CREDIT POLICIES BEFORE AND DURING THE CRISIS (MADE IN COLLABORATION WITH FINANSKRISEKOMMISSIONEN, KRAKA).

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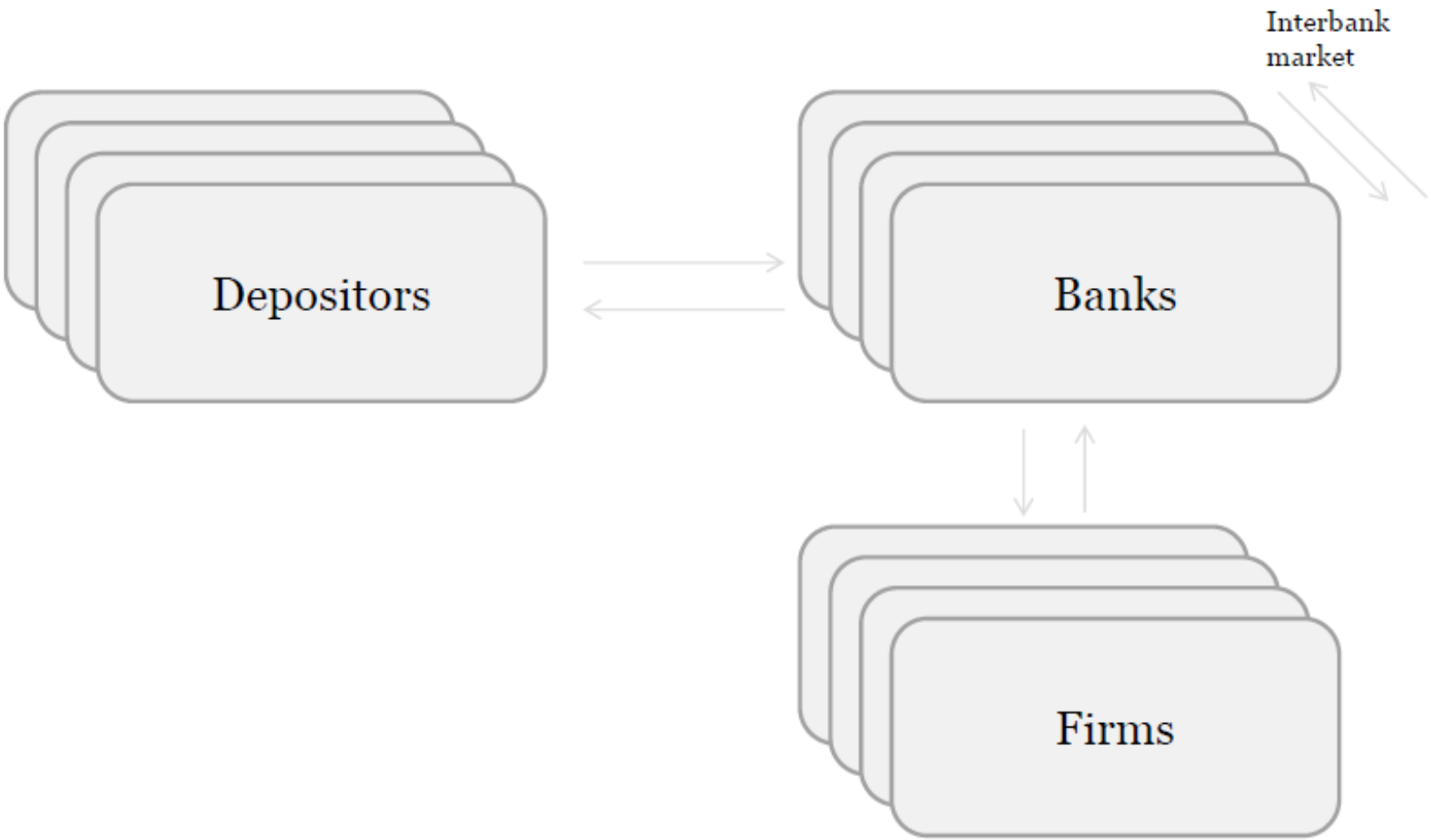
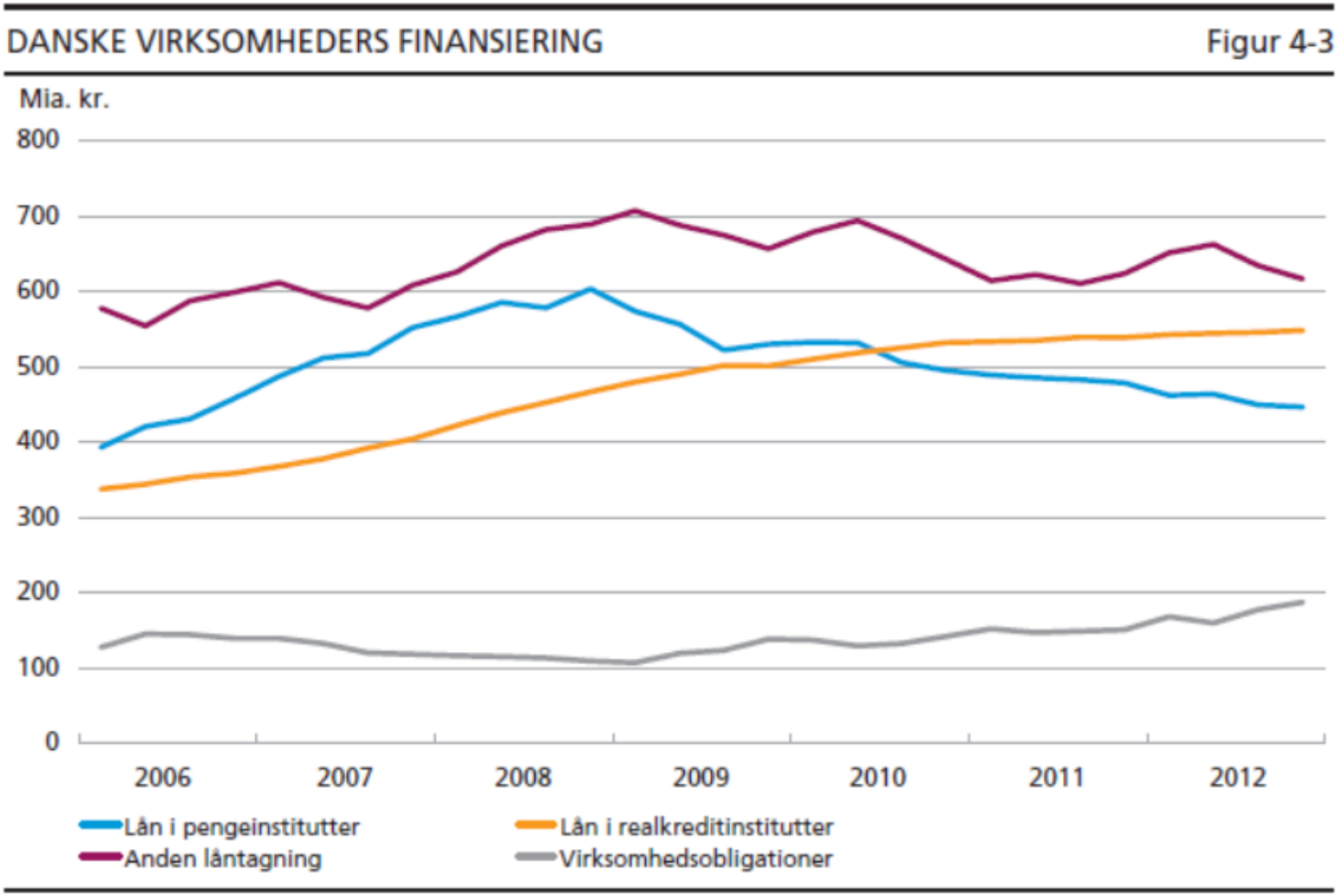
Credit in macro economics (very brief literature review)

- Classic models: Perfect capital markets => Modigliani-Miller theorem/Fishers separation theorem applies. There is always an optimal amount of capital and no scope for policy.
- Models with financial frictions: Asymmetric information => too little credit always, but especially during recessions (the financial accelerator effect). In Bernanke, Getler and Gilchrist (1999) due to decreasing assets values of entrepreneurs (”the balance sheet channel”). In Gertler and Kiyotaki (2010) due to agency problems on the interbank market (”bank lending channel”) (and of course hundreds of other papers). Meaningful to talk about credit crunches and policy intervention.
- Corporate governance: Short term CEO stock options make banks take on too much risk by lending money to businesses that are not credit worthy => too much credit. Further, implicit government insurance (bailouts) of banks could lead to a suboptimal high amount of credit (incentive to take systemic risks).

The bank lending channel vs Balance sheet channel



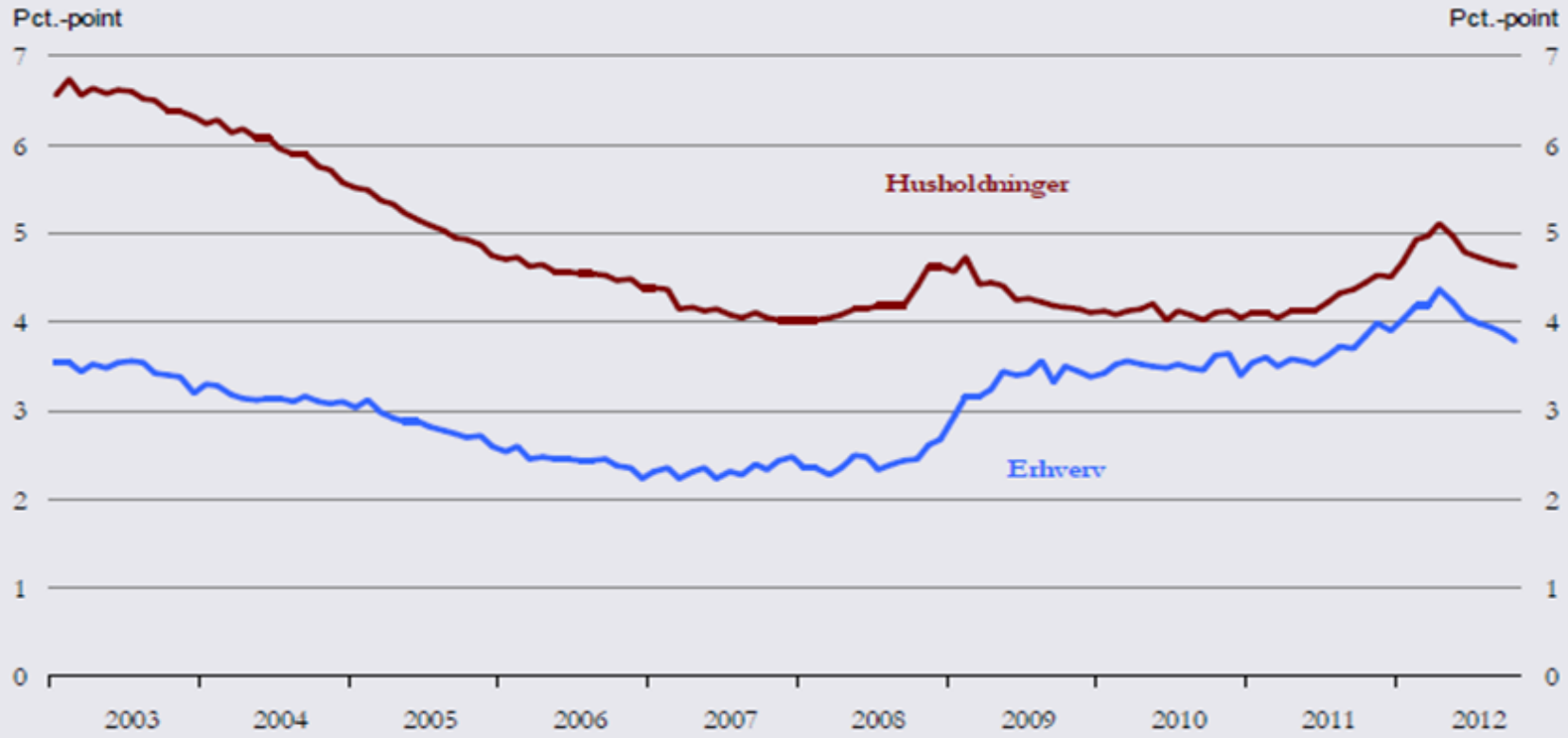
Aggregate firm financing



Anm.: Anden låntagning omfatter låntagning i udlandet (inkl. koncerninterne lån), hos offentlige myndigheder, andre finansielle formidlere mv.
Kilde: Danmarks Nationalbank.

Interest rate spreads

Figur 2.4
Pengeinstitutternes rentemarginaler



Anm.: Rentemarginalen er beregnet på baggrund af de effektive rentesatser for pengeinstitutters udestående forretninger og er givet ved forskellen mellem rentesatsen på ud- og indlån.

Kilde: Nationalbanken.

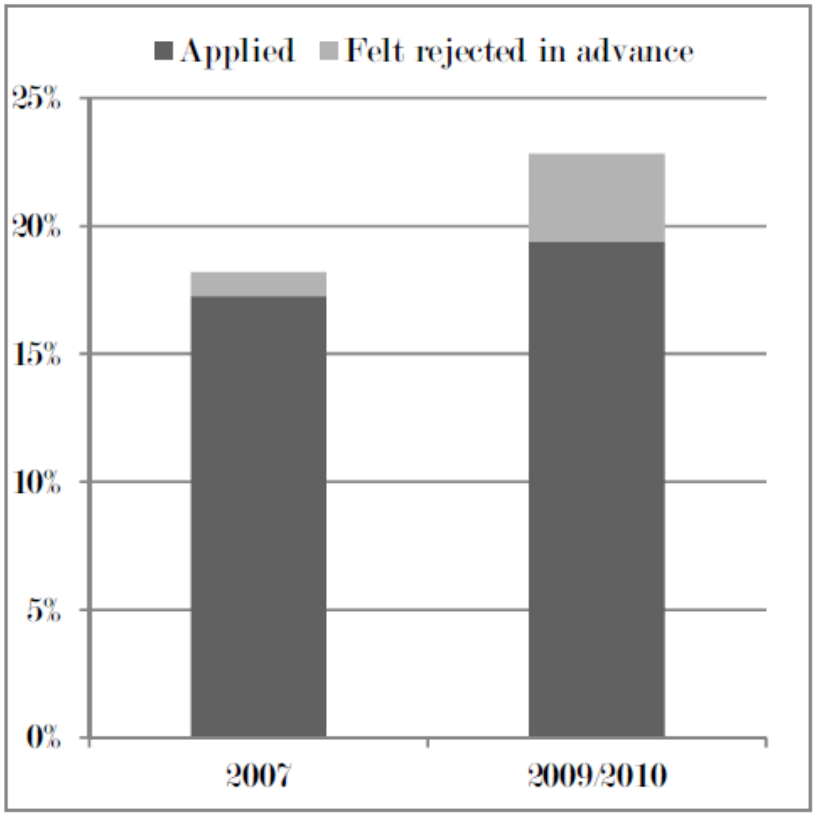
The data

- Outcome: Has the firm applied for a loan in year x from a bank and with what outcome? (fully approved/partially approved/not granted) (DST Credit Survey)
- Firms: 2,265 representative responses from SME-firms (5-249 employees), from a population of 13,990 (Firms were legally obliged to respond => response rate of > 90%)
- Coupled with: Danish register accounting data, information on firms primary bank connection (and accounting data for those banks) (Experian og Danish Financial Supervisory Authority), and SME-firms credit rating (according to experian).

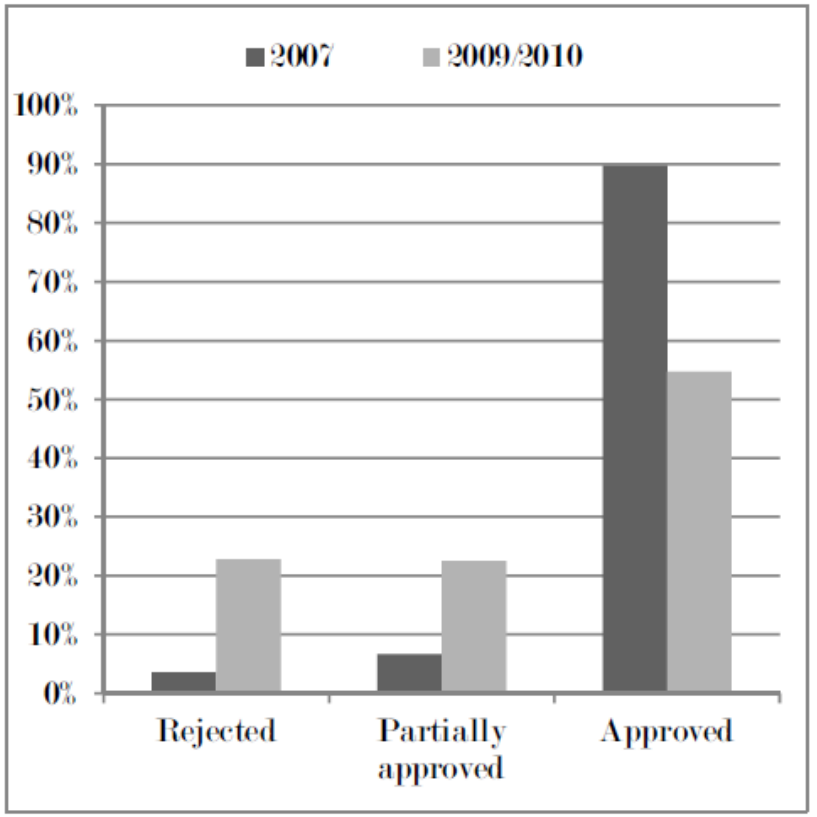
Credit demand and outcomes of applications

Figure 2: Credit demand and outcomes of applications

2a: Share of firms that demand credit



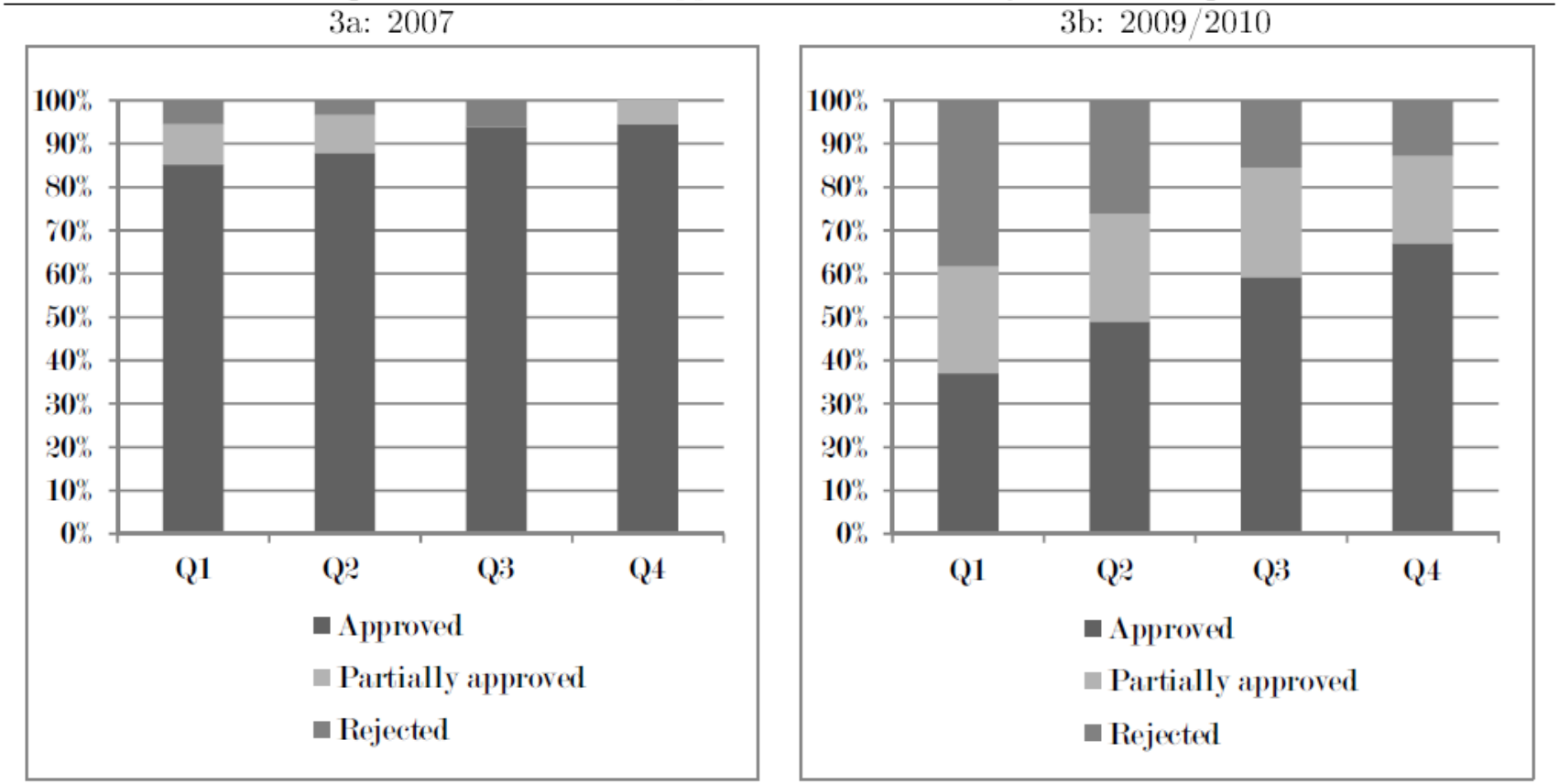
2b: Outcomes of loan applications



Note: Authors calculations based on Statistics Denmarks credit survey.

Outcome of loan applications by credit ratings

Figure 3: Outcomes of applications allocated by credit ratings

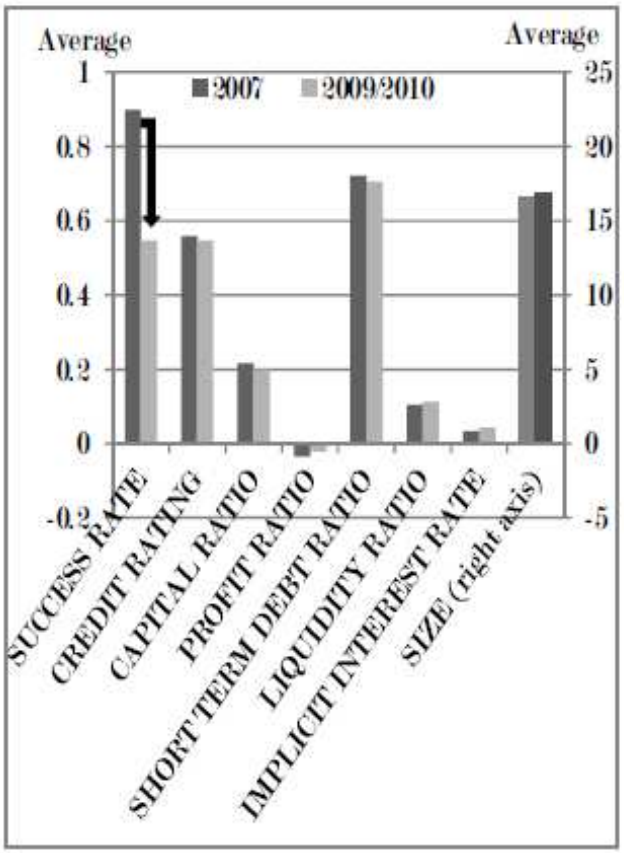


Note: Authors calculations based on Statistics Denmarks credit survey and Experian rating data. Q1, Q2, Q3, and Q4 are devided between the 25%, 50% og 75% quartiles of credit ratings in 2009/2010, respectively. Hence, Q1 is all firms with a rating lower than or equal to 0.43, Q2 a rating between 0.44 and 0.55, Q3 a rating between 0.56 and 0.67, and Q4 a rating of 0.68 or more.

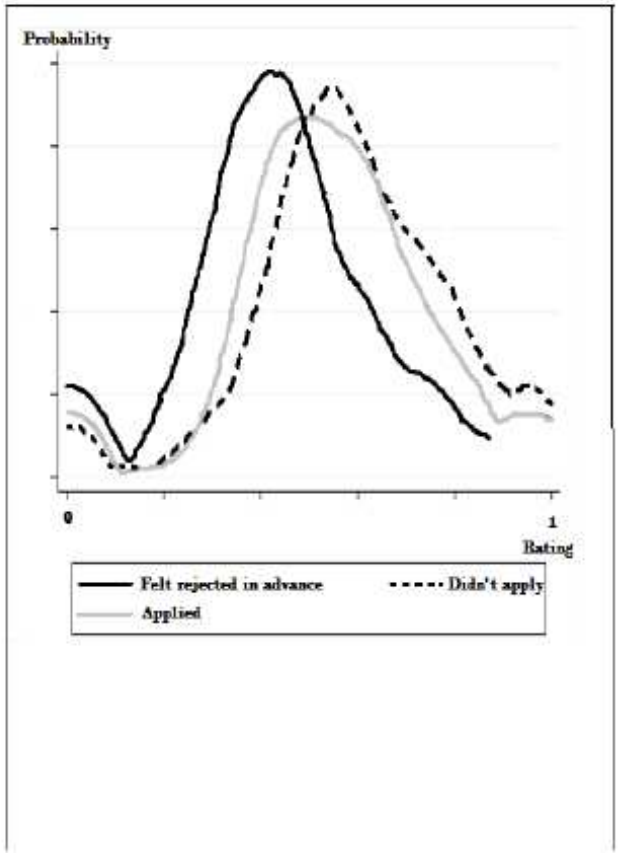
Average accounting numbers and self-selection

Figure 4: The credit policies and accounting numbers

4a: Success rates, key ratios, ratings, ect.



4b: Distribution of ratings



Note: Authors calculations based on Statistics Denmarks credit survey and firm registers, and Experian rating data. In figure 4a: The definitions of the variables are discuss in detail in the result section below. In figure 4b: the probability (y-axis) is measured as the reciprocal unit of the rating (x-axis). The distribution is estimated using the Epanechnikocs kernel (kdensity in STATA).

Econometric approach

- The aim is to model the probability of obtaining a loan for a firm with a given financial health and customer in a given bank.
- This conditional probability is termed the credit policy at time t.
- Model the selection effect explicitly (take into account that some firms feel discouraged because the general lending enviroment is deteriorating or has no need for credit).
- Specifically, I estimate a ordered probit model accounting for selection.

Hypotheses

- H1: Well capitalized and liquid firms have better access to credit
- H2: Firms access to credit is better in solid banks
- H3: If only the balance sheet channel is operational, there should be no significant effect on the supply of credit to firms with no change in creditworthiness during the business cycle.

Results

Table 3: Regression results with selection.

Outcome equation	2007	M.E.	2009/2010	M.E.
$CREDIT\ RATING_{i,t-1}$	1.28^{***}	0.45	1.24^{***}	0.44
	(0.41)		(0.40)	
$LOAN\ IMPAIRMENT\ RATIO_{b,t}$	51.85	18.24	-3.32^{**}	-1.18
	(42.38)		(1.58)	
Selection equation (the probability that a firm applies for a loan)				
Firm characteristics (i)				
$OTHER\ TYPES\ OF\ FINANCE_{i,t}$	1.05^{***}	-	1.34^{***}	-
	(0.12)		(0.10)	
$CAPITAL\ RATIO_{i,t-1}$	-0.80^{***}	-	-0.50^{**}	-
	(0.27)		(0.24)	
$CREDIT\ RATING_{i,t-1}$	-0.14	-	-0.39	-
	(0.33)		(0.30)	
$SIZE_{i,t-1}$	0.09^{**}	-	0.11^{***}	-
	(0.04)		(0.04)	
Primary bank characteristics (b)				
$LOAN\ IMPAIRMENT\ RATIO_{b,t}$	16.08	-	2.15^{**}	-
	(16.00)		(0.98)	
α	-2.25^{***}	-	-2.83^{***}	-
	(0.62)		(0.57)	
κ_1	-0.23	-	0.48^{*}	-
	(0.39)		(0.25)	
κ_2	0.23	-	1.16^{***}	-
	(0.35)		(0.24)	
ρ	0.55^{***}	-	0.53^{***}	-
	(0.17)		(0.10)	
Number of observations	1203		1253	

Note: M.E. is the marginal effect on $P(y_{j,t} = 3|s_{j,t} = 1)$ (the probability that the loan application is successful) evaluated at the mean. Standard errors in parentheses. ***Significant at a 1 percent level, **Significant at a 5 percent level, and *Significant at a 10 percent level.

Results

Table 4: Application outcomes in 2007 given the estimated credit policy in 2009/2010.

Outcome	Rejected	Partially approved	Approved
Actual outcome in 2007	4,0%	5,9%	90,1%
Actual outcome in 2009/2010	22,0%	24,6%	53,4%
Difference	18,1%	18,6%	-36,7%
In 2007 with credit policy from 2009/2010	15,1%	22,0%	62,9%
Change from tighter credit policy	11,2%	16,1%	-27,2%
Change from ratings, impairment charge ratio, and selection	6,9%	2,6%	-9,5%

Note: Formally computed as:

$$P(y = \nu_h | x_{2007}, \beta_{2010}, \kappa_{1,2010}, \kappa_{2,2010}, \gamma_{2010}, s_{2010} | z_{2007} = 1) = \frac{1}{n} \sum_{j=1}^{n} P(y_j = \nu_h | s_j = 1)$$

Using the results from table 3 above.

Robustness

- What measures are better at measuring bank health?
- The effects of including firms that did not apply for credit because they expected to be declined or the terms of the contract to be unfavourable are analysed.
- The distinction between market and accounting values is discussed.
- The problem of timing and the use of lagged values.
- Discussion of whether credit risk can be evaluated from firm specific information and thereby disentangled from macroeconomic conditions.

Policy implications

What channel is better at explaining credit cycles during the recent financial crisis?

- This analysis indicates that the bank lending channel explains most of differences between credit policies before and during the crisis.
- Focusing policy solely on the balance sheet channel seems fruitless in minimizing credit cycles, due to the very modest effects estimated in this paper.
- Ensuring that banks are robust and therefore do not have to limit their credit supply seems obvious.
- The quite large credit cycles in Denmark favors Basel-III type regulation. Tightening regulation should be done when the economy is booming.