ABSTRACT

Title of dissertation: CIVIL LIBERTIES, MOBILITY,
AND ECONOMIC DEVELOPMENT

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To what extent do civil liberties affect economic development? This dissertation addresses this question in two essays. The first chapter (joint with Roger Betancourt) provides a new economic interpretation of civil liberties as rights over a person's most basic human asset: her own self. The importance of these rights to economic development is based on the principle that property rights-defined over a broad set of "property"-are crucial for economic growth. The empirical literature to date shows little support for such claims related to civil liberties, however, with ambiguous evidence on the role of these rights in driving long-run growth. Using newly available data from Freedom House, we find that one of the recently disaggregated categories of civil liberties explains income differences across countries more powerfully and robustly than any other measure of property rights or the rule of law considered. This component, entitled "Personal Autonomy and Individual Rights," evaluates the extent of personal choice over issues such as where to work, study, and live, as well as a broader set of property rights and other choices.

While the first chapter finds that greater civil liberties can substantially im-

prove long-run economic development, the second chapter identifies a key friction in this relationship. In countries that lack complementary institutions, civil liberties governing individual mobility can complicate credit transactions. By allowing individuals to move to locations where less is known about their prior defaults, mobility freedoms induce opaqueness and can result in credit rationing. I develop an instrumental variable estimation to study these effects, which would otherwise be complicated by omitted variable bias and endogeneity. Using household survey data from Guatemala, I instrument for individual migration with the interaction of violence patterns and individual sensitivities toward that violence. Using this approach, I find that the act of migration within a country actually causes individuals to have significantly less access to credit, primarily because lenders are concerned about these borrowers' opportunistic default.

Civil Liberties, Mobility and Economic Development

by

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Dedication

This work is dedicated to my wife, Jessica. I simply can't imagine having done this without you.

This work is also dedicated to my two amazing children, who have given me a deep sense of perspective and gratitude.

Finally, my parents also deserve heaps of thanks for having instilled in me an early sense of inquisitiveness that, luckily, hasn't quit yet.

Acknowledgments

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Chapter 1

Introduction

Civil liberties have been the subject of extensive study by political scientists and legal specialists, partly because these fields are concerned with these rights as important ends in and of themselves. Relatively little work, however, among the recent economic literature examining the impact of institutions on economic development has focused on civil liberties. Recent attention has instead been concentrated on other measures intended to represent governance and the rule of law. Those empirical investigations that have incorporated civil liberties–most often measured by the Freedom House (FH) Civil Liberties index–have found mixed evidence of their influence on economic growth (Levine and Renelt (1992), King and Levine (1993)).

As my dissertation shows, however, civil liberties have important ramifications for economic development. Civil liberties–particularly rights over a person's geographic and social mobility–have a significant positive impact on long-term economic growth, but they also complicate credit transactions in countries that lack complementary institutions. This dissertation posits specific theoretical channels through which these effects take place. Perhaps just as crucially, however, it develops identification strategies to empirically test these hypotheses, spanning both cross-country and household-level analyses. One common element encountered at both levels of analysis is the difficulty of using pure experimental techniques to ad-

dress the possibility of reverse causation and omitted variable bias. Randomizing national institutions and individual migration is problematic for a number of reasons. Instead, I use instrumental variables approaches, finding striking evidence that individual mobility and other personal autonomy rights are uniquely powerful in explaining long-run differences in incomes across countries, but that mobility can also be a source of rationing in credit markets. Policymakers considering mobility improvements should therefore pay particular attention to complementary institutions, such as contract enforcement and information-sharing systems.

The first chapter in the dissertation (joint with Roger R. Betancourt) provides a new economic interpretation of civil liberties as rights over a person's most basic human asset: her own self. Traditional definitions of property rights can apply to human capital as they do to other physical and intangible assets. The importance of these rights to economic development is based on the principle that property rights–defined over a broader set of "property"–are crucial for economic growth (Olson 2000). It would thus not be surprising to find extensive evidence that the development of rigorously enforced civil liberties in some countries has led to extensive long-run growth in these nations. In fact, the literature to date shows little support for such claims.

The first chapter of this dissertation thus offers important results on the impact of civil liberties on income levels. We find that one of Freedom House's recently disaggregated categories of civil liberties is far superior to any of the alternative property rights indicators available. This component, entitled "Personal Autonomy and Individual Rights," evaluates the extent of personal choice over issues such as

where to work, study, and live, as well as a broader set of property rights and other choices.

While the first essay finds striking evidence that expanding certain civil liberties can substantially improve long-run economic development, the second essay identifies a key friction in this relationship. In countries that lack complementary institutions, civil liberties governing individual mobility can complicate credit transactions. Information on market participants is crucial to efficiency, but mobility can actually diminish the information available. For example, individual migration across space can cause individuals in the migrant's destination to be much less informed about the migrant than would those in her origin. If this dissipation of information happens in dimensions along which individuals can move (geographic space, social space), this movement can generate important inefficiencies.

The scope for such informational problems expands as inefficiencies in contract enforcement rise. The second chapter in this dissertation explores this relationship in the context of credit markets. These markets involve substantial risk of reneging by one party because the exchange happens over sometimes long periods of time. An extensive literature has focused on problems that arise in this context[1], but individual mobility has rarely been cited as a cause of any of these frictions.

One study that does explicitly link migration and credit access is La Ferrara (2003), which finds that migrants in rural Ghana are less likely to receive credit from kin group networks than from other sources, such as moneylenders, banks, or

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[1]Conning and Udry (2005) provide a useful survey of these issues, as applied to agricultural settings.

cooperatives. La Ferrara concludes that kin groups are particularly susceptible to rationing of credit to migrants because they rely intensively on reciprocity as an incentive for loan repayment. However, because it estimates the likelihood that a given loan will come from a kin member rather than another source, La Ferrara's study does not identify the full extent to which migrants are penalized in receiving loans from banks. The second chapter of this dissertation is the first study to ask whether formal lenders in developing countries also have enforcement challenges in lending to migrants.

The chapter outlines a theoretical model linking weak contract enforcement, individual mobility, and access to credit. When credit contracts are not enforced in courts, so that borrowers who are able to repay are not compelled to do so, lenders often turn to information-based solutions to exclude known defaulters from future loans. In these environments, mobility freedoms can actually create incentives for individuals to act strategically by reneging on contracts and moving to settings where less may be known about their previous behavior. Past migration may thus become a signal of previous conduct on loan contracts, albeit an imperfect one.

Naturally, lenders use these signals and restrict their exposure to a particularly risky set of borrowers (migrants). This creates an externality in which defaulters hide their previous action by moving, spreading its costs over other movers. The second chapter outlines these effects by building on the theoretical model outlined by Ghosh, Mookherjee and Ray (2000). My contribution is to incorporate the dissipation of information across space and heterogeneous mobility costs into this framework. The resulting model yields a new dimension of rationing, as the heightened incentives

for default among the most mobile individuals prevent more creditworthy migrants from getting loans.

Does the data bear out this inefficiency? This dissertation offers a novel approach to answering this question, which would otherwise be complicated by a number of critical issues, including the possibility of omitted variable bias and endogeneity. I use an instrumental variables approach to address these issues, using household survey data collected in Guatemala in 2000. As an instrument for migration, I consider individual respondents' sensitivity to violence or crime, coupled with regional patterns of actual violence and crime across the country. Those born into particularly dangerous locations and who happen to be particularly sensitive to violence or crime are especially likely to move. These migrants most often land in relatively safer regions, where they appear to be about as stable and credit-worthy as natives of these regions. This IV approach eliminates any confounding effects and reverse causality and identifies an inefficiency in which lenders do not provide loans to credit-worthy migrants.

I find strong evidence that individuals whose propensity to migrate is driven by violence-related concerns are 12.5% less likely to have a loan from a bank or cooperative. The effect is even starker among those individuals who have applied for loans. Moreover, by explicitly considering the verifiability of a migrant's income, the social capital at her disposal, and lending by her family, neighbors and other informal sources, I rule out alternative explanations of these effects. The results strongly support the theory that, with weak contract enforcement and information-sharing geographically limited to informal networks, mobility creates an informational ex-

ternality that limits the amount of credit lenders are willing to extend to migrants, some of whom may indeed be creditworthy.

Chapter 2

Civil Liberties and Economic Development (joint with Roger

Betancourt)

2.1 Introduction

Relatively little work among the extensive recent empirical literature examining the impact of institutions on economic development has focused on the role played by civil liberties. Recent attention has instead been concentrated on other measures intended to represent governance and the rule of law. Those empirical investigations that have incorporated civil liberties–most often measured by the Freedom House aggregate Civil Liberties index–have found mixed evidence of their influence on economic growth. For example, while Isham, Kaufmann and Pritchett (1997) present robust evidence of the impact of the aggregate Civil Liberties index on the performance of World Bank projects, Levine and Renelt (1992) find that the significance of the index is quite sensitive to changes in the conditioning set. King and Levine (1993) include the index as a covariate in their analysis of the relationship between financial development and growth, finding no evidence of civil liberties' role in shaping economic growth.

We return attention to the role of civil liberties in the context of the ongoing discussion about which institutions matter for growth, noting that these rights

may be better indicators of a government's long-term commitment to the rule of law than other proxies examined in the literature, as argued by Betancourt (2004, 2006). Building on conceptual work by North (1990) and Olson (2000), we identify the prevalence of the rule of law, indicated by the extent of civil liberties, as a plausible mechanism acting as a crucial determinant of long-term economic growth and development.

Given the mixed and limited empirical evidence supporting these propositions, we offer striking results on the impact of civil liberties on income levels. These new empirical findings became feasible as a result of Freedom's House decision to make publicly available the four main components of its aggregate civil liberties indicators at the end of 2006. Freedom House also disaggregated its index of political rights into its three main components. Thus, we are also able to compare the empirical relationship of these governance indicators to income levels.

In explaining differences in income levels across countries, our work is most closely related to that of Acemoglu and Johnson (2005) on unbundling institutions. Their work focused on differentiating between contracting institutions and property rights institutions; our work focuses on differentiating among different concepts and measures of property rights institutions. Our most intriguing result shows that, using the same methodology as these authors, one of Freedom House's recently disaggregated components of civil liberties is far more relevant to income differences than any of the alternative property rights indicators available, including the best indicator Acemoglu and Johnson identify. This component, entitled "Personal Autonomy and Individual Rights," evaluates the extent of personal economic freedoms

such as the choice of ownership form, employment, residence and education, as well as social freedoms such as choice of marriage partners and family size.

We further find that this fundamental result remains remarkably robust as we address a variety of well-cited criticisms of cross-country studies and some not so well-cited ones. These include reverse causation, important omitted variables such as geography and human capital, and a battery of sensitivity tests. Throughout, we find that Personal Autonomy and Individual Rights remains more important than any of the other institutional variables considered in terms of both the magnitude of its effect and its statistical significance.

This paper also contributes to the institutions literature in more subtle forms. First, it shows that the rule of law is a broader concept than the formal or informal protection against government and elite predation or expropriation, as characterized by Acemoglu and Johnson (2005) and Olson (2000). Our results highlight the importance of protection of individual economic rights and personal social freedoms from government activities as well as from social norms and non-governmental collective infringement. Second, it provides an opening for research into the question of why economies in East Asia are able to grow rapidly under non-democratic regimes. The beginnings of an answer lies in our main finding that not all civil liberties are created equal in terms of their impact on economic growth. Finally, this result also suggests the exploration of whether different human and property rights may matter more at different points on an economic development path.

The rest of this paper is organized as follows: In Section 2.2, we lay out a conceptual framework that relates the prevalence of civil liberties and the rule

of law to the operation of certain types of markets and economic growth. We then discuss the measurement of these institutions in Section 2.3, comparing the newly disaggregated Freedom House Civil Liberties data with other measures used in the literature to capture the existence and quality of property rights institutions. Using these measures, we then examine the empirical evidence on the role of civil liberties in determining long-term economic growth in an ordinary least squares setting (Section 2.4). We address issues of reverse causation in Section 2.5, and incorporate omitted variables such as human capital and geography in Section 2.6. We perform a variety of robustness checks on the sensitivity of the above results to a variety of other issues, including features of the data, in Section 2.7. By way of a conclusion, in Section 2.8 we offer a perspective on our three main contributions and their implications for future research.

2.2 Conceptual Framework: Why Civil Liberties Matter

Succinctly put, the logic of our analysis is based on two main propositions and three subsidiary ones. The two main ones are: First, the prevalence of the rule of law is a key factor determining the rate of economic growth in the long term. Second, the protection of human rights through the provision of civil liberties is one of the most–if not the most–fundamental indicators of the prevalence of the rule of law in a society. The three subsidiary propositions help suggest potential causal mechanisms for the operation of the first two. First, modern economies consist of two types of markets, spontaneous (and irrepressible) markets and socially contrived markets, and it is the

latter that underlie modern economic growth. Second, a critical distinction between these two types of markets is the role that the state performs in supporting these markets. More precisely, the prevalence of the rule of law is an essential determinant of the level of operations in socially contrived markets. Third, financial markets and tangible capital markets are important examples of socially contrived markets. The rest of this section discusses the basis for these propositions and their implications in some detail.

What does one mean by the prevalence of the rule of law in economics? It certainly encompasses the protection of property rights. This is a widely accepted view in discussions of institutions. Property rights are usually defined at the most elementary level as the right to consume services of, the right to generate income from and the right to alienate an asset, e.g., Barzel (1989). What seems to have been relatively ignored in recent literature is that the protection of human rights as part of the rule of law follows from the same logic. Violations of human rights (through loss of life, imprisonment or other less dramatic restrictions on the capabilities to make choices and enjoy their consequences) deprive individuals of property rights that emanate from every human being's most fundamental asset: her own person. These violations are inconsistent with the prevalence of the rule of law in a society.

Part of the reason for this lack of recognition in viewing human rights as a separate but equally important dimension of property rights is an understandable but misplaced reluctance to place something as precious as life under the same general label as a physical asset, such as a house. We merely note that the logic is the same without making any assertion as to the intrinsic valuations of these

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different rights. Furthermore, even within the category of human rights, distinctions are made between traditional rights, such as life and liberty, and more modern ones, such as economic and social freedoms. The former are frequently described as "first generation" human rights and the latter are frequently described as "second generation" human rights, e.g. Kaufmann (2004). Civil liberties usually encompass both sets of human rights.

Olson (2000, Ch.10) distinguishes between an active role for the state and a passive role. The former entails the provision of various types of public goods; the latter consists of constraining itself from abusing its monopoly of power and engaging in predatory behavior on its own behalf or that of a few small groups. Betancourt (2004) argues that the best indicator of a state's intentions to perform this passive role (and thus of its intentions to abide by the rule of law) is the state's explicit commitment to the protection of human rights. In their essay on institutions as a fundamental cause of economic growth, Acemoglu, Johnson and Robinson (2005, p.390) explain why commitment problems inherent in the use of political power can lead "...to economic inefficiencies and even poverty." One way of addressing some of these commitment issues on the part of governments is through a credible pledge to the protection of human rights. With the development of modern means of communication in the last century, it is easy to verify the fulfillment of these commitments. Furthermore, with the emergence of organizations devoted to monitoring governments' performance in these dimensions, the importance of human rights as indicators of performance could increase substantially in the future.

In their work on unbundling institutions, Acemoglu and Johnson (2005) distin-

guish between institutions supporting private contracts ("contracting institutions") and institutions constraining government and elite expropriation ("property rights institutions"). These authors put forth specific measures of each type of institution. Legal Formalism and Constraints on the Executive are the ones that perform best empirically in their respective categories. Based on these two measures, they show the unimportance of contracting institutions and the importance of property rights institutions in explaining differences in the level of income across countries and, thus, their relative importance in explaining long-term economic growth. We view these results as an illustration of the first proposition, since property rights institutions and the specific measure used by Acemoglu and Johnson can be viewed as one manifestation of what one means by the prevalence of the rule of law.

While Constraints on the Executive emphasizes the balance of powers aspect of the rule of law, civil liberties emphasize the protection of individual liberties aspect. Since the prevalence of the rule of law is a complex phenomenon, difficult to capture both conceptually and empirically, we view our emphasis on civil liberties as a complementary step to Acemoglu and Johnson's work in unbundling of institutions. Specifically, we claim that we have a conceptually better measure of the provision of the rule of law (and thus of property rights institutions) than the measure relied upon most heavily by Acemoglu and Johnson[1].

Our subsidiary propositions are based on an earlier literature that can be used to provide suggestive causal mechanisms for the empirical results that support the

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[1]In addition, our measure also performs better in explaining income levels in a variety of empirical settings shown below.

first proposition. The distinction between markets with transactions that are self-enforcing and markets with transactions that are not self-enforcing can be traced back at least to North (1990)[2]. He labels these two types of markets as traditional and modern, respectively, and identifies three conditions that lead to self-enforcing transactions: small numbers of market participants, repeated interactions among them and plentiful information on their characteristics. Similar conditions have been used in the recent industrial organization literature on contracting to explain why relational contracting in developing countries is self-enforcing, for example Thompson (2005).

The idea that there are two types of markets relevant for understanding economic growth was also put forth forcefully by Clague, Keefer, Knack and Olson (1999) [henceforth CKKO]. They point out the differential role of government in these two types of markets. In markets where transactions are not self-enforcing, which they label as socially contrived, they argue that one needs contract enforcement mechanisms, or else these markets will not exist or will operate at low levels of transactions. Exceptions to the need for government in socially contrived markets arise when the gains from exchange appear so large to participants on both sides of the market that they are willing to incur the risk of non-fulfillment, as occurs in some illegal markets. CKKO label these markets as irrepressible. Just as in markets where transactions are self-enforcing, which CKKO label spontaneous, explicit contract enforcement mechanisms are not necessary for these markets to thrive.

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[2]Parenthetically, North (1990) also emphasized the importance of an impartial judiciary and its role as a third party enforcement mechanism in determining economic performance in modern economies, where markets with transactions that are not self-enforcing predominate.

These authors acknowledge the possibilities of non-governmental mechanisms that provide enforcement services, but they stress the importance of governments in providing contract enforcement mechanisms in socially contrived markets and suggest contract-intensive money (CIM) as a measure of these institutions. CKKO stress that socially contrived markets are the most important for modern growth.

Further insight into the role of government in different types of markets arises from papers in a conference to honor Mancur Olson (Azfar and Cadwell 2003). In self-enforcing and irrepressible markets, the main role of the state is to provide "market augmenting services" such as law and order (the ability of governments to protect citizens from predation by other citizens, i.e., to prevent crime against property and persons by other individuals) and a medium of exchange. In socially contrived markets, however, the state needs also to provide contract enforcement services, for example through an independent judiciary. This is the essential market augmenting service in socially contrived markets identified by CKKO. It is also consistent with North's view of the difference between traditional and modern markets.

Betancourt (2004) argues that a commitment to the rule of law is another public good or "market augmenting service" that the state must provide for socially contrived markets to function at a high level[3]. This commitment entails constraining

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[3]McGuire (2003) argues that Olson's assertions about market augmenting government follow from Samuelson's analysis of public goods and Bator's analysis of market failure. He credits Olson with bringing to our attention the idea that "...the effective functioning of private markets is itself a collective good: the better functioning they are, the more public benefit they provide." Betancourt (2006) notes that viewing market augmenting services as public goods implies that they play the role of public inputs into the operation or production of market services. The traditional modeling of public inputs such as infrastructure in the public finance literature, however, treats them as having a direct effect on production subject to economy wide diminishing returns and views them as produced under the assumption of diminishing returns, for example Feehan and Matsumoto (2000). The market augmenting services identified here seem to be subject to several features that lead to non-convexities, such as increasing returns and thresholds in their production and

government and elite expropriation, as argued by Acemoglu and Johnson (2005), or preventing predation by government over citizens, as argued by Olson (2000). It differs from the public good "law and order" in that the latter focuses on predation by other citizens or non-government groups. It also differs from the public good "contract enforcement services" in that it is a much broader concept[4]. Furthermore, while there are private substitutes for the role of government in the provision of contract enforcement services (or of law and order), there are no private substitutes for the role of government in the provision of rule of law. Thus, we believe that the essential role of government in these two types of markets lies in the provision of the "rule of law" in socially contrived markets, rather than the contract enforcement mechanisms emphasized by CKKO and North[5].

Both financial markets and tangible capital markets imply transactions with strong inter-temporal dimensions. For participants on one side of these markets, many of the benefits from transactions take place in the future, while many of the costs of these transactions take place up-front or close to the present. Thus, these markets are socially contrived because transactions in them are unlikely to be self-enforcing. Both of these markets are usually viewed as important for economic growth. We believe that civil liberties are important for these markets to function

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network externalities in their effects. We merely note this issue but do not pursue it directly in what follows.

[4]From a legal perspective, Summers (2003) illustrates the distinction in the case of secured loans by calling contract enforcement institutions for this type of loans first-order rules and the general principles of the rule of law, second-order rules.

[5]Incidentally, one of the most effective mechanisms for implementing the rule of law (in terms of protecting property rights as well as first and second generation human rights) plays a similar role in providing law and order and enforcing contracts: namely, the existence of an impartial judiciary.

at a high level due to their socially contrived nature, suggesting possible causal mechanisms between civil liberties and long-term growth or development.

2.3 Measurement Issues: Civil Liberties and the Unbundling of Institutions

We follow Acemoglu and Johnson (2005) and differentiate between contracting institutions and property rights institutions. We differ from them in that we focus on identifying measures which capture our broader emphasis on the role of human rights as an indicator of the prevalence of the rule of law. Throughout, we compare our preferred measures to the one highlighted by Acemoglu and Johnson, namely the Polity IV Constraints on the Executive variable. This variable, produced by the Polity IV Project, captures the degree of constraints on politicians and politically powerful elites. This measure ranges from one to seven, where a higher score indicates greater constraints. We follow Acemoglu and Johnson (2005) in using the average score over the 1990's. We also compare these measures to the one emphasized by CKKO, namely CIM, which is defined as the contract-based share of the money supply or $CIM = \frac{(M-C)}{M}$, where C is currency and M is the money supply, including currency, demand deposits and time deposits.

In 2006, Freedom House for the first time ever agreed to release the data for every country on each of the four subcategory scores making up the organization's aggregate civil liberties index. Scores on the aggregate index have been available for many years. Table 2.1 presents the fifteen overarching questions representing

different dimensions of civil liberties on which each country is rated. Each question is rated on a score of 0 (worst) to 4 (best). These questions are then aggregated into four subcategories. Subcategories (D), (F) and (G) are composed of four dimensions each, whereas subcategory (E) is composed of three. Thus, the subcategory indexes for the former range from 0-16 and the one for the latter ranges from 0-12. The scoring for the aggregate Civil Liberties index is slightly different.

A more detailed look at subcategory (F), which is mislabeled "Rule of Law" from our point of view, suffices to establish the lack of correspondence between the conceptual measure described in the previous section and what this empirical measure represents. This subcategory combines four dimensions that capture very different phenomena. The first one (Is there an independent judiciary?) reflects the existence of a mechanism that is important for the rule of law as well as contract enforcement services and/or law and order. The second one reflects the rule of law with respect to procedural issues and the third one reflects the prevalence of law and order. The fourth one reflects the prevalence of non-discrimination against population segments by the government.

The other three subcategories are more homogeneous in what they capture. Freedom of Expression and Belief (D) captures the ability of media (first question) religious institutions (second question) educational institutions (third question) and private individuals and organizations (fourth question) to express their views. This measure corresponds to one dimension of first generation human rights. The subcategory Association and Organizational Rights (E) captures the ability of individuals and organizations, including trade unions and peasant organizations, to pursue their

interests collectively. It also corresponds to a (different) dimension of first genera-tion human rights. Finally, Personal Autonomy and Individual Rights (G) captures the ability of individuals to exercise their economic rights with respect to employ-ment, location, and ownership of property without severe infringements from the state or other individuals or groups (questions 1, 2, and 4), as well as their personal social freedoms with respect to marriage partners and family size regardless of gen-der (question 3). This measure corresponds to second generation human rights, as stressed by Kaufmann (2004)[6]. Subcategory G also reflects more intensely than the other categories interactions of individuals within a society as opposed to interac-tions with the state or its organizations.

Our dataset consists of the original data for 60 countries used by Acemoglu and Johnson (2005) supplemented in several ways. First and foremost, we merged this dataset with the Freedom House data on civil liberties and its subcategories, as well as with the organization's political rights index and its three subcategories[7]. We also incorporated the data on CIM from International Financial Statistics mentioned previously and added two other datasets that are important for our robustness tests. The first one simply extends the sample by including all the OECD countries that are not ex-colonies and thus excluded from the original 60 countries; the second one

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[6]Blume and Voigt (2007) provide a more recent contribution on human rights that is similar in approach to Kaufmann's.

[7]When Freedom House disaggregated the civil liberties indicator into subcategories, it also disaggregated its political rights indicators. Some contributions to the empirical explanation of long-term growth have used Freedom's House aggregate indicator of political rights, for example Barro (2003). Our conceptual framework also implies that governance indicators, such as political rights, could be used as indicators of the prevalence of the rule of law. Indeed, the Polity IV Constraints on the Executive can be viewed as a measure of political rights. Hence, we also consider below the role of these indicators in affecting long-term growth.

consists of data we gathered on gross secondary school enrollments and "geographic" variables for the original set of 60 countries. Table A.1 in the Appendix offers summary statistics on the dataset for the sample of 60 countries.

In Table 2.2, we present the simple correlations between all four subcategories, the aggregate index (Civil Liberties), Constraints on the Executive, CIM, the political rights subcategories and secondary school enrollment rates. Not surprisingly, all of the civil liberties subcategories and the aggregate index are more highly correlated among themselves than with Constraints on the Executive or CIM. The latter has the lowest correlations with other indexes by a wide margin[8].

The "Rule of Law" (F) and the Personal Autonomy and Individual Rights (G) subcategories have their highest correlation with the aggregate index whereas Freedom of Expression and Belief (D) and Freedom of Assembly (E) have their highest correlation with each other. On the other hand, the aggregate index, Freedom of Expression and Belief and Freedom of Assembly have their lowest correlation with Personal Autonomy and Individual Rights. It is also worthwhile to note here that some of the civil liberties subcategories are more closely correlated with certain political rights subcategories than with some of the other civil liberties measures. For example, Freedom of Expression and Belief and Association and Organizational Rights are more highly correlated with "Electoral Process" (A) and "Political Pluralism and Participation" (B) than with other civil liberties. Meanwhile, the Rule of Law subcategory is most closely correlated with the "Functioning of Government"

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[8]We are including CIM for completeness. Its original proponents viewed it as an indicator of contract enforcement services, not of the prevalence of the rule of law. In practice, it can capture features of both since the likelihood of flights from contract based money would be expected to be less where the rule of law prevails than where it does not prevail.

(C). Finally, the secondary school enrollment rate is substantially more correlated with Personal Autonomy and Individual Rights than with any of the other institutional variables.

2.4 Civil Liberties and Economic Development: A Simple OLS Comparison

One of our arguments is that the prevalence of the rule of law as indicated by the provision of civil liberties is a better measure of the institutions needed for growth than the alternative measures used in the literature. In this section, we examine the empirical power of these new measures of property rights institutions by comparing them to the main alternative used in the literature to explain long-term growth. We start our analysis by incorporating these measures as substitutes for Constraints on the Executive in the main empirical specification employed by Acemoglu and Johnson (2005).

In the first panel of Table 2.3-A, we present the results of OLS regressions of the log of GDP per capita in 1995 on two institutional variables: Legal Formalism, intended to capture contracting institutions; and one of a set of different measures intended to capture property rights institutions. For comparison with existing literature, we include the variable most often used by Acemoglu and Johnson to represent property rights institutions, namely Constraints on the Executive, in the first column, and CIM in the second column. The remaining columns consider subcategories of civil liberties. The results of are unambiguous. Legal Formalism is

statistically insignificant at the 5% level in all specifications. All of the civil liberties indicators are positive and statistically significant at the 1% level. The main difference between these measures lies in their explanatory power. It is especially striking that the civil liberties subcategory Personal Autonomy and Individual Rights explains about 75% more of the variation in GDP per capita than the second best measure, namely Constraints on the Executive[9].

Freedom House's political rights index is made up of three subcategories: Electoral Process (A), capturing the existence and degree of freedom, fairness and honesty in elections; Political Pluralism and Participation (B), capturing the nature of participation in the political process by individuals and groups; and Functioning of Government (C), measuring the effectiveness of governance[10]. In Table 2.3-B, we repeat the exercise in the previous table using political rights measures as the institutional variable capturing the prevalence of the rule of law in our regressions explaining long-term growth[11].

One measure of civil liberties, Personal Autonomy and Individual Rights, outperforms each of the political rights variables by a wide margin in terms of explanatory power. Indeed, none of the political rights variables performs as well as the Constraints on the Executive, which is the second best performing variable by this simple criterion. Of course, there are other relevant criteria that one can use

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[9]Not surprisingly, using a non-nested J-test, the specification relying on the Personal Autonomy and Individual Rights variable is accepted while the one relying on Constraints on the Executive is rejected at the 1% level when tested against each other. Similar results hold for the other indicators. We present the results of this test in Table A.2 of the Appendix.

[10]For more details, see *Freedom in the World 2005*, Freedom House (2006, pp. 780-781).

[11]The aggregate political rights index performed worse than two of the three subcategories and, thus, was excluded.

for these comparisons, particularly statistical and economic significance, as well as criticisms that one can make of these OLS regressions, such as the need to correct for reverse causation and omitted variables. We address the two main criticisms in the next two sections. Here, we note that all these institutional variables are statistically significant at the 1% level. Indeed if one were to use the magnitude of the t-ratio as a criterion, Personal Autonomy and Individual Rights would perform best. With respect to economic significance, we have included the beta coefficients[12] in the table but we note that they can be sensitive to the inclusion of covariates. Hence, the main point to be made here is that all the property rights variables reflect substantial economic significance in terms of their impact on the level of per capita income. Comparisons between the beta coefficients of explanatory variables are best made after we include additional covariates.

Summing up the main result from this section, the Personal Autonomy and Individual Rights subcategory of civil liberties performs best (in terms of explaining the highest percentage of the variation in the level of income per capita) in a simple comparison with any of the institutional variables that can be sensibly chosen as alternatives to capture property rights institutions or the prevalence of the rule of law. Despite the well known biases in this simple approach, especially when using cross-country data, it would seem unlikely that they would always work out in favor of this particular measure by sheer accident. After all, the other alternatives considered here are subject to the same type of biases in exactly the same setting.

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[12]Beta coefficients are the estimates from a regression in which all of the variables have been standardized (Kennedy 2003). They can be interpreted as the change in the dependent variable in terms of its standard deviations resulting from a change of one standard deviation in the independent variable.

2.5 Civil Liberties and Economic Development: Reverse Causation

Since the possibility of reverse causation between the institutional variables and GDP per capita is well-established, we re-estimate the simple specification of the previous section using 2SLS. As instruments for the institutional variables, we use the log of population density in 1500 and a dummy for British legal origin[13]. The results, which are presented in the two panels of Table 2.4, are similar in terms of signs to those in the previous section. Nevertheless while all coefficients in the top panel increase in magnitude, they decrease in statistical significance compared to the OLS estimation. The end result is that all five civil liberties indicators continue to be statistically significant at the same levels as with OLS (four at the 0.001 level and one at the 0.01 level) but Constraints on the Executive and CIM are now statistically significant at lower levels than with OLS (0.01 and 0.05, respectively.)

Interestingly, Table 2.4-B reveals that the political rights indices experience an increase in statistical significance compared to the OLS results. Indeed, one of them (A) attains statistical significance at the 0.001 level compared to the 0.01 level for OLS. Nonetheless, the Personal Autonomy and Individual Rights subcategory continues to have the highest t-ratio of any of the institutional variables in this setting. Thus, correcting for reverse causation preserves the basic results of the OLS specification. Namely, Legal Formalism does not seem to matter in explaining the level of per capita income across these 60 countries, but property rights institutions do matter regardless of how they are measured.

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[13]Acemoglu and Johnson also use settler mortality as an instrument in their analysis but the validity of this instrument has been challenged (Albouy 2006). We use this instrument instead of population density in 1500 as a robustness check and discuss it in Section 2.6.

Our analysis, thus far, confirms the basic results of Acemoglu and Johnson (2005) by showing that they hold for a variety of other measures of property rights institutions not considered by these authors. It also extends their analysis by showing that one of these alternative measures performs empirically better than theirs with respect to explanatory power and statistical significance in exactly the same setting. From the substantive point of view, however, this is a somewhat surprising result. The measure that performs better corresponds most closely to second generation human rights and not to first generation human rights[14]. However, this result is less surprising when one realizes that this measure captures economic dimensions expected to impact growth directly, such as economic mobility and the ability to exercise ownership rights.

2.6 Civil Liberties and Economic Development: Omitted Variables

We now consider how the previous results are affected by the introduction of additional variables identified as important in previous literature. In particular, we consider geography and human capital. With only 60 observations and the multicollinearity and endogeneity issues that affect cross-country data, however, there is always a trade-off between the need to preserve degrees of freedom and the dangers of omitted variable bias. Hence, we drop the Legal Formalism variable from all subsequent analysis in the interest of parsimony. Its lack of impact in any of the earlier results suggests little danger of omitted variable bias.

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[14]The fact that political rights do not perform as well is not surprising, because they are often used as a measure of democracy and it is often found that democracy does not explain long-run growth, for example Mobarak (2005) or Acemoglu, Johnson, Robinson and Yared (2008).

There are a number of dimensions of a country's geography that have been viewed as important in determining long-run growth by a number of authors. For instance, latitude has been used by Hall and Jones (1999) and others as an indicator of tropical climate. Thus, we consider the absolute value of a country's latitude as an explanatory variable. Similarly, whether or not a country is landlocked has been used by Faye, et al. (2004) to capture access to markets and infrastructure costs. Therefore we also consider an indicator of whether or not a country is landlocked as an explanatory variable[15]. Additionally, Kiszewski, et al (2004) have developed an indicator of a country's exogenous malaria ecology; Sachs (2003, 2005) shows that the environment for this disease affects a country's GDP. Hence, we also consider the malaria ecology index as an explanatory variable[16].

Glaeser, et al.'s (2004) criticism of the original Acemoglu, Johnson and Robinson (2001) article on the "Colonial Origins of Comparative Development" argues that settlers brought to the colonies at least one other characteristic known to be useful for growth besides institutions, namely human capital. Thus, we investigate the effect of human capital on our results. For this purpose, we need a human capital measure that is available for our sample of 60 countries. We follow Mankiw, Romer and Weil (1992) in using the secondary school gross enrollment ratio as our measure of human capital[17].

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[15]The dummy for landlocked countries was drawn directly from the Faye et al (2004) dataset; it equals 1 for landlocked countries and 0 for countries that border an ocean or major body of water. The landlocked countries included in our sample of ex-colonies are: Bolivia, Botswana, Burkina Faso, Ethiopia, Malawi, Mali, Nepal, Niger, Paraguay, Swaziland, Uganda, Zambia, and Zimbabwe.

[16]The malaria ecology index developed by Kiszewski, et al (2004) represents the relative stability of malaria transmission based on the biologic characteristics of mosquitoes present in a country. The index varies between 0 and 39.

[17]We use the 1995 gross secondary school enrollment rate drawn from the World Bank's World

Human capital introduces another issue of reverse causation since economic growth generates resources that can be used for educational purposes. Having dropped Legal Formalism from the analysis, we could use British legal origins as an instrument for the human capital variable. One argument for this use of British legal origins is that the common law tradition supported unconditioned private contracting as opposed to socially-conditioned private contracting (La Porta, Lopez de Silanes and Shleifer 2008). Thus, the common law tradition allowed agents finding some form of education useful to develop it, as opposed to waiting for a socially approved authority to recognize the need.

Since this use of British legal origins as an instrument for education is not an established practice in the literature, we checked the first stage regressions and found that legal origins was a strong instrument for Legal Formalism but a much weaker instrument for secondary school enrollment. These results are presented in Table A.3-A of the Appendix. In the empirical growth literature, ethnic fractionalization has been identified as an instrument for human capital, for example Durlauf, Johnson and Temple (2005). The rationale is that the higher the level of ethnic fractionalization in a society, the lower is the level of human capital, since education is normally publicly provided and any groups controlling the state would be disinclined to empower other groups through education.

We adopt the measure of ethnic fractionalization employed by Alesina, Develeeschauwer, Easterly, Kurlat and Wacziarg (2003)[18]. Alesina et al show that this

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Development Indicators. The measure is defined as the number of total pupils enrolled in secondary school, regardless of age, expressed as a percentage of the total population in the theoretical age group for secondary education (World Bank EdStats Database).

[18]The ethnic fractionalization variable is computed as one minus the Herfindahl index of eth-

measure is relatively independent of both European legal origins and property rights measures, but that it robustly explains variations in literacy rates across countries, even in panel data. It can be seen from Table A.3-B that this measure is a better instrument for secondary school enrollment than British legal origin in terms of both statistical significance and explanatory power.

Alesina et al do not show that ethnic fractionalization affects GDP growth solely through its effect on schooling. To the extent that ethnic fractionalization negatively affects GDP through other channels, this would cause the effects of schooling to be biased upwards. If we find that civil liberties nevertheless remain significant in a specification where the effects of schooling are magnified, we can consider this a lower bound on the true effect of civil liberties.

We limit the presentation of results to two property rights variables, namely Constraints on the Executive, which best captures aspects of balance of power, and Personal Autonomy and Individual Rights, which best captures second generation human rights and performs best among the civil liberties variables[19]. Tables 2.5-A and 2.5-B present the OLS results. It can be seen that the civil liberties variable dominates the Constraints on the Executive variable in every possible comparison in terms of predictive performance and statistical significance. Indeed, the addition of the human capital variable renders Constraints on the Executive statistically insignificant regardless of whether or not the geography variables are included. It

nolinguistic group shares in each country and reflects the probability that two randomly selected individuals from a population belong to different groups.

[19]We checked that the inclusion of additional covariates did not change the relative performance of the other civil liberties or political rights variables relative to Personal Autonomy and Individual Rights (G). It did not.

can also be seen that the institutional variables have significant explanatory power by themselves and that human capital adds substantially to explanatory power despite the inclusion of the institutional variables. On the other hand, the geography variables add to explanatory power given the institutional variables, but their contribution disappears once both institutions and human capital variables are included.[20]

Both the institutional variables and the human capital variables are subject to reverse causation biases. Thus, we present 2SLS results in Tables 2.6-A and 2.6-B, using population density, ethnic fractionalization and British legal origins as instruments in the first stage[21]. The 2SLS results continue to favor the civil liberties variable relative to the Constraints on the Executive one. In particular, the inclusion of human capital continues to render Constraints on the Executive statistically insignificant.

With respect to the geography and human capital variables, the results differ dramatically between OLS and 2SLS. The malaria ecology variable is not statistically significant in any 2SLS specification. Both the human capital variable and the civil liberties variable are statistically significant at the 5% level when included without the geography variables. Inclusion of the latter, however, renders the human capital variable statistically insignificant when Personal Autonomy and Individual Rights is the institutional variable. While initially surprising, this result may also reflect the effect of second generation human rights on the level of human capital.

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[20]We chose to include the malaria ecology variable by itself rather than either of the other two geography variables because it is the one that performs best in terms of explanatory power and statistical significance.

[21]We performed over-identification tests on the instruments and the hypothesis that they had a direct effect in the regression was rejected in every case.

Summing up, the prevalence of the rule of law through the provision of civil liberties, measured in terms of personal autonomy and individual rights, remains an important determinant of long-term growth and, thus, of economic development when geography and human capital are included in the analysis. It does so with and without correction for reverse causation. While magnitudes change substantially depending on the particular specification, the economic significance does not disappear in any specification.

2.7   Sensitivity Analysis

In view of the broad skepticism concerning the use of cross-country data, we performed a series of sensitivity analyses on our basic results to enhance confidence in their reliability. First, we checked the sensitivity of the results to the use of data for other years. Second we checked for outliers and assessed the effect of dropping them. Third, we extended the sample to non-colonies for the OLS estimation. Fourth, we used an alternative instrument instead of population density (settler mortality) in the 2SLS estimation. Fifth, we extended the analysis by including more than one property rights variable at a time. Finally, we checked the sensitivity of the results to the inclusion of regional dummies.

In explaining long-term growth, we have posited as a dependent variable the level of GDP per capita achieved in 1995. Our preferred measure of property rights institutions measures the level of Personal Autonomy and Individual Rights in 2005. To explore the sensitivity to these differences in dates, we constructed an estimate

of the latter variable for 1995[22]. The results of using the estimated 1995 indicator of Personal Autonomy and Individual Rights are very similar to the results for the 2005 indicator used in Tables 2.3 and 2.4. For example, the explanatory power of this 1995 estimated variable ($R2 = 0.4585$) is far closer to the 2005 indicator ($R2 = 0.4717$) than to that of any of the other indicators in Table 2.3, and the coefficient of the estimated variable (0.214) and its standard deviation (0.03) are quite close the corresponding coefficient estimates in Table 2.3 (0.238 and 0.03, respectively). We also obtained GDP per capita data for 2003 and re-did our original analysis, with the same conclusion.

One way to test for outliers is to exclude one country at a time from the sample and observe the impact on the results. This exercise makes no difference to the results in Tables 2.3 and 2.4. A more systematic way of doing so is to use the criteria for dropping outliers noted in Kennedy's *Guide to Econometrics* (2003, Chapter 20): DFFITS (DFBETA) or the normalized change in the OLS estimate of the i-th value of the dependent variable (the normalized change in an OLS coefficient estimate) resulting from omitting the i-th observation. Using these criteria we identified 18 observations that could be candidates for exclusion under either of these tests. Dropping all of these observations at the same time leaves us with 42 countries. In a regression comparable to those in Table 2.3, the explanatory power of the Personal Autonomy and Individual Rights variable was 0.46, and its

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[22]This was done by subtracting from the 2005 level the following term: [CL (2005) -CL (1995)]* (16/7)* ρ (2005). The first element is the difference in the levels of the aggregate civil liberties indicator; the second element corrects for the difference in scales between the aggregate index and the Personal Autonomy and Individual Rights indicator; the third element (ρ) is just the correlation between the two indicators in 2005. Thus, if the correlation were the same in the two years, our estimate would equal the actual value in 1995.

coefficient was 0.243 with a standard error of 0.05. The results for the other measures of institutions were similar and the basic conclusion of superior performance for this variable remained unaltered.

Next, we extended the sample by incorporating all OECD countries not previously included in the dataset because they are not former colonies (Australia, Canada, Mexico, New Zealand and the U.S. were already included). This procedure increases the sample size from 60 to 83. We present the OLS results in the top panel of Table A.4-A of the Appendix. Personal Autonomy and Individual Rights continues to have the greatest explanatory power by a wide margin in explaining long-term growth.

As a final check on the results in Sections 2.3 and 2.4, we used the settler mortality index used by Acemoglu and Johnson (2005) rather than population density in 1500 as the instrument for property rights institutions in the 2SLS regressions. This mortality index is somewhat controversial; see Albouy (2006) and Acemoglu, Johnson and Robinson's (2006) reply. In our context, use of this index as an instrument reduces sample size to 51 observations. Table A.4-B of the Appendix presents the results. They are the same as before. The Personal Autonomy and Individual Rights subcategory is the only property rights institutional variable statistically significant at the 0.1% level when explaining long-term growth.

In addressing the omitted variables problem in the previous section, we faced the problems of multicollinearity and endogeneity. In doing sensitivity analysis of these results, the same two problems arise in a more powerful form. Hence, we will drop the geography variables and consider other additions to the human

capital and institutional variables in our sensitivity tests. In the previous three sections, we compared the performance of the property rights variables when each entered into the estimation one-at-a-time. Our next sensitivity test examines what happens when multiple property rights variables are included in the estimation. Table 2.7-A shows the effect of adding several of the other institutional variables to the main OLS findings of Section 2.5 (i.e., to the estimation shown in Table 2.5-A, column 2). Even when controlling for human capital, the coefficient on Personal Autonomy & Individual Rights is significant and economically important in nearly every OLS regression, while almost none of the other institutions variables are (the only exception is the "Rule of Law" category (F), which has a *negative* coefficient in this specification).

In correcting the results for the endogeneity of the additional institutional variable, however, it is problematic to use the previous three instruments. From Table A.3-A we know that British legal origin is not a good instrument for the institutional variables that are used as indicators of property rights. We thus use as an additional instrument the proportion of Muslims in each country's population. The first stage is presented in Table A.3-C. The Muslim share is a reasonable instrument at least for one of the added institutional variables, Constraints on the Executive. The logic is that the greater the proportion of Muslims in a country, the greater the influence of religious leaders and the fewer checks and balances on the executive. Mobarak (2005) shows that the Muslim share of the population robustly explains various measures of democracy, even while controlling for indicators of oil-producing countries, those involved in wars, and the inequality of income within

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countries. Mobarak then uses an indicator of a Muslim majority in the population as an instrument in estimating the effect of democracy on cross-country differences in economic performance.

Our second stage results including multiple institutional variables are presented in Table 2.7-B. None of the institutional variables apart from Personal Autonomy & Individual Rights have coefficients that are statistically significant at the 5% level. They tend to lower the level of statistical significance of human capital and Personal Autonomy & Individual Rights relative to the basic result in Table 2.6-A. But the coefficient of Personal Autonomy & Individual Rights retains its sign in all cases, and it remains statistically significant in two out of the five cases. Just as in the case of the instruments for human capital, to the extent that the Muslim instrument negatively affects GDP through other channels, this would cause the effects of Constraints on the Executive to be positively biased. The fact that the coefficient on this variable is negative and insignificant is therefore notable.

Finally, Table 2.8-A presents the results of adding regional dummies for Sub-Saharan Africa or Latin America and the Caribbean to the basic 2SLS specification. Since the dummies are exogenous, we use the same instruments as in Table 2.6 to correct for endogeneity. Both dummies are statistically insignificant, with t-ratios less than unity. The estimates of the coefficients for both human capital and second generation human rights do not change much in either case. Nonetheless, including the Latin America and the Caribbean dummy does drive the coefficient of second generation human rights below statistical significance at the 5% level.

2.8 Implications

One contribution of our empirical analysis is to show that the dominance of property rights institutions over contracting institutions in explaining long-term growth is not limited to the measures considered by Acemoglu and Johnson (2005), such as Constraints on the Executive and Risk of Expropriation. On the contrary, using exactly the same methodology and sample, this dominance extends to a wide range of other variables. Prominent among these other variables are four dimensions of civil liberties recently provided at a disaggregated level by Freedom House.

It would be foolish to conclude from this finding that contracting institutions are irrelevant for development, for several reasons. First, only one measure of contracting institutions was considered, Legal Formalism, and there could be others not yet explored in the literature that would generate different results. Second, it is possible that these institutions don't matter empirically at the aggregate cross-country level, but would matter at lower levels of aggregation. Finally and foremost in our judgment, our prior belief is that public provision is essential for property rights and the rule of law, but not contract enforcement.

To further elaborate: while there are private substitutes for the lack of contract enforcement institutions, there are no private substitutes for the rule of law. If the operation of socially contrived markets at a high level is important to sustained economic growth, private substitutes for contract enforcement institutions, such as corruption, may arise and operate in some countries. These private substitutes can allow economic activities to take place at a high level even though the public

provision of contract enforcement institutions through legal formalism is missing. Thus, the result we established empirically does not necessarily imply that contract enforcement institutions are irrelevant for development. What it does suggest is that public provision of these institutions, if it holds up for other measures of publicly provided contracting institutions, is not an essential public input for economic development.

A second contribution of this paper–and perhaps its most important–is the unbundling of property rights institutions. Civil liberties matter in determining the level of long-term economic growth as indicators of the prevalence of the rule of law in general and of property rights institutions in particular. The civil liberties that matter most in this setting, however, are those associated with second generation human rights. The salience and robustness of this empirical finding is very unusual for analyses of cross-country data. We view this result as an unusually strong and auspicious step in the process of unbundling property rights institutions and in understanding their role in the economy. Thus, it is desirable to highlight the implications of our results for a couple of fundamental issues in the institutions and economic development literature.

It is difficult to believe that one can maintain high levels of second generation rights without having some minimal levels of first generation rights. Nonetheless, the well-documented and exceptional sustained economic growth of the East Asian economies since World War II is consistent with the idea that second generation rights are the most important. Vietnam and China are two recent and dramatic examples of countries with sustained growth despite divergence between second

generation human rights and other property rights institutions. Their scores on second generation human rights are 7 and 8, respectively, out of a possible 16. The next highest score for either country in any of the disaggregated civil liberties subcategories is 4 out of 16. These correspond to Freedom of Expression for China and Rule of Law for Vietnam. Indeed, one can plausibly argue that these recent scores on second generation human rights are the result of improvements concurrent with sustained economic growth. Regardless of this argument, understanding the nature of the relationships between different civil liberties subcategories in affecting long-term growth is a potentially fruitful area of future research. One might also expect some relationship between a minimal level of political rights and these second generation human rights. Using China and Vietnam as illustrations again, one finds that neither country scores higher than a 1 out of a possible 12 or 16 in any of the three political rights subcategories. Thus, future research should examine the interactions between political and economic institutions in the context of economic development. Some progress in this area can be found in Acemoglou and Robinson (2006) and North, Wallis and Weingast (2008).

A third contribution of this paper lies in the conceptual framework, which helps us interpret our first empirical result, and also helps us interpret the unusual implications of our second empirical result noted above. That is, one possible reason for the exceptional growth performance of China and Vietnam, despite their low scores on civil liberties and political rights, is that at low levels of development growth can be based on activities in markets that are not socially contrived, for example agricultural markets. Yet as one attains higher levels of development, it

becomes impossible to sustain growth without socially contrived markets and it is at this point that civil liberties and perhaps political rights begin to matter. In these early stages of the development process, the civil liberties that matter most are the ones associated with second generation human rights, since they have more direct effects on economic activities through improving labor mobility and the full exercise of ownership rights.

To conclude, we indicate how the subsidiary propositions of the conceptual framework provide implications for future research as well as a possible and plausible causal mechanism for our main empirical result. One way to proceed in terms of future research is to explore in greater detail the role of civil liberties in different socially contrived markets. For example, some of the most important socially contrived markets in an economy are financial markets since they usually involve the exchange of short-term payments for paper claims or promises of future benefits. Future research may contribute to the debate about the causal impact of financial development on economic growth (for example, Levine (2005)), by focusing on the impact of civil liberties in the development of narrowly defined financial markets, such as stock, credit, and insurance markets, as especially relevant socially contrived markets. For instance, one might assess the degree to which greater civil liberties may both deepen financial development and expand access to finance or determine whether foreign investment is pursued through stock markets, debt markets, or direct investment. This same causal argument, however, suggests a possible and plausible mechanism for our empirical finding that civil liberties in the form of second generation human rights are the ones with the greatest impact on long-term

growth. Namely, these human rights are the ones that capture those aspects of the rule of law most important for socially contrived markets, including financial markets. These socially contrived markets are the ones that determine economic growth over the long-term.

Table 2.1: Freedom House Civil Liberties Categories

FH Civil Liberties Category	Sub-Issues
D. Freedom of Expression and Belief	1. Are there free and independent media and other forms of cultural expression? 2. Are religious institutions and communities free to practice their faith and express themselves in public and private? 3. Is there academic freedom and is the educational system free of extensive political indoctrination? 4. Is there open and free private discussion?
E. Associational and Organizational Rights	1. Is there freedom of assembly, demonstration, and open public discussion? 2. Is there freedom for nongovernmental organizations? 3. Are there free trade unions and peasant organizations or equivalents, and is there effective collective bargaining?
F. Rule of Law	1. Is there an independent judiciary? 2. Does the rule of law prevail in civil and criminal matters? Are police under direct civilian control? 3. Is there protection from political terror, unjustified imprisonment, exile, or torture, whether by groups that support or oppose the system? Is there freedom from war and insurgencies? 4. Do laws, policies, and practices guarantee equal treatment of various segments of the population?
G. Personal Autonomy and Individual Rights	1. Does the state control travel or choice of residence, employment, or institution of higher education? 2. Do citizens have the right to own property and establish private businesses? Is private business activity unduly influenced by government officials, the security forces, political parties/organizations, or organized crime? 3. Are there personal social freedoms, including gender equality, choice of marriage partners, and size of family? 4. Is there equality of opportunity and the absence of economic exploitation?

Table 2.2: Correlation among institutional variables for 60 ex-colonies

	Const. on Exec.	CIM	Agg. Civil Lib. Index	Free.of Exp. & Belief (D)	Assoc. & Organ. Rights (E)	Rule of Law (F)	Person. Auto. & Indiv. Rights (G)	Elect. Process (A)	Politi. Plural. & Part. (B)	Funct. Of Gov. (C)	Second. School Enroll.
Constraints on the Executive	1										
CIM	0.113	1									
Aggregate Civil Liberties Index	0.6651	0.2015	1								
Freedom of Expression & Belief (D)	0.6145	0.2262	0.8958	1							
Associational and Organiz. Rights (E)	0.6647	0.2251	0.9094	0.9316	1						
Rule of Law (F)	0.615	0.2013	0.9153	0.784	0.7929	1					
Personal Autonomy & Individual Rights (G)	0.6864	0.2663	0.8895	0.7471	0.7598	0.8353	1				
Electoral Process (A)	0.6159	0.1988	0.8507	0.8723	0.8832	0.7407	0.7364	1			
Political Pluralism & Participation (B)	0.6709	0.1529	0.8857	0.91	0.9235	0.7911	0.7736	0.8867	1		
Functioning of Government (C)	0.5891	0.1924	0.898	0.8137	0.8262	0.905	0.8275	0.8183	0.8378	1	
Secondary School Enrollment	0.4958	0.3041	0.4407	0.3221	0.3469	0.4275	0.6413	0.2999	0.331	0.4213	1

Table 2.3-A: OLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)	(6)
Legal Formalism	-0.130	-0.054	-0.163	-0.142	-0.062	-0.049
	(0.101)	(0.113)	(0.107)	(0.108)	(0.109)	(0.087)
	<-0.2>	*<-0.1>*	*<-0.2>*	*<-0.2>*	*<-0.1>*	*<-0.1>*
Constraints on Executive	0.293***					
	(0.067)					
	<0.495>					
CIM		2.040**				
		(0.728)				
		<0.357>				
Freedom of Expression & Belief (D)			0.115**			
			(0.035)			
			<0.398>			
Associational & Organ. Rights (E)				0.131**		
				(0.042)		
				<0.373>		
Rule of Law (F)					0.120**	
					(0.036)	
					<0.409>	
Personal Autonomy & Indiv. Rights (G)						0.238***
						(0.034)
						<0.676>
Observations	60	60	60	60	60	60
R-squared	0.27	0.143	0.183	0.164	0.185	0.472

Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2.3-B: OLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)
Legal Formalism	-0.179	-0.147	-0.069
	(0.107)	(0.109)	(0.108)
	<-0.20>	*<-0.17>*	*<-0.08>*
Electoral Process	0.114**		
(A)	(0.034)		
	<0.407>		
Political Pluralism		0.085**	
& Participation (B)		(0.031)	
		<0.340>	
Functioning of			0.144***
Government (C)			(0.041)
			<0.421>
Observations	60	60	60
R-squared	0.189	0.14	0.196

Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2.4-A: 2SLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)	(6)
Legal Formalism	-0.002	0.18	-0.15	-0.044	0.078	-0.084
	(0.211)	(0.339)	(0.178)	(0.204)	(0.184)	(0.130)
	<-0.0>	<-0.2>	< −0.2>	<-0.1>	<-0.1>	<-0.1>
Constraints on Executive	0.878**					
	(0.273)					
	<1.482>					
CIM		11.980*				
		(5.463)				
		<2.096>				
Freedom of Expression & Belief (D)			0.314***			
			(0.084)			
			<1.083>			
Associational & Organ. Rights (E)				0.444**		
				(0.135)		
				<1.269>		
Rule of Law (F)					0.312***	
					(0.082)	
					<1.065>	
Personal Autonomy & Indiv. Rights (G)						0.373***
						(0.073)
						<1.059>
Observations	60	60	60	60	60	60

The instruments used in the 2SLS specifications are the log of population density in 1500 and a dummy for British legal origin. Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2.4-B: 2SLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)
Legal Formalism	-0.258	-0.127	0.057
	(0.190)	(0.207)	(0.193)
	<-0.29>	*<-0.14>*	*<-0.06>*
Electoral Process	0.337***		
(A)	(0.096)		
	<1.205>		
Political Pluralism		0.318**	
& Participation (B)		(0.100)	
		<1.279>	
Functioning of			0.408***
Government (C)			(0.114)
			<1.193>

The instruments used in the 2SLS specifications are the log of population density in 1500 and a dummy for British legal origin. Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2.5-A: OLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)
Personal Autonomy & Indiv. Rights (G)	0.241***	0.070*	0.200***	0.072**	0.069*
	(0.034)	(0.027)	(0.032)	(0.027)	(0.029)
	<0.685>	<0.200>	<0.567>	<0.205>	<0.196>
Secondary School Enrollment, 1995		0.030***		0.028***	0.027***
		(0.003)		(0.003)	(0.004)
		<0.756>		<0.707>	<0.703>
Malaria Ecology			-0.048***	-0.011	-0.01
			(0.012)	(0.009)	(0.01)
			<-0.36>	<-0.082>	<-0.077>
Landlocked Dummy					0.026
					(0.565)
					<0.003>
Latitude, Absolute Value					-0.07
					(0.169)
					<-0.028>
Observations	60	60	60	60	60
R-squared	0.469	0.805	0.587	0.81	0.811

Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2.5-B: OLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)
Constraints on Executive	0.295***	0.047	0.182*	0.039	0.04
	(0.067)	(0.042)	(0.071)	(0.044)	(0.044)
	<0.499>	<0.080>	<0.308>	<0.067>	<0.068>
Secondary School Enrollment, 1995		0.033***		0.032***	0.031***
		(0.003)		(0.003)	(0.003)
		<0.845>		<0.823>	<0.789>
Malaria Ecology			-0.053**	-0.007	-0.005
			(0.016)	(0.010)	(0.010)
			<-0.40>	<-0.05>	<-0.04>
Landlocked Dummy					0.182
					(0.586)
					<0.023>
Latitude, Absolute Value					-0.189
					(0.170)
					<-0.076>
Observations	60	60	60	60	60
	0.249	0.787	0.372	0.788	0.793

Standard errors in parentheses and beta coefficients in brackets. *** $p<0.001$, ** $p<0.01$, * $p<0.05$.

Table 2.6-A: 2SLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)
Personal Autonomy & Indiv. Rights (G)	0.426*** (0.072) <1.209>	0.225* (0.096) <0.638>	0.384*** (0.073) <1.090>	0.237* (0.107) <0.673>	0.238* (0.111) <0.676>
Secondary School Enrollment, 1995		0.024* (0.010) <0.602>		0.021 (0.013) <0.545>	0.022 (0.015) <0.575>
Malaria Ecology			-0.026 (0.017) <-0.194>	-0.003 (0.019) <-0.022>	-0.009 (0.019) <-0.07>
Landlocked Dummy					-0.862 (0.888) <-0.106>
Latitude, Absolute Value					0.293 (0.252) <0.118>
Observations	60	60	60	60	60

The instruments used in the 2SLS specifications are the log of population density in 1500, a dummy for British legal origin, and ethnic fractionalization. Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Table 2.6-B: 2SLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)
Constraints on Executive	0.988***	0.519	0.868**	0.32	0.302
	(0.269)	(0.365)	(0.301)	(0.230)	(0.230)
	<1.669>	<0.877>	<1.466>	<0.540>	<0.509>
Secondary School Enrollment, 1995		0.023		0.035**	0.039**
		(0.016)		(0.011)	(0.012)
		<0.590>		<0.907>	<0.990>
Malaria Ecology			0.02	0.03	0.029
			(0.039)	(0.020)	(0.020)
			<0.155>	<0.223>	<0.216>
Landlocked dummy Dummy					-1.096
					(0.979)
					<-0.135>
Latitude, Absolute Value					-0.012
					(0.277)
					<-0.005>
Observations	60	60	60	60	60

The instruments used in the 2SLS specifications are the log of population density in 1500, a dummy for British legal origin, and ethnic fractionalization. Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 2.7-A: OLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)
Personal Autonomy	0.076*	0.066*	0.075	0.105*	0.149**
& Indiv. Rights (G)	(0.03)	(0.03)	(0.04)	(0.04)	(0.04)
	<0.216>	<0.188>	<0.214>	<0.299>	<0.422>
Secondary School	0.030***	0.029***	0.029***	0.029***	0.028***
Enrollment	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
	<0.759>	<0.733>	<0.752>	<0.73>	<0.713>
Constraints on	-0.015				
Executive	(0.05)				
	<-0.03>				
CIM		0.574			
		(0.35)			
		<0.1>			
Freedom of			-0.005		
Expression			(0.03)		
& Belief (D)			<-0.02>		
Associational &				-0.038	
Organ. Rights (E)				(0.03)	
				<-0.11>	
Rule of Law (F)					-0.068*
					(0.03)
					<-0.23>
Observations	60	60	60	60	60
R-squared	0.806	0.814	0.805	0.81	0.821

Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 2.7-B: 2SLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)
Personal Autonomy & Indiv. Rights (G)	0.340*	0.155	0.546	0.438*	0.276
	(0.150)	(0.339)	(0.352)	(0.211)	(0.156)
	<0.965>	<0.441>	<1.550>	<1.243>	<0.783>
Secondary School Enrollment	0.025*	-0.015	0.004	0.013	0.022*
	(0.012)	(0.095)	(0.023)	(0.014)	(0.010)
	<0.647>	<-0.39>	<0.113>	<0.321>	<0.561>
Constraints on Executive	-0.302				
	(0.244)				
	<-0.51>				
CIM		10.479			
		(24.572)			
		<1.833>			
Freedom of Expression & Belief (D)			-0.174		
			(0.171)		
			<-0.601>		
Associational & Organ. Rights (E)				-0.184	
				(0.150)	
				<-0.525>	
Rule of Law (F)					-0.046
					(0.101)
					<-0.155>
Observations	60	60	60	60	60

The instruments used in the 2SLS specifications are the log of population density in 1500, a dummy for British legal origin, ethnic fractionalization, and the share of Muslims in the population in 1980. Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table 2.8-A: 2SLS, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)
Personal Autonomy	0.225*	0.197*	0.190
& Indiv. Rights (G)	(0.096)	(0.086)	(0.114)
	<0.638>	<0.559>	<0.540>
Secondary School	0.024*	0.024*	0.026*
Enrollment	(0.010)	(0.010)	(0.010)
	<0.602>	<0.619>	<0.667>
Sub-Saharan Africa		0.043	
Dummy		(0.213)	
		<0.0200>	
Latin America &			0.066
Caribbean Dummy			(0.226)
			<0.030>
Observations	60	60	60

The instruments used in the 2SLS specifications are the log of population density in 1500, a dummy for British legal origin , and ethnic fractionalization. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Chapter 3

A Mobility Curse? The Impact of Migration on Access to Credit

3.1   Overview

A well-documented stream of literature suggests that informational issues surrounding an individual's repayment history can lead to substantial rationing in formal credit markets. In many developing countries that lack robust contract enforcement and national information sharing institutions, credit markets depend on local information and reputation to bolster repayment incentives. In such contexts, migration across locations reduces the amount of information available about an individual in her destination. Moreover, individuals can escape damaging information by switching to locations where their past actions are less well-known. Migrants thus offer a unique set of potential borrowers who are particularly informationally opaque, and among whom strategic default may be particularly problematic. Thus we might expect to find exacerbated credit rationing among individuals who have migrated in such contexts.

Few studies have examined migrants under this lens. Eliana La Ferrara (2003) shows that among Ghanaian villagers, migrants are much less likely to obtain loans from kinsmen, who are particularly reliant on reputation and generalized reciprocation in enforcing loan repayment, than from other sources such as banks or coooperatives. Given its focus on informal borrowing among social groups, La Ferrara (2003)

does not address to what extent informational and enforcement issues differentially affect migrants when they seek loans in the formal credit market, where reciprocity is not generally at issue. In a different context, Guiso, Sapienza and Zingales (2004) find that migrants from the south of Italy to its north are less likely to use checks or hold stocks, which they interpret as being related to the Southerners' lower level of social capital. However, the paper does not find any *causal* effect of migration *per se* when controlling for the social capital in one's birthplace and does not seriously address the potential for reverse causality and omitted variables biases.

Does being a migrant in a developing country cause an individual to receive less access to credit? I answer this question using data on individual migration and credit holdings in Guatemala from 2000. This setting offers a compelling institutional environment: Guatemala saw significant internal (and international) migration both during and after the bloody civil war that ended in 1996. Creditor rights have historically been weakly protected in Guatemala, and in 2002 a World Bank appraisal cited "poor judicial procedures for rapid debt collection" and an "inadequate legal framework for secured transactions" as key problems affecting the financial sector. Moreover, there was little information sharing among banks, cooperatives, or other lenders in Guatemala prior to 2000. TransUnion opened the first credit bureau in the country in 2001, and credit information sharing mechanisms among microfinance institutions began appearing in late 2002. Thus, looking at Guatemalan survey data from 2000 offers an opportunity to assess the effects of migration on formal credit in the absence of well-developed credit information sharing and strong creditor protections. This is exactly the setting in which one would expect to find substantial

evidence of credit rationing affecting migrants.

To address the causal impact of migration on credit access, I adopt an instrumental variables approach that makes use of the broad thematic coverage of the World Bank's Living Standards Measurement Survey (LSMS), which includes questions about credit use, migration histories, and perceptions and experiences with violence and crime. Given that migration within Guatemala has been driven in part by patterns of violence within the country (Morrison 1993), I use the LSMS to identify the individuals who are most concerned about violence or crime in their local communities. These individuals are most likely to be sensitive to the actual rates of violence in the areas in which they were born and to move away from particularly violent areas. This exogenous migration propensity can be used to study the reduced access to credit associated with migration. Because migration due to violence in one's birthplace is essentially a one-time move, such migrants may be no more likely to default on their future loans than natives of an area. However, lenders are not likely to observe an individual's sensitivity to violence or crime and thus treat such individuals as they do all migrants. If these individuals experience less access to credit than do natives, the matter becomes a noteworthy economic inefficiency.

Migration is an important mechanism through which a country's human resources are aligned with their most productive uses. As countries grow economically, they often transition from regionally segmented markets to integrated ones in which both goods and people can move more freely across space. This work sheds light on a key friction in this process: Migration weakens the information structure and thus

restricts creditworthy individuals from obtaining loans. This research provides support for policies emphasizing the introduction of information sharing mechanisms in developing countries and improvement and expansion of existing ones, particularly as societies experience greater mobility.

The paper is laid out as follows: In section 3.2, I discuss the existing literature on migration and access to credit. I then present an overview of a theoretical model in section 3.3, illustrating how mobility can reduce access to credit in the presence of weak contract enforcement (the details of the model are included in Appendix A.2). Turning to the empirical evidence, I lay out an identification strategy in section 3.4, followed by a discussion of the data in section 3.5. I offer results in section 3.6 and consider alternative explanations for these findings in section 3.7. In section 3.8, I conduct a series of robustness checks. Finally, I conclude in section 3.9.

3.2   Existing Literature

An extensive literature has focused on explaining the lack of access to credit in developing countries. This literature largely focuses on imperfect enforcement and informational asymmetries, founded in large part on Stiglitz and Weiss's (1981) theoretical work demonstrating how adverse selection and moral hazard can cause backward bending supply curves and red-lining of potential borrowers (see Conning and Udry (2005) for a survey of these issues, as applied to agricultural settings). More recent papers have focused on empirically identifying the nature and scope of the specific frictions. Karlan and Zinman (2007), for example, find that adverse

selection and moral hazard lead to default rates as high as 20% in an experimental setting. As Ghosh, Mookherjee, and Ray (2000) note, imperfect enforcement can also be problematic, particularly in developing country contexts. Imperfect enforcement refers to situations in which frictions arise from voluntary default. However, individual mobility is rarely cited as a cause of any of these frictions. In explaining the widespread belief that female borrowers of microfinance institutions are less likely to engage in moral hazard, Armendariz de Aghion and Morduch (2005) suggest that greater immobility may make default more costly for female borrowers and monitoring cheaper for their lenders. Nonetheless, this suggestion that individual mobility may be a source of friction in credit markets has not been extensively investigated.

As previously noted, one study that does explicitly link migration and credit access is La Ferrara (2003), which finds that migrants are less likely to receive credit from kin group networks than from other sources, such as moneylenders, banks, or cooperatives. However, because it estimates the likelihood that a given loan will come from each source, this study does not identify the extent to which migrants are less likely to receive loans from any source at all. Moreover, La Ferrara finds that reciprocity as an enforcement mechanism appears to dominate informational asymmetries in explaining informal lending among kin groups–which is not necessarily the case among banks and other formal lenders.

Another study that considers migration in a different context is Guiso, Sapienza and Zingales (2004). In their study of the effects of social capital on the use of financial instruments such as checks and stocks in Italy, Guiso, Sapienza and Zingales

assess to what degree this behavior changes when an individual moves to a new region of the country. In OLS regressions, they find that migrants from the south to the north of Italy are less likely to use these instruments, presumably because of the Southerners' lower level of social capital. However, they do not find significant effects of migration *per se*, which is perhaps not surprising given that the confounding effects of reverse causation and omitted variables. Moreover, Guiso, Sapienza and Zingales focus largely on the differential use rather than access to credit among these movers.

One mechanism through which credit rationing can be mitigated is relationship lending, as Petersen and Rajan (1994) highlight. By building a relationship with a borrower over an extended time period, a lender becomes better informed about the borrower's riskiness and thus can overcome moral hazard, adverse selection, and contract enforcement issues. Migration to a new location often represents a severing of those relationships, making migrants even more opaque relative to the average native, who may have preserved his existing relationships with lenders.

Credit access issues specifically among Guatemalan households have been studied from a number of angles by Bruce Wydick and a series of coauthors. Wydick (2002) tracks 239 clients of a microfinance institution in western Guatemala, finding differing enterprise growth for women and men due in part to gender differences in credit constraints on consumption and investment. Wydick, Karp, and Hilliker (2008) identify substantial social imitation in obtaining credit among similar households, often through church and neighborhood networks. Wydick (1999) suggests that social repayment enforcement may also be particularly potent in this setting.

Moreover, Luoto, McIntosh and Wydick's (2007) study of the credit information system implemented among Guatemalan microfinance organizations beginning in 2002 finds a large positive impact on loan repayment. Although they have yet to address whether the significant migration in Guatemala has been a source of credit market frictions, these studies suggest that there is significant scope for both adverse selection and moral hazard among rural Guatemalan borrowers.

There is also evidence indicating that a substantial portion of internal migration within Guatemala over the past three decades can be explained by violence patterns. Micklin (1990) documents some of the conflict-related population movement in the early and mid-1980's. Morrison (1993) provides further evidence by using the number of corpses found or politically motivated killings in each region to explain both out- and in-migration rates for Guatemalan regions. Morrison's findings suggest that, at least at an aggregate regional level, migration patterns may be correlated with violence, independent of any relationship between violence and department-level income.

A much broader stream of literature has analyzed the self-selection of migrants in terms of key unobserved characteristics, with Borjas (1987) serving as a seminal paper. In these models, the information structure causing these characteristics to be unobserved is generally taken as given. As Lucas (1997) suggests, relatively little empirical work has addressed whether the act of migration actually obscures information about the individual migrant and thus in some instances negatively influences outcomes at the destination (Lucas highlights employment outcomes). This issue is particularly crucial for credit markets, because information can be used

to counteract weak contract enforcement. Moreover, Chiswick (1999) suggests that any favorable self-selectivity among migrants would be expected to be weaker among those who move primarily based on factors other than their own labor market or entrepreneurial success, including those who move to "escape from real or perceived threats to their freedom or safety." These findings suggest that studying migrants whose propensity to migrate is more related to local violence and crime as well as their sensitivity to personal safety offers a useful setting to study frictions such as weak contract enforcement and information sharing. Recent research has also studied how existing migrant networks can reduce migration costs for potential migrants, endogenizing the migration process (see, for example, Carrington et al (1996) and McKenzie and Rappaport (2007)). One channel through which these networks may operate is by improving information and enforcement mechanisms that dampen negative frictions associated with migration.

3.3   Theory

As previously noted, theoretical explanations of credit rationing in developing countries typically highlight asymmetric information and contract enforcement problems. These can be thought of separately as issues involving involuntary and voluntary default, respectively. Asymmetric information problems, such as adverse selection and moral hazard, involve involuntary default when borrowers are unable to repay their loans. Models explaining rationing due to involuntary default assume that contract enforcement compels borrowers to repay their loans when they are

able to do so. In many less developed countries, however, contract enforcement is generally problematic, and debt contracts may be particularly challenging to enforce. Thus, we can think of voluntary default arising out of poor contract enforcement as a more basic economic friction[1]. In the empirical section, I assess the evidence on the importance of contract enforcement relative to involuntary default in the Guatemalan context. In this section, I describe a theoretical model of voluntary default when individual borrowers are able to migrate. For brevity's sake, I outline the model's main features and results in narrative form, with detailed mathematical notation included in the Appendix.

Although much work on voluntary default has focused on sovereign govern-ments (Eaton and Gersowitz 1981), Ghosh, Mookherjee and Ray (2000) [henceforth GMR] show that an individual borrower's ability to default strategically can also affect within-country credit markets. In such contexts, information sharing and implicit cooperation among lenders can sometimes reduce voluntary default by in-centivizing borrowers to repay loans to avoid exclusion from future borrowing. That is, lenders may share information on a borrower's repayment history and follow a trigger strategy that rejects loan applicants with prior defaults. GMR allow this information sharing technology to vary in quality and show that a more effective

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[1]This is not to say that informational asymmetry problems may not still be present after con-tract enforcement is suitably strenghtened. For example, based on Stiglitz and Weiss's (1981) seminal paper on adverse selection, a credit market could exhibit greater rationing of migrants if lenders "know less" about individual migrants' returns than they do about individual natives. Different risk formulations, however, have been shown to lead to over-lending rather than rationing (for example, De Meza and Webb (1987)), and the equilibrium outcome depends on the distribu-tions of the different parameters. An extensive literature has also studied the scope for moral hazard in explaining credit rationing (see, for example, Jaffee and Russell (1976) and Aghion and Bolton (1997)). This issue would particularly affect migrants when less is known about their choices of inputs for projects, or, more generally, about their actions affecting their ability to repay loans.

technology–one with better detection of past defaults–can lead to a more efficient outcome.

I extend the GMR model in two key ways: First, I incorporate information dissipation over space. The intuition is that information sharing among lenders may be weaker when the lenders are located in different towns than when they are located in the same town. Second, I extend the GMR model by incorporating heterogeneity in individuals' migration costs, which include both a permanent and a time-varying component. In essence, some particularly mobile entrepreneurs with low permanent migration costs are perennial flight risks, while other entrepreneurs may move because of a one-time shock. As lenders cannot observe these migration costs, they must form expectations about entrepreneurs' future migration and repayment strategies. In so doing, they lump migrants who are repeat defaulters together with those who may have stronger repayment prospects.

The model involves entrepreneurs who make individual repayment and migration decisions conditional on their expectation of lender rationing of migrants, while lenders make loan decisions conditional on the composition of repayment decisions among migrants. An equilibrium is reached when these lending decisions are rationalized by entrepreneur behavior. As borrower strategies are discrete choices, closed form solutions for this equilibrium may not exist. In the appendix, I use simulations to show conditions on parameters under which it is not profit maximizing for lenders to extend credit to all migrants. Under these conditions, lenders will choose to ration loans to migrants in order to induce them to choose repayment of loans rather than default, as well as to reduce the incentive for future migration (since

this creates a stock of more opaque applicants).

The model provides an explanation of equilibrium credit rationing for migrants. Because the set of indistinguishable migrants includes those who are likely to default and move repeatedly, lenders may reduce their loan exposure to all migrants, including those who plan to stay and repay their loans. Moreover, equilibrium rationing may emerge even if an individual lender would want to serve the marginal migrant, because doing so would induce future migrants to default at higher rates. This is akin to "macro-rationing" highlighted by Shapiro and Stiglitz (1984) as an explanation of a positive equilibrium unemployment rate. The model highlights the underlying issue that will be tested in the empirical section: there are some individuals who make one-time moves and are unlikely to move again, but because lenders cannot distinguish these from other migrants, they treat them as they do all migrants. Under some conditions, lenders will therefore not provide loans to these potentially creditworthy individuals because of their previous migration.

3.4 Empirical Strategy

My theoretical model suggests that loans to migrants who move because of an exogenous factor (mobility shock) may be rationed, even if they would choose to stay and repay their loans in the future. I test this assertion empirically by identifying a factor that drives a major migration decision but is not likely to be otherwise correlated with credit demand or creditworthiness. To the extent that migrants who move for this exogenous reason receive less credit, this effect represents an economic

inefficiency in the sense that these individuals would receive loans if lenders could distinguish the reasons for their prior migration.

Testing this theory requires an appropriate institutional context in which enforcement of credit contracts is very weak and information-sharing among lenders is limited and geographically concentrated. The situation in Guatemala in 2000 fits these features well. An assessment of the Guatemalan legal environment for credit transactions in the early 2000's found that obtaining judicial rulings on security interests took 1.5 to 2 years, on average (USAID 2004). Judicial mechanisms were also "susceptible to dilatory practices, including the interposition of *amparo* remedies[2] by debtors alleging that their constitutional rights have been violated" (USAID 2004). Similarly, excessive delays were frequent and formalistic requirements were regarded as conducive to corruption (USAID 2004). Even once rulings had been reached, there were no bailiffs or other private or public entities to enforce the rulings, and creditors at times resorted to extrajudicial enforcement, including vandalism, illegal repossession and similar mechanisms. These were perceived as costly substitutes for efficient judicial enforcement (USAID 2004).

The costliness and difficulty of contract enforcement in Guatemala led to the development of information-based alternatives to compel borrowers to repay loans. As previously mentioned, TransUnion launched the first private credit bureau in the country in 2001. In 2002, CREDIREF was founded as a credit bureau primarily serving hundreds of micro-finance institutions and credit cooperatives, in addition to

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[2]The *amparo* judicial procedure is intended to protect constitutional rights, but the lack of control against frivolous claims has led to abuses of this method (USAID 2004).

at least two major banks (de Janvry et al 2003). Other collaborative efforts among MFIs have been undertaken more recently. However, these information-sharing efforts were not formalized or offered on a national basis in 2000. Any information-sharing taking place in 2000, therefore, was likely to be through informal exchanges among loan officers or individual bank branches in particular geographic locations.

In this empirical analysis, it is important to distinguish "access to credit" from the observed use of credit, as non-users of financial services often choose not to take out loans because they have no need for them ("voluntary self-exclusion," World Bank (2008)). I focus on access to formal credit in terms of traditional credit rationing, wherein lenders choose not to provide credit to some individuals even though these potential borrowers may be willing to pay the equilibrium interest rate ("involuntary exclusion"). Although I observe whether an individual reports having applied for a loan and whether she received it, there are strong reasons to believe that many individuals correctly expected to have their loan applications rejected and thus never applied. As in La Ferrara (2003), I instead begin by examining whether migrants are less likely to have loans conditional on a variety of demand-related characteristics, such as the individual's age, education level, and general poverty classification. That is, I condition the use of credit on a variety of factors affecting the return to capital and interpret any residual effects of migration on credit holdings as being related to lender supply decisions. I then relax this assumption by examining whether migration affects the probability of applying for a loan, as well as the probability of receiving it. This general approach is also akin to the extensive empirical literature examining labor market discrimination, which assesses whether

racial or gender variables significantly affect the component of wages unexplained by characteristics typically associated with labor productivity (see Altonji and Blank (1999) for a review).

The empirical relationship between individual migration and access to credit is riddled with reverse causality and omitted variable issues. An individual could move in part because she expects better access to credit in her destination, or she could be more entrepreneurial than her peers and thus less averse both to moving and to taking out a loan. Both of these reverse causality and omitted variable bias issues could lead to a positive relationship between migration and credit, confounding any actual rationing of loans to migrants. If we simply test the relationship between migration and credit access in an ordinary least squares (OLS) regression, it might not be surprising were we to find no statistically meaningful relationship, given these confounding factors. I therefore adopt an instrumental variables (IV) approach to identify the causal effect of migration on credit supply by focusing specifically on those factors that affect migration but (1) are not observed by potential lenders and thus cannot directly affect the supply of credit to an individual, and (2) are uncorrelated with individual unobservables that may be correlated with loan demand or lender perceptions of creditworthiness.

As previously noted, evidence on migration patterns in Guatemala suggests that a substantial portion of migration can be explained by the rate of violence in one's birthplace. The Guatemala LSMS survey is well-suited to study this effect because it specifically includes questions that allow me to determine which individuals are most likely to be sensitive to violence or crime in their local area. If

some individuals are particularly sensitive to these issues (relative to the average individual in their community), they may be more likely to migrate away from violent and crime-ridden areas than would less sensitive individuals or those born into less violent areas. The LSMS includes a module on social capital in which individual respondents are asked what they perceive to be the most challenging problems facing their local communities; crime, violence, and drug and alcohol addiction are among the possible choices. Lenders are unlikely to know how sensitive to such issues a potential borrower may be (conditional on the borrower's other characteristics). Moreover, in the LSMS, individuals are asked whether they themselves have directly experienced a variety of crimes or acts of violence in the previous year. Controlling for an individual's actual experience–which may be an outcome of migrant status or correlated with other unobservable characteristics–also allows me to focus specifically on a person's perceptions of violence not related to her underlying income-generating capabilities or creditworthiness.

Nonetheless, there are several reasons why this sensitivity may not serve as a valid instrument for migration propensity. First, such sensitivity could be correlated with other individual-level unobservables, such as risk aversion or other entrepreneurial attitudes. If this is the case, this sensitivity may in fact be correlated with an individual's demand for credit and thus directly affect her credit holdings independently of any migration-related effects (violating the exclusion restriction). Second, the effect of this sensitivity need not be uniform given the relative variation in actual violence rates across different locations. If certain areas of the country are particularly violence-ridden, we may expect to see a much stronger out-migration

response for particularly sensitive individuals born into these areas than from those where violence and crime are much less prevalent. Imposing a uniform response by examining the average effect of sensitivity to crime across the sample may mask the role played by this sensitivity.

To address these issues, I utilize the interaction of one's sensitivity to crime with the level of actual violence and crime in an individual's birthplace as my instrument. Using this interaction allows me to control for the direct effects of being sensitive to violence on credit holdings, highlighted as potentially problematic in the first point above, as well as the direct effect of one's birthplace[3]. The first stage regression assessing migration propensity is the following:

$$M_{ijk} = (Sens_{ijk} * Danger_j)\alpha + X_{ijk}\beta + Sens_{ijk}\gamma + Experience_{ijk}\lambda + \delta_j + \eta_k + \epsilon_{ijk}$$

$$(3.1)$$

where M_{ijk} is the out-migration decision of individual i born into location j and currently residing in k, $Sens_{ijk}$ is person i's sensitivity to violence or crime, $Danger_j$ is the average likelihood of experiencing violence or crime across all individuals in location j, X_{ijk} are other individual controls, $Experience_{ijk}$ is a dummy variable indicating whether a household has experienced violence or crime, and δ_j and η_k are fixed effects for birth and current locations[4].

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[3]My identifying assumption is that the effects on credit holdings of any other unobserved characteristics correlated with sensitivity do not vary by the relative level of violence in an individual's birthplace.

[4]There are several reasons why the estimate of α in 3.1 is likely a lower bound of the true

To capture the threat of danger in each person's birthplace, I use the average probability of experiencing violence or crime in each location. Why not simply use each individual's actual experience with violence or crime to explain subsequent migration decisions? First, the LSMS questions on conflict experienced refer to the previous 12 months, after most of the migration decisions I observe in the sample were made. Second, an individual's expectation of being victimized may be informed not only by her own experience but by the experience of the broader set of people in the community. In fact, individuals who reside in a crime-ridden area but have not themselves been victimized may indeed be quite fearful about their likelihood of becoming crime victims. Thus, I use the average level of violence and crime in one's birthplace in constructing the instrument for migration.

This approach raises a separate issue: although high violence rates in their birthplaces may indeed drive individuals to leave, they may also be correlated with other unobserved characteristics shared by individuals born in these locations. Estimation using location-level averages to explain individual-level outcomes can particularly suffer from such a "reflection problem" (Manski (1993)). I follow Bertrand, Luttmer and Mullainathan (2000), who address this problem in the context of their estimation of the social effects of welfare receipt by using heterogeneity in the impact of the network to identify its effects. I adopt a similar heterogeneity-based approach, adapting it to an IV setting where the heterogeneous social effects are

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effect of violence on migration. First, I am not estimating the direct effect of location-level danger, only the differential effect on those particularly sensitive to such danger. Second, since an individual's actual experience may be a result of her migration decision, λ may suffer from reverse causation/simultaneity problems and may capture some of the effects of α. Nonetheless, my focus is on identifying an exogenous source of variation and not assessing the total effect of the average violence in a location on individual migration decisions.

used as instrument for migration and can be reasonably assumed not to directly affect individuals' credit holdings.

To do so, I control for the direct effects of being born into a particularly dangerous location by using locational fixed effects, thus eliminating the effects of any other unobserved characteristics shared by those born in this location. I thus utilize only the effects of being particularly sensitive to danger among those born into dangerous locations as my exogenous source of variation in migration propensity. This requires assuming that the unobserved common locational characteristics do not vary in their impacts on migration in the same way as does sensitivity to violence or crime[5].

My primary estimation uses linear probability models, as these are computationally straightforward in a two-stage least squares setting. The equations I estimate are the following:

$$L_{ijk} = M_{ijk}\theta + X_{ijk}\phi + Sens_{ijk}\varphi + Experience_{ijk}\mu + \nu_j + \rho_k + \upsilon_{ijk} \tag{3.2}$$

$$M_{ijk} = (Sens_{ijk} * Danger_j)\alpha + X_{ijk}\beta + Sens_{ijk}\gamma + Experience_{ijk}\lambda + \delta_j + \eta_k + \epsilon_{ijk}$$

where L_{ijk} is a dummy variable indicating whether the individual has a loan from a bank or cooperative. The exclusion restriction I assume is:

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[5]Such a heterogeneous effects approach is particularly appropriate for an IV estimation because our interest is in isolating an exogenous component of migration and not necessarily in estimating the full scale of the social effects.

$$E((Sens_{ijk} * Danger_j) * \upsilon_{ijk} | X_{ijk}, Sens_{ijk}, Experience_{ijk}, D_j, D_k) = 0 \qquad (3.3)$$

where D_j and D_k are dummy variables indicating an individual's birth and current departments. That is, the interaction of an individual's sensitivity to crime and birth in a particularly violent area affects the likelihood of having a loan only through its effects on migration (conditional on the individual's other characteristics). In section 3.8, I construct an indirect test of the validity of this restriction.

3.5   Data

I use the Encuesta Nacional Sobre Condiciones de Vida (a World Bank-supported LSMS) conducted in 2000 throughout Guatemala, which surveyed individuals in 7,276 households. Guatemala is divided into 22 departments and 332 municipalities. The survey includes questions detailing in which municipality an individual was born, where she resided five years earlier, and how long she has lived in her current municipality. I primarily focus on inter-department migration over a person's adult lifetime by comparing her birthplace with her current residence[6]. Because long-term migration is often a household decision, I limit the sample to household heads. Moreover, a number of small departments had relatively few people surveyed and did not have any individuals who listed violence or crime as the

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[6]Naturally, this approach does not address phenomena of return and seasonal migration, but is consistent with previous analyses of migration patterns within Guatemala (Micklin (1990); Morrison (1993)). In addition, for this analysis, I use information on the number of years an individual has lived in her current location to label individuals who moved before they were 18 as non-migrants

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major issue there (discussed below). I eliminate these individuals from my estimation sample because the fixed effects estimation perfectly predicts their sensitivity to crime. Doing so reduces the sample to 6,843 household heads. More than 24% of these individuals migrated across departments sometime in their lives, with approximately 16% having migrated to their current department in the previous 10 years.

As previously discussed, the Guatemala LSMS includes a social capital module that asked respondents, *"In your opinion, what are the two principal problems in this community that you consider should be resolved in an urgent fashion?"*. Individuals can respond by choosing from among a list of categories, including: unemployment, lack of health services, lack of education services, violence, crime, insecurity, drug addiction, alcoholism, corruption, high costs of living, too much trash, growing social differences, disintegration of the society and the family, etc. Approximately 7.6% of the household heads listed violence or crime among the two most urgent problems. The module also asks about individual experiences with conflict, such as whether the respondent has been a victim of assault, robbery, vandalism, land conflict, or other violence in the previous 12 months. Using this component, I can condition an individual's perceived importance of violence or crime on her experiences, as well as other covariates.

Of course, this data relates to each individual's current perceptions, and these sensitivities may vary over a person's lifetime. Our assumption is that conditioning on age and other factors suitably generates a measure of each individual's long-term personality characteristics. I de-mean the sensitivity variable by regressing it on

an individual's current and birthplace departments and all of the other controls (including the actual violence experienced by each individual). I base my measure of individual sensitivity on the residual of this estimation, creating a categorical variable denoting the top half of the individuals as "high sensitivity" and the bottom half "low sensitivity." It is this high sensitivity measure that enters the regression above in both the direct and interaction terms. I make this adjustment because, in the first stage equation (3.1), the interaction term is a non-linear function of the sensitivity and thus one cannot control for the average sensitivity by simply using a linear dummy term for each location in the same equation[7]. I adopt this approach because it provides an intuitive interpretation in the 2SLS framework. Alternatively, one can directly include the interactions of the covariates with birth in a dangerous location directly in the 2SLS specification, but doing so complicates the interpretation of most of these covariates, which would enter in both stages. In section 3.8, I check that the approach I use–which involves a preliminary estimation– does not create an error-in-variables problem by bootstrapping the full estimation.

I also use the responses to the question about victimization in the previous 12 months to construct the share of individuals who have been victimized at the department level, using the survey's sampling weights to reflect the mean rates in the population. In order to assess the effect of violence and crime on a person's out-migration decision, it would be optimal to have time-varying data on the victimization rates to better match them to each person's birth or age. In the absence

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[7]Sensitivity to violence or crime is partly a function of where one is born and where one currently resides, as well as other covariates. The interaction of this sensitivity and birth in a dangerous location is a non-linear function of birth and current department dummies and other covariates.

of this data, I use the current violence rates from each individual's birth department, focusing on the rank order of the departments, which is more likely to remain relatively constant over time. In particular, I generate a dummy variable indicating whether an individual's birth department is among the top four most violent departments (i.e., Guatemala City, Sacatepequez, Chimaltenango, and Escuintla). Approximately 24% of the household heads were born in one of these departments. It is the interaction of this dummy variable and the individual's sensitivity to violence that serves as the primary instrument.

The credit section of the LSMS includes a variety of information on a household's current loan holdings. Only approximately 10% of household heads held loans of any type (the share is slightly higher if I consider all loans held by household members, not just its head). These loans were provided by a variety of sources, with 22% coming from banks (both private and state), 15% from cooperatives, 13% from individual moneylenders, and 25% from relatives or friends. I focus the analysis on the probability of having a loan from a bank or cooperative, as these are the main sources of formal credit. Most of the loans from all sources had been held for less than one year, and many had relatively short-term repayment schedules typical of developing country contexts.

Finally, other individual characteristics used as covariates include the individual's age, highest education level attained, gender, ethnicity, primary language, general poverty level, and household size, among others. Summary statistics are presented in Table 3.1.

3.6 Results

3.6.1 First Stage

Table 3.2 presents the first stage estimation of migration determinants. The first column shows the conditioning of one's sensitivity to violence or crime on the set of covariates. Department fixed effects are included for each individual's current residence and birthplace, controlling for the mean perception of violence among individuals born and currently living in each location. Standard errors are corrected for correlation among individuals within each municipality. Not surprisingly, individuals who had actually experienced conflict in the previous 12 months were more likely to rate violence as a key issue in the local community. Women and those less poor were also significantly more likely to cite violence or crime among the top issues.

As previously noted, the residual of this regression is grouped into two categories, indicating high and low sensitivity to violence or crime. I create a dummy variable, *Sensitivity to violence or crime*, which takes on a value of one for those in the high group and zero for those in the low group. In the second column, I regress migrant status on this sensitivity, as well as its interaction with the indicator for birth in a particularly violence-ridden area. Once again, I include dummies for both departments of current residence and departments of birth to control for common unobserved characteristics among individuals living and born in each area. Notably, migration is significantly driven by both one's sensitivity to violence and the interaction of this sensitivity with actual violence indicators at the department level,

with both coefficients being large, positive, and highly significant. Being older, less poor, and male is also significantly associated with having migrated during one's lifetime.

Moreover, each individual's actual crime experience does not directly affect migration. This result is particularly important because if migrants are more likely to be targeted for crime or violence in their new locations, we might be concerned that one's sensitivity to crime changes after migration. If this were the case, we would expect to see an effect of experience with violence on migration due to reverse causation; we do not find this result, suggesting that migration likely does not endogenously affect our measure of sensitivity to violence.

One of this study's main aims is the identification of an exogenous, one-time motive for migration. That is, after a person who is particularly sensitive to violence or crime moves away from her particularly dangerous birthplace, she should be much less likely to move again. This would be the case if most of highly sensitive migrants born into dangerous locations move to less dangerous locations. Once a highly sensitive individual has moved to a less dangerous location, her motive for further migration would be substantially reduced.

Table 3.3 confirms that the instrument I construct does indeed identify such migration patterns. I limit the sample to individuals who were born into the most dangerous departments and who migrated away from them. Among these migrants, we find stark differences in the danger level of their destinations based on the individual's sensitivity to such danger. 75% of low sensitivity individuals move to other dangerous locations, while only 39% of highly sensitive individuals do so. The large

difference between these probabilities is statistically significant at the 99.9% level. These findings provide evidence that migration among highly sensitive individuals born into dangerous locations is not likely to be a recurring phenomenon.

3.6.2 Second Stage

I next turn to the question of whether these migration determinants lead to worse credit access. Column 1 of Table 3.4 shows an OLS regression of credit (specifically, a dummy for having a loan from a bank or cooperative) on migration status as well as other covariates. In this estimation, the effect of being a migrant is negative, but the coefficient is statistically insignificant at any reasonable level. As previously mentioned, this is not entirely surprising, given the confounding effects of reverse causality and omitted variables noted earlier. Other covariates have the expected signs and are largely significant. Older, wealthier and better educated individuals are more likely to have loans, as are men and those with larger households.

Column 2 shows the reduced form (OLS) regression of credit on our main instrument. We find that an individual who is sensitive to violence or crime and is born into a particularly dangerous department is approximately 3.6% less likely to have a loan than an equally sensitive person born into a less dangerous area. This interaction effect is significant at the 95% confidence level. Interestingly, the direct effect of a person's sensitivity is actually slightly positive but not significant. Nonetheless, the interaction term is large enough so that when combining the direct and interaction terms, we find that being sensitive to violence and being born into

a dangerous locale leads to a 2% reduction in the likelihood of having a loan. The coefficients on the other covariates are largely unchanged from Column 1.

Column 3 of Table 3.4 presents the results of our primary 2SLS specification (see Eq. 3.2 and 3.1). Most notably, the coefficient on being a migrant is negative, significant, and quite large, suggesting that migration leads to a 12.5% drop in a person's likelihood of gaining access to credit. This much larger and more significant effect (relative to the OLS estimate in Column 1) is probably due to the elimination of confounding reverse causality effects present in the OLS setting. There are several other factors supporting this estimate. First, the coefficients on the poverty ratings are substantially higher in the 2SLS setting. In both our sample and in other evidence (Morrison 1993), migration in Guatemala is highly positively correlated with wealth levels[8]. It is thus likely that the OLS and reduced form coefficients on the poverty groupings are confounded by the correlated and negative effects of migration.

The second factor supporting the estimated magnitude of the effect of migration is the relatively strong first stage. The instrument is quite "relevant," and its large first stage coefficient (0.29) and t-statistic (6.14) suggest that the second stage should not suffer from bias due to "weak instrument" problems highlighted by Bound, Jaeger, and Baker (1995) and Staiger and Stock (1997). Moreover, comparing the magnitude of the first stage coefficient on the interaction of sensitivity and birth in a dangerous department with the second stage coefficient on migra-

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[8]Although migrants may be relatively less well-off than natives in their destinations, they are generally better off than natives in their birth departments.

tion (-0.125), we find that much of the reduced form effect of this interaction on migration (-0.0357) is due to the first stage relationship. That is, the first stage robustly identifies migration propensity, which would support the identification of even a relatively weaker relationship between migration and credit access.

I also consider whether the effects I detect on the probability that an individual has a loan truly reflect lender decisions rather than lower loan demand among migrants. One possibility may be that the demographic controls included in the estimation do not sufficiently control for loan demand. To address this possibility, I examine whether being migrant leads to a lower probability of applying for a loan, as well as whether migrants are less likely to be approved, conditional on having applied for a loan. Unfortunately, the LSMS only asks whether anyone in the household has applied for a loan in cash, presumably from any source, in the previous 12 months. We can surmise that most of these applicantions were to formal sources rather than informal, as the latter generally do not have application processes.[9]

The results, shown in Table 3.5, are striking. As the first column of Table 3.5 shows, being a migrant does not cause an individual to be less likely to apply for a loan (The coefficient on being a migrant is 0.045, with a t-statistic of 0.52). When one examines the subsample of 914 individuals who applied for a loan, however, one finds a large and significant negative effect of being a migrant on the probability of

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[9]Approximately 1% of the total sample of individuals cited not having applied for loans but nonetheless hold loans from formal sources. I consider these individuals to be applicants, bringing the share of individuals who applied for loans to approximately 13%. Moreover, as discussed earlier, it is also likely that at least some individuals correctly anticipated that they would be rationed and thus never applied for loans in the first place. Thus, to the extent we find an effect of being a migrant on loan holdings conditional on observed applications, we can surmise that this is a lower bound of the full effect of credit rationing, which would include those individuals who would otherwise be induced to apply for loans.

holding a loan. As shown in the second column of Table 3.5, conditional on applying for a loan, migrants are 78% less likely to actually hold a loan from a formal source. The other covariates retain the same signs as in the full specification. These results support my empirical strategy, which identifies the effects of migration on lender decisions rather than on loan demand.

3.7 Alternative Explanations

I next assess whether the primary findings could be driven by alternative explanations rather than our main claim that weak contract enforcement and information sharing led to greater rationing of loans to migrants. In particular, I examine whether moral hazard, adverse selection, or omitted variables such as social capital are the primary causes leading us to observe fewer loans to migrants.

3.7.1 Moral Hazard

As previously noted, credit rationing has often been linked to issues of involuntary default due to informational asymmetries. A notable example is moral hazard, which could particularly affect migrants if there is greater uncertainty about their actions or production choices. Informal lenders often rely on social mechanisms to monitor individuals' behavior. If moral hazard is the core factor causing rationing of loans to migrants, informal lenders would be particularly susceptible to this issue. Banks and other formal lenders, on the other hand, may not find social monitoring of moral hazard as crucial in their lending policies toward migrants. I therefore assess

whether rationing of loans to migrants is particularly heightened among informal lenders relative to formal lenders. Table 3.6 shows the results of running the 2SLS estimation while considering dependent variables capturing different loan sources. In column 1, I include the primary variable indicating whether an individual has a loan from a bank (private or public) or a cooperative. In column 2, I use a similar variable denoting whether she has a loan from a family member, friend, or individual. Notably, I find almost no effect of migration on informal lending (column 2), suggesting that moral hazard is unlikely to be driving the phenomenon of reduced lending to migrants.

3.7.2 Adverse Selection

Rationing due to involuntary default could also be driven by adverse selection issues. A credit market could exhibit greater rationing of loans to migrants if lenders "know less" about individual migrants' expected returns than they do about individual natives. As previously noted in Section 3.2, different risk formulations have been shown to lead to over-lending rather than rationing, and the equilibrium outcome under adverse selection depends on the distributions of the different parameters. Nonetheless, I examine whether the main effect of being a migrant on credit is driven by lender uncertainty about a borrower's income. All else equal, potential borrowers whose income comes primarily from less formal or verifiable sources should be less likely to receive loans. The LSMS includes detailed information on income sources; I calculate the share coming from "other sources," composed of

transfers from other community members and organizations (primarily churches), as well as remittances from both other parts of the country and from abroad. This calculation excludes government transfers for retirees, orphans, and those receiving food support.

From a lender's perspective, these "other sources" of income are likely to be less verifiable or more opaque than labor income or government transfers. Other factors may also affect a lender's uncertainty about a potential borrower's income, including the underlying volatility in the person's labor income. Nonetheless, if the opacity of an individual's income matters, we should observe greater rationing among individuals with larger shares of relatively opaque income. If migrant status is in fact proxying for greater income opacity, including the share of income from less verifiable sources (while controlling for the total level of income) should reduce the negative coefficient on migrant status. As Table 3.7 shows, having a greater share of income come from these "other sources" does reduce the likelihood of having a loan, but this does not reduce the effect of being a migrant, which remains large and statistically significant. Total individual income does raise a person's probability of being a migrant, as well as the probability that she has a loan, but this effect is not statistically significant[10]. Nonetheless, adverse selection due to the opacity of a borrower's income, here captured by the share of income from relatively less verifiable sources, does not appear to explain credit rationing to migrants.

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[10]In other specifications not shown, I include higher order polynomials of income to ensure that the pure income effect of community support and remittances is being adequately controlled for. These do not affect the results.

3.7.3 Omitted Variables: Social Capital

As discussed in the introduction, migration may have both positive and negative associations with access to credit. In fact, migration is typically seen as indicative of positive unobservable characteristics, such as an entreprenreurial personality. If lenders hold this belief, they may be more likely to extend credit to migrants than to others because their migration status could proxy for these positive characteristics. Nonetheless, there may be omitted variables that are correlated with migration status and lower credit demand or supply. One such possibility is an individual's social capital: A person with few social connections may be more likely to move than one with more connections, and the sparsity of these connections could cause her to have less demand for credit (or fewer possible co-signers for loans).

The LSMS Social Capital module asks whether any individuals in the household have participated in a variety of collective action, solidarity, or other social activities over the past year. I use the number of activities listed by the respondent (out of a maximum of 13) as a primary measure of the household's social capital. Of course, the timing of this measure is not ideal, as it may reflect post-migration conditions rather than the social capital the individual had in her origin region. Nonetheless, as with our measure of sensitivity to violence, conditioning on a set of individual characteristics and department means should eliminate some of the lifecycle and migration-related variation. Table 3.8 shows the first and second stage regressions including this measure of social capital as a covariate. As expected, having greater social capital is associated with a lower migration propensity, as

well as with greater access to credit. However, neither the first stage coefficient on our instrument nor the second stage coefficient on migration vary substantially in magnitude or statistical significance from our base specifications.

3.7.4 Urban-Rural Migration

Another alternative explanation of the results may be that the instrument I use explains specific migration paths particularly well. For example, one might suspect that individuals who are particularly concerned about violence and crime and who are born into particularly dangerous locations may be more likely to move to rural areas, where the threat of violence and crime may be somewhat lower and credit demand may be lower. There are several reasons that such differential migration paths are not likely to drive the results. Table 3.9 shows that this is not the case. Individuals for whom $Sens_{ijk} * Danger_j = 1$ are in fact no more likely to reside in a rural location than those individuals for whom the instrument $= 0$.

3.8 Robustness Checks

I next assess whether the main results are robust to a number of potential econometric issues: estimator uncertainty, exclusion restriction issues, sampling weight heterogeneity and endogenous covariates. The primary results largely survive this series of sensitivity checks.

3.8.1 Estimator Uncertainty

Given that I have added a preliminary stage to my estimation procedure, in which I residualize each individual's sensitivity to local violence or crime on her demographic characteristics, my primary 2SLS estimation could be subject to greater uncertainty than implied by conventional standard errors. That is, the standard errors calculated in the main estimation do not incorporate the additional uncertainty due to the measurement error in one of the key explanatory variables. To address this, I bootstrap the entire estimation procedure, including the demeaning of the sensitivity variable, using 192 resampling iterations. Table 3.10 compares the results of this bootstrapping to the unadjusted results. The coefficients and t-statistics remain similar, and it is clear that bootstrapping does not substantially alter the main findings.

3.8.2 Exclusion Restriction

Given that I utilize a just-identified IV approach, one may reasonably raise concerns over the validity of the exclusion restriction, which cannot be tested in the same manner as in an over-identified estimation. One reason for concern may be that using an interaction term as an instrument could render my estimates susceptible to nonlinearities in the effects of the individual variables. Although I address the issue of unobserved demand factors in section 3.6, this section checks that model misspecification in its treatment of demand does not lead to a violation of the exclusion restriction. As an example, consider the following model:

$$L_{ijk} = D_{ijk} * S_{ijk} + \epsilon_{ijk} \tag{3.4}$$

$$D_{ijk} = \alpha_1 + \alpha_2 Sens_{ijk} + \alpha_3 X_{ijk} + \alpha_4 Danger_i + \alpha_5 \nu_j + \alpha_6 \rho_k \tag{3.5}$$

$$S_{ijk} = \beta_1 + \beta_2 Danger_j + \beta_3 M_{ijk} + \beta_4 X_{ijk} + \beta_5 Danger_i + \beta_6 \eta_k \tag{3.6}$$

where D_{ijk} is the probability of individual i born in j and currently living in k applying for a loan, and S_{ijk} is the probability of a lender approving a loan conditional on an individual applying. Here, a person's sensitivity to local violence affects her demand for loans. Moreover, lenders know and use the danger level of a person's birthplace as a factor in approving her loan. In this model, having a loan is a non-linear function of these variables. In this case, we can re-write this model as the following:

$$L_{ijk} = \alpha_1\beta_1 + \alpha_1\beta_2 Danger_j + \alpha_1\beta_3 M_{ijk} + ... + \alpha_2\beta_2 Sens_{ijk} * Danger_j + ...$$
$$\tag{3.7}$$

In this model, being a migrant may affect whether we observe her holding any loans (i.e., if $\alpha_1\beta_3 > 0$). However, we may not be able to use the main instrument $(Sens_{ijk} * Danger_j)$ in an IV estimation because it may directly enter into the main regression (i.e. if $\alpha_2\beta_2 > 0$). Moreover, one cannot directly test this condition, as the resulting specification would be indistinguishable from my existing reduced

form specification. I can, however, assess whether $\alpha_1 \beta_2 > 0$. More intuitively, this is akin to testing whether, under this alternative model, lenders do differentiate their borrowers based on the danger level in individuals' birthplaces (i.e., $\beta_2 > 0$). It offers an indirect test of the exclusion restriction.

To implement this test, I re-estimate the reduced form specification and test whether the fixed effects for each of the four most dangerous birth departments are jointly significant. The p-value on this F-test is only 0.381, suggesting that individuals from these departments do not appear to be differentially affected. In other words, there is no direct effect of being born in a dangerous location on the probability of holding a loan. As such, we can be more confident that the effect of birthplace danger on credit occurs through the migration decision and not through a non-linear interaction of demand and supply decisions.

Finally, as one additional specification check, I assess whether there is any evidence that interaction terms between $Sens_{ijk}$ or $Danger_j$ and any of the other covariates enter into the main regression. To do so, I sequentially include the interactions of $Sens_{ijk}$ with X_{ijk} in the second stage regression, as well as the interactions of $Danger_j$ and X_{ijk} (X_{ijk} includes age, age squared, household size, gender, poverty rating, education level dummies, and ethnicity dummies). Notably, none of these interaction terms yields a significant coefficient[11]. Thus, even if one believes that $Sens_{ijk}$ or $Danger_j$ enter the main regression non-linearly, the higher-order terms of these variables are not correlated with any of the covariates. It seems relatively

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[11]When all of the interactions are included jointly in one main regression, the F-statistic testing whether they are jointly different from zero is 1.48 and not significant.

improbable that the interaction of $Sens_{ijk}$ and $Danger_j$ is the *only* interaction that is correlated with the higher-order terms of either of these variables.

3.8.3   Sampling Weights

Complex survey designs often lead some individuals or households to be included in a sample with greater probability than would be the case in pure random sampling. Whether one should account for this nonrandom sampling in regressions depends on the goals and nature of the estimation: If the primary purpose is descriptive, such as examining the mean of one variable conditional on others, or if one is interested in making inferences about the full population, sampling weights should be incorporated (Deaton 1997). However, if, as in my case, the purpose of the regression is limited to assessing variable relationships within the sample, the issue of survey design is primarily one of heterogeneity in the effects (whether the effects are correlated with the sampling weights). As Deaton (1997) notes, the classic econometric argument against the weighted estimator is that it will be less efficient and have larger standard errors than the unweighted estimator when the strata are not homogenous, while it will not necessarily be superior in terms of consistency. Thus, I first compare the unweighted and weighted estimators in Table 3.11, finding that the weighted estimator does change the coefficients somewhat, but also increases the standard errors. Therefore, following Deaton (1997), I conduct a Hausman-type specification test assessing whether the key effects vary with the sampling weights. That is, I estimate the following reduced form specification:

$$L_{ijk} = (Sens_{ijk} * Violence_j)\alpha + W * (Sens_{ijk} * Violence_j)\psi + Sens_{ijk}\gamma + W * Sens_{ijk}\varsigma$$

$$+ Violence_i\lambda + X_i\beta + \delta_j + \eta_k + \epsilon_{ijk}$$

where W is the matrix of sampling weights. Table 3.12 presents these results. One can use an F-statistic to test the null hypothesis that $[\psi, \varsigma] = [0, 0]$, obtaining a p-value of 0.81. Given the aforementioned efficiency tradeoff in using the weighted estimator, I continue to rely on the unweighted estimator as my preferred specification.

3.8.4 Endogenous Covariates

Although my primary instrumental variable estimation addresses the reverse causality of credit's effects on migration, it includes a number of control variables that may also endogenously affect migration. It is important to include these control variables because they may otherwise confound the effect of migration; if individuals who migrate are less poor and poverty is negatively associated with access to credit (as is the case in Guatemala), not including some measure of poverty in the estimation would bias the estimated effect of migration on credit upwards. I assess the extent to which any one of these endogenously determined covariates affects the primary results by sequentially dropping each covariate from the 2SLS regression. The results, presented in Table 3.13, suggest that omitting the household's size and experience with crime does not appear to substantially alter the results. Dropping

the household head's education level and the household's poverty status from the regressions does reduce the magnitude of the "migrant" effect, though not dramatically enough to suggest that endogeneity in either of these variables is likely to be driving my baseline results. Moreover, these variables are likely to be positively correlated with a household's ability to migrate, and their inclusion in the regressions is exactly intended to address the confounding effects of pre-migration wealth on post-migration access to credit.

3.9   Conclusions

My theoretical model illustrates that migrants who move because of a random shock can experience credit rationing, even if these migrants would choose to stay in their new locations and repay their loans. This model is consistent with empirical results suggesting that migrants who move for reasons that are uncorrelated with credit demand or creditworthiness are nonetheless substantially less likely to receive credit from formal lenders. I find that migrants are 12.5% less likely to have a loan and 78% less likely to receive one conditional on applying for a loan.

To confirm that weak contract enforcement is the primary cause of this rationing, I tested several alternative explanations. As these migrants do not experience rationing from informal sources, it is unlikely that moral hazard is driving my baseline result. Moreover, as the share of income from less verifiable and more volatile sources does not affect the migrant "penalty," adverse selection based on opacity of income does not appear to drive this differential treatment of migrants,

nor do social capital deficiencies or softer credit demand among migrants. Thus, migration leads some individuals to receive fewer loans because lenders are concerned about their tendency for strategic default and the signal they may send to future migrants. If lenders could distinguish the reasons for prior migration, they would be more likely to extend credit to individuals who are especially sensitive to local violence and who have moved to get away from their particularly dangerous birthplaces rather than to escape loan repayment commitments.

This paper adopts a quasi-experimental strategy to identify the effect of individual migration on access to credit, using the broad thematic coverage of the World Bank LSMS to observe a key migration factor that is not directly observed by lenders. This approach certainly has limitations, among them the reliance on a just-identified estimation that does not easily lend itself to tests of the exclusion restriction. However, the quasi-experimental approach allows me to study a compelling real-world context in which large numbers of people have been affected. Indeed, migration represents a major discrete event in many people's lives, which makes it difficult to study in an experimental or randomized control trial setting. Nonetheless, studying its impacts is crucial in light of ongoing research identifying the importance of civil liberties–particularly residential freedom–to economic growth and the development of complex markets, such as finance (BenYishay and Betancourt 2009). In this paper, I find that migration causes a substantial reduction in access to credit, highlighting an important friction that can partly dissipate broader gains in productivity and human capital that would otherwise result from labor mobility, as migration obscures the information structure and thus prevents

creditworthy individuals from obtaining loans. In developing countries, supporting robust credit information sharing institutions may be one way to minimize this friction. In addition, using quasi-experimental methods to study the impacts of migration represents an area of overlap between divergent approaches in contemporary development economics, linking an issue with macroeconomic implications with the methodological imperative for rigorous exogeneity (as argued by Abhijit Banerjee in *The Economist* (2008)).

Strengthening contract enforcement and creditor rights poses challenges. Even in the context of weak enforcement of debt contracts, information sharing among lenders can be used to incentivize borrowers to repay their loans. In 2001, with the support of the World Bank Group, TransUnion opened the first credit bureau in Guatemala. Nonetheless, as of 2007, only approximately 13% of the country's adult population was covered by the bureau (as reported by the IFC's *Doing Business* website). New investments in information sharing infrastructure in other developing countries are being pursued with similar fanfare, but the implementation of these systems remains uneven and challenging. This research suggests that further attention by policymakers should be devoted to the design and implementation of these systems.

This work also highlights migrants as a unique set of potential borrowers who are particularly opaque and thus are especially relevant for studying the extent of informational problems in credit markets. One channel through which this opacity arises endogenously is that migration involves a severing of relationships with lenders and other market participants, making migrants even more opaque relative to the

average native. Further study may also examine how such informational problems endogenously affect individual migration decisions, as individuals weigh migrating to an attractive destination against the lower likelihood of obtaining a loan after their migration. Such research could identify the impact of this reduced access to credit on individuals' incomes, consumption, and welfare.

Table 3.1: Summary Statistics

Variable	Mean	Std. Dev.	Min.	Max.
Individual has loan from bank or cooperative	0.047	0.211	0	1
Migrant Across Dept As Adult	0.164	0.37	0	1
Violence or Crime Listed as Primary or Secondary Local Problem	0.078	0.268	0	1
Born in One of Four Most Dangerous Departments	0.248	0.432	0	1
High Sensitivity to Local Violence or Crime * Birth in Dangerous Dept	0.053	0.224	0	1
Household Experienced Crime in Last 12 Months	0.142	0.349	0	1
Age	44.552	15.401	14	99
Household Size	5.198	2.515	1	18
Female	0.178	0.382	0	1
Poverty Rating 2 (Poor)[†]	0.355	0.478	0	1
Poverty Rating 3 (Not Poor)	0.54	0.498	0	1
Total Individual Income (Monthly, '000s of Quetzales)	1.53	9.18	0	500
Highest Level of Ed = Primary	0.448	0.497	0	1
Highest Level of Ed = Middle	0.145	0.353	0	1
Highest Level of Ed = Secondary	0.051	0.219	0	1
Highest Level of Ed = Post-Secondary	0.005	0.068	0	1
Highest Level of Ed = Adult Education	0.005	0.067	0	1
Kiche	0.067	0.25	0	1
Qeqchi	0.073	0.26	0	1
Kaqchikel	0.089	0.285	0	1
Mam	0.051	0.22	0	1
Other Maya	0.100	0.3	0	1
Garifuna	0.002	0.042	0	1
Xinka	0.003	0.054	0	1
Non-indigenous	0.615	0.487	0	1

Sample of 6843 household heads. [†] Omitted Poverty Rating is "Extremely Poor".

Dependent Variable	Violence or Crime Listed Among Top Problems	Migrated Across Dept As Adult
Estimation Type	Probit	OLS (First Stage)
High Sensitivity to Local Violence or Crime		0.2535***
		(8.97)
High Sensitivity to Local Violence or Crime * Birth in Dangerous Dept		0.2859***
		(6.14)
Household Experienced Crime in Last 12 Months	0.0338***	-0.0000
	(5.03)	(-0.00)
Age	0.0010	0.0055***
	(1.16)	(3.85)
Age Squared	-0.0000	-0.0000**
	(-0.87)	(-2.84)
Household Size	-0.0009	0.0030
	(-0.75)	(1.68)
Highest Level of Ed = Primary	0.0085	-0.0057
	(1.29)	(-0.66)
Highest Level of Ed = Middle	0.0483***	0.0014
	(4.75)	(0.12)
Highest Level of Ed = Secondary	0.0387**	-0.0035
	(2.96)	(-0.14)
Highest Level of Ed = Post-Secondary	0.0977**	-0.5064***
	(2.66)	(-6.19)
Highest Level of Ed = Adult Education	-0.0254	-0.0945
	(-0.71)	(-1.37)
Poverty Rating 2 (Poor)	0.0218	0.1631***
	(1.36)	(5.82)
Poverty Rating 3 (Not Poor)	0.0496***	0.2124***
	(3.29)	(7.40)
Female	0.0174**	-0.0218*
	(2.69)	(-2.09)
Observations	6843	6843
Ethnic Group Dummies	Y	Y
Current Dept Dummies	Y	Y
Birth Dept Dummies	Y	Y
R^2	.	0.45

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Omitted Poverty Rating is "Extremely Poor". The omitted ethnic group is Kiche; included groups are Qeqchi, Kaqchikel, Mam, other Mayas, Garifuna, Xinka, and non-indigenous.

Table 3.3: Migration patterns of migrants born into one of most dangerous departments

Sensitivity to Violence or Crime[†]	Currently reside in one of other dangerous departments	
	No	Yes
High	0.61	0.39
	(0.040)	(0.040)
Low	0.25	0.75
	(0.063)	(0.063)
Difference		0.36***
		(0.079)

[†] Sensitivity to Violence or Crime conditional on individual characteristics. *** denotes significance at 0.1% confidence level

Table 3.4: Access to Credit

Dependent Variable		Individual Has Loan	
Estimation Type	OLS	OLS (Reduced Form)[†]	2SLS (Second Stage)
Migrant Across Dept As Adult	-0.0067		-0.1250*
	(-0.83)		(-2.18)
High Sens. to Violence or Crime		0.0157	0.0474*
		(1.37)	(1.99)
High Sens. to Violence or Crime * Birth in Dangerous Dept		-0.0357*	
		(-2.19)	
Household Experienced Crime in Last 12 Months	-0.0122	-0.0124	-0.0124
	(-1.54)	(-1.56)	(-1.55)
Age	0.0049***	0.0049***	0.0056***
	(5.99)	(6.02)	(5.57)
Age Squared	-0.0001***	-0.0001***	-0.0001***
	(-6.46)	(-6.51)	(-6.00)
Household Size	0.0031*	0.0030*	0.0034*
	(2.37)	(2.29)	(2.47)
Highest Level of Ed = Primary	0.0152**	0.0159**	0.0152**
	(2.81)	(2.96)	(2.79)
Highest Level of Ed = Middle	0.0688***	0.0690***	0.0692***
	(6.70)	(6.72)	(6.69)
Highest Level of Ed = Secondary	0.1265***	0.1260***	0.1255***
	(5.26)	(5.21)	(4.99)
Highest Ed = Post-Secondary	0.1425	0.1537*	0.0905
	(1.84)	(1.99)	(1.12)
Highest Ed = Adult Ed.	0.0314	0.0315	0.0197
	(0.76)	(0.78)	(0.49)
Poverty Rating 2 (Poor)	0.0131	0.0175	0.0378**
	(1.37)	(1.94)	(3.17)
Poverty Rating 3 (Not Poor)	0.0397***	0.0438***	0.0703***
	(3.48)	(3.92)	(4.14)
Female	-0.0177**	-0.0175**	-0.0203**
	(-3.10)	(-3.08)	(-3.34)
Ethnic Group Dummies	Y	Y	Y
Current Dept Dummies	Y	Y	Y
Birth Dept Dummies	Y	Y	Y
R^2	0.05	0.05	

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

[†] The reduced form regression examines the effects of the instrument on the main dependent variable of interest, whether an individual has a loan.

Table 3.5: Differential Loan Application or Loan Approval?

Estimation	2SLS	
Dependent Variable	Individual Applies For Loan	Individual Has Loan
Migrant Across Dept As Adult	0.0451	-0.7830*
	(0.52)	(-2.06)
High Sensitivity to Local Violence or Crime	-0.0072	0.2733
	(-0.20)	(1.83)
Total Number of Social Capital Activities (Out of 13)	0.0132***	0.0043
	(5.12)	(0.51)
Household Experienced Crime in Last 12 Months	0.0170	-0.1292**
	(1.36)	(-2.67)
Age	0.0018	0.0360***
	(1.18)	(5.03)
Age Squared	-0.0000*	-0.0004***
	(-1.99)	(-4.88)
Household Size	0.0076***	0.0122
	(4.09)	(1.26)
Poverty Rating 2 (Poor)	0.0001	0.2050**
	(0.01)	(2.65)
Poverty Rating 3 (Not Poor)	0.0212	0.3980***
	(0.74)	(3.49)
Female	-0.0214*	-0.0527
	(-2.43)	(-0.95)
Observations	6843	914

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

Table 3.6: Moral Hazard? Formal vs. Informal Lending

Estimation	2SLS	
Dependent Variable	Individual Has Loan	
Loan Source	Formal (Bank or Cooperative)	Informal (Family, Friend, or Individual Moneylender)
Migrant Across Dept As Adult	-0.1250*	-0.0143
	(-2.18)	(-0.24)
High Sensitivity to Local Violence or Crime	0.0474*	0.0094
	(1.99)	(0.46)
Household Experienced Crime in Last 12 Months	-0.0124	-0.0005
	(-1.55)	(-0.06)
Age	0.0056***	-0.0017
	(5.57)	(-1.84)
Age Squared	-0.0001***	0.0000
	(-6.00)	(0.77)
Household Size	0.0034*	0.0002
	(2.47)	(0.17)
Poverty Rating 2 (Poor)	0.0378**	-0.0201
	(3.17)	(-1.18)
Poverty Rating 3 (Not Poor)	0.0703***	-0.0186
	(4.14)	(-0.99)
Female	-0.0203**	-0.0082
	(-3.34)	(-1.51)
Observations	6845	6845
Education Dummies	Y	Y
Ethnic Group Dummies	Y	Y
Current Dept Dummies	Y	Y
Birth Dept Dummies	Y	Y

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

Table 3.7: Adverse Selection? Controlling for Sources of Income

Dependent Variable	First Stage Migrant Across Dept	Second Stage Individual Has Loan
Migrant Across Dept As Adult		-0.1256*
		(-2.15)
High Sensitivity to Local Violence or Crime	0.2544***	0.0494*
	(9.42)	(2.04)
High Sensitivity to Local Violence or Crime *	0.2825***	
Birth in Dangerous Dept	(6.21)	
Total Individual Income	0.0016**	0.0006
(Monthly, '000s of Quetzales)	(3.12)	(1.88)
Share of Income From "Other" Sources	-0.0165	-0.0226**
	(-1.12)	(-2.62)
Household Experienced Crime in Last 12 Months	0.0002	-0.0118
	(0.01)	(-1.43)
Age	0.0051***	0.0055***
	(3.72)	(5.30)
Age Squared	-0.0000**	-0.0001***
	(-2.61)	(-5.54)
Household Size	0.0030	0.0038**
	(1.77)	(2.76)
Poverty Rating 2 (Poor)	0.1626***	0.0399**
	(5.95)	(3.28)
Poverty Rating 3 (Not Poor)	0.2113***	0.0769***
	(7.60)	(4.48)
Female	-0.0182	-0.0187**
	(-1.70)	(-2.88)
Observations	6845	6845
Education Dummies	Y	Y
Ethnic Group Dummies	Y	Y
Current Dept Dummies	Y	Y
Birth Dept Dummies	Y	Y

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

Table 3.8: Including Social Capital

Dependent Variable	First Stage Migrant Across Dept	Second Stage Individual Has Loan
Migrant Across Dept As Adult		-0.1271*
		(-2.23)
High Sensitivity to Local Violence or Crime	0.2538***	0.0476*
	(9.01)	(2.01)
High Sensitivity to Local Violence or Crime * Birth in Dangerous Dept	0.2865***	
	(6.16)	
Social Capital Activities (Out of 13)	-0.0051*	0.0052**
	(-2.36)	(2.93)
Household Experienced Crime in Last 12 Months	0.0016	-0.0141
	(0.14)	(-1.75)
Age	0.0058***	0.0053***
	(4.05)	(5.27)
Age Squared	-0.0000**	-0.0001***
	(-3.06)	(-5.68)
Household Size	0.0035	0.0029*
	(1.93)	(2.15)
Poverty Rating 2 (Poor)	0.1661***	0.0352**
	(6.00)	(2.94)
Poverty Rating 3 (Not Poor)	0.2173***	0.0658***
	(7.67)	(3.86)
Female	-0.0247*	-0.0174**
	(-2.32)	(-2.89)
Observations	6843	6843
Education Dummies	Y	Y
Ethnic Group Dummies	Y	Y
Current Dept Dummies	Y	Y
Birth Dept Dummies	Y	Y
R^2	0.45	

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

Table 3.9: Differences in Rural-Urban Migration?

Born into dangerous dept * High sensitivity to violence	Destination	
	Urban	Rural
= 1	0.578 (0.016)	0.422 (0.016)
= 0	0.582 (0.041)	0.418 (0.041)
Difference		0.004 (0.044)

Sub-sample of all migrants

Table 3.10: Bootstrapped Estimation

| | Migrant to Diff. Depart. | | Individual Has Loan | |
| | OLS (First Stage) | | 2SLS (Second Stage) | |
	Original	Bootstrapped	Original	Bootstrapped
Mover Across Dept As Adult			-0.1250*	-0.1250*
			(-2.18)	(-2.059)
High Sensitivity to Local Violence	0.2535***	0.3788***	0.0474*	0.0474*
	(-8.97)	(-10.358)	(-1.99)	(-2.088)
High Sensitivity to Local Violence *	0.2859***	0.4926***		
Birth in Dangerous Dept	(-6.14)	(-6.657)		
Household Experienced Violence or Crime	0	0.0081	-0.0124	-0.0124
	(-0.00)	(-0.758)	(-1.55)	(-1.744)
Age	0.0055***	0.0032	0.0056***	0.0056***
	(-3.85)	(-1.956)	(-5.57)	(-6.231)
Age Squared	-0.0000**	0	-0.0001***	-0.0001***
	(-2.84)	(-1.725)	(-6.00)	(-6.772)
Household Size	0.003	0.0004	0.0034*	0.0034*
	(-1.68)	(-0.232)	(-2.47)	(-2.412)
Poverty Rating 2 (Poor)	0.1631***	0.2527***	0.0378**	0.0378**
	(-5.82)	(-4.442)	(-3.17)	(-2.804)
Poverty Rating 3 (Not Poor)	0.2124***	0.3012***	0.0703***	0.0703***
	(-7.4)	(-5.059)	(-4.14)	(-4.204)
Female	-0.0218*	-0.0165	-0.0203**	-0.0203***
	(-2.09)	(-1.677)	(-3.34)	(-3.374)
Observations	6843	6843	6843	6843
Level of Ed Dummies	Y	Y	Y	Y
Ethnic Group Dummies	Y	Y	Y	Y
Current Dept Dummies	Y	Y	Y	Y
Birth Dept Dummies	Y	Y	Y	Y

Estimates based on 192 bootstrap repetitions of the full estimation procedure. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Omitted Poverty Rating is "Extremely Poor".

Table 3.11: Using Sampling Weights

	Dependent variable: Individual has loan			
Estimation	OLS (Reduced Form)		2SLS (Second Stage)	
	Unweighted	Weighted	Unweighted	Weighted
Migrant Across Dept As Adult			-0.1260*	-0.0945
			(-2.14)	(-1.70)
High Sens. to Local Violence or Crime	0.0175	0.0095	0.0498*	0.0311
	(1.54)	(0.86)	(2.04)	(1.44)
High Sens. to Local Violence or Crime * Birth in Dangerous Dept	-0.0354*	-0.0290		
	(-2.14)	(-1.66)		
Household Experienced Crime in Last 12 Months	-0.0119	-0.0140	-0.0118	-0.0154
	(-1.44)	(-1.14)	(-1.43)	(-1.25)
Age	0.0050***	0.0034**	0.0057***	0.0037***
	(5.90)	(3.26)	(5.40)	(3.37)
Age Squared	-0.0001***	-0.0000***	-0.0001***	-0.0000***
	(-6.18)	(-3.50)	(-5.68)	(-3.57)
Household Size	0.0034*	0.0036**	0.0038**	0.0041**
	(2.56)	(2.67)	(2.77)	(2.80)
Poverty Rating 2 (Poor)	0.0193*	0.0176	0.0399**	0.0308**
	(2.17)	(1.90)	(3.26)	(2.62)
Poverty Rating 3 (Not Poor)	0.0501***	0.0493***	0.0769***	0.0682***
	(4.52)	(4.04)	(4.44)	(3.94)
Female	-0.0206***	-0.0207**	-0.0234***	-0.0225***
	(-3.62)	(-3.24)	(-3.86)	(-3.59)
Observations	6843	6843	6843	6843
Level of Ed Dummies	Y	Y	Y	Y
Ethnic Group Dummies	Y	Y	Y	Y
Current Dept Dummies	Y	Y	Y	Y
Birth Dept Dummies	Y	Y	Y	Y
R-squared	0.05	0.05	-	-

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

Table 3.12: Test of Correlation Between Main Effects and Sampling Weights

Dependent Variable	Individual Has Loan
Estimation	OLS (Reduced Form)
High Sensitivity to Local Violence or Crime	0.0138
	(1.13)
High Sensitivity to Local Violence or Crime * Birth in Dangerous Dept	-0.0370*
	(-2.02)
Weighted Sensitivity to Local Violence	13.5345
	(0.55)
Weighted Sensitivity * Birth in Dangerous Dept	11.6214
	(0.14)
Household Experienced Crime in Last 12 Months	-0.0124
	(-1.55)
Age	0.0049***
	(6.01)
Age Squared	-0.0001***
	(-6.50)
Household Size	0.0030*
	(2.29)
Poverty Rating 2 (Poor)	0.0174
	(1.94)
Poverty Rating 3 (Not Poor)	0.0439***
	(3.94)
Female	-0.0175**
	(-3.07)
Observations	6843
Education Dummies	Y
Ethnic Group Dummies	Y
Current Dept Dummies	Y
Birth Dept Dummies	Y
R-squared	0.05

} Joint p-value = 0.81

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

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Table 3.13: Dropping Covariates

Dependent Variable	Individual Has Loan				
Dropped Covariate	Baseline	Hh. Crime Exp.	Hh. Size	Education	Poverty
Migrant Across Dept As Adult	-0.1260*	-0.1264*	-0.1328*	-0.117	-0.1029
	(-2.14)	(-2.15)	(-2.23)	(-1.85)	(-1.87)
Age	0.0057***	0.0057***	0.0067***	0.0058***	0.0062***
	(5.40)	(5.40)	(6.13)	(5.78)	(5.73)
Age Squared	-0.0001***	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(-5.68)	(-5.69)	(-6.49)	(-6.48)	(-6.01)
Household Exp. Crime in Last 12 Mos.	-0.0118		-0.0104	-0.0049	-0.0064
	(-1.43)		(-1.25)	(-0.58)	(-0.78)
Household Size	0.0038**	0.0037**		0.0035*	0.0004
	(2.77)	(2.70)		(2.47)	(0.36)
Highest Level of Ed = Primary	0.0160**	0.0159**	0.0174**		0.0237***
	(2.87)	(2.85)	(3.14)		(4.23)
Highest Level of Ed = Middle	0.0712***	0.0704***	0.0721***		0.0886***
	(6.80)	(6.70)	(6.82)		(7.84)
Highest Level of Ed = Secondary	0.1366***	0.1353***	0.1361***		0.1553***
	(5.78)	(5.72)	(5.74)		(6.96)
Highest Level of Ed = Post-Secondary	0.1049	0.1025	0.1009		0.1419
	(1.35)	(1.32)	(1.30)		(1.84)
Highest Level of Ed = Adult Education	0.0181	0.0181	0.0187		0.0284
	(0.46)	(0.46)	(0.47)		(0.69)
Poverty Rating 2 (Poor)	0.0399**	0.0391**	0.0361**	0.0444***	
	(3.26)	(3.23)	(3.05)	(3.51)	
Poverty Rating 3 (Not Poor)	0.0769***	0.0752***	0.0663***	0.1001***	
	(4.44)	(4.42)	(4.20)	(5.57)	
Female	-0.0234***	-0.0235***	-0.0270***	-0.0333***	-0.0203***
	(-3.86)	(-3.87)	(-4.41)	(-5.80)	(-3.41)
Observations	6843	6843	6843	6843	6843
Ethnic Group Dummies	Y	Y	Y	Y	Y
Current Dept Dummies	Y	Y	Y	Y	Y
Birth Dept Dummies	Y	Y	Y	Y	Y

Robust t statistics in parentheses. Errors clustered by municipality. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Omitted Poverty Rating is "Extremely Poor".

Appendix A1

Additional Results on Civil Liberties and Economic Development

Table A.1: Summary Statistics for Sample of 60 Ex-Colonies

Variable	Mean	Std. Dev.	Min	Max
Log of GDP Per Capita, 1995	8.00	1.03	6.16	10.25
Investment/GDP, Ave. over 1990s	13.12	7.00	2.90	42.18
Legal Formalism	3.91	1.16	1.58	6.01
Constraints on the Executive	4.79	1.75	1.18	7
CIM	0.82	0.18	0	1
Aggregate Civil Liberties Index	3.17	1.36	1	6
Freedom of Expression & Belief (D)	11.97	3.57	3	16
Associational & Organizational Rights (E)	8.17	2.95	2	12
Rule of Law (F)	8.10	3.53	1	15
Personal Autonomy & Individual Rights (G)	9.37	2.93	1	16
Electoral Process (A)	7.97	3.70	0	12
Political Pluralism & Participation (B)	10.33	4.16	1	16
Functioning of Government (C)	6.50	3.02	0	12
Malaria Ecology	5.10	7.80	0	31.55
Landlocked Dummy	0.22	0.42	0	1
Latitude, Absolute Value	0.20	0.13	0	0.67
Secondary School Enrolment	47.34	26.47	5.44	100

Table A.2: Non-nested Tests, OLS

Fitted Based on:	D vs. G		E vs. G		F vs. G		CIM vs. G		Ex. Cons vs. G	
	G	D	G	E	G	F	G	CIM	G	Ex. Cons
Legal Formalism	0.061	-0.119	0.058	-0.143	-0.011	-0.169	0.039	0.025	-0.008	-0.037
	(0.67)	(1.29)	(0.66)	(1.56)	(0.13)	(1.89)	(0.45)	(0.27)	(0.09)	(0.41)
Fitted values	1.322	-0.707	1.4	-0.933	1.629	-1.265	0.93	0.571	0.934	0.128
	(6.02)**	(1.91)	(6.46)**	(2.40)*	(6.75)**	(3.14)**	(6.45)**	(2.04)*	(4.66)**	(0.47)
Personal Autonomy		0.315		0.334		0.388		0.222		0.223
& Indiv. Rights (G)		(6.02)**		(6.46)**		(6.75)**		(6.45)**		(4.66)**
Freedom of Express.	-0.082									
& Belief (D)	(1.91)									
Assoc. & Organ.			-0.122							
Rights (E)			(2.40)*							
"Rule of Law" (F)					(0.152)					
					(3.14)**					
CIM							1.166			
							(2.04)*			
Constraints on									0.038	
Executive									(0.47)	
Observations	60	60	60	60	60	60	60	60	60	60
R-squared	0.5	0.5	0.52	0.52	0.55	0.55	0.51	0.51	0.47	0.47

Table A.3-A: First Stages, Dependent Variable in Column Heading

	Legal Formal-ism	Constraints on Exec.	Pers. Auton-omy & Indiv. Rights (G)	Secondary School Enroll-ment	"Rule of Law" (F)	Function. Of Gov. (C)
British Legal Origin	-1.739***	0.054	-0.255	8.698	0.599	0.366
	(0.21)	(0.43)	(0.67)	(6.32)	(0.79)	(0.71)
Log of Pop Density, 1500	0.041	-0.398**	-0.927***	-6.375**	-1.129***	-0.862***
	(0.06)	(0.13)	(0.20)	(1.86)	(0.23)	(0.21)
Observations	60	60	60	60	60	60
R-squared	0.568	0.151	0.282	0.209	0.312	0.244

Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table A.3-B: First Stages with Ethnic Fractionalization

	Legal Formal- ism	Constraints on Exec.	Pers. Auton- omy & Indiv. Rights (G)	Secondary School Enroll- ment	"Rule of Law" (F)	Function. Of Gov. (C)
British Legal Origin	-1.728***	0.119	-0.1	11.278*	0.642	0.335
	(0.21)	(0.43)	(0.65)	(5.63)	(0.80)	(0.72)
Log of Pop Density, 1500	0.043	-0.383**	-0.890***	-5.759***	-1.119***	-0.869***
	(0.06)	(0.13)	(0.19)	(1.65)	(0.23)	(0.21)
Ethnic Fractionaliz.	-0.204	-1.18	-2.852*	-47.381***	-0.796	0.57
	(0.43)	(0.89)	(1.34)	(11.58)	(1.64)	(1.47)
Observations	60	60	60	60	60	60
R-squared	0.57	0.177	0.336	0.391	0.315	0.246

Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table A.3-C: First Stages with Ethnic Fractionalization & Muslim Share of Population

	Legal Formal-ism	Constraints on Exec.	Pers. Auton-omy & Indiv. Rights (G)	Secondary School Enroll-ment	"Rule of Law" (F)	Function. Of Gov. (C)
British Legal Origin	-1.742***	0.051	-0.139	10.886	0.628	0.322
	(0.21)	(0.41)	(0.65)	(5.63)	(0.80)	(0.72)
Log of Pop Density, 1500	0.079	-0.205	-0.786***	-4.730*	-1.081***	-0.836**
	(0.07)	(0.14)	(0.22)	(1.91)	(0.27)	(0.25)
Ethnic Fractionaliz.	-0.222	-1.268	-2.903*	-47.892***	-0.815	0.554
	(0.43)	(0.85)	(1.34)	(11.58)	(1.65)	(1.49)
Muslim Share of Population	-0.004	-0.018*	-0.011	-0.106	-0.004	-0.003
	(0.00)	(0.01)	(0.01)	(0.10)	(0.01)	(0.01)
Observations	60	60	60	60	60	60
R-squared	0.578	0.262	0.346	0.403	0.316	0.247

Standard errors in parentheses. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table A.4-A: OLS including OECD, dependent variable is log GDP per capita in 1995

	(1)	(2)	(3)	(4)	(5)	(6)
Legal Formalism	-0.196*	-0.298*	-0.272**	-0.235*	-0.079	-0.074
	(0.09)	(0.12)	(0.10)	(0.10)	(0.10)	(0.07)
	<-0.2>	*<-0.3>*	*<-0.2>*	*<-0.2>*	*<-0.1>*	*<-0.1>*
Constraints on Executive	0.437***					
	(0.06)					
	<0.639>					
CIM		-1.018**				
		(0.36)				
		<-0.2>				
Freedom of Expression & Belief (D)			0.191***			
			(0.03)			
			<0.546>			
Associational & Organ. Rights (E)				0.226***		
				(0.04)		
				<0.564>		
Rule of Law (F)					0.193***	
					(0.02)	
					<0.666>	
Personal Autonomy & Indiv. Rights (G)						0.278***
						(0.02)
						<0.809>
Observations	83	83	83	83	83	83
R-Squared	0.469	0.153	0.367	0.385	0.476	0.684

Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

	(1)	(2)	(3)	(4)	(5)	(6)
			Table A.4-B: 2SLS using settler mortality			
Legal Formalism	0.054	0.275	0.284	0.751	0.924	0.195
	(0.24)	(0.30)	(1.09)	(1.45)	(1.08)	(0.19)
	<0.064>	*<0.320>*	*<0.331>*	*<0.876>*	*<1.078>*	*<0.228>*
Constraints on	0.992**					
Executive	(0.29)					
	<1.670>					
CIM		11.013**				
		(3.48)				
		<1.641>				
Freedom of			1.713			
Expression			(1.99)			
& Belief (D)			*<5.823>*			
Associational &				2.053		
Organ. Rights (E)				(2.34)		
				<5.684>		
Rule of Law (F)					1.212	
					(0.93)	
					<4.099>	
Personal Autonomy						0.569***
& Indiv. Rights (G)						(0.12)
						<1.522>
Observations	51	51	51	51	51	51

The instruments used are the log of settler mortality and English legal origin. Standard errors in parentheses and beta coefficients in brackets. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Appendix A2

A Theoretical Model of Migration and Access to Credit

A2.1   Overview

Credit markets in underdeveloped countries exhibit a number of well-studied phenomena, chief among them being credit rationing, wherein some potential borrowers are unable to borrow the full capital they may want, and some may be unable to borrow at all. Theoretical explainations of these phenomena typically highlight asymmetric information and contract enforcement problems. As GMR note, these can be thought of separately as issues arising from voluntary and involuntary default, although they share commonalities in the incentive problems around borrower behavior. Challenges with involuntary default often arise from adverse selection and moral hazard issues, while voluntary default reflects weak contract enforcement. All three issues may exist simultaneously, and I assess their relevance empirically. In this section, I lay out a theoretical model focused on voluntary default that arises when contract enforcement is weak–as is the case in many developing countries. I use simulations to illustrate how reduced access to credit for migrants can arise as a disciplining device.

GMR show that an individual borrower's ability to strategically default can lead to credit rationing, as lenders cannot raise the interest rate to account for the higher risk of default because doing so increases the incentive of the borrower to

default. GMR use a simple infinite horizon repeated lending-borrowing game to illustrate this, abstracting away from any production uncertainty to focus on the issue of strategic default by the borrower. They identify the effect of the borrower's outside option from defaulting and turning to another lender in future periods on her probability of repayment of her current loan. This tradeoff between current repayment and the future probability of getting a loan bounds the maximum repayment amount that is sustainable in equilibrium. GMR then show that providing lenders with a technology that detects past repayment behavior can weaken a borrower's outside option, incentivizing her to repay her loan to avoid exclusion from future borrowing. That is, lenders share information on a borrower's repayment history and follow a trigger strategy that rejects loan applicants with prior defaults. GMR allow this information sharing technology to vary in quality and show that a more effective technology–one with better detection of past defaults–can lead to a more efficient outcome, with pareto improvements to both borrowers and lenders.

I extend the GMR model in two key ways: First, I incorporate information dissipation over space. The intuition is that information sharing among lenders may be weaker when the lenders are located in different towns than when they are located in the same town. To model this, I create two separate pools of potential lenders: those within a location and those outside of it (i.e., in other locations). Lenders in other locations detect a borrower's prior defaults with lower probability than do lenders within a location. Second, I extend the GMR model by incorporating heterogeneity in individuals' migration costs, which include both a permanent and a time-varying component. Essentially, some particularly mobile entrepreneurs with

low permanent migration costs are perennial flight risks, while other entrepreneurs may move because of a one-time shock. Lenders cannot observe these migration costs and thus must form expectations about entrepreneurs' future migration and repayment strategies. In so doing, they lump migrants who are repeat defaulters together with those who may have stronger repayment prospects. This creates an inefficiency because the decisions of particularly mobile borrowers impose external costs–in the form of a lower probability of obtaining a loan–on borrowers who moved because of a temporary shock.

The model provides an explanation of credit rationing for migrants. If the expected repayment from lending to any one migrant is sufficiently low to make the average profitability of lending to migrants negative, lenders may choose not to lend to migrants at all. Even if the average profitability from any one migrant is positive, lenders may consider the effects of their lending policies on migration incentives (such as the effect on future generations of entrepreneurs in an overlapping generations framework). In some cases, lenders will randomly exclude some migrants in order to reduce the incentives for default and migration among those who are particularly likely to default. Some of the migrants who are randomly excluded may indeed be creditworthy, as they would plan to stay and repay their loans.

Below, I lay out the set-up, assumptions, objectives, and outcomes of the model.

A2.2 Set-up and assumptions

As in GMR, my model involves a multi-period game among infinitely lived entrepreneurs and lenders. These entrepreneurs and lenders are distributed over an infinite set of discrete locations, and there are a large number of lenders and entrepreneurs at each location.

Since involuntary default is not the focus of this model, I omit all production uncertainty. Each entrepreneur has a non-stochastic production function $F(L)$, where L is the value of all inputs used in production. The production function satisfies standard conditions: $F'(L) > 0$ and $F''(L) < 0$. As each entrepreneur has no capital of her own, she must borrow all capital and obtain a loan of size L. She maximizes her utility over her income by considering her output ($F(L)$) as well as the financing and migration costs she must incur.

In each period, the following actions take place:

1. Each entrepreneur applies for a loan from a lender.

2. A lender observes whether the entrepreneur is a migrant or native and screens the potential borrower, detecting past default with some probability.

3. If a lender detects a default, it follows a trigger strategy of never lending to that entrepreneur.

4. If a lender does not detect default, it offers natives a loan contract L, R, where R is the repayment amount; it follows a mixed strategy with respect to

migrants, offering some share ρ of migrants this loan contract[1] .

5. If an entrepreneur successfully obtains a loan, she produces and earns the relevant return, then decides whether to repay the loan.

6. If an entrepreneur does not obtain a loan, she must wait until the next period when she can apply to another lender.

7. Finally, each entrepreneur decides whether to remain in the current location or migrate to another location and incur a migration cost.

Each individual can migrate to any of the infinite set of discrete locations. Moving involves costs that are heterogeneous across individuals and over time:

$$C_{it} = c_i - \gamma_{it} \tag{A.1}$$

$$where$$

$$c_i \sim U(0, \bar{c})$$

$$\gamma_{it} \in \{-\gamma, \gamma\}$$

Essentially, each person has a permanent individual migration cost of c_i and experiences transitory migration cost shocks of γ_{it}. These migration "costs" may be negative, implying that agents may obtain a utility benefit from migration. For simplicity, I assume that $prob(-\gamma) = prob(\gamma) = \frac{1}{2}$, and that γ_{it} is distributed inde-

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[1]For ease of exposition, I focus on lender choices over the number of migrants who receive credit rather than over the interest rate charged to these migrants. GMR's basic result is that, in some cases, raising the interest rate may not raise lender profits because repayment rates decline. Even if lenders could charge migrants higher rates in our model, a similar rationing equilibrium may still be obtained because these higher rates would be constrained by the migrants' outside option of repeat migration and default.

pendently of c_i. I also assume that γ_{it} affects the initial period mobility costs but that future mobility costs are not present (i.e. $\gamma_{it} = 0 \ \forall t > 1)^2$.

Crucially, lenders cannot observe these mobility costs, making them unable to distinguish whether an entrepreneur who has moved experienced a one-time mobility shock or is more permanently mobile. Initially, entrepreneurs are distributed across the locations independently of their migration costs.

Before describing the objectives and actions of entrepreneurs and lenders, we must make one more set of assumptions about the effectiveness of the information sharing or screening technology used by lenders. Extending GMR's model, I allow the effectiveness of the technology to vary depending on where an individual's default has taken place. If a borrower defaults on the current loan and stays in the same location, other lenders can always uncover her past default[3]. However, if the borrower migrates to a new location, other lenders can only detect her past default in previous locations with some lower probability, say q, where $q < 1$. Thus, there is a full "scarring" or reputational effect of defaulting for natives, but some of this information is dissipated when individuals migrate.

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[2]This assumption eases tractability but is not crucial; without it, a borrower would face more than the six lifetime plan options identified under this assumption, but the basic mechanics would remain similar.

[3]A more general formulation would allow for some lower probability of detection even within a location. In this case, there may be credit rationing even for natives in a given location, but there would be a greater probability of rationing for migrants to this location. Because I concentrate on the latter effect in this paper, I focus on the special case where the probability within a location is equal to one

A2.3 Entrepreneur Objectives

Each entrepreneur begins her adult life with a clean slate (no migration or default in her history). Let us consider the entrepreneur's problem at the moment when she must make her first choices whether to repay and whether to migrate. She maximizes her utility by taking into account the probability of receiving a loan and thus being able to produce in the next period, the repayment amount, her migration costs, and her continuation value from the next period onward:

$$v_{it} = \max_{r_t, m_t}[x_t + \delta E(v_{i,t+1}(r_{t+1}, m_{t+1}, |r_t, m_t)] \tag{A.2}$$

where r_t and m_t indicate the borrower's choices of repayment and migration for the current period (each $\in \{0, 1\}$), x_t is the borrower's net income for the current period and $v_{i,t+1}$ is the borrower's continuation value. Her net income for the current period depends on her choices over repayment and migration as follows:

$$x_t = F(L) - r_t R - m_t(c_i - \gamma_{it}) \tag{A.3}$$

where c_i and γ_{it} are her migration cost parameters, as previously specified. In this dynamic programming problem, the choice variables in each period consist of r_t and m_t. In future periods, past choices over these variables become state variables (i.e., r_t and m_t become state variables in periods $t + 1$ onward), since they affect the future probability of getting a loan.

One of the key outcomes of the model is that the equilibrium probability of

getting a loan depends on an entrepreneur's migration decision. Here, I outline the entrepreneur's expectations over this probability and show in the subsequent section how these expectations can be rationalized by considering lenders' objectives. The probability of getting a loan in the next period is 0 if she defaults and remains in the same location, 1 if she repays and stays, $\rho(1-q)$ if she defaults and moves, and ρ if she repays and moves (where ρ is the borrower's expectations of lender strategies)[4].

Because there is no chance of getting a loan after defaulting and remaining in one's current location, we can conclude that defaulters will always move. This leaves three potential strategies in the first period: repay and stay, repay and move, and default and move. I solve this problem in two stages: I first consider the continuation values from pursuing each of the three strategies, and then add the first period payoffs to these continuation values to evaluate the total lifetime payoffs from each of the possible strategies.

A2.3.1 Future Periods

We first consider borrowers who repaid their loans and stayed in their current locations in the first period. The state variables are thus set to $r_t = 1$ and $m_t = 0$. At this point, her repayment in period t (R) is a sunk cost, though this will enter into her utility maximization in period t. Each borrower must maximize her utility over r_{t+1} and m_{t+1}, as follows:

---

[4]The effects of migration and default on the likelihood of obtaining future loans do not deteriorate over time. Once migrants are labeled as such, they cannot escape this label, and must bear the reduced likelihood of obtaining a loan forever. Similarly, once borrowers default, their likelihood of obtaining a loan is permanently reduced.

$$E(v_{i,t+1}(r_{t+1}, m_{t+1}|r_t = 1, m_t = 0)) = \max_{r_{t+1}, m_{t+1}} [x_{t+1}(r_{t+1}, m_{t+1}|r_t = 1, m_t = 0) \quad \text{(A.4)}$$

$$+ \delta E(v_{i,t+2}(r_{t+2}, m_{t+2}|r_{t+1}, m_{t+1}, r_t = 1, m_t = 0))]$$

where the utility from her three options over combinations of r_{t+1} and m_{t+1} is as follows:

$$E(v_{i,t+1}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 0) = F(L) - R + \quad \text{(A.5)}$$

$$\delta E(v_{i,t+2}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 0)$$

$$E(v_{i,t+1}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 1) = \rho(F(L) - R) - c_i + \quad \text{(A.6)}$$

$$\delta E(v_{i,t+2}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 1)$$

$$E(v_{i,t+1}|r_t = 1, m_t = 0, r_{t+1} = 0, m_{t+1} = 1) = \rho(1 - q)(F(L)) - c_i + \quad \text{(A.7)}$$

$$\delta E(v_{i,t+2}|r_t = 1, m_t = 0, r_{t+1} = 0, m_{t+1} = 1)$$

The only benefit of migration in this model (after the first period) is in potentially escaping the implications of default, so moving without defaulting is inferior to staying and repaying (except in the first period, as discussed below). That is,

$$E(v_{i,t+2}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 0) \geq E(v_{i,t+2}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 1)$$

and thus the value in Eq. A.5 ≥ Eq. A.6

This eliminates the possibility that individuals will repay their loans and move in future periods, but allows borrowers to still choose to "repay and move" in the first period. This formulation focuses on the variation in borrower behavior induced by one-time shocks to their mobility in the first period. This has the advantage of both clarity and producing hypotheses that can be empirically tested using my identification strategy. In a more general framework, these shocks could be recurring.

The issue is then whether these borrowers who have previously repaid their loans and stayed in their first locations choose to again repay their loans and remain in their location or to default and migrate. For tractability, we impose the condition that they expect to repeat these choices in all future periods. The infinite period values from repaying and staying (Eq. A.5) or defaulting and moving (Eq. A.7) thus converge to the following:

$$E(v_{i,t+1}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 0) = \frac{1}{1-\delta}[F(L) - R] \qquad (A.8)$$

$$E(v_{i,t+1}|r_t = 1, m_t = 0, r_{t+1} = 0, m_{t+1} = 1) = \frac{1}{1-\delta}[\rho(1-q)(F(L)) - c_i]$$

$$(A.9)$$

We next consider borrowers who repay their loans and move in the first period. Again, we will impose the requirement that their future strategies be continued over all periods. We observe that, since these individuals cannot escape their "migrant" and "defaulter" labels, migrating again bears no benefit unless one plans to default. As such, the two options again available to the borrower are to stay in her new

location and repay her loan or default and move again:

$$E(v_{i,t+1}|r_t = 1, m_t = 1, r_{t+1} = 1, m_{t+1} = 0) = \frac{1}{1-\delta}[\rho(F(L) - R)] \qquad \text{(A.10)}$$

$$E(v_{i,t+1}|r_t = 1, m_t = 1, r_{t+1} = 0, m_{t+1} = 1) = \frac{1}{1-\delta}[\rho(1-q)(F(L)) - c_i]$$

$$\text{(A.11)}$$

Finally, we consider borrowers who defaulted on their initial loans and migrated. Again, the two options available to these borrowers are to stay and repay their loans or default and move:

$$E(v_{i,t+1}|r_t = 0, m_t = 1, r_{t+1} = 1, m_{t+1} = 0) = \frac{1}{1-\delta}[\rho(1-q)(F(L) - R)]$$

$$\text{(A.12)}$$

$$E(v_{i,t+1}|r_t = 0, m_t = 1, r_{t+1} = 0, m_{t+1} = 1) = \frac{1}{1-\delta}[\rho(1-q)(F(L)) - c_i]$$

$$\text{(A.13)}$$

A2.3.2   Initial Period

We can thus summarize the borrower's problem in the current period as choosing from one of six possible lifetime strategies (two continuation values for each of the three possible strategies in the initial period):

Figure A2.1: Entrepreneur's Possible Lifetime Strategies
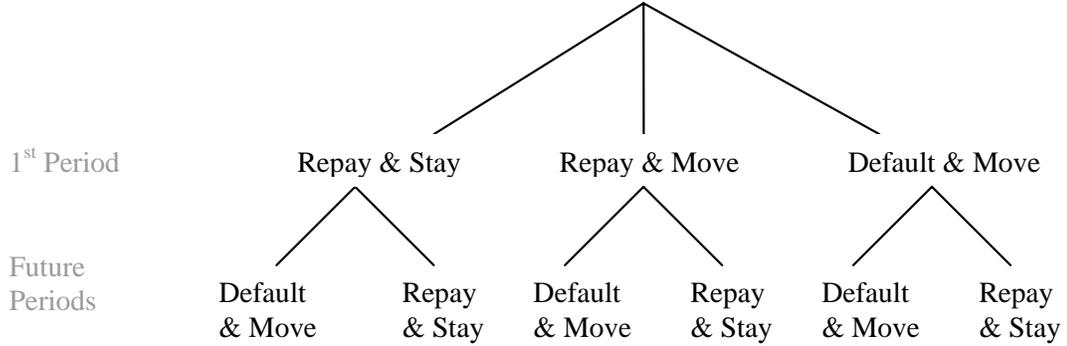
Substituting the continuation value for future periods into the first period maximization problem, one can calculate the borrower's expected lifetime utility from each potential strategy. Beginning with the strategy involving staying and repaying in the first period, one can add the first period net income $(F(L) - R)$ to each of the continuation values (as in Eqs. A.8 and A.9). Rearranging terms, we obtain the values of pursuing either of these two lifetime strategies:

$$E(v_{it}|r_t = 1, m_t = 0, r_{t+1} = 0, m_{t+1} = 1) = \frac{1}{1-\delta}[(1 - \delta + \delta\rho(1-q))F(L)$$

$$-\delta c_i] - R \tag{A.14}$$

$$E(v_{it}|r_t = 1, m_t = 0, r_{t+1} = 1, m_{t+1} = 0) = \frac{1}{1-\delta}[F(L) - R] \tag{A.15}$$

Similarly, one can consider the two strategies that involve repaying and moving

in the first period. The first period net income for these strategies is equal to $F(L) - R - c_i - \gamma_{it}$. Incorporating the continuation values for the two options in future periods (as in Eqs. A.10 and A.11), we obtain the following lifetime values for these strategies:

$$E(v_{it}|r_t = 1, m_t = 1, r_{t+1} = 0, m_{t+1} = 1) = \frac{1}{1 - \delta}[\rho(1 - \delta + \delta(1 - q))F(L)$$
$$-c_i] - \rho R + \gamma_{it} \qquad (A.16)$$

$$E(v_{it}|r_t = 1, m_t = 1, r_{t+1} = 1, m_{t+1} = 0) = \frac{1}{1 - \delta}\rho[F(L) - R] - c_i + \gamma_{it}$$
$$(A.17)$$

Finally, we consider the stratgies for a borrower who defaults and moves in the first period. She generates a net income of $F(L) - c_i - \gamma_{it}$ in the first period. Adding the continuation values (as in Eqs. A.12 and A.13), the lifetime values of her two potential strategies become:

$$E(v_{it}|r_t = 0, m_t = 1, r_{t+1} = 0, m_{t+1} = 1) = \frac{1}{1 - \delta}[\rho(1 - q)F(L) - \delta R]$$
$$-c_i + \gamma_{it} \qquad (A.18)$$

$$E(v_{it}|r_t = 0, m_t = 1, r_{t+1} = 1, m_{t+1} = 0) = \frac{1}{1 - \delta}[\rho(1 - q)F(L) - c_i] + \gamma_{it}$$
$$(A.19)$$

A borrower's optimal choice among these six lifetime strategies depends on her migration costs (c_i, γ_{it}). Moreover, those entrepreneurs who move in the first period $(m_t = 1)$ may still vary in their plans for repayment (r_{t+1}). These differences

are driven in part by the size of the initial mobility shock (γ_{it}) they experience. Some entrepreneurs whose permanent mobility costs are high but who experienced a large positive shock in the first period will choose to repay and migrate in the first period, staying in their new locations and repaying their loans in the future. Other entrepreneurs who have low permanent mobility costs will choose to default and move in the first period; these individuals are also more likely to continue defaulting and migrating in the future. However, because lenders cannot observe an entrepreneur's mobility costs, they will not be able to distinguish between migrants of the first kind, who experience a one-time mobility shock, and migrants of the second kind, whose prior defaults go undetected.

A2.4   Lender Objectives

Lenders maximize their expected profits from making each loan, taking into account the probability of its repayment. I concentrate on lender profits from loans to migrants. The key choice variable on which I focus is the proportion of migrant applicants to which a lender will provide loans (ρ). At this point, one must take a stand on the extent to which lenders coordinate their treatment of migrants. If they do not coordinate their efforts at all, then each lender's choice of the proportion of migrants who receive loans would not affect migrants' past decisions or expectations of future loan repayment (since these are formed based on expectations over large numbers of possible lenders). However, we have assumed that there is some information sharing among lenders and coordination around punishments for detected

default, particularly among lenders within a given location. Moreover, coordination in strategies may be easier to sustain than coordination in information sharing on repayment histories[5].

If we assume that there is some coordination among lenders, each lender's choice of ρ will take into consideration the effect on repayment prospects ($prob(r_{t+1}|m_t = 1; \rho)$) as well as on the stock of migrants ($prob(m_t = 1; \rho)$). The first term represents the probability that any individual migrant will repay her loan in period $t+1$. The latter term captures the probability that any individual migrates in period t. Since there are a large number of borrowers, this can be interpreted as the share of migrants in the total population at the beginning of period $t + 1$.

The lender's maximization problem at time $t + 1$ can thus be written as[6]:

$$\max_{\rho} E(\Pi_{t+1}) = \rho \Big[prob(r_{t+1} = 1 | m_t = 1; \rho)R - (1 + z)L \Big] prob(m_t = 1; \rho)$$

(A.20)

where z is the lender's opportunity cost of capital. In their profit maximization, lenders form expectations over the different repayment probabilities of migrants of different types (high or low initial mobility costs). That is, lenders expect that the repayment probability of the average migrant will be the probability of each type

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[5]As one explanation, it may be easier for another lender to observe whether a bank has lent money to an individual than to know whether the individual repaid the loan.

[6]For simplicity, I consider a lender's one-period profits. A more general formulation might considering lenders' profits over both the first and future periods jointly, leading to even more intensive rationing of migrants in $t + 1$ as lenders reduce incentives for default in period t. Nonetheless, the basic sources of rationing in the model would remain the same.

weighted by its share in the total population of migrants:

$$p(r_{t+1} = 1|m_t = 1) = p(r_{t+1} = 1|m_t = 1, \gamma_{i,t} = -\gamma) * (1 - \omega)$$

$$+ p(r_{t+1} = 1|m_t = 1, \gamma_{i,t} = \gamma) * \omega$$

where ω is the share of migrants who experienced an increase in mobility costs due to γ ("high shock"), and $(1 - \omega)$ is the share who experienced a decrease in mobility costs ("low shock"). We obtain ω by aggregating the migration choices of each type over individual c_i, as follows:

$$\omega = \frac{1}{2} \int_0^{\bar{c}} p(m_t = 1|\gamma_{i,t} = \gamma, c_i) f(c_i) dc_i \tag{A.21}$$

Again, if lenders could observe each individual's distinct migration cost components, they could differentiate their lending to these different types. As they cannot observe this information, they must treat this heterogeneous group uniformly.

A2.5 Joint Outcomes

Based on these objectives, entrepreneurs make individual repayment and migration decisions conditional on their expectation of lender rationing of migrants, while lenders make loan decisions conditional on the composition of repayment decisions among migrants. An equilibrium is reached when these lending decisions are rationalized by entrepreneur behavior.

As borrower strategies are discrete choices, no closed form solutions for this

equilibrium need exist. I therefore use simulations to provide an example under which it is not profit maximizing for lenders to extend credit to all migrants. These simulations illustrate how individuals who experience a "high" mobility shock ($\gamma_{it} = \bar{\gamma}$) may move in the first period but may then plan on repaying their loans at higher rates than other migrants (i.e. those who experience a "low" mobility shock). Each simulation uses the parameters to evaluate borrowers' utility under each of the six possible strategies and then select an optimal choice. These choices are then aggregated to reflect average outcomes for each type (γ_{it}). One can then study the resulting average probability of repayment for all migrants and its implications for lender revenues and profits.

I show the resulting average probability of repayment for all migrants, which may be lower than that the repayment probability among the "high shock" types. Table A.5 shows an equilibrium is reached when $\rho = 0.9$, i.e., when 10% of migrants are rationed. Table A.6 shows that raising the value of ρ to serve all migrants can lower the probability of repayment among migrants, thereby reducing the expected revenue of serving migrants. Since total costs increase along with the volume of loans to migrants, the total profits from serving all migrants is lower than from serving only 90%. Under these conditions, lenders may choose to ration migrants in order to induce them to choose repayment of loans rather than default, as well as to reduce the incentive for initial migration (since this creates a stock of more opaque applicants).

Table A.5: Simulation 1, Rationing Migrants

Parameters
$F(L) = 1.0$ $R = 0.9$ $\delta = 0.9$ $q = 0.1$ $\gamma = 0.5$ $\bar{c} = 1.0$ $\rho = 0.9$

Results		
Individual mobility shock (γ_{it})	High (γ)	Low $(-\gamma)$
Percent migrate in first period $(m_t = 1)$	100%	20%
Share of migrants $(p(\gamma_{it}\|m_t = 1))$	83%	17%
Probability of repayment in $t+1$ $(p(r_{t+1} = 1\|\gamma_{it}))$	30%	0%
Probability of repayment in $t+1$ for all migrants $(p(r_{t+1} = 1\|m_t))$	25%	
Expected revenues from serving migrants $(E(R\ p(r_{t+1} = 1\|m_t)p(m_t)))$	0.135	

Table A.6: Simulation 2, Serving All Migrants

Parameters
$F(L) = 1.0$ $R = 0.9$ $\delta = 0.9$ $q = 0.1$ $\gamma = 0.5$ $\bar{c} = 1.0$ $\rho = 1.0$

Results		
Individual mobility shock (γ_{it})	High (γ)	Low $(-\gamma)$
Percent migrate in first period $(m_t = 1)$	100%	30%
Share of migrants $(p(\gamma_{it}\|m_t = 1))$	77%	23%
Probability of repayment in $t+1$ $(p(r_{t+1} = 1\|\gamma_{it}))$	20%	0%
Probability of repayment in $t+1$ for all migrants $(p(r_{t+1} = 1\|m_t))$	15%	
Expected revenues from serving migrants $(E(Rp(r_{t+1} = 1\|m_t)p(m_t)))$	0.09	

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