# Financial Development, Crime and Income Inequality in India

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## Abstract

How does financial development affect crime? In this study of financial development and crime, using panel data from Indian states, it is found that financial development has in fact increased crime. It is observed that income inequality is one of the main channels through which financial development affects crime. This paper also studies the impact of income inequality on the *relation* between financial development and crime. It is observed that it is in the presence of high income inequality, that states have witnessed an increase in crime rates. An important implication of the study is that financial development needs to be accompanied by other policies that reduce inequality and prioritize inclusivity, so that as income inequality falls, the benefits of financial development may be realized.

## **<u>1. Introduction</u>**

In the last few decades, the world has witnessed increasing financial inclusion and development. The empirical literature indicates that financial development not only promotes economic growth, but it also reduces poverty by providing access to credit facilities to the poor and giving them an incentive to invest. These credit facilities also encourage entrepreneurial activities, therefore, generating job opportunities, and income. Further, investment and saving allows for risk management, thereby, reducing vulnerability to economic shocks. Thus, financial sector development aids overall economic development and leads to better standards of living. (King and Levine, 1993; Levine, 1997; Rajan and Zingales, 1996).

An institutional factor that is closely related to financial sector development is the rule of law. In fact, several influential studies find that a strong rule of law is critical for development as it spurs investment and business operations (e.g., Besley, 1995; Shleifer and Vishny, 1998; Svensson, 1998). Using cross country establishment level data, Ranasinghe and Restuccia (2018) study the effect of two institutions, namely, rule of law and financial frictions on output. They find that in countries where both these institutions are weak, policies that improve the rule of law have a greater impact on output than those that improve financial market development. But at some levels of rule of law, policies that improve the financial system have a greater impact. They conclude that financial development is important for economic development, but law and order is a necessary condition.

A well-developed legal and financial institution has positive effects on both access to credit and crime, two highly interlinked outcomes. However, to the best of our knowledge, no study has looked at the relation between access to finance and crime.<sup>1</sup> The relation between crime

<sup>&</sup>lt;sup>1</sup> There are various development indicators that have an effect on crime, most researched being poverty, income inequality, and unemployment. It is well documented that poverty stricken regions are more likely to have higher crime rates. This relation is widely supported in empirical studies conducted in developing as well as developed countries (Iyer and Topalova, 2014; Boukhatem, 2016; Scorzafave and Soares, 2009, Kelly, 2000; Fajnzylber, Lederman and Loayza, 2002; Lin, 2007; Krohn, 1976)

and financial development needs to be studied so that financial development measures can be implemented in a way that does not exacerbate crime.<sup>2</sup>

An expanding financial sector generates jobs and investment opportunities leading to lower poverty and inequality levels and higher incomes. Thus, an increase in financial development may reduce crime by increasing the opportunity cost of committing crime (Becker, 1968, 1995; Lochner, 2004, 2011). Second, in the absence of financial institutions, people would tend to hoard wealth. This might incite criminal activities as it is harder to steal from formal institutions, the chances of being apprehended are higher and the consequences are likely to be more severe. Third, financial development may reduce the size of the shadow economy and thereby lead to a reduction in crime since the shadow economy is much more likely to harbour criminal activities (Berdiev and Saunoris, 2016). On the other hand, lack of inclusivity in financial development may increase crime, as it can lead to higher income inequality and therefore, higher crime (see Iyer and Topalova, 2014; Sarsons, 2015; Bignon et al., 2016; Traxler and Burhop, 2010; Mehlum et al., 2006; Kelly, 2000; Fajnzylber, Lederman and Loayza, 2002; Scorzafave and Soares, 2009; Becker, 1968, 1995; Krohn, 1976). Secondly, financial development may also provide more 'opportunities' for certain types of crime by providing quick access to finance, which may result in an increase in white collar crime, economic crime and property crime. Thus, the relation between financial development and crime is ambiguous.

The relation between financial development and income inequality has been explored empirically and theoretically. However, it has been found to be ambiguous. Greenwood and Jovanovic (1990) develop a model where both economic growth and financial development are endogenously determined. They observe that economic growth and financial development are linked. Higher growth provides the background for financial development and financial development in turn increases economic growth. They find that similarly to the Kuznets hypothesis, where in the early stages of development, inequality rises and eventually decreases, the relation between financial development and income inequality also takes the form of a similar inverted-U. Therefore, they show that in the early stages of financial

 $<sup>^{2}</sup>$  Though there are very limited empirical studies that have looked at the effect of financial development on crime, the evidence on conflict is quite robust. Finance and the financial sector plays an important role in resolving ongoing conflicts, the duration of those conflicts and also which side wins. (Addison et. Al. 2001, 2002, 2015; De and Nandwani, 2015)

development, when the financial infrastructure is not quite efficient, income inequality rises. In the later stages of financial development, as efficiency increases, inequality starts to decrease. Empirical evidence from various studies using cross-country panel data for a number of countries, suggests a strong negative correlation between financial development and, poverty and inequality. It is also found that a deeper financial sector not only increases access to credit but greater access to financial services also enables people to insulate themselves from unfavourable macroeconomic scenarios (Beck, Demirguc-Kunt and Levine, 2004; Bittencourt, 2007; Batuo, Guidi and Mlambo, 2010; Shahbaz and Islam, 2011; Liang, 2006; Hoi and Hoi, 2013; Clarke, Xu and Zou, 2006). However, there is some evidence on the relation between financial development and income inequality that goes in the opposite direction. Law and Tan (2009) find evidence which shows that financial development has had an insignificant effect on income inequality in Malaysia. Wahid et al. (2012) show that financial development has worsened income inequality in Bangladesh. They find support for the Greenwood-Jovanovic inverted-U hypothesis and observe an inverse relation between financial development and inequality. Cross-country panel data evidence from Jauch and Watzka (2011) shows that financial development has not reduced income inequality, as predicted in theory, controlling for country fixed effects and per capita income. It has in fact increased inequality. These findings are upheld by various robustness checks.

Therefore, the evidence on the relation between financial development and income inequality is ambiguous. But the literature is unanimous on the relation between income inequality and crime. Theoretical and empirical evidence (both within and across countries), suggests that rising income inequality has a detrimental impact in crime rates. Both, rising poverty and inequality are highly correlated with crime (see Iyer and Topalova, 2014; Sarsons, 2015; Bignon et al., 2016; Traxler and Burhop, 2010; Mehlum et al., 2006; Kelly, 2000; Fajnzylber, Lederman and Loayza, 2002; Scorzafave and Soares, 2009; Becker, 1968, 1995; Krohn, 1976). While, most studies use income inequality to measure inequality, Hicks and Hicks (2014) measure inequality by using conspicuous consumption in addition to income. Their results indicate that inequality in conspicuous consumption leads to higher crime as opposed to inequality in income, as income is harder to find out. Conspicuous consumption, on the other hand, conveys information which plays a key role in determining the impact on crime. As conspicuous consumption is easily observable, it gives potential criminals the incentive they need to commit crimes. It is found that some consumption expenditures are also carried out in order to demonstrate wealth and status. The information that is made available with

such demonstration can lead to increases in violent crime. The theoretical literature is dominated by the economic theory of crime put forward by Becker (1968, 1995), which explains crime as a result of a rational decision making process in which a potential offender weights the costs and benefits of a criminal act. Therefore, an increase in economic resources would make an individual less likely to commit a crime because his opportunity cost of the future is higher. In other words, such a person has a very low discount factor where he values his future more than his present. It is also stressed that it is in the presence of inequality that people have the most incentive and pressure to engage in crime (Becker, 1995). Sociological theories of crime like the 'strain theory' and the 'social disorganisation theory' also suggest that when individual are unable to attain success with conventional and legal activities they are disenchanted with society and are more likely to view crime as an alternative. The feeling of deprivation is heightened in the presence of income inequality, which leads to higher crime (Merton, 1938; Kelly, 2000). There is robust empirical evidence that establishes the positive relation between income inequality and crime. Therefore, income inequality emerges as one of the key factors that may have an effect on the the relation between financial development and crime.

However, the relation between financial sector development and crime can also go in the opposite direction i.e. crime may also affect financial development. Areas with high rates of crime may discourage financial development. Banks may be reluctant to enter areas that report high rates of crime. Therefore, crime prone areas will tend to have fewer business set up and worse infrastructure, which implies higher unemployment. A decrease in income further effects education and health. It would also mean lax provision of public services like security. This leads to an endogeneity bias, resulting from reverse causality, which requires an appropriate estimator to be used. Therefore, an instrumental variable approach is used. Analysing data from Indian states for the period 1972 to 2011, this paper studies the impact of financial development on crime. To deal with the endogenous relation between financial development and crime, following Burgess and Pande (2005), the policy driven bank branch expansion regime that was implemented in 1977 and was abandoned in 1990 is used. The program mandated that for each branch that a bank opened in an already serviced location, it required to open 4 branches in non-serviced or unbanked locations. This ensured that rural areas and under-developed states saw more branch expansions in the policy years as compared to urban areas and the more developed states, because the former offered more unbanked locations.

The results indicate that financial development led to an increase in violent and nonviolent crime in Indian states. In order to test the effect that income inequality has on the relation between crime and financial development, all states are divided into three groups according to inequality levels. It is found that states with higher income inequality have seen increasing rates of crime as opposed to states with low and medium inequality levels, which do not show significant results. It is further examined whether financial development has had an impact on income inequality in India i.e. whether it serves as a channel for increases in crime rates due to financial development. It is found that financial development in India has exacerbated income inequality, which has led to increased crime. Our results suggest that financial development increases crime in the presence of income inequality and also worsens it.

The rest of this paper is organised as follows: section 2 gives the institutional background in context of the financial market and liberalization in India, section 3 outlines the empirical framework, section 4 presents the data and summary statistics, section 5 presents the results, and finally, section 6 concludes the discussion.

## 2. Institutional Background

The state-led branch expansion program undertaken by the Indian government in 1977 is the largest branch expansion program undertaken by any single country. It was implemented as part of the wider anti-poverty initiative of the government, including the IRDP (Integrated Rural Development Program). The policy was launched so as to increase and improve credit access in rural and remote areas, which are financially less developed, as the banking industry gravitates towards richer areas because of higher returns. Between bank nationalisation in 1969 and the end of the program in 1990, bank branches were opened in nearly 30,000 unbanked locations (locations with no prior savings or credit institutions). A major part of this expansion of the bank branch network in unbanked locations took place during the policy years, 1977 to 1990. The aim of the government was to open bank branches in unbanked locations with high populations and then overtime in less populated unbanked locations. The central bank launched a branch licensing policy in 1977 that made it mandatory for a bank to open 4 branches in unbanked locations for each branch that it opened in an already banked location. A list of unbanked and banked locations was published by the central bank. This lead to a greater increase in bank branches in less developed states as compared to more developed states because the former offered a greater number of unbanked locations. Therefore, a state with a lower number of initial bank branches (representing more unbanked

locations) witnessed a rapid expansion of bank branches in the years the policy was in place. This policy was abandoned in 1990. This trend was reversed in the following years with unbanked locations seeing no further expansion of bank branches. The following years witnessed more developed states seeing more expansion in terms of banks branches. The same trend was observed before the policy was implemented in 1977. In 1991, economic liberalisation took place. This sought to make the Indian economy more market oriented, emphasizing the role of private and foreign capital. It also eased restrictions on trade. Post 1990, there was minimal branch expansion into unbanked and rural locations has steadily declined. Without the mandatory policy in place, banks and financial companies sought richer and more developed locations. This is reflected in the reversing trend that is witnessed post 1990. Therefore, because the relation between the initial level of financial development and the number of bank branches (financial development) in a state reverses during the policy years, it serves as an ideal instrument for financial development (Reserve bank of India; Burgess and Pande, 2005; Kochar, 2011; Akhtar and Parveen, 2014).

## **<u>3. Empirical framework</u>**

In this paper, an instrumental variable model is used to deal with the endogeneity of financial development. The model is adapted from Burgess and Pande (2005). The 'initial level of financial development' of a state is used as an instrument for financial development.

So this changing relation between initial financial development and bank branch expansion is used as an instrument for financial development.

Burgess and Pande (2005) study the importance of rural banks and their role in reducing poverty in Indian states. They test whether state-led financing can help alleviate financial constraints and encourage development and reduce poverty. It is observed that state-led credit and savings schemes remain important in many developing countries (Besley, 1995). But the question has remained whether these policies were actually able to help the rural sector as opposed to being dominated by the elite and being susceptible to political considerations, claimed by many studies (La Porta et al, 2002; Sapienza, 2004). Therefore, it seems that credible evidence on the effectiveness of these programs remains extremely limited.

The banking industry seems to concentrate in richer and urban areas that offer higher returns, when expanding of its own accord. This poses a problem in determining the impact of branch

expansion on poverty. Therefore, these state-led programs provide an unbiased measure of branch expansion.

Branch data from 16 Indian states is used to construct a panel for the years 1961 to 2000. Initial financial development is the number of bank branches in 1961, which is used as an instrument for bank branch expansion. They observe that between 1961 and 2000, branches opened in unbanked locations rises from 105 to 29,109. A majority of this expansion took place between 1977 and 1990. Post 1990, there was no further expansion into unbanked locations. In order to study the impact on rural households, rural poverty levels are taken as the dependant variable.

Their dependent variable is rural poverty. On the right hand side, the main variable of interest is the cumulative number of bank branches in a state. There is a time trend variable that is generated from 1961 and is interacted with the initial level of financial development, which is the number of bank branches in a state in the year, 1961. There are two dummy variables introduced for the years following 1977 and 1990, respectively that capture the trend breaks. These are also interacted with the initial levels of financial development for each state. State and year fixed effects are included to control for the permanent differences across states and changes occurring over time affecting all states. In the first stage regression, the number of bank branches are a function of the initial levels if financial development. The initial levels of financial development are captured by time trend variables and dummy variables; both interacted with the number of branches in 1961. The three time trends are generated from the years, 1961, 1977 and 1990, respectively. The dummies are generated for the years following 1977 and 1990, respectively.

In their analysis, they find that higher levels of initial financial development are correlated with higher levels of bank branches for the period 1961-1977. However, this trend is reversed in 1977 and it is observed that lower levels of initial financial development are correlated with higher number of bank branches. In their second stage results, they found that bank branch expansion, rural bank credit share, and rural bank savings share have a significant alleviating effect on rural poverty.

A major critique of Burgess and Pande appears in Kochar (2005). She says that the branch licensing policy implemented by the central bank was designed to go together with the government's wide-ranging anti-poverty programs implemented during the same period. The

most notable of these programs was the IRDP. The IRDP was a credit based anti-poverty program and a strong network of banks was required for its success. The branch licensing policy was a vehicle for IRDP. Therefore, the results of Burgess and Pande (2005) include the effects of other anti-poverty programs as well as bank branches. It is stressed that because these programs were implemented in the same time period, it is impossible to separate their effects on poverty. The dependent variable in the analysis is crime and not poverty, which makes it possible to separate the effects of bank branches and IRDP. In order to do this, poverty levels are controlled for in the model, thereby controlling for the anti-poverty programs and their effects. So the model shows the impact of bank branches and other financial development indicators on crime excluding the effects of anti-poverty programs on crime.

### Section 3.1: The model

### **OLS estimation:**

An ordinary least square model of the following form is estimated. But it does not control for the endogeneity of financial development. Nonetheless, a model of the following form is estimated for all 4 measures of financial development: number of bank branches, credit outstanding, deposits, and savings.

$$cr_{it} = a_0 + b_1(fd_{it}) + c_2(x_{it}) + f_1(B_{i1972} * T_{1972}) + d_1(B_{i1972} * D_{1977}) + d_2(B_{i1972} * D_{1990}) + s_i + r_j + t_t + e_{it} - 1$$

Where, ' $cr_{it}$ ' is the measure of crime in state 'i' in the year 't', which are: violent crime and nonviolent crime, per 100000. ' $fd_{it}$ ' is the measure of financial development in state 'i' in the year 't', which are: number of bank branches, credit outstanding, deposits, and savings, per 100000. ' $B_{i1972} * T_{1972}$ ' is the time trend that switches on in 1972 and is interacted with the number of bank branches per 100000 in the state in 1972. ' $B_{i1972} * D_{1977}$ ' and ' $B_{i1972} * D_{1990}$ ' are two dummy variables that capture the break in the trend in the years 1977 and 1990. These too are interacted with the number of bank branches per 100000 in 1972. ' $s_i$ ', ' $r_j$ ', and ' $t_t$ ' are the state, region, and year fixed effects, respectively. These fixed effects account for permanent differences across states and events occurring over time that affect all states. ' $x_{it}$ ' is the vector of controls including: urban population, workforce participation, number of policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. ' $e_{it}$ ' is the error term.

## Instrumental variable model:

The empirical model of Burgess and Pande (2005) is modified in that this model studies the effect of financial development on crime. The data consists of state-level data for India from 1972 to 2011. The effects of financial development on a variety of crime indicators are analyzed. Bank branches are the main measure of financial development. Deposits, credit outstanding, and savings are also used to measure financial development. Instrumental variable regression takes care of the reverse causality between crime and financial development.

#### Linear trends in first stage:

The first stage regression is the same as the one used by Burgess and Pande (2005). It takes the form of a linear trend break model that captures the trend reversals caused by the branch licensing regime introduced in 1977. The regression takes the following form:

$$br_{it} = j_0 + g_1(B_{i1972} * T_{1972}) + g_2(B_{i1972} * T_{1977}) + g_3(B_{i1972} * T_{1990}) + h_1(B_{i1972} * D_{1977}) + h_2(B_{i1972} * D_{1990}) + z_{it} - 2$$

Where, ' $br_{it}$ ' is the dependent variable is the cumulative number of bank branches per 100000 in state 'i' in the year 't'. On the right hand side, ' $B_{i1972} * T_{1972}$ ', ' $B_{i1972} * T_{1977}$ ', and ' $B_{i1972} * T_{1990}$ ' are time trends that switch on in 1972, 1977 and 1990, respectively. These time trends are interacted with the number of bank branches per 100000 in the state in 1972. ' $B_{i1972} * D_{1977}$ ' and ' $B_{i1972} * D_{1990}$ ' are two dummy variables that capture the break in the trend in the years 1977 and 1990. These too are interacted with the number of bank branches per 100000 in 1972. ' $z_{it}$ ' is the error term.

In the first stage, the 1977 time trend is expected to be negative as it would imply that states with lower level of initial financial development were the ones that offered a higher number of unbanked locations and therefore, witnessed higher numbers of new branch openings.

## Second stage regression:

The second stage regression takes the following form:

$$cr_{it} = a_0 + b_1(br_{it}) + c_2(x_{it}) + f_1(B_{i1972} * T_{1972}) + d_1(B_{i1972} * D_{1977}) + d_2(B_{i1972} * D_{1990}) + s_i + r_j + t_t + e_{it} - 3$$

Where, ' $cr_{it}$ ' is the measure of crime in state 'i' in the year 't', which are: violent crime and nonviolent crime, per 100000. ' $br_{it}$ ' is the number of bank branches per 100000 in state 'i' in the year 't'. ' $B_{i1972} * T_{1972}$ ' is the time trend that switches on in 1972 and is interacted with the number of bank branches per 100000 in the state in 1972. ' $B_{i1972} * D_{1977}$ ' and ' $B_{i1972} * D_{1990}$ ' are two dummy variables that capture the break in the trend in the years 1977 and 1990. These too are interacted with the number of bank branches per 100000 in 1972. ' $s_i$ ', ' $r_j$ ', and ' $t_i$ ' are the state, region, and year fixed effects, respectively. These fixed effects account for permanent differences across states and events occurring over time that affect all states. ' $x_{it}$ ' is the vector of controls including: urban population, workforce participation, number of policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. ' $e_{it}$ ' is the error term.

## Credit outstanding, deposits, and savings as measures of financial development:

Credit outstanding, total deposits, and total savings are also used as measures of financial development. Since the branch licensing program sought to increase the proportion of formal credit, deposits, and savings, these indicators are apt measures of financial development. A regression of the following form is estimated:

$$cr_{it} = a_0 + b_1(crd_{it}) + c_2(x_{it}) + f_1(B_{i1972} * T_{1972}) + d_1(B_{i1972} * D_{1977}) + d_2(B_{i1972} * D_{1990}) + s_i + r_i + t_t + e_{it} - 5$$

The regression is similar to the instrumental variable regression with bank branches, as in equation (3). Here, ' $crd_{it}$ ' is the total credit outstanding per 100000 in state '*i*' and year '*t*', instead of bank branches.

Similarly, the following regression is estimated for total deposits per 100000, where ' $dp_{it}$ ' is the amount of total deposits in state 'i' and year 't':

$$cr_{it} = a_0 + b_1(dp_{it}) + c_2(x_{it}) + f_1(B_{i1972} * T_{1972}) + d_1(B_{i1972} * D_{1977}) + d_2(B_{i1972} * D_{1990}) + s_i + r_i + t_t + e_{it} - 6$$

The following regression is estimated for total savings per 100000, where ' $sv_{it}$ ' is the amount of total savings in state '*i*' and year '*t*':

$$cr_{it} = a_0 + b_1(sv_{it}) + c_2(x_{it}) + f_1(B_{i1972} * T_{1972}) + d_1(B_{i1972} * D_{1977}) + d_2(B_{i1972} * D_{1990}) + s_i + r_j + t_t + e_{it} - 7$$

The first stage regressions are the same as in equation (2).

#### The effect of income inequality on the relation between crime and financial development:

In order to check whether income inequality has an impact on the *relation* between crime and financial development, all the states are divided into 3 groups based on the level of income inequality: low, medium, and high. The mean of 2004 and 2011 is used due to availability for all states. There are 7 Low inequality states with Gini coefficient less than 0.25, 10 Medium inequality states with Gini coefficient between 0.25 to 0.30, and 18 High inequality states with Gini coefficient greater than 0.30. The regression run is identical to the main instrumental regression in equation (3) and the first stage is identical to the regression in equation (2).

#### The effect on income inequality:

An instrumental variable model is run with the Gini coefficient as the dependent variable, to check the effect of financial development on income inequality. The model takes the following form:

$$gn_{it} = a_0 + b_1(fd_{it}) + c_2(x_{it}) + f_1(B_{i1972} * T_{1972}) + d_1(B_{i1972} * D_{1977}) + d_2(B_{i1972} * D_{1990}) + s_i + r_j + t_t + e_{it} - 8$$

The model is similar in all aspects to the one used for crime except that the outcome is the income inequality. ' $gn_{it}$ ' is the Gini coefficient of state 'i' in the year 't', ' $fd_{it}$ ' is the measure of financial development in state 'i' in the year 't', which are: number of bank branches, credit outstanding, deposits, and savings, per 100000. ' $B_{i1972} * T_{1972}$ ' is the time trend that switches on in 1972 and is interacted with the number of bank branches in the state in 1972. ' $B_{i1972} * D_{1977}$ ' and ' $B_{i1972} * D_{1990}$ ' are two dummy variables that capture the break in the trend in the years 1977 and 1990. These too are interacted with the number of bank branches in 1972. ' $s_i$ ', ' $r_j$ ', and ' $t_t$ ' are the state, region, and year fixed effects, respectively. These fixed effects account for permanent differences across states and events occurring over time that

affect all states. ' $x_{it}$ ' is the vector of controls including: urban population, workforce participation, number of policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. ' $e_{it}$ ' is the error term.

## <u>4. Data</u>

The analysis uses state level panel data from 1972 to 2011 for all states and union territories excluding: Dadra and Nagar Haveli, Andaman and Nicobar Island, Puducherry and Lakshadweep Islands, due to missing data. The measures of crime are violent and nonviolent crime, in addition to individual crime heads namely: murder, kidnapping, dacoity, riots, robbery, burglary, theft, criminal breach of trust, cheating, and counterfeiting. Violent crime includes: murder, kidnapping, dacoity, and riots. Nonviolent crime includes: robbery, burglary, theft, criminal breach of trust, cheating, and counterfeiting. All measures of crime are deflated by the population of 1972 and are calculated per 100000 of population. The crime data has been sourced from the National crime records bureau for India. The finance variables namely: bank branches, deposits, credit and savings are sourced from the EPW research foundation database and are calculated in Rupees lakhs per 100000 of population. The Gini coefficient is sourced from the Planning Commission of India's database. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. All control variables are sourced from the census data, Govt. of India; Center for Systemic Peace database; EPW research foundation India time series database; and the Planning Commission. All variables included in the model are deflated by the population in 1972.

Table 1: Description of variables and data sources			
Variable name	Description	Source	
violent crime	Total number of violent crimes	National crime records bureau.	
	in a state per 100000, includes:		
	murder, kidnapping, dacoity,		

The following table summarizes all the variables in the analysis and their sources:

and riots.

nonviolent crime	Total number of nonviolent crimes in a state per 100000, includes: robbery, burglary, theft, criminal breach of trust, cheating, and counterfeiting.	National crime records bureau.
bank branches	Number of offices of all scheduled commercial banks per 100000	EPW research foundation India time series database.
credit	Total amount of bank credit outstanding in rupees lakhs per 100000.	EPW research foundation India time series database.
deposits	Total deposits in all schedules commercial banks in rupees lakhs per 100000.	EPW research foundation India time series database.
savings	Total savings in all schedules commercial banks in rupees lakhs per 100000.	EPW research foundation India time series database.
Gini coefficient	Average of the rural and urban Gini coefficient for states, in percentage.	Planning commission.
Controls:		
urban population	Percentage of population living in urban areas per 100000.	Census data, Govt. of India.
workforce participation	Percentage of people in the workforce per 100000.	Census data, Govt. of India.
police force	Number of civil police personnel per 100000.	Center for Systemic Peace database.
sc and st populations	Number of SC and ST	Census data, Govt. of India.

populations per 100000.

literacy rate	Total number of literates per 100000.	Census data, Govt. of India.
poverty	Poverty headcount ratio.	Planning commission.
infrastructure	Total length of transmission and distribution lines in circuit kilometres per 100000.	EPW research foundation India time series database.

Note: All variables included in the model are deflated by the population in 1972.

Violent crime has a much lower mean at 2.37 per 100000 with a standard deviation of 18.35, while, nonviolent crime has a higher mean at 126.31 with a higher standard deviation of 122.31. Bank branches have a mean of 13.94 branches per 100000 with a standard deviation of 10.8. The deposits, credit and savings are used in Rupees lakhs per 100000, with a mean of 17229.97 lakhs, 10583.22 lakhs and 4216.5 lakhs, respectively. The Gini coefficient has a mean of 29.55 and a standard deviation of 3.74 percentage points.

Table 2: Descriptive statistics				
Variable	Observations	Mean	Std. Dev.	
•••	020	26.27	10.05	
violent crime	838	26.37	18.35	
nonviolent crime	776	126.31	122.31	
bank branches	879	13.94	10.80	
deposits	879	17229.97	53100.45	
credit	879	10583.22	41966.41	
savings	879	4216.54	10777.73	
Gini coefficient	566	29.55	3.74	
Controls:				
urban population	879	164145.8	1529520	
police force	879	392.84	375.26	
workforce	879	235032.4	2447985	
SC pop	879	18209.8	14831.67	
ST pop	879	44085.71	66153.35	

literacy	879	88458.91	46077.5
infrastructure	879	1002.66	739.76
poverty HC	879	32.41	14.15

Note: All variables included in the model are deflated by the population in 1972.

The following graphs show the trends in total violent crime per 100000, total nonviolent crime per 100000, and the bank branches per 100000. These are the primary variables of interest in this analysis. The graphs are presented for five regions of India: north, south, east, west and north-east. All three of the crime variables show a generally upward trend. The level of financial development as measured by bank branches shows a marked upward trend over the years.

## Total violent crime per 100000:

Total violent crime shows a slightly upward trend for the eastern and southern regions. The northern and western regions show an increasing trend, with the west showing high volatility.



#### Total nonviolent crime per 100000:

Total nonviolent crime rates are higher for the northern region and show an upward trend and high volatility. Nonviolent crime is lowest in the east, followed by the south and west. These regions show some volatility but not a marked upward trend, with nonviolent crime rising slightly in the west.



## Total bank branches per 100000:

Financial development, measured by bank branches per 100000, is highest for the northern region and the increase is also the steepest. Bank branches are lowest in the east and show the least increase. The south and west show an upward trend.



## 5. Results

This section discusses the results of the study.

Table 3 presents the OLS results for the two main heads of crime: violent crime, and nonviolent crime. It is found that financial development has a positive and significant relation with both measures of crime. 1 bank branch increases violent crime and nonviolent crime by 0.86 and 10.04 times, respectively. Similarly, 1 lakh Rupees in credit outstanding and savings per 100000, results in a 0.0005 and 0.002 times increase nonviolent crime, respectively. The

Table 3: OLS results			
	Violent crime	Nonviolent crime	
bank branches	0.86***	10.04***	
	(<0.00)	(<0.00)	
deposits	0.00003	0.0003	
	(0.28)	(0.13)	
credit	0.00003	0.0005**	
	(0.25)	(0.01)	
savings	0.0002	0.002***	
	(0.18)	(<0.00)	
controls	yes	yes	
state/region/year FE	yes	yes	

relation between financial development and violent crime is insignificant for deposits, credit outstanding, and savings.

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations ranges from 680 to 738.

Table 5 shows the results of the instrumental variable regression model described in equation (3), where the independent variable is a measure of financial development. The first stage is as shown by a trend break model in equation (2).

The results show that financial development, as measured by bank branches has a positive impact on violent crime and nonviolent crime. The results show that 1 new bank branch results in a 1.87 times increase in violent crime and 30.81 times increase in nonviolent crime. Similar trends follow for other measures of financial development. 1 lakh Rupees in deposits, credit outstanding, and savings per 100000 results in 0.00009, 0.00008 and 0.0005 times increase in violent crime per 100000, respectively. Also, 1 lakh Rupees in deposits, credit outstanding, and savings per 100000 results in 0.002, 0.002 and 0.009 times increase in nonviolent crime per 100000 results in 0.002, 0.002 and 0.009 times increase in nonviolent crime per 100000, respectively. The impact on nonviolent crime is higher that the impact on violent crime. The time trend variable interacted with the initial level of financial

Table 5: IV results - crime			
	Violent crime	Nonviolent crime	
bank branches	1.87***	30.81***	
	(<0.00)	(<0.00)	
deposits	0.00009***	0.002***	
	(<0.00)	(<0.00)	
credit	0.00008**	0.002***	
	(0.01)	(<0.00)	
savings	0.0005***	0.009***	
	(<0.00)	(<0.00)	
controls	yes	yes	
state/region/year FE	yes	yes	

development is negative and significant, showing that higher initial levels of financial development resulted in lower financial development further on.

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations ranges from 680 to 738.

Table 6 shows the results of the instrumental variable estimation with the different heads of crime instead of the aggregated measures of crime that are used above. It is observed that the relation between the following crime heads: kidnapping, dacoity, robbery, burglary, theft, riots, criminal breach of trust, and cheating; and financial development is positive and significant. On the other hand, murder and counterfeiting do not have a significant relation with financial development. Theft in particular has a large impact on crime, with 1 bank branch resulting in a 46.96 times increase in theft. 1 bank branch results in a 3.34 and 2.87 times increase in cheating and burglary, respectively. Therefore, the increase in crime is largely driven by the impact on nonviolent crime, as also noted in table 5.

Table 6: IV results – disaggregated crime				
	bank branches	deposits	credit	savings
murder	-0.33	.00001	00001	00006
	(0.22)	(0.25)	(0.23)	(0.26)
kidnapping	0.62*	.00002***	.00002***	.0001***
	(0.06)	(<0.00)	(<0.00)	(<0.00)
dacoity	0.34**	.00001*	.00002*	.00008*
	(0.04)	(0.06)	(0.08)	(0.07)
robbery	0.74**	.00003***	.00003**	.0001**
	(0.01)	(<0.00)	(0.04)	(0.02)
burglary	2.87**	.0001*	.0001	.0006
	(0.04)	(0.09)	(0.18)	(0.13)
theft	46.96***	0.001***	.0017***	.009***
	(<0.00)	(<0.00)	(<0.00)	(<0.00)
riots	1.38*	.000005**	.00004*	.0003**
	(0.05)	(0.03)	(0.05)	(0.04)
criminal breach of trust	1.19	.00004*	.00003*	.0002*
	(0.28)	(0.09)	(0.07)	(0.06)
cheating	3.34***	.0001***	.0001***	.0006***
	(<0.00)	(<0.00)	(<0.00)	(<0.00)
counterfeiting	-0.08	000004	000002	00003
	(0.40)	(0.40)	(0.54)	(0.42)
controls	yes	yes	yes	yes
state/region/year FE	yes	yes	yes	yes

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations ranges from 685 to 751.

The results show overwhelming evidence in support of the positive relation between crime and financial development. It can be deduced that financial development has increased violent and nonviolent crime in Indian states and this effect is higher for nonviolent crime than that for violent crime. This is accordance with the theories of economic development and crime. These theories (Durkheimian, Marxian world, and the Opportunities theory) all conclude that economic development, at least initially, leads to an increase in crime. The reasons being varied, but essentially focused on the decay of the close knit societies, urbanization, and more 'opportunities' for crime due to industrialization, migration, and development (Durkheim, 1964; Kick and LaFree, 1985; Bennett, 1991; Neuman and Berger, 1988). This certainly explains the higher increase in nonviolent crimes that may be driven by the increased 'opportunities' for crime, as a direct result of financial development. The 'opportunities' theory, in particular provides an explanation for this effect. The theory, proposed by Kick and LaFree (1985) explains the historic origin of crime within societies. It is also called the ecological-opportunities theory as it argues that crime takes place when there is a favourable 'environment' for crime. This 'environment' refers to the availability of material resources available for inciting criminal activities. This theory emphasizes demographic and material conditions as the causes of crime. Financial development represents an increase in the material resources available for crime, thus representing greater 'opportunities' for crime. On the other hand, there is a lower impact on violent crime because it is more impulsive in nature and has interpersonal causes which tend to be independent of economic development in society. The increase in crime could also be a result of other factors present, like income inequality. Income inequality may be responsible for the positive impact of financial development on crime.

## The effect of income inequality on the relation between crime and financial development:

In order to check whether income inequality has an impact on the relation between crime and financial development, the instrument variable regression is run as shown in equation (3), for 3 groups of states divided according to the level of income inequality. The following tables show the results of the instrumental variable model for the aforementioned 3 groups.

Table 7.1 shows the results for the low inequality states. It is found that the effect of all measures of financial development on violent and nonviolent crime is largely insignificant.

Table 7.1: Low income inequality states		
	Violent crime	Nonviolent crime
bank branches	0.40	0.70
	(0.95)	(0.96)

deposits	0.003	-0.004
	(0.43)	(0.62)
credit	0.003	0.001
	(0.48)	(0.96)
savings	0.01	-0.01
	(0.46)	(0.45)
controls	yes	yes
state/region/year FE	yes	yes

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations ranges from 129 to 159.

Table 7.2 shows the result for medium income inequality states and the results are insignificant for all measures of crime and financial development.

Table 7.2: Medium income inequality states			
	Violent crime	Nonviolent crime	
bank branches	0.35	7.36	
	(0.81)	(0.42)	
deposits	.00002	.0003	
	(0.69)	(0.32)	
credit	.00002	.0004	
	(0.74)	(0.36)	
savings	.0001	.002	
	(0.67)	(0.30)	
controls	yes	yes	
state/region/year FE	yes	yes	

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations ranges from 191 to 195.

Table 7.3 shows the result for high income inequality states. It is found that financial development has had a highly significant positive effect on both measures of crime. The results show that 1 new bank branch results in a 2.87 times increase in violent crime. 1 lakh Rupees in deposits, credit outstanding, and savings per 100000, results in a 0.0002, 0.0002 and 0.0008 times increase in violent crime, respectively. 1 lakh Rupees in deposits, credit outstanding, and 0.0002, 0.002 and 0.001 times increase in violent crime, respectively.

Table 7.3: High income inequality states				
Violent crime Nonviolent crime				
bank branches	2.87***	25.51		
	(<0.00)	(0.10)		
deposits	.0002***	.002**		
	(<0.00)	(0.02)		
credit	.0002**	.002**		
	(0.02)	(0.02)		
savings	.0008***	.01**		
	(<0.00)	(0.03)		
controls	yes	yes		
state/region/year FE	yes	yes		

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are: proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations ranges from 360 to 384.

Therefore, the results indicate that income inequality plays an important role in the relation between crime and financial development. The results have shown that it is in the presence of high income inequality that financial development has failed to reduce crime rates. In case of low and medium income inequality states, the results do not hold. The evidence supports the hypothesis that income inequality is an important factor that incites and pressurizes people to commit crime. The results support the existing theories and empirical evidence that hold income inequality as the main factor that is responsible for inciting criminal behavior. Theoretical and empirical evidence is unanimous on the detrimental impact of inequality on crime. Therefore, whether financial development has had an effect on income inequality is further analyzed in this paper.

## The effect on income inequality:

Table 8 shows the results of financial development on income inequality. The results show that bank branches have a positive and significant effect on inequality. The results indicate that financial development has exacerbated income inequality in India. The results show that 1 new bank branch per 100000 results in a 0.95 percent increase in the Gini coefficient. Deposits, credit outstanding, and savings have increased income inequality by 0.00003, 0.00005 and 0.0002 percent, respectively. *This could be due to the following three reasons: the lack of inclusivity in financial development; the financial development that was carried out being insufficient in scope; and the third reason may be that financial development may not, in itself be the answer to income inequality. It may need to be accompanied by other policies that tackle income inequality. The results have also shown that it is in the presence of high income inequality that financial development has failed to reduce crime rates and financial development needs to be accompanied by other inequality reducing policies, so that as income inequality falls, the benefits of financial development may be realized.* 

Table 8: IV results - income inequality	
	GINI
bank branches	0.95**
	(0.02)
deposits	.00003*
	(0.04)
credit	.00005*
	(0.05)
savings	.0002**
	(0.03)
controls	yes
state/region/year FE	yes

Note: \*\*\*, \*\* and \* denote statistical significance at 1%, 5% and 10% level, respectively. P-values are reported in parentheses. Standard errors are clustered by state. All variables included in the model are deflated by the population in 1972. The controls included are:

proportion of urban population, workforce participation, the number of civil policemen, proportion of scheduled tribes and scheduled caste populations, literacy rate, poverty headcount ratios as a proxy for per capita income and length of electricity cables as a measure of infrastructure. The number of observations is 551.

### 6. Conclusion

This paper used data from Indian states to study the impact of financial development on crime and the mechanisms underlying that relation, in a first attempt to study this relation. The years covered are 1972 to 2011. The empirical model used is adapted from Burgess and Pande (2005), which uses the branch licensing policy regime that was implemented between 1977 and 1990. The regime mandated a 1:4 ratio of branches opened in banked locations vs. those opened in unbanked locations. Therefore, one of the measures of financial development used is the number of bank branches, others used are deposits, credit outstanding, and savings, while the initial level of bank branches serves as the instrument.

The results indicate that financial development has had a positive and significant impact on crime. There is a positive effect on both violent and nonviolent crime. The impact on nonviolent crime is higher than the effect on violent crime, and the results are driven by the impact on nonviolent crime. This might be a direct impact. This is in accordance with the theoretical literature that suggests that as economic development takes place, financial development being an important component of economic development, increased 'opportunities' are available for crime. The theories also suggest that as societies develop and modernize; they experience a change that results in urbanization and a break in the traditional family structure and close knit societies. This also contributes to an increase in crime as the informal social controls are broken (Durkheimian, Marxian world, and the Opportunities theory). This is also supported by the lower impact on violent crimes which tend to be impulsive, interpersonal in nature, and independent of the level of economic development. The second channel that may be responsible and is well documented in literature is income inequality. Literature suggests that income inequality is one of the foremost factors that incite criminal behavior and a positive relation is well supported, theoretically and empirically. This paper checks whether income inequality influences the relation between crime and financial development. In order to do this, all states are divided into 3 groups with respect to income inequality. It is observed that states with low and medium inequality do not show any significant impact on crime. Conversely, the high income inequality group experienced an increase in both violent and nonviolent crime. The results also show a positive impact of financial development on income inequality. Therefore, these results suggest that financial development has increased both crime and income inequality in India. And it is in the presence of high income inequality, that financial development has failed to reduce crime rates.

The findings are consistent with the existing theoretical and empirical evidence, except that financial development seems to have increased income inequality in India. This could be due to several reasons: *first, the lack of inclusivity in financial development; second, that the financial development that was carried out was insufficient in scope; third, that financial development may not, in itself be the answer to income inequality. It may need to be accompanied by other policies that tackle income inequality.* 

The main contribution of this paper is that it is a first attempt to study the impact of financial development on crime in India. The main finding is that financial development has increased crime in Indian states. It is found that states with high levels of income inequality witnessed an increase in violent and nonviolent crime rates as opposed to states with low and medium income inequality. *Therefore, a major implication of this paper is that financial development should not be dismissed as a measure that increases crime but needs to be implemented carefully alongside other policies that target income inequality and prioritize inclusivity, so that as income equality falls, the benefits of financial development may be realized.* 

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