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IFN Working Paper No. 1374, 2020

# **Inequality, Relative Deprivation and Financial Distress: Evidence from Swedish Register Data**

Paula Roth

# Inequality, Relative Deprivation and Financial Distress: Evidence from Swedish Register Data\*

Paula Roth<sup>†</sup>

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## Abstract

Several studies have linked rising insolvency rates to increasing inequality and argued that this might be explained by individuals' desire to "Keep up with the Joneses". Using unique administrative register data on individual insolvencies in Sweden, I test whether the probability to become insolvent is related to inequality in one's reference group or to one's income distance relative to peers. Identification relies on area fixed effects, an extensive set of background characteristics and varying the definition of relevant reference groups. I find that there is a positive relationship between inequality and insolvency, where a 10 percent increase in top incomes increases the individual probability to become insolvent by 12 percent.

**JEL Codes:** D14, D31, D63, D91, E21

**Keywords:** Inequality, Insolvency, Bankruptcy, Financial distress, Social interaction

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# 1 Introduction

Since the 1980s, household debt-to-income has increased around the Western world and is now at historically high rates in many countries (IMF, 2020).<sup>1</sup> High levels of household debt can increase the risk of financial distress and insolvency – which in turn has large negative welfare implications in terms of health and labor market outcomes (Blomgren et al., 2016, Weaver, 2015, Meltzer et al., 2013 and Bridges and Disney, 2010). Furthermore, individual over-indebtedness has lately been suggested as one of the main reasons behind the 2008 financial crisis (Kumhof et al., 2015, Atkinson and Morelli, 2015, van Treeck, 2014 and Rajan, 2010). Together, this makes it important to understand the decisions of individuals who become insolvent.

A potential explanation for the increase in household debt is that households finance their increased consumption with credit in order to keep up with the consumption of those with higher incomes. The idea that individuals care about their relative consumption relates back to Veblen (1899) and Duesenberry (1949) and is gaining support by an emerging empirical literature.<sup>2</sup>

Identifying the link between inequality and household debt faces several endogeneity issues. Agarwal et al. (2020) study the effect of a lottery as an exogenous income shock and find that the number of personal bankruptcies increase in the immediate neighborhood of a lottery winner.<sup>3</sup> Bertrand and Morse (2016) use elaborate strategies to account for omitted variables and find that inequality is positively related to personal bankruptcy rates on the state level.<sup>4</sup> However, due to lack of micro data, neither of these studies have been able to investigate the relationship between inequality and over-indebtedness on the individual level. Hence, they cannot capture heterogeneity in the effect or control

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<sup>1</sup>See Figure 1 for the development of household debt in OECD countries.

<sup>2</sup>There are several macroeconomic papers relating the increase in inequality to the increase in household debt, suggesting a causal link (see for example Kumhof et al. (2015) and Iacoviello (2008)). There is, however, less done on the link between inequality, debt and social norms.

<sup>3</sup>However, Agarwal et al. (2020) do not have access to individual panel data with linked information on bankruptcies, individual controls (such as income) and lottery wins. Hence they can only measure bankruptcies at the aggregate postal code level.

<sup>4</sup>In descriptive studies of the relationship between inequality and financial distress at the aggregate level, Frank et al. (2014), Adkisson and Saucedo (2012) and Zhu (2011) find similar results. Several studies look directly the relationship between relative income and savings or debt. One example is Drechsel-Grau and Schmid (2014), who document that households that have a lower relative income save less. Georgarakos et al. (2014) find a relationship between indebtedness and inequality, and that this relationship is stronger among the poorer households.

for important individual factors, such as absolute income. Furthermore, in Agarwal et al. (2020), it is possible to question the external validity of a lottery win in comparison with other sources of income inequality.<sup>5</sup>

In this paper, I use micro level data on insolvencies from the Swedish Enforcement Authority (SEA) combined with socioeconomic background variables to study the relationship between inequality, relative deprivation and individual insolvencies. To my knowledge, I am the first to investigate the relationship between inequality and financial distress on the individual level.<sup>6</sup> Sweden is unique in having a government authority assisting the collection of both private and public debts, which gives access to micro data on insolvencies in Sweden. The availability of panel data for the Swedish population allows me to control for several important background variables, such as absolute income, education and the incomes of other household members. Detailed information on geographical location and workplace allows me control for area fixed effects and area specific time trends. Unlike previous studies which focus on the greater neighborhood (i.e. state or municipality), I can evaluate the importance of different reference groups, such as the workplace and the smaller neighborhood. Furthermore, I can evaluate whether there are heterogeneous effects across the population by comparing the results for different income groups.

To compare my results to previous studies, I estimate the relationship using group-level measures of inequality. Estimating the relationship using individual-level data, I find that a 10 percent increase in top incomes increases the individual probability to become insolvent by 12 percent. My results suggest that there are heterogeneous effects, where low-income individuals are more likely to become insolvent when they live in areas with high inequality. To evaluate this, I look at a measures of relative position, using the Yitzhaki index of relative deprivation. I find that, conditional on the individual's income, a higher relative deprivation increases the probability to become insolvent. Specifically, a one standard deviation increase in the relative deprivation increases the probability by 3.3 percentage points, which can be compared to the population mean at 4.76 percent. I find

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<sup>5</sup>This has been discussed in several papers using lottery wins as exogenous income shocks, see for example Cesarini et al. (2017) and Crossley et al. (2016) showed that there are several external validity problems with using lottery wins.

<sup>6</sup>A related study is Kreiner et al. (2020) who analyze the driving forces behind financial troubles using administrative Danish data on individual defaults on personal loans.

similar results regardless of the choice of reference group. A particular contribution is my study of the gender differences in status comparison. Even though men and women are almost equally represented among insolvent individuals, the relationship between relative deprivation and insolvency is two times higher for men than for women.

The results highlight that there are potential negative welfare effects of increased income inequality and that it is especially important for policy-makers to prevent low-income groups from falling behind.

My results primarily add to a series of recent studies exploring the link between inequality, social comparison and bankruptcy. There are several other studies linking relative income to behavioral effects; Kuhn et al. (2011) find that neighbors of lottery winners increase their consumption, Card et al. (2012), Godechot and Senik (2015) and Clark et al. (2009) study wage comparisons at the firm level and Ravina (2005) finds a positive relationship between average consumption levels and the individual's own consumption, using credit card data. Furthermore, this paper relates to research on social comparison, with important work dating back to Veblen (1899), Duesenberry (1949), Becker (1974), Akerlof (1980) and Manski (1993). The existence of social comparison has been shown in experimental studies (see for example Fehr and Schmidt, 2006 and Charness and Rabin, 2002) and there are several empirical studies examining new ways of providing causal estimates of peer effects and social comparison (see Benhabib et al., 2011 for a review of studies on social comparison).

This paper is organized as follows. In Section 2, I motivate the empirical strategy and in Section 3, I compare insolvency in Sweden with other countries and explain the legal framework in Sweden. In Section 4, I describe the data and present descriptives on insolvency in Sweden. In Section 5, 6 and 7, I present results using different measures of inequality. In Section 8, I conclude with a discussion about the results and future research.

## **2 Empirical Strategy**

The analysis consists of two parts. In the first part, I estimate the relationship between group-level measures of inequality and individual insolvency. This allows to me to com-

pare my results to previous studies. In the second part, I study the relationship between the individual's relative position in the income distribution and the probability to become insolvent.

In the first analysis, I follow Bertrand and Morse (2016)<sup>7</sup> and estimate the relationship between top incomes and individual insolvency. For the measure of top incomes, I use the incomes in the 80th and 90th percentile, following Bertrand and Morse. To capture the Keeping up with the Joneses-mechanism it is relevant to look at measures of top incomes since the idea of Veblen and others was that individuals compare themselves to individuals above them in the income distribution. I also evaluate two additional measures of inequality: the ratio between the 95/50th percentile and the Gini coefficient.

For the analysis of top incomes, the reference area is assumed to be the municipality where an individual lives. There are 290 municipalities in Sweden with an average population of 35,000 individuals, ranging from 2,500 to 950,000. This can be compared to Bertrand and Morse (2016), using the much larger US states as the reference area, where the population size ranges from almost 590,000 to 39 million, or to Luttmer (2005) who uses Public Use Microdata Areas (PUMAs) with on average 150,000 inhabitants.

The outcome variable indicates whether an individual has received a claim or not during the year. This differs from the measure of personal bankruptcy filings since it is less severe, as will be seen in section 3. The estimating equation for the first analysis is the following:

$$\begin{aligned} Insolvency_{imt} = & \beta_0 + \beta_1 Inequality_{m(t-2)} + \beta_2 Log(Income)_{im(t-2)} \\ & + \beta_4 X_{imt} + \beta_5 M_{mt} + \omega_m + \theta_t + \omega_m t + \epsilon_{imt}, \quad (1) \end{aligned}$$

$Inequality_{mt}$  is a measure of inequality at the municipality level. I follow Bertrand and Morse (2016) and use the income of 80th and the 90th percentile. As a robustness check, I also use the ratio between the 95th and the 50th percentile and the Gini coefficient. I control for the log of lagged individual disposable income.  $M_{mt}$  is a vector of municipality controls. More specifically, the median income, the share of married households, the

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<sup>7</sup>The study of bankruptcy rates is available in their online appendix.

average age, the average number of children per household, the share of individuals with low education, and share of relatively poor.<sup>8</sup> I also add controls for regional house prices.<sup>9</sup>  $X_{imt}$  is a vector of individual controls (age, age squared, gender, education attainment in years, marital status, number of kids and employment status). Being able to control for individual income allows me to capture many relevant omitted variables.  $\omega_m$  are municipality fixed effects.  $\theta_t$  are year fixed effects and  $\omega_mt$  are municipality specific time trends. Each observation is weighted by population size. The standard errors are robust and clustered at the municipal level.

In the second part, I estimate the relationship between relative income and insolvency. I use the fact that I have detailed information on geographic location and workplace and evaluate difference levels of the reference group. Following previous literature, I start by defining the reference group as all individuals living in a municipality. Then, I allow for a more narrow definition by assuming that the relevant reference group consists of individuals at the same workplace. I also define the reference group as the closer neighborhood (SAMS)<sup>10</sup> and individuals in the same age group in the municipality.<sup>11</sup> I control for reference area characteristics, as well as area fixed effects, year fixed effects and area specific time trends.

For the second study, I use the following estimating equation:

$$\begin{aligned} \text{Insolvency}_{imt} = & \beta_0 + \beta_1 \text{RelativeDeprivation}_{im(t-2)} + \beta_2 \text{Log(Income)}_{im(t-2)} \\ & + \beta_4 X_{imt} + \beta_5 M_{mt} + \omega_m + \theta_t + \omega_mt + \epsilon_{imt} \quad (2) \end{aligned}$$

where I control for the log of lagged individual disposable income. As above,  $X_{imt}$

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<sup>8</sup>The share of individuals with low education is defined as individuals with education less than high school and relatively poor households are classified as those with an income less than 60 percent of the median income.

<sup>9</sup>House prices are not available on the municipal level, due to the low sales volumes in small municipalities. Bertrand and Morse (2016) also control for local price levels. In Sweden, there is arguably less variation in local price levels due to the centralized price setting in most business areas, and the most interesting variation is captured by the house price controls.

<sup>10</sup>Small Areas for Market Statistics, SAMS, is a geographic sub division of Swedish municipalities. There are 9,200 SAMS-areas with around 1,000 inhabitants.

<sup>11</sup>Previous studies have mainly focused on the neighborhood and the workplace as reference points, see for example Godechot and Senik (2015), Clark and Senik (2010) and Clark et al. (2009)



is a vector of individual controls. Being able to control for individual income allows me to capture the many relevant omitted variables.  $Insolvency_{imt}$  is a binary outcome variable, which takes on the value one if the individual has received a claim in  $t$ .  $RelativeDeprivation_{imt}$  is relative deprivation measured as the Yitzhaki index.

To evaluate the relationship between relative income and insolvency, I construct a measure of relative deprivation based on the previous work by Yitzhaki (1979), among others. The Yitzhaki index of relative deprivation (YRD) is a measure of the cumulative distance between an individual's income to that of everyone with higher income in his or her reference group, divided by the reference group size. The individual with the highest income will be assigned the value 0. Those with relatively lower income will have increasing values of  $YRD_{it}$ .<sup>12</sup>  $M_{mt}$  is a vector of municipality controls such as median income, unemployment and share of relatively poor.  $\theta_t$  are year fixed effects,  $\omega_m$  are municipality fixed effects and  $\omega_mt$  are municipality specific time trends. Standard errors are robust and clustered at the reference group level.

The difficulties in providing empirical evidence on peer effects and social comparison have been long discussed (eg. Manski, 1993).<sup>13</sup> Below, I discuss the most important threats to a causal interpretation of the coefficient on aggregate and relative inequality and consider ways of testing them. The two most obvious threats are individual sorting and omitted variables that are correlated with average local income, as well as the risk of insolvency. Unobserved area characteristics could for example be local policies, labor market structure and price levels. Regarding individual sorting, one possibility is that individuals who are financially constrained, are less mobile than individuals with less constraints. This leads to a clustering of financially constrained individuals. Conversely,

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<sup>12</sup>The Yitzhaki index is defined as below:

$$YRD_{it} = \frac{1}{N_t} \sum_j (y_{jt} - y_{it}) \quad \forall \quad y_{jt} > y_{it} \quad (3)$$

where  $y_{it}$  is the individual's own income in year  $t$  and  $y_{jt}$  is the income of an individual with higher income in your reference area (municipality, neighborhood or workplace).  $N$  is all the individuals in the reference area, including those with lower income in year  $t$ .

<sup>13</sup>Manski coined the term reflection problem, where one standard problem relates to the study of peer effects in the class room, where it is difficult to entangle whether results are affected by the group, or if the group effects is a result of correlated background characteristics. In the usual setting, the individual outcome variable  $y_i$  is regressed on the aggregate group outcome  $y$ , which leads to questions about reverse causality. In my study, the outcome variable is different from the dependent variable of interest, which makes the reflection problem less valid.

high-income individuals who are less financially constrained may want to live in urban areas where the possibilities for work are better, leading to reverse sorting, where high inequality leads to less financial distress. However, if this is the source of sorting, it is more likely to cause a negative bias. Another possibility is that insolvency is related to the individual's willingness to take on risk, so that less risk-averse individuals are more prone to become insolvent. If this is the case, one could worry that individuals who are more willing to take on risk, also move to areas where inequality is higher, leading to a positive bias.

One way to address the potential problem of unobserved area characteristics that are correlated with both inequality and insolvency is to include area fixed effects. If the results hold up after inclusion of area fixed effects (municipality, SAMS or workplace fixed effects) they cannot be driven by unobservables that operate on that geographical level, such as climate or local policies. I add controls for regional house prices, since these might be correlated with both income and insolvency levels. Furthermore, I also include area specific time trends, which allows me to control for time trends in each geographical area. The identification also relies on the possibility to study different reference groups.

Another potential worry is that the results are driven by omitted individual characteristics that influence both the decision on where to live and the probability to become insolvent. I control for a large battery of individual controls, which reduces the possibility of omitted individual characteristics. One of the most important controls is the individual's absolute income. By keeping the individual income constant, I can implicitly control for other relevant unobserved factors such as health status and work motivation. Even though the panel structure of the data would allow for inclusion of individual fixed effects, this is problematic when working with data in which events are rare, since this would eliminate all non-events from the sample.<sup>14</sup>

One way to evaluate the importance of individual sorting on unobservables is to estimate the relationship between the aggregate inequality measures and individual background variables (the same variables used in the main analysis) with and without municipality specific time trends. I find that in neither of the cases the individual variables

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<sup>14</sup>See Cook et al. (2020) and King and Zeng (2001) for a further discussion about binary outcomes in rare events data.

seem to be related to inequality on the aggregate level, which is speaking against the idea of sorting on the municipality level. The results from this balancing exercise can be found in Table D3.4 in Appendix D.<sup>15</sup>

Furthermore, I will look at a two-year lag of income, meaning that I am not concerned about reverse causality – being insolvent today will not affect your income two years ago. If I only looked at the current income, reverse causality would be an issue, since being insolvent might reduce the incentives to work.<sup>16</sup>

### 3 Institutional Background

Sweden is unique in having a government authority, The Swedish Enforcement Authority (SEA), assisting in the collection of debts. In other countries, creditors must use the general court system, or go through local authorities, if they want their debts repaid. This makes it slightly difficult to compare data on insolvencies across countries. However, some numbers are comparable. For example, filing for bankruptcy in the US have similarities to both debt collection and debt-restructuring in Sweden. There are two types of personal bankruptcies in the US, referred to as a chapter 7 and a 13 bankruptcy. The first chapter provides for liquidation of all assets, and the proceeds are shared between the creditors, and has some similarities with a Swedish debt-restructuring. A chapter 13 bankruptcy provides adjustments of debts and a repayment plan, which is similar to a debt collection in Sweden. In 2017, 19,000 individuals applied for a debt-restructuring in Sweden, which is 0.13 percent of the population (see Table 2). In the US, the same number for personal bankruptcies has been between 0.2 and 0.5 percent.<sup>17</sup> Behind these numbers is an even larger share of Americans with financial problems. Around 35 percent of American consumers experience financial distress at least once in their lifetime (Athreya et al., 2017) and survey evidence suggest that more than 13 percent per year

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<sup>15</sup>A joint F-test of the controls when adding municipality specific time trends, show that for the Gini coefficient and Log(P80) they are not significantly different from zero. For the Log(P95/P50) I can reject the zero hypothesis above a 5 percent significance level. Finding one significant F-stat is hardly surprising given that the number of observations exceed 30 million. However, the economic magnitudes are small. For example, one more year of education attainment decreases the Log(P95/P50) with less than 0.0001 percent, which is arguably not economically significant.

<sup>16</sup>This is especially true in the case of a wage seizure, since all wage income above a certain threshold is used for repayment of debts

<sup>17</sup>American Bankruptcy Institute (2016)

miss their debt payment.<sup>18</sup> In Europe, survey evidence shows that the average number of individuals who are unable to make ends meet is 12.6 percent, with large differences between the countries, ranging from 35.6 percent in Greece to 2.2 percent in Norway. 28 percent of Europeans are unable to face unexpected financial expenses and more than one fourth experience that they are under financial strain.

In general, Swedes are good at paying their bills on time. In comparison to other European countries, Scandinavians have a short repayment period and in general few delays.<sup>19</sup> 2.6 percent of Swedes have arrears on mortgage- or rent-payments, which is less than the European average at 3.8 percent. Only 3.5 percent are unable to make ends meet, while the European average is as high as 12.6 percent.<sup>20</sup> However, there is still a relatively high number of unpaid debts and the number of applications to collection companies has increased over the years, as seen in Table 1 below. Strikingly, between 2008 and 2017, the number of debtors increased by nearly 300 percent.

Table 1: Statistics on Collected Amounts and Debtors

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
New claims (in 1,000)	7,400	7,200	7,300	7,900	7,800	7,800	7,900	8,200	7,750	7,850
Recovered claims (in 1,000)	4,500	5,500	5,800	5,800	6,500	6,500	7,000	7,200	6,800	7,700
Debtors (in 1,000)	370	400	500	500	460	490	850	1,000	1,100	1,100
Debtors, % of population	3.58	3.91	4.94	5.00	4.61	5.03	8.81	10.46	10.46	11.60
Capital to collect (in billion Euro, 2016)	4.9	5.8	5.0	4.8	5.8	7.0	6.3	6.3	9.4	8.1
Collected capital (in billion Euro, 2016)	1.9	1.9	1.9	1.8	2.6	2.2	3.0	2.7	3.0	3.3
Applications to SEA (in 1,000)	900	1,000	1,100	1,000	1,000	1,000	1,100	1,150	1,140	1,170

Note: Data from Svensk Inkasso (2017) on the number of incoming claims, debtors and capital to collect between 2008 and 2017. % of population means share of whole Swedish population, data from SCB.

The route from an unpaid bill to a registration with the Swedish Enforcement Agency is often long (see Figure 4 in Appendix C for a representation of the different steps). When an individual does not pay a bill on time, the creditor can use a collection company, before going to the SEA. The collection company cannot force the debtor to pay (even though there are stories of threat and violent behavior), but will send several reminders with expensive additional fees. If the collection company cannot make the debtor pay, the debt will be sent to SEA. SEA receives more than 1 million of these claims per year. The creditor can then use SEA to collect their debt. SEA has several measures of doing so. If the debtor does not pay instantly, it can be done through wage seizure. In this case, SEA

<sup>18</sup>New York Fed (2017)

<sup>19</sup>See Figure 2 for a comparison of payment days for European countries

<sup>20</sup>See Table 9, for a comparison on insolvency and financial distress in European countries

comes to an agreement with the employer who will then pay part of the wage directly to SEA. If there is no wage income, a foreclosure will take place, where SEA seizes all assets, except the ones crucial for a minimal life standard. Debtors who do not succeed to pay of their debts in a long time, can apply for debt-restructuring. If debt-restructuring is granted, the individual needs to live at the minimum existence level<sup>21</sup> for up to five years without taking up new credit. All additional income will go straight to SEA. After this period, the individual will be considered debt-free. In 2019, 12,250 individuals were granted debt-restructuring, which is 60 percent of the total applications.<sup>22</sup>

## 4 Data

I base my analysis on insolvency data maintained by The Swedish Enforcement Authority (SEA). This registry contains data on all individual claims received during the last four years.<sup>23</sup> This amounts to more than 1 million applications yearly, concerning approximately 400,000 individuals. Due to legal reasons, this information cannot be saved for more than four years. Hence, the data contain a panel of individuals who received claims between 2014 and 2017 and the total number of claims for each individual.

SEA also has information on the stock of individuals currently registered for collection.<sup>24</sup> When the debt is paid in full, the individual is removed from the collection register. In this registry, I have information on all individuals who were registered for collection in 2017, with information on the year of registration, the size of the current and original debt, as well as the type of debt. Debts are divided into public and private debts. For the public debts, there is a specification of the type of debt (such as unpaid TV-licenses, unpaid taxes etc.). Private debts, which are debts to firms or individuals, are not further specified in the data.

The insolvency data is combined with other administrative registries containing data

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<sup>21</sup>Your housing cost plus an additional 490 Euro for living expenses (in 2017).

<sup>22</sup>The SEA conducts an individual evaluation of each application. The authority evaluates whether it is likely that the debts can be repaid within a reasonable time frame. How and why a debt occurred is also important. They also take into account the individual's need of financial rehabilitation (Kronofogdemyndigheten, 2018).

<sup>23</sup>A registered claim means that a creditor has sent an application to SEA, asking for help to collect the an unpaid debt. See step (4) in Figure 4.

<sup>24</sup>See step (6) in Figure 4.

on the whole Swedish population between 1990 and 2015 for individuals above 15 years of age. The registries contain detailed information on income as well as socioeconomic characteristics on all individuals. Since these variables are only available until 2015, income and background variables will be lagged two years compared to the insolvency data, to be able to make use of the full panel between 2014 and 2017. I will also run the analysis using the years where data is available without lags, 2014 and 2015.

## 4.1 Descriptives

In Sweden, there is a great variation on the municipal level regarding the share of individuals who are registered at the SEA. The share registered for collection ranges from less than 1 percent in Danderyd to more than 8 percent in Ljusnarsberg. Accounting for the difference in average incomes at the municipality level, does not explain the difference in the share indebted. Looking at the share of claims, accounting for municipality income explains 23 percent of the difference.

The number of individuals registered for collection has been stable around 420,000 (around 4.5 percent of the Swedish population) for several years while the total amount of debts has increased, see Table 2. Between 2010 and 2017, the total amount of debt registered for collection increased by one billion Euro.<sup>25</sup>

Table 2: Different Levels of Financial Distress (% of Population in Brackets)

Year	Currently registered	Total debt	Individuals with wage-collection	Number of claims	Applications for debt-restructuring
2010	423,721 (4.5)	7.1	103,383 (1.1)	1,172,469	7,961 (0.08)
2011	418,530 (4.41)	6.6	93,989 (0.99)	1,137,586	8,453 (0.09)
2012	427,417 (4.47)	7.1	92,108 (0.96)	1,156,246	8,898 (0.09)
2013	434,627 (4.51)	7.4	94,190 (0.98)	1,133,159	9,206 (0.10)
2014	426,046 (4.37)	7.5	95,872 (0.98)	1,147,365	10,071 (0.10)
2015	427,734 (4.34)	7.6	99,679 (1.01)	1,138,167	11,258 (0.11)
2016	423,184 (4.23)	7.6	100,364 (1)	1,111,176	12,349 (0.12)
2017	417,693 (4.13)	8.1	103,343 (1.02)	1,157,187	19,023 (0.13)

Note: Summary statistics on the available data from Kronofogdemyndigheten between the years 2010 and 2017. Applications are in number of individuals, with the share of the whole Swedish population in brackets. Debt amounts are measured in billion Euro, adjusted to CPI in 2016.

<sup>25</sup>Wage collection is a measure of collecting debts, where the SEA comes to an agreement with the employer of the debtor about a share of the wage going directly to the SEA for repayment of debts.

Looking more closely at the data over registered adults in Table 3, we see that between 2014-2017, more than 1.5 million individuals, 4.76 percent of the adult population, have been registered with a claim. The large majority of these individuals received less than six claims and 51 percent (783,330 individuals) have only one claim. Receiving a claim severely affects individuals' possibilities when it comes to credit, housing and career choices. For example, most banks will not give out credit to individuals registered with a claim and their only option is then credit companies charging high interest rates. Furthermore, the chance of signing a contract regarding installments, such as mobile plans and rents, is greatly diminished.

An interesting observation is that the average income is increasing with the number of claims. This suggests that there are different explanations for individuals who receive one claim and those receiving several claims in a year. One hypothesis is that receiving one claim is caused by unexpected income shocks, while a higher number of claims is due to structural economic decisions, such as tax avoidance or other criminal activity. In Section 7.4, I will focus the analysis on individuals with a lower number of claims, excluding those who are most likely driven by other motives than social comparison.

Table 3: Income Among Insolvent and Non-Insolvent Individuals

Number of claims 2014-2017	Observations	Percent of adult- population	Average income (in Euro, 2016)
No claim	30,414,125	95,24%	22,831
One claim or more	1,520,334	4,76%	19,685
1 - 5 claims	1,354,916	4,24%	19,487
6- 10 claims	114,644	0,36%	20,488
11-15 claims	30,636	0,10%	22,044
16-20 claims	11,223	0,04%	24,350
>20 claims	8,915	0,03%	25,527

Note: Comparison of incomes between individuals with claims and those without claims in the pooled data for the years 2014 to 2017. Income is measured in billion Euro, adjusted to CPI in 2016. % of population means adult population (15+ years).

In Table 4, I present descriptives of some key variables for three different groups, including individual-year means averaged between 2012 and 2015. In column 1 we see averages for the individuals not registered with claims or collection, column 2 for individuals registered with claims and in column 3 individuals registered for collection. Note that the number of individuals registered for collection is only the stock of those currently registered in 2017. During the period of my study, the number has been stable over the

years, meaning that around 5 percent of the adult population are registered for collection annually.

From Table 4, we see that both household and individual incomes are lower among individuals registered for claims and collection compared to the rest of the population. Individuals with claims have less education and are on average almost seven years younger than individuals without claims. 44 percent of individuals registered with a claim and 40 percent registered for collection are women. They are also more likely to be receiving social benefits, to be unemployed at any point during the year, to be on early retirement and on sick leave. When we look at those registered for collection, which is more severe than being registered with a claim, these individuals have even lower incomes and education. All income variables are in current prices (2016). In Figure D3.1, I look closer at the age distribution among insolvent individuals. The graphs show that the debt amount is unevenly spread across different age groups and increasing with age.

Table 4: Descriptives, Pooled Data 2014-2017

	(1) Not registered	(2) Claims	(3) Collection	(4) All
Observations	30,595,748	1,538,173	444,047	32,133,921
Household disposable income (in Euro, 2016)	47,126	34,998	24,767	46,546
Disposable income (in Euro, 2016)	24,327	20,748	15,850	24,156
Wage income (in Euro, 2016)	19,259	15,538	9,487	19,081
Years of education	11.96	11.30	10.87	11.93
Age	48.03	41.31	46.30	47.71
Number of children	0.81	1.00	0.75	0.82
Receiving social benefits (%)	2.87	13.81	20.87	3.39
Unemployed (%)	11.02	27.06	31.38	11.78
Self employed (%)	7.08	8.21	0.47	8.23
Owning a house (%)	50.10	33.58	23.23	49.30
Female (%)	50.66	43.87	39.73	50.33
Early retirement (%)	4.56	8.21	14.90	4.74
Married (%)	41.22	27.06	22.22	40.53
Sick leave (%)	7.01	12.44	14.03	7.10

Note: Summary statistics. Income is measured in Euro, adjusted to CPI in 2016. Individuals who are defined as not registered with claims have not received a claim in any of the years between 2014 and 2017. Individuals with claims have at least one claim during the same period. Individuals with wage collection are under execution by the Swedish Enforcement Authority.

Debts are classified as either public or private. Public debts are debts that are owed to the state. This includes everything from unpaid taxes and fees for unpaid childcare allowances. Table 5 shows that there are more public than private debts. 63 percent have a private debt, 73 percent have a public debt and 36 percent are registered with both private and public debts. The majority of registered individuals have less than 20 public



and or private debts. The reason for why the sum of public debts differ from the sum of total debt is that the total debt amount is the amount accrued at the date of the data collection<sup>26</sup>, while the sum of public debt is the amount at the registration of the debt. The average registered amount of public debt will be higher, since people pay of their debts over time.

Table 5: Type of Debt and Average Debt Amount

	Mean	Median	Min	Max
Total debt amount (Euro)	21,976	5,543	1	41 million Euro
Number of public debts	10.17	1	0	4,508
Sum of public debts at registration date (Euro)	6,673	356	0	95 million Euro
Number of private debts	2.83	1	0	211

Note: Summary statistics of the debt amounts registered with the SEA, divided into private and public debts. Private debts are debts owed to an individual or to a firm. Public debts are debts owed to the state, such as tax debt. Debt amounts are measured in billion Euro, adjusted to CPI in 2016.

Taking a closer look at the public debts we see that a few types stand out. In Table D3.2 in the Appendix, the public debts are sorted by occurrence in the data. The most common type of unpaid debt are tax debts and unpaid TV-license.<sup>27</sup> Looking at the average disposable income among individuals with each type of debt, there is also a large difference between debt types. For example, while the average disposable income for individuals with tax debt is 17,366 Euro, the same number for individuals with unpaid penalties is less than 10,000 Euro.

## 5 Results: Group-Level Measures of Inequality

First, following the previous literature, I estimate the relationship between insolvency and top income levels in the municipality. Bertrand and Morse (2016) evaluate whether higher top incomes in a state are predictive of a higher bankruptcy rate. They find that a 10 percent increase in the incomes of the 80th percentile increases the rate of bankruptcies by 10 percent. Their outcome measure is the number of yearly personal bankruptcy filings at the state level. For my analysis, the outcome is an indicator variable stating whether the individual has received a claim for unpaid debts during the year.

<sup>26</sup>2017-08-01

<sup>27</sup>Each type of public debt is described in Table D3.3

## 5.1 Top Incomes

The results are shown in Table 6 below. In column 1 and 2, I only control for individual income and year fixed effects. In columns 2-8, I add individual controls, municipality controls, municipality fixed effects, municipality specific time trends and a control for average house prices at the district level. When adding controls for unemployment, I find a positive and significant relationship between higher top incomes and the individual probability to become insolvent. In the full specification, A 10 percent increase in the incomes in the 80th percentile increases the probability to become insolvent by 12 percent, which is similar to the results found in Bertrand and Morse (2016). In column 10-12, I look separately at individuals with disposable income below or above the median income (P50), and I find a slightly higher relationship for individuals with lower incomes.

## 6 Results: Measures of Relative Position

In the previous analysis, I find evidence that individuals are negatively effected by higher inequality in their municipality. To investigate this further, I now turn to measures of relative position. In the following analysis I use micro level data on insolvencies, measured as a dummy for receiving a claim, and evaluate the relationship between relative inequality in the reference group on the individual probability to receive a claim.

### 6.1 Relative Deprivation

Below, I evaluate the effect of relative deprivation – the weighted sum of the income distance to neighbors with higher incomes – on the likelihood of becoming insolvent. As above, I only control for individual income and year fixed effects in column 1. In columns 2-4, I add individual controls, municipality controls, municipality fixed effects, municipality specific time trends and a control for the average house price at the district level. The results suggest a positive relationship between relative deprivation and the probability of becoming insolvent. That is, individuals who are further away from their peers in the reference group, have a higher probability of receiving a claim. Increasing the relative deprivation by one standard deviation<sup>28</sup> increases the probability to receive a claim by 3.3 percentage points. Comparing this to the population mean of 4.76 shows that the effect is not negligible. In monetary terms, an increase of one standard deviation is the same as increasing the relative distance to neighbors in your reference group by 7,000 Euro, which is less than one third of the average annual income in Sweden.

In column (5) I restrict the reference area to individuals at the same workplace. Previous research has suggested that the workplace is an important network and reference group (see for example Card et al., 2012 and Hensvik and Skans, 2016). I re-estimate the relative deprivation measure at the plant level.<sup>29</sup>

A possible explanation for the low effect at the plant level, is that we are only comparing individuals who are employed, which in itself decreases the probability to be insolvent. Also, the results are in line with findings by Godechot and Senik (2015) and Clark et al.

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<sup>28</sup> $\mu_{YRD} = 0.089, SD_{YRD} = 0.067$

<sup>29</sup>I drop all individuals with no fixed workplace and workplaces with less than 10 employees.

Table 6: Top Incomes and Individual Insolvency

Sample: Independent variable:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
					All							
					Receiving a claim [population mean: 4.76 percent]							
Log(P80)	0.013 (0.010)		0.158*** (0.045)		0.136*** (0.027)		0.118*** (0.032)		0.127** (0.043)		0.114*** (0.031)	
Log(P90)		0.012 (0.008)		0.044** (0.014)		0.072*** (0.018)		0.049* (0.022)		0.046 (0.029)		0.054* (0.024)
Unemployed			0.037*** (0.001)	0.037*** (0.001)	0.025*** (0.001)	0.025*** (0.001)	0.025*** (0.001)	0.025*** (0.001)	0.010*** (0.001)	0.010*** (0.001)	0.024*** (0.001)	0.024*** (0.001)
Log(P50)			-0.072 (0.039)	-0.032 (0.033)	-0.055* (0.022)	-0.009 (0.022)	-0.040 (0.024)	-0.002 (0.025)	-0.033 (0.037)	0.012 (0.040)	-0.054* (0.025)	-0.023 (0.022)
Log(P20)			0.017* (0.008)	0.014* (0.007)	0.006 (0.006)	0.003 (0.006)	-0.009 (0.011)	-0.016 (0.012)	-0.030 (0.019)	-0.039 (0.020)	0.004 (0.010)	-0.002 (0.010)
Log(House Prices)					-0.008*** (0.002)	-0.007** (0.002)	-0.013** (0.005)	-0.015** (0.005)	-0.017** (0.006)	-0.019** (0.006)	-0.009 (0.005)	-0.011* (0.005)
Observations	31,206,038	31,206,038	31,206,038	31,206,038	30,510,293	30,510,293	30,510,293	30,510,293	14,612,137	14,612,137	15,898,156	15,898,156
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Income	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Year FE	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes

Individuals age 16 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual income is measured as the log of lagged disposable income, CPI adjusted to SEK 2016. Household controls include age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for being unemployed during the year. Area controls include mean and median income in the municipality, share of poor, average age. All regressions are estimated using OLS. Standard errors are robust and clustered at the municipality level. Observations are weighted by population size.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

(2009), who show that wage comparisons at the workplace mainly works as a signal about future outcomes. They find that individuals feel more satisfied about their own income if the average wage at their firm is high, indicating that individuals view this as a signal about their own future income. Their findings might explain why I only find small effects at the workplace level.

Table 7: Relative Deprivation

	(1)	(2)	(3)	(4)	(5)
	Dependent variable: Receiving a claim [population mean: 4.76 percent]				
YRD/10,000 - municipality	0.244*** (0.040)	0.251*** (0.036)	0.491*** (0.010)	0.491*** (0.010)	
YRD/10,000 - workplace					0.111*** (0.019)
Year FE	Yes	Yes	Yes	Yes	Yes
Individual Income	Yes	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes	Yes
Reference Group Controls	No	No	Yes	Yes	Yes
Municipality FE	No	No	Yes	Yes	No
Municipality Specific Time Trends	No	No	No	Yes	No
Workplace FE	No	No	No	No	Yes
Workplace Specific Time Trends	No	No	No	No	Yes
Observations	31,206,038	30,510,293	30,510,293	30,510,293	13,708,066

Note: Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual income is measured as disposable income, CPI adjusted to SEK 2016. Individual controls include income, a quadratic in income, age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include log of the mean income in the municipality, share of poor, average age, marriage rate, unemployment rate, share of females and share with low education. Workplace controls include mean disposable income at the workplace and the municipality controls. Both include a control for log of average household prices at the district level. Relative deprivation is divided by 10,000 to simplify the interpretation. All regressions are estimated using OLS. Standard errors are clustered at the municipality level. Observations are weighted by the size of the reference group.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Furthermore, I perform the analysis using only the actual current income, that is, using the two years where I have matched current income and claims, 2014 and 2015.<sup>30</sup> The results are similar to the ones from the main analysis, but less precise, due to the short time span available. Results are available upon request.

## 6.2 Different Effects Between Men and Women

It is also interesting to see how the effect varies between men and women. In Table 8, I replicate column 4 in Table 7 for men and women separately. The results show significant differences between men and women. For men, a one standard deviation increase in the

<sup>30</sup>Recall that SEA data is between 2014 and 2017, while the SCB data is between 1995 and 2015.

YRD increases the probability to become insolvent by 4.3 percentage points. For women, the same number is 2.3 percentage points. In the population, 4.2 percent of the women and 5.4 percent of the men are registered with claims, so there is not a large difference in the occurrence of insolvency between genders.

One explanation could be that men and women become insolvent for different reasons. Within sociology and law there has been several studies looking at differences in insolvency between men and women. These studies show that the indebtedness of women can, to a greater extent, be related to the household. For men, over-indebtedness is more often related to external factors, such as entrepreneurship and car purchases (Sandvall, 2011, Sörendal, 2001 and Niemi-Kiesiläinen, 1996). Another factor could be differences in risk-taking and competitiveness between men and women. If men in general are more competitive than women, this could explain why they would care more about social comparison and the incomes of their neighbors, which is also consistent with experimental findings by Huberman et al. (2004). Substantial attention has been given to gender differences in risk preferences and competition, and most studies find that men indeed seem to be more risk-taking and competitive compared to women (see Apicella and Dreber, 2015, Säve-Söderbergh, 2012, Eckel and Grossman, 2008, Croson and Gneezy, 2009 and Niederle and Vesterlund (2007), among others).

Table 8: Gender Differences

	(1) Women	(2) Men
Dependent variable: Receiving a claim [population mean: 4.76 percent]		
YRD/10,000 - municipality	0.340*** (0.013)	0.646*** (0.016)
Year FE	Yes	Yes
Individual Controls	Yes	Yes
Municipality Controls	Yes	Yes
Municipality FE	Yes	Yes
Municipality Specific Year Trends	Yes	Yes
Observations	15,442,252	15,068,041

Note: Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual income is measured as disposable income, CPI adjusted to SEK 2016. Individual controls include age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include log of the mean income in the municipality, share of poor, average age, marriage rate, unemployment rate, share of females and share with low education. All regressions are estimated using OLS. Standard errors are clustered at the reference group level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

In Table D3.5, I look specifically at men in different ages. The results show that the largest effect is found for men aged 30 to 64. I also look separately at men with different civil status in this age group, and find a strong effect in all cases, but the most prominent for unmarried men with no children.

## 7 Robustness

In this section, I consider several robustness checks. First, I evaluate additional reference groups, the age group in the municipality and the SAMS-area, and find that the relationship between relative deprivation and insolvency is persistent across all considered groups. Furthermore, I add controls for household income, re-estimate the results for a measure of permanent income rather than current income, and in the last test, I drop individuals with a large number of claims to test whether my results are greatly affected by outliers.

## 7.1 Varying the Reference Area

Using the municipality where an individual lives as the reference group is similar to the use of American states in Bertrand and Morse (2016) and Frank et al. (2014). However, other papers have emphasized the importance of the smaller neighborhood. For example, Agarwal et al. (2020) use Canadian data and estimate the effect of inequality on the zip code level, where the median population size is 16 households. With Swedish data, one of the smallest available geographical unit is the SAMS-area, (Small Areas for Market Statistics), in which the Swedish population is divided into 9,200 smaller areas. The average number of inhabitants is approximately 2,400 individuals.

I replicate column 4 from Table 7 for the SAMS-level with controls for average income at the SAMS-level, including SAMS fixed effects. The results in Table D3.7 show that the effect holds on the SAMS level. The estimates are smaller in magnitude compared to the municipality estimates.

Another relevant reference group is individuals in the same age group. Previous studies have emphasized that individuals mostly compare themselves with others whom they interact more frequently with (Clark and Senik, 2010) and that they are demographically similar too (Corcoran et al., 2011). Hence, one reasonable assumption is that the relevant reference groups consist of fellow students, parents and colleagues.

One way to capture this is to define the reference group as individuals of similar age living in the same municipality. For this analysis, I assume that the relevant reference group is everyone within the same age bracket, defined as ten year intervals for the ages 20-29, 30-39, 40-49, 50-59, and so on. I have re-calculated the YRD for these age-municipality groups and estimated the same regression model as above, controlling for individual incomes, and municipality characteristics. Comparing the results in Table D3.7 to Table 7, we see that the estimate is of similar magnitude. A one standard deviation increase in the relative deprivation increases the probability to become insolvent by 2.5 percentage points.<sup>31</sup>

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<sup>31</sup> $\mu_{YRD} = 0.079, SD_{YRD} = 0.065$



## 7.2 Controlling for Household Income

Since household income might also decide an individual's possibility to pay debts and other commitments, I replicate Table D3.7 and control for household income. The results in Table D3.8 show that the estimates are marginally larger and qualitatively the same as in Table D3.7.

## 7.3 Permanent Income

Previous research has shown that individual behavior is mostly affected by changes in permanent income, rather than transitory income. For example, Dahlberg and Gustavsson (2007) and Böhlmark and Lindquist (2006) show that changes to inequality in transitory income has no effect on crime, while there is a positive effect resulting from increases in inequality in permanent incomes. To evaluate whether the probability to become insolvent is more affected by changes in inequality in permanent income, I use the fact that I have income data dating back to 1995 to estimate a measure of permanent income. I construct the permanent income measure using a three year average of disposable income. I use the permanent income measure to recalculate the relative deprivation measure. Table D3.9 show that the results from the main analysis still hold. The magnitudes are slightly larger compared to the results in the main analysis, suggesting that permanent income is an important factor.

## 7.4 Dropping Individuals with Many Claims

As seen in Table 3, the large majority of individuals receive less than 5 claims in a given year. Individuals with a high number of claims are likely to be driven by factors other than social comparisons.<sup>32</sup> Below, I exclude outliers, that is, individuals who received more than 10 claims in a year and re-estimate my main regression.<sup>33</sup> The point estimates are not very different compared to the main results in Table D3.7, showing that my results are not driven by outliers.

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<sup>32</sup>Many of these individuals are likely engaged in criminal activity, where some of the individuals with the most claims are acting as decoys.

<sup>33</sup>The standard deviation in number of claims per year is 3.337. Following the Mean and Standard Deviation Method, I remove everyone with more than three times the standard deviation, which is approximately 10 claims.

## 8 Concluding Remarks

Previous literature has presented cross-sectional evidence of a positive relationship between inequality and insolvency rates at the aggregate level. The relationship is explained by individuals' desire to "Keep up with the Joneses". In areas with higher inequality, individuals will decrease their savings and increase their consumption, in order to follow the consumption pattern in the reference group. With less savings, individuals are more likely to become insolvent.

Due to a previous lack of micro level data on insolvencies, this relationship has not been evaluated at the individual level. I have used micro level register data on insolvencies, combined with population and taxation registers to evaluate whether inequality in a reference group leads to a higher probability of becoming insolvent. I have tested different measures of inequality as well as different definitions of the reference group, controlling for individual income and other relevant background variables. When using individual-level data, I find a positive and significant relationship between higher top incomes in a municipality and the individual probability to become insolvent. My results suggest that there are heterogeneous effects, where low-income individuals have a higher likelihood of becoming insolvent if they live in municipalities with high inequality.

In addition, I look at a relative measure of inequality, measured as the Yitzhaki index. I evaluate several definitions of the reference group and find similar effects across the groups. A one standard deviation increase in the individual's relative deprivation leads to a 3.3 percentage point increase in the probability to become insolvent. The magnitude can be compared to the population mean of 4.76 percent.

A particular contribution is my study of the gender differences in status comparison. Even though men and women are almost equally represented among insolvent individuals, the relationship between relative deprivation and insolvency is twice as high for men. The results show that the largest effect is found for unmarried men aged 30 to 64.

Understanding the impact of inequality on the economic decisions of individuals and households is of importance for researchers and policy makers. Previous research has shown that inequality has a positive effect on consumption among low- and middle-income households, supporting the existence of "trickle-down consumption" (see Bertrand and

Morse (2016)). Increased consumption, in itself, might not have a negative impact on the well-being of individuals. However, higher consumption and lower savings can increase the risk of insolvency. Studies have shown that individual insolvency is detrimental to health and labor market outcomes. Being insolvent inhibits consumption possibilities and may decrease incentives to work, since a large share of the income is going to repayment of debts. Lately, high insolvency rates have been suggested as one of the main reasons behind the 2008 financial crisis. This, together with the negative impact on individual well-being, makes it important to understand the decisions of individuals who become insolvent. If inequality makes people prone to become over-indebted, this provides policy makers with a strong reason to counteract inequality.

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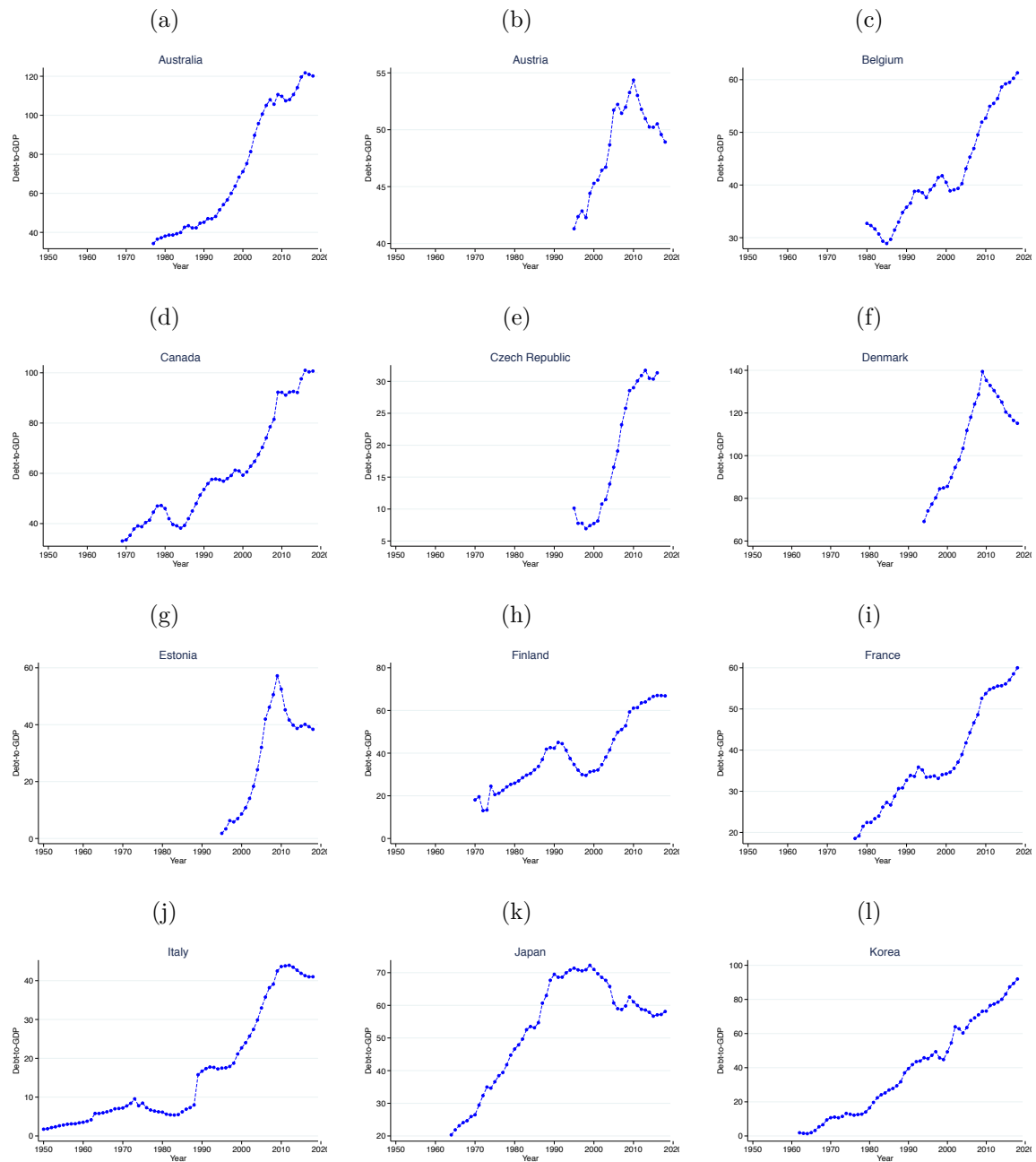
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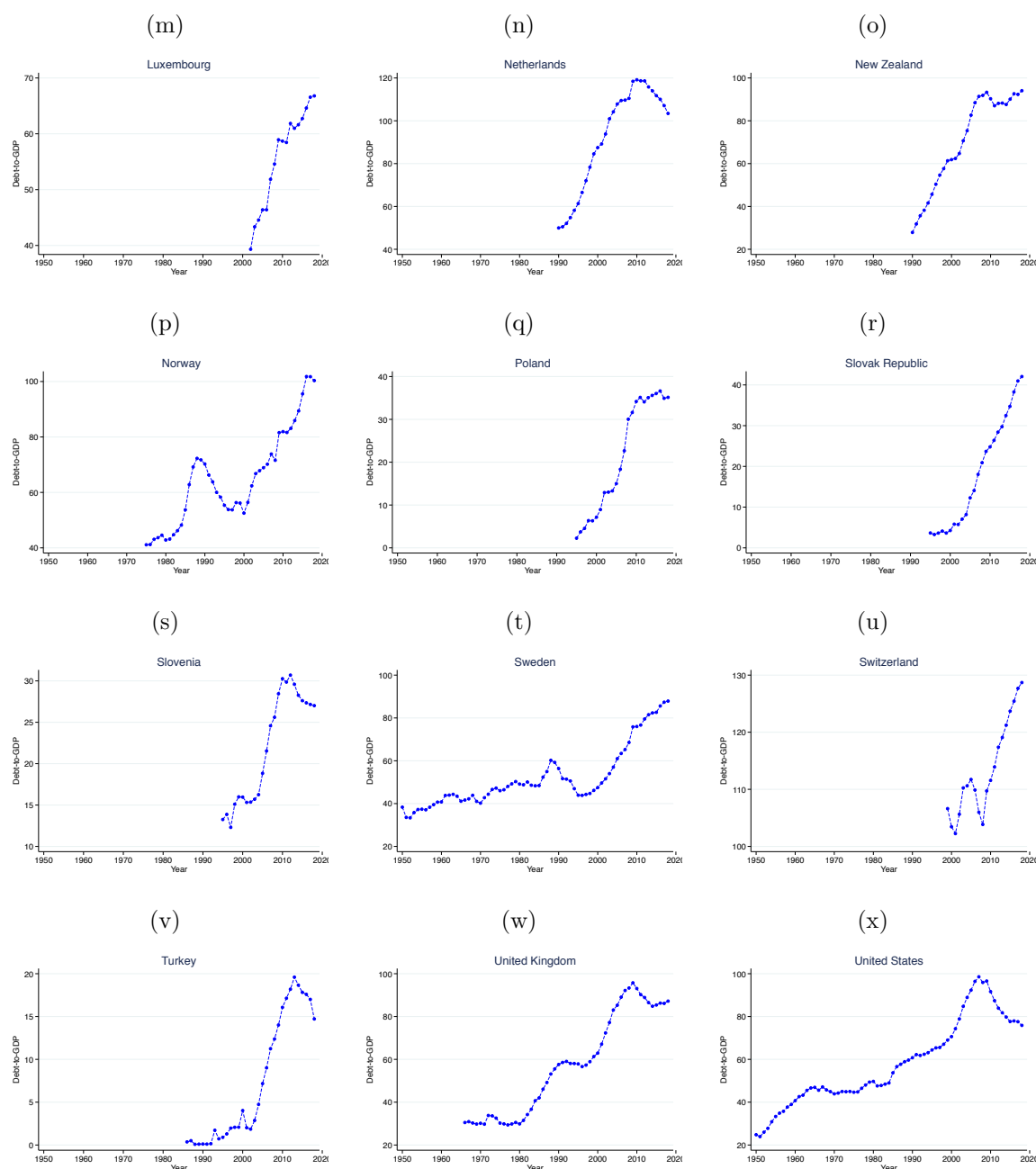
# Appendices

## A Household Debt in OECD countries

Figure 1: Household Debt-to-GDP



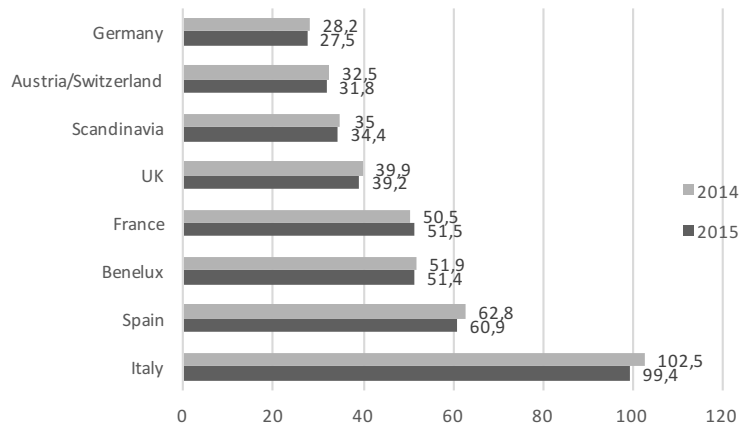
## Household Debt-to-GDP, cont'd



Note: Data on household debt from IMF, measured as the total stock of loans and debt securities issued by households as a share of GDP (IMF, 2020).

## B Insolvency and Social Comparison in Sweden and Europe

Figure 2: Collection Periods in Days, Europe



Note: Time from issue of debt to debt repayment for firms in days. Source: Creditreform (2017) p.18

Figure 3: Inequality and Indebtedness in Swedish Municipalities (%)

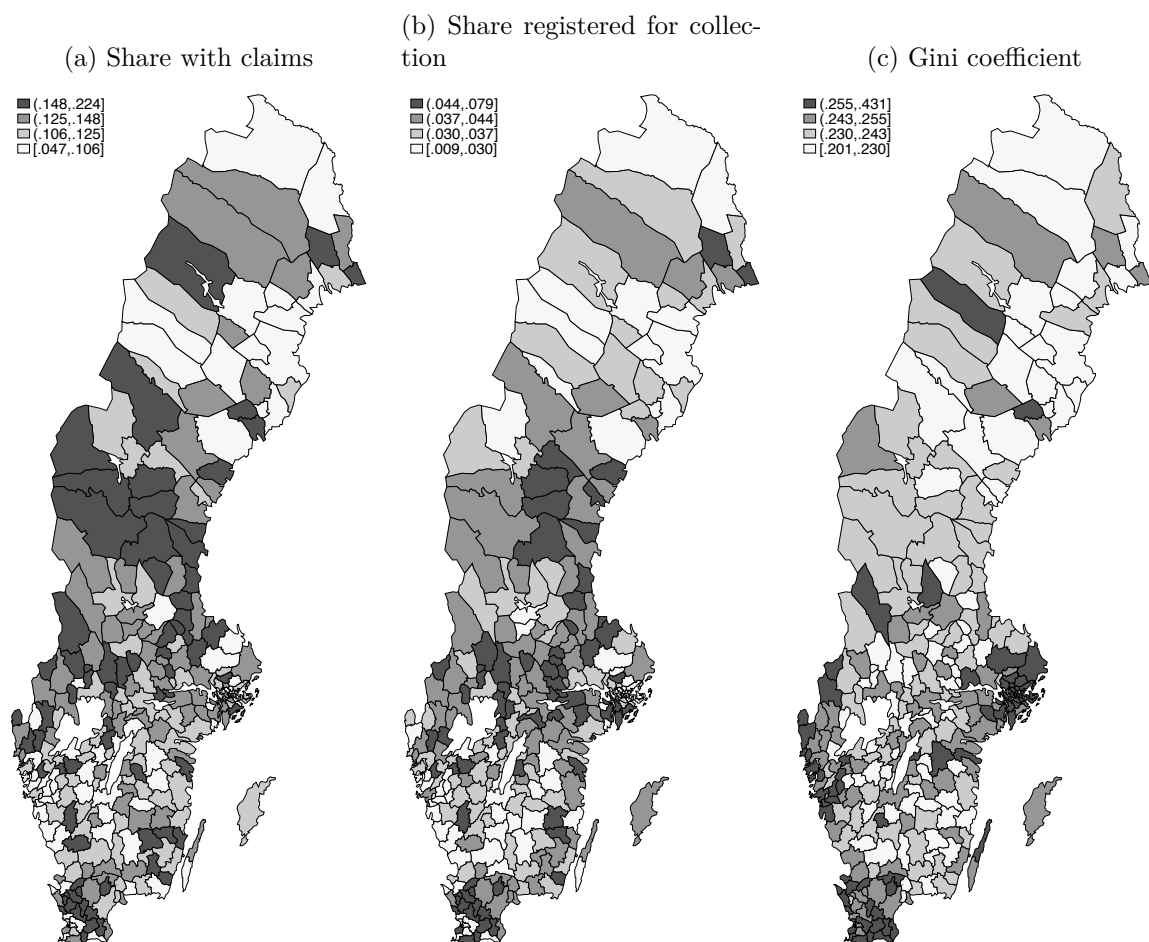


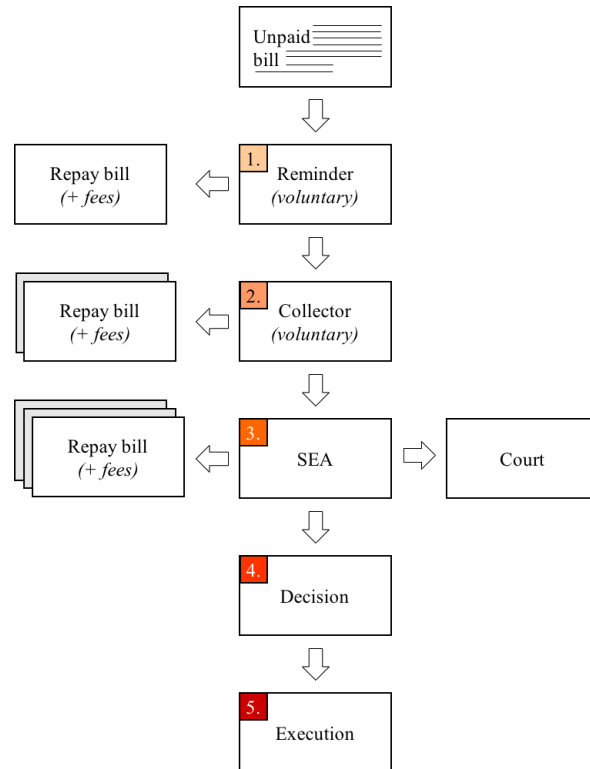
Table 9: Insolvency in Europe - Percentage of Population with Different Levels of Financial Distress (2010-2018)

Country	<i>Percentage of population with:</i>		
	Inability to face unexpected	Arrears on mortgage- or rent payments	Inability to make ends meet
Austria	22.6	3.8	5.2
Belgium	25.1	3.3	8.4
Bulgaria	56.2	1.9	29.8
Croatia	61.1	1.3	20.5
Cyprus	53.8	7.6	26.7
Czech Republic	35.9	2.9	8.0
Denmark	25.8	2.6	3.7
Estonia	39.3	2.2	6.4
Finland	28.0	4.7	2.4
France	32.4	5.6	4.5
Germany	31.7	2.0	2.6
Greece	45.8	13.1	35.6
Hungary	62.4	5.6	21.4
Iceland	34.4	10.2	10.2
Ireland	49.3	8.4	14.0
Italy	38.5	4.3	14.8
Latvia	67.2	4.1	18.3
Lithuania	55.7	1.2	8.9
Luxembourg	22.8	2.2	3.9
Malta	22.2	2.2	11.3
Montenegro	72.6	3.3	27.2
Netherlands	22.3	3.3	3.4
North Macedonia	57.3	1.2	33.9
Norway	14.7	3.5	2.2
Poland	44.6	1.3	10.4
Portugal	36.5	4.6	19.5
Romania	51.1	0.6	19.7
Serbia	46.7	1.2	31.0
Slovakia	36.6	4.5	10.9
Slovenia	42.7	3.3	8.6
Spain	39.4	5.5	14.3
Sweden	20.1	2.6	3.5
Switzerland	20.1	2.7	3.5
Turkey	43.7	10.3	13.2
United Kingdom	37.6	4.1	7.2
Total average	28.0	3.8	12.6

Note: Survey data from Eurostat SILC, EU SILC (2020)

## C The Road to the Swedish Enforcement Authority

Figure 4: The Road to SEA



## D Descriptives

Figure D3.1: Age Distribution, Registered Individuals

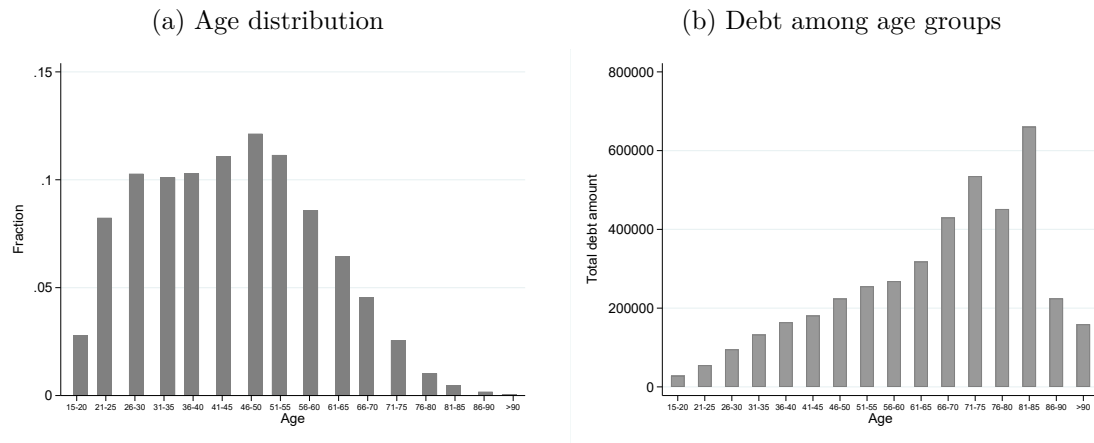


Table D3.1: Claims and Currently Indebted in Swedish Municipalities

	Number of claims, %	Registered for collection, %
Average share	12.82	3.73
Variance of share	3.47	1.12
Min share	4.05	0.75
Max share	30.85	8.15
	Number of claims	Registered for collection
Average number of individuals	3945	1177
Variance	8380	2471
Median	2145	608
Min	222	62
Max	125020	31703

Table D3.2: Different Types of Public Debts and Disposable Income of Indebted

	Number of indebted	Average disposable income (Euro)	Average number of registrations per individual	Max number of registrations
Tax debt	118,997	17,366	2.9	1,466
TV	94,013	17,152	3.0	62
CSN	87,772	15,288	0.8	17
Fine	55,215	12,106	0.4	51
Victims' fund	45,755	10,277	0.3	16
Child allowance	34,093	16,646	4.5	570
Parking	33,978	15,015	1.8	4,259
Legal fee	21,686	10,575	0.1	11
Other debt	6,348	15,824	0.1	98
Penalty	3,547	9,993	0.0	14
Customs	186	12,332	0.0	4
Transfers	24	12,563	0.0	1
Sanction	19	9,013	0.0	3

Table D3.3: Explanation of Different Types of Public Debt

Debt type	Definition
Tax debt	Unpaid taxes to the Swedish tax authority
TV	Unpaid TV-license. This license is mandatory for everyone owning a TV and amounts to 240 Euro per year and household
CSN	Unpaid student debt
Fine	Different type of unpaid fines, including company fines
Victims' fund	Unpaid fee to the fund for crime victims. Everyone who is convicted for a crime are obliged to pay a fee to this fund
Child allowance	Unpaid child allowance. Does only cover parents who have not come to a private agreement, but where the allowance goes through the Swedish Insurance Agency
Parking	Unpaid parking tickets
Legal fee	Unpaid fee for using the Swedish justice system
Other debt	Includes different types of unpaid debts, such as social fees within the EU, infrastructure fees etc.
Penalty	Unpaid penalties
Customs	Unpaid customs
Transfers	Debts regarding welfare transfers that have been wrongly disbursed
Sanction	Unpaid sanctions



## D Additional Results

### D.1 Balancing Test

Table D3.4 presents the results of the following estimation

$$Inequality_{mt} = \beta_0 + \beta_1 X_{imt} + \omega_m + \theta_t + \eta_{mt} + \epsilon_{imt}$$

Where  $X_{imt}$  are the controls used in the individual analysis; age, age squared, gender, education attainment in years, marriage status, employment status, number of kids and disposable income. Column 1-3 are estimated without municipality specific time trends, and column 4-6 are estimated with the linear trends. In the first row, I show the F-statistic from a joint F-test of all coefficients.

Table D3.4: Balancing

	(1) Gini	(2) Log(P80)	(3) Log(P95/P50)	(4) Gini	(5) Log(P80)	(6) Log(P95/P50)
F-test of all controls = 0						
$F(6, 289)$	0.76	9.24	10.42	0.94	1.43	2.58
$Prob > F$	0.6232	0.000	0.000	0.4653	0.2047	0.0134
Age	0.000000283 (0.000000217)	-0.000000331 (0.00000143)	-0.00000168 (0.00000325)	5.45e-08 (7.11e-08)	-5.96e-08 (6.59e-08)	-0.00000137** (0.000000448)
Age squared	-2.19e-09 (2.16e-09)	1.87e-09 (1.45e-08)	1.77e-08 (3.26e-08)	-2.92e-10 (7.00e-10)	4.79e-10 (5.87e-10)	1.15e-08** (3.86e-09)
Female	0.000000251 (0.000000668)	0.0000160*** (0.00000282)	0.0000477*** (0.00000616)	1.75e-08 (0.00000267)	0.000000858* (0.000000386)	0.00000600*** (0.00000175)
Education attainment	4.09e-08 (0.000000296)	-0.00000330* (0.00000141)	-0.00000514 (0.00000289)	-0.000000110 (8.46e-08)	-0.000000167* (8.14e-08)	-0.00000113* (0.000000531)
Married	-0.00000193 (0.00000146)	0.000000657 (0.00000444)	0.00000964 (0.0000126)	0.000000721 (0.000000532)	8.56e-08 (0.000000571)	0.00000299 (0.00000291)
Unemployed	-0.000000949 (0.00000944)	0.000145** (0.0000551)	0.000482*** (0.000109)	0.000000231 (0.00000392)	0.00000144 (0.00000437)	-0.0000138 (0.0000222)
Kids	0.00000174 (0.00000109)	0.00000756 (0.00000715)	0.0000200 (0.0000143)	-3.05e-08 (0.000000347)	-9.58e-08 (0.000000394)	-0.00000118 (0.00000223)
Income (1,000,000 SEK 2016)	-0.00000377 (0.00000510)	0.000189*** (0.0000261)	0.000470*** (0.0000528)	-0.000000364 (0.00000176)	0.00000900** (0.00000305)	0.0000745*** (0.0000192)
Income squared (1,000,000 SEK 2016)	7.72e-10 (1.01e-08)	-0.000000339*** (4.18e-08)	-0.000000888*** (0.000000116)	-3.00e-09 (2.79e-09)	-2.05e-08* (9.13e-09)	-0.000000136*** (3.98e-08)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Controls	Yes	Yes	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality Specific Time Trends	No	No	No	Yes	Yes	Yes
Observations	30,903,673	30,903,673	30,903,673	30,903,673	30,903,673	30903673

Note: Individuals age 16 and above in year 2012-2015. The dependent variable is an aggregate inequality measure, either the Gini coefficient, the Log(P80) or the Log(P95/P50). Individual income is measured as disposable income, CPI adjusted to SEK 2016. Individual controls include age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. All regressions are estimated using OLS. Standard errors are robust and clustered at the reference group level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## D.2 Different Effects for Men and Women

Table D3.5: Relative Deprivation, Men in Different Ages

<i>Ages</i>	(1) 15-29	(2) 30-49	(3) 50-64	(4) 65+
YRD/10000 - municipality	0.354*** (0.036)	0.881*** (0.031)	0.813*** (0.034)	0.436*** (0.034)
Observations	3,321,344	4,903,407	3,444,054	3,399,236
	(5) Married	(6) Unmarried	(7) Unmarried with children	(8) Unmarried without children
YRD/10000 - municipality	0.704*** (0.022)	0.939*** (0.045)	0.914*** (0.032)	0.937*** (0.049)
Observations	4,040,486	4,306,975	1,552,995	2,753,980
Year FE	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes
Municipality Controls	Yes	Yes	Yes	Yes
Municipality FE	Yes	Yes	Yes	Yes
Municipality Specific Year Trends	Yes	Yes	Yes	Yes

Note: Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual income is measured as disposable income, CPI adjusted to SEK 2016. Household controls include age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include log of the mean income in the municipality, share of poor, average age, marriage rate, unemployment rate, share of females and share with low education. Observations are weighted by the reference group population size. All regressions are estimated using OLS. Standard errors are clustered at the reference group level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

## D.3 Robustness

### D.3.1 Other measures of inequality

Table D3.6: P95/P50, Gini and share indebted

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable: Log(Number of individual debt collections)					
Log(P95/P50)	5.952** (2.283)		0.136 (0.092)		0.040 (0.101)	
Gini		16.384* (6.743)		0.298 (0.211)		0.124 (0.191)
Share Unemployed					1.848*** (0.336)	1.848*** (0.327)
Log(P50)					-0.416** (0.142)	-0.426** (0.144)
Log(P20)					-0.028 (0.065)	-0.022 (0.063)
Year FE	No	No	Yes	Yes	Yes	Yes
Municipality FE	No	No	Yes	Yes	Yes	Yes
Municipality Specific Time Trends	No	No	No	No	No	No
Observations	2320	2320	2320	2320	2320	2320

Municipalities between 2008-2015. The dependent variable is the log of the number of indebted individuals in a municipality. Municipality characteristics include the population size, share unemployed, share married, average number of kids, share with less than high school education, share female, share poor and average age. All regressions are estimated using OLS. Observations are weighted by the population size. Standard errors are clustered at the municipality level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### D.3.2 Varying the Reference Group

Table D3.7: All Reference Groups

	(1)	(2)	(3)	(4)
	Dependent variable: Receiving a claim [population mean: 4.76 percent]			
YRD - municipality	0.491*** (0.009)			
YRD - age group		0.314*** (0.015)		
YRD - workplace			0.111*** (0.019)	
YRD - SAMS				0.308*** (0.020)
Year FE	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes
Area Controls	Yes	Yes	Yes	Yes
Area FE	Yes	Yes	Yes	Yes
Area Specific Time Trends	Yes	Yes	Yes	Yes
Observations	30,510,293	30,510,293	13,708,066	30,469,848

Note: Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual income is measured as disposable income, CPI adjusted to SEK 2016. Individual controls include income, a quadratic in income, age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include log of the mean income in the municipality, share of poor, average age, marriage rate, unemployment rate, share of females and share with low education. For workplace and SAMS I also include mean disposable income at the workplace/SAMS-level. All regressions are estimated using OLS. Observations are weighted by the reference group population size. Standard errors are clustered at the reference group level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### D.3.3 Controlling for Household Income

Table D3.8: All Reference Groups - Controlling for Household Income

	(1)	(2)	(3)	(4)
	Dependent variable: Receiving a claim [population mean: 4.76 percent]			
YRD - municipality	0.346*** (0.006)			
YRD - age group		0.235*** (0.012)		
YRD - workplace			0.114*** (0.023)	
YRD - SAMS				0.199*** (0.019)
Year FE	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes
Area Controls	Yes	Yes	Yes	Yes
Area FE	Yes	Yes	Yes	Yes
Area Specific Time Trends	Yes	Yes	Yes	Yes
Observations	30,497,855	30,497,855	13,705,170	30,457,418

Note: Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual and household income are measured as disposable income, CPI adjusted to SEK 2016. Individual controls include income, a quadratic in income, age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include log of the mean income in the municipality, share of poor, average age, marriage rate, unemployment rate, share of females and share with low education. For workplace and SAMS I include mean disposable income at the workplace/SAMS-level as well as the municipality controls. All regressions are estimated using OLS. Observations are weighted by the reference group population size. Standard errors are clustered at the reference group level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### D.3.4 Using Permanent Income

Table D3.9: Municipality Level, Using Permanent Income

	(1)	(2)	(3)	(4)
	Dependent variable: Receiving a claim [population mean: 4.76 percent]			
YRD/10,000 - municipality, perm. income	0.294*** (0.044)	0.308*** (0.041)	0.552*** (0.012)	0.553*** (0.012)
Year FE	Yes	Yes	Yes	Yes
Individual Income	Yes	Yes	Yes	Yes
Individual Controls	No	Yes	Yes	Yes
Municipality Controls	No	No	Yes	Yes
Municipality FE	No	No	Yes	Yes
Municipality Specific Time Trends	No	No	No	Yes
Observations	31,311,947	30,603,413	30,603,413	30,603,413

*Note:* Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual income is measured as disposable income, CPI adjusted to SEK 2016, for a three year average. Individual controls include income, a quadratic in income, age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include log of the mean income in the municipality, share of poor, average age, marriage rate, unemployment rate, share of females and share with low education. All regressions are estimated using OLS. Observations are weighted by the reference group population size. Standard errors are robust and clustered at the municipality level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

### D.3.5 Dropping Individuals with Many Claims

Table D3.10: All Reference Groups - Dropping Individuals with Many Debts

	(1)	(2)	(3)	(4)
	Dependent variable: Receiving a claim [population mean: 4.76 percent]			
YRD - municipality	0.493*** (0.009)			
YRD - age group		0.313*** (0.015)		
YRD - workplace			0.111*** (0.019)	
YRD - SAMS				0.307*** (0.007)
Year FE	Yes	Yes	Yes	Yes
Individual Controls	Yes	Yes	Yes	Yes
Area Controls	Yes	Yes	Yes	Yes
Area FE	Yes	Yes	Yes	Yes
Area Specific Time Trends	Yes	Yes	Yes	Yes
Observations	30,476,744	30,476,744	13,689,320	30,436,333

Note: Individuals age 15 and above in year 2012-2015. The dependent variable is a dummy for receiving a claim during the year. Individual and household income are measured as disposable income, CPI adjusted to SEK 2016. Individual controls include income, a quadratic in income, age, a quadratic in age, dummy for gender, years of education, number of children in the household and a dummy for unemployed during the year. Municipality controls include mean and median income in the municipality, share of poor and average age. For workplace and SAMS I include mean disposable income at the workplace/SAMS-level. All regressions are estimated using OLS. Observations are weighted by the reference group population size. Standard errors are clustered at the reference group level. Observations are weighted by the reference group population size. Standard errors are clustered at the reference group level.

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$