



Network for Studies on Pensions, Aging and Retirement

# Occupational pensions, macroprudential limits, and the financial position of the self-employed

*Francesco G. Caloia  
Stefan Hochguertel  
Mauro Mastrogiacomo*

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## **Affiliations**

Francesco G. Caloia – Vrije Universiteit Amsterdam and De Nederlandsche Bank

Stefan Hochguertel – Vrije Universiteit Amsterdam

Mauro Mastrogiamomo – Vrije Universiteit Amsterdam and De Nederlandsche Bank

**Abstract**

Macro-financial stabilization using prudential regulation and supervision of banks, firms, and households, aims to mitigate sources of systemic vulnerabilities that emanate from overexposure to risk and highly leveraged debt positions of economic agents. In this paper, we show that the macro-prudential policies for the housing market, rather than compulsory pension savings, affect the debt position of Dutch households. These policies are particularly binding among lower income groups, where self-employed workers are overrepresented as a share of total employment. Using administrative and survey data, we present evidence that self-employed workers are more credit-constrained, start participating in the credit market at older ages and take out higher debt amounts compared to wage earners. We argue that this has implications for the retirement preparation of the self-employed, which lags behind that of wage workers both in terms of expectations and outcomes. Many self-employed persons could be included in the industry/occupational pension system, without expecting a worsening of their debt position, so long as borrowing limits are set in accordance with macro-prudential principles.

## Samenvatting

### **Tweedepijlerpensioenen, macro-prudentieel beleid en de financiële positie van zelfstandigen**

Macro-financiële stabilisatie omvat prudentiële regelgeving en toezicht op banken, bedrijven en huishoudens, met het doel om systemische kwetsbaarheden te verminderen die voortkomen uit overmatige blootstelling van economische actoren aan risico's en schuldposities met een hoge hefboomwerking. In deze paper beargumenteren we dat het macro-prudentiële beleid voor de woningmarkt, en niet het verplichte pensioensparen, invloed heeft op de schuldpositie van Nederlandse huishoudens. Dit beleid raakt vooral groepen in de lagere inkomensklassen, waar zelfstandigen oververtegenwoordigd zijn in de totale beroepsbevolking. Met behulp van administratieve gegevens en enquête-uitkomsten presenteren we empirisch bewijs dat zelfstandigen meer te maken hebben met kredietrestricties, pas op oudere leeftijd deelnemen aan de hypotheekmarkt en hogere schulden aangaan in vergelijking met werknemers. We stellen dat dit gevolgen heeft voor de pensioenvoorbereiding van zelfstandigen, een groep die wat betreft zowel verwachtingen als resultaten achterblijft bij die van loonontvangers. Veel zelfstandigen zouden in de tweede pijler kunnen worden opgenomen, zonder een verslechtering van hun schuldpositie te hoeven verwachten, terwijl de limieten bij de kredietverstrekking overeenkomstig macro-prudentiële principes worden vastgesteld.

## 1. Introduction

Many countries have seen an expansion of highly leveraged household balance sheets in recent decades, in aggregate data reflected in simultaneous increases in the volume of pension assets, home values, and outstanding mortgage debt.

Financial innovation, financial deepening, tax incentives, and changes in government regulation have made household borrowing, partially against housing collateral, comparatively easy. At the same time, some countries have seen a simultaneous expansion of domestic pension and mortgage markets. The Netherlands, for instance, witnessed a tripling of its pension assets over the 30 years since 1981, and a quadrupling of aggregate mortgages outstanding relative to GDP (Mrkaic et al., 2014; Shirono, 2014; Parlevliet and Kooiman, 2015). Denmark is another prominent example where vigorous mortgage and pension developments of similar magnitude took place in that same period.

One policy lesson from inflated household balance sheets and illiquid asset positions derives from the potential vulnerability of households when exposed to interest rate and asset price shocks; another lesson derives from implications for business cycle amplification through a consumption response. Coupled with a concern for financial stability, the Financial Crises & Great Recession triggered an increased application of macroprudential policy tools on a global scale. Within that toolset, bank assets-gearred instruments, such as regulation of mortgage loan-to-value (LTV) ratios or of debt-service-to-income (DSTI) and loan-to-income (LTI) ratios, have been identified as being important and effective for restraining household borrowing (Igan and Kang, 2011; Cerutti et al., 2017).

There are good reasons to believe that pensions and mortgages influence each other. Home equity can be tapped as a source of retirement income to supplement or substitute pension benefits. Conditional on mortgage ownership and receipt of pension benefits, retired households can use the annuity receipts to fund ongoing mortgage expenses. Interaction channels with monetary or macroprudential policies may run through interest rates and borrowing regulations. On the pension funds side, low interest rates require increased premiums to cover future liabilities. On the household side, low interest rates tend to fuel mortgage demand, whereas increased compulsory pension savings may crowd out free savings. If expansionary monetary policy is complemented with tightened macroprudential limits, as was the case in recent years, higher down payment requirements may under crowd-out of non-pension saving become binding.

Providing convincing evidence of a causal effect, supported at the micro level, requires quasi-experimental variation, however. The crowding-out or “displacement effect” of compulsory pension savings is well documented. Pension reforms (Attanasio and Brugiavini, 2003; Attanasio and Rohwedder, 2003), changes to savings incentives (Chetty et al., 2014), between-country discontinuities in pension institutions (Kapteyn and Panis, 2005), and within-country discontinuities across occupations (Li et al., 2016) offer exogenous variation to identify the impact of pensions on voluntary savings. Depending on the country, cohort, and time period under study, estimates of the displacement effect vary greatly. In general, however, most studies agree that a compulsory pension system contributes to reducing private savings, also for younger cohorts. However, the link to mortgage debt has not been directly investigated in that light.

We make an important step in that direction. Our innovation is that we focus in particular on self-employed workers. There are two main reasons for this. First, the average outstanding mortgage debt of the self-employed is particularly high compared to wage earners, and at the same time they are typically not covered by the occupational pension system. This offers the possibility to view them as a natural control or comparison group for wage earners, who may decide to alter their savings behavior when confronted with changes in compulsory pension contributions. The basic idea is that, while wage earners are simultaneously subject to compulsory participation in occupational pensions and to policy-controlled credit constraints, only the latter apply for the self-employed. Second, following Caloia (2019), we argue that macro-prudential policies in the Netherlands are particularly binding at the left tail of the income distribution. We then show that the self-employed are overrepresented among those low-income groups, where they are much more responsive to macro-prudential policy changes. The self-employed, however, are also overrepresented in the right tail of the wealth and income distributions, where they also belong to the largest debt holders.

We use microdata, partly sourced at loan level, which allow a very precise assessment of policy impacts, complemented by survey data that cover the financial behavior of households in the credit and mortgage market. The combined evidence we provide is novel, as it shows that a relaxation of the macroprudential borrowing limits can lead to higher indebtedness for the self-employed. Furthermore, the self-employed are more credit constrained than wage earners, they participate in the credit market at comparatively older ages, and, when they do participate in the credit market, they borrow larger debt amounts.

Recent policy changes have attempted to attenuate some of the known compulsory savings distortions. In 2006, a life-cycle saving plan was introduced (Bovenberg and Conneman, 2007), allowing employees with compulsory savings to advance certain expenditures to an earlier time in life, for instance expenses associated with the birth of a child (Bovenberg, 2005). This scheme was subsequently revoked. The retirement preparation of the self-employed, however, keeps lagging behind that of wage-employed workers, both in terms of expectations and realizations. Many self-employed persons could be included in the occupational pension system, without expecting a worsening of their debt position, if borrowing limits are set in a prudential manner.

The paper proceeds as follows. Section 2 introduces the institutional setting and context, including some macro-prudential policies analyzed in the empirical part. Section 3 presents the data we use. Section 4 presents the findings of the empirical and descriptive analysis. Section 5 states our conclusions.



## 2. Context and Institutions

To provide context, we briefly sketch relevant aspects of self-employment in the Netherlands (Section 2.1). There are two types of institutions that need to be introduced. One refers to the retirement system in relation to the self-employed (Section 2.2), the other to the macroprudential tool set that authorities have been using in the recent past (Section 2.3).

### 2.1 Self-employment

In the Netherlands, self-employed workers, comprising both entrepreneurial employers and a growing number of solo self-employed, now represent a substantial share of the labor force. In 2017, the solo self-employed without employees alone constituted more than 12% of the labor force (Statistics Netherlands, 2019).<sup>1</sup>

There is substantial heterogeneity among the self-employed, however. Traditionally, a distinction exists between self-employed persons who choose to work on their own because they prefer being independent and enjoy the flexibility that autonomy affords (voluntary self-employment), and self-employed persons who in some sense are “forced” to work that way (Parker, 2004; Blanchflower and Oswald, 1998). The latter group often includes marginalized persons who have limited possibilities to find paid employment (i.e., those that become self-employed for want of other employment prospects). Recent labor market trends and developments towards alternative work arrangements (Mas and Pallais, 2020) to gig and platform work also made possible the emergence of a large group of own-account workers with possibly lower labor market attachment. Those may be seen as self-employed but they do not choose their self-employment as a labor market career (Berger et al., 2019; Boeri et al., 2020). Part of this group may be identical or overlap with the group of zero-hours contract workers and agency workers (Datta et al., 2019; De Graaf-Zijl et al., 2018). They are potentially similar to the involuntary group and may also fall under the informal labor market. These groups are less likely to save for retirement than the “voluntary” self-employed (Hershey et al., 2017). In addition, they are likely to be less wealthy than their “voluntary” counterparts. Research often distinguishes “pull” and “push” factors in the decision to become self-employed (Böheim and Mühlberger, 2009; Kautonen et al., 2009) and shows the role of wealth in the decision to become an entrepreneur (Jovanovic, 1987; Blanchflower and Oswald, 1998; Jensen et al.,

1 We employ the term solo self-employed to refer to those self-employed persons who have no dependent workers on their payroll (Boeri et al., 2020). In the Dutch context, this group is referred to as *zelfstandigen zonder personeel (zzp'ers)*.

2021) or, more specifically, to become self-employed (Li et al., 2016) under frictions in financial markets. Financial distress among marginal self-employed persons is high, and insurance is often not taken out because of liquidity needs.

These descriptions illustrate why policymakers are concerned about the saving behavior of self-employed workers who are often not subject to mandatory inclusion in social insurance systems (Boeri, 2020; ILO & OECD, 2020). Liquidity constraints require entrepreneurs and small self-employed workers to rely on internal finance for investments, making them less able to commit a substantial share of their fluctuating incomes to saving for long-term purposes. Conversely, adverse selection effects may make voluntary insurance too expensive even for those who are risk averse, thus creating welfare losses from underinsurance. In addition, behavioral biases (such as overoptimism, present bias) direct workers away from making saving choices that are in their own best interest in the absence of a mandate; such effects tend to be more pronounced at the lower end of the labor market and income distribution.

## 2.2 Relevant retirement institutions

The pension and retirement system in the Netherlands is a two- or three-tier system, where a universal flat-rate social security system that is financed via payroll taxes (the first pillar state pension, *AOW*) is supplemented in the case of wage earners by a premium-financed defined benefit industry/occupational pension system (the second pillar).<sup>2</sup> This integrated two-tier system for wage earners is extended by a voluntary and largely unregulated third pillar of private savings and insurance market products to help individuals provide for their consumption needs at old age. About 90% of all wage earners are covered by the industry/occupational tier, and conversely about 90% of all self-employed workers are effectively excluded from this.

This exclusion is due to a mandate that does not apply to self-employed workers. Whereas individuals may be able to join a pension fund for specific occupations or sectors, a mandate only applies when at least 60 percent of the target population joins such an arrangement (see Van der Lecq and Oerlemans (2009) for details). As long as participation is voluntary, smaller occupations with a large fraction of self-employed workers may not achieve the critical mass to establish their own fund or may not reach the threshold for a mandate.<sup>3</sup> In practice, the limited popularity of third pillar products leaves the mandatory but moderate first pillar as the main

2 The second pillar refers not only to an occupational stratification but also covers industry-wide (or sectoral) pension funds and corporate pension funds (of typically larger companies).

3 The Dutch central bank supervises pension funds and keeps a complete register of these.

retirement provision for many self-employed workers. This is reflected in internationally low pension replacement rates for the self-employed (OECD, 2019, F.2.13).

Owing to small numbers and difficulties of tracing particular cases in the data, we treat all self-employed in the same way, and hence shall abstract from two special cases: (i) About 10% of all self-employed individuals are covered by mandatory industry/occupational pensions. Those are to be found in specific occupations of (mostly) highly skilled professionals or crafts, and in specialized industries; in addition, the relatively large sectoral pension funds for the construction industry or for painters include self-employed workers. Second, self-employed workers who were employed as wage earners in the previous year can prolong their participation in their previous fund for up to ten years. However, this option is hardly ever exercised, since continued contributions are higher than when employed as wage earners because the employer contribution must be paid as well.

It is well known that there is substantial inequality in the retirement expectations and retirement outcomes of the self-employed compared to wage earners. This applies regarding the starting age of retirement, but especially in terms of the level of retirement benefits available to finance consumption in old age. This is one of the reasons why the self-employed generally expect and in fact do retire later than wage workers (Hochguertel, 2015). The income replacement rates of the self-employed are significantly lower than those of wage earners when retired. More in detail, the median self-employed household is expected to replace only 50% of its current income with its first (and, where available, second) pillar pension: Knoef et al. (2016) find that more than 40% of self-employed workers do not achieve a 70% replacement rate, which is the intended target of Dutch policymakers. The gap between the pension outcomes of these two groups is reduced, on average, when private wealth is accounted for.

### **2.3 Macro-prudential policies**

Macro-prudential policies constitute a recently reinforced regulatory framework that addresses both financial institutions and households, with the aim to limit and mitigate macroeconomic risk exposure in the financial system. In Europe, the ECB is the main macro-prudential authority, but some macro-prudential measures are set by national governments or national macro-prudential authorities. In the Netherlands, borrower-based measures are set by the government. Of particular interest are borrower-based measures, such as loan-to-value (LTV) limits and debt-service-to-income (DSTI) limits. These measures limit the maximum amount of debt that household

can take out to finance the purchase of their home. The DSTI is also often expressed in the form of an equivalent loan-to-income (LTI) limit.<sup>4</sup>

LTV limits set the maximum debt amount relative to the valuation of the property used as collateral. LTI and DSTI limits set the maximum amount of debt or debt service relative to household income. In our analysis, we focus on the second limit, known in the Netherlands as the NIBUD norms. NIBUD is the National Institute for Family Finance Information, which is consulted by the government before setting the limits. These limits constrain the extent to which first-time buyers can access the housing market. We focus on these limits as they represent the main affordability constraint in the mortgage market. Also, these norms are characterized by substantial cross-sectional and time variation, thereby allowing to identify the causal effect of these policies on household borrowing.

4 Using a standard annuity with a prudentially fixed interest rate, it is possible to translate the DSTI limits (maximum share of income to be spent on servicing a mortgage contract) into LTI limits (a multiple of yearly income to be spent on purchasing a home). The two concepts are thus interchangeable.

### 3. Data

#### 3.1 Datasets

We use three main microdata sources. The first data source is DNB's Loan Level Data (LLD). This dataset contains information on debtors, loans, and collateral at the individual mortgage contract level. The data cover almost 85% of all residential mortgage loans originated by Dutch banks.

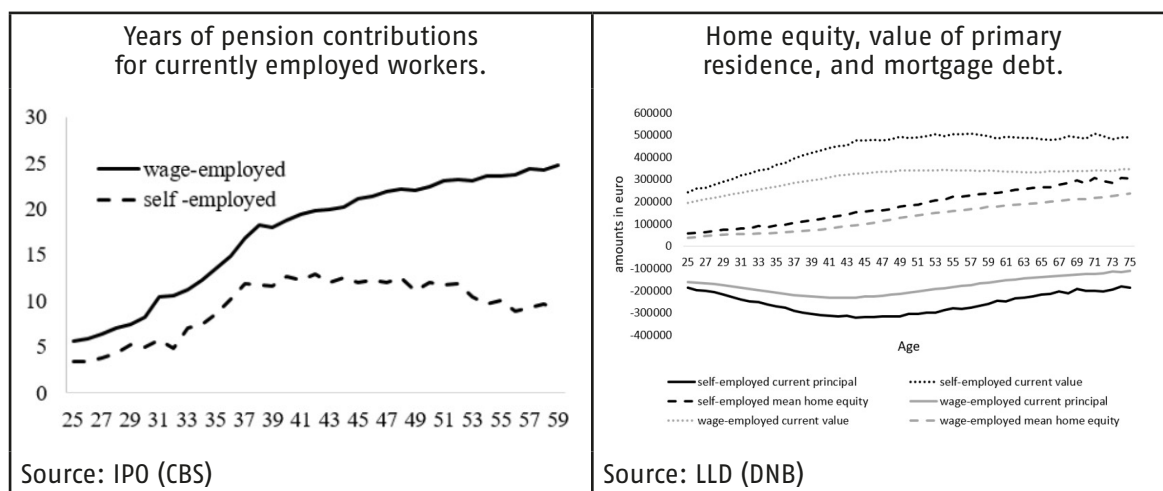
The second data source is the universe of individual incomes and wealth from tax records, made available by Statistics Netherlands (CBS). This data source has been merged at household level to the Loan Level Data, to make it possible to have a detailed and comprehensive view of both the assets and the liabilities side of Dutch households' balance sheets.

The third data source is the DNB Household Survey (DHS). The DHS is a panel dataset that is representative of the Dutch residential population. It surveys about 2,000 households at annual frequency since 1993. The DHS contains detailed and comprehensive self-reported information on all assets and liabilities, as well as an extensive questionnaire on personal characteristics and on psychological and social aspects of financial behavior.

#### 3.2 Descriptive evidence on compulsory savings and debt

In the introduction, we have discussed how compulsory savings can distort saving decisions. One example was the displacement effect, whereby households save less prior to retirement because of their mandated saving in occupational pension

Figure 1: Participation in occupational pensions and debt



arrangements. This could in turn result in lower down payments and thus higher mortgage debt when purchasing a home.

Figure 1 shows differences in occupational pension savings (left) and mortgage debt (right) for self-employed and wage workers.

The figure shows that, at all ages, current self-employed workers have accumulated less pension rights compared to wage workers. By age 50, they have less than half the level of wage earner pension contributions. At the same time, the self-employed have bought more expensive homes with larger debt. This prima-facie evidence suggests that the lack of compulsory savings has not directly translated into a higher down payment. What then motivates their readiness to take on higher debt?

## 4. Empirical analysis

### 4.1 The effect of macro-prudential limits

We estimate the effect of macro-prudential limits on the amount of debt granted to households, starting from 2013. These limits are expressed in terms of debt-service-to-income (DSTI). A DSTI constraint establishes the maximum debt service that a household can afford to pay on a monthly basis, as a percentage of its income. The limits are determined on the basis of budgeting computations that account for the cost of living. The DSTI ratio translates into an equivalent loan-to-income (LTI) ratio, to determine the corresponding maximum debt amount that can be granted to a borrower. Figure 2 provides an example of the recommended LTI limits for 2014 (the rates have in the meantime come down across the board).

Figure 2: Heat map of LTI limits in 2014

Bruto jaarinkomen	Hypotheekrente				
	3.75%	4.25%	4.75%	5.25%	5.75%
19500	3.0	2.9	2.8	2.7	2.6
20000	3.1	3.0	3.0	2.9	2.8
20500	3.3	3.2	3.1	3.0	2.9
21000	3.5	3.4	3.3	3.2	3.1
21500	3.6	3.5	3.4	3.2	3.1
22000	3.8	3.6	3.5	3.4	3.3
22500	3.9	3.8	3.8	3.7	3.6
23000	4.0	4.0	3.9	3.8	3.8
23500	4.1	4.1	4.0	3.9	3.9
24000	4.2	4.2	4.1	4.0	3.9
25000	4.4	4.3	4.2	4.2	4.1
26000	4.5	4.4	4.3	4.2	4.1
28000	4.6	4.5	4.4	4.3	4.2
55000	4.7	4.6	4.5	4.4	4.3
58000	4.8	4.7	4.6	4.5	4.4
61000	4.9	4.7	4.6	4.5	4.4
63000	4.9	4.8	4.7	4.6	4.5
65000	5.0	4.9	4.8	4.7	4.6
68000	5.1	5.0	4.9	4.8	4.6
70000	5.2	5.1	5.0	4.8	4.7
75000	5.3	5.2	5.0	4.9	4.8
77000	5.3	5.3	5.2	5.1	5.1
79000	5.4	5.3	5.3	5.2	5.1
85000	5.5	5.4	5.4	5.3	5.2
96000	5.6	5.5	5.4	5.4	5.3
110000	5.7	5.6	5.5	5.4	5.4

*Explanatory note:* LTI limits depend on budgeting computations based on a standard annuity loan. The highest possible indebtedness applies to households with high income and low interest rate (lower left corner); borrowers in that cell can borrow up to 5.7 times their gross annual income. Row and column labels: Bruto jaarinkomen = gross annual income. Hypotheekrente = mortgage interest rate.

Since these limits are based on budgeting computations that account for the cost of living, they vary with income and interest rate. The higher the gross household income, the higher the LTI limit, as a higher share of income can be used to repay the debt. Also, the higher the interest rate, the lower the LTI limit, as interest payments account for higher budget shares.

To estimate the effect of the affordability constraint introduced by the macro-prudential limits on household debt, we follow Caloia (2019) and select a sample of all borrowers who took up their mortgage after 2013.<sup>5</sup> These thus represent the new production of loans (from a bank's perspective) or the flow of borrowers who are exposed to the limit changes. We then estimate the following equation using linear regression:

$$\log(\text{mortgage debt}) = \alpha + \beta_1 \log(\text{DSTI limit}) + \beta_2 \log(\text{DSTI limit}) * \text{income} + \mathbf{X}'\gamma + \varepsilon$$

This specification allows us to understand to what extent changes in debt limits trigger changes in outstanding debt amounts. The left-hand side variable is the household mortgage debt amount at origination. The coefficient of the interaction term allows us to estimate the effect of the limits along the income distribution. Note that the beta coefficients can be interpreted causally, as the NIBUD norms are changed every year and the changes are exogenously determined. The changes are both cross-sectional (changes differ at different income levels) and over time (for instance, because of a reduction of the interest rate). In fact, if the tightness of these credit constraints differs along the income distribution, then also the effect of changes in these debt limits must differ at different income levels. That is because the limits are much stricter for low-income households than for high-income households; as shown in Figure 2, at an interest rate of 5.25%, for example, a household with gross annual income of EUR 110,000 can borrow twice as much relative to income (5.4) compared to a household with gross annual income of EUR 19,500 (2.7).

Table 1 summarizes the empirical regression results. Marginal effects of the same regression are plotted. The result is also represented in Figure 3, left panel, which shows the graphical representation of specification (b) in Table 1. At relatively low levels of household income (below EUR 50,000, corresponding to about 3/8 of the sample), changes in debt limits entirely explain changes in actual debt (marginal effect above or equal to one). In particular, this suggests that a reduction in the debt limit is associated with a reduction in debt of at least the same amount. The marginal effect can in fact be greater than 1.0 as these norms are comply-or-explain norms,

5 For data quality purposes, we select households that took up their mortgage starting from 2013. Before 2013 the LLD is reported on a best-effort basis.



Table 1: Regression Results

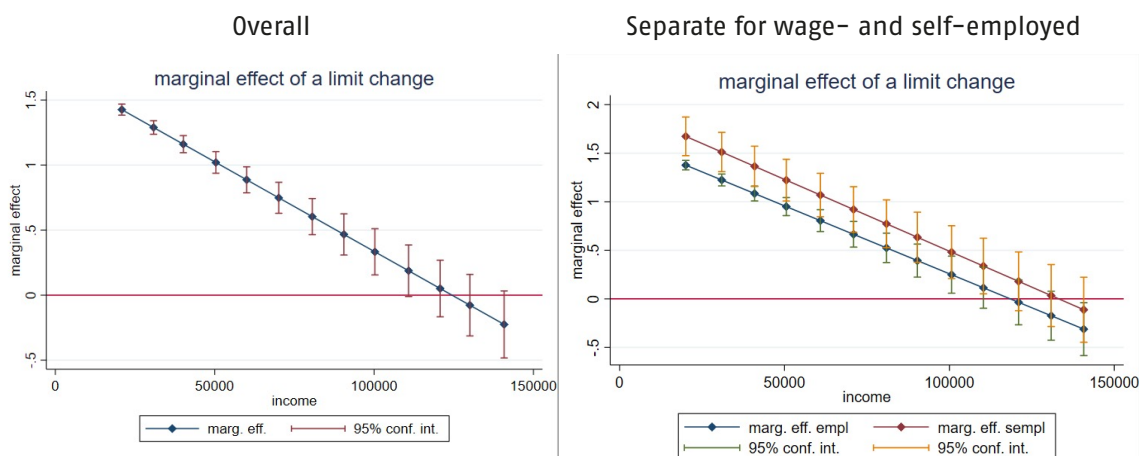
	Dependent variable: mortgage debt		
	(a)	(b)	(c)
LTI limit	1.466 [0.019] ***	1.712 [0.025] ***	1.657 [0.026] ***
LTI limit * hh_income(000s)		-0.0137 [0.001] ***	-0.0289 [0.001] ***
LTI limit * self-employed			0.3128 [0.069] ***
LTI limit * self-employed * hh_income (000s)			-0.008 [0.000] ***
Controls	YES	YES	YES
Time FE	YES	YES	YES
Region FE	YES	YES	YES
N of observations	216831	216831	216831
R squared	0.36	0.36	0.36

*Explanatory note:* The dependent variable is the logarithm of the amount of mortgage debt at origination. Control variables include loan type, household income, loan maturity, employment dummies, age, region, and time fixed effects. The symbols \*, \*\*, and \*\*\* denote the conventional statistical significance levels of 10%, 5%, and 1%, respectively.

i.e. there are pre-determined exceptions that allow borrowers and banks to exceed the limit. This in turn suggests that at those relatively low incomes, debt limits are perfectly binding, and the possibility to participate in the credit market depends also on the possibility to "explain" taking mortgages with higher LTIs or DSTIs. For mid-incomes (above EUR 50,000 and below EUR 110,000, about half of our sample) the estimated marginal effect is greater than zero but lower than 1.0. This means that increasing the debt limit induces a non-proportional increase in debt, suggesting that limits are binding only for a few households. At high income levels (above EUR 110,000, about 1/8 of our sample), debt and debt limits are uncorrelated as the estimated marginal effect is statistically indistinguishable from zero (confidence intervals cross the zero line).

In specification (c) the corresponding marginal effect is estimated specifically for self-employed workers. The right panel of Figure 3 shows steeper marginal effects of changes in debt limits upon changes in household debt for self-employed borrowers compared to wage-employed borrowers. In other words, LTI limits are even more binding at low incomes and less binding at high incomes. Confidence bands are narrower for wage-employed and wider for self-employed borrowers, and they do not overlap at the lower end of the income distribution, showing a significantly larger

Figure 3: Marginal effects



*Explanatory note:* Post-estimation results based on results displayed in Table 1. Left panel: overall effect, model (b) of Table 1. Right panel: separate effects for wage- and self-employed, model (c) of Table 1. Data source: LLD, own computation.

impact for the self-employed. At higher levels of income, the marginal effects for both groups pull closer to one another, and the confidence bands overlap.

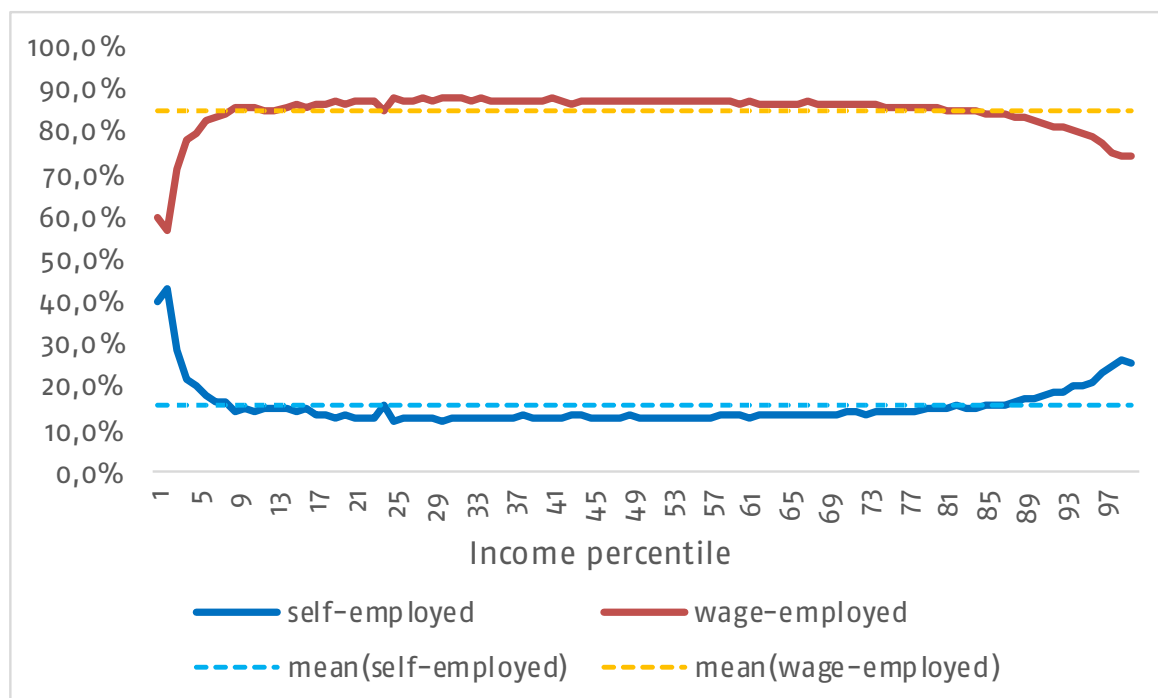
To summarize, debt limits in the credit market are effective credit constraints. However, this is significant only for low-income households, who can use only a limited share of their disposable income to service their mortgage debt. On the one hand, the tightening of the macro-prudential limits over time increases the resilience of households to financial shocks, such as unexpected changes in interest rates, house prices or incomes. On the other hand, and especially in periods of increasing house prices, these limits reduce the possibility to access the housing and credit market for many first-time buyers.

The last result found is that these limits are particularly binding for the self-employed. In the next subsection, we present descriptive evidence that shows how accessing the credit market can be a critical issue for this specific socio-economic category, and we discuss the implications for the retirement preparation of these workers.

#### 4.2 Credit constraints

In this subsection, we present descriptive analyses that address two questions: (1) why should macro-prudential policies be more binding for the self-employed, and (2) why should credit-constraints have implications for the retirement preparation of the self-employed.

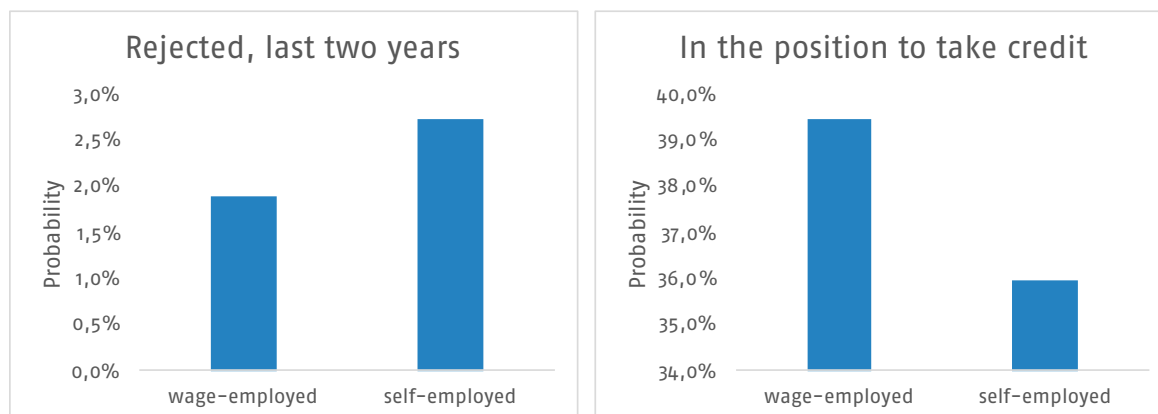
Figure 4: Employment types (%) along the income distribution



*Explanatory note:* The figure selects only labor market participants who are either self-employed or wage-employed. Source: Statistics Netherlands, own computation.

One reason why macro-prudential limits can be more binding for the self-employed has to do with their income situation. Self-employed workers bear business risk. By definition, their earnings correspond to the residual cash flows (i.e. what is left after all production factors have been remunerated) that are more volatile than wages. Wages largely follow deterministic paths for a number of years for which collective labor agreements have been negotiated. Also, as shown in Figure 4, self-employed workers are overrepresented at both tails of the income distribution.

At very low income levels, where macro-prudential limits are more binding and higher debt amounts are probably more needed, the share of the self-employed is about 2 or 3 times the population average. This U-shaped relation between self-employment and income gives a good picture of the dual nature of self-employment: on the one side, successful entrepreneurs who succeed in obtaining above-average returns on their investments; on the other side, vulnerable workers who are excluded from more formal types of employment that would give higher levels of protection. As shown in the empirical analysis presented in the previous section, changes in debt are fully explained by changes in debt limits for lower-income households. This means that self-employed, who are overrepresented in the low income range, may see their credit requests turned down by their banks. Especially in periods of increasing house prices or of tightening macro-prudential policies, some marginal borrowers

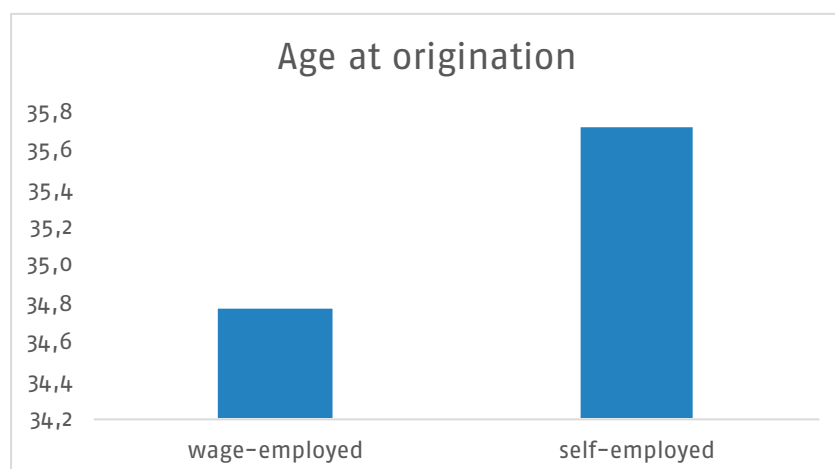
*Figure 5: Credit constraints by employment type*

*Explanatory note:* The differences across groups in these graphs are statistically significant at the 1% confidence level. Source: DNB Household Survey.

may no longer comply with the affordability constraint and see their credit request rejected. The data used so far are uninformative about households that applied for credit but were rejected by the lender.

To test this hypothesis, we therefore turn to the pooled DHS data for the 2008–2019 period, which contains two questions about the actual and hypothetical possibilities to take up credit. The first question asks respondents whether they have had a credit request rejected in the past two years. The second question asks respondents whether they are currently in the position to take credit or not. The results, reported in Figure 5, show that, on average, the self-employed are more likely to be credit-constrained than the wage-employed. In particular, the self-employed are 9% (3.5 percentage points) less likely to be in the position to take up credit, and they are 42% (0.8 percentage points) more likely to have a credit request turned down from their bank than the wage-employed.

Accounting for the employment position of the partner does matter, however, for the interpretation of these figures: self-employed workers with a self-employed partner are 1.4 percentage points more likely to see their credit request rejected. Therefore, having a wage-employed partner helps in increasing a self-employed worker's likelihood of not being rejected (rejection is then only 0.2 percentage points more likely than for the wage-employed). The same holds for being in the position of taking up credit: self-employed workers with a self-employed partner are 7.9 percentage points less likely to take up credit than wage-employed workers, while the probability for self-employed workers with a wage-employed partner is exactly the same as for wage-employed couples.

*Figure 6: Age at origination by employment type*

*Explanatory note:* The difference is statistically different from zero at the 1% confidence level.  
Source: Loan Level Data.

If the self-employed are more credit constrained than the wage employed, they might postpone their access to the credit market to older ages and save for a down payment over time. To test this hypothesis, we turn to the Loan Level data once again and focus on the population of current borrowers. Here, we select starters on the housing market<sup>6</sup> and test whether the average age at mortgage origination is higher among self-employed workers than among wage earners. In testing the difference between the two group means, we include origination year fixed effects. This controls for the possibility that the difference is due to self-employed workers originating their mortgage more recently than wage earners. This is possible, given the recent surge in self-employment in the labor force. The result of this test, shown in Figure 6, confirms that the self-employed access the credit market nearly one year later than wage workers. The difference, equal to 0.9 (11 months), is statistically significant at the 1% confidence level.

It is furthermore interesting to analyze the wealth of self-employed workers who managed to access the credit and housing market, relative to the corresponding category of wage workers. We already presented a descriptive and less formal analysis in Figure 1. We now regress the debt amount held by borrowers on age, the share of debt held in non-amortizing (interest-only loans) or deferred amortization instruments (saving, investment and life insurance loans), the year of origination, and loan maturity. Conditioning on age excludes the possibility that the self-employed have more

<sup>6</sup> We proxy starters by borrowers whose age at origination is below or equal to 40.

*Figure 7: Household mortgage debt by employment type*

*Explanatory note:* The difference is statistically different from zero at the 1% confidence level.

*Source:* Statistics Netherlands, ILLD, own computation.

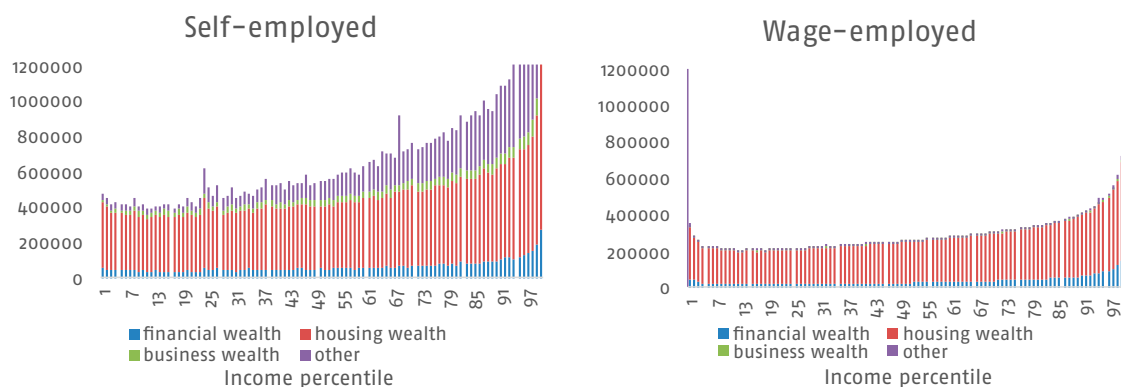
debt than wage workers simply because they are younger.<sup>7</sup> Conditioning on the year of origination and maturity excludes the possibility that the self-employed are more indebted because they borrowed more recently and/or because they have longer debt maturities, and thus have more years left to repay their debt. Eventually, conditioning on the share of non-amortizing or deferred amortization instruments excludes the possibility that the difference in debt amounts is solely explained by the contractual terms agreed in the mortgage. Importantly, we do not condition for income and wealth, as we allow the possibility that the self-employed borrow more than wage earners because they are richer.

Figure 7 shows that, after taking into account the role of these specific confounders, the self-employed are on average EUR 65,000 (or 28%) more indebted than the wage employed. This difference is not explained by pure “age effects” or by the contractual terms agreed by the debtors.

The evidence that self-employed workers are more indebted than wage-employed workers could be taken as evidence against the hypothesis that the self-employed are more credit-constrained. In fact, if the self-employed are over-represented at low incomes, then they should have lower debt levels than wage workers, since they borrow against lower incomes. If instead self-employed borrowers borrow more than wage-employed borrowers, they would be a selected group of self-employed workers. However, the rejection rates presented above suggest that the credit

<sup>7</sup> Younger households are more indebted than older households, simply because their debts originated more recently and they still have to amortize a large part of their debt.

Figure 8: Wealth along the income distribution, by borrower type



*Explanatory note:* Wealth is top-coded to 1.2 million. Source: Statistics Netherlands, LLD, own computation

constraints-induced selections operate for the self-employed more at the extensive margin (incidence of debt holding).

To investigate these possibilities further, we use the Loan Level Data, linked to the income and wealth data of Statistics Netherlands. This allows us to have a comprehensive look at level and composition of wealth of the two socio-economic categories. Figure 8 shows the composition of wealth at each percentile of the income distribution. Conditional on income, the self-employed are wealthier than wage earners. As the levels of financial wealth and the housing collateral pledged for mortgage loans look similar, the difference is particularly due to other wealth categories (business wealth, minority stakes in business interests, housing wealth other than first residence, etc.). This evidence confirms that self-employed borrowers are a selected group of self-employed workers, and it supports the idea that credit constraints tend to be more binding for the self-employed.

The evidence provided in Figure 4 and Figure 8 has been constructed using income tax record data. There are not many characteristics that can be used to infer the professional and personal background of these workers. However, what is evident from our data sources is that, at the bottom of the income distribution (25th percentile and below), workers tend to be more often solo self-employed than that they would be managing directors or majority shareholders; this second group is more often to be found at the top of the income distribution (75th percentile and above). Moreover, the low-income group ( $\leq 25$ ) tends to be more highly represented in sectors such as construction, accommodation, culture and sport, hospitality, wholesale and retail trade, and other services. The high-income group ( $\geq 75$ ) instead is found more often in the financial and health sectors, as well as in specialized services.

## 5. Conclusions

In international comparison, the average old-age income replacement rate for the self-employed in the Netherlands is one of the lowest among the OECD countries (OECD, 2019). In view of the vast heterogeneity in this group and the potential vulnerability of some of the self-employed, policy proposals to include the self-employed in the occupational pension system by way of default or mandate have been discussed. At the same time, as a group the self-employed are among the largest debt holders. In this article, we focus on distributional differentiation. We show that the recently introduced and/or tightened macro-prudential policies are particularly binding for lower income groups, where self-employed workers are overrepresented as a share of total employment. We show that a relaxation of LTI limits can lead to higher indebtedness for these borrowers. We provide evidence that the self-employed tend to be more credit-constrained than wage workers, and not just by the limits established by macro-prudential policy. In particular, we show that they are less in a position to take up credit and that they are more likely to see their credit request rejected by lenders. As a consequence, they participate in the credit market at relatively older ages compared to wage workers, and when they do access it, they usually take up higher debt amounts.

This has implications for the financial position of households prior to their retirement. We suggest that the large indebtedness of households is not due to participation in occupational pension plans, as sometimes suggested, but to the relaxation of credit constraints. This implies that the self-employed in the lower part of the income distribution are more often excluded from the possibility to borrow, while those who do qualify for credit borrow high amounts.

In turn, this implies that, for many, housing wealth is either not an option to build up a pension, or that it is relatively risky for the more select group that receives credit. Highly indebted households without an occupational pension are thus hardly diversified and are more exposed to asset price risks at the time when they wish to retire and draw down their wealth.

Do these findings imply that policy should mandate all self-employed to save for an occupational pension? Given previous findings in the literature, the benefits of including low-income self-employed in occupational retirement plans are limited, as the flat-rate but all-encompassing social security (AOW) offers decent replacement rates for lower income households. For the middle and higher segments of the income distribution, we show that inclusion of these groups in the pension system should not worsen their financial position in the form of additional debt, provided that borrowing limits are set in a prudential manner.



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