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## Micro Evidence and Mechanisms from Peru

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## **Abstract**

Using a unique empirical setting, 1,000 vendors in 90 traditional markets in Lima, we find that social ties among market founders are key to the emergence of formal (third-party) enforcement of market norms, and that formal enforcement is key to collective action and growth. Markets that are more likely to use formal disciplinary actions against vendors who disregard market norms make larger collective investments, provide more collective services, and exhibit more regular payment of dues. They also experienced higher growth from 2007–2017, following the entry of modern supermarkets. Some markets were established by vendors from the same neighborhoods, with the opportunity to have developed stronger social ties. These informal ties turn out to be a key determinant of the strength of markets' formal institutions. Taking advantage of this historical characteristic as an instrumental variable, we infer that formal enforcement has a causal effect on collective action and growth.

JEL Codes: H4, O11, O17

Keywords: public goods, collective action, institutions, growth

## Introduction

Is the formal enforcement of norms—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 norms 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. However, social–informal–ties undergird formal enforcement mechanisms: markets founded by vendors with stronger social ties exhibit greater third-party enforcement of market norms. None of these effects can be accounted for by informal enforcement norms: markets where founders had strong social ties do not exhibit stronger informal enforcement; stronger informal enforcement is not robustly 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 that these have on institution-building to account for their long-run consequences, but they have lacked data to explicitly identify these mechanisms. Data from Lima markets yield measures of social ties and third-party enforcement and precise, complete measures of collective good provision. These permit direct estimates of the effects of social ties on enforcement and of enforcement on 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 these reduced-form effects: formal enforcement of rules, collective action and growth are all higher in markets where founders enjoyed stronger social ties. We can exclude the possibility that differences in the formal rules themselves account for these differences: the formal *enforcement* of norms varies substantially across groups with identical formal *rules*.

Second, centralized, third-party enforcement has a substantial causal effect on cooperative behavior and growth. Markets that rely more on the formal enforcement of rules 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. Third, the use of third-party enforcement institutions depends on intangible links among group members, such as the social ties that bind them. In contrast to previous work, the empirical context demonstrates that more incidental sources of social cohesion, not only those driven by significant historical events, have longer run effects on institutional outcomes.

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 trust required for those institutions to succeed are less clear.

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 founders. Engineering studies that we commissioned in 90 markets in Lima allow us to exactly quantify the change in market infrastructure from 2007–2017. Surveys of market administrators allowed us to quantify the collective services that markets provide to vendors and the difficulties that markets have in collecting dues from vendors. Surveys of almost 1,000 vendors in these markets yield direct measures of norm enforcement: whether the response to three typical violations of market norms is informal and social (pressure from other vendors) or formal (economically costly

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 yielded information about the social origins of the founding vendors. In some cases, the founders all came from the same small informal settlement; in others, members resided in different or large settlements. 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. Founders from the same, smaller settlements had significant opportunity to engage together in these collective actions, building social ties among themselves. Founders from different or large settlements did not. Exploiting the exogeneity of the initial social ties of the founding members to market decisions from 2007–2014, we can use these ties as an instrument for formal enforcement and show a causal effect of the “rule of law” on public investment and market growth.

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. 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. In this analysis, we were able to collect data on social ties among market founders; vendor perceptions of the extent to which third-party, centralized sanctions are used to promote cooperative behavior; and the actual collective decisions that markets make.

The next section of the paper describes in more detail the gaps in the literature to which this analysis is directed. The following section describes the historical and institutional context surrounding traditional food markets in Lima. We then turn to our identification strategy; 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 the 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 institutional outcomes generations or centuries later because they disrupted institutions needed 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 the underlying concepts (social ties, rule of law, 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 social 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 avoid free riding in the management of renewable common pool resources. Knack and Keefer (1997) show that trust and norms of civic mindedness were associated with faster economic growth at the country level. Pathbreaking work by Dell and coauthors (2010, 2017) uses exogenous historical circumstances that promoted or disrupted social norms of cooperation to identify the causal effects of these norms on contemporary cooperative behavior (public good provision at the village level), and incomes.

This work implies that social norms promote 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 norms as engines of cooperative behavior and at the 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—but the markets that rely most on third-party, centralized punishment are 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.<sup>1</sup>

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 promote 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 more than half of retail food sales in the country, and in Lima. A recent market census identifies 1,232 markets in Lima, supporting 100,000 families (CENAMA, 2016). More than 2.5 million families use the traditional markets, according to the 2015 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.<sup>2</sup> 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.<sup>3</sup> Peru occupies one of the top positions 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 (INEI 2013).<sup>4</sup> 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

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<sup>1</sup> 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.

<sup>2</sup> 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.

<sup>3</sup> Gómez, Juan Carlos y Dalmiro Morán (2012). *Informalidad y tributación en América Latina: Explorando los nexos para mejorar la equidad*. Serie Macroeconomía del Desarrollo, CEPAL. Santiago de Chile: United Nations.

<sup>4</sup> INEI (2013). Available at: de [https://www.inei.gob.pe/media/MenuRecursivo/publicaciones\\_digitales/Est/Lib1154/](https://www.inei.gob.pe/media/MenuRecursivo/publicaciones_digitales/Est/Lib1154/)

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 the right of the market board of directors to compel vendors to live up to their obligations to the market is not officially recognized by external authorities. Since markets and vendors cannot appeal to Peruvian legal institutions to resolve internal disputes, the enforcement of intra-market rules depends 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. The markets have a board of directors elected by the vendors and one or two market administrators who are hired by the board. 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 key for our analysis is that boards can 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, especially, impose sanctions on market vendors who transgress market norms, for example by failing to pay market fees. We describe markets where this is most likely to happen as exhibiting the formal (third-party, centralized) enforcement of market norms. The alternative enforcement mechanism is decentralized social pressure.

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 to finance larger one-off expenditures. Markets may also earn income from fees charged for use of the public restroom or nurseries.

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. A subset of 37 markets levied extraordinary fees; 22 percent of vendors do not pay them regularly.

### **Identification: The Homogeneity of Markets and Vendors**

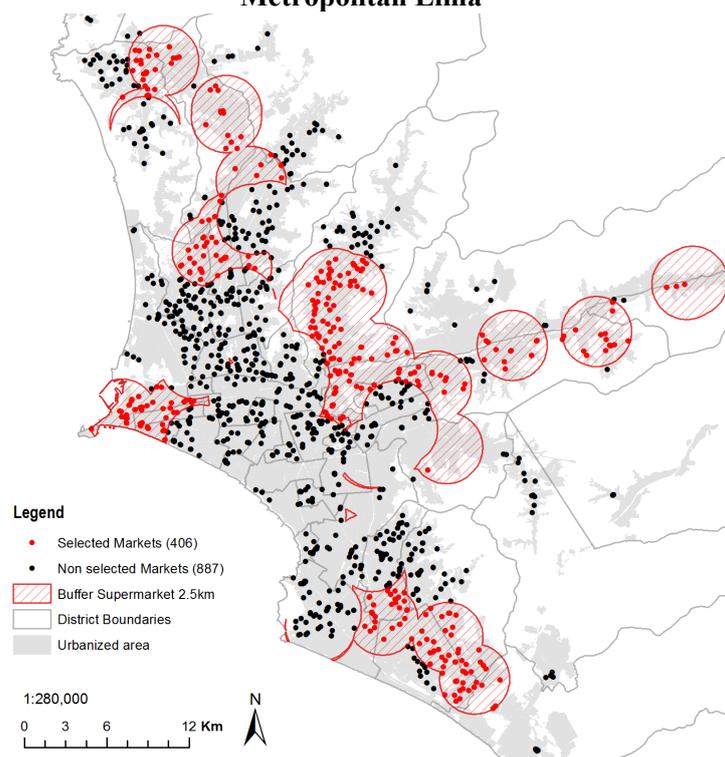
Several features of the data facilitate causal inferences about the effects of social ties and formal rule enforcement on infrastructure investment and growth. One is the homogeneity of the units of observation. A significant concern in all work on the economics of institutions is the potential for unobserved differences among units of analysis to cause a spurious correlation between institutional arrangements and economic outcomes. Popular markets are homogeneous—and notably more homogeneous than municipalities, regions or countries.

To further ensure the homogeneity of the markets in our sample, we identify effects based on comparisons of markets from the same neighborhoods of Lima and that were exposed to similar economic shocks. 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, but differences could nevertheless exist. For example, those from southern Peru settled in southern Lima and those from the center and north in northern Lima. Supermarkets entered some areas and not others. These variations could affect

both the rule of law inside popular markets (the willingness of boards to impose sanctions on norm violations) and their willingness to invest in market infrastructure.<sup>5</sup>

We therefore identified neighborhoods that each contained multiple popular markets, all similarly exposed to the entry of supermarkets. We first identified all the supermarkets that were established since 2007. The markets themselves were selected using the 2016 National Census of Markets (CENAMA 2016) from among 1,293 markets with 102,067 vendors. The traditional market census (CENAMA) revealed 406 markets that were within 2.5 kilometers of those supermarkets. All 2.5-kilometer zones are depicted in Figure 1.

**Figure 1: Traditional Markets around Supermarkets Established Since 2007 in Metropolitan Lima**



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. In addition, since supermarket entry is not a perfect proxy for neighborhood demand, we focused on traditional markets that are similarly located in outer areas of the city (more recently populated) and that share similar socio-economic characteristics.

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.<sup>6</sup> The

<sup>5</sup> 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 differences) with respect to preferences for purchasing perishable food items in traditional markets.

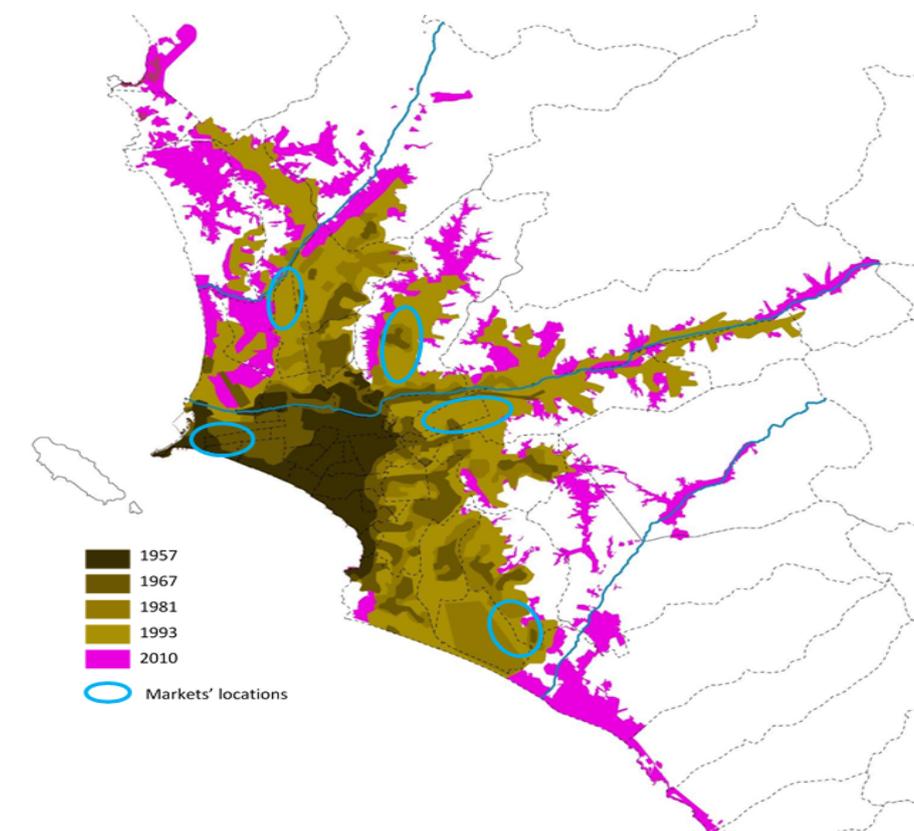
<sup>6</sup> There were some discrepancies between the CENAMA data used to construct the sample and actual market conditions. For example, it turned out that one of the markets in the sample had only 10 market stands, contrary to the CENAMA

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 are in peripheral parts of the city that experienced substantial population growth over the last 35 years; indeed, in some cases these areas of the city were uninhabited 35 years ago.

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. We identify institutional effects based on within-neighborhood differences: all estimations control for the 20 neighborhood fixed effects.

**Figure 2: The Location of Study Markets**



In addition, vendors in different product categories (e.g., meat versus dry goods) 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.

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data. All others, however, met the sample selection criteria. Results are robust to deleting this market from the estimates.

## Identification: Historic Social Ties as an Instrument for Current Rule Enforcement

We identify the effect of formal enforcement on market public good provision and vendor sales growth using as an instrument for formal enforcement the historic social ties between market founders. Formal enforcement mechanisms involve the delegation of sanctioning authority 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. Our identifying assumption is that these ties influence whether markets currently use formal enforcement mechanisms, but do not otherwise influence a market's decision to invest in public goods.

We asked current market board members about the founders 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 the settlement.

We assume that markets were established by founders who shared strong social ties if, first, at least half of the founders—enough to constitute a majority of decision makers—came from the same settlement and, second, the settlement was no larger than 80 hectares in size, beyond which, the sheer physical size of the community would have attenuated social ties. Evidence from the markets supports the two key assumptions of the instrument: that social ties were likely to be significant among this group; and that 80 hectares is an appropriate size threshold beyond which social ties are likely to be significantly attenuated.

In the context of Peruvian urban development in the 1980s, the fact that founders shared common residency in the same settlement created unusual opportunities to strengthen social ties. Ninety percent of the markets in our sample were established in neighborhoods that themselves developed without state recognition and with no legal right to the provision 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 and 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. 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 y 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.

Compared to typical 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 founders 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 other founders.<sup>7</sup>

Eighty hectares is an appropriate threshold of settlement size beyond which social ties among founders from the settlement are unlikely to be strong. For example, 80 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

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<sup>7</sup>Dunning (2009) presents evidence from four Latin American cities, including Lima, 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.

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.<sup>8</sup>

The instrument, *Social Ties*, is therefore equal to one in a market where at least 50 percent of the founders are co-residents of a settlement no larger than 80 hectares. Results are robust to alternative thresholds: whether the percentage of co-founders was 40 or 60 percent, and whether settlements were smaller than 70 or 90 hectares.<sup>9</sup>

Other survey questions provide support for the validity of the instrument. In markets with social ties, 48 percent of respondent vendors said that other vendors could generally be trusted, and 75 percent said that members of the board of directors could be trusted. Among markets where founders came from larger or different settlements, 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  $p < .10$ .

There are three concerns regarding the excludability of the instrument. First, 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.

Second, founders 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. In this case, it would be incorrect to exclude social ties from the second stage regression—its effects would operate not only through the willingness of boards of directors to punish norm violations, but also through its effect on vendors' human capital.

However, all founders, regardless of their settlement of origin, had the same opportunity to participate in the management of their respective settlements. Moreover, the data suggests that on key decisions related to the management of markets, founders of markets with and without social ties made similar decisions. For example, just as in any shopping center, the placement of stores by category is a key strategic decision: customers enjoy a better shopping experience when similar stores are located together. In fact, markets founded by neighbors were not significantly more likely than other markets to be laid out in this way.<sup>10</sup> Results are robust to controlling for this indicator of the managerial competence of the founders.

Finally, third, the assignment of social ties to markets might have been non-random. That is, markets where at least 50 percent of founders came from the same settlement differed in unobserved ways from markets without social ties. However, interviews with current members of market boards and the circumstances of peri-urban settlement in Lima 35 years ago support the

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<sup>8</sup> Other evidence, though not from 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 – 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 hectare 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.

<sup>9</sup> An alternative instrument would allow the strength of social ties to 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.

<sup>10</sup> 47 percent of markets with social ties were originally laid out by category, compared to 38 percent of markets without social ties. The difference is not significant: a one-tailed t-test of the hypothesis that the fraction in markets with social ties is larger has a  $p$ -value of .21.

assumption that the assignment was “as if random”. 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.

The wealth of data we collected (reviewed in the next section) allows us to exclude further threats to identification. For example, it is possible that markets with social ties had differential access to outside institutions, in contrast to our contention that vendors had little recourse to external institutions in resolving intra-market disputes. In fact, markets with and without social ties did not differ with respect to the number of inspections that they reported from the municipality, Civil Defense or the Ministry of Health.

## 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. Eighty percent of the respondents were the actual 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 founded by neighbors and not founded by neighbors. 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: 48 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). 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). 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 norms, 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 Norms*

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, in this case market administrators. 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 norms. “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, an admonition or 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.

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 (three) 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. Of these, however, 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. On average across the 90 markets, 20 percent of market respondents said that there would be no response at all to an infraction; only seven percent thought that the response would consist of some level of social pressure from other vendors.

#### *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 heterogeneous across jurisdictions. We have data on all public goods that markets provide. The homogeneity of markets means that unobserved factors are unlikely to yield a spurious correlation between enforcement and public good provision.

Specifically, we can fully characterize the physical qualities of the infrastructure. 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 instand the particular level and type of infrastructure (e.g., 500,000 soles to instand a cement floor, 1,000,000 to instand 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.<sup>11</sup>

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 determined through this process 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 of 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 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 of our core estimates of the impact of formal enforcement. Substantial theory and prior research predict that enforcement institutions should also accelerate firm 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? It would clearly not be a meaningful proxy for income (profits) or productivity of a manufacturing enterprise. Unobserved variations in capital and labor would render measures of sales almost useless as measures of income or productivity. Differences in product and product quality across firms also yield significant noise and potential bias. Nevertheless, within the retail sector, sales could be a noisy proxy for income and productivity and for this reason, indicators such as the number of customers are recommended for use in analyzing the profits and

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<sup>11</sup> 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.

productivity of retail enterprises (for example, 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  $\partial\pi_i - \partial\pi_j = (\partial N_i - \partial N_j)\left((P - P_W)\bar{x} - \frac{\partial C}{\partial X}\bar{x} - \frac{\partial C}{\partial N}\right) + (\partial R_i - \partial R_j)\left(\frac{\partial P}{\partial R}\bar{x}N - P_R\right)$  and it follows necessarily that  $\partial\pi_i > \partial\pi_j$  if  $\partial N_i > \partial N_j$ , controlling for differences in  $\partial R$ .

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, a 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*

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 constant. Initial differences in capital are less problematic in the case of traditional food markets, where capital plays a small role in 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.<sup>12</sup>

As indicated in the earlier discussion regarding the exogeneity of the instrument, *Social Ties*, we control for the geographic size of the settlement in which a market is located. 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.<sup>13</sup>

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. It is possible that founders who had worked together to organize an informal neighborhood—building social ties in the process—might have gained managerial or other experience that they then employed in the food market. It might then be the case that their managerial experience, rather than their social ties, account for subsequent market decisions. One important managerial decision is the layout of markets; the most efficient layout organized market stands by category of products. 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 founders. The difference, however, is not significant (the one-tailed *t*-test of the nul hypothesis that the fraction of properly laid out markets is lower among markets with strong social ties is rejected with  $p=.21$ ). 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

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<sup>12</sup> We also collected extensive information on maintenance and security, common services also financed by vendors, but these exhibit little variation across markets.

<sup>13</sup> 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.

and have a distinct view of market governance. We therefore control for the stand sizes of respondent vendors in the vendor-level regressions.

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 founders 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 1: Summary Statistics**

	N	Mean	Std. Dev.	Min.	Max.
<b><i>Dependent variables</i></b>					
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), 2007–2017	968	-.13	.68	-3.3	3
<b><i>Independent variables – Market Characteristics</i></b>					
<i>Percent vendors reporting the types of punishment in response to vendor infractions of any of three market norms</i>					
Material board sanctions	976	.285	.198	0	.833
Board admonishment	976	.449	.225	0	1
Vendor social pressure	976	.066	.077	0	.273
Market Infrastructure Index 2007	90	9.1	2.9	3	15
Number of vendors with voting rights ( <i>socios</i> )	90	119	99	10	762
Number of market stands	90	154	177	10	1,280
Age of market	90	34	13	10	88
Share of stands in each product category					
Vegetables	90	.1	.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	.14	.069	.026	.39
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
Percent of market stands controlled by founding vendors or their families	90	.41	.3	0	1.2
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

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***Independent variables – Characteristics of Respondent Vendors***

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Log (number of weekend customers, 2007)	976	3.9	.78	1.6	6.7
What does the respondent sell?					
Chicken	976	.2	.4	0	1
Meat	976	.091	.29	0	1
Fruit	976	.11	.31	0	1
Vegetables	976	.23	.42	0	1
Dried Goods	976	.26	.44	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
Gender (Male=1)	976	.29	.45	0	1
Born outside of Lima and Callao	976	.67	.47	0	1

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Our argument is that markets acquired stronger social ties among founders 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 without strong social ties. As Table 2 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 of the social ties indicator, markets with social ties are found in smaller settlements; again, this variable is not significant. Markets with social ties confront somewhat less competition from other traditional markets and they report fewer weekend customers in 2007.

**Table 2: Balance Table, Markets With and Without Strong Social Ties**

	Weak social ties	Strong social ties	Difference of means	p-value
<i>Independent variables – Market Characteristics</i>				
Market Infrastructure Index 2007	9.034	9.281	-0.247	0.697
Number of vendors with voting rights ( <i>socios</i> )	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
Dried goods	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	0.446	0.443	0.003	0.947
Percent reporting that other vendors would respond to infractions with some or much social pressure	0.074	0.056	0.018	0.307

<i>Independent variables – Characteristics of Respondent Vendors</i>				
Log (number of weekend customers, 2007)	3.995	3.691	0.304**	0.002
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
Dried goods	0.249	0.292	-0.043	0.144
Education	4.441	4.350	0.091	0.473
Age	52.365	52.284	0.081	0.934
Is a market founder	0.324	0.363	-0.039	0.463
Has other stands in the market				
Gender (Male=1)	0.158	0.143	0.015	0.586
Born outside of Lima and Callao	0.294	0.263	0.031	0.427
Fraction of respondents born outside of Lima	0.659	0.715	-0.056	0.233
Observations	58	32		

Table 3 summarizes the responses to the questions from markets with and without social ties among founders. 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 norms.

**Table 3: 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%
<b>The board fines the violator</b>	<b>38%</b>	<b>50%</b>	<b>7%</b>	<b>13%</b>	<b>15%</b>	<b>30%</b>
<b>The board closes the violator's stand temporarily</b>	<b>3%</b>	<b>1%</b>	<b>4%</b>	<b>6%</b>	<b>1%</b>	<b>1%</b>
<b>The board expels the violator</b>	<b>1%</b>	<b>1%</b>	<b>3%</b>	<b>5%</b>	<b>0%</b>	<b>0%</b>
<b>Total</b>	<b>100%</b> <b>(738)</b>	<b>100%</b> <b>(238)</b>	<b>100%</b> <b>(731)</b>	<b>100%</b> <b>(232)</b>	<b>100%</b> <b>(738)</b>	<b>100%</b> <b>(232)</b>

## Results

Important prior research compares collective action in regions that were exogenously exposed to some political condition in the past (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 test mechanisms.

Specifically, to test the proposition that third party enforcement of market norms allows for greater provision of collective goods, we regress measures of collective action in market  $j$ ,  $Y_j$ , on each of the two formal enforcement variables,  $Enf_j$ , 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. Because enforcement and infrastructure investment are endogenous, we also instrument for enforcement using the *Social Ties* variable. Estimates relying on market-level observations control for zone fixed effects (the 20 zones in which the 90 markets are grouped).

### *Results – Formal Enforcement and Market Infrastructure Investment*

Table 4 examines the determinants of market infrastructure investment from 2007 to 2017, focusing on the broader formal enforcement variable, the percent of market respondents who indicate that the board makes any of four responses (admonition, fine, temporary closure, expulsion) in response to the three infractions. Since investment is a function of initial capital stock, all specifications control for the 2007 value of the market infrastructure index calculated by the engineer employed for this project.

The first specification in Table 4 looks directly at the effect of history and social ties at the origin of the market on market investment. The index 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 1.8, 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.

The remainder of the table estimates three different specifications of equation (1), first with ordinary least squares and then, in the last three columns, using the instrumental variable. All regressions control for market infrastructure in 2007 and the broad formal enforcement variable. The first, base regression in each set of three, OLS and IV, 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 founders 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 founders 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 extra 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 3.42, 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 .58 increase in market infrastructure investment from 2007-2014. This is 0.20 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 (-.86).

Column (3) controls for market characteristics. The association between formal board sanctions and market investment continues to be significant. However, vendors who were founders, older, men, well-educated, etc., 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. After adding controls for vendor characteristics that might influence their perceptions of market enforcement, in column (4), the magnitude of the estimated association between formal enforcement and market investment rises to 3.6, similar to column (2).

Estimates in columns 5 - 7 address the possible endogeneity of vendor responses to the enforcement question and infrastructure investment by the market. The endogeneity could arise because of salience (markets with more recent, significant investment also have more recent

experience with sanctions); reverse causality (respondents might infer from substantial investment that the board would punish those who violate market norms); and omitted economic circumstances (boards may be reluctant to apply material sanctions, and to invest in infrastructure, in markets where customers have begun to patronize other shopping options, such as supermarkets). The last three estimates in Table 4 therefore instrument the formal enforcement variable with the *Social Ties* variable. Social ties established at the time of market founding should affect the willingness of vendors to allow the board to impose sanctions but be exogenous to current investment decisions.

In all three estimates that control for endogeneity, the estimated effects of formal enforcement on investment are large. The coefficient on formal enforcement in column (5), 10.8, implies that a one standard deviation increase in the formal enforcement variable is associated with a 0.63 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. After the addition of vendor controls in column (7), the estimated effect of formal enforcement on investment rises to 15.6: a one standard deviation increase in formal enforcement is associated yields a 0.91 standard deviation increase in market investment.

Among the correlates controlling for market characteristics, the larger is the share of market stands controlled by founders or their families, the greater is investment: having labored together to start the market and worked 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.

Panel B of Table 4 summarizes the results of the first stage of the IV regressions. The instrument is significant in the first stage regressions. A few of the second stage controls are also significant in the first stage regression (results not shown). Respondents were less likely to indicate formal board sanctions as a response to vendor infractions in markets founded in 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.

Panel B reports numerous tests of the instrument. The Kleibergen-Papp underidentification test rejects the null hypothesis that the model is under-identified. The instrument could only weakly identify the model, however, yielding an upward bias in the estimated effects of enforcement. The Kleibergen-Papp Wald statistic rejects the hypothesis that the maximum relative bias of the endogenous variable is greater than 15 percent, however. Moreover, even if the IV estimates had a relative bias of 100 percent with respect to the OLS estimate, and were discounted accordingly, they would still demonstrate a large effect of formal enforcement on public investment. Consistent with this, tests of robust inference under weak instruments (Anderson-Rubin, Stock-Wright) strongly reject the null hypothesis that the true effect of formal enforcement is zero.

Column (6), like column (3), adds the controls for social sanctions, board admonitions and vendor social pressure. Board admonitions, but not vendor social pressure, are again significantly associated with greater market investment compared to markets where no sanctions are reported. However, as in column (3), the estimated effects of social sanctions are approximately one-half those of formal, material sanctions. Again, though, we cannot reject that the effects of admonitions are the same as those of formal enforcement.

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

<b>Panel A: Second stage results</b>							
<b>Dependent variable: Change in Market Infrastructure (Market Investment) Index, 2007–2014</b>							
	OLS				IV		
	(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		2.759* (1.581)	1.803 (1.629)	3.908** (1.826)	9.971** (4.367)	9.727** (4.684)	17.926** (7.526)
Constant	12.637*** (1.479)	10.465*** (1.618)	7.190 (4.380)	-7.521 (8.222)	6.049** (2.911)	-0.541 (5.962)	-26.973** (13.492)
Observations	90	90	90	90	90	90	90
R <sup>2</sup>	0.651	0.641	0.736	0.783	0.527	0.627	0.530
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes
Vendor controls				Yes			Yes
<b>Panel B: Summary of First Stage Results – Dependent variable, Formal Enforcement</b>							
Social Ties					0.118*** (0.034)	0.124** (0.049)	0.090* (0.048)
N					90	90	90
R <sup>2</sup>					0.446	0.555	0.654
Kleibergen-Papp underidentification test (LM statistic) (p-val)					12.22 (.001)	9.77 (.002)	7.99 (.005)
Kleibergen-Papp weak identification test (Wald statistic)					11.95	6.48	4.09
Stock-Yogo critical values: 10% = 16.4; 15% = 8.96; 20% = 6.7; 25% = 5.5							
<b>Tests of weak-instrument-robust inference</b>							
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)

Note: 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 4 supports the conclusion that formal enforcement of group norms allows for more collective action compared to markets in which vendors report greater reliance on social pressure or perceive little enforcement of any kind: markets with board enforcement invest more in market infrastructure. It also documents the origins of formal enforcement: strong social ties within a market permit markets to establish formal enforcement mechanisms. The results raise two further questions.

The formal enforcement variable in Table 4 includes all possible board actions against vendors, including board admonishments. However, although they are a formal act of third-party enforcement, admonishments do not impose tangible costs on vendors. Since collective actions on the scale of major market infrastructure investments offer high returns to free riding, it is possible that only strong sanctions are capable of changing vendor behavior. Table 5 investigates this question, repeating the analysis of Table 4 but using a strict measure of formal enforcement by the 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. The diagnostic statistics indicate that identification is weaker using strict enforcement rather than broader board enforcement. However, as the Anderson-Rubin and Stock-Wright tests indicate, even if the upward bias estimates introduced into the IV estimates by a weak instrument were very large and the estimated coefficient on strict enforcement were discounted accordingly, the effect of strict enforcement on market infrastructure investment would still be large and significant.

**Table 5: Formal Enforcement of Norms and Collective Action- Strict Board Enforcement**

<b>Panel A: Second stage results</b>						
	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Percent of respondents who say infractions met by material board sanctions	3.419*** (1.233)	2.763* (1.458)	3.634** (1.699)	10.798* (5.728)	10.211** (4.695)	14.532** (5.752)
Constant	12.192*** (1.337)	8.901** (3.968)	-1.534 (7.443)	12.273*** (1.098)	8.773** (3.612)	0.161 (6.383)
Observations	90	90	90	90	90	90
R <sup>2</sup>	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
Vendor controls				Yes		
<b>Panel B: Summary of First Stage Results – Dependent variable, Strict Formal Enforcement</b>						
Social Ties				0.109** (0.048)	0.118** (0.051)	0.111* (0.055)
N				90	90	90
R <sup>2</sup>				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)

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 social pressure or that do nothing. They do not address the question of whether formal sanctions have a larger effect than social sanctions. Such a comparison requires that we separately identify, with independent instruments, the effects of each. In the absence of such instruments, we can still make three observations that argue for the importance of formal sanctions.

First, *Social Ties* do not predict social pressures. 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. While social ties surely facilitate social pressures, they also permit potentially more effective sanctions, such as the formal board sanctions that are more evident in markets in which founders enjoyed stronger social ties.

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

The third observation concerns board admonitions. In and of themselves, admonitions impose no clear costs that would deter vendors who violate market norms. However, third-party signals that a violation of market norms has occurred can coordinate social pressure by vendors against the targets of the board admonitions (similar to Greif's 1993 analysis of the Maghribi traders). In this case, although the efficacy of board admonitions as a deterrent to infractions of market norms depends on social pressure, social pressure would not emerge absent the delegation of signaling capacity to the board.

#### *Results – Formal Enforcement, Market Services and Dues-Paying*

Additional evidence that formal enforcement facilitates collective action emerges from the effect of formal enforcement on the provision by the market of services (security, cleaning, water, electricity, and disinfection), and on the collection of dues by the market. The analysis makes two modifications to the specifications in Table 4, substituting the services index discussed earlier in place of the market infrastructure investment index and removing the control for initial market infrastructure stock in 2007.

Table 5 reports 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. The broad formal enforcement variable has large and significant effects on service provision after controlling for endogeneity. The strict formal enforcement variable (fines, temporary closure and expulsion), is also significantly associated with higher services in the OLS regressions.

Panel A indicates that broadly defined formal enforcement is not robustly associated with greater services. However, results in columns (5) and (6)—two of the three specifications that control for the endogeneity of formal enforcement—are significant. Moreover, the estimates in each of the three estimates that control for endogeneity, columns (5) – (7), are large in magnitude. A one standard deviation increase in formal enforcement leads to an increase in the services index of approximately .14, almost two-thirds of a standard deviation (.23).

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

<b>Panel A: Broad Formal Enforcement (any Board sanction)</b>							
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	0.177	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 <sup>2</sup>	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
<b>Panel B: Strict Formal Enforcement (material Board sanctions)</b>							
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 <sup>2</sup>		0.376	0.610	0.711	0.276	0.539	0.673

Note: 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.

Panel B demonstrates, in contrast, more robust effects of strict formal enforcement on collective service provision. Estimates are significant in five of six specifications. The estimated effects of strict formal enforcement are large in all six estimates. A one standard deviation increase in strict formal enforcement (.20) yields a .19 increase in the service index according to the estimate in column (4), 0.83 standard deviations.

The final piece of direct evidence that markets with stronger formal enforcement capability exhibit greater collective action concerns the dues-paying behavior of vendors. In markets with stronger formal enforcement, do more vendors pay their ordinary dues regularly? Table 7 indicates that they do. As in Table 6, Panel A of Table 7 focuses on broad formal enforcement; Panel B on strict enforcement.

The specifications in Table 7 make two changes compared to those in Table 4. First, we omit the 2007 stock of market infrastructure from the base specification. The second modification relates to issues specific to market dues. Market administrators provided information on the percentage of vendors who always paid their *ordinary* dues on time. 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 50 percent of the standard deviation of the dues variable (.21).

Broad formal enforcement has a significant effect on collective action (dues-paying) after controlling for endogeneity. All IV estimates are significant, and the magnitude of the estimated effects is once again 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.<sup>14</sup> Strict formal enforcement—the application of material sanctions by the board, and not only admonitions—plays an important role. From Panel B of Table 7, strict formal enforcement is significant in nearly all specifications. The magnitude of its estimated effects is large and comparable to the those reported in Panel A.

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<sup>14</sup> 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 ( $p=.11$ ).

**Table 7: Formal Enforcement of Norms and Dues Payment**

<b>Panel A: Broad Formal Enforcement (any Board sanction)</b>							
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 (0.119)	0.051 (0.151)	-0.072 (0.186)	0.773** (0.373)	0.890** (0.392)	1.317* (0.747)
Market currently collecting extraordinary dues	-0.157** (0.068)	-0.154** (0.069)	-0.147** (0.067)	-0.167** (0.071)	- (0.069)	- (0.063)	-0.068 (0.102)
Constant	0.946*** (0.078)	0.915*** (0.118)	-0.436 (0.517)	-0.171 (0.796)	0.437* (0.259)	1.254** (0.557)	-2.183 (1.404)
Observations	0.369	0.336	0.626	0.650	0.102	0.379	0.164
R <sup>2</sup>	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
<b>Panel B: Strict Formal Enforcement (material Board sanctions)</b>							
Percent of respondents who say infractions met by material board sanctions		0.221 (0.133)	0.283** (0.133)	0.310* (0.167)	0.764** (0.384)	0.926** (0.381)	0.958** (0.406)
Observations		90	90	90	90	90	90
R <sup>2</sup>		0.364	0.657	0.677	0.193	0.492	0.553

Note: 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.

### *Results – Formal Enforcement and Growth in Vendor Sales*

The results in Tables 5–7 are the core findings of the analysis because the dependent variables, market infrastructure investment, collective services provided, and dues-paying behavior, are exact and direct measures of collective action in markets. Prior research has lacked the granular information necessary to examine systematically the mechanisms through which social contexts and formal enforcement allow groups to solve collective action problems, a key contribution of the analysis here.

However, 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 2007–2017. This is a noteworthy period for traditional markets since, during this period, they experienced the entry of supermarkets. In principle, markets with better internal governance, such as the ability of the board to respond to violations of market norms, should respond more effectively to such a shock.

Reliance on vendor recall 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 the obvious difficulty. We mitigate this problem by asking them to focus only on the number of customers that they had on Saturdays. 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 toward 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.<sup>15</sup>

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.

$$(2) \Delta\Pi_{ji} = \varphi_1 + \gamma_1 X_{ind_{ji}} + \gamma_2 X_{Mkt_j} + \gamma_3 Enf_j + \varepsilon_i$$

Table 8 (Panels A and B) reports the estimated effects of broad and strict formal enforcement on the growth in customer numbers. In contrast to the effects of enforcement on the services markets provide to vendors and dues-paying behavior by vendors, broad formal enforcement has a large and robust effect on growth; the effects of strict enforcement are less robust.

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 2007–2017 was .18 higher, or one-fourth of a standard deviation of the growth variable (.68).

Column (2) of Panel A reports the coefficient on broad formal enforcement, revealing a highly significant correlation between this enforcement variable and growth. A one standard

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<sup>15</sup> 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 increase in broad formal enforcement is associated with a.09 increase in the growth measure, approximately.14 of a standard deviation. After controlling for the endogeneity of enforcement, the estimated magnitudes of enforcement effects triple: a one standard deviation increase in broad formal enforcement increases the growth variable by.38, more than one-third of a standard deviation.

Panel B again focuses on the effects of strict formal enforcement. The IV results are similar in magnitude to the broad formal enforcement estimates in Panel A and significant in two of the three specifications. The OLS regressions in Panel B highlight the importance of addressing endogeneity, since they point to a slight *negative* association between strict enforcement and growth. The IV regressions remove the influence of growth on strict enforcement and show that the exogenous component of enforcement increases sales growth. It is, however, easy to see how sales growth itself might have a negative “reverse” impact on strict enforcement: when growth is lagging or negative, vendors struggle more to comply with market norms and boards make more frequent use of harsher sanctions.

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. To respond to this concern, and to the lack of data on capital stock, researchers typically control for initial income. We observe the initial capital stock and control for it in all but the base specifications. Capital is not an important input into traditional markets, however, and the estimated effect of the stock of initial market infrastructure is generally insignificant.

We do not have measures of vendor capital stock, but market stands are in any case not capital intensive. Butchers are the main exception to this rule: more successful butchers invest in refrigerated cases, slicers and other equipment. We control, however, for the market category to which a respondent vendor belongs.

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.

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

<b>Panel A: Broad Formal Enforcement (any Board sanction)</b>							
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*** (0.193)	0.419** (0.198)	0.379* (0.202)	1.496** (0.712)	1.626** (0.734)	1.603** (0.701)
Constant	-0.395*** (0.030)	-0.774*** (0.138)	-1.145* (0.617)	-0.870 (0.681)	- (0.499)	- (0.950)	- (0.968)
Observations	968	968	968	968	968	968	968
R <sup>2</sup>	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
<b>Panel B: Strict Formal Enforcement (material Board sanctions)</b>							
Percent of respondents who say infractions met by material Board sanctions		-0.197 (0.218)	-0.386* (0.204)	-0.279 (0.198)	1.485 (0.936)	1.785* (1.023)	1.711* (0.937)
Observations		968	968	968	968	968	968
R <sup>2</sup>		0.133	0.207	0.257	.	0.023	0.106

Note: 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.

## Conclusions

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. The key mechanism discussed in the literature is institutional but direct tests of this mechanism have been hobbled by the absence of data and the difficulty of disentangling formal rules and the formal and informal enforcement of those rules. We develop evidence that charts the entire evolution of market governance, from the social ties among market founders to the enforcement capacity of market boards and from these to collective action by the market's vendors and vendors' sales growth. The homogeneity of markets and particularly of their formal institutions and rules allows us to precisely identify the effects of formal, third-party enforcement of market norms on collective action. Taking advantage of the detailed information we were able to collect, we conduct the first analyses that establish causal effects of formal enforcement of community norms on community collective action and economic growth

The results have several implications for future research on institutions and development. The homogeneity of markets and the wealth of information we have on them allows us to document mechanisms that are difficult to identify in larger and more complex communities (e.g., countries). Future research on larger communities 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 strong enforcement authority to state entities.<sup>c</sup>

The analysis of traditional markets also has policy implications. One relates to the impact of governance on productivity. Although traditional markets retain a dominant market presence in Peru, in much of Latin America they have given way to supermarkets.<sup>16</sup> 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 Latin America work with suppliers to homogenize pallet sizes, delivery times, delivery frequency, etc., while market vendors 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. Traditional markets occupy attractive real estate, but among the obstacles to the transfer of the land occupied by traditional markets to a higher valued use is the quality of market governance. Where this is weak, as in markets where boards have less capacity to enforce norms, vendors are less likely to agree to uproot themselves.

A possibly more profound implication relates to citizen mistrust in the state. This is a common phenomenon, as is 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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<sup>16</sup> See, for example, Faiguenabaum, 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**

<b>Panel A: Second stage results</b>							
<b>Dependent variable: Change in Market Infrastructure (Market Investment) Index, 2007–2014</b>							
	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*** (0.099)	-0.828*** (0.102)	-0.925*** (0.143)	-0.868*** (0.154)	-0.864*** (0.099)	-0.988*** (0.122)	-0.901*** (0.136)
Percent of respondents who say infractions met by any Board sanction		2.759* (1.581)	1.803 (1.629)	3.908** (1.826)	9.971** (4.367)	9.727** (4.684)	17.926** (7.526)
Level of consolidation of urbanization at mkt founding, 1-low, 2, 3-high			-0.830* (0.477)	-0.787 (0.508)		-0.357 (0.507)	0.006 (0.617)
Size of urbanization where mkt. is (hectares)			0.001 (0.004)	-0.005 (0.004)		0.002 (0.004)	-0.008* (0.005)
Market urbanization was occupied formally (1) or through invasion (0)			0.544 (0.920)	0.823 (1.031)		-0.910 (1.365)	-1.400 (1.728)
Percent of market stalls owned by founders			1.178 (0.996)	2.040** (0.989)		0.872 (0.908)	3.321** (1.314)
Index of number/distance of supermarkets around market			-0.963 (0.791)	-0.984 (0.907)		-0.768 (0.852)	-0.132 (1.183)
Index of number/distance of traditional markets around market			0.211 (0.153)	0.149 (0.137)		0.319** (0.149)	0.256 (0.161)
Age of market			0.078 (0.052)	0.088* (0.050)		0.098** (0.049)	0.144** (0.073)
Youngest quartile of markets			3.457* (1.834)	5.543*** (1.746)		3.840** (1.603)	8.569*** (2.742)

Second youngest quartile of markets	1.867 (1.233)	2.424* (1.204)	2.152* (1.143)	3.320** (1.494)
Third youngest quartile of markets	1.181 (0.813)	1.338 (0.887)	1.745** (0.825)	2.219** (1.069)
Oldest quartile of markets	0.000 (.)	0.000 (.)	0.000 (.)	0.000 (.)
Number of vendors with voting rights in market	0.001 (0.003)	0.002 (0.003)	-0.000 (0.003)	0.002 (0.003)
Number of stalls in market	-0.002 (0.002)	-0.001 (0.002)	0.000 (0.002)	0.003 (0.002)
Market organized by product category at founding	0.818 (0.514)	0.484 (0.631)	0.722 (0.537)	-0.029 (0.795)
Percent of stalls that sell vegetables (CENAMA)	-11.483 (7.450)	-11.081 (8.230)	-6.434 (6.671)	-1.232 (8.594)
Percent of stalls that sell fruit (CENAMA)	-17.888 (11.530)	-16.049 (12.056)	-24.869*** (9.590)	-34.873** (14.595)
Percent of stalls that sell meat(CENAMA)	-19.262 (14.471)	-27.123* (14.094)	-22.049* (11.487)	-41.838** (17.160)
Percent of stalls that sell chicken (CENAMA)	7.510 (10.658)	13.305 (11.000)	10.287 (9.553)	23.436* (13.114)
Percent of stalls that sell fish (CENAMA)	17.018 (18.672)	22.329 (18.851)	19.178 (15.098)	30.675 (20.270)
Percent of stalls that sell dried goods (CENAMA)	5.317 (4.600)	4.122 (5.788)	6.322 (4.300)	5.979 (5.489)
Average education of respondent vendors (years)		0.492 (0.651)		-0.325 (0.748)
Average age of respondent vendors		0.244** (0.096)		0.468*** (0.160)
Respondent vendor is a market founder		-2.745* (1.438)		-7.831** (3.278)
Respondent vendor has multiple stalls		2.293		2.857

Respondent vendor gender (1-male, 0-female)				(2.227)			(2.000)
				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

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. Infrastructure 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)		- (0.088)	-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	0.082		0.079	0.122

	(0.142)	(0.118)	(0.123)	(0.102)
Third youngest quartile of markets	0.009	0.017	0.048	0.056
	(0.092)	(0.083)	(0.079)	(0.069)
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 (0.216)			-0.098 (0.179)
Respondent vendor gender (1-male, 0-female)				-0.145 (0.204)			-0.150 (0.161)
Respondent vendor born outside Lima				-0.128 (0.187)			-0.233 (0.149)
Constant	0.933*** (0.044)	0.755*** (0.155)	0.611 (0.452)	-0.369 (0.939)	0.358 (0.310)	0.082 (0.561)	-1.237 (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 (0.119)	0.051 (0.151)	-0.072 (0.186)	0.773** (0.373)	0.890** (0.392)	1.317* (0.747)
Market currently collecting extraordinary dues	-0.157** (0.068)	-0.154** (0.069)	-0.147** (0.067)	-0.167** (0.071)	- 0.165** (0.069)	-0.148** (0.063)	-0.068 (0.102)
Mkt. Infrastructure Stock 2007			0.015 (0.011)	0.013 (0.012)		0.008 (0.011)	0.009 (0.014)
Level of consolidation of urbanization at mkt founding, 1-low, 2, 3-high			0.069 (0.045)	0.058 (0.051)		0.119** (0.055)	0.155** (0.078)
Size of urbanization where mkt. is (hectares)			-0.000 (0.000)	0.000 (0.001)		-0.000 (0.000)	-0.001 (0.001)
Market urbanization was occupied formally (1) or through invasion (0)			0.027 (0.097)	0.075 (0.101)		-0.127 (0.119)	-0.174 (0.185)
Percent of market stalls owned by founders			0.339*** (0.113)	0.248* (0.126)		0.306*** (0.087)	0.395*** (0.145)
Index of number/distance of supermarkets around market			0.020 (0.075)	-0.022 (0.084)		0.040 (0.074)	0.082 (0.111)
Index of number/distance of traditional markets around market			0.019 (0.013)	0.016 (0.014)		0.030** (0.012)	0.027 (0.017)
Age of market			0.011* (0.006)	0.010 (0.007)		0.014*** (0.005)	0.015** (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**
	(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	-	-3.241**
	(0.880)	(0.905)	2.643***	(1.647)
Percent of stalls that sell meat(CENAMA)	-2.629**	-2.444*	-	-
	(1.250)	(1.346)	2.929***	3.683***
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)
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

Note: 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*** (0.193)	0.419** (0.198)	0.379* (0.202)	1.496** (0.712)	1.626** (0.734)	1.603** (0.701)
Mkt. Infrastructure Stock 2007			0.025* (0.014)	0.020 (0.013)		0.012 (0.015)	0.007 (0.015)
Percent of stands that sell vegetables (CENAMA)			-1.276* (0.655)	-1.018 (0.628)		-0.715 (1.073)	-0.399 (1.078)
Percent of stands that sell fruit (CENAMA)			2.065 (2.277)	1.557 (2.182)		0.975 (2.560)	0.347 (2.451)
Percent of stands that sell meat(CENAMA)			-2.921 (2.039)	-2.695 (1.895)		-2.896 (2.448)	-2.777 (2.262)
Percent of stands that sell chicken (CENAMA)			1.305 (1.782)	1.020 (1.726)		2.088 (2.116)	1.854 (2.087)
Percent of stands that sell fish (CENAMA)			-0.154 (2.595)	-0.694 (2.387)		-0.551 (3.281)	-1.075 (3.053)
Percent of stands that sell dried goods (CENAMA)			0.832 (0.589)	0.740 (0.560)		1.076 (0.747)	0.984 (0.710)
Market organized by product category at founding			-0.040 (0.065)	-0.048 (0.058)		-0.054 (0.081)	-0.064 (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** (0.000)	0.001** (0.000)		0.001* (0.000)	0.001* (0.000)
Level of consolidation of urbanization at mkt founding, 1-			0.188***	0.177***		0.163**	0.151**

low, 2, 3-high				
	(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**				-
				(0.073)				0.204***
Dried Goods Stand				-0.188***				-
				(0.071)				0.207***
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	-	-	-	-1.971**
	(0.030)	(0.138)	(0.617)	(0.681)	1.427***	2.220**		(0.968)
					(0.499)	(0.950)		
Observations	968	968	968	968	968	968	968	968
R <sup>2</sup>	0.143	0.143	0.208	0.259	0.105	0.156	0.208	0.208
Zone fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market controls			Yes	Yes		Yes	Yes	Yes
Vendor controls				Yes				Yes

Note: 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.