets without strong social ties among founding vendors. The difference, however, is not significant (the one-tailed t-test of the null hypothesis that the fraction of properly laid-out markets is lower among markets with strong social ties is rejected with p=.41). No result is affected by controlling for the layout of markets at their origin.

The vendor-level regressions, examining the effects of enforcement on growth in client numbers, also include controls for the vendor's own product category. The size of vendor stands is not uniform since, even in markets with uniform stand sizes, some vendors combine multiple adjoining stands. Vendors with larger stands may be higher quality vendors and therefore grow faster, independent of market governance. They also may be more powerful than other vendors and have a distinct view of market governance. We therefore control for the stand sizes of respondent vendors in the vendor-level regressions.

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[11] Traditional markets less than 200 meters from a traditional market receive a weight of 1; 200–500 meters, 0.75; 500–1000, 0.5; and 1000–1600 meters, 0.25.

Numerous other vendor characteristics might affect both sales and governance responses. We control for vendor education, gender and age, and whether the vendor was born outside of Lima ("migrant"). Most respondents were women, most completed high school, and most were born outside of the metropolitan area. Some respondents were founding vendors with potentially different views from those of other respondents regarding market governance. The average of respondents who were founders is a control in the market level regressions. The individual responses to the founder question are controlled for in the vendor regressions.

Table 2: Summary Statistics

	N	Mean	Std. Dev.	Min.	Max.
Dependent variables					
Change in Market Infrastructure Index, 2007–2014	90	4.6	2.9	0	14
Percent of vendors who always pay ordinary dues	90	.83	.21	.01	1
Change, log(number of weekend customers), 2007-17	968	-.13	.68	-3.3	3
Independent variables – market characteristics					
Market Infrastructure Index 2007	90	9.12	2.86	3	15
Number of vendors with voting rights (*socios*)	90	119	98.7	10	762
Number of market stands	90	154	177	10	1.3e+03
Age of market	90	34.4	13.5	10	88
Share of stands in each product category					
Vegetables	90	.103	.054	.028	.3
Fruit	90	.053	.03	0	.16
Meat	90	.044	.028	0	.16
Chicken	90	.085	.035	.026	.2
Fish	90	.031	.02	0	.1
Dried goods	90	.137	.069	.026	.388
Degree to which settlement around market was consolidated at market founding (1, Low; 2, Medium; 3 High)	90	1.9	.86	1	3
Size of settlement in which market is located (hectares)	90	94	124	3	444
Market located in settlement that was occupied formally (1) or through invasion (0)	90	.56	.5	0	1
Market organized by product category at market foundation	90	.41	.49	0	1
Weighted index of supermarket competition in 2017	90	1.1	.8	.2	3
Weighted index of traditional market competition in 2017	90	6.9	3	1.5	14
Percent of respondents who say infractions met by any Board sanction	90	.733	.174	.205	1
Percent of respondents who say response to infractions is social pressure	90	.067	.078	0	.273
Independent variables – characteristics of respondent vendors					
Log (number of weekend customers, 2007)	976	3.9	.78	1.6	6.7
What does the respondent sell?					
Chicken	976	.20	.4	0	1
Meat	976	.09	.29	0	1
Fruit	976	.11	.31	0	1
Vegetables	976	.23	.42	0	1

Dried Goods Stand (Fish, Disposable Products, Dried Goods, Seasonings Products)	976	.26	.44	0	1
Other	976	.106	.31	0	1
Education	976	4.4	1.4	1	7
Age	976	52	12	27	84
Is a market founder	976	.34	.47	0	1
Has other stands in the market	976	.15	.36	0	1
Size of market stand (sq. meters)	976	8.8	3.9	2	42
Gender (Male=1)	976	.29	.45	0	1
Born outside of Lima and Callao	976	.67	.47	0	1

Our argument is that markets acquired stronger social ties among founding vendors in an "as if random" fashion. If this is the case, markets with founders with strong social ties should be similar on observables compared to markets with weaker ties. As Table 3 demonstrates, the sample is balanced across "treatment" and "control" groups: nearly all observable characteristics are similar across markets with and without strong social ties. Markets with social ties were founded in areas that exhibited somewhat less consolidation (between "low" and "medium" compared to markets without social ties, where consolidation was "medium"); this variable is not significant in the regressions below. By construction, markets with social ties are found in smaller settlements; again, this variable is not significant in the regressions reported below. Markets with social ties confront somewhat less competition from other traditional markets and they report fewer weekend customers in 2007.

Table 3: Balance Table, Markets with and without Strong Social Ties

	Weak social ties	Strong social ties	Difference of means	p-value
Independent variables – market characteristics				
Market Infrastructure Index 2007	9.034	9.281	-0.247	0.697
Number of vendors with voting rights (*socios*)	117.379	120.813	-3.433	0.876
Number of market stands	167.224	131.188	36.037	0.359
Age of market	35.638	32.250	3.388	0.256
Share of stands in each product category				
Vegetables	0.104	0.101	0.003	0.818
Fruit	0.055	0.051	0.004	0.536
Meat	0.046	0.039	0.007	0.235
Chicken	0.092	0.072	0.020[**]	0.008
Fish	0.031	0.031	0.001	0.895
Other	0.134	0.141	-0.006	0.678
Degree to which settlement around market was consolidated at market founding (1, Low; 2, Medium; 3 High)	2.069	1.625	0.444[*]	0.018
Size of settlement in which market is located (hectares)	123.534	40.719	82.816[**]	0.002
Market located in settlement that was occupied formally (1) or through invasion (0)	0.603	0.469	0.135	0.223

Market stands organized by product category at market foundation	0.379	0.469	-0.089	0.415
Percent of market stands controlled by founding vendors or their families	0.426	0.380	0.047	0.489
Weighted index of supermarket competition in 2017	1.057	1.288	-0.231	0.189
Weighted index of traditional market competition in 2017	7.470	6.000	1.470[*]	0.023
Percent reporting the Board would respond to any of three infractions with an admonishment	0.692	0.809	-0.117[**]	0.002
Percent of respondents who say response to infractions is social pressure	0.074	0.056	0.018	0.307
Independent variables – characteristics of respondent vendors				
Log (number of weekend customers, 2007)	4.015	3.711	0.303[**]	0.000
What does the respondent sell?				
Chicken	0.210	0.187	0.023	0.384
Meat	0.095	0.085	0.010	0.613
Fruit	0.106	0.108	-0.002	0.934
Vegetables	0.226	0.238	-0.012	0.679
Other	0.249	0.292	-0.043	0.144
Education	4.454	4.380	0.075	0.429
Age	52.302	52.144	0.157	0.843
Is a market founder	0.326	0.363	-0.037	0.244
Has other stands in the market	0.159	0.142	0.017	0.472
Size of stand (sq. meters)	8.37	9.47	1.10	0.00
Gender (Male=1)	0.300	0.269	0.031	0.304
Born outside of Lima and Callao	0.653	0.711	-0.058	0.064
Number of markets/vendors	58/623	32/353	976	

Results

Important prior research compares collective action in regions that were exogenously exposed to some, often adverse, historical event (forced labor, an empire, slavery, etc.) with otherwise similar regions that were not exposed to it. Following this logic, we begin each of the analyses below by asking whether markets founded by vendors with close ties (values of *Social Ties* equal to one, 50 percent or more of market founders came from the same settlement of 80 hectares or less in size) exhibit more collective action today than markets without such ties. In each case, the analysis then exploits the wealth of information we have about markets to examine mechanisms.

Specifically, to explore the proposition that third party enforcement of market rules allows for greater provision of collective goods, we regress measures of collective action in market j, Y_j, on formal enforcement, Enf_j, the characteristics of the market, X_Mkt_j, and the characteristics of market vendors i, averaged over market j, $\overline{X\_ind}_{ji}$.

$$(1)\ Y_j = \varphi_1 + \gamma_1 \overline{X\_ind}_{ji} + \gamma_2 X\_Mkt_j + \gamma_3 Enf_j + \varepsilon_i$$

The collective action variables are market infrastructure investment, collective services provided by the market and the percentage of vendors who regularly pay their ordinary

dues. Estimates relying on market-level observations control for zone fixed effects (the 20 zones in which the 90 markets are grouped). We report robust standard errors. In specifications that control for fixed cluster effects, as we do here with neighborhood fixed effects, Abadie, et al. (2017) recommend reporting errors adjusted for clustering, when we expect heterogeneity in treatment effects across clusters. We do not observe heterogeneity, but all results are robust to reporting zone-clustered standard errors. Finally, to further investigate mechanisms, we test whether the component of enforcement that is correlated with *Social Ties* is also correlated with collective action (public good provision by the market).

This paper examines the role of formal enforcement in solving collective action problems and asks whether social ties influence the decision of groups to allow third-party, formal enforcement. These arguments imply, first, that we should observe significant correlations between social ties and formal enforcement, collective action decisions and growth, as well as between formal enforcement of rules and market outcomes. These correlations are estimated using ordinary least squares in the first regressions in every table.

They also imply that the component of formal enforcement that is explained by historic social ties should also be correlated with public good provision and other indicators of market collective action. The second set of regressions in each table employs two-stage least squares to examine this implication: the first stage regresses formal enforcement on social ties and the second stage estimates the association of the predicted value of formal enforcement with market collective action.

Results: Social Ties, Formal Enforcement and Market Infrastructure Investment
To examine the effects of formal enforcement on market infrastructure investment from 2007 to 2017, this section presents results from two sets of regressions. The first, in Table 4, uses the definition of formal enforcement described earlier, the percent of market respondents who indicate that the board would take any of four enforcement actions (admonition, fine, temporary closure, expulsion) in response to the three infractions. The second, in Table 5, uses a narrower definition, one that looks only at the three "hardest" sanctions, fines, temporary closure and expulsion.

The first specification in Table 4 directly estimates the effect on market investment of social ties among market founders, at the origin of the market decades earlier. The index of market infrastructure investment is significantly larger in markets where *Social Ties* equals one. This effect is substantively large. The standard deviation of the market infrastructure investment index is 2.9; the effect of *Social Ties* is to increase the index by 1.2, or .41 of a standard deviation. The regression controls for the stock of

capital in 2007. As expected, markets with more and better market infrastructure in 2007 had less need to invest in the subsequent period.

Table 4: Formal Enforcement of Rules and Collective Action: All Board Enforcement Actions

Panel A: Second stage results							
Dependent variable: Change in Market Infrastructure (Market Investment) Index, 2007–2014							
	OLS				2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	1.175**						
	(0.479)						
Percent respondents who say infractions met by any Board sanction		2.76*	1.80	3.91**	9.97**	9.73**	17.93**
		(1.58)	(1.63)	(1.826)	(4.367)	(4.68)	(7.526)
Constant	12.6***	10.47***	7.19	-7.52	6.05**	-0.54	-26.97**
	(1.48)	(1.62)	(4.38)	(8.22)	(2.91)	(5.96)	(13.49)
Observations	90	90	90	90	90	90	90
R^2	0.65	0.64	0.74	0.78	0.53	0.63	0.53
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes

Panel B: Summary of First Stage Results – Dependent variable, Formal Enforcement				
Social Ties		0.12***	0.12**	0.09*
		(0.03)	(0.05)	(0.05)
N		90	90	90
R^2		0.45	0.56	0.65
Kleibergen-Papp underidentification test (LM statistic) (p-val)		12.22 (.001)	9.77 (.002)	7.99 (.005)
Kleibergen-Papp weak identification test (Wald statistic)	Stock-Yogo critical values: 10% = 16.4; 15% = 8.96; 20% = 6.7; 25% = 5.5	11.95	6.48	4.09
Tests of weak-instrument-robust inference				
Anderson-Rubin Wald test (Chi-square) (p-val)		7.96 (.005)	7.41 (.007)	13.32 (.0003)
Stock-Wright LM S statistic (Chi-square) (p-val)		6.56 (.01)	5.78 (.02)	8.69 (.003)

Notes: See Appendix for full results. The enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by issuing an admonishment, imposing a fine or closing the stand either temporarily or permanently. Robust standard errors in parentheses. * p<0.1 ** p<0.05 *** p<0.01.

The next three columns of Table 4 report three different specifications of equation (1) and are also estimated with ordinary least squares. All regressions control for the market infrastructure index in 2007, as calculated by the engineer employed for this project,

since investment is a function of initial capital stock. The first, base regression controls only for zone fixed effects. The second estimate adds variables capturing relevant market characteristics: how consolidated was the settlement where the market is located at the time of the market's founding; the geographic size of the settlement in which the market is located; whether the occupation of the settlement was more formal (not through invasion); the fraction of market stands controlled by founding vendors or their families; an index of the presence of supermarkets in the zone; an index of the presence of traditional markets in the zone; the age of the market; three dummy variables capturing whether the market is in the youngest, second youngest or third youngest age quartile; the number of stand owners (with market voting rights); the number of market stands; whether the market was laid out by product category at founding; and the percentage of stands dedicated to vegetables, fruit, meat, chicken, fish and dried goods, respectively.

The third specification adds controls for respondent characteristics: average education level and age; percentage who were founding vendors and percentage who control multiple stands; the percentage who were men and the percentage who were born outside of Lima. The enforcement coefficient indicates the amount of additional infrastructure investment in markets with formal enforcement compared to markets with either informal enforcement (social pressure) or no enforcement at all. The column (2) coefficient on the formal enforcement of market rules is 2.76, implying that a one standard deviation increase (.17) in the percentage of vendors who say that the board imposes sanctions in response to infractions is associated with a .47 increase in market infrastructure investment from 2007-2014. This is 0.17 of the standard deviation of market investment (2.9). Markets that had a larger stock of infrastructure in 2007 had less reason to invest subsequently; consistent with this, the stock of market infrastructure is significantly, negatively associated with investment (see appendix table).

Column (3) controls for market characteristics and the enforcement variable is no longer significant. However, vendors who were founders, older, men, well-educated, etcetera might have responded differently to the enforcement question. Since they were represented in varying proportions in the different markets, their heterogeneous perceptions inject noise into the measure of enforcement. Column (4) adds controls for vendor characteristics that might influence their perceptions of market enforcement. The magnitude of the estimated association between formal enforcement and market investment rises to 3.9.

Estimates in columns 5 –7 use two-stage least squares to ask whether the effects of social ties on market infrastructure operate through formal enforcement. Our main interest in these results is to find correlations that illustrate the mechanisms underlying

the effects of historic social ties on current collective action. We discuss below the possible causal interpretation of these estimates.

Panel B of Table 4 summarizes the results of the first stage of the 2SLS regression (only the *Social Ties* coefficient is shown, for ease of presentation). Formal enforcement is significantly greater in markets in which founders had closer social ties and the effect is substantively large. Markets with social ties exhibit a formal enforcement score of between .09 and .12 points higher, approximately 50 percent of the standard deviation of the score (.21).

Turning to Panel A, the second-stage results, the estimated effects of formal enforcement on investment are significantly larger when we look only at the component of formal enforcement that is explained by social ties. The coefficient on formal enforcement in column (5), 9.97, implies that a one standard deviation increase in the formal enforcement variable is associated with a .58 standard deviation increase in the infrastructure investment index. The addition of market controls in column (6) does not change the estimated effect of formal enforcement. The specification in column (7) yields an implausibly large estimated effect of formal enforcement on investment, a coefficient of 17.9. We attribute this to a highly saturated specification, which include numerous vendor controls.[12]

Among the correlates controlling for market characteristics, the larger is the share of market stands controlled by founding vendors or their families, the greater is investment: having labored together to start the market and after working together for the longest period of time, founders should find it easier to resolve collective action problems. Markets in the youngest quartiles invest more, but the effect of formal enforcement on market infrastructure investment is identified based on variation between markets within quartiles. Several vendor characteristics are also significantly associated with investment, including the average age of respondent vendors (higher investment) and whether respondents were market founders (lower). In markets where vendors have multiple stands, collective action problems should decline because each vendor is more likely to internalize the externalities of their contributions to market public goods. Consistent with this, the larger the average number of respondent vendors with multiple stands, the greater is market investment.

Other variables that are significant in the first stage regression (results not shown) include the following. Formal enforcement was significantly lower in markets founded in

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[12] In a sample of only 90 markets, and in the presence of a large set of controls, there is less residual variation in enforcement that will be correlated with social ties. Thinking of social ties as an instrument, this leads to a weak instrument and explosive effects on the estimated coefficient of enforcement in the second stage. The Kleibergen-Papp weak instrument statistic is, consistent with this argument, lowest in column 7.

more consolidated urbanizations; in larger markets (those with more stands); the smaller the fraction of founders among respondents (founders may be more likely to insist on board punishments than others); and markets where a smaller fraction of respondents was born outside of Lima.

Causality

Table 4 identifies several new correlations that are consistent with the importance of social ties and formal, third-party rule enforcement for the resolution of collective action dilemmas, in this case investment in market infrastructure. We know from the table that historic social ties are directly associated with greater public investment, that formal rule enforcement is stronger in markets with stronger historic ties, and that public investment is higher in markets with that component of formal rule enforcement that is correlated with historic social ties. To what extent do these estimates support a causal interpretation?

Evidence from the earlier discussion of the *Social Ties* variable allows us to conclude that the assignment of historic social ties to markets was "as if random". Whether a market was founded by residents of the same small settlement was a coincidental outcome of independent decisions by individuals to set up a stand in the same area. It is therefore unlikely that unobserved conditions both promoted social ties among founding merchants and increased merchant willingness to accept formal rule enforcement and to invest more in market infrastructure decades later. Hence, we can interpret the results of the estimates in the first column of Table 4 and the first stage regressions in the 2SLS specifications as evidence that social ties among the founding merchants of a market have a significant causal effect on subsequent rule enforcement and market investment.

The results provide weaker support for a causal interpretation of the correlation between formal rule enforcement and public investment. The results from the OLS regressions are consistent with, but not proof of, the causal argument that formal enforcement of rules allows markets to engage in more collective action, specifically public investment. However, the formal enforcement of rules by market boards is not randomly assigned. A causal interpretation requires that, for the 2SLS results in Table 4, the assumptions underlying the exclusion restriction hold for *Social Ties* are valid and *Social Ties* is a strong enough instrument for formal enforcement.

Theory points to reasons why the exclusion restriction need not hold. The effects of social ties on subsequent collective action may operate through additional channels and not only formal rule enforcement. For example, markets with social ties may also exhibit greater (unobserved) agreement on the timing, amount and allocation of

investments in market infrastructure, and on the corresponding dues needed to finance it. However, such alternative mechanisms, which operate through their effects on collective decision making, are consistent with a complementary role for formal rule enforcement. Agreement on investments in market infrastructure does not eliminate the incentive to free ride and the necessity of enforcement. Moreover, our results reject the hypothesis that social ties operate through enhanced informal, decentralized enforcement.

The first stage results of the 2SLS regressions in Table 4 do not offer robust support for the strength of *Social Ties* as an instrument for market investment. In particular, the Kleibergen-Papp weak identification test statistics reported in columns 5-7 do not allow us to reject the null hypothesis that the relative bias of formal enforcement (the bias in the 2SLS estimate relative to the bias in the OLS estimate) is greater than 10 percent. However, results from the column 5 estimate rejects the null that the relative bias is greater than 15 percent. As significantly more controls are added, reducing the variation in formal enforcement that can be explained by the instrument, the KP statistics correspondingly decline.

Weak instruments bias upwards the second stage estimates of the endogenous variable, in this case formal enforcement. Although the KP statistic drops by half from column 5 to column 6, the estimated coefficient of formal enforcement in the second stage is nearly unchanged. In the presence of many vendor controls in the column 7 specification, though, *Social Ties* become a demonstrably weak instrument; the estimated coefficient of formal enforcement doubles in magnitude.

Nevertheless, the estimated effects of social ties on formal enforcement and of formal enforcement on market infrastructure investment are large. Hence, even if the bias induced by a weak instrument had the effect of spuriously doubling the estimated effect of formal enforcement in columns 5 and 6, one-half of the estimated effect would still be large. The tests of robust inference under weak instruments (Anderson-Rubin, Stock-Wright) reported at the bottom of Panel B strongly reject the null hypothesis that the true effect of formal enforcement is zero. That is, despite the weakness of the instrument, the tests of robust inference under weak instruments still point to a significant effect of enforcement on infrastructure investment.

We draw three conclusions from this discussion. First, historic social ties have a significant positive impact on collective decision-making decades later, both with respect to formal rule enforcement and to market infrastructure investment. Second, regardless of instrument strength, the correlations revealed at each stage in the 2SLS regressions are evidence of the exact mechanisms through which historical circumstances influence current economic outcomes. Third, the evidence weakly supports a causal interpretation

of the 2SLS results regarding the impact of formal rule enforcement on market infrastructure investment.

Results using strict formal enforcement

Table 5 asks whether the Table 4 results are robust to removing board admonishments from the definition of the formal enforcement variable. Few vendors in any market say that the main response to rule violations will be informal social sanctions. Many respondents, however, point to board admonishments. If admonishments are related to informal social sanctions, then the Table 4 results still underline the importance of third-party enforcement, but they do not cleanly distinguish formal and informal sanctions, or third-party enforcement from the role of social pressure.

As the earlier discussion observes, it is incorrect to equate third-party admonishments with informal social enforcement, since spontaneous social enforcement is substantively different than social enforcement coordinated by a third party. Nevertheless, the strength of the third-party admonishment may depend on the strength of informal social sanctions. Estimates in Table 5 therefore employ an alternative definition of third-party enforcement that includes only enforcement actions that impose a tangible cost on vendors: board, fines, temporary closure and expulsion. These regressions address the question of whether markets with boards that can impose costly sanctions invest more in market infrastructure compared to markets that rely on board admonishments, social pressure, or that do nothing.

Strict board punishments appear to be key to infrastructure investment. Considering the first row of Panel A, the estimated coefficients of the strict formal enforcement variable are all significant and of similar magnitudes to the estimates in Table 4. However, in the Table 5 estimates, board admonishments are shifted into the category of punishments against which strict formal sanctions are compared. This indicates that strict formal sanctions play a large role in resolving collective action dilemmas.

Panel B reports the main results from the stage 1 regressions. As with the broader formal enforcement variable, *Social Origins* is a significant predictor of strict formal enforcement. Strict enforcement has fewer sources of variation (three sanctions instead of four) and the diagnostic statistics indicate that identification is correspondingly weaker. Once again, however, the Anderson-Rubin and Stock-Wright tests point to evidence that, even discounting the upward bias induced by the weak instrument, strict enforcement has a significant impact on market infrastructure investment.

Table 5: Formal Enforcement of Rules and Collective Action: Strict Board Enforcement

	OLS			2SLS		
Panel A: Second stage results						
	(1)	(2)	(3)	(4)	(5)	(6)
Percent of respondents who say infractions met by material Board sanctions	3.419***	2.763*	3.634**	10.798*	10.211**	14.532**
	(1.233)	(1.458)	(1.699)	(5.728)	(4.695)	(5.752)
Constant	12.192***	8.901**	-1.534	12.273***	8.773**	0.161
	(1.337)	(3.968)	(7.443)	(1.098)	(3.612)	(6.383)
Observations	90	90	90	90	90	90
R^2	0.651	0.641	0.736	0.783	0.527	0.627
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Market controls		Yes	Yes		Yes	Yes
Vendor controls			Yes			Yes
Panel B: Summary of First Stage Results – Dependent variable, Strict Formal Enforcement						
Social Ties				0.109**	0.118**	0.111*
				(0.048)	(0.051)	(0.055)
N				90	90	90
R^2				0.443	0.604	0.702
Kleibergen-Papp underidentification test (LM statistic) (p-val)				5.84 (.016)	7.59 (.006)	7.23 (.007)
Kleibergen-Papp weak identification test (Wald statistic)	Stock-Yogo critical values: 10% = 16.4; 15% = 8.96; 20% = 6.7; 25% = 5.5			5.1	5.3	4.06
Anderson-Rubin Wald test (Chi-square) (p-val)				7.96 (.005)	7.41 (.007)	14.13 (.0002)
Stock-Wright LM S statistic (Chi-square) (p-val)				6.56 (.01)	5.78 (.016)	9.16 (.003)

Notes: Controls the same as in the corresponding regressions in Table 4. Robust standard errors in parentheses. * p<0.1, ** p<0.05, *** p<0.01. Enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by imposing a fine or closing the stand either temporarily or permanently.

The estimates in Tables 4 and 5 indicate that formal sanctions yield greater market investment compared to markets that rely on informal, decentralized enforcement— social pressure—or that do nothing. They raise the question of whether social ties might also improve collective decision making through their impact on informal enforcement, by itself. Two pieces of evidence are inconsistent with this hypothesis.

First, *Social Ties* do *not* predict the imposition of social sanctions on violators of market rules. In specifications such as the first stage regressions in Table 4, substituting social pressures for formal enforcement as the dependent variable, *Social Ties* is insignificant. This might seem paradoxical, since social ties surely facilitate the application of social sanctions. However, social ties also permit potentially more effective

sanctions, such as the formal board sanctions that are more evident in markets in which founding vendors enjoyed stronger social ties. Hence, while markets with historic social ties may have greater capacity to impose decentralized, social sanctions against rule violators, they also have greater capacity to use third party-imposed, centralized sanctions. The data indicate that they prefer the latter, since vendors in markets with historic social ties are more likely to report that board-approved sanctions are the likely response to violations of market rules.

Second, in ordinary least squares estimates, such as those in columns 2–4 in Table 4, controlling for informal rule enforcement (social pressure) does not reduce the correlation of formal board sanctions with market infrastructure investment. In addition, markets where vendors are more likely to say that social pressures are the preferred sanction for infractions of market rules exhibit no more market investment than markets where vendors say nothing is done in response to infractions.

Finally, it is worth observing that formal, third-party adjudication can facilitate the decentralized imposition of social sanctions. For example, board admonitions impose no tangible costs on vendors who violate market rules. However, the admonitions constitute a third-party signal that a violation of market norms has occurred. This signal may serve as a coordination device that allows vendors to apply social sanctions against violators of market rules, as in Greif's 1993 analysis of the Maghribi traders. This logic suggests that even if social ties trigger decentralized, informal sanctions on rule violators, these sanctions would still depend on the delegation of signaling capacity to the board.

Results: Market Services and Dues-Paying

The results from the previous section show the importance of social ties and formal enforcement for the provision of market infrastructure. Because of its cost, this is the most challenging collective action problem confronting markets. Two other collective action challenges are the provision of market services (security, cleaning, water, electricity, and disinfection) and the collection of regular market dues.

These are easier collective decisions since the stakes are lower. Regular dues are typically low compared to the dedicated fees paid to finance infrastructure. This is part because markets do not rely on regular dues to cover all the costs of the services they provide, but also generate income from the fees they charge for the use of bathroom facilities. Since the stakes are lower, the collective action dilemma is less acute and the need for social ties and formal enforcement less pronounced. Nevertheless, the same general correlations among historic social ties, formal enforcement and collective action are also found in the provision of market services and in dues-paying behavior.

The analysis makes two modifications to the specifications in Table 4. First, the dependent variable is now the services index discussed earlier in place of the market infrastructure investment index. Second, since the stock of market infrastructure is not relevant for service provision, the control for initial market infrastructure stock in 2007 is removed from the specification.

Table 6 reports the results of regressions that estimate whether markets with greater capacity to use formal enforcement also provide more services to vendors. Panel A presents the key results using the broad formal enforcement variable, including board admonitions. Panel B does the same using the strict enforcement variable, excluding admonitions. Results are weaker for the broad enforcement variable but remain strong using strict enforcement.

Table 6: Formal Enforcement of Rules and Market Services Provided to Vendors

Panel A: Broad Formal Enforcement (any Board sanction)						
Dependent variable: Percentage of five services provided by market						
	OLS				2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	0.102*						
	(0.061)						
Percent respondents who say infractions met by any Board sanction		0.267	0.177	0.129	0.864*	0.719*	0.747
		(0.220)	(0.170)	(0.184)	(0.448)	(0.413)	(0.566)
Constant	0.933***	0.755***	0.611	-0.369	0.358	0.082	-1.237
	(0.044)	(0.155)	(0.452)	(0.939)	(0.310)	(0.561)	(1.151)
Observations	90	90	90	90	90	90	90
R^2	0.339	0.331	0.592	0.690	0.204	0.509	0.610
Panel B: Strict Formal Enforcement (material Board sanctions)							
Percent of respondents who say infractions met by material Board sanctions		0.390***	0.286*	0.314*	0.854*	0.755**	0.705
		(0.128)	(0.152)	(0.161)	(0.483)	(0.367)	(0.483)
Observations		90	90	90	90	90	90
R^2		0.376	0.610	0.711	0.276	0.539	0.673
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes

Notes: See Appendix for full results. The enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by issuing an admonishment, imposing a fine or closing the stand either temporarily or permanently. Robust standard errors in parentheses. * p<0.1 ** p<0.05 *** p<0.01.

Column 1 in Panel A shows, once again, that markets with stronger historic ties among founding vendors engage in more collective action, this time greater provision of market services. Recalling the earlier discussion regarding the exogeneity of historic social ties,

this result points to a causal relationship between those ties and current "public good provision" by markets.

The additional OLS results indicate an insignificant correlation between broad formal enforcement and services. However, from the 2SLS results, the component of broad formal enforcement that is correlated with market ties is significantly correlated in columns 5 and 6 with market services. Panel B, looking only at strong board sanctions, shows a significant correlation with the provision of market services in five of six specifications.

Table 7: Formal Enforcement of Rules and Dues Payment

Panel A: Broad Formal Enforcement (any Board sanction)							
Dependent variable: Percentage of vendors who regularly pay their ordinary dues							
	OLS				2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	0.091**						
	(0.045)						
Percent respondents who say infractions met by any Board sanction		0.045	0.051	-0.072	0.773**	0.890**	1.317*
		(0.119)	(0.151)	(0.186)	(0.373)	(0.392)	(0.747)
Market currently collecting extraordinary dues	-0.157**	-0.154**	-0.147**	-0.167**	-0.165**	-0.15**	-0.068
	(0.068)	(0.069)	(0.067)	(0.071)	(0.069)	(0.063)	(0.102)
Constant	0.946***	0.915***	-0.436	-0.171	0.437*	-1.254**	-2.183
	(0.078)	(0.118)	(0.517)	(0.796)	(0.259)	(0.557)	(1.404)
Observations	0.369	0.336	0.626	0.650	0.102	0.379	0.164
R^2	0.339	0.331	0.592	0.690	0.204	0.509	0.610
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes
Panel B: Strict Formal Enforcement (material Board sanctions)							
Percent of respondents who say infractions met by material Board sanctions		0.221	0.283**	0.310*	0.764**	0.926**	0.958**
		(0.133)	(0.133)	(0.167)	(0.384)	(0.381)	(0.406)
Observations		90	90	90	90	90	90
R^2		0.364	0.657	0.677	0.193	0.492	0.553

Notes: See Appendix for full results. The enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by issuing an admonishment, imposing a fine or closing the stand either temporarily or permanently. Robust standard errors in parentheses. * $p<0.1$ ** $p<0.05$ *** $p<0.01$.

Table 7 considers social ties, formal enforcement and the dues-paying behavior of vendors. In markets with stronger formal enforcement, do more vendors pay their

ordinary dues regularly? Table 7 focuses on the percentage of vendors who regularly pay their ordinary dues, which exist in all the markets in our sample. However, 37 of the 90 markets also have *extraordinary* dues, responding to unusual expenditures, including infrastructure improvements, but also expenditures for unforeseen emergencies. Vendors who have larger financial obligations to the market (ordinary and extraordinary dues) are less likely to pay their ordinary dues regularly than vendors whose obligations are smaller, all else equal. Hence, in the base specification we control for whether markets collect extraordinary dues from members.

The first column of Table 7, Panel A, reinforces the key conclusion regarding the long-run effects of social ties among market founders: in those markets, the percentage of vendors who pay their ordinary dues regularly is nine percentage points higher than among other markets. This is almost fifty percent of the standard deviation of the dues variable (.21).

Consistent with the fact that regular dues are used to pay for market services, the effects of enforcement are the same as those for services. Broad formal enforcement, including board admonitions, is only significant in the 2SLS regressions, where we examine only that component of broad enforcement that is correlated with historic social ties. Nevertheless, the magnitudes of all estimates are large. A one standard deviation increase in formal enforcement (.17) raises the percentage of regular dues-payers by approximately 16 percentage points, three-quarters of a standard deviation.[13]

Strict formal enforcement—the application of material sanctions by the Board—is systematically correlated with greater dues-paying. From Panel B of Table 7, strict formal enforcement is significant in nearly all specifications. The magnitudes of estimated effects are comparable to those reported in Panel A.

Results: Formal Enforcement and Growth in Vendor Sales

The results in Tables 4–7 are the core findings of the analysis because the dependent variables, market infrastructure investment, collective services provided and dues-paying behavior, are exact measures of collective action within markets. Ample literature also suggests that enforcement institutions should promote economic growth. To examine this proposition in the Lima markets we must rely on vendor reports of growth in the number of their weekly clients from 2007 to 2017. This is a noteworthy period for traditional markets since, during this period, they experienced the entry of supermarkets.

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[13] Whether markets impose extraordinary dues is negatively associated with regular payment of ordinary dues and highly significant. Extraordinary dues may not be independent of the enforcement capacity of the market, however. Excluding it from the regression has little effect on the results in Table 6: magnitudes of the formal enforcement coefficients are largely unchanged and only the coefficient in the second OLS specification, in column 2, becomes slightly insignificant (*p*=.11).

In principle, markets with better internal governance, such as the ability of the board to respond to violations of market rules, should respond more effectively to such a shock: their sales should grow more rapidly (or shrink more slowly) than the sales of markets with worse internal governance.

Reliance on vendor reports of sales growth poses two difficulties that are not present in the measures of collective action that we use in the earlier analyses. The noisiness of customer numbers, as reported by vendors, is one obvious difficulty. We mitigate this problem by asking them to focus only on the number of customers that they had on Saturdays, the day that generates the most sales.

The second difficulty is the possibility of cognitive bias. De Nicola and Giné (2014) investigate the accuracy of recall data looking at boat owners in coastal India. They find that as the recall period lengthens, boat owners are less likely to recall their actual income in the past and more likely to infer it from their mean income over the period. Consequently, the variance of income over time based on boat owners' recollections is lower than the true variance. The effect of this is to bias growth towards zero as recall periods lengthen. Our recall period is ten years. By suppressing differences in growth across vendors, the phenomenon documented by de Nicola and Giné therefore makes it more difficult for us to identify an effect of enforcement on growth in the number of clients.[14]

Using equation (2), we estimate the effects of third-party enforcement on the change in the log of the number of clients from 2007 to 2014, $\Delta\Pi_{ji}$. Our base specification includes only the enforcement variable Enf_j and, as in the earlier tables, we supplement the base specification first with controls for market characteristics X_Mkt_j and then with controls for the individual characteristics of vendors, X_ind_{ji}. In contrast to the estimates reported in the earlier tables, vendors are the unit of observation. Since errors may be correlated across vendors within markets, we correct for market-clustered standard errors.

$$(2) \quad \Delta\Pi_{ji} = \varphi_1 + \gamma_1 X\_ind_{ji} + \gamma_2 X\_Mkt_j + \gamma_3 Enf_j + \varepsilon_i$$

The first column of Table 8 again reports the reduced-form effect of social ties among market founders on market conditions years later, in this case the growth in customer numbers reported by market vendors. In markets with social ties, the difference in the log of Saturday customers from 2007 to 2017 was .18 higher, or one-fourth of a standard

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[14] For respondents that experienced negative actual growth in customer numbers, mean customer numbers during the period should be less than customer numbers at the beginning of the period. Using mean customer numbers to calculate sales growth therefore underestimates the extent of the sales decline. For respondents who experienced positive actual growth, mean customer numbers should be greater than initial numbers. The extent of sales growth is therefore underestimated. Hence, the effect of recall bias is to reduce the estimated sales growth differences among market stands.

deviation of the growth variable (.68). Because of the exogeneity of *Social Ties*, we interpret this as evidence that historic social ties among market founders allow markets to better respond to shocks, such as the emergence of supermarket competition, decades later.

As in previous tables, the remainder of Table 8 (Panels A and B) reports the estimated effects of broad and strict formal enforcement on the growth in customer numbers. The OLS estimates are difficult to interpret since prior growth should affect current punishment. For example, it is possible that negative sales shocks reduce the willingness of vendors to impose social sanctions on each other, leading to increased reliance on third party punishment for infractions, particularly strict sanctions. Comparisons of columns 2-4 in Panels A and B provide evidence of this ambiguity. Panel A reports the coefficient on broad formal enforcement, revealing a highly significant and positive correlation between this enforcement variable and growth. Panel B focuses on strict formal enforcement, excluding board admonitions. There, the correlation is negative: slower growth is associated with greater reliance on tangible punishments.

The 2SLS estimates extract that component of enforcement that is correlated with historic social ties. The results are consistent across the two enforcement measures, revealing a positive correlation between third-party enforcement and market sales growth after the entry of supermarkets.

In growth regressions in which large jurisdictions are the units of observation, such as countries, convergence is a significant concern: countries with a larger stock of initial capital should, all else equal, grow more slowly. All regressions therefore control for the value of the market infrastructure index in 2007. However, initial capital stock is less important for the growth of firms in the service sector and, consistent with this, the estimated effect of the stock of initial market infrastructure is generally insignificant.[15]

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[15] Vendors vary in their capital intensity. Butchers, for example, need refrigeration cases, slicers and other equipment, while vegetable vendors require only bins to display their goods. We do not have measures of vendor capital stock. We control, however, for the market category to which a respondent vendor belongs.

Table 8: Formal Enforcement of Rules and Growth in Number of Customers, 2007–2017

Panel A: Broad Formal Enforcement (any Board sanction)

Dependent variable: Difference in log(number of customers), 2017–2007

	OLS				2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	0.180**						
	(0.083)						
Percent respondents who say infractions met by any Board sanction		0.550***	0.419**	0.379*	1.496**	1.626**	1.603**
		(0.193)	(0.198)	(0.202)	(0.712)	(0.734)	(0.701)
Constant	-0.40***	-0.77***	-1.15*	-0.87	-1.43***	-2.22**	-1.97**
	(0.030)	(0.138)	(0.617)	(0.681)	(0.499)	(0.950)	(0.968)
Observations	968	968	968	968	968	968	968
R^2	0.143	0.143	0.208	0.259	0.105	0.156	0.208
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes
Panel B: Strict Formal Enforcement (material Board sanctions)							
Percent of respondents who say infractions met by material Board sanctions		-0.197	-0.386*	-0.279	1.485	1.785*	1.711*
		(0.218)	(0.204)	(0.198)	(0.936)	(1.023)	(0.937)
Observations		968	968	968	968	968	968
R^2		0.133	0.207	0.257	.	0.023	0.106

Notes: See Appendix for full results. The enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by issuing an admonishment, imposing a fine or closing the stand either temporarily or permanently. Robust standard errors in parentheses; * p<0.1 ** p<0.05 *** p<0.01.

Among the control variables, some coefficients stand out. One of these is whether the respondent operates multiple stands. This mitigates a source of measurement error – vendors who acquired additional stands from 2007 to 2017 might have reported customer growth simply for that reason. In fact, either for this spurious reason, or because the number of stands captures differences across vendors in ability, larger vendors in fact grew more rapidly: the coefficient on the multiple-stands variable is positive and highly significant. The estimated coefficient on the size of the vendor's stand is also positive and significant. More educated respondents report faster growth, while older respondents and market founders report slower growth. There are no gender differences in growth, but vendors born outside of Lima report faster growth than others.

Conclusions

The traditional markets in Lima, Peru offer a novel opportunity to examine the mechanisms through which historic circumstances exert longer run effects on collective action and economic growth. We develop evidence that charts the entire evolution of market governance, from the social ties among the vendors who were present at the origin of the market to the enforcement capacity of market boards and from these to various measures of collective action by the market's vendors and to vendors' sales growth after a competitive shock, the entry of supermarkets. The homogeneity of markets and particularly of their formal institutions and rules allows us to precisely identify correlations among historic, social ties formal, third-party enforcement of market rules and collective action.

The results have implications for future research on institutions and development. Broadly, the analysis provides further insights into the question of why institutions are difficult to change. Social ties, and the interpersonal trust that they produce, may be a significant determinant of the willingness of a society to delegate significant enforcement authority to third party institutions. While the pathway to changing the *de jure* structure of institutions may appear to be straightforward, strategies for building the underlying social ties required for those institutions to succeed are less clear.

Somewhat more narrowly, future research on larger communities (regions and countries) should not only examine the formal institutions for making collective decisions, but also how those decisions are enforced. For example, just as in Lima markets, even among countries with similar political institutions there is significant variation in the enforcement of tax laws and of regulations intended to curb the imposition of negative spillovers by some citizens on others. The analysis of Lima markets also underlines the importance of exploring the interaction between enforcement and social ties among citizens. Where mistrust in society is high, just as where social ties between market founders are weaker, there may be little support for the delegation of enforcement authority to state entities.

The study also points to new directions in the study of informality. One key question is the degree to which informality suppresses productivity. The results here suggest that at least in the domain of informal markets, but possibly in any context where informal firms can organize themselves, the capacity for collective action could be an important determinant of the productivity costs of informality. These implications extend to policies regarding urban renewal, where the relocation of households or markets often plays an important role. The loss of social ties among relocated individuals is widely recognized as an intangible cost of relocation; the results here indicate that the loss might also have economic costs.

Related to the question of informality and productivity, our study suggests a possible new explanation for the difficulty of transferring economic assets to higher-valued uses. Although traditional markets retain a dominant market presence in Peru, in much of Latin America they have given way to supermarkets.[16] Traditional markets lack economies of scale (market vendors do not make joint purchases in wholesale markets, but independently stock their markets in frequent visits to wholesale markets). Nor do they enjoy the logistical efficiencies of supermarkets. Supermarket chains in Peru work with suppliers to homogenize pallet sizes, delivery times, delivery frequency, etc. Vendors in popular markets use taxis to transport early morning purchases at the wholesale market back to their stands. In interviews, supermarket executives revealed that the key obstacle they confront is lack of access to real estate. The capacity of market vendors to act collectively is likely to affect their ability to respond price signals of land value, such as offers from supermarket chains to buy the market's premises.

A final, more profound implication of the study relates to citizen mistrust in the state and the inability of citizens to rely on state institutions to solve contractual problems. The traditional markets in Lima demonstrate that organizations can develop internal substitutes for the external, state enforcement of their internal collective agreements. States (or municipalities) that cannot easily resolve the deeper institutional challenges of state-centered third-party contract enforcement may, nevertheless, be able to lower obstacles to collective action within organizations. Especially tractable interventions might include those that reduce information asymmetries among vendors, including information about the costs of infrastructure and collective services, and the economic benefits of particularly important collective decisions.

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[16] See, for example, Faiguenbaum, et al. (2002) for an analysis of the rapid rise of supermarkets in Chile.

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Appendix

EXPANDED Table 4: Formal Enforcement of Norms and Collective Action - ANY Board Enforcement

Panel A: Second stage results

Dependent variable: Change in Market Infrastructure (Market Investment) Index, 2007–2014

	OLS				IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	1.175**						
	(0.479)						
Mkt. Infrastructure Stock 2007	-0.859***	-0.828***	-0.925***	-0.868***	-0.864***	-0.988***	-0.901***
	(0.099)	(0.102)	(0.143)	(0.154)	(0.099)	(0.122)	(0.136)
Percent of respondents who say infractions met by any Board sanction		2.759*	1.803	3.908**	9.971**	9.727**	17.926**
		(1.581)	(1.629)	(1.826)	(4.367)	(4.684)	(7.526)
Level of consolidation of urbanization at mkt founding, 1-low, 2, 3-high			-0.830*	-0.787		-0.357	0.006
			(0.477)	(0.508)		(0.507)	(0.617)
Size of urbanization where mkt. is (hectares)			0.001	-0.005		0.002	-0.008*
			(0.004)	(0.004)		(0.004)	(0.005)
Market urbanization was occupied formally (1) or through invasion (0)			0.544	0.823		-0.910	-1.400
			(0.920)	(1.031)		(1.365)	(1.728)
Percent of market stalls owned by founders			1.178	2.040**		0.872	3.321**
			(0.996)	(0.989)		(0.908)	(1.314)
Index of number/distance of supermarkets around market			-0.963	-0.984		-0.768	-0.132
			(0.791)	(0.907)		(0.852)	(1.183)
Index of number/distance of traditional markets around market			0.211	0.149		0.319**	0.256
			(0.153)	(0.137)		(0.149)	(0.161)
Age of market			0.078	0.088*		0.098**	0.144**
			(0.052)	(0.050)		(0.049)	(0.073)
Youngest quartile of markets			3.457*	5.543***		3.840**	8.569***
			(1.834)	(1.746)		(1.603)	(2.742)
Second youngest quartile of markets			1.867	2.424*		2.152*	3.320**
			(1.233)	(1.204)		(1.143)	(1.494)
Third youngest quartile of markets			1.181	1.338		1.745**	2.219**
			(0.813)	(0.887)		(0.825)	(1.069)
Oldest quartile of markets			0.000	0.000		0.000	0.000
			(.)	(.)		(.)	(.)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Number of vendors with voting rights in market			0.001	0.002		-0.000	0.002
			(0.003)	(0.003)		(0.003)	(0.003)
Number of stalls in market			-0.002	-0.001		0.000	0.003
			(0.002)	(0.002)		(0.002)	(0.002)
Market organized by product category at founding			0.818	0.484		0.722	-0.029
			(0.514)	(0.631)		(0.537)	(0.795)
Percent of stalls that sell vegetables (CENAMA)			-11.483	-11.081		-6.434	-1.232
			(7.450)	(8.230)		(6.671)	(8.594)
Percent of stalls that sell fruit (CENAMA)			-17.888	-16.049		-24.869***	-34.873**
			(11.530)	(12.056)		(9.590)	(14.595)
Percent of stalls that sell meat(CENAMA)			-19.262	-27.123*		-22.049*	-41.838**
			(14.471)	(14.094)		(11.487)	(17.160)
Percent of stalls that sell chicken (CENAMA)			7.510	13.305		10.287	23.436*
			(10.658)	(11.000)		(9.553)	(13.114)
Percent of stalls that sell fish (CENAMA)			17.018	22.329		19.178	30.675
			(18.672)	(18.851)		(15.098)	(20.270)
Percent of stalls that sell dried goods (CENAMA)			5.317	4.122		6.322	5.979
			(4.600)	(5.788)		(4.300)	(5.489)
Average education of respondent vendors (years)				0.492			-0.325
				(0.651)			(0.748)
Average age of respondent vendors				0.244**			0.468***
				(0.096)			(0.160)
Respondent vendor is a market founder				-2.745*			-7.831**
				(1.438)			(3.278)
Respondent vendor has multiple stalls				2.293			2.857
				(2.227)			(2.000)
Respondent vendor gender (1-male, 0-female)				0.388			0.320
				(2.020)			(1.909)
Respondent vendor born outside Lima				-3.357			-5.981**
				(2.114)			(2.630)
Size of market stand, square meters				-0.029			-0.121
				(0.121)			(0.147)
Constant	12.637***	10.465***	7.190	-7.521	6.049**	-0.541	-26.973**
	(1.479)	(1.618)	(4.380)	(8.222)	(2.911)	(5.962)	(13.492)
Observations	90	90	90	90	90	90	90
R^2	0.651	0.641	0.736	0.783	0.527	0.627	0.530

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

EXPANDED Table 6: Panel A – Formal Enforcement of Norms and Market Services Provided to Vendors

Dependent variable: Percentage of five services provided by market

	OLS		IV				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	0.102* (0.061)						
Percent respondents who say infractions met by any Board sanction		0.267 (0.220)	0.177 (0.170)	0.129 (0.184)	0.864* (0.448)	0.719* (0.413)	0.747 (0.566)
Mkt. Infrastruture Stock 2007			0.002 (0.011)	-0.002 (0.012)		-0.002 (0.010)	-0.003 (0.010)
Level of consolidation of urbanization at mkt founding, 1-low, 2, 3-high			-0.067* (0.039)	-0.062* (0.036)		-0.034 (0.044)	-0.026 (0.043)
Size of urbanization where mkt. is (hectares)			0.000 (0.000)	-0.000 (0.000)		0.000 (0.000)	-0.000 (0.000)
Market urbanization was occupied formally (1) or through invasion (0)			0.056	0.060		-0.044	-0.044
Percent of market stands owned by founders			-0.158 (0.107)	-0.207* (0.119)		-0.179** (0.088)	-0.149 (0.101)
Index of number/distance of supermarkets around market			0.039 (0.078)	0.015 (0.085)		0.052 (0.074)	0.052 (0.077)
Index of number/distance of traditional markets around market			-0.007 (0.013)	-0.008 (0.013)		0.000 (0.012)	-0.003 (0.012)
Age of market			0.009 (0.006)	0.010* (0.006)		0.010** (0.005)	0.013*** (0.005)
Youngest quartile of markets			0.311 (0.209)	0.386* (0.205)		0.337** (0.172)	0.521** (0.208)
Second youngest quartile of markets			0.060 (0.142)	0.082 (0.118)		0.079 (0.123)	0.122 (0.102)
Third youngest quartile of markets			0.009 (0.092)	0.017 (0.083)		0.048 (0.079)	0.056 (0.069)

	(1)	(2)	(3)	(4)
Oldest quartile of markets	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Number of vendors with voting rights in market	0.000	0.000	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)
Number of stands in market	-0.000	-0.000*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Market organized by product category at founding	0.012	-0.008	0.005	-0.027
	(0.052)	(0.055)	(0.048)	(0.052)
Percent of stands that sell vegetables (CENAMA)	-1.456*	-1.505**	-1.110*	-1.049
	(0.821)	(0.712)	(0.604)	(0.642)
Percent of stands that sell fruit (CENAMA)	-0.174	0.536	-0.652	-0.281
	(0.929)	(1.015)	(0.824)	(1.079)
Percent of stands that sell meat(CENAMA)	-0.741	-0.961	-0.931	-1.580
	(1.355)	(1.185)	(1.143)	(1.028)
Percent of stands that sell chicken (CENAMA)	-0.732	-0.691	-0.541	-0.248
	(1.077)	(1.044)	(0.856)	(0.905)
Percent of stands that sell fish (CENAMA)	1.705	2.325	1.853	2.636*
	(2.144)	(1.719)	(1.759)	(1.492)
Percent of stands that sell dried goods (CENAMA)	0.589	0.543	0.658*	0.587*
	(0.406)	(0.442)	(0.347)	(0.354)
Average education of respondent vendors (years)		0.193**		0.155**
		(0.080)		(0.063)
Average age of respondent vendors		0.006		0.015
		(0.010)		(0.012)
Respondent vendor is a market founder		-0.049		-0.263
		(0.154)		(0.232)
Respondent vendor has multiple stands		-0.120		-0.098
		(0.216)		(0.179)
Respondent vendor gender (1-male, 0-female)		-0.145		-0.150

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				(0.204)			(0.161)
Respondent vendor born outside Lima				-0.128			-0.233
				(0.187)			(0.149)
Constant	0.933***	0.755***	0.611	-0.369	0.358	0.082	-1.237
	(0.044)	(0.155)	(0.452)	(0.939)	(0.310)	(0.561)	(1.151)
Observations	90	90	90	90	90	90	90
R^2	0.339	0.331	0.592	0.690	0.204	0.509	0.610
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes

EXPANDED Table 7 (Panel A): Formal Enforcement of Norms and Dues Payment

Dependent variable: Percentage of vendors who regularly pay their ordinary dues

	OLS		IV				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	0.091**						
	(0.045)						
Percent respondents who say infractions met by any Board sanction		0.045	0.051	-0.072	0.773**	0.890**	1.317*
		(0.119)	(0.151)	(0.186)	(0.373)	(0.392)	(0.747)
Market currently collecting extraordinary dues	-0.157**	-0.154**	-0.147**	-0.167**	-0.165**	-0.148**	-0.068
	(0.068)	(0.069)	(0.067)	(0.071)	(0.069)	(0.063)	(0.102)
Mkt. Infrastructure Stock 2007			0.015	0.013		0.008	0.009
			(0.011)	(0.012)		(0.011)	(0.014)
Level of consolidation of urbanization at mkt founding, 1-low, 2, 3-high			0.069	0.058		0.119**	0.155**
			(0.045)	(0.051)		(0.055)	(0.078)
Size of urbanization where mkt. is (hectares)			-0.000	0.000		-0.000	-0.001
			(0.000)	(0.001)		(0.000)	(0.001)
Market urbanization was occupied formally (1) or through invasion (0)			0.027	0.075		-0.127	-0.174
			(0.097)	(0.101)		(0.119)	(0.185)
Percent of market stalls owned by founders			0.339***	0.248*		0.306***	0.395***
			(0.113)	(0.126)		(0.087)	(0.145)
Index of number/distance of supermarkets around market			0.020	-0.022		0.040	0.082
			(0.075)	(0.084)		(0.074)	(0.111)
Index of number/distance of traditional markets around market			0.019	0.016		0.030**	0.027
			(0.013)	(0.014)		(0.012)	(0.017)
Age of market			0.011*	0.010		0.014***	0.015**
			(0.006)	(0.007)		(0.005)	(0.007)
Youngest quartile of markets			0.337*	0.240		0.378**	0.551**
			(0.186)	(0.213)		(0.161)	(0.257)
Second youngest quartile of markets			0.240**	0.223*		0.270**	0.312**

	(1)	(2)	(3)	(4)
	(0.107)	(0.117)	(0.109)	(0.137)
Third youngest quartile of markets	0.170**	0.167**	0.230***	0.251***
	(0.074)	(0.078)	(0.073)	(0.089)
Oldest quartile of markets	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Number of vendors with voting rights in market	0.000**	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Number of stalls in market	0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Market organized by product category at founding	0.005	0.019	-0.006	-0.035
	(0.042)	(0.053)	(0.048)	(0.077)
Percent of stalls that sell vegetables (CENAMA)	-0.179	-0.294	0.357	0.589
	(0.543)	(0.652)	(0.659)	(0.876)
Percent of stalls that sell fruit (CENAMA)	-1.904**	-1.346	-2.643***	-3.241**
	(0.880)	(0.905)	(0.915)	(1.647)
Percent of stalls that sell meat(CENAMA)	-2.629**	-2.444*	-2.929***	-3.683***
	(1.250)	(1.346)	(1.070)	(1.423)
Percent of stalls that sell chicken (CENAMA)	0.291	0.062	0.584	1.220
	(0.820)	(0.841)	(0.874)	(1.194)
Percent of stalls that sell fish (CENAMA)	3.292**	3.320**	3.523**	4.175**
	(1.524)	(1.595)	(1.384)	(1.852)
Percent of stalls that sell dried goods (CENAMA)	0.142	0.162	0.248	0.407
	(0.316)	(0.382)	(0.365)	(0.477)
Average education of respondent vendors (years)		0.046		-0.036
		(0.063)		(0.070)
Average age of respondent vendors		-0.006		0.019
		(0.008)		(0.017)
Respondent vendor is a market founder		0.198		-0.333
		(0.128)		(0.339)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Respondent vendor has multiple stalls				-0.110			-0.032
				(0.231)			(0.218)
Respondent vendor gender (1-male, 0-female)				0.053			0.002
				(0.177)			(0.178)
Respondent vendor born outside Lima				0.057			-0.285
				(0.228)			(0.278)
Size of market stand, square meters				-0.006			-0.018
				(0.012)			(0.015)
Constant	0.946***	0.915***	-0.436	-0.171	0.437*	-1.254**	-2.183
	(0.078)	(0.118)	(0.517)	(0.796)	(0.259)	(0.557)	(1.404)
Observations	90	90	90	90	90	90	90
R^2	0.369	0.336	0.626	0.650	0.102	0.379	0.164
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes

Notes: See Appendix for full results. The enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by issuing an admonishment, imposing a fine or closing the stand either temporarily or permanently. Robust standard errors in parentheses. * p<0.1 ** p<0.05 *** p<0.01.

EXPANDED Table 8 (Panel A) – Formal Enforcement of Norms and Growth in Number of Customers, 2007–2017

Dependent variable: Difference in log (number of customers), 2017–2007

	OLS		IV				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Social ties among market founders (1-0)	0.180**						
	(0.083)						
Percent respondents who say infractions met by any Board sanction		0.550***	0.419**	0.379*	1.496**	1.626**	1.603**
		(0.193)	(0.198)	(0.202)	(0.712)	(0.734)	(0.701)
Mkt. Infrastruture Stock 2007			0.025*	0.020		0.012	0.007
			(0.014)	(0.013)		(0.015)	(0.015)
Percent of stands that sell vegetables (CENAMA)			-1.276*	-1.018		-0.715	-0.399
			(0.655)	(0.628)		(1.073)	(1.078)
Percent of stands that sell fruit (CENAMA)			2.065	1.557		0.975	0.347
			(2.277)	(2.182)		(2.560)	(2.451)
Percent of stands that sell meat(CENAMA)			-2.921	-2.695		-2.896	-2.777
			(2.039)	(1.895)		(2.448)	(2.262)
Percent of stands that sell chicken (CENAMA)			1.305	1.020		2.088	1.854
			(1.782)	(1.726)		(2.116)	(2.087)
Percent of stands that sell fish (CENAMA)			-0.154	-0.694		-0.551	-1.075
			(2.595)	(2.387)		(3.281)	(3.053)
Percent of stands that sell dried goods (CENAMA)			0.832	0.740		1.076	0.984
			(0.589)	(0.560)		(0.747)	(0.710)
Market organized by product category at founding			-0.040	-0.048		-0.054	-0.064
			(0.065)	(0.058)		(0.081)	(0.077)
Number of stands in market			-0.000	-0.000		0.000	-0.000
			(0.000)	(0.000)		(0.000)	(0.000)
Number of vendors with voting rights in market			0.001**	0.001**		0.001*	0.001*
			(0.000)	(0.000)		(0.000)	(0.000)
Level of consolidation of urbanization at mkt founding, 1-low, 2, 3-high			0.188***	0.177***		0.163**	0.151**

	(0.060)	(0.057)	(0.064)	(0.062)
Size of urbanization where mkt. is (hectares)	0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Market urbanization was occupied formally (1) or through invasion (0)	-0.111	-0.185*	-0.282*	-0.361**
	(0.105)	(0.100)	(0.154)	(0.152)
Index of number/distance of supermarkets around market	-0.012	0.006	0.011	0.033
	(0.101)	(0.097)	(0.132)	(0.128)
Index of number/distance of traditional markets around market	0.002	0.011	0.020	0.029
	(0.018)	(0.017)	(0.024)	(0.023)
age25	0.116	0.098	0.229	0.232
	(0.287)	(0.279)	(0.326)	(0.314)
age34	0.118	0.110	0.174	0.169
	(0.156)	(0.142)	(0.190)	(0.173)
age42	-0.074	-0.094	0.003	-0.020
	(0.110)	(0.099)	(0.130)	(0.118)
age42plus	0.000	0.000	0.000	0.000
	(.)	(.)	(.)	(.)
Age of market	-0.001	-0.000	0.003	0.004
	(0.010)	(0.009)	(0.011)	(0.011)
Percent of market stands owned by founders	-0.099	-0.061	-0.135	-0.081
	(0.139)	(0.133)	(0.168)	(0.154)
Vendor sells chicken		-0.137*		-0.154**
		(0.069)		(0.072)
Butcher Stand		-0.161*		-0.186**
		(0.086)		(0.090)
Fruit Stand		-0.070		-0.088
		(0.081)		(0.085)
Vegetable Stand		-0.181**		-0.204***
		(0.073)		(0.073)

Dried Goods Stand				-0.188***			-0.207***
				(0.071)			(0.073)
Respondent vendor has multiple stands				0.141***			0.129**
				(0.051)			(0.050)
Average education of respondent vendors (years)				0.040**			0.034**
				(0.018)			(0.017)
Respondent vendor gender (1-male, 0-female)				-0.013			-0.012
				(0.046)			(0.045)
Average age of respondent vendors				-0.007***			-0.006**
				(0.002)			(0.002)
Respondent vendor born outside Lima				0.133**			0.116**
				(0.053)			(0.054)
Size of the vendor's stand (square meters)				0.013*			0.013
				(0.008)			(0.009)
Respondent vendor is a market founder				-0.073			-0.129**
				(0.057)			(0.060)
Constant	-0.395***	-0.774***	-1.145*	-0.870	-1.427***	-2.220**	-1.971**
	(0.030)	(0.138)	(0.617)	(0.681)	(0.499)	(0.950)	(0.968)
Observations	968	968	968	968	968	968	968
R^2	0.143	0.143	0.208	0.259	0.105	0.156	0.208
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes

Notes: See Appendix for full results. The enforcement index is the percent of market respondents that indicate that the board would respond to any of the three infractions by issuing an admonishment, imposing a fine or closing the stand either temporarily or permanently. Robust standard errors in parentheses.   * p<0.1 ** p<0.05 *** p<0.01.