What else lies behind the Credit Rationing? Exploring the issue of Employment.

SCHOLARONE™
Manuscripts

Table 1. Credit Rationing and Employment on Survey Data

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Caggesse & Cunat (2008)	FINANCING CONSTRAINTS AND FIXED-TERM EMPLOYMENT CONTRACTS	Italy	1995-2000	Mediocredito Centrale Surveys	18783 Observations	Credit Constrained	Fixed Time Workers/Permanent Fixed Time Workers/ Total Employment
Campello et al. (2010)	The real effects of financial constraints: Evidence from a financial crisis	36 countries (Asia, Europe, US)	2007-2008	Self employed Survey	1050 CFOs	Financial Constraints (Not Affected/Somewhat Affected/Affected)	Employment Change
Ferrando & Mulier (2015)	The real effects of credit constraints: evidence from discouraged borrowers in the euro area	Europe	2010-2014	SAFE & Financial Statements	7739 Observations	Discouraged	Future Employment Growth A Period Ahead
Gerlach et al. (2015)	Do Credit Constraints Affect SME Investment and Employment?	Ireland	2012-2013	SME Credit Demand Survey	2565 Firms	Credit Constrained Discouraged	Number of Employees
Gomez (2019)	Credit Constraints, firm investment and Employment: Evidence from Survey Data	Europe	2014-2017	Survey on the Access to Finance of Enterprises	10774 Firms	Credit constrained (not Only on bank financing)	Employment Increase/ Decrease
Cao & Leung (2020)	Credit Constraints and Productivity of SMEs	Canada	2009-2013	Survey on Financing And Growth of Small And Medium Enterprises	6459 Observations	Probability of Financial Constraints Based on Internal Evaluation Model	Employment Change

Table 2. Credit Rationing and Employment on Non-Survey Data

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Dromel et al. (2010)	Credit Constraints and the persistence of Employment	20 OECD Countries	1982-2003	Self created panel	20 OECD Countries	Credit Rationing (share of private credit by deposit money banks/ GDP)	Unemployment Rate
Benmelech et al. (2011)	Financing Labor	US	1970-2009	Compustat	51609 Firms	Long Term Debt that Matures Soon	Employment Change
Pagano & Pica (2012)	Finance and Employment	United Nations	1970-2003	UNIDO	5297 Observations	External financial Dependence of Industry and Country	Employment Change
Berg (2018)	Got rejected? Real effects of not getting a loan	Germany	2009-2012	German Bank Bureau van Dijk	16855 Loan Applications	Bank Evaluation of Firm's Profile	Employment Change
Siemer (2019)	Employment Effects of Financial Constraints During the Great Recession	US	2007-2009	Bureau of Labour Statistics Compustat	7+ Million Observations	External Financial Dependence Per Sector, Size and Age	Employment Change

1
2
3
4
5
6
7

Table 3. Credit Supply Shocks and Employment – Economy Level Analysis

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Benmelech et al. (2011)	Financing Labor	US	1970-2009	Compustat	51609 Firms	Japanese Real Estate Index for Firms that Borrowed Money from Japanese Banks in US	Employment Change
Giroud & Mueller (2015)	FIRM LEVERAGE AND UNEMPLOYMENT DURING THE GREAT RECESSION	US	2007-2009	Longitudinal Business Database Compustat	327500 Establishments	Change in Real Estate Prices in 2006 & 2009	Employment Change in 2006 & 2009
Hochfeller et al. (2015)	Winners and Losers of Financial Crises: Evidence from Individuals and Firms	Germany	1997-2010	Bankscope	14994 Establishments	Affected Federal States by Landesbank's Trading Losses in US Securities	Employment Change
Greenstone et al. (2020)	DO CREDIT MARKET SHOCKS AFFECT THE REAL ECONOMY? QUASI-EXPERIMENTAL EVIDENCE FROM THE GREAT RECESSION AND 'NORMAL' ECONOMIC TIMES	US	2007-2010	NETS Database	43540 Observations	Cumulative Effect of 2008 & 2009 Supply Shocks	New Employment Created - Terminated Employment
Gutierez et al. (2021)	Do Credit Supply Shocks Affect Employment in Middle-Income Countries?	Mexico	2010-2016	Mexican Central Bank	461 Labour Markets	Credit Supply Shock in Each Labour Market	Employment Change In Each Labour Market

8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

1
2
3
4
5
6
7
8
9
10
11
12
13

Table 4. Credit Supply Shocks and Employment – Bank & Firm Relationship Analysis

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Chodorow (2014)	The employment effects of credit market Disruptions: Firm-level evidence from The 2008-2009 Financial Crisis	Global	2008-2009	Dealscan Bankscope	2050 Observations	Syndicated Loans Change By Firms During the Crisis	Employment Change
Popov & Rocholl (2015)	Financing constraints, employment and labour compensation: evidence from The subprime mortgage crisis	Germany	2005-2012	Dafne Database	64745 firms	Banks Affected by US Morgage Crisis Vs Not Affected	Employmet Change
Acharya et al. (2018)	Real effects of the Sovereign Debt Crisis In Europe: Evidence from Syndicated Loans	Europe	2006-2012	Dealscan Amadeus	3781 Firms	Dependence in GIIPS Banks	Employment Change
Bentolila et al. (2018)	When Credit Dries Up: Job Losses in Great Recession	Spain	2006-2010	Bank of Spain	149458 Firms	Firms with Relation to Spanish Weak Banks vs No Nelation	Change in Average Level of Employment per Year
Farinha et al. (2021)	REAL EFFECTS OF IMPERFECT BANK-FIRM MATCHING	Portugal	2006-2016	Central Bank of Portugal	512446 Firms	Outstanding Credit from EBA Banks Relative to All Banks Bank & Firm Matching	Employment Change

37
38
39
40
41
42
43
44
45
46
47

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

Table 5. Financial Health Measurements and Employment

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Hernando & Carrascal (2008)	The Impact of Financial Variables on Firm's Real Decisions: Evidence from Spanish Firm-level Data	Spain	1985-2001	Bank of Spain	70625 Observations	Total Debt Burden (Short-Term Debts + Interests) Profitability	Average Company Employment in the Year
Spaliara (2009)	Do Financial Factors Affect the Capital-Labour Ratio? Evidence from UK Firm-Level Data	UK	1994-2004	FAME & STAN Database	14700 Firms	Collateral Leverage Cash Flow	Capital-Labour Ratio
Benmelech et al. (2011)	Financing Labor	US	1970-2009	Compustat	51609 Firms	Leverage Profitability Liquidity	Employment Change
Duygan et al. (2015)	Financing Constraints and unemployment: Evidence from the Great Recession	US	2007-2009	Compustat Survey of Small Business Finance	US working Force	Capital Expenditures Financed By External Funds (Firm Level)	US citizens (Work Or Not)
Giroud & Mueller (2015)	FIRM LEVERAGE AND UNEMPLOYMENT DURING THE GREAT RECESSION	US	2007-2009	Compustat	327500 Establishments	Leverage (Debt/Assets)	Employment Change
Berton et al. (2018)	Banks, Firms, and Jobs	Italy	2008-2012	PLANET, ASIA Bank of Italy	200000 Firms	Change in Total Loans	Employment Change

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

What else lies behind the Credit Rationing? Exploring the issue of Employment.

Abstract

The relationship between credit rationing and employment attracted scholars' attention in the aftermath of the Great Recession. Researchers, using a plethora of measurements and models, have examined the effect of credit rationing and its different manifestations and effects on employment, even though some issues have remained unexplored to date. This paper reviews the literature extensively by analysing recent work and providing a guide for models, datasets and research findings within the context of capital market imperfections. We further break down the literature into closer in nature categories for reader's convenience and comprehension. Finally, we address gaps in the existing literature and propose government policies that can tone down the potential effect of credit rationing on employment.

Keywords: Information Asymmetry, Small Business Lending, Credit Rationing, Employment, Discouragement.

1. Introduction

Most of the studies, since the mid-1960s, have isolated firm real decisions from financial factors with Modigliani and Miller (1958) characteristically demonstrating the so-called Irrelevance Theorem. The main conclusion was that a firm's financial structure will not affect its market value within a perfect capital markets context suggesting that a firm's financial status is irrelevant for real investment decisions. The Modigliani and Miller theorem was attractive because it allows researchers to ignore the complications posed by financial considerations. In particular, the developers of the neoclassical theory of investment, Jorgenson (1963) and Hall and Jorgenson (1967), advocate that a firm's optimization problem could be solved without reference to financial factors like internal cash reserves, debt utilization or dividend payments, qualifying the user cost of capital as the sole determinant of investment. Consequently, internal and external finance are viewed as substitutes; firms use external finance to smooth investment when internal finance is scarce. Empirical research has, however, usually produced results that are at odds with the Modigliani-Miller (1958) propositions on financial irrelevance.

In this vein, over the past few decades, several studies have emerged deviating from the traditional business fixed investment models by integrating the influence of financing constraints into the determination of a firm's investment decisions. Such a deviation from the paradigm of perfect capital markets is characterised by *ex-ante* and *ex post* asymmetries of information between lenders and borrowers, leading to an equilibrium outcome where the assumed perfect substitutability between internal and external sources of finance breaks down (Greenwald, *et al*. 1984; Mayers and Majluf, 1984). Consequently, a cost differential, known as the External Finance Premium, exists between external and internal funds, with the former being more costly than the latter (Townsend, 1979; Greenwald, *et. al.* 1984; Myers and Majluf, 1984; Bernanke and Gertler, 1990; Gertler, 1992; Kiyotaki and Moore, 1997). In this context, numerous studies have investigated the properties of such equilibrium in situations where lenders (principals) cannot costlessly obtain information about the opportunities, characteristics or actions of borrowers (agents) (Townsend, 1979; Stiglitz and Weiss, 1981; Greenwald, *et. al.* 1984; Myers and Majluf, 1984; Bernanke and

Gertler, 1990; Gertler, 1992; Kiyotaki and Moore, 1997). Hence, asymmetric information by its own exacerbate financing constraints.

Asymmetric information in debt financing may increase the cost of new debt or even restrict firms from borrowing due to credit rationing (Stiglitz and Weiss, 1981; Greenwald, *et. al.* 1984). The term credit rationing is employed to describe situations in which either a) among loan applicants who appear to be identical, some receive a loan, and others do not even if they are willing to pay higher interest rate, or b) there are identifiable groups of individuals in the population who, with given loan supply of credit, are unable to get a loan at any interest rate, even though with a larger supply of credit, they would. In this framework, the emphasis on capital market imperfections may have an important negative effect on real economic variables such as investment (e.g. Tybout, 1983; Oliner and Rudebusch, 1992; Carpenter and Rondi, 2000; Drakos and Kallandranis, 2005a,b; Campello et al., 2010; Gerlach et al., 2015; Kallandranis, 2019; Kallandranis et.al., 2020 etc.), real growth rates (e.g. Blinder & Stiglitz, 1983; Bencivenga & Smith, 1993), exports (e.g. Arkolakis et al., 2010; Cheng et al., 2021; Pietrovito & Pozzolo, 2021), productivity (e.g. Yu & Fu, 2021), inflation (Gao et al., 2012; Akinkoye et al., 2015), R&D and innovation activities (Santos & Cincera, 2022 ; Vlassas et al., 2023) and employment (e.g. Benmelech et al., 2011; Chodorow, 2014; Duygan et al., 2015).

It is rather visible from the above analysis that the role of capital in a context of financial frictions has been put at the centre stage in the literature of real firm investment decisions. Indeed, capital is acknowledged as a main factor in firms', and not only, growth output. However, the role of financing constraints in the firm's investment decisions has left the equally significant employment factor almost neglected. In this vein, such models can reveal interesting interlinkages of the credit market with the labour market, demonstrating how frictions in financial markets can magnify volatility not only at capital level but at employment level too. Such a relationship can have important effects on the real economic activity, however only a handful of relevant studies have explored this issue (e.g., Campello et al., 2010; Benmelech et al., 2011; Ferrando & Muelier, 2015; Gerlach et al., 2015; Gomez, 2019).

Indeed, if a firm formulates its employment decisions within a Modigliani-Miller (1958) world, such an economy would be characterized by a dichotomy between the real and financial decisions of firms and full reversibility of production decisions (e.g. Drakos and Kallandranis, 2006). This ideal environment guarantees that in the occurrence of a stochastic shock, labor demand would respond fully and immediately to its long-run state variables. On the contrary, imperfections in the capital markets, often stemming from information asymmetry, tend to result in suboptimal decisions for firms classified as financially distressed. To the extent that these imperfections cause the breakdown of the MM theorem then the otherwise irrelevant, financial aspects of the firm will be correlated with employment decisions. As a result, the short-run dynamics of labor demand will be sensitive to variations in the financial profile of employment decision-making agents. In particular, employment decisions when the firms are in financial distress can be affected through the higher cost of external funds (Sharpe, 1994). Hence, an additional feature of the consequences of capital market imperfections and ultimately credit rationing is the possible effect of frictions on labor demand.

Albeit the relationship of credit rationing and investment has had a significant focus within the credit rationing literature, surprisingly not a vast number of studies have been conducted on the relationship of credit rationing and employment. From a macroeconomic scope of analysis, growth of capital markets can create what is called by Pagano & Pica (2012) as "jobless growth": firms may invest in technologies that are more capital-intensive, resulting in an increase on productivity but not employment. Consequently, a positive relationship between enhanced financial accessibility and growth may not necessarily translate into a positive link between finance and employment. Even if this positive link is true, it does not render into an increase in employment across all industries and firms. Indeed, as financial intermediaries become increasingly selective and cautious on their resource allocation this leads towards firm closures, layoffs and general firm restructuring if firms' outlook is not considered positive. However, this is not a definite conclusion as more developed financial markets and intermediaries can also fund firms with negative outlooks bearing liquidity challenges to improve their prospects and stabilize their financial profile. Albeit these two countering effects are linked, the positive effect of the growth of financial markets receives significantly more public debate over the negative one.

In the scope of within-firm analysis, theoretically, credit rationing should affect firm employment decisions for a number of reasons. First, if a mismatch on labour costs and a firm's cash flow exists, then firms will have to finance such costs from the production process (e.g. Greenwald & Stiglitz, 1988) resulting in employment fall when the ability to finance capital is not optimal. Second, there is a possibility especially for larger firms that labour is not solely a variable cost in production (e.g., Oi, 1962; Hamermesh and Pfann, 1996) but has also a fixed or quasi-fixed cost component through procedures like hiring and training of employees. Third, credit rationing might affect employment indirectly in a firm via its impact on investment (Benmelech, 2011). Indeed, capital market frictions hinder investment as firms are constrained by the available internal funds of firms which due to the complementary nature between labour and capital, employment is adjusted to account for the decline in capital.

Within the concept of the previously reported factors, the conventional issue of credit rationing becomes even more pertinent for small and medium sized enterprises (SMEs hencheafter) as, due to their size, they experience challenges related to informational opacity and lack of substantial collateral, making them more susceptible to credit rationing problems (e.g., Stiglitz & Weiss, 1981; Jaffee & Stiglitz, 1990; Liberti & Petersen, 2019, Kallandranis et.al., 2023 etc.). The decline in SME's lending has received much attention from researchers and policymakers as a consequence of its potential link to important economic measurements such as investment and unemployment rates. It is well known that the main challenge that SMEs have to encounter in their environment is the lack of demand for their goods and services (Gerlach et al., 2015), but changes in bank credit and other supply-side factors are also of significant importance to SME's performance. Disruptions in the flow of bank credit may have notable real effects on the labour market (Duygan et al., 2015) and the functioning of SMEs, as they lack viable alternatives to bank credit.

In this respect, policymakers need to comprehend which factors support or hinder SMEs performance and develop a plan that will help them flourish in their respective business environments (Greenstone et al., 2020), as they contribute more than 50% of global employment according to World Bank. Such a plan is critical to a sustained

employment recovery. In this context, the issue of credit rationing is intensified for SMEs in low and middle-income economies (LMIEs) in comparison to advanced economies (Beck et al., 2008; Ayyagari et al., 2012) due to problems such as underdeveloped credit markets and less competitive banking systems that makes them less capable in dealing with informational asymmetries (Gutierez et al., 2021). Thus, SMEs in LMIEs face higher loan rejection rates and higher interest rates which may contribute, as mentioned above, to a mismatch on labour costs and a firm's cash flow. Firms have to finance such costs from the production process (e.g. Greenwald & Stiglitz, 1988) resulting in employment decline.

This paper is prompted by the scarcity of research investigating credit rationing's impact on the real firms' decisions, despite its substantial significance for SMEs and global economies. It focuses on creating an extensive literature review based merely on the relationship of credit rationing and employment and it contributes to the existing literature in a number of ways. The latter has been neglected in the literature relative to the traditional liquidity approach of capital market imperfections. We contribute to the existing literature, since according to our knowledge, there are not enough recorded papers that provide an analytical review of the relation between credit rationing and employment. Second, we attempt to create a road map that will gather the different approaches on examining this relationship and categorise them accordingly. Third, we analyse the specifications of each category and at the end provide pointers to guide future research.

The paper is organized as follows. In Section 2.1, we outline the fundamental framework of our categorization and elaborate on the methodology employed in conducting our research. In Sections 2.2-2.4, we classify the existing literature into categories based on the independent variables that the models used. Finally, in Section 3, we refer to the results of our review, the gaps of the current literature, and possible ways to counter them in future research. For the convenience of the reader, tables are provided including a list of the most relevant papers throughout the analysis.

2.1. Empirical Literature Classification

Before delving into the analysis of the relationship of credit rationing and employment, it is important to understand and account for measurements that may change

the statistical importance of this relationship. Researchers, in order to produce robust results, have incorporated a wide range of control variables to ensure their models are free from biased and inaccurate results.

In order to compensate for the absence of significant information about firms past borrowing history, the use of certain variables should be treated very cautiously. The relevant literature makes use of qualitative data that can serve as proxy variables to examine risk characteristics on both the supply and demand sides. This analysis takes into account variances in the investment opportunity set, as described by Hubbard (1998). The correlation between this opportunity set and suitable proxies that capture elements of information flows and transparency is significant, which can certainly impact the cost of capital. In this context, the regressor most frequently employed in models related to credit rationing and employment is that of size (Campello et al., 2010; Chodorow, 2014; Duygan et al., 2015; Gerlach et al., 2015; Popov & Rocholl, 2015; Giroud & Mueller, 2015; Bentolila et al., 2018; Berg, 2018; Siemer, 2019; Gomez, 2019; Farinha et al., 2021). Large firms possess greater resources to withstand economic shocks and are less susceptible to informational asymmetries compared to smaller counterparts. Furthermore, due to their relatively bigger size, it is easier to adjust their employment status accordingly, when the economic circumstances change substantially. However, the way size is implemented within empirical model changes based on data availability of firms as well as researcher's preference. Generally, researchers prefer to distinguish between two (2) different categories of size; large and small firms. The criteria used to make this distinction are usually the number of employees within a firm, using most of the times a benchmark of less than 50 or 250 employees to define a firm as small, and turnover, where the benchmark value varies depending on the country and industry of the data.

Additionally, firm age is a common control variable utilized in such models (Chodorow, 2014; Ferrando & Mulier, 2015; Gerlach et al., 2015, Bentolila et al., 2018; Berg, 2018 ; Siemer, 2019; Gomez, 2019). Specifically, longevity can suggest an inherent capacity of the company to survive, which would signal its quality and hence decrease the presence of asymmetric information, and consequently enhance opportunities for bank financing. Regarding its correlation with employment, during the initial stages of a firm's

existence, employment growth is heavily influenced by the increase in production of goods or services. Therefore, it is logical to assume that the longer a firm has been operating, the higher the chance to employ a greater amount of personnel.

A group of control variables that recurrently appears in these empirical models are metrics that reflect financial stability of a firm. Profitability (Kleeman & Wiegand, 2013; Gerlach et al., 2015; Popov & Rocholl, 2015; Gomez, 2019; Farinha et al., 2021), turnover (Caggesse & Cunat, 2008; Gerlach et al.,2015; Berg, 2018; Gomez, 2019), cash flow (Benmelech et al., 2011, Popov & Rocholl, 2015; Cao & Leung, 2020) and liquidity (Kleeman & Wiegand, 2013, Berg, 2018) are the most commonly employed. They are used either as absolute or relative values, primarily as ratios with assets. Originally a high value of such metrics means a probable greater employment growth for a firm. Similarly to financial stability measurements, debt related measurements such as bank dependence (bank debt over total debts), debt to assets ratio (Gomez, 2019; Cao & Leung, 2020; Farinha et al., 2021) and lagged debt levels (Gerlach et al., 2015) examine the relative financial healthiness of a firm. Finally, beyond firm specific variables, there are also country, industry and time characteristics that could impact this relationship between credit rationing and employment. To account for these effects, researchers may use fixed effects for different countries, times and industries, adjusting based on the variability of the datasets.

Under this theoretical and empirical context, we have classified the empirical literature into three main categories depending on the focus of the relationship of employment and credit rationing as well as credit supply shocks. In particular, we focus on 1) a set of variables measuring employment and how credit rationing affects it based on survey (Dromel et al., 2010; Benmelech et al., 2011; Pagano & Pica, 2012; Berg, 2018; Siemer, 2019) and non-survey data (Caggesse & Cunat, 2008; Campello et al., 2010; Ferrando & Mulier, 2015; Gerlach et al., 2015; Gomez, 2019; Cao & Leung, 2020), 2) the impact of credit supply shocks on the growth of employment at the macroeconomic level (Benmelech et al., 2011; Giroud & Mueller, 2015; Hochfeller et al., 2015; Greenstone et al., 2020; Gutierez et al., 2021) and on bank to firm relationship level (Chodorow, 2014; Popov & Rocholl, 2015; Acharya et al., 2018; Bentolila et al., 2018; Farinha et al., 2021)

and 3) the significance of balance sheet measurement in influencing employment growth (Hernando & Carrascal, 2008; Spaliara, 2009; Benmelech et al., 2011; Duygan et al., 2015; Giroud & Mueller, 2015; Berton et al., 2018). The most prominent studies across the aforementioned categories are presented in Tables 1-5, giving the reader a comprehensive classification and analysis of their content. We also provide a tree diagram in order to depict the three main aspects mentioned above.

(Insert Diagram 1 here)

The relevant literature utilizes predominantly balance sheet measurements over survey data to analyse the relation of credit rationing and employment. Despite the availability of various databases and datasets, there is a preference in the usage of Compustat (Benmelech et al., 2011; Duygan et al., 2015; Giroud & Mueller, 2015; Siemer, 2019) and other global databases like Dealscan and Bankscope. Moreover, since the employment variable is mostly measured through percentage changes over time, implementation of least squares, two-stage least squares and the generalized method of moments models are the most commonly used within the literature over other binary models like probit and logit. In order to measure pre and post event effects, researchers also commonly use methods like the regression discontinuity design, propensity score matching and difference-in-difference models. Regarding the periods under scrutiny, the selected studies encompass a time span of 15 years (2008-2023) and include a wide variety of countries and samples, while the data availability on years range from 1970-2017, covering 47 years in total. The variety of different countries and time spans for relevant research allows us to examine whether the relationship of credit rationing, and employment holds true under distinct economic cycles.

Regarding the adopted methodology, several steps were implemented in order to sort out the relevant literature. First, we set out the basic criteria for our research, which were related with how all different forms of credit rationing affect the employment of a firm, focusing on SMEs and banks. Second, we chose the Google Scholar and ResearchGate search engines, to browse and read through relative papers along with academic publishing companies specializing in related scientific fields. Our search was conducted in English and all the papers used in our review were published within the last

15 years (2008-2023), since the modern empirical model measurements of this relationship started after the Great Recession. The keywords we used for our research were: "employment and credit rationing", "employment and financial constraints" and "employment and credit supply shocks". We also conducted the same browsing methods followed by the two keywords "in SMEs" and "banks", to monitor better relevant studies. Third, we initialised the basic screening procedure, by reading abstracts of relevant papers and delving into details of those closely related to the relationship of credit rationing and employment. After assessing the relevance of these papers to our research interest, their robustness in terms of econometric results and the journals under which they were published, we ended up with the studies presented in the following Sections and Tables. In the fourth and final step, we classified those papers into 5 separate categories, based on the different ways credit rationing, financial constraints and credit supply shock were applied on econometric models. We included only research that was relevant with our study and excluded other independent and dependent variables for reader's convenience, as they are not within the concept of the relationship we want to examine.

2.2. Credit Rationing and Employment on Survey & Non-Survey Data

The first category of credit rationing and employment we constructed is related to the direct analysis of their correlation, dividing them between research conducted on survey and non-survey data. Ever since the analysis of survey data emerged, a debate has arisen over its usefulness relative to other forms of data analysis like balance sheet measurements and databases. Specifically, survey data allow researchers to collect specific information tailored to the variable of their interest, since questions can be designed to directly address them. Nevertheless, survey responses could be prone to bias. This bias may arise either from the respondents who might be reluctant to disclose personal information about their enterprise or from the researcher who could have formulated questions in a way that leans towards a specific response. That being mentioned, it is unquestionable that both forms of data analysis can provide different types of results that can be helpful when analysing the relationship of credit rationing and employment.

A similar point in both forms of analysis is the use of the employment variable. As a variable to measure, employment is quite straightforward. Researchers mostly prefer to compute the percentage change of employment over time (Campello et al., 2010; Benmelech et al., 2011; Chodorow, 2014; Giroud & Mueller, 2015; Hochfeller et al., 2015; Bentolila et al., 2018; Berg et al., 2018; Berton et al., 2018; Siemer, 2019; Gutierez et al., 2021) and analyse how their primary finance variable influences that change while controlling for other key factors. However, it should be noted that there are unique approaches to its computation too. For example, in this first subcategory of papers summarized in Table 1, Ferrando and Muelier (2015) compute future employment growth a period ahead and not earlier. Gomez (2019) measures employment fluctuations relative to the prior year of the firm and does not account for the level of change. Gerlach et al. (2015) use the absolute value of the number of employees within a firm when researching how its financial measurements affect it. Caggesse & Cunat (2008) delve deeper into the analysis of employment and research the impact of fixed time workers over permanent workers ratio on changes in credit constraints.

Since the dependent variable of all analysed models (employment) is similar in nature, we proceed with categorisation based on the financial measurements utilised. In the papers outlined in Table 1 (survey data analysis), three different types of independent variables can be spotted: a) credit constrained variables (Caggesse & Cunat, 2008; Gerlach et al., 2015; Gomez 2019), b) discouraged borrowers variables (Ferrando & Muelier, 2015; Gerlach et al., 2015) and c) financial constraints indicators (Caggesse & Cunat, 2008; Campello et al., 2010; Cao & Leung, 2020). The existing literature on credit rationing (Ferrando & Muelier, 2015; Gerlach et al., 2015; Ferrando et al., 2017; Gomez, 2019) brand a firm as credit constrained either when a) a firm's loan was rejected by a bank, b) a firm only received a limited amount of the loan proposed (70-75% of the amount requested, based on the categorisation of the survey) and c) a firm rejected a loan proposal by the lender due to high interest rate costs. In this segment of the literature, Caggesse & Cunat (2008) discovered that firms facing more pronounced credit constraints increase substantially the utilization of fixed-term workers over permanent workers. All in all, they demonstrate that the flexibility of fixed-term workers is crucial for firms encountering problems in credit availability, leading to significant increase in total employment volatility

in an industry. On the other hand, Gomez (2019) doesn't differentiate between discouraged and credit rationed firms but takes into consideration not only bank financing but also other forms of financing like credit lines, bank overdraft and trade credit. Gomez (2019) reported that credit constraints do not have a significant effect on employment growth.

(Insert Table 1 here)

According to Jappelli (1990), firms are defined as discouraged borrowers when they do not apply for a loan due to fear of possible rejection. In a relative short note, we need to highlight that this strand of literature, has received an overly low attention and only recent studies have explored the discouraged borrowers in credit dynamics and documented its importance in the credit markets (e.g., Levenson & Willard 2000; Chakravarty & Yilmazer, 2009; Popov & Udell, 2010; Freel *et al*., 2012; Anastasiou et.al. 2022; Kallandranis et.al., 2023). In this context, discouraged firms are prevalent in banking systems that: a) credit supply is limited, b) banks can't screen appropriately the firms applying and c) the application cost for firms is positive (Kon & Sotrey, 2003) and significant relative to its estimated chances of the loan being accepted. Kon & Storey (2003) formulated a model demonstrating that firms become discouraged when the total effective costs of borrowing exceed the expected profits of investing from the utilisation of the bank loan. Within the context of the relationship of employment and credit rationing, Ferrando & Muelier (2015) developed a model that accounts for the inherent endogeneity issues of discouragement, since discouraged borrowers typically encounter worse growth opportunities compared to the average firm. In order to counter that problem, they used an instrument that measures firm level financial constraints where firms are asked to report the most pressing hurdle they face. In their results, they found that employment growth is 2.7% lower for discouraged borrowers relative to firms that applied for a loan in the two years following their discouragement status. Likewise, Gerlach et al. (2015) found a significant negative effect of credit constraints and discouragement on employment of SMEs. When they split the sample between discouraged borrowers and credit rationed firms, they report that the main driving factor for that negative effect are discouraged borrowers.

Other financial constraints indicators reported in surveys can be observed in the research conducted by Campello et al. (2010) and Caggesse & Cunat (2008). Campello et

al. (2010) employ a financial constraints indicator based on firms reporting whether they are affected by financial problems (3 subcategories – not affected, somewhat affected, very affected). They found that there is a 6% employment reduction on firms that report high financial constraints. Cao & Leung (2020) assess the likelihood of firms facing financial constraints by assigning scores based on their reported financial status. After pooling the results, they divided firms into three subcategories depending on whether firms requested external financing even though they needed it (most likely constrained), requesting and successfully acquiring their loan (unlikely to be constrained) and requesting but getting lower amount of the loan than expected (likely constrained). Finally, Caggesse and Cunat (2008) used a financial constraint indicator labelled on the survey as 'willing to pay higher interest rate than the market's' in order to reach the aforementioned results.

The second part of this category we have constructed is that of credit rationing and employment on non-survey data (see Table 2 for details). We have further divided this category into two different segments: a) firm level analysis (Benmelech et al., 2011; Berg, 2018) and b) non-firm level analysis (Dromel et al., 2010; Pagano & Pica 2012; Siemer, 2019). Under firm level analysis, Benmelech et al. (2011) researched how long-term debt that matures the coming year for a firm and represents more than 5% of the firm's assets affect its employment status. Since the debt was issued two, three or four years prior to their data, they posit that the variation of the amount of long-term debt maturing in any given year is exogenous to firm outcomes of the years covered by the data. In their results, they discover a significant and negative correlation between the maturing long-term debts and changes in employment. Berg (2018), in a research paper focusing especially on SMEs, developed a bank evaluation model for firms assigning them a rating of 1-11 based on hard firm information. Loan applications with a rating surpassing the bank's cut-off value (1-7) were accepted, while loan applications with a rating worse than that value was subjected to further review (7-9), leading to a drop, in loan acceptance rate. Firms whose value was on the 10-12 threshold were rejected. Berg's model showed that the economic effects for SMEs are significant, with a reduction of 1% in credit supply translating into a drop in employment of almost 1%.

(Insert Table 2 here)

Under non-firm level analysis, Dromel et al. (2010) focus their research on country level, Pagano & Pica (2012) on country and sector level, while Siemer (2019) on sector level. In detail, Dromel et al. (2010) addressed the literature gap on how credit frictions influence the transitional dynamics of unemployment. The underlying idea of their model is that unemployment (the dependent variable of the model) may rise by frictions in the credit markets. This assertion is corroborated by the outcomes of their model, demonstrating a negative association with credit rationing (measured as the share of private credit by deposit money banks divided by the country's' GDP) and a country's unemployment rate, mostly through its lagged value. Pagano and Pica's (2012) principal theoretical basis for their model is based on the hypothesis that financial growth on employment should differ across industries, depending on their need for external finance. For the creation of their model, they divide countries into high financially developed countries and low financially developed countries based on the average ratio of stock market capitalization to GDP. They report that the effect of finance on employment is positive and statistically significant in developing countries but not in developed ones while the financially dependent sectors experience lower employment growth. In conclusion, Siemer (2019) focuses primarily on the employment growth of young versus old firms by using an indicator that measures external financial dependence, utilising info on size, age and industry of firm. Using a difference-in-differences estimator, it is highlighted that, during the recession, employment growth diminishes by 8% in small firms compared to large firms. This differential effect is predominantly due to the impact of financial constraints on young firms.

2.3. Credit Supply & Employment

The second category of credit rationing and employment is subject to credit supply shocks that may hamper bank financing as they become more selective in their lending practices. A reduction in credit availability may lead to a decline in business investment and profits, forcing firms to cut back on capital expenditures. The decrease in investment could typically impact employment growth within firms. This issue has an especially significant impact on SMEs that face higher asymmetric information and lower

creditworthiness relative to bigger firms. As a result, credit supply shocks may have a more severe impact on SMEs, where credit rationing can result in extended employee layoffs and hiring freezes.

Researchers have investigated thoroughly the effect of credit supply shocks on employment (Benmelech et al., 2011; Chodorow, 2014; Giroud & Mueller, 2015; Hochfeller et al., 2015; Popov & Rocholl, 2015; Acharya et al., 2018, Bentolila et al., 2018; Greenstone et al., 2020; Farinha et al., 2021; Gutierez et al., 2021). Within this literature, some of the most influential papers are summarized in Table 3 and Table 4. We split this branch of the literature into two different approaches: a) credit supply shocks and their effect on employment at an economy level (Benmelech et al., 2011; Giroud & Mueller, 2015; Hochfeller et al., 2015; Greenstone et al., 2020; Gutierez et al., 2021) and b) credit supply shocks and their effect on bank and firm financing relationship (Chodorow, 2014; Popov & Rocholl, 2015; Acharya et al., 2018, Bentolila et al., 2018; Farinha et al., 2021).

(Insert Table 3 here)

Giroud & Mueller (2015) and Greenstone et al. (2020) investigated the effects of the global financial crisis of 2007-8 on employment of the United States. Greenstone et al. (2020) reported that states with banks that cut lending affected small business employment growth rates by 0.6%. To determine whether this effect is supply-driven, they separated states with more Citigroup branches than US Bankcorp branches and found out that only a small percentage of small business employment reduction could be explained. They deduced that credit supply shocks contributed to real economy outcomes during the Great Recession, but its effects were modest. Giroud & Mueller (2015) investigated this relationship by using real estate prices of 2006 (prior to the crisis) and 2009 (during the crisis) and measuring employment change during those years. They found that a 1% decline in house prices is associated with 0.053%-0.068% drop in employment.

Benmelech et al. (2011), Hochfeller et al. (2015) and Gutierez et al. (2021) analyse on a scale more specific than the country level how credit supply shocks affect employment during different time periods. Benmelech et al. (2011) examined the impact of the decline in real estate prices in Japan during the 1990s on the U.S. economy through the contraction of loan supply by U.S. affiliates of Japanese banks. In their analysis, they found out that

these banks had a decline in credit supply in the US concurrently with the drop in real estate prices in Japan. Using this as a first stage in a two-staged model, they find that metropolitan statistical areas' unemployment increases by 1% when there was a contraction in Japanese affiliated bank lending following a real estate decline. Hochfeller et al. (2015) examined how employment reacts in different Germany states to Landesbank's trading losses in US securities. Indeed, according to their results, states affected by credit supply shocks experience a 0.8-0.9% reduction in part-time and total annual employment growth. Finally, Gutierez et al. (2021) analyse domestic credit supply shocks in each labour market in Mexico and how they affect their employment growth. In contrast to prior research, they place more emphasis on positive shocks, and their findings reveal that a positive credit supply shock of one standard deviation, increases yearly employment by 0.45% when compared to labour markets with no credit supply shocks. Moreover, they find that this increase is mostly attributed to employees in the upper half of the wage distribution.

As for credit supply shocks and their effect on bank and firm financing relationship, the primary paper that investigated this relationship was that of Chodorow (2014). Chodorow researched the effect of syndicated loans on firms' employment during the Global Financial Crisis. In a syndicated loan, the main lender set up a loan deal with a firm and provide the majority of the financing while secondary lenders provide the remainder of the funds. Chodorow observed that firms engaging in relationships with less healthy banks during the pre-crisis had lower possibilities of acquiring a loan after the Great Recession and reduced employment more compared to firms that had relationship with healthier lenders.

(Insert Table 4 here)

Based on the logic of that seminal paper, many researchers henceforth investigated how employment fluctuates focusing on specific bank characteristics. For example, Popov & Rocholl (2015) differentiated between banks impacted by the US mortgage crisis and those unaffected and investigated whether firms that had a financing relationship with either group was affected significantly. They concluded that firms with bank relationships to banks affected by the US mortgage crisis reduced employment by 2.2% relative to firms attached to non-affected banks. Similarly, Acharya et al. (2018) researched whether

dependence on GIIPS banks (Greece, Ireland, Italy, Portugal, Spain) affected firms' employment. In their results, they reported that firms in higher dependence on GIIPS banks experienced less growth in employment, approximately 4.1% less for an increase of one standard deviation to GIIPS bank dependence. Bentolila et al. (2018) focusing exclusively on the bipole of relationships with financially weak (saved by the Spanish government) versus strong Spanish banks, found out that firms with attachment to weak banks faced employment losses of about 2.8% higher relative to the other category of firms. Finally, Farinha et al. (2021) created a two staged model where the outstanding credit from EBA banks is measured, relative to other banks, to create a firm and bank match that is later used to measure employment change. A deterioration in the EBA index by one standard deviation is associated with a drop of 0.9% in employment. When firms are further categorized into single and multiple relationships with banks firms, they discover that the former entirely drives the effect.

2.4. Financial Health Measurements and Employment

The third and last category of employment and financial constraints is related to the use of balance sheet measurements as financial health indicators to measure employment growth and/or change. Within this literature, the most commonly used measurements are leverage and debt ratios (Hernando & Carrascal, 2008; Spaliara, 2009; Benmelech et al., 2011; Giroud & Mueller, 2015; Berton et al., 2018), profitability (Hernando & Carrascal, 2008; Benmelech et al., 2011), liquidity and cash flow (Spalira, 2009; Benmelech et al., 2011 as well as collateral (Spaliara, 2009). While balance sheet measurements are not direct indicators of employment change in a firm, they can indirectly affect employment. Concerning liquidity, companies with ample liquidity (high current assets to current liabilities) reduce their cash reserves following a credit supply shock. This allows them to absorb the shock without significant impacts on employment. However, firms with low liquidity need to increase their cash holdings when credit rationed, leading to potential cuts in assets that may hamper investment and employment (Berg, 2018).

(Insert Table 5 here)

In a similar note, high levels of debt can strain a company's financial resources, potentially leading to cost-cutting measurements such as layoffs to meet debt obligations. Under assumptions such as quasi-fixed labour or potential lag between labour input and production, firms may need to raise funds externally to finance labour (Spalira, 2009). Moreover, profitability enables firms to invest in expansion and R&D potentially fostering employment growth. As such, monitoring these measurements can provide insights into the overall well-being of a company and help anticipate potential variation in employment.

Within the context of a firm's debt influence on employment, Hernando & Carrascal (2008) analysed the responsiveness of employment to debt burden, indicating a a negative relation. Giroud & Mueller (2015) reported that firms which increased their debt levels in the run-up to the Great Recession exhibited a larger decline in employment from demand shocks compared to firms with lower debt levels. Duygan et al. (2015) focused on differences between small and large firms. Their research demonstrated that employees in small firms within industries characterized by high external financial dependence were more probable to become unemployed compared to workers of the same type in large firms during the financial crisis. Moreover, there was no significant differences in large and small firms with low external financial dependence in unemployment dynamics. Finally, Berton et al. (2018) reported that change in total loans by firms influence significantly employment layoffs at the firm level. This effect is attributed to small and micro firms and mostly in the service sector relative to industries.

Regarding other financial health measurements, Spaliara (2009) examines how the capital to labour ratio responds to fluctuations in collateral, leverage and cash flow. Spaliara finds a negative effect of cash flow and leverage on the capital to labour ratio while collateral exerts a significant positive effect, stressing the importance of tangible assets in borrowing capital. Likewise, Benmelech et al. (2011) found a positive relationship of profitability and liquidity on employment growth.

3. Conclusion

In this paper we examine under a broader prism the credit rationing literature and its results on real economy. Specifically, we made a brief distinction between the effect of

credit rationing for both factors of production, namely capital and labour. We merely focused though our analysis on the main topic of this paper, the relationship of employment and credit rationing. We started by analysing the theoretical background that binds them, referring to the phenomenon of jobless growth and job reallocation due to financial market growth. We proceeded by making a within firm analysis and introducing the importance of financing in cases of mismatch between cash flow and labour costs, quasi-fixed labour costs and the indirect impact of credit rationing on employment through investments. We made a distinct reference towards SMEs, since these effects are exacerbated due to information opacity and lack of collateral that lead to higher likelihood of being credit rationed. Combined with the fact that SMEs don't have alternative sources of financing other than that of bank credit, the implications of credit rationing are further intensified.

After introducing the framework of the relationship between employment and credit rationing, we clustered the relevant literature depending on the independent variables utilized. The first category we introduced was that of pure credit rationing and employment models. We further broke down this category into two segments, that of survey data analysis, that focused on credit constrained, discouraged borrowers and financial constrained measurements, and that of non-survey data analysis focusing on both the firm level and non-firm level.

The second category we created was that of credit supply measurements and employment, analysing their relationship at economy and firm level. Generally, based on relevant literature, it is showcased that credit rationing, and credit supply fluctuations may hamper employment at a national level as well as at a firm level, affecting both large and small firms. The third and final category we created was that of financial health measurements (through balance sheet indicators) and employment where the relevant literature emphasizes on leverage and debt ratios that have been shown to have a negative impact on employment, while profitability, liquidity and cash flows a positive one.

Albeit there are a vast number of papers regarding credit rationing and employment, the existing literature comes with its limitations and omissions. First, in credit supply literature where banks are divided into weak and strong through a variety of methodologies and data. It is important to consider and account for the possibility that healthy banks may

have collaborated with financially stronger firms relative to the weak ones. Failing to control for such characteristics may bias the estimation (Bentolila et al., 2018). Second, mostly evident in financial health measurements and credit rationing literature, is the issue of endogeneity. Variables measuring financial health like leverage and profitability are also correlated with firm's demand for labour. Likewise, financial availability and financial constraints measurements are correlated with demand for firm's final product or service which in turn also influences its demand for labour (Benmelech et al., 2011). Third, a common characteristic in almost all studies researched, is the fact that there are no dynamic analysis models on the relationship of credit rationing and employment through time.

The implications of the findings are indeed interesting as they highlight the information inadequacies between enterprises and banks. Having established the importance of credit rationing in hampering employment, policymakers need to take measures in order to counter this problem, especially for the SMEs which are under a disadvantage relative to larger enterprises. Policymakers can employ a range of strategies to mitigate these issues, including enhancing information exchange among participants in the credit sector and expanding loan guarantee schemes. Policymakers must prioritise the development of policies that facilitate enterprises' access to financing, as it is crucial for their success.

Especially for the case of SMEs, policy measures need to broaden the diversity of financing for SMEs by using also other forms of capital such as equity capital and encourage the use of innovative financial technologies (fintech). Usage of other forms of financing should help mitigate the over reliance on bank financing. Coupled with financial education initiatives, that will enhance the knowledge of firm owners and decision makers on how to enhance their firm's financial profile and creditworthiness, access to finance of firms can be improved. Furthermore, targeted policies for certain firms like credit guarantee programs for banks to encourage lending in SMEs, tax incentives for businesses that are expanding and interest rate subsidies to lower the cost of bank capital are crucial measures to promote growth within firms. Regarding collaborations, public-private firm partnerships can help foster a supportive environment for employment growth through

synergies.   Finally, policy making should emphasize on alleviating the informationally driven adverse effects on the employment decisions of financially constrained firms.

Regarding future study, there are multiple avenues to pursue. From our perspective, what still remains unclear is the specific factors that cause employment growth to be affected by credit rationing and especially the special case of discouraged borrowers. What requires examination is the modelling of the process that enterprises undergo in employment decisions within a context of self-rationed borrowers, using a formal economic model. It may be necessary for such a model to incorporate behavioural components in order to accurately reflect the firms' perception of prospective employment change.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

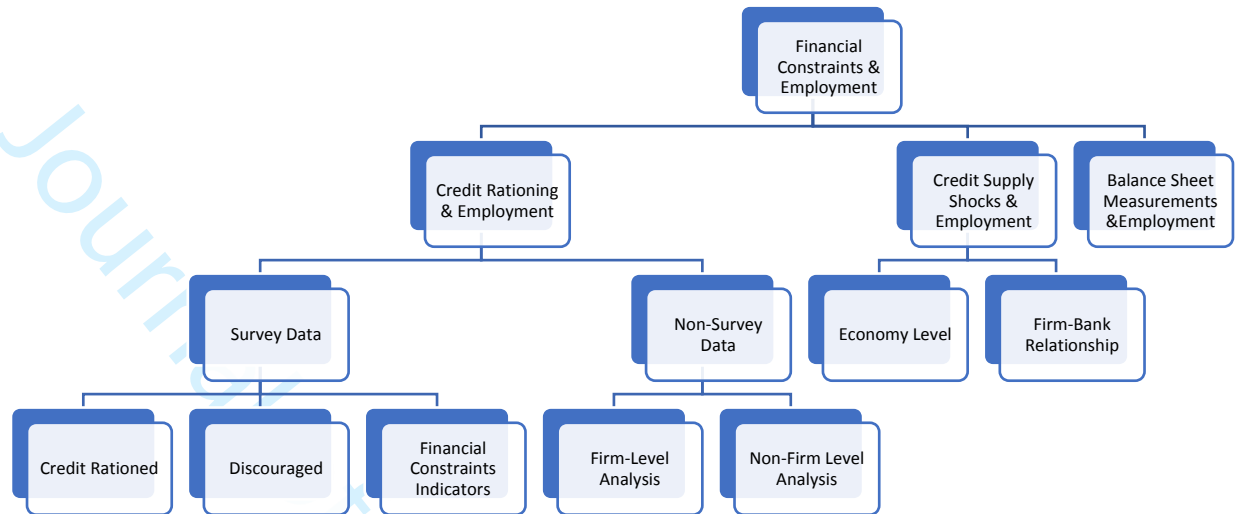Diagram 1: Financial Constraints & Employment Categories

Table 1. Credit Rationing and Employment on Survey Data

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Caggesse & Cunat (2008)	FINANCING CONSTRAINTS AND FIXED-TERM EMPLOYMENT CONTRACTS	Italy	1995-2000	Mediocredito Centrale Surveys	18783 Observations	Credit Constrained	Fixed Time Workers/Permanent Fixed Time Workers/ Total Employment
Campello et al. (2010)	The real effects of financial constraints: Evidence from a financial crisis	36 countries (Asia, Europe, US)	2007-2008	Self employed Survey	1050 CFOs	Financial Constraints (Not Affected/Somewhat Affected/Affected)	Employment Change
Ferrando & Mulier (2015)	The real effects of credit constraints: evidence from discouraged borrowers in the euro area	Europe	2010-2014	SAFE & Financial Statements	7739 Observations	Discouraged	Future Employment Growth A Period Ahead
Gerlach et al. (2015)	Do Credit Constraints Affect SME Investment and Employment?	Ireland	2012-2013	SME Credit Demand Survey	2565 Firms	Credit Constrained Discouraged	Number of Employees
Gomez (2019)	Credit Constraints, firm investment and Employment: Evidence from Survey Data	Europe	2014-2017	Survey on the Access to Finance of Enterprises	10774 Firms	Credit constrained (not Only on bank financing)	Employment Increase/ Decrease
Cao & Leung (2020)	Credit Constraints and Productivity of SMEs	Canada	2009-2013	Survey on Financing And Growth of Small And Medium Enterprises	6459 Observations	Probability of Financial Constraints Based on Internal Evaluation Model	Employment Change

Table 2. Credit Rationing and Employment on Non-Survey Data

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Dromel et al. (2010)	Credit Constraints and the persistence of Employment	20 OECD Countries	1982-2003	Self created panel	20 OECD Countries	Credit Rationing (share of private credit by deposit money banks/ GDP)	Unemployment Rate
Benmelech et al. (2011)	Financing Labor	US	1970-2009	Compustat	51609 Firms	Long Term Debt that Matures Soon	Employment Change
Pagano & Pica (2012)	Finance and Employment	United Nations	1970-2003	UNIDO	5297 Observations	External financial Dependence of Industry and Country	Employment Change
Berg (2018)	Got rejected? Real effects of not getting a loan	Germany	2009-2012	German Bank Bureau van Dijk	16855 Loan Applications	Bank Evaluation of Firm's Profile	Employment Change
Siemer (2019)	Employment Effects of Financial Constraints During the Great Recession	US	2007-2009	Bureau of Labour Statistics Compustat	7+ Million Observations	External Financial Dependence Per Sector, Size and Age	Employment Change

1
2
3
4
5
6
7

Table 3. Credit Supply Shocks and Employment – Economy Level Analysis

8
9

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Benmelech et al. (2011)	Financing Labor	US	1970-2009	Compustat	51609 Firms	Japanese Real Estate Index for Firms that Borrowed Money from Japanese Banks in US	Employment Change
Giroud & Mueller (2015)	FIRM LEVERAGE AND UNEMPLOYMENT DURING THE GREAT RECESSION	US	2007-2009	Longitudinal Business Database Compustat	327500 Establishments	Change in Real Estate Prices in 2006 & 2009	Employment Change in 2006 & 2009
Hochfeller et al. (2015)	Winners and Losers of Financial Crises: Evidence from Individuals and Firms	Germany	1997-2010	Bankscope	14994 Establishments	Affected Federal States by Landesbank's Trading Losses in US Securities	Employment Change
Greenstone et al. (2020)	DO CREDIT MARKET SHOCKS AFFECT THE REAL ECONOMY? QUASI-EXPERIMENTAL EVIDENCE FROM THE GREAT RECESSION AND 'NORMAL' ECONOMIC TIMES	US	2007-2010	NETS Database	43540 Observations	Cumulative Effect of 2008 & 2009 Supply Shocks	New Employment Created - Terminated Employment
Gutierez et al. (2021)	Do Credit Supply Shocks Affect Employment in Middle-Income Countries?	Mexico	2010-2016	Mexican Central Bank	461 Labour Markets	Credit Supply Shock in Each Labour Market	Employment Change In Each Labour Market

10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

Table 4. Credit Supply Shocks and Employment – Bank & Firm Relationship Analysis

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Chodorow (2014)	The employment effects of credit market Disruptions: Firm-level evidence from The 2008-2009 Financial Crisis	Global	2008-2009	Dealscan Bankscope	2050 Observations	Syndicated Loans Change By Firms During the Crisis	Employment Change
Popov & Rocholl (2015)	Financing constraints, employment and labour compensation: evidence from The subprime mortgage crisis	Germany	2005-2012	Dafne Database	64745 firms	Banks Affected by US Morgage Crisis Vs Not Affected	Employmet Change
Acharya et al. (2018)	Real effects of the Sovereign Debt Crisis In Europe: Evidence from Syndicated Loans	Europe	2006-2012	Dealscan Amadeus	3781 Firms	Dependence in GIIPS Banks	Employment Change
Bentolila et al. (2018)	When Credit Dries Up: Job Losses in Great Recession	Spain	2006-2010	Bank of Spain	149458 Firms	Firms with Relation to Spanish Weak Banks vs No Nelation	Change in Average Level of Employment per Year
Farinha et al. (2021)	REAL EFFECTS OF IMPERFECT BANK-FIRM MATCHING	Portugal	2006-2016	Central Bank of Portugal	512446 Firms	Outstanding Credit from EBA Banks Relative to All Banks Bank & Firm Matching	Employment Change

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47

Table 5. Financial Health Measurements and Employment

Authors	Title	Country(ies)	Years	Data Sources	Sample	Independent Variable	Dependent Variable
Hernando & Carrascal (2008)	The Impact of Financial Variables on Firm's Real Decisions: Evidence from Spanish Firm-level Data	Spain	1985-2001	Bank of Spain	70625 Observations	Total Debt Burden (Short-Term Debts + Interests) Profitability	Average Company Employment in the Year
Spaliara (2009)	Do Financial Factors Affect the Capital-Labour Ratio? Evidence from UK Firm-Level Data	UK	1994-2004	FAME & STAN Database	14700 Firms	Collateral Leverage Cash Flow	Capital-Labour Ratio
Benmelech et al. (2011)	Financing Labor	US	1970-2009	Compustat	51609 Firms	Leverage Profitability Liquidity	Employment Change
Duygan et al. (2015)	Financing Constraints and unemployment: Evidence from the Great Recession	US	2007-2009	Compustat Survey of Small Business Finance	US working Force	Capital Expenditures Financed By External Funds (Firm Level)	US citizens (Work Or Not)
Giroud & Mueller (2015)	FIRM LEVERAGE AND UNEMPLOYMENT DURING THE GREAT RECESSION	US	2007-2009	Compustat	327500 Establishments	Leverage (Debt/Assets)	Employment Change
Berton et al. (2018)	Banks, Firms, and Jobs	Italy	2008-2012	PLANET, ASIA Bank of Italy	200000 Firms	Change in Total Loans	Employment Change

References

Acharya, V. V., Eisert, T., Eufinger, C., & Hirsch, C. (2018). Real effects of the sovereign debt crisis in Europe: Evidence from syndicated loans. *The Review of Financial Studies*, *31*(8), 2855-2896.

Akinkoye, E. Y., Sanusi, K. A., & Moses, P. O. (2015). Dynamic interaction between inflation and credit rationing: the case of Nigeria. *International Journal of Business and Economic Development (IJBED)*, *3*(2).

Anastasiou, D., Kallandranis, C., and Drakos, K. (2022). Borrower Discouragement Prevalence for Eurozone SMEs: Investigating the Impact of Economic Sentiment, *Journal of Economic Behavior and Organization*, Vol. 194, pp. 161-171.

Arkolakis, C. (2010). Market penetration costs and the new consumers margin in international trade. *Journal of political economy*, *118*(6), 1151-1199.

Beck, T., Demirgüç-Kunt, A., & Maksimovic, V. (2008). Financing patterns around the world: Are small firms different?. *Journal of financial economics*, *89*(3), 467-487.

Bencivenga, V. R., & Smith, B. D. (1993). Some consequences of credit rationing in an endogenous growth model. *Journal of economic Dynamics and Control*, *17*(1-2), 97-122.

Benmelech, E., Bergman, N. K., & Seru, A. (2011). *Financing labor* (No. w17144). National Bureau of Economic Research.

Bentolila, S., Jansen, M., & Jiménez, G. (2018). When credit dries up: Job losses in the great recession. *Journal of the European Economic Association*, *16*(3), 650-695.

Bernanke, B., and Gertler, M., (1990). "Financial Fragility and Economic Performance", *Quarterly Journal of Economics*, 105, 97-114.

Berg, T. (2018). Got rejected? Real effects of not getting a loan. *The Review of Financial Studies*, *31*(12), 4912-4957.

Berton, F., Mocetti, S., Presbitero, A. F., & Richiardi, M. (2018). Banks, firms, and jobs. *The Review of Financial Studies*, *31*(6), 2113-2156.

Blinder, A. S., & Stiglitz, J. E. (1983). Money, credit constraints, and economic activity.

Caggese, A., & Cuñat, V. (2008). Financing constraints and fixed-term employment contracts. *The Economic Journal*, *118*(533), 2013-2046.

Campello, M., Graham, J. R., & Harvey, C. R. (2010). The real effects of financial constraints: Evidence from a financial crisis. *Journal of financial Economics*, *97*(3), 470-487.

Cao, S., & Leung, D. (2020). Credit constraints and productivity of SMEs: Evidence from Canada. *Economic Modelling*, *88*, 163-180.

Carpenter, R. E., and Rondi, L. (2000). Italian corporate governance, investment, and finance. *Empirica*, 27(4), 365-388.

Chakravarty, S., Yilmazer, T., (2009). A multistage model of loans and the role of relationships. *Financial Management*, 38 (4), pp.781–816.

Cheng, D., Tan, Y., & Yu, J. (2021). Credit rationing and firm exports: Microeconomic evidence from small and medium-sized enterprises in China. *The World Economy*, *44*(1), 286-311. #

Chodorow-Reich, G. (2014). The employment effects of credit market disruptions: Firm-level evidence from the 2008–9 financial crisis. *The Quarterly Journal of Economics*, *129*(1), 1-59.

Drakos, K., and Kallandranis, C. (2005a). Firm-specific Attributes of Financing Constraints: The Case of Greek Listed Firms, *Journal of Investment Management and Financial Innovations* vol (2), pp: 98-110.

Drakos, K., and Kallandranis, C. (2005b). Investment and Cash Flow: Evidence from Greek Listed Companies, *Applied Economics Quarterly*, 51/4.

Drakos, K., and Kallandranis, C. (2006). Modelling Labour Demand Dynamics: Going Beyond the Frictionless Environment, *Labour: Review of Labour Economics and Industrial Relations,* Vol. 20 (4) pp. 699-720.

Dromel, N. L., Kolakez, E., & Lehmann, E. (2010). Credit constraints and the persistence of unemployment. *Labour Economics*, *17*(5), 823-834.

Duygan-Bump, B., Levkov, A., & Montoriol-Garriga, J. (2015). Financing constraints and unemployment: Evidence from the Great Recession. *Journal of Monetary Economics*, *75*, 89-105.

Farinha, L., Kokas, S., Tsoukas, S., & Sette, E. (2021). Real effects of imperfect bank-firm matching.

Ferrando, A., & Mulier, K. (2015). The real effects of credit constraints: evidence from discouraged borrowers in the euro area.

Ferrando, A., Popov, A., & Udell, G. F. (2019). Do SMEs benefit from unconventional monetary policy and how? Microevidence from the Eurozone. *Journal of Money, Credit and Banking*, *51*(4), 895-928.

Freel, M., Carter, S., Tagg, S., and Mason, C. (2012) The latent demand for bank debt: Characterizing discouraged borrowers. *Small Business Economics*, 38, 399-418.

Gao, Q., Gu, J., & Hernandez-Verme, P. (2012). A semiparametric time trend varying coefficients model: with an application to evaluate credit rationing in US credit market. Annals of Economics and Finance, 13(1), 189-210.

Gerlach-Kristen, P., O'Connell, B., & O'Toole, C. (2015). Do credit constraints affect SME investment and employment?. *The Economic and Social Review*, *46*(1, Spring), 51-86.

Gertler, M., (1992). "Financial Capacity and Output Fluctuations in an Economy with Multiperiod Financial Relationships", *Review of Economic Studies*, 59, 455 - 472.

Giroud, X., & Mueller, H. M. (2015). *Firm leverage and unemployment during the great recession* (No. w21076). National Bureau of Economic Research.

Gómez, M. G. P. (2019). Credit constraints, firm investment and employment: Evidence from survey data. *Journal of Banking & Finance*, *99*, 121-141.

Greenstone, M., Mas, A., & Nguyen, H. L. (2020). Do credit market shocks affect the real economy? Quasi-experimental evidence from the great recession and "normal" economic times. *American Economic Journal: Economic Policy*, *12*(1), 200-225.

Greenwald, B., Stiglitz, J., and A. Weiss, (1984). "Information Imperfections and Macroeconomic Fluctuations", *American Economic Review*, 74, 194-199.

Greenwald, B. C., & Stiglitz, J. E. (1986). Externalities in economies with imperfect information and incomplete markets. *The quarterly journal of economics*, *101*(2), 229-264.

Gutierrez, E., Jaume, D., & Tobal, M. (2021). Do Credit Supply Shocks Affect Employment in Middle-Income Countries?. *Documentos de Trabajo del CEDLAS*.

Hall, R. E., & Jorgenson, D. W. (1967). Tax policy and investment behavior. *The American economic review*, *57*(3), 391-414.

Hamermesh, D. S., & Pfann, G. A. (1996). Adjustment costs in factor demand. *Journal of Economic literature*, *34*(3), 1264-1292.

Hernando, I., & Martínez-Carrascal, C. (2008). The impact of financial variables on firms' real decisions: evidence from Spanish firm-level data. *Journal of Macroeconomics*, *30*(1), 543-561.

Hochfellner, D., Montes, J., Schmalz, M., & Sosyura, D. (2015). Winners and losers of financial crises: Evidence from individuals and firms. *University of Michigan: Working Paper*.

Hubbard, G., (1998). Capital Market Imperfections and Investment, *Journal of Economic Literature*, 36(1), 193-225.

Jaffee, D., & Stiglitz, J. (1990). Credit rationing. *Handbook of monetary economics*, *2*, 837-888.

Jappelli, T. (1990). Who is credit constrained in the US economy?. *The Quarterly Journal of Economics*, *105*(1), 219-234.

Jorgenson, D. W. (1963). Capital theory and investment behavior. *The American economic review*, *53*(2), 247-259.

Kallandranis, C., (2019). Non-Linear Response of Firm Investment to q: Evidence from Greek Listed Firms, *Journal of Risk Governance and Control: Financial Markets & Institutions*, 9(1), pp. 53-63. http://doi.org/10.22495/rgcv9i1p5

Kallandranis, C., Kalantonis, P., and Aljandali, A. (2020). Corporate Fixed Investment and Internal Liquidity: Evidence from Greek Listed Companies, *Corporate Governance and Sustainability Review*, 4(2), pp. 68-76. http://doi.org/10.22495/cgsrv4i2p

Kallandranis, C., Anastasiou, D., and Drakos, K. (2023). Credit Rationing Prevalence for Eurozone Firms, *Journal of Business Research*, Vol. 158, 113640.

Kleemann, M., & Wiegand, M. (2013). The causal effect of restrictive bank lending on employment growth: A matching approach.

Kiyotaki, N., Moore, G., (1997). "Credit Cycles", Journal of Political Economy, 105, 211- 248.

Kon, Y., & Storey, D. J. (2003). A theory of discouraged borrowers. *Small Business Economics*, *21*, 37-49.

Levenson, A. and Willard, K., (2000). Do firms get the financing they want? Measuring credit rationing experienced by small business in the US, *Small Business Economics*, 14(2) 83–94.

Liberti, J. M., & Petersen, M. A. (2019). Information: Hard and soft. *Review of Corporate Finance Studies*, *8*(1), 1-41.

Mayers, S. and Majluf, N., (1984). "Corporate Financing and Investment Decisions when Firms have Information that Investors do not have", *Journal of Financial Economics*, 13, 187-221

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review*, *48*(3), 261-297.

Oi, W. Y. (1962). Labor as a quasi-fixed factor. *Journal of political economy*, *70*(6), 538-555.

Oliner, S. D., and Rudebusch, G. D. (1992). Sources of the financing hierarchy for business investment. *The Review of Economics and Statistics, 74*(4)*, 643-654. https://doi.org/10.2307/2109378

Pagano, M., & Pica, G. (2012). Finance and employment. *Economic Policy*, *27*(69), 5-55.

Pietrovito, F., & Pozzolo, A. F. (2021). Credit constraints and exports of SMEs in emerging and developing countries. *Small Business Economics*, *56*, 311-332.

Popov, A., Udell, G., (2010). Cross-border Banking and the International Transmission of Financial Distress during the Crisis of 2007–2008. *European Central Bank, Germany*.

Popov, A. A., & Rocholl, J. (2015). Financing constraints, employment, and labor compensation: evidence from the subprime mortgage crisis.

Santos, A., & Cincera, M. (2022). Determinants of financing constraints. *Small Business Economics*, *58*(3), 1427-1439.

Sharpe, S. A. (1994). Financial market imperfections, firm leverage, and the cyclicality of employment. *The American Economic Review*, *84*(4), 1060-1074.

Siemer, M. (2019). Employment effects of financial constraints during the great recession. *Review of Economics and Statistics*, *101*(1), 16-29.

Spaliara, M. E. (2009). Do financial factors affect the capital–labour ratio? Evidence from UK firm-level data. *Journal of banking & finance*, *33*(10), 1932-1947.

Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American economic review*, *71*(3), 393-410.

Townsend, R., (1979) "Optimal Contracts and Competitive Markets with Costly State Verification", *Journal of Economic Theory*, 21, 265-293.

Tybout, J. R. (1983). Credit rationing and investment behavior in a developing country. *The Review of Economics and Statistics*, 598-607.

Vlassas, I., Kallandranis, C., & Anastasiou, D. (2023). Innovative Activity and Access to Finance of SMEs: Views and Agenda. *Theoretical Economics Letters*, *13*(1), 59-83.

Yu, J., & Fu, J. (2021). Credit rationing, innovation, and productivity: Evidence from small- and medium-sized enterprises in China. *Economic Modelling*, *97*, 220-230.