Crime Rates and Access to Banking Services:

An International Comparison

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TABLE OF CONTENTS

ABSTRACT

The question motivating this paper is, "Does increasing access to banking reduce the occurrence of crime?" The answer is a resounding "yes!" To answer the question, a series of standard OLS regressions are performed based on the model used by Soares (2004), employing the new data set of Beck, Demirguc-Kunt and Peria (2007) for bank access measures. The results from Soares are replicated using an updated data set, then expanded upon with the inclusion of a banking access indicator, namely bank branches per capita, to measure the effect on crime rates by category: theft, burglary and total theft. Some issues of mild to moderate multicollinearity arise; however, some respecification of the model substantially decreases its presence. Overall, the findings support a positive response to the question asked; access to banking appears to result in decreased crime rates. The results are statistically significant and substantial in magnitude. The basic motivation is that criminals ought to perceive that individuals can more easily access safe storage for their money and are thus less likely to be in possession of cash and other valuables; therefore, this unobservable individual action of depositing in an account should reduce the criminal's perception of their potential gains.

TABLE OF FIGURES

TABLE OF TABLES

TABLE OF EQUATIONS

SECTION 1: INTRODUCTION

In the year 2008, the Financial Consumer Agency of Canada sent out an information slip with Government Sales Tax rebates, encouraging individuals to open a personal bank account and informing consumers of their rights (Financial Consumer Agency of Canada 2008). These rebates target low-income individuals, the most frequently unbanked (Hogarth, Anguelov and Lee 2005). The government advocates increased utilization of banking services for a variety of reasons, including to encourage saving, to decrease the use of usurious financial service companies and to provide means for consumption smoothing. Presumably unbeknownst to the government, there may be a relationship between access to banking services and crime rates at a macroeconomic level. This paper attempts to determine what that relationship constitutes.

The underlying theory presented in the paper is that high crime rates will motivate individuals to place their assets in a bank account instead of keeping cash under a mattress or in a coffee can, thereby reducing the opportunity for theft to occur. Consequently, the crime rate ought to decrease with this increased bank use. Anecdotal evidence involving violent theft further corroborates the hypothesis that access to banking reduces crime rates by reducing the potential for victimization due to possession of valuables. In order to test this hypothesis, the paper employs a newly available data set compiled by Beck, Demirguc-Kunt and Peria (2007). The data provides various new indicators that measure banking sector outreach in 99 countries. This paper's contribution to crime research is the employment of this new data set into existing empirical work that utilizes the, also relatively new, International Crime Victims Survey.

If the theory is correct, with a causal relationship between banking access and theft, there is an incentive to increase the access to banking available to individuals. The potential positive externality of reduced crime rates arising from increased access to banking services would justify

development of banking institutions. Subsequently the theory espoused in this paper may bolster the motivation for the various operations of micro-finance institutions.

The traditional view of criminologists is that development leads to increasing industrialization and moral breakdown through disintegrating neighbourhood and familial relationships, resulting in higher rates of crime as countries develop (Heaton 2006;Cornwell and Trumbull 1994). Soares (2004), however, attributes the concomitant rise in crime rates and gross national product (GNP) per capita to increased institutional capacity and trust in state institutions. Therefore, the increase is in fact due to greater reporting rates and not the commonly held belief that crime levels have increased.

Motivating this endeavour is the question "Does increasing access to banking reduce the occurrence of crime?" To answer the question, a series of standard OLS regressions are performed based on the model set up used by Soares (2004), employing the new data set of Beck, Demirguc-Kunt and Peria (2007) for bank access measures. The models use several measures of crime as dependent variables. The results from Soares are replicated using an updated data set, then expanded upon with the inclusion of banking access indicators to measure the effect on crime rates by category. Some issues of mild to moderate multicollinearity arise; however, some respecification of the model substantially decreases its presence. Overall, the findings support a positive response to the question asked; access to banking appears to result in decreased crime rates. The results are statistically significant and substantial in magnitude.

The general definitions of the various crimes referred to in the paper follow. First, theft constitutes the act of stealing; the wrongful taking and carrying way of the personal goods or property of another (Random House Unabridged Dictionary 2006). Burglary is the felony of breaking into and entering the house or building of another with intent to steal (Random House Unabridged Dictionary 2006). Finally, robbery entails the felonious taking of the property of

another from his or her person or in his or her immediate presence, against his or her will, by violence or intimidation (Random House Unabridged Dictionary 2006).

This paper reviews the existing literature in Section 2 and the basis of the research into the economics of crime. Section 3 explains the theoretical justifications for pursuing a potential relationship between banking access and crime. Next, Section 4 outlines the theory behind the specification of the model. The theoretical motivation for the selection of dependent variables also reviews the previous findings in the literature. Section 5 discusses the data sources employed and then Section 6 sets up the model estimation and examines the results. Conclusions and recommendations for future research wrap up the paper in Section 7.

SECTION 2: LITERATURE REVIEW ON CRIME AND DEVELOPMENT

Gary Becker initiated the modern discussion of the relationship between crime and economics with his 1968 paper entitled *Crime and Punishment: An Economic Approach.* He calculates the optimal number of crimes in a society, using costs of monitoring and of the crime and probabilities of apprehension. Prior to Becker there were works on law enforcement and economics by Montesquieu (1748), Cesare Beccaria (1767) and Jeremy Bentham (1789). The study of the determinants of criminal behaviour has traditionally remained in the purview of criminologists and sociologists; however, economists are increasingly focusing on aspects of crime (Doyle, Ahmed and Horn 1999). The *Journal of Economic Perspectives* published a symposium on the economics of crime in 1996. The papers concern themselves with public policy, punishment and the market for offenses and ways to counteract the number of young American men committing crimes (DiIulio 1996; Ehrlich 1996; Freeman 1996).

Some areas of current research attempt to determine the cause of the fall in crime rates in the United States, the determinants of crime rates, the effect of deterrent measures and the relationship between development and crime. The most relevant recent development in the literature is a paper by Soares (2004) which rejects the commonly held view in criminology circles that crime rates increase with economic development. Soares (2004) exposes the difference between official reported crime rates and actual crime perpetration rates. The recent work surrounding crime and development presents various incarnations of a core group of variables, with varying findings (Cohen, Felson and Land 1980; Howsen and Jarrell 1987; Bennett 1991; Doyle, Ahmed and Horn 1999; Soares 2004; Edmark 2005).

One of the major contributions of the Becker paper is the notion that criminals are also utility maximizers, who face opportunity costs for their actions. That is, criminals act rationally,

given the constraints that they face, some of which are controlled by public policy and social attitudes. Becker goes on to propose an extensive system of fines, much like that in environmental economics whereby the offender must recoup the cost to society of their actions, internalizing the costs (Becker 1968). The substantial portion of Becker's (1968) paper focused on the application of fines as a deterrent and subsequently several hundred articles have reviewed various economic aspects of enforcement and deterrence (Polinsky and Shavell 2000). Deterrence theory comprises a substantial portion of the literature on crime; it is also tied to the determinants of crime rates.

Becker's (1968) results point towards the conclusion that offenders are risk preferring at the margin and therefore the payoff from illegal activities could be manipulated so that the real income received would be lower than that resulting from legitimate activities. In other words, the trade-off between legal and illegal activities can be modeled in a similar fashion to the trade-off between labour and leisure. However, the payoffs are often not sufficiently large, therefore the utility maximizing behaviour of those entering into illegal activities must be modeled as risk-preferring. Becker also suggests that there be a system of fines which potentially place a value or "purchase price" on crime. This may move into corruption issues that previously hampered the reporting of crime, where in some countries there are in fact purchase prices for illegal activities, for example bribery and extortion. Soares (2004) confronts this issue where official reporting rates may not reflect true crime rates and creates a model for correcting official crime rates to more accurate values.

Following Becker's insights, Ehrlich (1973) created a model focusing on incentives and time allocation. This model predicts an ambiguous effect of development on crime (Soares 2004, 157). The effects of the model depend predominantly on the relationship between risk aversion and income, a result which Soares (2004) declares "not... very intuitively appealing" due to the relationship between income and crime, which also depend on changes in the degree of risk

aversion. Freeman (1996) focuses on the relationship between legitimate and illegitimate employment income, showing that crime can have higher payoffs and thus induces participation.

There are two main theories presented in the crime and development literature, which stem from the criminology side of academia. The Durkenheim model (1964)

> Asserts that with growth in size and density, societies evolve more complex divisions of labor. This complexity transforms the dominant mode of social integration from mechanical solidarity with its collective conscience to organic solidarity. Durkheim (1964) suggests that when development of normative systems attendant to organic solidarity lags behind the division of labor, an abnormal condition – anomie- exists within which variation and innovation take place, including deviance and crime (Bennett 1991, 344).

Another important empirical aspect of the Durkheim model is that it measures rate of change in the development variables; that is, the values employed are year-over-year changes instead of absolute levels.

The second dominating hypothesis is Shelley's modernization hypothesis of 1981. It

> Contends that as youth migrate to urban centres to escape economically deficient rural areas, they break the traditional personal, family and community ties of a mechanical form of social integration. Social controls, both formal and especially informal, weaken (if not disappear) and deviant and criminal behavior increases... Central to this hypothesis is the contention that the rate of increase in crime is directly proportional to that of development (Bennett 1991, 344).

The literature found fault with these two theories due to their lack of predictive power and inability to explain differences amongst crime categories (Bennett 1991). There are further theories which attempt to explain the apparent differences, specifically between property crime and homicide. Bennett's (1991) work found evidence that the level of development in a country does not affect its homicide rates and that the growth rate had an opposite effect than that predicted: it decreased homicide (Bennett 1991, 348). Subsequent work explains that the relationship between homicides and development is more representative of overall crime than previously thought. While many property crimes go unreported depending on the development stage of a country, homicides tend to have high reporting rates. Soares (2004) attributes this to the

necessity of filing a death certificate in almost all countries and situations and subsequently reporting the death to police when the cause is identified as homicide. Therefore, reporting is not a function of the willingness of citizens; there are institutional checks in the reporting system outside of the police and judicial structures (Soares 2004, 169).

Vast arrays of variables have been tested for their relationship to crime, with mixed results across studies. Unemployment is a logical indicator, theoretically measuring the availability of formal sector employment and expected to have a positive coefficient. However, this positive coefficient is not consistent across empirical studies; Doyle, Ahmed and Horn (1999) contend that the result encapsulates unemployment rates which may constitute characteristics beyond a mere lack of legal job opportunities. One hypothesis put forward to explain the presence of a negative coefficient is that the unemployed constitute a deterrent due to their active or passive crime watch function, by staying closer to home. This reduces the rate of victimization because they are less likely to be robbed while home during periods of unemployment (Doyle, Ahmed and Horn 1999, 720). Freeman (1996) postulates that joblessness is associated with higher crime rates, highlighting a variety of evidence that unemployment and crime are closely tied (33). Levitt (2004) highlights the link between employment and normal goods that can lead to victimization, such as alcohol, frequenting nightclubs and ability to own a car, concluding that there is an ambiguous relationship between the economy and crime (170). Edmark (2005)also concludes that there is ambiguous empirical evidence on the relationship between unemployment and crime (355). Edmark's work finds a significant, positive relationship between unemployment and crime in the categories of burglary and car theft.

Wages per sector provide another, potentially more accurate, measure of the opportunity cost of crime. The opportunity cost includes foregone wages due to incarceration (Becker 1968, 208). Other potential independent variables account for disaggregation among sectors, for example the difference in an increase in agricultural industrialization versus a shift toward manufacturing.

Bennett (1991) attempts to include this via a ratio variable with manufacturing's contribution to GDP over agriculture's contribution to GDP, which is called *Form of Development*[1] (347). There is a lot of ambiguity in the results of the literature on the importance of various independent variables (Doyle, Ahmed and Horn 1999, 719; Soares 2004, 159).

A portion of the literature also includes effects arising from the age structure of the population, often focusing on the proportion of males around age 15 to 25. Cohen, Felson and Land (1980) remark that previous work on changes in demographic structure only consistently constitute a "relatively modest" share of US crime trends since 1960. Youth in this range are also "at greater risk of property crime victimization than are older adults" (Cohen, Felson and Land 1980, 103). This leads to the cohort hypothesis proposed by Easterlin in 1980, whereby the more individuals in a cohort, the more they must compete and experience frustration and alienation. He concludes that these experiences drive some to crime, resulting in a higher crime rate. The age structure aspect is seen as presenting the size of the potential pool of offenders, thus previous hypotheses indicated that the prevalence of juveniles determined the crime rate (Bennett 1991, 346). Freeman's (1996) work also highlights the greater crime participation amongst young American men, compared to other age groups. Demographic shifts are an economic explanatory factor Levitt rejects as a primary cause of decreased U.S. crime rates, attributing only one-sixth of the decline in property crime through the 1990s to demographic shifts (Levitt 2004).

The literature also seeks out wide variety of causes for the decline in the U.S. crime rate through the 1990s. Levitt has been prolific in this field, proposing a variety of reasons for the decline; he concludes that four factors are primarily responsible, including legalization of abortion, increased prison populations, decreasing crack cocaine prevalence, victim precaution measures and increased police numbers (Levitt 2004; Levitt and Ayres 1998; Levitt 1996).

[1] Original italics.

The work of Soares shows that though the crime literature has traditionally discovered a positive relationship between crime levels and development, it is not due to an increase in the true levels of crime. Bennett summarizes the existing findings that show declines in violent crimes but increases in thefts as development increases (Bennett 1991, 343). In fact, the increase in reported crime is due to greater institutional capacity in procedural structure, greater access and trust in the legal system. Thus the rise in theft is a reporting issue, not a result of development. Concerns regarding the underreporting of results have been noted since the eighties, with Howsen and Jarrell (1987) indicating in their study of crime rates in Kentucky counties that victims will not always report crimes if they perceive their interests will not be served, biasing crime rates. If all locales had consistent underreporting, empirical results would be more robust, however this is especially unlikely across nations and cultures (Howsen and Jarrell 1987). Soares (2004) creates a method for adjusting reported crime rates to more accurately portray the true crime rates, through the use of the International Crime Victims Survey. He finds that there is a relationship between level of development and underreporting. Underreporting of crime is not only an issue in developing countries; Cohen et al. (1980) comment on American data. They acknowledge that reporting trends are reflective of the structure of the police agencies who voluntarily report statistics to the FBI, highlighting the variance between districts in quality of reporting. Therefore, criminologists are very interested in the relationship between trends in official crime statistics and the rates at which crimes are reported to the police (94).

They go on to assert that reporting problems in certain crime categories in the United States cannot be taken to be a large problem, due to cultural and financial incentives such as the necessity to file a police report to make an insurance claim. This is an example of the close relationship between crime and finances. The existing literature, however, does not look at how banking services themselves affect crime rates. Section 3 outlines some banking behaviours and justification for a potential relationship between crime and banking services.

SECTION 3: ACCESS TO BANKING AND CRIME

As previously introduced, this paper concerns itself with the relationship between banking and crime rates. The conjecture is that increased access to banking should reduce crime rates, due to individuals potentially holding less of their wealth in cash on their persons and in their homes and vehicles. Due to the tight proposed relationship between banking and crime rates, there is the potential for endogeneity issues, whereby access to banking ought to reduce crime rates and high crime rates ought to push individuals towards use of banking services. Our conjecture is that increased crime rates should increase demand for banking services, however that would result in the "use of banking" appearing on both sides of an equation. Actual use of bank accounts data is also very limited, ruling out its use as a variable. To circumvent the endogeneity problem, the variable employed for banking is "access to banking" instead of "use of banking." This measure is used because the prevalence of bank branches is assumed by the author to be less tied to the crime rate than ownership of accounts. Owning a deposit account is an unobservable action, from the perspective of a criminal, therefore they are reduced to adjusting their payoff perceptions based on what they can observe – prevalence of bank branches. There may be an increase in bank branches with an increase in demand for banking services, which are driven by various factors; other explanatory variables such as GNP growth included in the regression should help control for demand changes. Unfortunately, there is limited data available so comparing lagged values of banking service uptake or access and subsequent changes in victimization rates is not possible at this time. Given the preceding rational, bank branches per capita as a measure of banking access is approximating an exogenous variable that is not endogenously determined in the equations subsequently modelled.

The hypothesis examined herein stems from the belief that criminals make decisions based on their perceptions; therefore, in the mind of the criminal, increased access to banking should

reduce the prevalence of potential crime targets. Subsequently, the expected returns to an act of theft ought to decrease and fewer crimes should be committed. Ayres and Levitt (1998) use similar logic when advancing the case for installation of Lojack[2], in that it is an unidentifiable precaution taken by potential victims, which results in positive externalities for all due to the perceptions of criminals changing in response. They find that a low actual installation rate of Lojack results in a dramatic decrease in auto-thefts. Though in the case of Lojack there are more reasons for criminals to adjust their perceptions of payoff, the basic theory remains the same – the potential for gains from the crime are reduced. Again, the argument that reduced income from criminal activities reduces participation in criminal activities is advanced by Freeman (1996). Therefore, the measure access to banking is selected as it does not directly rely on the actual uptake of banking services by individuals, but on criminals' perceptions of their payoff from committing a theft crime. Criminals do not know which individuals and households utilize a bank account and this unobservable action theoretically provides benefits to all potential victims.

To focus on the relevance of banking access to crime rates necessitates inquiry into banking behaviours, which allows us to ascertain the dynamics of the relationship between banking and other explanatory variables. To start, there is the issue of banking service uptake rates. There is a portion of literature that focuses on the unbanked, those individuals that do not utilize any formal banking services, especially use of accounts. According to the hypothesis in this paper, the unbanked should be a relatively small portion of the population in countries with relatively low crime rates; the majority of the population taking up banking should have discouraged crime to the extent that crime rates are low and few individuals do not hold accounts. Hogarth, Christoslav and Lee (2005) researched the characteristics of the unbanked and the motivations behind the decision to not have a bank account. Their prior research found low-income households cited "product motivation reasons" for their lack of account ownership, reasons such as a lack of money, lack of

[2] "Lojack is a hidden radio-transmitter device used for retrieving stolen vehicles" (Ayres and Levitt 1998, 43).

desire to have an account or they simply had not gotten around to opening an account. They propose a variety of barriers to account ownership, including "the households' ability to manage their bank accounts" and "cognitive processing" skills. Hogarth, Christoslav and Lee (2005) find overestimation of costs is often a discouraging factor for unbanked households (10). There is no discussion of the costs of banking services across countries, which may play a factor in the determination of bank penetration; bank penetration appears to be highly correlated with GNP. There are also a variety of recently developed financial services and institutions being offered in many countries, especially through the work of non-governmental organizations operating microfinance institutions.

While those countries that fall under the banner of "developed nations" generally have highly developed financial institutions and large uptake rates, the same is not necessarily true of those countries classified as "developing." Research into the banking behaviour of households in developing countries has found that income smoothing does occur, however households live very close to their total means and tend to be credit constrained (Schmidt-Hebel, Webb and Corsetti 1992). To access credit, the development of rotating savings and credit associations (roscas) has become quite popular across the developing world, as well as a variety of microfinance institutions (MFIs). These organizations often enable a group of individuals to qualify for deposit accounts; many organizations are also expanding to provide more banking services (Gugerty 2007). Participants in these organizations often cite the use of peer pressure to maintain saving and to enable the purchase of larger goods as motivations for participation.

According to Rutherford (1996), the poor look at geographical proximity, ease of withdrawal and safety when analysing holding a bank account, amongst other reasons. The concern for the safety of their deposit at the bank may change their willingness to hold a deposit account, which would encourage higher rates of direct victimization under the hypothesis in this paper. Poor individuals in developing countries also find themselves intimidated by the process

and turned off by the transaction costs of depositing and withdrawing from an account (Wright 1999). The continued development of financial institutions in the developing world, targeting a variety of socioeconomic groups, should lead to increased access, an issue of concern for those working in the microfinance sector (Wright 1999).

While studies of crime rates look at age structure to see the pool of potential crime perpetrators, age structure is also relevant to banking behaviour. The propensity to own a bank account generally rises as individuals move out of the youth and young adult age category (Hogarth, Anguelov and Lee 2005, 17). Hogarth Anguelov and Lee (2005) propose that age is a measure of experience, as well age allows for the development of a credit history and work history, variables which they find increase the probability of owning a bank account.

This paper undertakes to empirically analyze the hypothesis that access to banking reduces the occurrence of crime as a new contribution to the literature on the economics of crime. To do so, it draws upon the newly published database by Beck, Demirguc-Kunt and Peria (2007) on access to banking services and on crime and development. It also builds upon the research of Soares (2004).

SECTION 4: DATA SOURCES

Beck, Demirguc-Kunt and Peria (2007) recently undertook the construction of a dataset that measures access to and use of banking services in a selection of 99 countries. Information was collected through surveys sent to the central banks of the countries involved. Not all countries responded for all categories, inhibiting the inclusion of further variables in this paper. A wealth of information is available in the basic analysis of their paper, including loan size and number of loans held. For the empirical exercises in my paper, I examine demographic penetration of bank branches. The presence of this new data set allowed me to test the hypothesis that access to banking reduces crime rates; previously there was a dearth of similar banking measures. Their data set is for 2003/2004, which naturally has certain limitations.

The International Crime Victims Surveys (ICVS) provide a new benchmark in comprehensive data regarding crime at a macroeconomic level. As previously mentioned, the level of reporting to the government often increases with the level of economic development, portraying an inaccurate relationship between crime and growth (Soares 2004). The United Nations, under their Interregional Crime and Justice Research Institute (UNICRI) expanded their victimization surveys from European countries to a group of international countries, coordinating surveying through a variety of international research institutes. The data sets are irregularly timed, covering 1989, 1992, 1996 and 2000 (Soares 2004).

While previous research relied on official government data, the ICVS conducts one-on-one surveys with individuals via telephone or in person. Different countries have different sample sizes, ranging from approximately one thousand to approximately eight thousand. A wide variety of questions relating to victimization are asked of respondents, including screening questions. Some of the surveys cover only urban or capital city residents, while others are nation-wide.

One drawback of this data set is the lack of time span covered by the ICVS. The majority of the countries included have only been surveyed once. Though there are a few who have now been covered multiple times, there is no consistency to elapsed time, nor a large group that has been resurveyed. This limits research into the topic due to the inability to explore panel aspects of crime (Soares 2004, 162).

The crime measure used in this paper is straightforward. Each response indicating that the respondent had been the victim of at least one theft or one robbery, received a value of one, in each item category available, for example motorcycle, bike, and personal property.[3] Then the number of positive responses for a complete crime category was divided by the total number of respondents in each country and multiplied by one hundred. This gave the percentage of the population, or representative group, who had been victims of each crime group, thefts and burglaries. Both the theft and burglary categories were aggregated and divided to determine the total level of crime in each country. The ICVS gives values in a variety of categories, however it does not specify the exact target or item that was stolen, therefore all theft categories are included in the crime index. For the purposes of this paper, money is assumed to be the ideal gain from crime, while other objects may be acquired either due to no discovery of cash or in lieu of cash. Cash is unlikely to be traced, highly liquid and compact enough to steal without drawing excessive attention to oneself. Given the inability to separate out money crimes, there is noise in the dependent variable. However, using the rationale that cash is the primary objective and removal of cash would dramatically reduce the profitability of perpetrating a crime, the amount of noise should not overpower the results.

Figure 1 presents the resulting crime indices; the numbers are similar to those presented by Soares. The most marked difference is in the mean thefts per capita. The most notable difference in construction is that the data set used in my paper focuses on the year 2000, while all of Soares' data comes from older ICVS surveys, namely 1989, 1992 and 1996/1997. Additionally, the exact

[3] For a detailed list of the categories included, please see Appendix III: Questions Used from ICVS Data.

methodology employed by Soares in the construction of the crime indices was not presented, for example whether both current and previous year crimes are included; therefore, this paper developed its own index measures which may differ from the original indices.

	Soares (1989-1996 Data)			Keery (1996-2000 Data)		
	Theft	**Burglary**	**Contact[4]**	**Theft**	**Burglary**	**Total Crime**
Mean	25.08	6.68	7.65	20.147	7.2368	27.384
S.D.	6.84	3.74	3.68	8.2172	4.5585	11.650
Max	41.8	17.40	21.00	39.570	17.400	53.840
Min	11.6	0.80	2.00	6.6700	1.2900	8.0600
No. Of obs.	45	45	45	44	44	44
Correlations						
Theft	1.00			1.00		
Burglary	0.58	1.00		0.63338	1.00	
Contact	0.55	0.76	1.00	-	-	-
Total Crime	-	-	-	0.95306	0.83795	1.00

Figure 1- Number of Crime Victims as a Percentage of Survey Population

(Percentage thefts per capita, percentage burglaries per capita and percentage total crime per capita). Soares uses ICVS data averaged for all the surveys in which the country was included (1989, 1992 and/or 1996/97).

(Source: Soares 2004)

Keery uses ICVS data for crimes in the past year at time of survey, using country surveys from 1996 or 2000.

In an attempt to replicate the basic results of Soares, the main variables are constructed from the same data sets. Soares employed an average of all the ICVS surveys from 1992 through 1997 including only data from the years in which a country was included. This paper uses the year 2000 surveys, which is the year of the most current ICVS data. A dozen countries are represented by data from 1996, in order to entertain a larger sample size.[5]

The majority of the non-crime, socio-economic data comes from the World Bank's World Development Indicators, for the year 2000. GNP is constructed with the gross national income (GNI) for 2000, measured in 2000 $USD, divided by the reported population. Degree of urbanization is the urban population as a percentage of total population, also from the WDI (Soares

[4] While included in the work of Soares, contact crimes are omitted from the data due to the lack of relevance to the hypothesis.

[5] Argentina, Bolivia, Botswana, Brazil, Costa Rica, India, Indonesia, Kyrgizstan, Nigeria, Slovakia, South Africa, Zimbabwe

2004, 183). Education is the primary gross enrolment rate, defined as "the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown (Unesco Institute for Statistics 2008)." Therefore, high gross enrolment rates do not reflect overall education, but in fact a lower level of already achieved education. Ratios over 100 indicate higher levels of older students and adults involved in primary education. The majority of developed countries fall in the 98 to 109 band.

While Soares (2004) includes a religion dummy with value 1 for populations with over 60% identifying as adherents of a Christian religion taken from the Central Intelligence Agency (CIA), the religion variables in this paper are more disaggregated. Also coming from the CIA data, they include the percentage of adherents or those that claim any of the following religions: Muslim, Christian, Orthodox, Jewish, Buddhist, Hindu, Sikh or Atheist/Agnostic.

The Gini coefficients are taken from a variety of years, in order to maintain a moderately large country sample size. The furthest back value comes from 1992 for Switzerland. All values are found as close to the year 2000 as possible. The justification for inclusion of values from such a broad time frame is the generally small changes in the Gini over a decade. The data comes from the World Bank website *Inequality Around the World.*

When both the ICVS and banking data are compiled, there is unfortunately little crossover. Both sets present over 90 countries worth of data, providing only 45 countries of overlap. Additionally, there are no education values available for the Philippines, further reducing the sample size for a portion of the regressions.

Summary Statistics

To reveal some of the variety in the sample, this section highlights the countries holding the highest and lowest values in each of the variable categories. Appendix IV lists many of the variable values employed in this paper. Overall, Azerbaijan leads with the lowest total crime per capita

(column TCRIME PC) rate of 0.080, followed by Croatia (0.092), and then Portugal (0.117). Colombia with 0.538, Zimbabwe and Costa Rica with 0.487and then the United Kingdom with 0.450 show the highest prevalence of total crime per capita. Again, Azerbaijan holds the lowest per capita theft rate (THEFT PC) with 0.067), followed by Croatia (0.067) and Portugal (0.091). At the opposite end of the scale Colombia leads the way with a theft rate of 0.396 per capita, with Brazil the second highest at 0.361 and the United Kingdom the third highest at 0.339. Finland squeaks ahead of the previous three lowest in the theft group to take the lowest per capita burglary (BUR PC) rate of 0.013. The highest rate goes to Zimbabwe (0.1740), followed by Zambia (0.1738) and then Costa Rica (0.169).

Uganda has the lowest number of branches per thousand (column BranchP) at 0.53 while Belgium has the most with 53.15. Zambia and Bolivia hold the second and third lowest access measures, respectively. Canada has the third highest rate at 45.60, edged out by Portugal with 51.58 and then Belgium. The across-sample average is 15.26 branches per thousand.

Uganda has the lowest GNP per capita of 245 USD (column GDP PC), while Switzerland has the highest with 42138 USD. Zimbabwe's GNP growth rate for 2000 of negative eight percent takes the cake for the worst; the second lowest is the negative one of Argentina. Azerbaijan shows strong growth of eleven percent, with Russia showing ten percent. In terms of inequality, the lowest Gini (GINI) coefficients go to Hungary, Sweden and Slovakia at around 25. The most unequal societies in the sample are Namibia, Brazil and Botswana with Gini coefficients of 74, 61.3 and 61 respectively. Canada ranks fifteenth with 31.15. Belgium (97%), the United Kingdom (89%), Argentina (89%) and Australia (87%) have the highest rates of urbanization. Uganda (12%), India 28%), Namibia (32%) and Zimbabwe (34%) have the lowest.

The education variable finds Zambia, Nigeria and Croatia with the lowest gross primary enrolment rates at 80%, 91% and 93% respectively. The highest values are 150%, 125% and

124%, belonging to Brazil, Uganda and Portugal, respectively. These numbers mean that there are students who are not the appropriate age enrolled in primary level education. Additionally, "the high correlation between cognitive ability and educational attainment has been well established, so that educational attainment often serves as a proxy for cognition" (Hogarth, Anguelov and Lee 2005, 10). This potentially means a high degree of correlation between education and banking services, which does not present itself in the correlation matrix of the variables used in the empirical analysis performed subsequently; the matrix is found in Appendix I. The value for the correlation between demographic branch penetration (DBRNCHP) and education (EDUC) is a mere 0.099.

VARIABLE RELATIONSHIPS

The hypothesis examined in this paper suggests a negative relationship between crime rates and access to banking; a trendline should have a downwards slope as access to banking increases and crime rates decrease. To determine the basic relationship in the data, the variable demographic bank penetration was plotted against total crime and then a trendline was fitted. This is presented in Figure 2. To further examine this hypothesis the process was repeated using a different access measure, demographic ATM penetration, in Figure 3. Both plots reveal definitive downwards trends. However, this relationship could be due to other factors such as GDP per capita. Therefore, the addition of further socio-economic variables is necessary to control for other influences in the relationship.

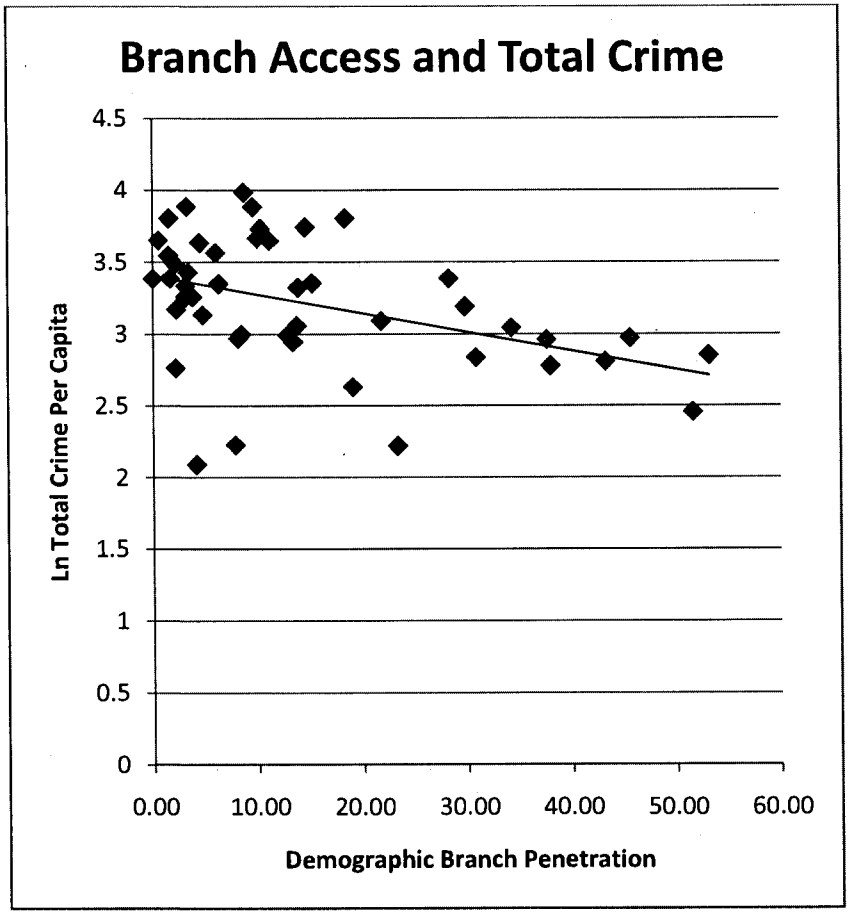

Figure 2- Linear Relationship between Crime and Branch Penetration

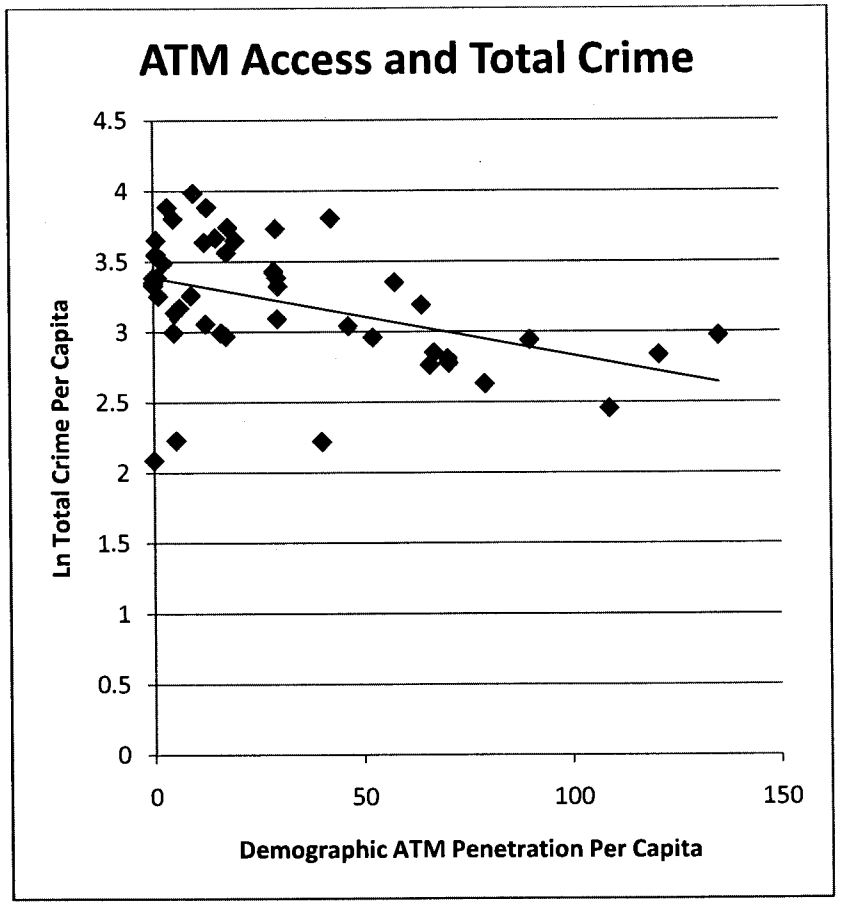

Figure 3- Linear Relationship between Crime and ATM Penetration

SECTION 5: SPECIFICATION AND EXPECTATIONS

$$\ln(Crime) = f\left(\underset{(-)}{\ln(GNP)}, \underset{(+)}{GINI}, \underset{(+/-)}{URBAN}, \underset{(-)}{EDUCATION}, \underset{(-)}{GROWTH}, \underset{(-)}{BANKING\ ACCESS}, \underset{(-)}{RELIGION}\right)$$

Equation 1 - Basic Function and Expected Signs

This paper takes the basic model specification of Soares, Equation 1, and expands upon it with the data from Beck, Demirguc-Kunt and Peria (2007) to isolate the effects of the access to banking. The expected signs are indicated in parentheses under the variables. Soares includes economic variables as the development variables; development is the main focus of his paper. The other variables in Soares's specification acted as controls for potential shifts in tastes which are correlated with development.

$$\begin{aligned}\ln(total\ crime\ per\ capita) &= \beta_0 + \beta_1 \ln(GNP) + \beta_2 URB + \beta_3 EDUC + \beta_4 GROWTH + \beta_5 GINI \\ &+ \beta_6 DEMOGRAPHIC\ BRANCH\ PENETRATION + \beta_7 MUSLIM + \beta_8 CHRISTIAN \\ &+ \beta_9 ATHEIST{:}AGNOSTIC + \beta_{10} ORTHODOX + \epsilon\end{aligned}$$

Equation 2 - Basic Specification

Standard OLS regressions were performed to determine the effect of including access to banking services on the crime rates in a macroeconomic sample. Equation 2 shows the basic linear specification of the model. The regressions were modeled after the work of Soares, extending them to include the additional explanatory variable demographic branch penetration, as well as several other permutations. The variable log(police) is dropped, following the logic of Soares, and the single religion variable is replaced with Muslim, Christian, Atheist:Agnostic and Orthodox. The independent variable of interest is demographic branch penetration.

There are three different dependent variables which are a logged measure of crime: burglary, theft, as well as a composite of the two, total crime. The index is created by including all

respondents in the ICVS data who indicated that they had been victimized in the previous year, divided by the total number of respondents to approximate the victimization rate for the country. The rate is expressed as a percentage. Using the International Crime Victims Survey as a basis, thefts were defined identically to Soares. However, robberies were also included in our theft category due to the lack of difference in the mind of the perpetrator. Robberies are defined as theft through violence or intimidation. The opportunity cost of committing a robbery does go up, as punishments are generally more severe, however the difference between perpetrating a theft and threatening a victim, verbally or physically, whilst perpetrating a theft is very small. Following the logic of Doyle, Ahmed and Horn (1999), the crime measure includes all property crime. They state that they "did not estimate the model for individual crimes since the disaggregation of property crime data may be subject to what Heineke (1978) calls overly narrow definitional differences whereby planned burglaries are easily turned into larcenies, not because of differentials in the likelihood of arrest but instead because the criminal views them as near substitutes" (Doyle, Ahmed and Horn 1999, 721).[6]

Thefts do not include threats but may still involve body contact, for example pick pockets. Theft specifically includes theft of objects from a car, car theft, personal property theft, motorbike or moped theft and bicycle theft. For the purposes of this paper, money is assumed to be the ideal gain from crime, while other objects may be acquired either due to no discovery of cash or in lieu of cash. Burglary is defined as break and enter of a home, but does not include contact between the victim and the perpetrator. This last category includes both attempted and perpetrated burglaries and is included as a separate category in the regressions. Total crime encompasses all three categories of property theft. No other contact crimes such as assault or rape are included in the regressions.

[6] A larceny under US common law and English law is the wrongful taking and carrying away of the personal goods of another from his or her possession with intent to convert them to the taker's own use. (Random House Unabridged Dictionary 2006)

There are four basic equations, shown in the next section, covering the three crime measures, plus a specification that includes the disaggregated religion variables. Equation 2 with all of the religion variables was estimated first, showing high levels of multicollinearity. The results of the set of religion regressions can be found in Table 1. For each dependent variable there are three different basic model specifications. The work of Soares is presented for comparison to the work of Keery. The term "duplicates" refers to the model specifications of Soares which have been updated to utilize the new data from 2000.

First, using the new data, the model of Soares was duplicated for all of the specifications that did not include ln(police) to determine how closely the updated data matched the previous findings. Then the variable "demographic branch penetration" was added and compared to the duplicated work of Soares. Multicollinearity issues emerged, surprisingly not mentioned in Soares's paper. In order to mitigate the effect of multicollinearity, further specifications were attempted. Urban was excluded, to the detriment of the model's characteristics; fit dropped dramatically, no variables were significant and condition indexes were very high. Another permutation was the exclusion of education; in this case the model had acceptable characteristics. Therefore, the results of the specification without education are included in the results tables. This model was undertaken due to the questionable choice of education measure, which has values in the range 80% to 150% and therefore may not provide much insight into the impact of education on crime.

INCLUDED VARIABLES

LOG CRIME

Soares (2004) employs the natural logarithm of the measures of crime as the dependent variable, presenting the crime levels as percentages of the population (Soares 2004). Soares (2004) utilizes three measures of crime: thefts, burglaries and contact crimes. This paper uses three categories, however, as previously defined in section 5.

LOG GNP

Soares (2004) uses "the natural logarithm of the GNP per capita at constant US$" as a primary independent variable. The justification for the inclusion of this variable is that several factors including institutional development, actual law enforcement and corruptibility are excluded, yet highly correlated with GNP per capita (Soares 2004). The use of GNP per capita shows the amount of national income potentially available to an individual. This relates to Becker's model as the potential income share that an individual may seek through legitimate or illegitimate means, so the greater the GNP per capita, the larger the potential income share. Several other works include GDP per capita, with the results being mixed due to the underreporting error that resulted in the previous belief of an increase in crime with an increase in GNP (Bennett 1991). Other papers also use consumption per capita to fulfill a similar role (Pudney, Deadman and Pyle 2000).

For log GNP, I expect a negative coefficient due to the results of Soares which found consistently negative coefficients when reporting errors were corrected through the ICVS data.

INEQUALITY RATIO

The difficulty in accurate measurement and the variable's effectiveness at capturing the inequality in society receive side mention in the Soares (2004) paper due to the potential for bias towards zero in the coefficient (Soares 2004). In Soares' opinion, inequality is possibly a measure of internal social conflict (Soares 2004). Following the Becker model, inequality would represent

potential gains for criminal activity. The inequality ratio reveals the proportion of the population that holds a very small proportion of the national income. Thus it also represents the potential for a large marginal increase in income through crime for this group, as well as low opportunity cost and wealthy targets.

Unfortunately the ratio data is unavailable for all but eighteen countries in the sample; it is therefore excluded, as the results would be very limited for such a small sample. Instead, the Gini coefficient is included as a measure of inequality. The data for Soares is taken from the World Development Indicators; Soares uses inequality data from 1999, again limited to only a few of the countries in the sample. This paper primarily uses data for 2000, as it is the same year as the ICVS surveys employed, though some values were unavailable for 2000. Soares (2004)found that inequality was the most closely linked independent variable to crime rates. Doyle, Ahmed and Horn (1999) however, found that inequality had no effect in their US study. Freeman associates greater inequality with increased crime rates (1996,33).

The Gini coefficient is partially functioning as an opportunity cost proxy, while wages often fulfill the same function. At the macroeconomic level including developing countries, disaggregating into wage rates per occupational category would most likely be unfeasible and quite probably provide little insight. While wages frequently function as opportunity cost proxies, the same logic as the argument for exclusion of unemployment leads to the conclusion that formal sector wages and structure would not accurately portray the opportunities and costs in many countries. In developed nation, country-specific studies, wages are often broken down by sector and result in statistically significant results.[7] For this reason, the Gini coefficient is more appropriate than wages for the purposes of this study.

[7] For example see Doyle, Ahmed and Horn, 1999.

The coefficient on the Gini ratio is expected to be positive, indicating more social unrest and corresponding to the Becker model where a lack of opportunity cost would increase the prevalence of crime. Societies that are more unequal may also have economies built on many shadow economy activities and corrupt legal systems that limit persecution, encouraging crime through all levels of society.

URBAN

Urban is the percentage of the population living in urban areas, as taken from the World Development Indicators and in keeping with the Soares model. Though Soares proposes the use of an urbanization variable for its relationship to police presence and reporting due to reduced transaction costs, there are many other implications of an increase in urbanization. Transaction costs may be reduced due to smaller areas to cover for police and easier access to police for the populace. There is a trade off in the criminology literature between the breakdown of traditional family structures and the increased presence of people, resulting in an ambiguous prediction for the urban coefficient (Cohen, Felson and Land 1980, 91).

From this follows the assumptions of Cohen, Felson and Land (1980) that ceteris paribus, potential crime perpetrators prefer targets with fewer, rather than more guardians and "... persons who are related to an individual by secondary-group ties or by no stable social relationships at all and who do not themselves have norm-enforcing role obligations are less likely than persons related to the individual by primary-group ties to act as guardians for the individual's property" (98-99). Additionally, ceteris paribus, increasing the number of people moving through transit locations provides an increased number of potential targets and subsequently an increase in property crime violations, but also increases the potential witnesses (Cohen, Felson and Land 1980, 99). Overall, they propose that an increase in population density where people are not directly related and spend more time in transit will lead to an overall increase in property crime, consistent with the hypothesis of Soares (2004).

Partially relating to the level of urbanization is the level of industrialization, as mentioned in relation to growth. The increased quantity of goods and money available due to production, coupled with population density may provide more opportunities for theft, part of this effect may also be captured in the growth variable (Bennett 1991, 344).

Cullen and Levitt's (1999) work estimates a one for one trade-off between crime reporting and city residency: each additional crime reported decreases city population by one person. They state that higher-income households, and households with children, have a higher responsiveness to crime rate changes, compared to other households. It suggests that there should be a negative coefficient on the urban variable. They also find that as crime rates increase, house prices tend to decrease; this lowers the property tax base, reducing city revenues. Other work suggests that increased police forces (requiring funding), do in fact reduce crime (Levitt 2004). There are also implications due to the relocation of the more mobile sections of society, resulting in more negative externalities for those remaining (Cullen and Levitt 1999).

The concentration of individuals in one area allows a bank to service more individuals. This would decrease the need for multiple branches. However, this paper is focusing on demographic branch penetration as a measure of *access* to banking. Overall, the sign of the coefficient for urbanization is ambiguous in the literature.

EDUCATION

Soares (2004) uses the gross primary enrolment rate from the World Development Indicators 1999. His justification for the inclusion of education is as an "attempt to capture the population's degree of knowledge of individual rights, and also social transformations that may affect the reporting rates of certain types of crimes, such as sexual and violent ones" (Soares 2004).

The use of enrolment rate as a measure of education creates the potential of it acting as an indicator of reduced opportunity for crime, because it removes children from the streets, according to Soares (2004). This may in reality be a consequence of removing children and teenagers from the streets where they have greater potential to commit crimes, as opposed to the direct effect of education (Soares 2004, 175). Results from Soares' (2004) work indicate that education has a negative effect on crime rates, in theory due to the reduced time potential to take part in illegitimate activities, as well as an increase in human capital and potential employment.

GROWTH

The growth rate is taken from the World Development Indicators, which measures the nominal growth rate of GDP for the data year as an annual percentage. Soares (2004) uses the GNP per capita average growth for the survey year. The inclusion of growth should indicate the economic situation of the country at that point in time, where growth should indicate better legal sector vacancies, drawing marginal criminals out of the illegal sector (Soares 2004). However, these effects may not be fully realized without a lagged period, thus requiring panel data. Though not necessarily true, growth can be seen as indicative of greater employment opportunities. A continuation of this argument is the reduced time available for illegal activity due to employment, theoretically necessitating the inclusion of the unemployment or employment rates. The per capita growth rate captures the *potential* for legitimate gains, while the unemployment rate is highly sensitive to shifts between the informal and formal sectors, thus the unemployment rate is not included. Growth may also refer to industrialization, or at the very least a proliferation of goods, increasing the number of potential targets and therefore possibly the amount of theft. This direction of change stems from dated theory that attempt to explain the concomitant increase in development and crime (Bennett 1991, 344).

RELIGION

Soares (2004) includes the prevalence of Christianity in his regression equation, using a dummy which indicates that 60% or more of a population adheres to a Christian religion taken from CIA data.

A negative expectation of the religion coefficient is consistent with the "hellfire" hypothesis, which proposes that the costs of illegal activity act as a strong deterrent due to punishment in the afterlife (Hirschi and Stark 1969). Additionally, there is the current social cost. Heaton (2006) summarizes the literature's establishment of religious organizations as behavioural benchmarks against which individuals assess behaviours or "providers of neural stimulation," when there is a lack of these bodies individuals it results in a higher propensity to commit crimes (Heaton 2006). There is the potential for upward bias if religious organizations clustered around areas of high crime, to "convert the sinners" (Heaton 2006). The proposed negative bias explanation is declining attendance and participation in religious activities due to guilt or institutional censure stemming from criminal activities (Heaton 2006). Heaton concludes that OLS estimates are biased downwards, relative to IV estimates. Heaton (2006) also observes higher arrest rates in locales with higher historic religious participation, by approximately one third. This may occur due to more stringent retribution attitudes amongst religious communities.

Both Soares (2004) and Heaton (2006) find no statistical relationship between religion and crime. Heaton suggests that religious individuals who are a small minority may have greater trust and openness, with higher victimization rates. This trend may also arise due to the collective social pressure arising from a highly religious community to deter crime; larger populations would have less cohesive social pressures. This provides the rational for a series of religion variables to indicate the fragmentation resulting from the presence of a multitude of religious minorities. The strength of the social bonds and the threat of social exclusion may result in a negative coefficient.

DEMOGRAPHIC BANK PENETRATION

The main contribution of this paper concerns the variable used to measure demographic bank penetration. The research of Beck, Demirguc-Kunt and Peria (2007) provides measures of Automated Teller Machine (ATM) penetration and branch penetration, amongst others. Both are measured in terms of geographic and demographic penetration. Geographic ATM penetration is the number of ATMs per 1000 km^2, while geographic branch penetration is the number of bank branches per 1000 km^2. Likewise, the demographic measures are per 100,000 people. Kearns (2008) presents travel time to the nearest bank as a measure of access at the individual household level (25). Geographic measures would encompass part of the transaction costs, as in Kearns' measure, however they would not necessarily be uniform, for example in countries like Canada and Brazil where the majority of the population lives in much more condensed locales, not all of which would be captured in the urbanization variable. Additionally, attempts to examine the relationship between deposit accounts per capita and crime would lead to the previously mentioned issues of endogeneity. Meanwhile, the sample size would be reduced substantially due to very few countries being represented in the two primary data sets. Bank branches also have the characteristic of requiring fewer skills on the part of the customer; they do not have to be literate or comfortable with computer technology.

The prediction for the coefficient on demographic bank penetration is unambiguously negative. The motivation behind the paper is that access to bank accounts reduces the available assets that comprise a substantial part of the payoff to potential criminals, with cash being the most lucrative. Again, access to banking services constitutes a reduction in the perceived payoff by a criminal, according to the hypothesis. With easy access to banking, a thief would not expect anyone to hold a significant amount of cash. Meanwhile use of a bank account may represent an endogeneity problem whereby increased crime could cause increased use of bank accounts; actual use is likely to be driven by the presence of crime. Concomitantly, increased actual use of bank

accounts likely deters theft through reduced payoff potential. Thus, the unobservable actions of individuals, coupled with the presence of financial institutions, should produce positive externalities for the general populous in reduced crime rates due to changing the perceptions of potential thieves. Personal crimes are the only ones represented in the crime survey; therefore crimes against companies, such as banks, are excluded from the study.

SECTION 6: RESULTS

The results are presented in tables following the introduction and discussion of the first attempt at a regression. The values in brackets underneath the coefficients are standard errors. A (*) indicates variables significant at the 10 percent level; a (**) indicates significance at the 5 percent level; and a (***) indicates significance at the 1 percent level. There are no significance levels presented for specific regressions in the work of Soares, therefore they are presented unmarked in the tables that follow. However, they are discussed in the ensuing comparison of results.

SPECIFICATION ONE

Equation 2 outlined a model with disaggregated religion variables, with results in Table 1. In this specification (column 4) there is an auxiliary r-squared problem with lnGNP as it exceeds 0.8 with a value of 0.8206. Additionally, there is a condition index of 34.752 which indicates medium multicollinearity. Due to the findings of the data set, the multicollinearity does not present a problem because the subsequent redefinition of the equation with fewer explanatory variables resolves the issue.

The errors appear to be non-normally distributed due to a conflict between the Jarque-Bera and the Chi-Squared test results. Upon plotting the residuals, however, there does not appear to be an extensive problem.

The model appears to have a rather satisfactory fit, based on the R-square and R-square adjusted values. Due to the lack of statistical significance, an F test is used to test the null hypothesis that the religion variables are jointly zero; we fail to reject the null hypothesis.

The only statistically significant variables are the constant, education, growth and demographic branch penetration. The religion variables do not seem to be very useful and this is after removing the less prevalent religion variables. The positive coefficient for urban follows the theory. The positive coefficient on education however, coupled with the fact that it is significant, is unexpected. The positive coefficient counters the work of Freeman (1996) which finds high-school drop outs to be more likely to commit crimes than those with more education.

Estimation of Equation 2 shows that the availability of bank branches decreases the incidence of crime, according to the coefficient with value -0.0139. This is shown in the final column (4), as compared to the earlier regression in column (3) which did not include the variable demographic branch penetration. This statistically significant result follows the prediction of the hypothesis. Inclusion of the new variable improved the value of the adjusted R-squared substantially, from 0.3898 to 0.4690. Additionally, the new variable is significant at the 95 percent level. Given the presence of multicollinearity, and the lack of statistical significance of the religion variables, further specifications follow.

BASIC REGRESSION

TOTAL CRIME: RELIGIONS	Soares (1)	Soares Duplicate (2)	Keery (3)	Keery (4)
ln(gnp)	0.1613	-0.1131**	-0.1457**	-0.0501
	(0.1459)	(0.0566)	(0.0578)	(0.0667)
Ratio/Gini	0.0445	0.0119**	0.0100*	0.0078
	(0.0279)	(0.0058)	(0.0059)	(0.0056)
Urb	-0.0061	0.0069	0.0063	0.0053
	(0.0101)	(0.0047)	(0.0049)	(0.0045)
Educ	-0.0025	0.0052	0.0072	0.0090
	(0.0175)	(0.0059)	(0.0058)	(0.0054)
Growth	-0.0358	-0.0580***	-0.0604***	-0.0613***
	(0.0205)	(0.0210)	(0.0218)	(0.0204)
ln(pol)	-0.0179	-	-	-
	(0.0576)	-	-	-
D Branch	-	-	-	-0.0139**
	-	-	-	(0.0057)
Christian	0.1746	-0.0006	-0.0033	-0.0020
	(0.2657)	(0.0022)	(0.0034)	(0.0032)
Muslim	-	-	-0.0048	-0.0033
	-	-	(0.0039)	(0.0037)
Ath/Agn	-	-	0.0034	0.0040
	-	-	(0.0046)	(0.0043)
Orthodox	-	-	-0.0039	-0.0028
	-	-	(0.0039)	(0.0037)
Constant	1.9539	1.9935***	2.0869***	2.2312***
	(1.1502)	(0.5801)	(0.5826)	(0.5467)
R^2	0.43	0.4378	0.5205	0.5954
R^2 Adj.	-	0.3441	0.3898	0.4690
Obs	25	43	43	43

Table 1 - Regression Results for Equation 2

*Note: * Indicates variables with 10 percent significance; ** indicates 5 percent significance; and *** indicates 1 percent significance.*

FURTHER REGRESSIONS

$$\ln(thefts\ per\ capita) = \beta_0 + \beta_1 \ln(GNP) + \beta_2 GINI + \beta_3 URB + \beta_4 EDUC + \beta_5 GROWTH + \beta_6 DEMOGRAPHIC\ BRANCH\ PENETRATION + \varepsilon$$

Equation 3 - Specification for Thefts

$$\ln(burglaries\ per\ capita) = \beta_0 + \beta_1 \ln(GNP) + \beta_2 GINI + \beta_3 URB + \beta_4 EDUC + \beta_5 GROWTH + \beta_6 DEMOGRAPHIC\ BRANCH\ PENETRATION + \varepsilon$$

Equation 4 - Specification for Burglaries

$$\ln(total\ crime\ per\ capita) = \beta_0 + \beta_1 \ln(GNP) + \beta_2 GINI + \beta_3 URB + \beta_4 EDUC + \beta_5 GROWTH + \beta_6 DEMOGRAPHIC\ BRANCH\ PENETRATION + \varepsilon$$

Equation 5 - Specification for Total Crime

ECONOMETRIC ISSUES

MULTICOLLINEARITY

Equation 2, which includes disaggregated religion variables, shows high levels of multicollinearity, which is intuitive; the presence of one religion in high quantity generally precludes the presence of another. To circumvent the presence of multicollinearity further models were specified. All of the religion variables were excluded due to the presence of multicollinearity as well as a lack of statistical significance. Soares (2004) also excluded the religion variable in the final specification in his paper. Several other specifications, including the removal of urbanization and various religions were also tested. However, the issues of multicollinearity remained. Equations 3, 4 and 5 show the basic specifications employed for theft, burglaries and total crime per capita. Tables 2, 3 and 4 present the results from the regressions on thefts, burglaries and total crime respectively; they are located in the next section.

The condition index for the basic regression of equation 2 with religions is 34.752. Therefore, several more models are estimated in an attempt to reduce the multicollinearity.

Specifications total crime, column (2) in table 4, and burglaries, column (4) in table 3 have mild to moderate multicollinearity, while specification theft, column (4) in table 2, has multicollinearity; the results are described in more detail in the following section. The remaining specifications do not indicate the presence of any multicollinearity. The inclusion of the religion variables results in moderate multicollinearity therefore it is not examined further; however, the adjusted R-squared does indicate a good fit of the model. Surprisingly, Soares does not mention multicollinearity issues. As mentioned, theory coincides with the presence of multicollinearity in the specification of these models.

The correlation matrix found in Appendix I shows high levels of correlation between the level of urbanization in a country and the demographic branch penetration, as well as GNP. This makes sense, because traditionally more developed countries have higher levels of urbanization. Branch penetration is also highly correlated with GNP. These correlations range from 0.576 to 0.786. The high level of correlation between these variables is intuitive, but contributes to the prevalence of multicollinearity in the regressions. Given the relatively small sample size, the presence of multicollinearity is not surprising and should not present a problem (Greene 2008, 60). Several of the regressions have auxiliary R-squared values exceeding 0.8, specifically in the case of ln(GNP). Unfortunately, there is not another proxy for this variable at hand, therefore it remains included.

THEFTS	Soares	Soares	Soares Duplicate	Keery	Keery	Soares	Soares Duplicate	Keery
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(gnp)	0.1613	0.0289	-0.11307**	-0.00401	-0.01299	-0.0112	-0.080896	0.012138
	(0.1459)	(0.0625)	(0.04753)	(0.05619)	(0.06325)	(0.0374)	(0.05701)	(0.07101)
Ratio/Gini	0.0445	0.0227	0.00585	0.00296	0.00556	0.0173	0.014797***	0.013120**
	(0.0279)	(0.0120)	(0.005167)	(0.004776)	(0.005203)	(0.0095)	(0.005924)	(0.005754)
Urb	-0.0061	0.0063	0.00743	0.00632	0.00826*	0.0093	0.0053647	0.005010
	(0.0101)	(0.0056)	(0.004478)	(0.004072)	(0.00490)	(0.0037)	(0.005238)	(0.00504)
Educ	-0.0025	-0.0038	0.00893	0.01183**	-	-	-	-
	(0.0175)	(0.0061)	(0.005425)	(0.005006)	-	-	-	-
Growth	-0.0358	-0.0089	-0.05566***	-0.05703***	-0.06298***	-	-	-
	(0.0205)	(0.0098)	(0.01902)	(0.01723)	(0.01992)	-	-	-
ln(pol)	-0.0179	-	-	-	-	-	-	-
	(0.0576)	-	-	-	-	-	-	-
D Branch	-	-	-	-0.01628***	-0.01457**	-	-	-0.014309**
	-	-	-	(0.005391)	(0.006138)	-	-	(0.00694)
Christian	0.1746	-	-	-	-	-	-	-
	(0.2657)	-	-	-	-	-	-	-
Constant	1.9539	2.771	1.4578***	1.6793***	2.6674***	2.567	2.2443***	2.628000***
	(1.1502)	(0.5418)	(0.5553)	(0.5082)	(0.4166)	(0.2657)	(0.4317)	0.4550
R^2	0.43	0.31	0.4006	0.5217	0.3909	0.29	0.2149	0.2921
R^2 Adj.	-	-	0.3196	0.4420	0.3107	-	0.1561	0.219500
Obs	25	41	43	43	44	42	44	44

Table 2 - Theft Regressions

BURGLARIES	Soares	Soares	Soares Duplicate	Keery	Keery	Soares	Soares Duplicate	Keery
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ln(gnp)	-0.5909	-0.2731	-0.145480**	-0.064178	-0.02866	-0.0112	-0.088587	-0.002159
	(0.3068)	(0.1623)	(0.07179)	(0.09264)	(0.09513)	(0.0374)	(0.07754)	(0.09935)
Ratio/Gini	-0.0092	0.0545	0.025066***	0.022913***	0.02015***	0.0173	0.025446***	0.023888***
	(0.0452)	(0.0205)	(0.007804)	(0.007874)	(0.007825)	(0.0095)	(0.008056)	(0.008051)
Urb	0.444	0.022	0.006609	0.005781	0.00357	0.0093	0.002008	0.001679
	(0.0213)	(0.0109)	(0.006764)	(0.006714)	(0.006752)	(0.0037)	(0.007124)	(0.007051)
Educ	0.0133	0.0046	-0.005723	-0.003563	-	-	-	-
	(0.0279)	(0.0138)	(0.008194)	(0.008253)	-	-	-	-
Growth	0.036	-0.0106	-0.060530**	-0.061552**	-0.06819**	-	-	-
	(0.0457)	(0.0209)	(0.02873)	(0.02841)	(0.02996)	-	-	-
ln(pol)	0.2278	-	-	-	-	-	-	-
	(0.1209)	-	-	-	-	-	-	-
D Branch	-	-	-	-0.012133	-0.01385	-	-	-0.013293
	-	-	-	(0.008888)	(0.009231)	-	-	(0.00971)
Christian	0.1434	-	-	-	-	-	-	-
	(0.5111)	-	-	-	-	-	-	-
Constant	2.7162	1.7996	1.1687	1.3338	1.2568**	2.567	0.60104	0.957450
	(2.4265)	(1.2129)	(0.8387)	(0.8379)	0.6190	(0.2657)	(0.5872)	(0.6365)
R^2	0.51	0.38	0.438	0.4657	0.4091	0.29	0.2962	0.3285
R^2 Adj.	-	-	0.3621	0.3766	0.3313	-	0.2434	0.2596
Obs	25	41	43	43	44	42	44	44

Table 3 - Burglaries Regressions

TOTAL CRIME	Keery (1)	Keery (2)	Keery (3)	Keery (4)	Keery (5)
ln(gnp)	-0.1205***	-0.01611	-0.01256	-0.08090	0.01214
	(0.04896)	(0.05886)	(0.06466)	(0.05701)	(0.07101)
Ratio/Gini	0.0113**	0.00854*	0.00963*	0.01480**	0.01312
	(0.005322)	(0.005003)	(0.005319)	(0.005924)	(0.005754)
Urb	0.0071	0.00599	0.00677	0.00536	0.00501**
	(0.004613)	(0.004266)	(0.00459)	(0.005238)	(0.00504)
Educ	-0.0048	0.00754	-	-	-
	(0.005588)	(0.005244)	-	-	-
Growth	-0.0561***	-0.05739***	-0.06357***	-	-
	(0.01959)	(0.01805)	(0.02036)	-	-
D Branch	-	-0.01558**	-0.01483**	-	-0.01431**
	-	(0.005647)	(0.006275)	-	(0.00694)
Constant	2.0023***	2.2144***	2.9070***	2.2443***	2.628***
	(0.5719)	(0.5324)	(0.4208)	(0.4317)	(0.455)
R^2	0.4367	0.535	0.4366	0.2149	0.2921
R^2 Adj.	0.3606	0.4575	0.3625	0.1561	0.2195
Obs	43	43	44	44	44

Table 4 - Total Crime Regressions

Note: Specification 2Td has non-normal errors, therefore t and F tests are not valid, but still used as conservative measures.

INTERPRETATION OF RESULTS

DEMOGRAPHIC BRANCH PENETRATION

For the demographic branch outreach variable, an increase in the coefficient indicates the effect of a one unit increase in the number of bank branches per 100,000 people. The focus of the paper is to test whether access to banking services plays a role in decreasing crime rates. Through all the model specifications the coefficients are negative, aligning with the hypothesis presented. In the case of burglaries, the effect of demographic branch penetration is not significant, with p-values ranging from 0.142 for column (5), table 3 to 0.181 for column (4), table 3. In all of the rest of the specifications, however, the coefficients are significant at the 95 and 99 percent levels. It appears that theft crimes are significantly reduced by increased access to banking, as seen by the values in table 2, columns (4), (5) and (8). These results conform to the hypothesis.

The magnitudes of the coefficients remain relatively consistent throughout all of the specifications, in the range of -0.012 to -0.016. In comparison with the other coefficients, these estimates are large. Growth is the only statistically significant variable that consistently maintains a large magnitude. The coefficient on Gini falls in the same range as demographic branch penetration. The best fitting model is column (2) in table 4 with an adjusted R-squared value of 0.4575. This specification models total crime based upon ln(gnp), gini, urban, education, growth and demographic branch penetration. Therefore, it contains the greatest number of relevant variables, based on the work of Soares as well as the model specifications presented in the tables. Reassuringly, the coefficient on demographic branch penetration is -0.01558 and it is significant at the 99 percent level. In the regression, growth and the constant are also significant at 99 percent, while the Gini is significant at 90 percent; urban and education are significant at 80 percent. The only coefficient that is not significant is ln(gnp), the non-significance of ln(gnp) is consistent across the other regressions.

Table 2, column (4) finds the largest magnitude coefficient on demographic branch penetration, with a value of -0.01628. This model includes ln(gnp), gini, urban, education and growth as independent variables. The adjusted R-squared value is 0.4420. There are only three significant variables in this model, however: education, growth and demographic branch penetration.

The total crime specification may have higher adjusted R-squared values due to the presence of more responses in the ICVS when the multiple theft categories are aggregated. The burglaries regressions are lacking due to their lack of frequency in positive responses in the ICVS, therefore the value of the dependent variable is rather low and has a low variance across countries. This explains the lack of significant variables in the burglaries regressions. Comparatively, demographic branch penetration coefficients are quite significant when analysed against the other coefficients in the burglary regressions, where only Gini and growth are significant. The overall results of the inclusion of demographic branch penetration are extremely interesting as they coincide in sign with the hypothesis and are nearly exclusively significant.

LN(GNP)

Soares found that in "six out of nine cases the effect of income is negative (in three cases it is borderline significant, although only one case is significant at the 5% level)" (Soares 2004, 167). In our regressions for total crime without demographic branch penetration we find that it is significant in one case at the 1% level (column (1) in table 4) and in both cases it is negative. The duplicates of Soares find ln(GNP) to be consistently negative, however significant at the 5% level in only one case: column (3), table 2. For the all regressions in this paper it is positive twice out of eleven equations, column (5) in table 4 and column (8) in table 2, and never statistically significant. In fact, the P-values for ln(GNP) were often larger than 0.6, indicating that they are not statistically different from zero.

Ln(GNP) is not significant in any of the model specifications, except for some of the Soares duplicates. The coefficients vary from positive to negative values, in both the new models and Soares's work. The magnitudes also vary substantially in the Keery regressions, from -0.12 to 0.012. The largest occurs in the total crime specification, column (5) in table 4. Some of the duplicate models of Soares have opposite signs to the originals, however throughout Soares's work the signs change based on the specifications. For the majority of the regressions the coefficients follow the predictions of theory; that is, the more income in a country, the lower the theft rate.

GINI

Having adjusted for a different measure of inequality, the duplicates of Soares's equations share all of the same signs; however they do possess different magnitudes. In all cases but one, column (5) in table 4, it is significant, while Soares finds inequality to be significant or almost significant across all of his regressions (Soares 2004, 167). We find that out of the eleven cases modeled all are positive, with six significant, two borderline significant and three not significant.

The coefficient on Gini is significant in the majority of the regressions. It also has an unambiguously positive coefficient, consistent with the theory; the greater the level of inequality in a society the higher the crime rate due to opportunity costs and perceived injustice. Column (4) in table 3 for burglaries shows the largest coefficient for Gini at 0.022913, significant at the 99% level.

URBAN

"Urbanization has a positive effect in seven cases, being close to significant for all the burglaries regressions and for the shortest specification for both thefts and contact crimes (Soares 2004, 167)," in the work of Soares. Urban is positive in all the duplicated equations, however it is not significant or borderline significant in any of them. The new estimated equations find small, positive coefficients for urbanization, with one being significant, five being borderline significant and five being insignificant. The significant coefficient can be found in column (5) of table 4.

The variable urban has correlation of 0.75 with ln(gnp), therefore a model was estimated without urban; however it had heteroskedasticity issues and did not provide further insight, therefore it was not pursued further. The theory provided rational for both positive and negative coefficients on the urban coefficient, while the results found a positive and occasionally significant relationship. The regression results indicate that an increased percentage of the population living in an urban centre has the effect of increasing the crime rate. Save for most of the burglaries specifications, the coefficients are in the range of 0.005 to 0.008. This is not a large impact when compared to the magnitude of the other coefficients, but is statistically significant in several cases.

EDUCATION

In the new Keery equations the Soares (2004) conclusion that the education variable is not statistically significant holds for only two regressions: column (4) in table 3 and column (1) in table 4; another is borderline significant: column (2) in table 4; and a third is significant: column (4) in table 2. Two are positive and two are negative, the negative results in columns (3) and (4) of table 3 are not statistically significant.

The coefficient of education changes signs, it is negative for the burglaries duplicates and Soares's specifications, but positive for the other specifications. By conjecture, it would appear that a certain degree of education is required to perpetrate thefts successfully. However, given the definition of the variable, it may be reflecting the hindered educational attainment of older individuals who are resorting to crime.

GROWTH

In Soares' work the variables growth changes signs and magnitudes between specifications, while rarely being significant. However, the growth coefficients appear to all be consistently negative and in all the duplicates they are statistically significant. Likewise across the Keery equations, growth is negative and statistically significant, almost exclusively at the 1% level.

Growth reveals itself as the most statistically significant independent variable, exhibiting significance at a minimum of the 95% level in all cases. The coefficients fall in the range of -0.05566 to -0.06819, larger than the majority of the other coefficients by an order of ten. This unambiguously follows the theory, in that the more potential official sector employment opportunities there are for legitimately gained income, the lower the crime rates. Additionally, the growth measure functions like the Gini in that the growth of GNP represents potential income for individuals in society. Growth also may indicate that potential criminals have their time occupied in legitimate endeavours.

RELIGION

The inclusion of more disaggregated religion variables in the second specification form of Soares's work results in no statistically significant coefficients, all of which have very small coefficients. An F-test of their joint significance also results in failure to reject the null hypothesis that the religion variables are jointly equal to zero. All the religion variables have negative coefficients of approximately the same magnitude, except for the combined category of atheist and agnostic, which has a positive coefficient.

SECTION 7: CONCLUSIONS

The question motivating this paper was, "Does increasing access to banking reduce the occurrence of crime?" The answer is a resounding "yes!" After outlining the existing theories, we put forward the motivation for the inclusion of the access to banking services in a model designed to test the relationship between development and crime. The basic motivation is that criminals ought to perceive that individuals can more easily access safe storage for their money when there is a greater number of bank branches available to them. Thus, individuals are less likely to be in possession of cash and other valuables; therefore, the banking access should reduce the criminals' perception of their potential gains. The finding that access to banking does reduce theft crimes has many ramifications for development workers, governments, private interests and regular citizens. Development workers may involve themselves in developing trust in financial institutions, as well as building institutional capacity; governments, especially elected governments, are often under pressure to reduce crime levels and developing the financial sector may prove to be a means of achieving this; and private parties may be interested in providing financial services. Individuals stand to benefit in many ways, such as reducing victimization and the subsequent time and emotional costs. Increasing access to banking reveals itself as a means of reducing the victimization of a population. Merely the ability to access a bank allows for unobservable victimization prevention on the part of an individual, reducing the perceived payoff as seen by a criminal. There are also other positive externalities associated with a reduction in theft crimes, such as a reduced burden on the judicial system. Though currently unquantified, there may be reduced social costs arising from the reduced crime rates based on increased access to banking services.

To answer the proposed question, standard OLS regressions were performed on a data set of 44 countries with three dependant variables – theft, burglary and total crime. There was the presence of mild to moderate multicollinearity so further models were specified with the exclusion

of some of the explanatory variables. The inclusion of demographic branch penetration as a measure of access to banking resulted in statistically significant and negative coefficients when regressing on dependent variables measuring crime rates. We found that the coefficients ranged in size from -0.012133 to -0.01628. The dependent variable total theft, throughout the specifications, resulted in larger relative adjusted R-squared values, corroborating the effectiveness of the model selection and the hypothesis. Overall, there is a notable negative effect on crime rates when there is increased access to banking services, supporting the hypothesis.

There are a vast number of questions arising from the work presented in this paper, as well as a variety of ways to experiment with the dependent variables included in the model. The effect of actual uptake of financial services should have differing marginal effects on criminals perceptions, as in the Ayres and Levitt (1998) Lojack study. When the more wealthy individuals in neighbourhoods take up bank accounts, it should have a greater effect by reducing or eliminating the largest potential payoffs available to a criminal, reducing the relative attraction to illegitimate activities over legitimate activities. Therefore, the marginal impact on crime rates should be larger for wealthier individuals than average or poor individuals. However, increased access to bank accounts may push criminals towards other categories and socioeconomic targets for crime, some of which are indirectly accounted for in the current measure of property crimes. Financial service use by the upper echelons of society may have redistributive effects, pushing property theft crimes down onto other socioeconomic groups. This study is limited to national level data, which finds an overall decrease and does not take into account shifts in the characteristics of victims.

Other examples include the inclusion of women's and men's unemployment separately in the model following the logic of Cohen, Felson and Land (1980) who attempt to create an index of the number of people located in residential areas to deter crime. It would also theoretically represent the "social breakdown" that criminologists postulate correlates with increasing urbanization. They advocate the construction of a household population density ratio to focus on

the social bonds and potential for crime witnesses (102). However, the implications of the informal sector economy still apply, as well as household based employment. Inclusion of a better adjusted or more diverse education variable may also prove useful in bettering the fit of the model. The dispersion of values available negated the use of gross primary enrolment as an apt or accurate measure of national achievement, as previously mentioned.

Based on the work of Hogarth, Christoslav and Lee (2005), there are several more variables that may contain merit if included in this macroeconomic study focusing on banking. They found the banked in the United States possessed the following characteristics:

> Banked households had higher income and net worth (measured in 2001) dollars; were less likely to spend all their money; more likely to be 2-person households; less likely to have children present; more likely to be married; had higher levels of education; were more likely to be white; more likely to be employed or retired; were older; were more likely to be home owners and vehicle owners; were more likely to anticipate a major expense; were more likely to use a medium or long-term planning horizon. (Hogarth, Anguelov and Lee 2005, 18)

Greater focus on the attributes of the banked across countries could lead to further insights into the distribution of theft crimes and victimization, as well as the undertaking of banking-related victim precautions. Regional effects would also be interesting to study; there may be regional cultural characteristics that influence whether or not people trust the institutions and the various crime rates. There are regional variables available in the ICVS data set.

This paper does not measure access to credit, which may or may not require banking services as a prerequisite. However, data on the subject is no doubt very difficult to collect due to the widespread operation of small Micro Finance Institutions and a lack of unifying body.

This study would benefit enormously from an intertemporal approach to evaluate the lag-factor of variable changes, such as an increase in GNP growth, on crime rates. It is possible that legitimate work opportunities increase just prior to GNP growth, with an identifiable drop in crime

rates; the decrease in crime may even precipitate GNP growth, the direction of the relationship is unknown, merely speculative. Also of note is that within country variation explains the majority of the results in Soares' (2004) paper, with the "decomposition of between and within effects stress[ing] the importance of analyzing the time dimension of the crime phenomenon, since education and growth did not appear to be significant..." (Soares 2004). Thus the variation over time should provide a substantial amount of insight into this research.

Migration rates and immigration status may also be an intertemporal effect that changes the flow of money and the effect of crime. A case in point in the returned wages in the Philippines; one would assume that a bank account is a necessary part of returning wages, so does the inflow of cash influence the crime rate, or are the bank access measures artificially high due to the cultural tendencies?

Becker's (1968) mention of crime avoidance expenditures, such as utilizing a bank account, may have a correlation with our data, leading to several new questions. For example, what is the relationship between increased crime avoidance expenditures and ln GNP? Decreasing crime rates may also be due to increasing expenditures, both public and private, on the avoidance of crime. There are many potential avenues for research arising from the basic model studied here.

Injecting a new independent variable available from the development of a new data set by Beck, Demiguc-Kunt and Peria (2007) into the established work of Soares (2004) allowed for a focused study of the effect of banking on theft rates at a macroeconomic level. The ability to access a bank account, to act as a safe location for storing assets and decrease the potential returns to theft in the perception of a criminal, does decrease the incidence of theft. The presence of more bank branches per capita allows for individuals to undertake unidentifiable actions with positive externalities for society. This provides impetus for private and public development of financial institutions simultaneously with other public institutions. Though there are other variables that

are also statistically significant, empirical tests of the inclusion of demographic bank access corroborate the hypothesis that access to banking reduces crime rates. It is hoped that this paper opens the door to further research on the relationships between financial services and crime.

APPENDIX I: CORRELATION MATRIX

1	LTCRIMPC	1.000										
2	DBRNCHP	-0.471	1.000									
3	DATMP	-0.493	0.779	1.000								
4	LROBPC	0.868	-0.456	-0.432	1.000							
5	LTHEFTPC	0.962	-0.411	-0.464	0.706	1.000						
6	LGNP	-0.335	0.785	0.714	-0.394	-0.256	1.000					
7	DRATIO	0.192	-0.075	-0.058	0.104	0.229	-0.013	1.000				
8	URB	-0.136	0.576	0.504	-0.262	-0.040	0.750	0.224	1.000			
9	EDUC	0.263	0.099	-0.029	0.070	0.349	0.031	0.147	0.200	1.000		
10	GROWTH	-0.392	-0.039	0.064	-0.321	-0.391	-0.047	-0.115	0.045	-0.058	1.000	
11	MUSLIM	-0.212	-0.291	-0.353	-0.129	-0.223	-0.447	-0.144	-0.390	-0.179	0.368	1.000
12	CHRIST	0.104	0.357	0.306	0.085	0.096	0.426	0.165	0.268	0.311	-0.370	-0.575
13	JEW	-0.029	0.163	0.239	-0.104	0.017	0.198	0.358	0.289	0.109	-0.211	-0.101
14	ATHAGN	0.014	0.182	0.396	0.035	0.008	0.293	-0.093	0.335	-0.086	0.230	-0.243
15	BUDD	-0.107	-0.004	0.273	0.055	-0.194	0.112	-0.114	0.169	-0.104	0.196	-0.079
16	ORTHO	-0.023	-0.200	-0.236	-0.116	0.038	-0.296	0.033	-0.052	-0.015	0.033	0.071
17	HINDU	0.071	-0.136	-0.185	0.038	0.067	-0.070	-0.138	-0.335	-0.252	-0.010	0.005
18	SIKH	0.113	-0.154	-0.156	0.248	-0.024	-0.238	-0.118	-0.245	-0.370	-0.009	-0.070
19	GINI	0.479	-0.349	-0.341	0.559	0.368	-0.339	0.283	-0.280	0.270	-0.188	-0.112
		LTCRIMPC	DBRNCHP	DATMP	LROBPC	LTHEFTPC	LGNP	DRATIO	URB	EDUC	GROWTH	MUSLIM
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**

1.000							
0.222	1.000						
-0.095	-0.068	1.000					
-0.132	-0.026	0.371	1.000				
-0.582	-0.108	-0.205	-0.071	1.000			
-0.250	-0.052	-0.126	-0.034	-0.082	1.000		
-0.051	-0.044	-0.109	-0.029	-0.069	0.343	1.000	
0.272	0.110	-0.245	-0.127	-0.195	0.049	0.196	1.000
CHRIST	JEW	ATHAGN	BUDD	ORTHO	HINDU	SIKH	GINI
12	**13**	**14**	**15**	**16**	**17**	**18**	**19**

APPENDIX II: ICVS QUESTIONS USED

The following response codes were used from the International Crime Victims Survey Data:

I002: Year; I005: Country; C01A100: Car Theft: Last Year; C02A100: Theft from Car: Last Year; C04A100: Theft of Motorcycle/Moped: Last Year; C05A100: Bicycle Theft: Last Year; C06A100: Burglary: Last Year; C07A100: Burglary Attempt: Last Year; C09A100: Robbery: Last Year; C10A100: Theft of Personal Property: Last Year

APPENDIX III: GLOSSARY

Burglary	The felony of breaking into and entering the house of another at night with intent to steal, extended by statute to cover the breaking into and entering of any of various buildings, by night or day. (Random House Unabridged Dictionary 2006)
Christian	In Soares- dummy assuming value 1 when at least 60% of the population classifies themselves as any variety of Christian
Demographic Branch Penetration	Number of bank branches per 100,000 people
Education	Ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education shown
Larceny	The wrongful taking and carrying away of the personal goods of another from his or her possession with intent to convert them to the taker's own use. (Random House Unabridged Dictionary 2006)
Ln(GNP)	Logarithm of GNI per capita (percent of millions per capita), measured in millions of current USD
Religion Variables	Percentage of population classified as each of the respective major religions.
Robbery	The felonious taking of the property of another from his or her person or in his or her immediate presence, against his or her will, by violence or intimidation. (Random House Unabridged Dictionary 2006)
Theft	The act of stealing; the wrongful taking and carrying way of the personal goods or property of another; larceny. (Random House Unabridged Dictionary 2006)
Urban	Urban population as a percentage of total population

APPENDIX IV: COUNTRY CHARACTERISTICS

Country	BRANCHP	GDP PC	THEFTPC	BURPC	TCRIMEPC	GNI	GROWTH	POP/THOU	URB	EDUC	GINI
Albania	2.11	1933	0.2630	0.0641	0.3271	3790.48	7	3080	42	102	28.64
Argentina	10.01	3381	0.3266	0.0654	0.3920	276655.96	-1	36896	89	118	52.40
Australia	29.86	26062	0.1706	0.0728	0.2434	388755.23	2	1915	87	101	34.52
Azerbaijan	4.11	865	0.0667	0.0140	0.0806	4987.42	11	8049	51	94	36.00
Belarus	4.79	1770	0.1822	0.0474	0.2296	12690.16	6	10005	70	112	27.04
Belgium	53.15	29205	0.1255	0.0476	0.1731	237180.13	4	1025	97	106	33.00
Bolivia	1.53	894	0.2883	0.1612	0.4494	8172.39	3	8317	62	115	44.42
Botswana	3.77	4290	0.1529	0.1078	0.2607	5825.91	8	1729	53	105	61.00
Brazil	14.59	2788	0.3610	0.0610	0.4220	626548.08	4	174161	81	150	61.30
Bulgaria	13.87	2538	0.2066	0.0711	0.2777	12281.40	5	8060	69	106	34.09
Canada	45.60	26380	0.1501	0.0452	0.1954	706043.38	5	30770	79	99	31.15
Colombia	8.74	1747	0.3957	0.1427	0.5384	81462.68	3	41683	71	115	59.82
Costa Rica	9.59	4365	0.3180	0.1690	0.4870	14696.61	2	3929	59	108	50.82
Croatia	23.36	6356	0.0685	0.0235	0.0920	17959.32	3	4503	56	93	31.40
Czech Republic	11.15	8375	0.2807	0.1040	0.3847	55438.87	4	10273	74	103	27.64
Denmark	37.63	39429	0.1546	0.0382	0.1929	156698.05	4	534	85	101	26.56
Estonia	15.19	6210	0.2318	0.0541	0.2859	5419.71	8	1370	69	103	33.07
Finland	19.06	31007	0.1257	0.0129	0.1386	120655.98	5	5176	61	100	27.00
France	43.23	29267	0.1390	0.0270	0.1660	1346196.73	4	58896	76	107	29.70
Georgia	3.14	768	0.2090	0.0510	0.2600	3174.77	2	4720	53	100	39.00
Hungary	28.25	8182	0.2333	0.0621	0.2954	45390.25	5	10211	65	101	24.57
India	6.30	563	0.2333	0.0517	0.2850	455219.28	4	101592	28	94	37.83
Indonesia	8.44	971	0.1335	0.0668	0.2003	154077.30	5	206265	42	109	30.70
Korea	13.40	12634	0.1140	0.0759	0.1899	509443.31	8	47008	80	98	28.80
Kyrgizstan	3.11	344	0.1903	0.0897	0.2800	1287.70	5	4915	35	97	35.76
Lithuania	3.39	5273	0.2123	0.0957	0.3080	10643.2952	4	3500	67	104	31.47
Namibia	4.47	2312	0.2385	0.1414	0.3798	3446.69	3	1879	32	104	74.00
Netherlands	34.23	31548	0.1620	0.0475	0.2095	393384.92	4	15925	77	108	29.50
Nigeria	1.62	370	0.2055	0.0899	0.2955	40255.93	5	124773	44	91	51.07
Panama	12.87	4328	0.1286	0.0710	0.1996	11007.00	3	2950	66	109	57.65
Philippines	7.83	989	0.0733	0.0193	0.0927	80694.67	6	76213	58	-	45.74

Poland	8.17	5487	0.1585	0.0368	0.1952	169844.42	4	38454	62	99	33.00
Portugal	51.58	14665	0.0910	0.0255	0.1165	109877.93	4	10226	54	124	38.45
Romania	13.76	2719	0.1799	0.0332	0.2131	36767.64	2	22443	55	103	30.40
Russia	2.24	3022	0.1953	0.0433	0.2387	252972.50	10	146303	73	107	35.26
Slovakia	10.28	5922	0.3367	0.0814	0.4181	20021.45	1	5389	56	103	25.28
Slovenia	2.19	13383	0.1261	0.0324	0.1585	19337.59	4	1989	51	98	30.80
South Africa	5.99	3530	0.2343	0.1190	0.3533	129704.08	4	44000	57	108	58.00
Sweden	21.80	33586	0.1924	0.0280	0.2204	239894.79	4	8869	84	109	25.00
Switzerland	37.99	42138	0.1287	0.0324	0.1611	266655.14	4	7184	73	103	34.00
Uganda	0.53	245	0.2565	0.1293	0.3858	5818.67	6	24690	12	125	43.00
United Kingdom	18.35	30278	0.3388	0.1111	0.4498	1443492.27	4	59743	89	101	36.00
United States	30.86	37388	0.1270	0.0440	0.1710	9930899.72	4	282217	79	100	39.88
Zambia	1.52	413	0.1738	0.1738	0.3477	3081.72	4	10451	35	80	53.07
Zimbabwe	3.27	634	0.3131	0.1740	0.4871	7145.14	-8	12656	34	100	46.95

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