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# Small business debt financing: the effect of lender structural complexity

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## *Abstract*

**Purpose:** Small- and medium-sized firms (SMEs) depend on large measure on commercial banks for external capital, and U.S. SMEs are increasingly experiencing bank credit constraints and resorting to costly alternatives. The purpose of this paper is to investigate the impact of lender organizational complexity on SME financing shortfalls. In particular, it examines credit shortage effects associated with the SME's reliance on bank holding company (BHC) owned, as opposed to independent, lenders.

**Design/methodology/approach:** Building on agency-theoretic rationales, the authors posit that both hierarchical and horizontal complexity associated with present-day BHC structures will diminish an affiliated bank's ability and willingness to properly underwrite SME credit needs. Consequently, they hypothesize that SMEs whose commercial lenders are BHC affiliates are likely to experience greater credit shortages. This hypothesis was tested using exhaustive financial data from a large and nationally representative sample of U.S. SMEs.

**Findings:** Greater SME reliance on loans from BHC lenders was found to be associated with a greater use of late trade-credit payments. The latter is an expensive form of financing and a generally accepted indicator of shortages in conventional (and cheaper) credit.

**Originality/value:** Despite the evolution toward more complex bank organizational forms, especially among community banks, the implications for SME lending are not yet fully understood. This paper's contribution is to offer a first examination of the impact of post-deregulation BHC structures on SME financing shortfalls.

**Keywords:** SME finance, bank lending, relationship lending, bank holding company, organizational complexity, agency costs, credit constraints.

**Paper Type:** Research paper

## Introduction

Debt finance is the primary source of external capital for U.S. small- and medium-sized enterprises (SMEs), and commercial banks are the primary supplier of such capital (FRB, 2017a; Williams, 2017), even for the smallest SMEs and for start-ups (Robb and Robinson, 2014; Bellavitis et al., 2017). However, due to greater information asymmetry, it is difficult for banks to assess the creditworthiness of these borrowers and, as a result, SMEs often experience difficulties in securing appropriate bank financing (e.g., Levenson and Willard, 2000; Berger and Udell, 2007). To compound the credit woes of U.S. SMEs, bank lending to them has become even more constricted since the 2007-09 financial crisis, as SMEs have lost significant business loan market share (Williams, 2017; Dore and March, 2018)[1]. Consequently, the 2016 *Small Business Credit Survey* by the *Federal Reserve* found credit availability to be the most common financial challenge among U.S. “small employer firms” (defined as firms with at least one non-owner employee, but less than 500), with only 42 percent of these firms having their funding needs fully met (FRB, 2017a) [2]. Financing shortfalls detract from the ability of SMEs to grow and deliver their full potential economic benefits (Carpenter and Petersen, 2002; Mach and Wolken, 2012; Duygan-Bump et al., 2015).

Given the broad economic and societal implications, understanding factors associated with bank credit constraints of SMEs is an important area of research. Prior studies have found SME credit shortages to be related to the strength of firm-bank relationships (e.g., Petersen and Rajan, 1994, 1995; Berger and Udell, 1995; Cole, 1998; Kysucky and Norden, 2016), the informational transparency of the firm (e.g., Petersen and Rajan, 2002; Kirschenmann, 2016), the level of concentration in the local banking market (Petersen and Rajan, 1995; Ryan et al., 2014), the size of the lending institution (Berger et al., 2005, 2017), and other factors such as the owner’s race/ethnicity (Cavalluzzo and Cavalluzzo, 1998; Blanchflower et al., 2003) or the size (Levenson and Willard, 2000; Cenni et al., 2015) or age (Petersen and Rajan, 1994) of the firm. However, apart from bank size, there has been scant attention to the relationship between aspects of lender organizational complexity and credit rationing to SMEs. Both hierarchical complexity, in the form of additional layers of control (Berger and Udell, 2002, 2006; Stein, 2002), and horizontal complexity, arising from a greater number of business units and from diversification into non-banking activities (DeYoung et al., 1999), may affect a bank’s ability to lend to SMEs.

In the U.S. banking context, a conspicuous organizational and legal institution linked to both to greater hierarchical complexity and to services diversification is the *bank holding company* (BHC) arrangement. BHCs are entities that own or have controlling interests in one or more U.S. commercial banks[3]. Moreover, throughout the 1990s, BHCs were progressively allowed to venture outside of commercial banking and, since 1999, well capitalized BHCs are allowed to diversify into securities underwriting and trading, insurance underwriting and agency, real estate investments, and even some non-financial activities related to the above. BHCs have been the predominant organizational arrangement in U.S. banking since the early 1980s, to the detriment of independent banks. The new diversification powers afforded to them in the 1990s resulted in further adoption of this organizational form and in broad expansion of BHCs into nonbank subsidiaries (Cetorelli et al., 2014).

Despite their prevalence among U.S. banks in general, and among small banks in particular, only a handful of studies have explored implications of BHC structures for SME lending: DeYoung et al. (1999) and Craig and Hardee (2001) found that BHC-affiliates, as well as affiliates of more complex BHC structures, invested a lesser share of their assets on SME loans; net of bank size effects. In a subsequent study at the firm level of analysis, Craig and Hardee (2007) found that a greater presence of BHC-affiliated banks in the broad region where the SME is domiciled was associated with a greater probability that the firm would hold external debt, but also with a lesser debt ratio. These findings are suggestive of possible credit rationing to SMEs by BHCs; however, prior studies are limited in that they explored either the supply (bank lending activities) or demand (firm debt) sides of the SME lending relationship, as opposed to using dyadic data that could provide direct evidence of credit constraints[4]. Moreover, some of these studies test the effects of multi-bank structures only (DeYoung et al., 1999; Berger et al., 2005), while single-bank holding companies can also be quite organizationally complex and often play an enlarged role in SME lending. Finally, all prior studies are based on data that precedes the sweeping regulatory changes that increased the powers of BHCs in the late 1990s, and which resulted in widespread diversification by many of these institutions. The ensuing organizational complexity may have further diminished the ability and predisposition of BHC-affiliated banks (large or small) to properly fund the credit needs of SMEs.

The purpose of the present study is to shed further light on the impact of lender organizational complexity on the adequate supply of bank credit to SMEs. In particular, we explore the effect of lender BHC affiliation on SME credit constraints, post-deregulation in the U.S. Drawing on agency-theoretic models of organizational design where investment decisions are made in a context of asymmetric information, we posit that lending under a BHC arrangement diminishes a bank's ability to properly underwrite SME loans –especially larger non-collateralized loans. Additionally, given the regulatory permission and incentives of present-day BHCs to diversify away from traditional intermediation activities, we argue that BHC-affiliated lenders will be less willing to fully underwrite larger SME loans, regardless of the bank's size. Consequently, we hypothesize that lender BHC affiliation will be related to greater SME credit constraints. We test this hypothesis using dyadic data from the last wave of the *Survey of Small Business Finances*, collected by the *Federal Reserve* from a large and nationally representative sample of U.S. SMEs. Consistent with our theoretical arguments, SMEs with greater reliance on BHC lenders are found to suffer greater credit shortages.

The remainder of the paper is organized as follows: Section 2 provides background information on the evolution, powers, and pervasiveness of BHC structures in the U.S. banking system. Section 3 contains a review of the small business lending literature and of relationship-lending theory in particular and, then, explores how the organizational complexity inherent in BHC structures creates or exacerbates disadvantages in the practice of relationship lending; leading to our testable hypothesis. Section 4 describes the data, variables, and the econometric model employed. Section 5 reports the empirical results of our study. The final section concludes with a summary, contributions to the literature, and recommendations for policy and practice, as well as a discussion of limitations of our approach and suggestions for further research.

### **Bank holding companies**

BHCs were regulated in the U.S. in 1956, with the passage the *Bank Holding Company Act*. This law closed prior loopholes that had allowed BHCs to engage in activities forbidden to banks at the time (in particular, interstate banking and diversification into non-banking financial activities), but it also resolved the legal uncertainty that had surrounded these arrangements since the early 20<sup>th</sup> century (Watkins and West, 1982; Omarova and Tahyar, 2011). Subsequently,

during the 1980s and 1990s, the banking industry was deregulated and BHCs formally regained their pre-regulation perquisites. Interstate branching deregulation began in the 1980s and culminated with the passage of the *Riegle-Neal Act* of 1994 which allowed BHCs to acquire banks in any state[5]. Most importantly, since the mid-1980s and especially during the 1990s, federal banking regulators gradually extended the scope of activities permissible to BHCs; culminating in the passage of the *Gramm-Leach-Bliley Act* of 1999 (GLB Act). Between 1984 and 1997, the Federal Reserve's list of nonbanking activities permissible to BHCs grew from 13 to 34 activities, including (among others): (i) owning capital leasing firms, finance companies, mortgage brokers, industrial banks, and savings associations; (ii) participating in other financial services like investment advising, trust services, or securities brokerage; (iii) participating in other services like management consulting; and (iv) even some trading for the bank's own account was allowed –in foreign exchange, precious metals, and derivatives. Subsequently, in 1999, the GLB Act removed all barriers for BHCs across commercial banking, investment banking (that is, securities and derivatives underwriting and trading), insurance underwriting and agency, and real estate investment and development. After the financial crisis of 2007-09, the *Dodd-Frank Act* of 2010 restricted some of the permitted activities[6], but BHCs largely maintained their ability to diversify across a broad array of financial services. Its ample diversification powers remain a key advantage of the modern BHC form.

This regulatory framework facilitated the pervasive diffusion and growth of this organizational form in the U.S., through three distinguishable phases: Until 1965, BHCs were relatively unimportant, predominantly small, and concentrated in Midwest states (Watkins and West, 1982). Between 1965 and 1985 (that is, prior to interstate branching deregulation), BHC adoption occurred very fast, driven by bank mergers and acquisitions within state lines, and by the end of 1985 BHCs controlled 65 percent of all commercial banks. Finally, after 1985, progressive further adoption and growth of the BHC form has been driven by consolidation across state lines, including acquisitions among BHCs, as well as by sprawling diversification into non-banking financial services. Spurred by the new business-line diversification advantages afforded to BHCs, the share of commercial banks organized as a holding company increased to 86 percent by the end of 2018 (*FRB*, 2019). Also, the largest BHCs in particular grew very rapidly in size and scope during this period, morphing into sprawling financial services conglomerates (Avraham et al., 2012; Cetorelli et al., 2014). Although the majority of BHC

assets continue to be related to commercial banking, revenue generation at these institutions has increasingly shifted away from traditional intermediation activities and into securities brokerage and trading, investments, insurance, and other fee-charging services (Avraham et al., 2012; Copeland, 2012).

Due to the pervasiveness of this organization form, the U.S. population of BHCs includes institutions of all sizes, and the vast majority of BHCs are small, community banks[7]. Most importantly, the vast majority of community banks are organized under a BHC[8] and, since 1990, between 20 and 30 percent of new banks opened each year are formed as a BHC from the start[9]. The ubiquity of BHC structures among small community banks is particularly relevant, since these institutions play an outsized (Tikvina, 2016) and critical (Berger et al., 2017) role in lending to SMEs.

## **Theoretical background and hypothesis development**

### *Lending technology and SME finance*

Small business lending theory posits that lending effectively to SMEs requires collecting and acting on *soft* information about the creditworthiness of rather *informationally-opaque* prospects (Petersen and Rajan, 1994, 2002; Berger and Udell, 1995, 2002; Stein, 2002). *Soft* information is used in lieu of verifiable financial records and/or collateralized assets, and refers to private data about firm's finances as well as about the personal background, skills, and character of the firm's owner; and/or about the reputation or other intangible assets of the firm (Berger and Udell, 2002; Liberti and Mian, 2009; Grunert and Norden, 2012). This information has to be collected first-hand by bank officers embedded in the community; through direct and repetitive contact with the firm, its owner/s, and/or others doing business with it, in the course of banking and social relationships. Besides private and difficult to obtain, this information is also "tacit" (Polanyi, 1958), meaning that it is not easily transmitted to, nor verifiable by, others; either within or across organizational boundaries. Therefore, effective use of this essential *soft* information necessitates that underwriting decisions be made locally, by loan officers familiar with the client. This type of SME lending practice is referred to in the literature as "*relationship lending*".

By contrast, other loan underwriting techniques where approval and terms rely primarily on *hard* information are generally characterized as "*transactions-based*" lending (Berger and

Udell, 2002, 2006). Such *hard* information is typically obtained at the time of origination and it may include: (i) audited financial statements, (ii) verified value of assets that can be pledged as collateral, (iii) publicly available information about credit and payment history (in particular, small business credit scores), or (iv) a combination of the above. Given this, transaction-based lenders focus on credit to large firms and, until the mid-1990s, their lending to SMEs was rather circumscribed to fixed-asset loans and leasing (for real estate, vehicle, and equipment purchases) and to lines of credit to the larger, older, and relatively safer SMEs (Berger and Udell, 2002, 2006). After the introduction of *small business credit score* (SBCS) tools by credit reporting agencies in the mid-1990s (Berger and Frame, 2007), and thanks to new automated underwriting and monitoring models based on these tools, transaction-based lenders also moved very aggressively into very small non-collateralized credit lines and into business credit cards, and quickly dominated the SME micro-loan market.

In sum, extant small business lending theory and findings suggest that both relationship- and transactions-based lending approaches may be effective credit provision technologies to properly fund purchases/leasing of long-term fixed assets and for small revolving credit to SMEs. Other essential funding needs of the SME (in particular, larger credit lines without fixed asset collateral that provide vital working capital for operations and growth) are unlikely to be well served by transactional lenders and will rather depend on relationship lenders operating in the local banking market.

The cumulative empirical evidence supports the notion that relationship lending is a superior technology in the context of SME finance. Studies have found that stronger bank-firm relationships are related to adequate levels of credit to the SME (e.g., Petersen and Rajan, 1994, 1995; Uzzi and Gillespie, 2002; Cenni et al., 2015; Kirschenmann, 2016); and to lower interest rates or other favorable loan terms (e.g., Petersen and Rajan, 1994, 2002; Berger and Udell, 1995; Agarwal and Hauswald, 2010; Bharath et al., 2011; Grunert and Norden, 2012; Neuberger and R athke-D oppner, 2015; Kysucky and Norden, 2016).

### *Lending technology and lender organization design*

Since relationship-based lending relies on difficult to transmit and non-externally-verifiable creditworthiness information, established theory postulates that this lending technology calls for delegation of loan underwriting decisions to local officers in direct contact

with SME applicants (Stein, 2002), as well as for flatter bank structures with fewer layers of management (Berger and Udell, 2002; Liberti and Mian, 2009). Delegation of authority over loan decisions is seen as instrumental to providing *ex-ante* incentives for the loan officer to invest in collecting soft information (Stein, 2002; Berger et al., 2005). In turn, fewer layers of managerial control alleviate *ex-post* moral hazard problems arising from lending on the basis of non-verifiable information (Radner, 1993; Berger and Udell, 1995). Extending this rationale beyond management, relationship lending should also favour closely-held banks, with no public equity or debt, as the latter would create an additional layer of moral hazard problems between bank management and the external shareholders/creditors (Berger and Udell, 2002, 2006).

The above premises led authors to hypothesize that small banks, which tend to have less hierarchical structures and to be closely-held, will have a comparative advantage in the practice of relationship lending; while large banks will be better suited to supplying funds using more standardized, transactions-based approaches (Berger and Udell, 2002; Stein, 2002)[10]. Consistent with these hypotheses, prior studies have found bank size to be negatively related to the ability to offer relationship loans and positively related to credit constraints of SMEs (Berger et al., 2001, 2005, 2017; Cole et al., 2004; Craig and Hardee, 2007; Berger and Black, 2011), as well as to greater reliance on formal, numerical-based criteria for loan approval (Frame et al., 2001; Cole et al., 2004). Given their advantages in acquiring and processing private borrower information, prior research has also found that small, local banks devote a greater share of their assets to SME loans (Berger et al., 1998; Peek and Rosengren, 1998; Strahan and Weston, 1998). And, interestingly, after the introduction of SBCS-generated micro-loans, Berger and Black (2011) found that the comparative advantage of small banks in relationship lending was particularly relevant when providing credit to mid-size and larger SMEs.

#### *Lender holding company structure and SME credit constraints*

Apart from bank size, small business lending theory suggests that other sources of organizational complexity may also be related to a bank's ability to offer relationship loans –if they affect either the number of managerial layers or the centralization of credit approval decisions (Stein, 2002). In this vein, prior authors have argued that multi-bank holding companies (M-BHC), in particular, have more complex structures, where loan officer underwriting discretion will either be curtailed or be problematic, thus hampering SME lending

(Craig and Hardee, 2001, 2007). It has also been argued that M-BHCs have access to a wider range of investment opportunities, so that SME lending becomes a lesser priority in their strategies (DeYoung et al., 1999). The limited research on M-BHC effects, however, has produced rather mixed findings: Craig and Hardee (2001) found single-bank holding company (S-BHC) affiliates to exhibit greater proclivity to SME loans than affiliates of M-BHC, net of size effects; but Craig and Hardee (2007) found very similar effects for both types of structures. Two other studies explored only the effects of M-BHCs dummies (thus, failing to discriminate between independent banks and S-BHC affiliates), and found a significant effect in one case (DeYoung et al., 1999) but not in the other (Berger et al., 2005).

In our view, the prior focus on M-BHCs as a proxy for greater lender organizational complexity is problematic, as S-BHCs can be equally complex. Besides sister bank units, there are several other sources of organizational complexity that are likely to stifle the ability of any BHC-affiliate to lend effectively to SMEs. First, by regulation, additional hierarchical complexity is implied in the BHC arrangement compared to an independent bank (see below), which increases the agency costs associated with relationship lending. Second, the BHC regulatory framework allows for and promotes the issuing of equity and/or debt securities by the parent organization, to properly finance the operations and expansion of subsidiaries, regardless of whether the latter include one or more banks. This adds an additional reporting layer (or layers) in BHCs, thus compounding the agency costs of lending on the basis of non-verifiable soft information. Third, both M-BHCs and S-BHCs have the ability to diversify and encompass many non-bank subsidiaries, especially after deregulation, resulting in rather horizontally complex structures. This is likely to result in more indirect forms of hierarchical monitoring of bank subsidiaries by the centre and, thus, greater control loss. Horizontal complexity is also likely to result in lesser ex-ante incentives of loan officers to collect soft information about SME creditworthiness: Corporate access to a wider range of investment opportunities implies that the priorities of the centre may shift away from business loans (or from SME loans in particular) at any time, thus raising uncertainty for bank subsidiary officers about future resources available for loans, which in turn reduces their willingness to invest in the ongoing collection of private information about potential local loan applicants. As a result, we argue that a bank affiliate of a BHC of any type (S-BHC or M-BHC) will have a disadvantage in relationship lending vis-a-vis a similarly-sized independent bank.

To illustrate the impact of BHC affiliation on the ability to underwrite relationship loans, consider the base-line case of a very small and independent, community bank. In this case, agency problems can be fully avoided by the bank president with local market knowledge making or reviewing the bulk of relationship loan decisions herself, and by the bank being closely-held so that there are no public owners or debtors scrutinizing these decisions (Berger and Udell, 2002; Brickley et al., 2003; Berger et al., 2005). Now, if this bank chooses to organize as its own small S-BHC, this will require the creation of an additional layer of officers, as well as the provision of additional capital to fund the operations of the holding company, in a way that is satisfactory to the *Federal Reserve*[11]. Over time, the bank's holding-level officers are unlikely to have the same soft information that the bank president has about her loan applicants. Therefore, continued relationship lending by the small bank will now give rise to moral hazard problems. Additionally, the newly created BHC is likely to seek to comply with financial strength requirements of the regulator by using its new power to access public sources of capital and, thus, by issuing different types of securities at the holding level. The latter will further exacerbate the moral hazard problems associated with lending on the basis of non-verifiable information. Finally, the creation of the holding office, along with the new BHC opportunities to diversify into other financial services, raises the spectre that the bank president may not necessarily receive her expected level of funding in any given period, as the BHC's investment priorities may shift at any time. Given this uncertainty, her ex ante incentives to collect soft information about potential prospects are now weakened (Stein, 2002; Berger et al., 2005). As a result of all these changes, the small BHC-affiliated bank is more likely to shy away from relationship loans in favour of collateralized loans or other loans based on hard information.

The same impediments to relationship lending will arise if the small bank in our example is acquired by an established BHC as opposed to forming its own (except that the acquiring BHC may be more organizationally complex upon affiliation, thus amplifying the immediate impact). Similarly, in the case of mid-size and large banks, the impediments to relationship lending described above will add to other impediments associated with bank size and further raise the costs of relationship lending under BHC membership versus independence. In particular, for the larger banks, BHC affiliation (post-deregulation) will add horizontal complexity and, thus, greater disincentives to invest in ex-ante production of soft information. Therefore, we expect the agency problems associated with relationship lending to increase with BHC affiliation,

irrespective of bank size, so that affiliated institutions will exhibit a comparatively greater focus on transaction-based lending. As a result, BHC affiliation will curtail the ability to underwrite the most difficult SME loans (that is, larger non-collateralized loans), which in turn is likely to lead to greater credit shortages to SME borrowers by affiliated banks.

Besides their lesser ability to underwrite relationship loans, BHCs are also likely to have a lesser strategic focus on lending activities, in general, and on difficult SME loans in particular, than independent commercial banks. As discussed above, one key advantage of BHC status after deregulation is the possibility to diversify into nonbanking activities; and, due to historically very low interest rates in the U.S. since the mid-1990s, these activities often provide greater returns than traditional intermediation. As a result, since enactment of the GLB Act of 1999, BHCs' investment into non-interest earning businesses has grown faster than their further investment in commercial banking, including acquisitions (Cetorelli et al., 2012). As investment in business loans competes unfavourably with other options in the BHC portfolio, we expect BHC-affiliated banks to be less likely to fund larger balances in inherently risky SME loans than similarly sized independent banks.

In conclusion, given (i) the hierarchical and horizontal complexity associated with BHC structures which impede the practice of relationship lending, as well as (ii) the incentives of post-deregulation BHCs to prioritize investment into other financial services, we expect BHC-affiliates to be less likely than independent banks to offer sufficient credit to their SME borrowers, regardless of bank size. Therefore, we hypothesize that:

*SMEs that rely more heavily on BHC-affiliated lenders will suffer greater credit shortages.*

## **Method**

### *Data*

We tested our hypothesis using the latest available *Survey of Small Business Finances* (SSBF) data. The SSBF was a large data collection program sponsored by the *Federal Reserve Board*, which focused on the financial structure and use of bank credit and other financial services by representative samples of the U.S. population of SMEs. Survey efforts were conducted four times, in 1987, 1993, 1998 and 2003, before the program was discontinued. Despite its interruption, SSBF remains one of the most comprehensive and rich sources of data

on U.S. SME finance and loan activity and, as such, continues to be a key resource for research on SME lending (see, for example, Berger et al., 2014; Cole and Sokolyk, 2016; Han et al., 2017). For our purpose, the 2003 SSBF provides a unique opportunity to investigate SME credit shortage effects of post-deregulation BHCs, separate from the confounding effects associated with the 2007-2009 financial crisis and the subsequent period of constrained SME lending to date[12].

The sampling frame for the 2003 edition of the SSBF was the approximately 6.3 million firms listed in the Dun's Market Identifier (DMI) file as of May 2004 which met the target population definition of private, nonfinancial, nonfarm, small employer firms (defined as firms below 500 employees). The survey was conducted on a stratified random sample by census region, urban versus rural locations, and firm employment size categories. Data was collected between June 2004 and January 2005, with the reference date for income statement and balance sheet variables ranging from July 2003 to June 2004. Response rate was about 32 percent, resulting in 4,240 firm observations. To ensure the quality and interpretability of financial controls used in our regression equations, we screened for firms with positive sales and assets, and eliminated a few observations where profits were reported greater than sales. This resulted in a sample of 4,056 firms used for the present study. These firms are small by several standards; for instance, the average asset size is around half a million dollars and the average number of employees is around nine. Table 1 provides descriptive statistics.

[Insert Table 1 about here]

### *Variables*

For our dependent variable, we sought an appropriate measure of SME credit availability versus credit shortages. Following prior studies, we used the percent of trade credit that is paid late by the SME as a good indicator of its relative credit constraints (e.g., Petersen and Rajan, 1994, 1995; Berger et al., 2005). Trade credit arises when suppliers allow payment of the bill after receipt of the goods (often 30 to 90 days past the time of delivery). Suppliers typically offer discounts for advanced payment, and/or charge interest or penalties for late payment of account balances due. As a result, paying trade credit late is a very expensive form of short-term finance[13]. It also has reputational costs for the firm. Therefore, firms resort to late trade credit

payments when cheaper alternative sources of financing are unavailable or have been extinguished (McGuinness and Hogan, 2016; Ryan et al., 2014) and, everything else equal, more credit constrained firms will pay a higher fraction of their trade credit late (Petersen and Rajan, 1994). Respondents to the 2003 SSBF rely significantly on trade credit: 62 percent of the SMEs in our sample reported using trade credit in the prior year, and they made 64 percent of their purchases on credit, on average. Of these firms, 41 percent (that is, 25 percent of our overall sample) reported making at least some of their payments after the bill was due, and on average made late payments on 31 percent of their trade credit balances.

In turn, our independent variable of interest was defined as the reliance on finance from BHC-affiliated lenders, measured as the percent of all outstanding commercial loan balances that was due to institutions affiliated to a bank holding company, as opposed to independent lenders. See Table 2 for further details on the operationalization of the above and other study variables.

[Insert Table 2 about here]

### *Analysis*

To properly estimate the BHC-lender(s) effect, we controlled for other factors that may also contribute to SME's credit constraints, or to late trade credit payments in particular. Drawing from prior studies, our regression model includes proxies for the owner's and firm's credit risk (Cenni et al., 2015; Kirschenmann, 2016), for the informational transparency of the business –defined as the availability of *hard* information that may be used to receive transactions-based loans (Petersen and Rajan, 1994, 2002; Berger et al., 2005), and for the strength of relationships with lenders, which proxies for access to relationship loans (Petersen and Rajan, 1994, 1995, 2002). We also added controls for the firm's industry, for firm characteristics that prior studies found to be related to credit constraints (in particular, age, size, growth, profitability, and financial leverage), and for the competitive characteristics of the local banking market (Petersen and Rajan, 1995, 2002; Berger et al., 2005; Cenni et al., 2015)[14].

The control model was fitted first (Model 1); followed by estimation of the full model that includes the BHC- lending term of interest (Model 2). Parameters were estimated using Tobit regression, adjusted for the strata and sampling weights of the survey. Since the credit constraints proxy was expressed as a percentage, both low and high-boundary values of the

underlying dependent variable of interest might be censored (for example, even if a firm exhibits extraordinarily high levels of credit constraints, its percent credit paid late cannot be more than 100 percent). Thus, to properly account for the full underlying distribution of credit constraints, we modelled using two-sided Tobit censored regression (Maddala, 1999).

Our estimates also account for additional variation caused by imputation of missing values. Prior to the 2003 edition, SSBF survey files were released as complete data sets where all missing values (about two percent) had been imputed by the *Federal Reserve* using randomized regressions of each variable as a function of other survey variables. This practice was regarded as problematic by some authors and cited as a detriment to the use of SSBF data (e.g., Cox et al., 2000). In response, the 2003 SSBF release contains five separate versions of fully imputed data, referred to as “implicates” (that is, five separate versions of the database with slightly different estimated values for the missing data). We ran and then combined estimates from the separate implicates, in order to obtain adjusted estimate standard errors (Rubin, 1996). Table 3 reports multiple-imputation Tobit estimates of the control and full regression models.

[Insert Table 3 about here]

## Results

The first column in Table 3 shows the estimation of the control model (Model 1). In terms of firm characteristics, we find (log of) firm assets to be positively related to the fraction of trade credit paid late (3.12;  $p < 0.01$ ), while sales growth is negatively associated with it (-3.44;  $p < 0.10$ ). The firm size result deserves commentary; as the positive coefficient is consistent with our arguments (and with other recent findings –for example, Berger and Black’s 2011) but it contrasts with findings from studies using older SSBF data. Using 1988 SSBF, Petersen and Rajan (1994, 1995) found firm assets to be negatively related to credit constraints; subsequently, using 1993 SSBF, Berger et al. (2005) failed to find a significant relationship; while, using 2003 SSBF data, we find a positive relationship. The evolution of credit constrained subjects, from smaller SMEs in the late 1980’s to larger SMEs in the mid-2000s, is consistent with the evolution of small business lending in the U.S: The large scale irruption and proliferation of automated small business credit-scored loans for very small credit lines since the mid-1990s appears to have resulted in the smallest SMEs being better credit supplied than in the past. By

contrast, in the lending environment of the early 21<sup>st</sup> century, it is the SMEs in need of larger credit lines that are credit constrained. These firms are likely to be poorly served by transactional-lending banks/BHCs, while relationship-based lenders have become less common and declining in numbers.

Owner and firm credit risk variables are also found to be significantly related to credit constraints, in the expected direction: main owner delinquency increases the firm's credit constraints (33.20;  $p < 0.01$ ), while owner wealth (-2.16;  $p < 0.10$ ) and especially a better firm credit score (-8.05;  $p < 0.01$ ) increase the firm's ability to receive appropriate credit. Finally, among bank-firm relationship variables, and consistent with the prior literature, the coefficient on number of lenders is positive and strongly significant (6.17;  $p < 0.01$ ), suggesting that SMEs that borrow from a larger set of banks are more credit constrained. As the number of lenders increases the relationship with each lender is not as strong, which detracts from the ability of the SME to receive sufficient credit (Petersen and Rajan, 1994, 1995; Cenni et al., 2015). The coefficient on distance to lenders is also positively related to credit constraints (1.87;  $p < 0.05$ ). After the advent of credit-score lending technology and of internet banking, close distance to lenders is a good indicator of access to relationship-based lenders, because those pursuing relationship-based loans will work with local banks (Brevoort et al., 2010). In short, holding creditworthiness constant, we find that SMEs working with fewer and neighbouring lenders are less credit constrained. These results provide strong evidence that those that can gain access to relationship-based loans are more appropriately funded.

The second column of Table 3 shows results for the full regression model (Model 2). As expected, the coefficient on lending from BHC-affiliated banks is positive and strongly significant (0.13,  $p < 0.01$ ), indicating that businesses with greater reliance on BHC-owned lenders are more credit constrained.

## **Discussion and conclusion**

U.S. SMEs rely on commercial banks as the key source of their external financing (FRB 2017a; NSBA 2017), and the vast majority of these institutions today are either the main bank or a secondary affiliate of a BHC. Yet, there has been insufficient research on the implications of the BHC arrangement for the supply of bank credit, in general, and for SME lending in particular. To help fill this gap, this paper offers a first examination of the impact of post-

deregulation BHC structures on financial shortfalls of SMEs. In particular, we investigate credit shortage effects from the SME's reliance on BHC-affiliated lenders. We argue that, due to greater hierarchical as well as horizontal organizational complexity, BHC affiliation will diminish the ability of the lender to practice relationship lending and, thus, to properly underwrite the most difficult credit requests of the SME. Also, as post-deregulation BHCs are both able and prone to shift their focus towards non-interest income generating businesses, we expect that they will be less likely to fully underwrite their SME borrowers' credit needs. Consistent with these arguments, results with a large and representative sample of the U.S. population of SMEs indicate that firms which rely more heavily on BHC-affiliated lenders also resort in greater measure to late trade-credit payments. The latter is an expensive form of financing, and a generally accepted indicator of shortages in conventional (and cheaper) credit from financial institutions.

Our research makes several contributions to the literature. First, our theoretical development combines the precepts of alternative agency-theoretic models of organizational design under *soft* versus *hard* investment information, which postulate that either hierarchical monitoring (Berger and Udell, 2002, 2006) or agent's lack of control over resources (Stein, 2002; Berger et al., 2005) create disadvantages when information about investment prospects is *soft* in nature. We integrate both of these moral hazard and control-rights rationales, and apply them to the institutional context of post-deregulation BHC structures. Second, we add to the few prior theoretical treatments of the impact of bank organizational complexity on SME credit shortages. Our model differs from precedent formulations in several respects; reaching different conclusions on occasion. For example Berger et al. (2005) argue that M-BHC structures improve the conditions for relationship lending, thus benefiting credit to SMEs, while we reach the opposite conclusion. Most significantly, we incorporate considerations of horizontal complexity (via diversification into multiple non-bank subsidiaries), whereby modern S-BHCs structures can be as organizationally complex as M-BHCs. As a result, our guiding logic shifts to a comparison of BHC-affiliated versus independent banks, as opposed to M-BHC-affiliated versus stand-alone banks (S-BHCs or independent) as in prior work. Third, our empirical study complements previous small business lending research which found BHC-affiliates to engage in lesser SME lending (Craig and Hardee, 2001; DeYoung et al., 1999); and that SMEs in areas dominated by BHC-owned lenders tended to have lower debt ratios (Craig and Hardee, 2007).

While these studies were evocative of possible credit rationing to SMEs by BHCs, we provide the first direct confirmatory evidence of such rationing, for post-deregulation lenders. Our main finding indicates that banks within modern BHCs are unlikely to serve the credit needs of SMEs as well as independent banks would. Finally, our work underscores the need for further study of the impact of complex bank structures on lending to SMEs.

The underlying arguments advanced in this paper have important implications for SME lending, which appear to be borne by market developments following the wholesale adoption of BHC structures and the liberalization of their permitted activities in the U.S. For example, our model predicts that small community banks choosing to be organized as a BHC will behave like larger banks by gravitating toward transaction-based loans. Consistent with this prediction, after the boom in BHC adoption in the early 1980s, community banks have progressively shifted their portfolios towards collateralized commercial loans and away from other business loans (FDIC, 2012)[15]. Also consistent with our model, among the community banks most likely to undertake this shift toward fixed-asset lending were those that had issued external debt securities at the holding level (FDIC, 2012). Besides collateralized loans, the use of credit score-generated loans has also become quite widespread among community banks (Berger et al., 2011). Most worryingly, since 2005, the community banks' shift toward transaction-based approaches has been accompanied by a steady and persistent decline in SME lending activities by these vital lenders (Haynes and Williams, 2011; Williams, 2017)[16]. Concurrently, larger banks have also reduced their SME lending year-after-year since the financial crisis; a trend overwhelmingly dominated by the largest institutions which are also the most diversified into the lines of business permitted after 1999 (Avraham et al., 2012; Copeland, 2012)[17]. As a result, SMEs are increasingly reporting credit shortfalls (FRB, 2017a) and resorting to very costly alternative providers, like trade credit or online lenders (Williams, 2017). Aside from other factors that may have contributed to the above trends, our paper suggests that the high prevalence of BHC structures in the banking system has created favourable conditions for the decline in bank credit afflicting U.S. SMEs today.

The policy implication is that the progressive deterioration of SME lending in the U.S. may need to be regarded, at least in part, as an unintended consequence of the regulatory changes of the late 1990's. The aim of the GLB act of 1999, and of the progressive deregulation of permissible activities that preceded it, was to ensure the viability of the commercial banking

industry in the context of transformative innovation in the financial services sector (Omarova and Tahyar, 2011; Cetorelli et al., 2012, 2014). The resultant complexity in U.S. bank structures may well be a necessary element of the industry's adaptation to changes in financial intermediation (Cetorelli et al., 2014). However, findings from the present study add to the limited but mounting evidence that this complexity also carries negative consequences for the essential provision of credit to SMEs. Thus, policies that seek to ameliorate the negative consequences of bank structural complexity would be desirable. Beyond ongoing efforts to recalibrate the regulation of complex banking organizations, as well as the recent ease of Dodd-Frank compliance burdens for small and regional banks, targeted policies that promote and support independent and/or less organizationally complex community banks (or, more specifically, relationship-lending specialists) should also be considered.

In terms of recommendations for practice, our study confirms prior results suggesting that SMEs benefit from working with neighboring lenders and by developing relationships with a small number of lenders. We believe that this is especially important for businesses that may need larger lines of credit (or other larger non-collateralized loans). Additionally, our model and findings suggests that SME owners/managers should favour developing relationships with independent (non-BHC affiliated) lenders or, given the dearth of independent banks in many local markets, with banks that are members of less complex BHCs.

We acknowledge limitations of our study. Regretfully, we were not able to control for bank size in our regression model. While access to this and other data about the lenders in the 2003 SSBF would have been preferred, the *Federal Reserve* regards this information as confidential. Nevertheless, we have little reason to believe that omission of this regressor is introducing undue bias in our BHC-lenders estimate. Bank loans to SMEs are about evenly split between large and community bank providers[18], where the overwhelming majority of both types of banks were organized under a BHC by the time of data collection for the 2003 SSBF[19]. Therefore, the covariance between lender BHC affiliation and bank size should be minimal in our data[20]. The above notwithstanding, future research with greater access to lender data could provide a fuller specification of the credit constraints equation. Our analysis is also limited by not having direct measures of organizational complexity –instead, we assume that BHC affiliates will operate within structures that are more vertically and horizontally complex than those of comparable independent banks. This is a sound assumption, but it makes for a

rather coarse complexity proxy. Future studies with access to bank organizational design data could explore more precise predictions and, thus, offer a tighter test of the relationship between lender organizational complexity and credit constraints to SMEs. For example, researchers could zero in on SMEs working with community bank lenders, in particular, and try to unpack the relative impact on financing shortfalls that is due to lender hierarchical complexity (including external share and/or debt holders) versus that which is due to lender business line diversification, or from the interplay between the two; or from different types of hierarchical or horizontal complexity. We would benefit from a greater understanding of the types of bank organizational complexity that have greater hampering effects on the ability to provide relationship loans, as well as of complexity thresholds where relationship lending stops being practical.

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## Notes

[1] SME loans (defined as non-farm loans of less than \$1 million) suffered a severe correction during the recession and have barely recovered since; on the other hand, loans to large companies (i.e., of \$1 million or more) have been growing fast, post-recession (see Dore and Mach, 2018).

[2] The U.S. Federal Reserve and most of the finance and banking literature refer to firms up to 500 employees as “small businesses”, while the broader management literature rather refers to these firms as SMEs. The vast majority (89%) of US SMEs are microenterprises (i.e., firms with no employees other than the owner, or with less than 5 full- or part-time employees) (FRB, 2017b). Among employer SMEs (i.e., excluding owner-only firms), which are the subject of this study, microenterprises still represent the majority (55%) and only 5 percent of SMEs employ 50 or more workers (FRB, 2017a).

[3] A BHC may also own another BHC, which in turn owns or controls a bank.

[4] To date, the only exception to this comes from a robustness check described in Berger et al.’s (2005) study of bank size effects using the 1993 *Survey of Small Business Finances*. Although regression statistics are not reported, the authors relay that, in an alternative specification, a multi-bank holding company dummy contributed “little additional explanatory power” to their regression of credit constraints (p. 262). Besides other limitations discussed below, this test also focused on the SME’s most recent loan, as opposed to considering the firm’s full portfolio of current bank loans and lenders.

[5] After 1997, banks could also expand across state lines without the need to form a BHC.

[6] Short-term trading on the bank’s own account was prohibited; and investments in private equity firms, hedge funds, venture capital funds and similar vehicles were restricted.

[7] At the end of 2018, out of a total of 3,877 top-tier BHCs only 604 (16% of BHCs) had assets of over \$1 billion (FRB, 2019). Hence, the overwhelming majority of independent BHCs (84%) are small financial institutions, typically including a single local or regional community bank, along with a few non-bank subsidiaries.

[8] By the end of 2012, 79 percent of small banks (< \$1 billion in assets), including 74 percent of very small banks (< \$100 million in assets), were either the main bank or a subsidiary of a BHC (see data from the *Federal Reserve Board* at <https://www.fedpartnership.gov/-/media/bank-life-cycle/charts/bank-ownership-by-bhcs-based-on-assets.pdf>). Over 10% of community banks were subsidiaries of a BHC with a different main bank (FDIC, 2012). As for large banks (>\$1 billion in assets), 89 percent were owned by a BHC.

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[9] For example, see data from the *Federal Reserve Board* at <https://www.fedpartnership.gov/-/media/bank-life-cycle/charts/de-novo-banks-forming-bhcs-at-inception.pdf>

[10] Brickley et al. (2003) also argue that small bank officers tend to have higher levels of stock ownership. This provides both high-powered incentives to exert *ex-ante* effort to collect soft-information, as well as higher *ex-post* trust that relationship loan decisions would have been taken in alignment with shareholder interests.

[11] Capital adequacy guidelines enforced by the Federal Reserve for small BHCs are based on “the principle that bank holding companies should serve as a source of (financial) strength for their subsidiary banks.” (Code of Federal Regulations, Title 12, Part 225, Appendix C; 62 FR 9343).

[12] Besides reduced credit to small firms during any crisis (e.g., Bernanke, Gertler, and Gilchrist, 1996), the 2007-9 period has also been associated with disturbed SME lending behaviour by small banks (Berger et al., 2015), as well as with an altered relation between bank credit and trade credit to SMEs (Psillaki and Eleftheriou, 2015; McGuinness and Hogan, 2016) which would have also biased our dependent variable of choice.

[13] Using 1988 SSBF data, Petersen and Rajan (1994) estimate an implicit annual interest rate of trade credit paid late of 44.6%, including foregone trade discounts.

[14] Ideally we would have liked to control for lender size as well. This variable, however, is not part of the public SSBF files, and it could not be made available to us either. As noted by Craig and Hardee (2007), the richness of detail on SME finances in the SSBF database comes at the cost of less detail on the lender side.

[15] In the period from 1984 to 2011 (that is, in the first three decades after BHCs became pervasive), the share of community banks specializing in commercial real estate (defined as banks with 30% or more of their assets assigned to commercial real estate loans) grew from 2% to 24%. During the same period, the share of community banks specializing in non-real estate business loans declined from 11% to 2% (FDIC, 2012).

[16] SME loans to assets ratios of community banks (defined as commercial banks under \$1 billion in assets) declined year-after-year and were down by around 20 percent overall, between 2005 and 2015 (see, for example, Table 4 in Haynes and Williams, 2011; and Table H in Williams, 2017).

[17] The SME loans to assets ratios of banks with \$50 billion or more in assets have declined by 35%, overall, between 2010 and 2015 (Williams, 2017).

[18] Data from FDIC Statistics on Depository Institutions at the time of the 2003 SSBF (that is, in mid-2004), show that community banks (<\$1B in assets) were responsible for 41% of the outstanding value of SME loans (<\$1M) underwritten by commercial banks, and for 44% of the value of commercial bank micro business loans (<\$100 thousand).

[19] At the end of 2004, 82% of U.S. commercial banks were affiliated with BHCs (FRB, 2005).

[20] As a further check, we collected data on bank size (measured as total assets) and BHC affiliation from the commercial bank *Call Reports* for 2003 and found the correlation between bank size and BHC affiliation to be 0.01.

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**Table 1**  
**Descriptive Statistics**

	<b>Mean</b>	<b>Std. Dev.</b>
Trade credit paid late (%)	7.76	20.68
Lending from BHC-affiliated banks (%)	30.42	43.46
Firm age (years)	14.36	11.05
Firm assets (\$1,000)	568.90	3109.52
Number of employees	8.89	21.62
Sales growth	0.33	0.86
Return over assets	1.18	2.19
Outside debt ratio	0.47	0.77
Local bank concentration (HHI; discrete)	2.42	0.60
Urban market (MSA; yes=1)	0.80	0.40
Owner delinquency (yes=1)	0.07	0.25
Owner wealth (\$1,000)	778.86	1194.72
Dun & Bradstreet credit rating (discrete)	3.62	1.43
Financial records (yes=1)	0.55	0.50
Business credit card (yes=1)	0.49	0.50
Professionally managed (yes=1)	0.06	0.23
Length of longest bank relationship (years)	11.86	10.13
Number of lenders	1.01	1.21
Average distance to lenders (miles)	2.73	2.05

**Table 2**  
**Operationalization of Variables**

Variable	Description
Trade credit paid late (%)	Percentage of the balances on account with suppliers (that is, purchase amounts that were not paid by the time of delivery) that are paid after the bill was due in full.
Lending from BHC-affiliated banks (%)	Outstanding balance of loans from institutions affiliated to BHCs as a percent of the firm's total commercial loans. Includes lines of credit, mortgages, motor vehicle loans, equipment loans, capital leases, and other commercial loans. Excludes loans from friends and family members, as well as loans from partners or stockholders.
Firm characteristics:	
Firm age	Natural log of 1+ age of the firm in years
Firm assets	Natural log of firm's total assets
Sales growth	Categorical variable indicating sales trend over the prior three years. Coded as: -1 = firm's sales declined over the prior three years 0 = firm's sales unchanged over the prior three years 1 = firm's sales increased over the prior three years
Return over assets	Earnings after interest payments but before taxes, over assets. (Winsorized at 5th/95th percentiles to avoid undue influence of outlier observations.)
Outside debt ratio	Total loans and credit card balances outstanding, minus family and owner/partner loans, over assets. (Winsorized at 5th/95th percentiles.)
Local banking market characteristics:	
Bank concentration	2003 commercial bank deposit Herfindahl index of MSA or county where firm is headquartered. Converted to a discrete variable, coded as: 1 = competitive market ( $0 < \text{Herf indahl} < 1000$ ) 2 = moderately concentrated ( $1000 \leq \text{Herf indahl} < 1800$ ) 3 = highly concentrated ( $1800 \leq \text{Herf indahl}$ )
Urban market (dummy)	Equals one if firm is located in a metropolitan statistical area (MSA).
Owner and firm credit risk:	
Owner delinquency (dummy)	Equals one if within the past three years the main owner has been 60 or more days delinquent on three or more personal obligations.
Owner wealth	Natural log(1+wealth of main owner), where wealth is net worth excluding firm value.
Dun & Bradstreet credit rating	Dun & Bradstreet small business credit score expressed as a discrete variable. Coded as: 1=0-10, 2=11-25, 3=26-50, 4=51-75, 5=76-90, 6=91-100. A value of 1 indicates a firm that is a most risky credit; 6 least risky.
Firm informational transparency:	
Financial records (dummy)	Equals one if firm used financial records to respond to questions during the survey interview.
Business credit card (dummy)	Equals one if firm uses business or corporate credit cards for business expenses.
Professionally managed (dummy)	Equals one if the firm is not owner-managed.
Relationship with lenders:	
Length of longest bank relationship	Maximum number of years of banking relationship, across all financial institutions that the firm currently works with.
Number of lenders	Number of different financial institutions with whom the firm holds an outstanding loan balance. Includes lines of credit, mortgages, motor vehicle loans, equipment loans, capital leases, and other commercial loans.
Average distance to lenders	Distances in miles were calculated using the latitude and longitude of the firm headquarters' location and of the branch of the financial institution used by the firm. Distances were then averaged across all firm lenders.

**Table 3**  
**Two-sided Tobit Estimates of Fraction of Trade Credit Paid Late<sup>a</sup>**

	Model 1	Model 2
Firm characteristics:		
Firm age	0.13 (0.17)	0.15 (0.17)
Firm assets	3.12 *** (1.09)	3.43 *** (1.09)
Sales growth	-3.44 * (1.99)	-3.40 * (1.99)
Return over assets	0.03 (0.04)	0.03 (0.05)
Outside debt ratio	-0.46 (0.47)	-0.49 (0.50)
Local banking market characteristics:		
Bank concentration	-3.68 (2.96)	-3.22 (2.97)
Urban market	-7.23 (4.50)	-7.72 * (4.51)
Owner credit risk:		
Owner delinquency	33.20 *** (6.89)	33.78 *** (6.91)
Owner wealth	-2.16 * (1.31)	-2.19 * (1.31)
Firm credit risk:		
<i>Dun &amp; Bradstreet</i> credit rating	-8.05 *** (1.21)	-8.12 *** (1.22)
Firm informational transparency:		
Financial Records	-2.41 (3.29)	-2.14 (3.27)
Business credit card	3.67 (3.45)	4.29 (3.44)
Professionally managed firm	6.80 (5.93)	6.84 (5.96)
Relationship with lenders:		
Length of longest bank relationship	-0.15 (0.19)	-0.16 (0.19)
Number of lenders	6.17 *** (1.30)	5.97 *** (1.33)
Average distance to lenders	1.87 ** (0.85)	1.58 * (0.84)
Lending from BHC-affiliated banks		0.13 *** (0.04)
Observations ( <i>n</i> )	4,056	4,056

<sup>a</sup> Each model also includes intercept and two-digit SIC code industry dummies. Estimation accounts for stratification and sampling weights of the survey data. Multiple imputation parameter estimates reported, with robust standard errors in parentheses.

\*\*\*, \*\*, \* stand for significance levels at 1%, 5%, and 10% respectively.