The non-bank lending channel: an important substitute for SME bank debt

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Abstract

Purpose – Post-global financial crisis (GFC), contraction in bank lending to small and medium-sized enterprises (SMEs) created a market opportunity for non-bank lenders. Despite the consequential global growth of SME non-bank debt, little is known about the characteristics of firms that use non-bank debt. Using a database on access to finance in the post GFC period, this paper identifies the characteristics of SMEs that apply for and use non-bank debt.

Design/methodology/approach – The non-bank debt lending of 1,683 Irish SMEs post GFC is described. A probit model is estimated to characterise firms that obtained non-bank debt using a three-stage modelling procedure, corrected for selection biases based on firm decisions to apply for bank debt and/or alternative finance.

Findings – Non-bank debt is found to be a substitute for bank debt and is used by bank-rejected, bank-discouraged, self-discouraged and very young firms. This suggests some market segmentation with non-bank lending reducing SME funding gaps. Inconsistent with the financial intermediation literature, findings may reflect increased bank regulation and rationalisation.

Practical implications – Non-bank debt is an important source of finance for bank-rejected and discouraged borrowers. Given this structural change in SME lending, it is important to understand the nature of, and any risks associated with, the non-bank debt sector.

Originality/value – This study uniquely considers all sources of non-bank debt. It builds on other studies to consider the impact of both bank and self-discouragement on the use of non-bank debt.

Keywords SME finance, Non-bank debt, Bank credit constrained, Bank-discouragement, Self-discouragement, Funding gaps

Paper type Research paper

1. Introduction

Post-global financial crisis (GFC), SME overdependence on bank finance became a global policy concern (OECD, 2012; OECD, 2020). Increased bank regulation and tighter lending conditions contributed to bank reluctance to lend to small businesses during and after the GFC, (Cowling *et al.*, 2016b; Harrison *et al.*, 2022). Non-bank debt offset the global contraction in SME bank lending and emerged as an important source of SME finance (CBI, 2021; Gopal and Schnabl, 2022). Gopal and Schnabl (2022, p. 35) referring to how US non-bank debt offset the permanent decline in SME bank lending state that it is "*crucial to expand our understanding of nonbanks*". In the US, non-bank lenders increased their share of small business loans from an estimated 50% pre-2008 to nearly 60% by 2016 (Gopal and Schnabl, 2022) and in the UK they provided an estimated 30% of SME finance in 2019 (UK Finance, 2020). The British Business Bank (2024) reports that alternative lenders maintain a strong market position despite Covid-related challenges, serving segments typically underserved by traditional banks. In Ireland,

Data statement: Results are based on analysis of strictly controlled Research Microdata Files provided by the Central Statistics Office (CSO). The CSO does not take any responsibility for the views expressed or the outputs generated from this research.

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non-bank SME lending grew to €4.3 billion (18% of total) by 2020 (CBI, 2021), with 36% of corporate SMEs holding non-bank debt by 2022 (Gaffney and McGeever, 2022) and demand for non-bank SME finance rising from 5% to 9% between 2022–2023 (Department of Finance, 2023). The impact of this structural change to SME lending has received limited examination in the literature to date. This paper aims to address this gap by characterising firms that apply for, and use, all sources of non-bank debt finance.

Non-bank debt is a sub-category within alternative finance, along with informal debt, trade credit, equity, and government assistance (Casey and O'Toole, 2014; Ferrando and Mavrakis, 2017). In this study, non-bank debt finance is defined as external debt finance that is contractually provided by formal institutions other than banks CBI (2021). It is distinct from informal debt, equity, government assistance and trade credit. Non-bank debt includes asset finance (e.g. leasing, hire purchase and factoring), overdrafts, mezzanine debt, term loans, venture debt and peer to peer lending.

Despite the recent growth in SME non-bank debt, no other study, that the authors are aware of, has solely focused on the characteristics of the SME firms that apply for, and use, non-bank debt. Previous studies reviewed SME use of alternative finance instruments which included some non-bank debt instruments, (issued debt, leasing/hire-purchase/factoring and peer to peer finance), along with equity, informal loans and grant finance (Casey and O'Toole, 2014; O'Toole *et al.*, 2015; Ferrando and Mavrakis, 2017). Building on previous studies, this paper uniquely classifies external debt instruments as either bank debt or non-bank debt to allow for a distinct evaluation of the entire SME non-bank debt channel. Focusing on non-bank debt provides a useful contribution given bank lending constraints (Wehinger, 2012; ECB, 2013; Imarhiagbe *et al.*, 2017), the increase in the use of SME alternative finance (Casey and O'Toole, 2014; O'Toole *et al.*, 2015; Moritz *et al.*, 2016; Ferrando and Mavrakis, 2017), SME preference for debt (Myers, 1984; Myers and Majluf, 1984; Mac an Bhaird, 2010) over external equity (Moritz *et al.*, 2016) and the policy focus on reducing SME overdependence on bank debt (OECD, 2012, 2020). It further enlightens the findings of studies focusing on the use of trade credit as an alternative finance instrument for credit constrained SMEs (Casey and O'Toole, 2014; McGuinness and Hogan, 2016). The latter studies largely find that SMEs prefer debt over equity consistent with pecking order theory (Myers, 1984; Myers and Majluf, 1984; Irwin and Scott, 2010; Mac an Bhaird and Lucey, 2010).

To characterise SMEs who use non-bank debt finance, this study uses data from the Central Statistics Office (CSO) Access to Finance Survey 2014 (ATF) of Irish SMEs ($N = 1{,}683$). The Irish case is interesting as Ireland was significantly impacted by the GFC (Beck, 2014; Harrison *et al.*, 2022). Its banking system was highly concentrated (Beck, 2014) and the SME bank rejection rate (2009–2011) was close to double the euro area average (Holton *et al.*, 2014). Outstanding core SME credit (excluding financial intermediation and property related sectors) to the Irish SME sector declined from €33.9 billion in March 2010 to €21.4 billion in 2014, falling to €11.6 billion in December 2023 (CBI, 2024) and from 2011, non-bank lenders had an increasing presence in Ireland (Deloitte, 2016). This suggests a greater role for non-bank debt in SME funding, hastening the need to fully understand its role (CBI, 2021). To understand the role of non-bank debt lending through characterising SMEs who rely on this funding channel, a three-stage modelling procedure is adopted which controls for two sources of selection biases based on the likelihood of firms applying for: (1) bank debt; and (2) non-bank debt finance (Power and Reid, 2005). To correct for selection bias, the inverse mills ratio is calculated, in accordance with Heckman (1979) and included as an additional regressor in binary probit estimates.

This study provides three main contributions to the SME finance literature. Firstly, this study contributes to the literature on the use on alternative finance by SME firms (Casey and O'Toole, 2014; O'Toole *et al.*, 2015; Ferrando and Mavrakis, 2017) by focusing on all sources of non-bank debt, reflecting the growing role of non-bank debt in SME finance. Secondly it contributes to the literature on non-bank debt (Denis and Mihov, 2003; Chernenko *et al.*, 2022) which to date has focused on medium and large firms. Thirdly it considers the influence of

bank and self-discouragement in the substitution to non-bank debt. The remainder of this paper is structured as follows. Section 2 discusses the literature and formulates hypotheses on accessing non-bank debt. Section 3 describes the data, and the methods applied in the analysis. Section 4 outlines the findings. Section 5 discusses the findings, considering the implications for government policy and finally, Section 6 concludes.

2. Literature review

This section reviews key research on SME access to debt finance and more recent studies on the use of alternative finance (trade credit, debt, equity and government assistance) by SME firms (Casey and O'Toole, 2014; O'Toole *et al.*, 2015; Ferrando and Mavrakis, 2017), from which the authors formulate the main hypotheses on the use of non-bank debt by SME firms.

2.1 SME debt finance – demand and supply

On the demand side, SMEs preference for debt is consistent with the financing pattern predicted by the pecking order theory of capital structure (Myers and Majluf, 1984). This theory asserts that information asymmetries drive a wedge between the internal and external costs of capital. Firms make financing choices in a hierarchical fashion, first using internal sources as opposed to external sources due to the relative cost differences (Berger and Udell, 1998; López-Gracia and Sogorb-Mira, 2008; Martinez Cillero *et al.*, 2019). Equity providers demand a higher return to reflect additional uncertainty and risk, therefore issuing equity is relatively more expensive (Baskin, 1989) and inconsistent with the SME preference for control (Berger and Udell, 1998).

On the supply side, imperfections in capital market allocations can constrain access to financial resources (Cowling *et al.*, 2016b; Masiak *et al.*, 2019; Harrison *et al.*, 2022). Models of equilibrium credit rationing (Stiglitz and Weiss, 1981) suggest that small firms' information opacity may make securing external finance particularly challenging (Berger and Udell, 1998). Information asymmetry gives rise to the market imperfections of adverse selection and moral hazard and contributes to agency conflicts and increased monitoring costs (Hyytinen and Väänänen, 2006; Fraser, 2014b; Harrison *et al.*, 2022). Agency conflicts between lenders and borrowers increase transaction costs for smaller firms with limited financial history (Jensen and Meckling, 1976; Berger and Udell, 1998). Banks address information asymmetry through specialised information production by screening, monitoring, and designing contracts (Diamond, 1984, 1991; Fama, 1985; Lehmann and Neuberger, 2001; Berger and Udell, 2006).

2.2 Non-bank debt - a substitute for bank debt

Bank debt and trade credit are well known substitutes (McGuinness and Hogan, 2016), but the relationship between bank and non-bank debt is less clear. Recent studies examining the use of alternative finance all find evidence that credit constrained firms are more likely to use some category of alternative finance (Casey and O'Toole, 2014; O'Toole *et al.*, 2015; Ferrando and Mavrakis, 2017).

Previous studies show that the amount of credit available to SMEs has fallen sharply since the GFC (McGuinness and Hogan, 2016), causing SMEs difficulties in accessing bank credit (Harrison *et al.*, 2022). Empirical studies in the US showed non-bank lenders provided 32% of all large companies loans during 2010–2015 (Chernenko *et al.*, 2019) accommodating the financing needs of firms with lower credit quality (Denis and Mihov, 2003) and where there were supply frictions in credit markets (Chernenko *et al.*, 2022). Similarly, deteriorations in financial markets seem to increase the utilisation of alternative financing instruments by SME firms (Casey and O'Toole, 2014; O'Toole *et al.*, 2015; Moritz *et al.*, 2016; Ferrando and Mavrakis, 2017) who have fewer alternative funding options (Ebben, 2009). O'Toole *et al.* (2015), using the ECB SAFE survey (2010–2013), found asset finance was the dominant alternative funding source, increasing as bank lending tightened. Therefore, this study

examines whether a negative relationship exists between bank debt and non-bank debt usage by testing the following hypothesis.

H1. Non-bank debt is a substitute for bank debt

2.3 Bank credit constrained firms

Casey and O'Toole (2014), using the ECB SAFE survey (2009–2011), test the effects of bank lending constraints on alternative finance usage and find that credit rationed (bank rejected) firms are more likely to use trade credit and informal loans, but not market finance (issued equity or debt). Ferrando and Mavrakis (2017), using the ECB SAFE survey (2009–2014), evaluated the factors impacting the probability of EU firms (SMEs, mid-caps and large enterprises) using specific categories of alternative financing, including trade credit, informal loans, equity, grants, leasing, issued debt and mezzanine. They found that bank constrained (both rejected and discouraged) firms had a higher probability of using alternative finance. Separating credit constrained firms into bank rejected and discouraged firms, Ferrando and Mavrakis (2017) find bank rejected firms revert to trade credit, other loans and leasing but this is not the case for bank-discouraged firms.

Loan rejection rates are higher for smaller firms with shorter banking relationships (Fraser, 2014a). Discouraged borrowers are firms that demand finance, but did not apply as either they feared rejection or the costs were too high (Cowling *et al.*, 2016a). This study further distinguishes between bank-discouraged and self-discouraged firms to capture price-based discouragement. Bank-discouraged borrowers are firms who do not apply for bank finance because either they felt their application would be rejected or they made informal enquiries but did not proceed as the bank seemed reluctant to lend (Fraser, 2014a; Kon and Storey, 2003). Self-discouraged borrowers are firms who do not apply for bank finance because either they felt the cost of credit was too high, the business was unable to repay the debts, or the bank lending terms were too strict. This distinction between bank and self-discouragement is similar to Casey and O'Toole (2014) who distinguish between credit rationed firms that were denied bank finance and self-rationed firms that rejected the bank offer of finance due to the cost being too high. Factors associated with discouragement, such as size, age and risk and the owner's lack of wealth and experience have been identified in the literature (Kon and Storey, 2003; Fraser, 2014a; Ferrando and Mulier, 2022). Discouraged borrowers are smaller, younger, have declining turnover and an increased debt to asset ratio (Mac an Bhaird *et al.*, 2016; Cowling *et al.*, 2016a; Cowling and Sclip, 2022). Levels of borrower discouragement may be greater in times of financial crisis, (Mac an Bhaird *et al.*, 2016; Ferrando *et al.*, 2017; Ferrando and Mulier, 2022) and are associated with information opacity (Cowling *et al.*, 2016a), perceived application costs (Fraser, 2014a), and the screening error of banks (Kon and Storey, 2003). Structural changes to the banking sector, such as bank branch closures (a soft information channel) and a less competitive lending market, also contribute to bank-discouragement (McQuinn, 2019). Recent studies have found that a significant portion of discouraged borrowers would obtain a bank loan if they applied (Ferrando and Mulier, 2022; Wernli and Dietrich, 2022) challenging the assumption that borrower discouragement is efficient.

Building on the Ferrando and Mulier (2017) study, this study examines whether a relationship exists between bank credit constrained firms (rejected and discouraged) and non-bank debt use by testing the following two hypotheses:

H2. Bank rejected borrowers are more likely to use non-bank debt

H3. Discouraged borrowers are more likely to use non-bank debt

2.4 Firm size

Information asymmetry varies with firm characteristics such as size, age, governance and legal form (Mac an Bhaird and Lucey, 2010; Freel *et al.*, 2012). Lenders in an imperfect market use a

range of criteria to bridge the information gap including firm risk level indicators such as firm age and size (Cowling *et al.*, 2016b; Freel *et al.*, 2012). Smaller firms face higher transaction costs as they tend to have less financial history and fewer formal financial tracking processes (Berger and Udell, 1998; Mac an Bhaird and Lucey, 2010; Benkraiem and Gurau, 2013). As the firm grows, it accumulates assets in the form of inventory, accounts receivables and equipment which may be used to collateralise debt (Berger and Udell, 1998).

Increased economic uncertainty leads to a shift towards lending to larger business as lending institutions appear to use firm size as their primary lending criterion, (Cowling *et al.*, 2012). Removal of bank local decision-making structures (Trethowan, 2017), has also led to more mechanistic SME assessments. The latter favour large firms (Lee and Brown, 2017) as SMEs may have difficulty building reputations to overcome informational opacity (Berger and Udell, 1998). Larger firms typically have more diversified access to finance sources (Lawless *et al.*, 2015; Ferrando and Mavrakis, 2017) and are more likely to access non-bank leasing (O'Toole *et al.*, 2015; Ferrando *et al.*, 2017). Therefore, this study examines if firm size influences the decision to use non-bank debt. In this context, the following hypothesis is tested:

H4. Larger SME firms are more likely to use non-bank debt

2.5 Firm age

The SME capital structure evolves over the firm's "financial growth cycle" (Berger and Udell, 1998; Mac an Bhaird and Lucey, 2011; Martinez Cillero *et al.*, 2019). The literature presents contrasting views on firm age and debt usage. On the supply side it is easier for older firms to access external debt due to established credit history and reduced information asymmetry, aligning with the trade-off theory (Berger and Udell, 1998; Lehmann and Neuberger, 2001; Fraser *et al.*, 2015). On the demand side, the literature cites a negative relationship between firm age and debt and argues that younger firms, with fewer resources and collateral, rely more on debt, supporting the pecking order theory (López-Gracia and Sogorb-Mira, 2008; Martinez Cillero *et al.*, 2019; Mac an Bhaird and Lucey, 2010). Older firms are better able to use internal funds or can access external equity financing more readily (López-Gracia and Sogorb-Mira, 2008; Mac an Bhaird and Lucey, 2010). Younger firms are therefore more likely to require external financing, particularly in recessionary periods with tightening cash flows (Cowling *et al.*, 2012).

Recent studies on the use of non-bank finance find that very young firms (<2 years) are more likely to use grant financing (Casey and O'Toole, 2014) and young firms (<5 years) equity financing (O'Toole *et al.*, 2015). Evidence on the use of leasing is mixed. Ferrando and Mavrakis (2017) find very young firms (<2 years) are more likely to use leasing, however O'Toole *et al.* (2015) find that younger firms (<5 years) are less likely to use leasing, hire-purchase and factoring.

Consistent with the pecking order theory it is expected that younger firms with less internal resources will seek to use non-bank debt. Therefore, this study examines whether a relationship exists between firm age and non-bank debt by testing the following hypothesis.

H5. Younger firms are more likely to use non-bank debt

3. Data and methods

3.1 Data

This empirical study uses data on Irish SMEs from the Access to Finance Survey 2014 (ATF) (CSO, 2014). Previous studies used earlier rounds of the ATF (2007 and 2010) [1] survey data to examine Irish SME's credit access (Lawless and McCann, 2011) and demand for finance before and after the GFC (Mac an Bhaird, 2013). It is applied here to understand if post GFC, non-bank debt is assisting with known SME funding gaps. Of the sample frame of 6,000 SME firms, 1,683 responded (27.3% response rate). The survey examined firms demand for bank

finance, equity finance and other finance types including non-bank debt, trade credit and government grants. The survey also captured a range of firm characteristics including firm size, export status, bank rejection and discouragement, the extent of (property) debt overhang and dependence on internal funding sources.

The sample provides a good sectoral and geographic representation of the firm population in Ireland. The construction sector is underrepresented (9.2% vs 19.9% in population) and industry overrepresented (16.3% vs 6.9% in population). Micro firms are underrepresented (53% vs 92% in population) (CSO, 2014).

3.2 Dependent variables

The ATF survey records whether firms sought bank finance, equity finance or other sources of finance, including non-bank debt and records how successful the firms were in obtaining the relevant source of finance, see Table 1 for variable descriptives. From this data three measures were developed: (1) the decision to apply for bank debt (*Apply Bank Debt*$_i$); (2) the decision to apply for other non-bank (non-bank loans, trade credit and grant) finance sources (*Apply Non-Bank Debt*$_i$); and (3) those firms granted non-bank debt finance (Use Non-Bank Debt$_i$) such as leasing, factoring, invoice discounting, mezzanine debt and peer to peer finance. This study classifies firms that use any non-bank debt instrument as using non-bank debt, which differentiates this study from previous studies which examined the use of specific non-bank instruments (e.g. informal debt, equity and government grants). Classifying the use of non-bank debt in this way allows evaluation of the entire non-bank debt channel. These measures are all binary (1/0) in nature and are described in greater detail in Table 1, which describes and includes summary statistics of the variables.

Interestingly, despite the diverse nature of non-bank debt financing instruments, such as asset finance, peer to peer and mezzanine finance, this study found that 90% of firms that used non-bank debt obtained asset finance (e.g. leasing, hire purchase, invoice discounting or factoring). This may be reflective of the immature nature of the Irish and European non-bank debt market in 2014.

3.3 Independent variables

Key independent variables include use bank debt, bank rejection, bank-discouragement, self-discouragement, firm size and age. Control variables include sector, debt burden, availability of internal funding, firms located in Dublin and export status. Each of the variables are described in turn below.

Use Bank Debt: The survey captures if firms were successful in applying for any bank debt (including a term loan, overdraft, invoice discounting, lease/hire purchase and/or export financing). Use Bank Debt takes on a value of "1" for firms which applied for and successfully obtained some form of bank debt in 2014.

Borrowing Rejection and Discouragement: Examining the impact of credit constraints on the dependent variables, this study considers both bank-rejected borrowers and discouraged borrowers. The survey identifies firms that have applied for bank debt and have been unsuccessful, partially successful, and successful. Bank rejection takes on a value of "1" for firms that have been unsuccessful or only partially successful in applying for bank debt. The ATF survey defines partially successful as those firms that "*did not get the requested amount and/or the desired terms etc*." CSO (2010), p. 3. The proportion of the application that was successful is not disclosed.

Bank-discouragement takes on a value of "1" if the firms were informally rejected or believed banks were not lending. Self-discouragement takes on a value of "1" if a firm avoids applying for bank debt due to the high cost of credit, or an inability to repay, or strict bank lending terms.

Age and Size: Firms are categorised as micro, small and medium sized based on their number of employees. Age is controlled for by categorising firms as start-up firms when

Table 1. Description of the variables

Variable	Description of measure	*n*	%
Dependent variables			
Applied for bank debt	= 1 if firm applied for bank debt in 2014; = 0 otherwise	407	24.2
Applied for non-bank debt finance	= 1 if firm applied for other sources of finance including non-bank debt, government grants and trade credit in 2014; = 0 otherwise	90	5.4
Use non-bank debt	= 1 if firm applied for and successfully obtained non-bank debt finance in 2014; = 0 otherwise	50	3.0
Independent variables			
Use bank debt	= 1 if firm applied for and successfully obtained bank debt finance in 2014; = 0 otherwise	338	20.0
Size:			
Micro	= 1 if less than 10 employees; = 0 otherwise	886	52.6
Small (ref)	= 1 if between 10 and 49 employees; = 0 otherwise	525	31.2
Medium	= 1 if between 50 and 249 employees; = 0 otherwise	272	16.2
Age:			
Startup	= 1 if firm is aged 2 years or less; = 0 otherwise	133	7.9
Young	= 1 if firm is aged over 2 years and less than 6 years; = 0 otherwise	245	14.6
Older (ref)	= 1 if firm is aged 6 years and less than 10 years. = 0 otherwise	292	17.3
Mature	= 1 if firm is aged 10 years or more; = 0 otherwise	846	50.3
Borrower discouragement:			
Bank rejected	= 1 if bank refused (or part refused); = 0 otherwise	103	6.1
Bank discouraged	= 1 if firm is discouraged due to belief that banks are not lending or due to informal rejection; = 0 otherwise	89	5.3
Self-discouraged	= 1 if firm is discouraged by cost of credit or repayment terms; = 0 if otherwise	110	6.5
Sector			
Construction	= 1 if a firm is in the construction sector; = 0 otherwise	155	9.2
Selected services	= 1 if a firm is in the selected services sector; = 0 otherwise	772	45.9
Prof., scientific and technical	= 1 if a firm is in the professional, scientific and technical sector; = 0 otherwise	308	18.3
Information and communication	= 1 if a firm is in the information and communication sector; = 0 otherwise	173	10.3
Industrial (ref)	= 1 if a firm is in the industrial sector; = 0 otherwise	274	16.3
Other control variables			
Debt burden	= 1 if firm or its owner has property debt that is an obstacle to firm performance; = 0 otherwise	257	15.3
No internal funding	= 1 if firm has not used internal funds to finance firm expenditure; = 0 otherwise	552	32.8
Dublin	= 1 if a firm is located in Dublin County; = 0 otherwise	594	35.3
Export	= 1 if a firm is an exporter; = 0 otherwise	222	13.2
Total sample N		*1,683*	*100%*

Note(s): "ref" refers to the reference category; n is a subset of N. See Table A3 for correlation matrix
[a]Results are based on analysis of strictly controlled Research Microdata Files provided by the Central Statistics Office (CSO). The CSO does not take any responsibility for the views expressed or the outputs generated from this research
Source(s): Authors' own analysis using data from the CSO Access to Finance Survey 2014[a]

trading for 2 years or less, young firms when trading 3–5 years, established firms when trading 6–9 years and mature firms when trading for 10 years or more which is similar in approach to Casey and O'Toole (2014), and Ferrando and Mavrakis (2017).

Controls: Controls for other firm characteristics include sector, debt burden, lack of internal funding, firms located in Dublin and export status.

Sector: This study controls for broad sector activity, categorising firms as operating in construction, selected services (retail, accommodation, food and professional services), professional scientific and technical, information and communication and industrial sectors.

Debt burden: Debt burden takes a value of "1" for firms that declared property debts as an obstacle to their performance and "0" otherwise. This may contribute to bank rejection (Fraser *et al*., 2015).

Lack of internal funding: No internal funding takes a value of "1" for firms that did not use any internal funds to fund expenditure in 2014 and "0" otherwise. Firms with sufficient internal funds tend not to apply for external financing (ECB, 2019).

Dublin: Geographical location is identified by a county code. Firms located in Dublin County, (Dublin is the capital of Ireland), takes a value of "1" and "0" for firms located outside County Dublin. Firms in peripheral locations have fewer alternative sources of finance available to them (Lee and Brown, 2017).

Exports: Exports takes a value of "1"for firms that exported goods and services in 2014 and "0" otherwise. Exporting firms typically have higher growth rates.

Table A3 in Appendix presents the correlation matrix and reports low correlations between the independent variables.

3.4 Sample descriptives

Table 2 presents descriptive statistics for the sample and its sub-samples: use bank debt, use non-bank debt, use both bank and non-bank debt and use neither bank nor non-bank debt. Bank debt users are predominantly established firms (56% aged 10+ years) with fewer micro firms (36% vs 53% sample average). Of the firms that successfully obtained bank debt, 12% were rejected (fully or partially) in their application for a separate banking loan. Non-bank debt users are typically younger with higher rejection rates and debt burdens. Firms using both debt types are older and larger than average, while 57% of firms that use neither debt types are micro firms.

3.5 Methodology

This study relies on survey data and similar to Casey and O'Toole (2014) uses binary indicators for the dependent and independent variables. This necessitates the use of a binary probit model to characterise firms who use non-bank debt finance. The binary structure simplifies interpretation, as coefficients in our models directly reflect changes in the probability of the outcome occurring when predictors shift from 0 to 1 (or vice versa) which is advantageous. It is acknowledged though that binary explanatory variables restrict the granularity of observed behaviours that could emerge in using continuous equivalents as predictors (Maddala, 2001). The estimates are corrected for sample selection bias as it is recognised in the literature that firms with certain characteristics are more likely to apply for finance types (Berger and Udell, 1998; Mac an Bhaird and Lucey, 2011). Thus, the decision to apply for finance types is not random. In characterising firms who use non-bank debt finance, these selection biases need to be accounted for. This study specifically controls for selection biases arising from the decision to apply both for bank debt and non-bank debt. The Heckman two step procedure (Heckman, 1979) which is frequently adopted in the literature to control for sample selection biases is applied here also (Power and Reid, 2005; Lee *et al*., 2015; Cowling and Sclip, 2022).

Initially, two selection equations were specified. Equation (1) models the application for bank debt and Equation (2) models the application for non-bank debt. Selection equation (1)

Table 2. Descriptive statistics for sample and sub samples: use bank, use non-bank, use bank and non-bank and use neither bank nor non-bank debt

Variable	Entire sample	%	Use bank	%	Use non-bank	%	Use bank and non-bank	%	Use neither	%
N	1,683		338		50		24		1,319	
Use non-bank debt	50	3%	24	7%						
Use bank debt	338	20%			24	48%				
Age: 2 years or less	133	8%	26	8%	9	18%	<=5		102	8%
Age: 3–5 years	245	15%	52	15%	<=5		<=5		191	14%
Age: 6–9 years	292	17%	48	14%	<=5		<=5		241	18%
Age: 10 years or over	846	50%	190	56%	30	60%	15	63%	641	49%
Micro	886	53%	123	36%	17	34%	<=5		751	57%
Small	525	31%	142	42%	20	40%	11	46%	374	28%
Medium	272	16%	73	22%	13	26%	8	33%	194	15%
Bank rejected	103	6%	41	12%	12	24%	6	25%	56	4%
Bank discouraged	89	5%	0	0%	<=5		0	0%	86	7%
Self discouraged	110	7%	<=5		<=5		0	0%	106	8%
Construction	155	9%	30	9%	7	14%	<=5		121	9%
Selected services	772	46%	168	50%	29	58%	16	67%	592	45%
Professional, scientific and technical	308	18%	57	17%	<=5		<=5		250	19%
Information and communication	173	10%	22	7%	<=5		<=5		149	11%
Industrial sector	274	16%	61	18%	8	16%	<=5		207	16%
Debt burden	257	15%	77	23%	17	34%	7	29%	171	13%
No internal funding	552	33%	88	26%	19	38%	9	38%	454	34%
Dublin	594	35%	91	27%	15	30%	8	33%	491	37%
Export	222	13%	74	22%	10	20%	6	25%	144	11%

Note(s): Where the sample size N is less-than or equal to 5, N is not disclosed

[a]Results are based on analysis of strictly controlled Research Microdata Files provided by the Central Statistics Office (CSO). The CSO does not take any responsibility for the views expressed or the outputs generated from this research

Source(s): Authors own analysis using data from the CSO Access to Finance Survey 2014[a]

was estimated first using binary probit estimation where firm *i*'s probability of applying for bank debt, *Pr (Apply Bank Debt$_i$ = 1)*, is given by:

$$Pr(Apply\,Bank\,Debt_i = 1) = \Phi\,(\beta_i X_i + \varepsilon_i) \quad (1)$$

where X is a vector of regressors including firm age, size, sector, debt burden, no internal funding, Dublin location and export status and Φ denotes the cumulative standard normal distribution function. Selection Equation (2) is then estimated using binary probit estimation where firm *i*'s probability of applying for non-bank debt, *Pr (Apply Non-Bank Debt$_i$ = 1)*, is expressed as:

$$Pr(Apply\,Non\text{-}Bank\,Debt_i = 1) = \Phi(\beta_i Z_i + \mu_i) \quad (2)$$

where Z is a vector of regressors including firm age, size, bank rejection, bank-discouragement, self-discouragement, sector, debt burden, no internal funding, Dublin location and export status. The estimates of Equations (1) and (2) are used to calculate the respective inverse Mills ratios. These Mill's ratios are included as additional regressors in the binary probit estimation explaining the probability of successfully obtaining and using non-bank debt, *Pr (Use Non-Bank Debt$_i$ = 1)*, given by Equation (3) below:

$$\Pr(Use\,Non\text{-}Bank\,Debt_i = 1) = \Phi\,(\beta_i D_i + \alpha_i C_i + \lambda_i W_i + \lambda_i Y_i + \upsilon_i) \quad (3)$$

Here D_i is a vector of the key independent variables, use bank debt, firm age, firm size, bank rejection, bank-discouragement and self-discouragement and C_i is a vector of standard firm controls including sector, debt burden, no internal funding, Dublin location and export status (see Table 1). W_i is the inverse Mills ratio for firms applying for bank debt and Y_i is the inverse Mills ratio for firms applying for non-bank debt. The disturbance terms across the three equations are captured by ε_i, μ_i and υ_i respectively.

4. Results

Table 3 reports the marginal effects derived from estimates of Equations (1), (2) and (3) which explain the decision to apply for bank debt (Column I), the decision to apply for non-bank debt (Column II) and the decision to use non-bank debt (Column III) respectively. Their associated coefficients and significance are reported in Table A1 in Appendix. The Wald chi-square test was significant for each equation indicating that the estimates are reliable. The inverse Mills ratio for firms applying for non-bank debt (Mills Non-Bank) was significant in estimates of Equation (3) indicating that selection bias exists from this source and that it was important to control for it.

4.1 Use non-bank debt

The estimates of Equation (3) presented in Column III, Table 3 examine the decision to use non-bank debt finance. Firms that successfully obtained bank debt are 15% less likely to use non-bank debt, providing support for H1. This finding suggests that the non-bank lending channel provides additionality to SME finance post crisis, catering for firms that may be less suited for bank finance.

Credit constrained firms are more likely to use non-bank debt than unconstrained firms. Bank rejected firms are 99% more likely to use non-bank debt supporting H2. In addition, bank-discouraged firms and self-discouraged firms are 93% and 94% respectively, more likely to use non-bank debt supporting H3. This suggests bank rejected firms are substituting bank debt with non-bank debt, post crisis. These findings are similar to O'Toole *et al.* (2015) who found that bank rejected firms substitute between formal issued debt and bank debt as bank lending conditions tighten. They also support Ferrando and Mavrakis (2017) who found

Table 3. Marginal effects of firm characteristics on non-bank debt usage based on estimates from the Heckman two-step procedure

Firm characteristics	Applied bank debt (I)	Applied non-bank debt (II)	Use non-bank debt (III)
Use bank debt			−0.151***
			(0.052)
Age: 2 years or less	0.086	0.041	0.963***
	(0.057)	(0.033)	(0.020)
Age: 3–5 years	0.069	−0.001	−0.107
	(0.045)	(0.021)	(0.068)
Age: 10 years or over	0.070**	0.008	0.061
	(0.033)	(0.016)	(0.182)
Micro	−0.176***	−0.046***	−0.650
	(0.036)	(0.018)	(0.511)
Small	−0.045	−0.022	−0.476**
	(0.036)	(0.015)	(0.234)
Bank rejected		0.205***	0.999***
		(0.048)	(0.001)
Bank discouraged		0.035	0.934***
		(0.032)	(0.015)
Self-discouraged		0.041	0.936***
		(0.032)	(0.014)
Construction	0.020	0.003	0.080
	(0.052)	(0.023)	(0.114)
Selected services	0.036	−0.008	−0.257
	(0.037)	(0.016)	(0.183)
Professional, scientific and technical	0.021	−0.025	−0.300***
	(0.044)	(0.016)	(0.113)
Information and communication	−0.072	−0.002	0.257
	(0.048)	(0.024)	(0.500)
Debt burden	0.144***	0.030*	0.467
	(0.036)	(0.019)	(0.788)
No internal funding	0.021	0.021	0.760**
	(0.028)	(0.015)	(0.263)
Dublin	−0.074***	−0.004	0.119
	(0.026)	(0.013)	(0.303)
Export	0.090**	0.017	0.296
	(0.039)	(0.018)	(0.512)
Mills bank			−1.178
			(1.289)
Mills non-bank			3.019***
			(1.167)
Wald Chi-square	88.15***	72.63***	54.97***
N	*1,362*	*1,362*	*421*

Note(s): The associated standard errors are in parenthesis; ***, **, * denotes significance at the 99%, 95% and 90% level

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Source(s): Authors' own analysis using data from the CSO Access To Finance Survey 2014[a]

that bank rejected borrowers were more likely to use leasing. Findings on the use of non-bank debt by discouraged borrowers is novel. Few studies have captured it in their models. Others have found no effect. Ferrando and Mavrakis (2017) based on data from 2009 to 2014 found no statistical significance in the use of leasing and issued debt by bank-discouraged borrowers.

Small firms are 48% less likely to use non-bank debt relative to medium sized enterprises, providing some support for H4. These findings align with prior research which found that micro and small firms are less likely to use leasing, find switching to non-bank finance more challenging (Ferrando and Mavrakis, 2017) and are more likely to use internal finance (Masiak *et al.*, 2019).

Focusing on firm age, firms aged 2 years or less are more likely to use non-bank debt than firms aged 6–10 years (marginal effect = 96%). Hence, there is support for H5. This is consistent with Ferrando and Mavrakis (2017) who found that firms under 10 years old are more likely to use leasing and the marginal effect is larger for firms under 2 years old. This suggests non-bank debt may precede bank finance in the post-crisis SME finance lifecycle. Asset finance dominated the non-bank debt used by firms in the sample (90%). Asset finance provides collateral which resolves the moral hazard and adverse selection problems under asymmetric information (Lehmann and Neuberger, 2001; Ioannidou *et al.*, 2022). This suggests that transaction lending technologies may have found ways around the constraints that opaqueness pose for young firms (Berger and Udell, 1998, 2006; Mkhaiber and Werner, 2021).

Turning to the control variables, firms in the professional, scientific and technical sector are 30% less likely to use non-bank debt. Firms in this sector tend to be less transparent to lenders and typically have fewer tangible assets for collateral compared to other sectors, (Lawless *et al.*, 2015). Firms lacking internal funds are 76% more likely to use non-bank debt, suggesting possible substitution of equity with non-bank debt, aligning with the pecking order theory.

4.2 Robustness

The use of non-bank debt finance was a relatively rare event within the sample which reduces the effectiveness of the probit model. Potential remedies include the rare logit, a bias correction method proposed by King and Zeng (2001) and the firth logit, a penalised maximum likelihood estimation proposed by Firth (1993). When probit estimates reproduced from Column III, Table A1 in Appendix are compared to similar rare logit and firth logit estimates Table A2 in Appendix, they are found to be similar in sign, magnitude and significance.

5. Discussion

The results outlined in Section 4 and their implications are considered further below.

5.1 Substitute for bank debt

The negative relationship between bank and non-bank debt suggests that non-bank debt helped shield SMEs from bank credit contraction. Non-bank lenders tend to specialise in certain sectors or lending products and typically do not provide the full range of financial services (current accounts and overdrafts) that many SMEs use (Collins, 2023). Therefore, firms that borrow from non-bank lenders will still require a banking relationship.

5.2 Bank credit constrained firms

The magnitude of the marginal effects on the use of non-bank debt by bank rejected, bank-discouraged and self-discouraged borrowers supports the view that the non-bank debt lending channel is an important substitute for bank debt for credit constrained SME firms, similar to larger firms (Denis and Mihov, 2003; Chernenko *et al.*, 2022). Findings on the use of non-bank debt by discouraged borrowers is novel and important as discouragement is at least twice as prevalent as bank rejection (Ferrando and Mulier, 2022). Recent studies conclude that discouragement is a transitory state in the firm's lifecycle and might have implications in terms of forgone investment and employment opportunities (Cowling and Sclip, 2022). Thus, policy

should focus on interventions that induce discouraged borrowers to apply for bank loans (Ferrando and Mulier, 2022).

Findings suggest that non-bank lending protected SMEs during bank credit contraction by serving credit-constrained firms. Bank regulations likely contributed to reduced SME lending, creating opportunities for non-bank lenders (Chen *et al.*, 2017). Findings also suggest, at least initially, there is a pecking order of internal funds, bank debt, non-bank debt and equity.

Findings appear at odds with the financial intermediation theory which asserts that banks have expertise in screening and monitoring informationally opaque borrowers (Diamond, 1984; Fama, 1985). However, this is perhaps explained by the changing nature of bank-firm relationships and the increased use of transaction-based lending technologies, such as asset finance, to resolve the information opacity problems (Mac an Bhaird and Lucey, 2010). The Irish Credit Review Office, which reviews bank rejected SME loan applications under €3mn, reports that they "typically see borrowers with some form of credit challenge but which are nonetheless viable, or potentially viable" (Collins, 2023, p. 9).

From a policy perspective it would be important to understand how non-bank lenders overcome SME information opacity to provide funding to credit constrained firms and the nature of the risks associated with the non-bank debt sector (CBI, 2021). Any increase in the regulation of the non-bank sector should consider the role of regulation in the transition of SMEs to non-bank debt. Contraction in SME non-bank lending would leave credit constrained firms with few financing alternatives.

5.3 Firms size

This study finds small firms are less likely to use non-bank debt, compared to medium firms. With little alternative to bank debt, the contraction in SME bank lending may restrict small firm investment and growth. Policy supports should consider providing small firms with the opportunity to build reputations to overcome informational opacity (Diamond, 1991; Berger and Udell, 1998).

5.4 Firm age

This study finds firms aged 2 years or less (i.e. start-ups) are more likely to use non-bank debt than firms aged 6–10 years. This suggests that non-bank lending may be closing the traditional funding gap of start-up firms. It is consistent with the pecking order theory, and firms may be substituting non-bank debt for equity finance with non-bank debt featuring earlier than bank debt in the SME finance lifecycle. Non-bank lenders tend to specialise in specific lending technologies (CBI, 2021) which may suit some start-up firms.

6. Conclusions

The findings of this study suggest that post crisis, non-bank debt is extending the reach of SME finance to borrowers who face both formal (bank rejected) and informal (discouraged) credit constraints and is reducing the funding gap experienced by very young firms. This is consistent with previous studies which have shown that the use of non-bank finance sources have been important, particularly for younger SMEs (Moritz *et al.*, 2016; Masiak *et al.*, 2019) and credit constrained (bank rejected) borrower firms (Ferrando and Mavrakis, 2017; O'Toole *et al.*, 2015; Casey and O'Toole, 2014). This study is increasingly relevant given the growing importance of non-bank finance across Europe (OECD, 2020) and provides evidence for policy decisions on the sector. Access to finance for investment is increasingly important for SMEs as they will require finance to fund the Sustainable Development Goals investment gap (Zhan and Santos-Paulino, 2021).

6.1 Contribution to knowledge

This study enhances the SME finance literature by exploring non-bank debt usage among SMEs, expanding on previous research on larger firms and examining how the non-bank

lending channel expanded to offset the contraction in SME bank debt, particularly for bank credit constrained firms.

6.2 Implications for policy

Contributing to policy, this paper determines that government policies to diversify SME finance sources have reduced SME dependence on bank lending. The use of non-bank debt by credit constrained firms suggests that non-bank debt is an important source of finance to firms that have few alternative sources of finance. This is relevant given the importance of the SME sector to the economic activity of global economies and the importance of finance to firm survival (Holton *et al.*, 2013). While diversified financing sources can enhance SMEs' resilience to economic shocks, recent geopolitical events and tighter monetary conditions have raised concerns around non-bank lenders' stability due to their funding models and their risk appetite (Gaffney and McGeever, 2022).

However, non-bank lending is not a perfect substitute for bank lending, particularly for micro and small firms. They remain reliant on banks for many products and services as non-bank lenders typically do not provide the full range of financial services (current accounts and overdrafts) that banks provide (Collins, 2023). This implies that constraints in accessing bank finance will continue to hamper the growth of SMEs. These constraints are set to continue as bank regulatory changes, related compliance costs and efficiency demands reduce bank investment in relationship lending (Mol-Gómez-Vázquez *et al.*, 2022) which along with bank branch consolidation disrupts the bank-firm information flow (McQuinn, 2019) and encourages the channelling of bank debt to larger firms which are perceived as less risky (Mol-Gómez-Vázquez *et al.*, 2022; Cowling *et al.*, 2012).

6.3 Implications for practice

While non-bank debt is a substitute for bank debt, traditional banks will likely remain the primary SME finance providers in the medium term (Department of Finance, 2022). SMEs will need to manage both bank and non-bank lending relationships in a more fragmented funding sector. This may be more challenging for micro and small firms, who can face difficulties securing traditional bank financing. Nonetheless, non-bank lenders diversify SME funding options servicing a market segment which traditional banks have exited and are therefore not always competing directly with banks. As the non-bank market develops, traditional banks may partner with non-bank lenders to provide complementary finance or follow on funding later in the firm life cycle.

6.4 Research limitations

The nascent nature of the SME non-bank debt sector in 2014 means that the sample size is small. The small sample bias was addressed using the firth logit and rare logit estimation techniques, see Appendix, Table A2. The non-bank debt market has grown significantly over the past decade. However, the data source used in this study was discontinued after 2014, limiting the study's ability to fully assess these trends over time.

6.5 Future research

The substitution of bank debt with non-bank debt by credit constrained firms suggests that firms prefer bank debt, it would be interesting to understand if this preference changes over the longer-term. Research examining how non-bank debt affects firm performance would provide valuable insights. Understanding the distinct characteristics of self-discouraged versus bank-discouraged firms warrants further investigation, as these differences may carry important policy implications. On the supply side future research could explore how non-bank lenders overcome the market failures of adverse selection and moral hazard.

Notes

1. The 2010 and 2014 ATF surveys used different methodologies and are not comparable (CSO, 2014).

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Appendix

Table A1. Effects of firm characteristics on non-bank debt usage based on estimates from the Heckman two-step procedure

Firm characteristics	Applied bank Debt (I)	Applied non-bank Debt (II)	Use non-bank Debt (III)
Use bank debt			−0.790***
			(0.222)
Age: 2 years or less	0.246	0.313	5.072**
	(0.156)	(0.212)	(2.243)
Age: 3–5 years	0.201	−0.002	−1.254
	(0.127)	(0.195)	(1.436)
Age: 10 years or over	0.214**	0.078	0.438
	(0.102)	(0.153)	(1.364)
Micro	−0.536***	−0.424***	−4.682
	(0.110)	(0.153)	(3.601)
Small	−0.139	−0.222	−3.273**
	(0.112)	(0.157)	(1.431)
Bank rejected		1.023***	16.579***
		(0.163)	(6.462)
Bank discouraged		0.273	5.288***
		(0.212)	(1.911)
Self-discouraged		0.316	6.084***
		(0.201)	(2.154)
Construction	0.059	0.034	0.430
	(0.153)	(0.211)	(0.501)
Selected services	0.110	−0.075	−1.643
	(0.112)	(0.153)	(1.059)
Professional, scientific and technical	0.063	−0.277	−5.453***
	(0.129)	(0.202)	(2.062)
Information and communication	−0.234	−0.016	1.026
	(0.166)	(0.228)	(1.449)
Debt burden	0.407***	0.246*	1.873
	(0.097)	(0.136)	(2.500)
No internal funding	0.063	0.184	3.000**
	(0.085)	(0.122)	(1.182)
Dublin	−0.230***	−0.043	0.655
	(0.082)	(0.120)	(1.406)
Export	0.260**	0.145	1.251
	(0.108)	(0.147)	(1.615)
Mills bank			−7.912
			(8.724)
Mills non-bank			20.274***
			(7.839)
Wald Chi-square	88.15***	72.63***	54.97***
N	*1,362*	*1,362*	*421*

Note(s): The coefficients are provided here, and their associated standard errors are in parenthesis; ***, **, * denotes significance at the 99%, 95% and 90% level

[a]Results are based on analysis of strictly controlled Research Microdata Files provided by the Central Statistics Office (CSO). The CSO does not take any responsibility for the views expressed or the outputs generated from this research

Source(s): Authors' own analysis using data from the CSO Access to Finance Survey 2014[a]

Table A2. Effects of firm characteristics on non-bank debt usage

Firm characteristics	Probit: Use non-bank debt (I)	Rarelogit: Use non-bank debt (II)	Firthlogit: Use non-bank debt (III)
Use bank debt	−0.790***	−1.344***	−1.344***
	(0.222)	(0.413)	(0.388)
Age: 2 years or less	5.072**	8.451*	8.422**
	(2.243)	(4.413)	(3.677)
Age: 3–5 years	−1.254	−1.842	−1.895
	(1.436)	(3.073)	(2.192)
Age: 10 years or more	0.438	0.944	0.904
	(1.364)	(2.827)	(2.152)
Micro	−4.682	−8.002	−7.896
	(3.601)	(7.265)	(5.918)
Small	−3.273**	−5.424**	−5.404**
	(1.431)	(2.748)	(2.377)
Bank rejected	16.579***	26.479**	26.550**
	(6.461)	(12.294)	(10.662)
Bank discouraged	5.288***	8.513**	8.533***
	(1.911)	(3.635)	(3.112)
Self discouraged	6.084***	9.691**	9.717***
	(2.154)	(4.088)	(3.530)
Construction	0.430	0.793	0.779
	(0.501)	(1.003)	(0.877)
Selected services	−1.643	−2.548	−2.579
	(1.059)	(2.157)	(1.652)
Professional, scientific and technical	−5.453***	−8.705**	−8.758***
	(2.062)	(3.984)	(3.387)
Information and communication	1.026	1.472	1.520
	(1.449)	(2.969)	(2.406)
Debt burden	1.873	3.335	3.248
	(2.500)	(5.137)	(4.056)
No internal funding	3.000**	4.898**	4.896**
	(1.182)	(2.246)	(1.934)
Dublin	0.655	0.875	0.929
	(1.406)	(2.943)	(2.230)
Export	1.251	2.339	2.278
	(1.615)	(3.290)	(2.599)
Mills bank	−7.912	−11.282	−11.641
	(8.724)	(18.290)	(14.053)
Mills non-bank	20.274***	32.373**	32.461**
	(7.839)	(14.953)	(13.037)
Wald Chi-square	54.97***		40.11***
N	*421*	*421*	*421*

Note(s): The coefficients are provided here, and their associated standard errors are in parenthesis; ***, **, * denotes significance at the 99%, 95% and 90% level

[a]Results are based on analysis of strictly controlled Research Microdata Files provided by the Central Statistics Office (CSO). The CSO does not take any responsibility for the views expressed or the outputs generated from this research

Source(s): Authors' own analysis using data from the CSO Access to Finance Survey 2014[a]

Table A3. Correlation matrix

	Use non-bank debt 1	Use bank debt 2	Age: 2 years or less 3	Age: 3–5 years 4	Age: 10 years + 5	Micro 6	Small 7	Bank rejected 8	Bank-discour-aged 9	Self-discour-aged 10	Cons-truction 11	Selected services 12	Prof., scient. and tech. 13	Info. and comm. 14	Debt burden 15	No internal funding 16	Dublin 17	Export 18
1	1.00																	
2	−0.21***	1.00																
3	0.15***	−0.01	1.00															
4	−0.07	0.00	−0.14***	1.00														
5	0.01	0.04*	−0.35***	−0.49***	1.00													
6	−0.04	−0.16***	0.10***	0.00	−0.12***	1.00												
7	0.00	0.12***	−0.05**	−0.01	0.08**	−0.71***	1.00											
8	0.02	0.13***	0.00	−0.01	0.00	−0.02	0.04*	1.00										
9	0.11**	−0.12***	0.00	−0.02	−0.03	0.06**	−0.03	−0.05**	1.00									
10	0.11**	−0.13***	−0.02	0.02	−0.03	0.08***	−0.04	−0.06**	−0.06***	1.00								
11	0.04	−0.01	0.06**	0.00	0.02	0.07***	−0.04*	−0.01	−0.02	0.02	1.00							
12	0.06	0.04	0.00	0.00	−0.01	−0.03	0.00	0.05**	0.01	0.02	−0.29***	1.00						
13	−0.10**	−0.02	−0.03	−0.01	0.00	0.06***	−0.04	0.00	−0.04	0.06**	−0.15***	−0.44***	1.00					
14	−0.01	−0.06**	0.06**	0.05**	−0.09***	−0.05*	0.00	−0.05**	0.03	−0.02	−0.11***	−0.31***	−0.16***	1.00				
15	0.06	−0.10***	−0.05*	−0.08**	0.11***	−0.03	0.02	0.22***	0.14***	0.11***	0.03	0.06***	−0.04*	−0.09***	1.00			
16	−0.01*	−0.07***	0.01	0.11***	−0.09***	−0.08***	0.05**	−0.01	0.02	−0.02	−0.08***	0.02	−0.02	0.04*	−0.04	1.00		
17	0.02	−0.09***	0.03	0.00	−0.01	−0.05**	−0.01	−0.07***	0.04*	0.01	−0.03	−0.05**	0.10***	0.13***	−0.04*	0.05**	1.00	
18	0.01	0.11***	−0.05*	0.00	0.03	−0.14***	0.09***	0.01	0.02	−0.03	−0.10***	−0.22***	0.04	0.14***	−0.02	−0.07***	0.00	1.00

Note(s): Significant pairwise correlations noted, ***, **, * indicates significance at the 99%, 95% and 90% level

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