THE EFFECT OF TRADE SECRECY ON THE DESIGN OF LOAN SYNDICATES AND CONTRACTS

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ABSTRACT

Boaz Noiman: The Effect of Trade Secrecy on the Design of Loan Syndicates and Contracts
(Under the direction of Robert Bushman)

I examine how proprietary information in the form of trade secrets affects lending syndicate composition and contracting. Trade secrets derive economic value from exclusivity, and as such impose information risks and exacerbate agency conflicts in debt contracting. Using the staggered adoption of the Uniform Trade Secrets Act as a source of plausibly exogenous variation in borrowers' reliance on trade secrecy, along with a text measure to identify borrowers with trade secrets, I document that trade secrecy shapes syndicate composition by increasing the probability of relationship lending between the lead arranger and the borrower, the lead arranger and syndicate participants, and the participants and the borrower. Further, I find that the lead arrangers retain a larger share of the loan and form syndicates with fewer overall lenders and more lead arrangers in lieu of syndicate participants. Next, I show that institutional lenders are more likely to fund borrowers with trade secrets. Finally, I document that lenders relax securitization requirements and require higher loan spreads. Collectively, this study shows that trade secrecy creates information risk and agency conflicts that have a first-order effect on the design of lending syndicates.

Keywords: relationship lending, syndicate structure, trade secrets, information asymmetry, innovation.

JEL classification: G12, G21, G30, O31, O32, O33, O34.

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LIST OF ABBREVIATIONS

CRSP	The Center for Research in Security Prices
IP	intellectual property
LIBOR	London Interbank Offered Rate
MTB	market-to-book
OLS	ordinary least squares
PP	pricing provisions
R&D	research and development expenses
ROA	return on assets
SIC	Standard Industrial Classification
SUTVA	stable unit treatment value assumption
TRLPC	Thomson Reuters Loan Pricing Corporation
ULC	Uniform Law Commission
UTSA	Uniform Trade Secrets Act

CHAPTER 1: INTRODUCTION

A large literature examines how relationship lending mitigates the rich array of information asymmetries intrinsic to private loan contracting.[1] However, there is limited direct evidence of the role played by proprietary information in private lending markets. This lack of evidence is the result of the formidable challenge of identifying the presence of proprietary information. In this paper, I investigate the loan contracting implications of borrowers' proprietary information in the form of trade secrets. I identify the presence of trade secrecy by using a quasi-natural experiment and textual analysis of financial statements. The main objective of the paper is to explore how trade secrecy influences both loan syndicate formation and loan contract design. The analyses provide consistent evidence that trade secrecy affects the composition and structure of loan syndicates, reduces collateral requirements, and increases loan spreads.

Lenders rely on information about borrowers' innovation and intellectual property (IP) to assess borrowers' business potential and cash flow trajectories.[2] Trade secrets are IP rights on confidential information that derive value from their confidentiality within a business. Possession of a firm's secret by competitors may harm a firm's competitive advantage and subsequently

[1] E.g., empirically; Petersen and Rajan, 1994; Petersen and Rajan, 1995; Berger and Udell, 1995; Lee and Mullineaux, 2004; Sufi, 2007; Ivashina, 2009; Bharath et al., 2011; Gopalan et al., 2011; Bolton et al., 2016; Cai et al., 2017; Amiram et al., 2017; Bushman et al., 2017; Karolyi, 2018; Khan et al., 2019; Saidi and Zaldokas, 2021; Kang, 2022.

[2] "At least when it comes to understanding a company's overall position, [intellectual property] may provide comfort between doing something or not. It doesn't necessarily follow [...] that lending will increase or be directly assigned to the IP, but it might make the difference between lending and not lending." Richard Holden, Head of Manufacturing at Lloyds Banking Group, the Intellectual Property Office report, 2003.

reduce future cash flows. Because a trade secret's exclusivity and value derives from its confidentiality, borrowers have incentives to conceal proprietary information from potential lenders when they rely on secrecy. Since debt contracting is facilitated by the flow of confidential information between borrowers and lenders (Diamond, 1984), I posit that the incentives of borrowers to protect trade secrecy poses unique information challenges for debt contract design.

The multi-layered information asymmetries inherent in syndicated lending create a unique setting to study the effects of borrowers' proprietary information. A syndicated loan is jointly issued to a firm by more than one lender. Loan syndicates, comprised of lead arrangers and less informed participants, facilitate credit expansion by simultaneously allowing for delegated monitoring and risk sharing, which lowers the risk threshold for originating a loan (Ivashina and Scharfstein, 2010). The lead arranger is primarily responsible for collecting and communicating relevant information about the borrower to potential syndicate participants, while syndicate participants tend to maintain an arm's length relationship with the borrower. Consequently, syndicated loans create information asymmetry problems resulting from lenders' differential access to borrower's proprietary information on three levels.

First, there is a fundamental information asymmetry between lead banks and the borrower. Although the lead bank initiates the loan and has the most access to borrower's information, this access is still contingent on the borrower's willingness to share proprietary information. Relationship lead banks that repeatedly transact with a borrower may have superior access to a borrower's private information more developed channels of communication with its managers. Borrowers may also be more willing to reveal sensitive private information to relationship lenders (e.g., Greenbaum and Thakor, 1995; Boot, 2000). Second, loan syndicates

create information asymmetries between lead banks and participant lenders. Syndicate participants tend to maintain an arm's length relationship with the borrower, and although they may receive some private information from the lead bank or borrower, they are generally at an information disadvantage relative to the borrower and lead bank. Such information asymmetries expose syndicate participants to the risk of moral hazard and adverse selection problems with the lead bank (Ivashina, 2009). Third, in the competition across lenders to win a mandate to serve as the lead arranger on a loan, inside lenders with a prior relationship with a borrower may have a significant informational advantage relative to less informed, outside lenders.

The existence of trade secrets can exacerbate agency conflicts in loan syndicates. First, borrowers' incentives to conceal proprietary information to avoid leakage impose an additional layer of information risk for lenders. In this regard, these incentives suggest that financial reporting will have limited ability to communicate the value of trade secrets (Dechow et al., 2010), contributing to borrowers' opacity. Second, due to their novel, borrower-specific nature (Almeling, 2012), trade secrets have characteristics of soft information that require lenders' expertise and often familiarity (or a relationship) between the information collector and the decision maker to successfully contract over (Liberti and Peterson, 2019). Third, the financing of innovative projects embeds significant risks as they often require funding over a long period of time and the probability of success is highly uncertain (Holmstrom, 1989; Manso, 2011; Acharya and Xu, 2017). Fourth, the asset pledgeability hypothesis suggests that a lack of collateral in innovation-intensive firms advantages equity over debt funding (Brown et al., 2009). Trade secrets exacerbate borrowers' collateral constraints as enhanced protections of trade secrets incentivize firms to substitute trade secrets for patents (Glaeser, 2018; Cohen et al., 2019; Glaeser et al., 2020), where patents are more likely to serve as collateral (Mann, 2018; Liss and

Noiman, 2022). Finally, trade secrets are a significant proportion of corporate value and comprise the majority of corporate innovation (Jankowski, 2012).[3]

Due to the inherent difficulty of identifying the existence of trade secrets, insight into the effects of trade secrets is limited (Cohen, 2010). This paper overcomes this challenge by using two complementary empirical approaches. First, the analysis exploits the staggered passage of the Uniform Trade Secrets Act (UTSA) by different states at different times in a differences-in-differences design. The UTSA increased the strength of and reduced the uncertainty about the legal protections afforded to trade secrets, and consequently encouraged firms to pursue secrecy projects. Second, I follow Glaeser (2018) and use a disclosure-based measure for the existence of trade secrets.

I hypothesize that information asymmetry issues inherent to trade secrecy will result in a greater prevalence of relationship lenders in the syndicate and more concentrated syndicates. Prior research finds that relationship lending mitigates lenders' information risk when funding opaque borrowers (e.g., Sufi, 2007). Through sustained engagement with a borrower, a relationship lead arranger acquires expertise in borrowers' specific technology and may facilitate borrowers' willingness to reveal more confidential information to the lead arranger without risking misappropriation of the secret. This enables lower production costs of borrower-specific information and more efficient monitoring (Cai et al., 2017; Berger, 1999; Boot, 2000). Further, repeated, privileged access to borrowers' information facilitates the acquisition of proprietary information and confers a comparative advantage over outside banks when competing for a loan mandate (Rajan, 1992; Bushman et al., 2017). Relationship lending can also alleviate collateral constraints associated with trade secrecy and decrease the cost of debt (Bharath et al., 2011).

[3] The U.S. Chamber of Commerce estimates that publicly traded U.S. companies own $5 trillion in trade secrets, equivalent to approximately 20% of total market capitalization (Chamber of Commerce, 2016).

With respect to syndicate concentration, borrowers may have incentives to limit the number of lenders who gain access to proprietary information, resulting in lending syndicates with fewer overall lenders.

Trade secrecy may also increase the importance of relationships between syndicate participants and lead arrangers, and between syndicate participants and borrowers. Previous lending relationships between lead arrangers and participants can facilitate increased levels of trust and lines of communication that enable the efficient dissemination of borrowers' private information between the lead and participants (Godlewski, 2010). Syndicate participants also gain private information through previous lending relationships with the borrower, reducing their dependence on the lead arranger. Further, Finally, relationship lending within the syndicate reduces monitoring costs in high uncertainty periods (Bolton et al., 2013) and facilitates a more efficient negotiation in cases of financial distress (Lee and Mullineaux, 2004), which are more likely in innovative borrowers (Manso, 2011).

However, relationship lending might not be the appropriate financial arrangement for borrowers with trade secrets. First, the UTSA enforced the legal rights of trade secrets and the recovery of damages caused by misappropriation of the secret. The enhanced litigation risk might deter lenders from leaking secrets. At a minimum, UTSA should decrease the expected economic rents from misappropriation of the secret, and accordingly, borrowers' information leakage risk. Second, firms with trade secrets provide more management earnings forecasts (Glaeser, 2018). As management earnings forecasts are of particular interest to capital providers (Beyer et al., 2010), they might compensate for the increase in opacity associated with trade secrets. Finally, trade secrets protection might change borrowers' fundamentals and future cash flows such that effected borrowers become more attractive to outside lenders.

My first set of analyses examines the role of lending relationships in addressing elevated information asymmetries associated with trade secrecy. I find robust evidence that lending syndicates respond to trade secrecy with multi-tiered relationships. Specifically, trade secrecy increases the probability of relationship lending between the lead arranger and the borrower, between syndicate participants and the lead bank, and between participant sand the borrower. These results are consistent with inside lenders having an information advantage that enables them to compete more aggressively for a loan mandate, with borrowers favoring relationship lenders to alleviate the risk of the misappropriation of secrets, with relationship lending facilitating the flow of confidential information (Berger, 1999; Boot, 2000).

Further, I study the lead arranger's exposure to the loan and the number of lenders. Participant lenders are concerned with the lead arranger's ex ante screening efforts and ex post monitoring incentives. Prior research documents that lead arrangers' incentives to screen and monitor increase in their skin in the game as reflected in the share of the loan they retain (Ivashina, 2009). Because trade secrets increase information asymmetries and require closer monitoring, I predict that the loan share retained by the lead arranger is increasing in the borrower's reliance on trade secrecy. Consistently, I find that lead arrangers retain a larger share in the loan and form a syndicate with less overall lenders and more lead arrangers in lieu of syndicate participants.

I next examine how trade secrecy affects which types of lenders join a lending syndicate. The literature suggests that institutional lenders who are not subject to stringent banking regulations, use private information when trading in the borrowers' stock (Ivashina and Sun, 2011; Peyravan, 2020). Funding borrowers that rely on trade secrecy provide opportunity to gain valuable private information about borrowers' secrets. I document that institutional lenders are

more likely to participate in loan syndicates funding borrowers with trade secrets, consistent with a demand for valuable private information.

Further, I study other contractual aspect of lending syndicates that may be sensitive to trade secrecy. I document that the probability of collateralized loans decreases in trade secrets, in line with trade secrets decreasing the pool of collateral available to borrowers and relationship lending alleviating lenders collateral requirement (e.g., Bharath et al., 2009; Loumioti, 2012). Next, consistent with Guernsey et al. (2022), I show that borrowers experience higher cost of debt. To provide further evidence of the importance of secrecy in shaping lending decision, I split my sample into partitions based on the extent of borrowers' secrecy reliance at the time of loan origination and show that the likelihood of relationship lending increases with borrowers' reliance on secrecy. Finally, I verify that my inferences from using the UTSA as a shock to trade secrecy do not appear to be explained by pre-existing differential trends for borrowers affected by the UTSA.

My study makes several contributions to the literature. First, I contribute to research on relationship financing. Prior empirical work in this area largely focuses on the effect of borrowers' information environment on loan syndicates design. Specifically, my study extends Saidi and Zaldokas (2021), which examines the patenting side in the patenting-secrecy trade-off and find that increased disclosure of patenting activity facilitates new relationships in the syndicated loan market and results in lower cost of debt. To the best of my knowledge, my paper is the first to show borrowers' trade secrecy activity affects their relationship lending arrangements.

I also contribute to the literature that examines how innovative firms finance their projects. Prior studies document that equity financing dominates debt financing for firms

investing significantly in innovation (Acharya and Subramanian, 2009; Brown et al., 2009; Frank and Goyal, 2003). Specifically, Guernsey et al. (2022) document that firms covered by the UTSA reduce debt level and increase equity issuance, emphasizing the complexities that borrowers' trade secrets impose on private lending. Further, studies usually use patent grants and citations as proxies for corporate innovations (Chava et al., 2017; Hochberg et al., 2018; Mann, 2018). My study extends this line of research by studying trade secrets, which decrease borrowers' collateral pool, and by showing the mechanism that lending syndicates adopt to mitigate the adverse selection and moral hazard problems associated with trade secrets-intensive borrowers.

My study also relates to the literature the consequences of trade secrecy (Png, 2017a, 2017b; Glaeser, 2018; Klasa et al., 2018). Cohen (2010) highlights the importance of understanding trade secrecy for promoting innovation and for policy setting. This study concentrates on the patenting-secrecy trade-off and its interaction with financing decisions, documenting a potentially unintended consequence of better legal protection of trade secrets in the form of a decrease competition in the lending market and a higher cost of debt.

Finally, my study contributes to the literature on corporate proprietary information. Prior empirical studies on voluntary disclosure and proprietary costs face the challenge of identifying the existence of proprietary information and addressing the endogenous nature of the corporate information environment. I address these potential concerns by using by using a source of plausibly exogenous variations in firms' reliance on trade secrecy. Specifically, I concentrate on the effects of secrecy activity in private lending and document that borrowers' trade secrecy decreases competition between relationship and outside lenders, increases the probability of institutional lenders entering a loan, potentially to exploit valuable private information in other investment opportunities, and increases the cost of capital.

The rest of this paper is organized as follows. In section 2, I provide background information on trade secrets, the UTSA, and relationship lending. I discuss the empirical specification and variable description in section 3, and describe data sources, sample, and present summary statistics in section 4. Section 5 present my empirical results and section 6 concludes the paper.

CHAPTER 2: BACKGROUND

2.1 Trade Secrets and The Uniform Trade Secrets Act (UTSA)

A trade secret is any unpatented innovation that derives economic value from being proprietary. From an information perspective, the trade-off firms face when deciding between patenting and keeping an innovation as a trade secret is between the costs associated with increased opacity in the case of trade secrets (or the loss of benefits associated with transparency), and the proprietary costs associated with increased public disclosure in the case of patenting. A valid patent provides a legal monopoly for seventeen years in exchange for public disclosure. Costs of the public disclosure associated with patenting include both litigation risk, which might result with the courts ultimately invalidating the patent, and the risk of competitors using the publicly disclosed information, legally, illegally, or after the patent legal monopoly expires, to undermine the competitive advantage of the patented innovation. According to the Business Research and Development Innovation Survey, respondents choose to not patent the majority of their innovations. Prior to the UTSA, the U.S. law provided some legal remedies and protections in the case of trade secret misappropriation by a third party, aiming to protect unpatented innovations and thus spur further innovation.

The Uniform Law Commission (ULC) established the UTSA in 1979 and amended it in 1985. The UTSA adoption is likely exogenous with respect to outcomes of firms headquartered in adopting states, as empirical evidence suggests that the adoption decision is unrelated to the states' legal and economic environment or lobbying interests (Ribstein and Kobayashi, 1996; Guernsey et al., 2022). The UTSA aims to codify the interstate legal treatment of trade secrets

and ultimately reduce the uncertainty of the legal protections afforded to trade secrets, improving the prior common civil law procedures that governed trade secrets in two key aspects. First, the UTSA expands the scope of trade secrets and defines trade secrets as follows: "information, including a formula, pattern, compilation, program device, method, technique, or process that derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use, and is the subject of efforts that are reasonable under the circumstances to maintain its secrecy".

Second, the UTSA defines misappropriation as "acquisition of a trade secret of another by a person who knows or has reason to know that the trade secret was acquired by improper means, or disclosure or use of a trade secret of another without express or implied consent by a person who used improper means to acquire knowledge of the trade secret". This definition reduces the uncertainty of the legal protection afforded to trade secrets by clarifying the rights and remedies for businesses that experienced misappropriation of their trade secrets. However, a trade secret can be legally acquired as the UTSA excludes misappropriation of a secret through reverse engineering of publicly available information from being improper means.

Empirical work establishes the effects of the UTSA on affected firms' decision making. Papers find that the UTSA results in higher R&D (Png, 2017a) and fewer patents (Png, 2017b) on average, for effected firms. Taken together, this suggests that the UTSA encourages firms to favor trade secrecy over patenting. Glaeser (2018) shows that firms increased nonproprietary information to compensate for the increase in firms' opacity post UTSA passage. Finally, Guernsey et al. (2022) document that firms covered by the UTSA reduced debt levels and increased investment in intangibles by issuing more equity. My study contributes to the literature

examining the power on the UTSA by documenting the first order effects in private lending. To the best of my knowledge, my study provides the first evidence for the mechanism that lending syndicates adopt to address the enhanced information risk associated with borrowers' trade secrecy.

For the purpose of this study, the UTSA has two main outcomes on borrowers that are seeking private financing. One, the UTSA increases the value existing trade secrets by increasing the legal protection afforded to trade secrets. Second, the increased legal protection encourages firms to rely on trade secrecy, such that firms are more likely to invest in projects that result in trade secrets. Overall, the UTSA introduces a plausibly exogenous shock to firms' reliance on trade secrets, resulting in an increase in the proportion of firm value that is derived from trade secrets.

2.2 Relationship Lending in Syndicated Loans

Prior research considers three critical elements of relationship lending. First, the lender gathers borrower-specific information, often proprietary in nature, through screening and monitoring services (Diamond, 1984; Winton, 1995; Allen, 1990). Second, the lender interacts with the borrower through multiple transactions over time and/or across products. This suggest that the private information gathering takes place through multiple transactions, and that the information gathered in prior transactions can be used intertemporally (Boot et al., 1995; Boot, 2000). Finally, the proprietary information remains confidential, or available only to the lender and the borrower (Berger, 1999).

The confidential nature of relationship lending explains why relationship lending is designed to address information asymmetries associated with funding opaque borrowers (e.g., Sufi, 2007; Boot, 2000; Bushman et al., 2017; Saidi and Zaldokas, 2021). The main motivation for relationship lending suggests that when borrowers' private information is credible and

lenders' information acquisition cost is not negligible, scale economies in recurring transactions and expertise in information production reduce borrower-specific information production costs and facilitate better screening and monitoring by lenders.

Syndicated lending provides a unique setting for investigating information asymmetries as this financial structure introduces information friction between the borrower and the lenders and within lenders. A loan syndicate is issued to a borrower by multiple lenders, serving as either lead arrangers or syndicate participants, where the terms and conditions are similar between lenders, except for fees that the lead arrangers mostly receive. In the syndication process, the lead arrangers establish initial connection with the borrower and are responsible for information collecting, screening, and monitoring post loan origination. The lead arrangers sign a preliminary agreement with the borrower that specifies the amount of the loan, covenants, fees, collateral, and a range for interest rate.

Next, the lead arranger provides an information memorandum on the borrowing firm to potential lenders and invites them to fund a portion of the loan. Once the participants agree to join the loan, the final pricing of the loan is determined, and the loan agreement is signed. Importantly, unanimity of all syndicate members is required to change the terms of the loan agreement. In some cases, renegotiation of minor terms requires only a majority of half or two thirds of the lenders.

This syndication structure creates information asymmetries on three levels. First, the lead arrangers' access to information is contingent on the borrowers' willingness to share proprietary information, leading to an information asymmetry between the lead arranger and the borrower. Further, relationship lenders build communication channel with the borrower through repeated transactions, creating an information advantage for lenders competing to serve as lead arrangers

on a loan (Rajan, 1992). Empirically, Sufi (2007) shows that the probability of relationship lead arrangers increases in opaque borrowers. Bushman et al. (2017) documents that increased media sentiment on borrowers reduces information frictions between the borrower and potential lenders and facilitates non-relationship lenders serving as lead arrangers on a loan, resulting in lower cost of debt. Saidi and Zaldokas (2021) show that increased patents disclosure reduces borrowers' dependence on relationship lenders and helps borrowers to switch between lenders.

Second, syndicated lending creates information problems within loan syndicates. While the lead arranger has privileged access to borrowers' private information and serves as a monitoring agent, syndicate participants usually maintain an arm's length relationship with the borrower. Consequently, syndicate participants face both adverse selection and moral hazard problems (e.g., Sufi, 2007; Ivashina, 2009). A key issue is that lead arrangers' screening and monitoring efforts are unobservable to participants.[4] This creates an adverse selection problem ex ante as a lead bank may shirk on screening efforts or syndicate loans of lower quality to extract private economic rents. Participants lenders also face a moral hazard problem as the lead arrangers' motivation to effectively monitor the loan ex post diminishes with the portion they retain in the loan.

The literature documents that relationship lending addresses information risks within lending syndicates as well. Sufi (2007) shows that relationship lending is more prevalent in loan syndicates funding opaque borrowers. Bushman et al. (2017) document that increased media sentiment on a borrower reduced information concerns and allowed new syndicate participants to join the syndicate. Studies also show that relationship lending can facilitate more efficient

[4] Empirically separating between the adverse selection and moral hazard problems stemming from the information risk of the syndicates is challenging since the outcomes of the two are similar (Cohen and Siegelman, 2010).

negotiation between syndicate lenders, resulting in faster loan origination (Godlewski, 2010) and more efficient restructuring in cases of financial distress (Lee and Mullineaux, 2004).

The literature also considers the effect of relationship lending on other contractual aspects of the loan syndicate. Specifically, studies show that more efficient screening and monitoring, facilitated by easier information sharing between relationship lenders and borrowers, results in lower cost of capital and more available funds, relative to a borrower without such relationships (e.g., Peterson and Rajan, 1994; Berger and Udell, 1995; Sufi, 2007). Moreover, relationship lending can alleviate collateral constraints (Berger and Udell, 1992; Peterson and Rajan, 1994; Bharath et al., 2011).

The literature also documents that lenders may exploit private information gained through lending relationship for investment decisions other than the lending decision. Institutional lenders are subject to less stringent regulation relative to commercial banks, facilitating exploitation of private information gained through lending relationships by trading in the equity and debt markets (e.g., Acharya and Johnson, 2007; Bushman et al., 2010). Further, relationship lending may actually decrease the efficiency in lending decisions. In this viewpoint, borrowers with fewer alternative funding sources may be "locked-in" by a relationship lender (Sharpe, 1990; Rajan, 1992).

CHAPTER 3: RESEARCH DESIGN

3.1 The Effect of Trade Secrecy on Loan Syndicate Design

To explore the effect of variation in borrowers' trade secrecy activity on loan syndicate design, I employ the following specification:

$$Syndicate_{it} = \alpha + \beta * Trade\ Secrets_{it} + \sum_{n=1}^{N} \gamma * Controls_{it} + \varepsilon_{it} \quad (1)$$

The left-hand-side variable, $Syndicate_{it}$, represents different measures of loan syndicate *i* at time *t*. I examine three measures of lending relationships in the borrower-lead arranger-participant lender triangle: prior relationship between the lead arranger and the borrower, prior relationship between the lead arranger and syndicate participants, and prior relationship between syndicate participants and the borrower. Next, I examine other properties of the syndicate composition, including lead arranger share, number of lenders, and lender type. Finally, I consider other measures of the syndicate contract, including the probability of pledging collateral to secure a loan and loan pricing. The right-hand-side variable, $Trade\ Secrets_{it}$, represents one of the two complementary measures for the propensity of borrowers to have trade secrecy activity. First, the UTSA as a plausibly exogenous shock to borrowers' reliance on trade secrecy, and a text-based measure on 10-K discussions (all variables are described in detail below and in appendix B).

To the extent that the differences-in-differences assumptions are satisfied, the coefficient on the UTSA captures the causal effect of trade secrecy on affected loan syndicates. The first

assumption is the parallel trends assumption, or the assumption that there would not be a difference in outcome between affected and unaffected borrowers, had the treatment (the UTSA) not happened. Of course, outcomes in the absence of treatment are naturally unobservable. However, research documents that uniform laws, including the UTSA, were largely exogenous to outcomes in adopting states (Ribstein and Kobayashi, 1996). Further, I find no differential trends between adopting states and non-adopting states pre-UTSA passage (section 5.8).

The second assumption requires the stable unit treatment value assumption ("SUTVA") that effected firms' outcomes do not affect the outcomes of other firms. Similar to other studies employing USTA, I acknowledge the possibility that SUTVA may be violated to the extent that innovation-spillovers exist between firms. The third differences-in-differences assumption requires perfect compliance, or that all and only firms in the treatment group receive the treatment (The UTSA). Because compliance with the UTSA is imperfect, meaning that some firms relied on trade secrets prior to the UTSA and not all firms rely on trade secrets post UTSA, my analyses concentrate on "marginal adopters", or borrowers that would not have pursued trade secrecy without the passage of the UTSA.

In terms of the estimated models for relationship lending, lender type, and collateral analyses, I follow Sufi (2007) and other studies in the field and estimate a logit model at the syndicate lender level. For the other analyses, including the number of lenders, lead share and spread, I employ an OLS model that includes loan year and industry fixed effects. Finally, I follow prior studies and cluster the standard errors at the headquarter states of location level in all specifications to adjust for potential grouped error terms at the same level of the exogenous variation, UTSA protection.

The key coefficient of interest is β, which captures the extent to which trade secrecy is associated syndicate structure and contracting. As my trade secrets measures represent an increase in the value of current trade secrets and the probability of future secrecy activity, I expect to find a positive and significant coefficient if increased trade secrecy activity is associated with increased probability of relationship lending between the borrower, lead arranger, and participant banks, as well as a positive effect on other loan characteristics.

3.2 Identifying Borrowers with Trade Secrets

To proxy for trade secrets, $Trade\ Secrets_{it}$, I construct two complementary measures. First is an indicator variable that captures the staggered passage of the Uniform Trade Secrets Act (UTSA) by different states at different times. Specifically, the indicator variable $UTSA_{it}$ takes a value of 1 if loan *i* at time *t* is issued for a borrower headquartered in a state currently subject to UTSA, and 0 otherwise. The use of UTSA as an exogenous shock to trade secrecy activity provides a basis for drawing causal inferences. However, it is important to note that UTSA in no way obligates affected firms to pursue trade secrets, or prevents unaffected firms from pursuing trade secrecy activity. As a consequence, the UTSA measure may capture the effect of marginal compliers only, and may not be generalizable to the average effect of trade secrets.

To address generalizability issues associated with studying the marginal effects of secrecy (Glaeser and Guay, 2017), I follow Glaeser (2018) and construct a disclosure-based measure for trade secrets, $Trade\ Secrecy_{it}$, which takes the value 1 if borrower *i* references either "trade secret" or "trade secrecy" in the most recent 10-k preceding the loan origination date at time *t*. Regulation S-K requires firms to discuss the risk of misappropriation of their valuable trade secrets. As this regulation enables firms with discretion over which trade secrets they

discuss, there are two main ways that firms could benefit from disclosing the existence, but not the nature of a trade secret. First, to validate a misappropriation of a secret case, the plaintiff (the innovative firm) must establish that there was a secret, that the secret was sufficiently valuable such that misappropriation resulted in economic harm, and that the secret was subject to reasonable efforts to maintain its secrecy. 10-K disclosures of the existence of a trade secret can be used as evidence for the existence of the secret, that the secret was sufficiently valuable to be mentioned in the annual report, and that the firm made reasonable efforts to maintain the secret. Second, competitors cannot appropriate the secret without understanding how it works. Thus, the disclosure of the existence of a trade secret does not risk revelation of how the secret works. Further, a firm's product offerings often reflect its secrets such that their existence, but not their value or nature, is public information. As a result, a potential limitation of my text-based measure is that it is imprecise.

3.3 Relationship Lending Variables

The analysis considers three aspects of relationship. First, I consider previous relationships between the lead bank and the borrower. Following Bushman et al., (2017), I define *Lead-Borrower Relationship* as an indicator variable that takes 1 if a loan's lead arranger has syndicated at least 50% of the borrower's prior loan deals by volume over the five-year period preceding loan *i* issuance date at time *t*, and 0 otherwise.[5] As an alternative measure of lead bank-borrower relationships. I use the number of past deals between the specific lead bank and borrower in the five-year period preceding loan *i* issuance date at time *t*, *Lead-Borrower # of Deals*. Second, *Participant-Borrower Relationship* is an indicator variable equal to 1 if the participant has been involved in a deal with the borrower over the five-year period preceding

[5] Some studies in the literature consider only the existence of a previous relationship between the lead arranger and the borrower, regardless of volume.

loan *i* issuance date at time *t*, and 0 otherwise. Third, *Lead-Participant Relationship* is an indicator variable equal to 1 if the lead bank has been involved in a deal with the participant lenders over the five-year period preceding loan *i* issuance at time *t*, and 0 otherwise.

3.4 Other Syndicate Characteristics

Next, I consider syndicate composition in terms of the total lender participation in loan *i* (*# Lenders),* number of lead banks (*# Leads*), and number of participants (*# Participants*). I also test for the total portion of the loan that is retained by the lead banks (*Leads Exposure*). To test the probability of securing a loan, I construct an indicator variable that takes 1 if the loan facility is secured, and 0 otherwise (*Collateral*). Finally, to test whether the pricing of the loan vary with borrowers' secrecy activity I construct the variable *Spread,* which is the natural logarithm of the loan spread over LIBOR.

3.5 Identifying Institutional Lenders

I classify lenders as either commercial bank lenders or nonbank lenders following Kang (2022). I classify a lender as a commercial bank lender if its lender type in DealScan is one of the following "US Bank", "Foreign Bank", "Thrift/S&L", "African bank", "Asia-Pacific Bank", "East. Europe/Russian Bank", "Middle Eastern Bank," or "Western European Bank". Next, I classify lender's 4-digit SIC code as a commercial bank lender if it is between 6011 and 6082, or 6712, or 6719. I classify all remaining lenders as nonbank lenders.

3.6 Other Regulatory Shocks to Trade Secrets

I include two further measures to capture borrowers' incentive to use trade secrets. Both enforce trade secrets protection rights through reduced leakage risk by restricting employee mobility.[6] First, an indicator that takes one if when the borrower's headquarter state has applied

[6] E.g., because of the mobility of scientific personnel and the industry's strong academic roots, biotechnology firms do not consider trade secrecy a viable alternative (Lerner, 1995).

the Inevitable Disclosure Doctrine, which restricts employee mobility between firms and essentially operates as an indirect positive shock to the protection of trade secrets (Klasa, 2018). Second, the noncompete enforcement index, which measures the likelihood that the state judiciary will enforce a noncompete agreement and enforces trade secrecy protection through the enforcement of restrictions on human capital transition between firms (Garmaise, 2011).

3.7 Control Variables

I follow prior studies and include all loan and borrower controls that might be associated with lenders participation decisions and borrowers' secrecy activity and creditworthiness. I control for borrowers' characteristics that prior research suggests are associated with innovation activity and credit worthiness, including R&D expenditures (*R&D*) and whether data on R&D expenditures is missing (*Missing R&D*), size of total assets (*Size*), profitability (*ROA*), interest coverage ratio (*Interest Coverage*), leverage (*Leverage*), Altman's (1968) bankruptcy measure (*Z-score*), special items (*Special items*), and an indicator variable reflecting whether the borrower has experienced a loss (*Loss*). Finally, with respect to market values, I control for the borrowers' buy and hold stock return over the fiscal quarter (*Return*), an indicator variable reflecting whether stock returns are negative (*Negative return*), and the market-to-book ratio (*MTB*). All variables are defined in appendix B.

Further, I control for loans specific characteristics, including loan size (*Amount*), maturity (*Maturity*), an indicator for the whether the loan is a revolving line of credit (*Revolver*), and if the loan is a term loan A or B and below (*Term A / B*), whether the loan is secured (*collateral*), whether the loan has a performance pricing provisions (*PP*), the tie between the loans' issuance date and the previous deal (*Time between*), and the number of financial covenants (*Covenants*), which varies at the package deal level.

CHAPTER 4: DATA AND SUMMARY STATISTICS

4.1 Data

I obtain my primary data on loan syndicates, including loan-specific characteristics, borrowers and lenders identifiers, lender role (lead arranger or participant) and type (bank or non-bank) from the DealScan database provided by the Thomson Reuters Loan Pricing Corporation (TRLPC). I get borrowers' accounting information data from Compustat and stock price data from CRSP. Following prior research, I employ the firm's headquarters as a proxy for its location to examine the three regulations that effect trade secrecy activity, the passage of the UTSA, the application of the inevitable disclosure doctrine, and the components of the noncompete enforcement index (Garmaise, 2011). Since Compustat provides only the most recent location of the firm, I employ headquarters location data from Jennings et al. (2017), which specifies the location of the firm's headquarters by year. After eliminating loans with missing data, my final sample contains 21,036 loan facilities between 1997-2017. The analysis on lead-borrower relationship and lead arrangers' exposure to the loan require additional data decreases my sample to 13,375 and 6,475 loan facilities, respectively.

4.2 Summary Statistics

Table 1: *Summary Statistics*

Variable	*N*	Mean	Std	5th	25th	Median	75th	95th
Trade Secrets Variables								
UTSA	21,036	0.73	.	.	.	.	.	.
Trade Secrecy	21,036	0.43	0.50	0.00	0.00	0.00	1.00	1.00
Primary Loan Characteristics								
Lead-Borrower Relationship	13,375	0.47	0.50	0.00	0.00	0.00	1.00	1.00
Lead-Borrower # of Deals	39,105	9.20	18.50	0.00	0.00	2.00	10.00	40.00
Participant-Lead Relationship	131,717	0.90	0.30	0.00	1.00	1.00	1.00	1.00
Participant-Borrower Relationship	131,717	0.51	0.50	0.00	0.00	1.00	1.00	1.00
# Lenders	21,036	8.12	8.56	1.00	2.00	6.00	11.00	24.00
# Leads	21,036	1.86	1.71	1.00	1.00	1.00	2.00	5.00
# Participants	21,036	6.26	8.27	0.00	1.00	4.00	9.00	22.00
Inst. Lender	21,036	0.45	0.50	0.00	0.00	0.00	1.00	1.00
Collateral	21,036	0.75	0.43	0.00	1.00	1.00	1.00	1.00
Spread	21,036	5.25	0.71	3.83	4.91	5.42	5.70	6.21
Total Leads Share	6,475	43.11	30.16	8.75	19.20	33.57	60.00	100.00
Max Lead Share	6,475	32.97	29.66	6.67	11.63	20.00	45.00	100.00
Av. Lead Share	6,475	32.34	29.61	6.48	11.33	20.00	42.11	100.00
Regulatory Variables								
Inevitable Disclosure Doctrine	21,036	0.12	.	.	.	.	.	.
Noncompete Enforcement Index	21,036	0.34	0.17	0.00	0.25	0.33	0.42	0.58
Other Loan Characteristics								
Maturity	21,036	50.81	23.03	12.00	36.00	60.00	60.00	84.00
PP	21,036	0.53	0.50	0.00	0.00	1.00	1.00	1.00
Amount	21,036	18.67	1.70	15.42	17.73	18.83	19.81	21.13
Time between	21,036	624.87	721.57	0.00	158.00	412.00	853.00	1823.00
Covenants	21,036	1.79	1.36	0.00	1.00	2.00	3.00	4.00
Revolver	21,036	0.57	0.50	0.00	0.00	1.00	1.00	1.00
Term A	21,036	0.06	0.24	0.00	0.00	0.00	0.00	1.00
Term B	21,036	0.27	0.44	0.00	0.00	0.00	1.00	1.00
Borrower Characteristics								
Size	21,036	6.97	1.90	3.71	5.72	6.99	8.26	10.08
Leverage	21,036	0.34	0.23	0.01	0.18	0.32	0.46	0.76
ROA	21,036	0.00	0.29	-0.05	0.00	0.01	0.02	0.04
Loss	21,036	0.26	0.44	0.00	0.00	0.00	1.00	1.00
MTB	21,036	1.83	13.69	0.85	1.12	1.41	1.92	3.42
Special items	21,036	-0.01	0.05	-0.02	0.00	0.00	0.00	0.00
Interest coverage	21,036	28.76	736.51	-12.06	-1.06	1.43	7.37	68.56
R&D	21,036	0.00	0.01	0.00	0.00	0.00	0.00	0.03
Missing R&D	21,036	0.76	0.42	0.00	1.00	1.00	1.00	1.00
Return	21,036	0.30	12.98	-0.41	-0.11	0.02	0.16	0.53
Negative return	21,036	0.44	0.50	0.00	0.00	0.00	1.00	1.00

This table presents sample descriptive statistics for the main variable of interest. All variables are defined in Appendix B.

Table 1 presents descriptive statistics for the variables I use in my empirical tests. The main explanatory variables, UTSA and the text measure identifying borrowers that adopt trade secrecy, as measured by 10-K discussions, have mean of 73% and 43% of the loans in the

sample, respectively. The high proportion of loans post UTSA is because the first state adopted UTSA in 1981, while DealScan loan data coverage is limited prior 1994. With respect to my relationship variables, 47% of the loan facilities in my sample are issued by a lead bank that syndicated above 50% of the borrowers' past deals and originated 9.2 prior deals with the borrower, on average, with the number of lead-borrower past deals ranging from 0-40. Further, 90% of syndicate participants join syndicates led by lenders they previously transacted with, to provide funding to relationship borrowers in 51% of the loans. The prevalence of relationship financing in my sample demonstrates the importance of this financing arrangement in loan syndicate to overcome information asymmetries.

The average syndicate in my sample consists of 8.12 overall lenders and comprised of 1.86 lead arrangers and 6.26 syndicate participants on average. The overall number of lenders varies between 1-24 and is contributed mainly to the significant standard deviation in the number of participants, ranging from 0-22. Next, the lead arrangers retain 43% of the loan, while the means of the average lead share and the maximum lead share are both 32% approximately. The similarity in means and standard deviation between the average proportion of the loan held by lead arrangers and the maximum share held by a lead arranger demonstrate that lead arrangers mostly retain a similar exposure to the loan.

Other loan characteristics suggest that 75% of the loans are secured by collateral and the average loan pricing is 190 basis points (*Spread* is the natural logarithm of all-in-drawn interest spread). Further, the average loan amount in my sample is $128M (*Amount* is the natural logarithm of loan amount) with a maturity of about 4 years (50.81 months). With regards to the type of sample loans, 57% of the loan facilities are revolver credit lines, 6% are term loan A, 27% are term loan B or below, and 10% are other types of loans or loans with missing type data.

Finally, sample borrowers are relatively large, with a mean value of total assets of $1,060M (*Size* is measured as the logarithm of the total assets). The average ratio of earnings before extraordinary items to total assets (*ROA*) is 0, corresponding with 26% of sample borrowers sample experiencing losses. Sample borrower leverage, measured as the ratio of total debt to total assets, is 34%, and the market-to-book ratio is 1.83.

CHAPTER 5: RESULTS

5.1 Trade Secrets and The Probability of a Relationship Lead Arranger

I start my analysis with examining how trade secrecy is associated with the probability of a relationship lender serving as lead arranger. Borrowers' trade secrecy imposes information risk on lenders competing to serve as lead arrangers. The borrower has incentive to conceal the secret to avoid misappropriation risk. Further, as trade secrets are novel, borrower-specific, and lack of comparative data by nature, they often require lenders' expertise and familiarity (or a relationship) between the information collector and the decision maker (Liberti and Peterson, 2019). Both result in higher information acquisition costs for competing lead arrangers.

As discussed earlier, I hypothesize that relationship lending can address the enhanced information risk imposed by trade secrecy and facilitate more efficient information sharing between the borrower and the lead arranger. From the perspective of a borrower seeking financing, relationship lending enables borrowers to reveal more confidential information to the lead arranger without risking misappropriation of the secret (Boot, 2000). From the lenders' perspective, repeated interactions with the borrower would enable the lender to gain more expertise and build trust with the borrower, decreasing production costs of borrower-specific information and better monitoring (Cai et al., 2017). Further, through repeated access to borrowers' proprietary information is a significant competitive advantage to incumbent banks (Rajan, 1992). I predict that the probability that a relationship lead arranger initiating the loan increases in borrowers' reliance on trade secrecy.

Table 2: *Trade Secrets and the Probability of a Relationship Lead Arranger*

	Lead-Borrower Relationship		***Lead-Borrower # of Deals***	
	(1)	(2)	(3)	(4)
UTSA	0.301***		0.737***	
	(0.043)		(0.213)	
Trade secrecy		0.121***		1.643***
		(0.040)		(0.193)
Regulatory controls				
Inevitable disclosure doctrine	-0.067	-0.062	0.569*	0.556*
	(0.060)	(0.060)	(0.292)	(0.291)
Noncompete enforcement index	0.097	0.165	-1.758***	-1.527***
	(0.113)	(0.113)	(0.572)	(0.569)
Borrower controls				
Size	0.039**	0.041**	1.379***	1.363***
	(0.018)	(0.018)	(0.082)	(0.082)
Leverage	-0.248***	-0.216**	0.144*	0.197**
	(0.091)	(0.091)	(0.079)	(0.079)
ROA	1.396**	1.413**	-7.084**	-7.409**
	(0.709)	(0.708)	(3.273)	(3.271)
Loss	-0.249***	-0.254***	-1.849***	-1.907***
	(0.053)	(0.053)	(0.250)	(0.250)
MTB	0.046**	0.039**	-0.098	-0.163*
	(0.018)	(0.018)	(0.091)	(0.091)
Special items	-1.505*	-1.531*	6.773*	7.254*
	(0.811)	(0.810)	(3.910)	(3.907)
Z-score	-0.011**	-0.010**	0.007	0.006
	(0.004)	(0.004)	(0.005)	(0.005)
Interest coverage	-0.000	-0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
R&D	-6.070***	-5.956***	-10.572	-11.711
	(2.199)	(2.188)	(10.327)	(10.318)
Missing R&D	0.002	0.030	-0.981***	-0.467*
	(0.057)	(0.058)	(0.265)	(0.271)
Return	-0.001	-0.001	-0.009**	-0.010**
	(0.002)	(0.002)	(0.004)	(0.004)
Negative return	0.043	0.040	-0.347*	-0.363*
	(0.038)	(0.038)	(0.186)	(0.186)

Table 2 - Continued

	Lead-Borrower Relationship		***Lead-Borrower # of Deals***	
	(1)	(2)	(3)	(4)
Loan controls				
Maturity	0.007***	0.007***	0.027***	0.026***
	(0.001)	(0.001)	(0.005)	(0.005)
PP	-0.278***	-0.284***	-2.725***	-2.697***
	(0.044)	(0.044)	(0.209)	(0.209)
Amount	0.422***	0.417***	0.704***	0.687***
	(0.021)	(0.021)	(0.090)	(0.090)
Collateral	-0.127***	-0.146***	1.922***	1.856***
	(0.049)	(0.049)	(0.246)	(0.246)
Time between	-0.000***	-0.000***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Covenants	0.022	0.019	0.002	-0.006
	(0.016)	(0.016)	(0.081)	(0.081)
Revolver	0.428***	0.437***	0.959***	0.964***
	(0.069)	(0.069)	(0.352)	(0.351)
Term A	0.733***	0.739***	3.797***	3.692***
	(0.119)	(0.119)	(0.466)	(0.466)
Term B	-0.000	0.008	0.234	0.264
	(0.083)	(0.083)	(0.410)	(0.409)
Model	Logit	Logit	OLS	OLS
Fixed effects	No	No	Industry/Year	Industry/Year
N	13,375	13,375	39,105	39,105
R^2	0.116	0.114	0.050	0.051

This table presents results from Logit regressions estimating the probability of relationship lead arranger (columns 1-2) and OLS regressions estimating the number of prior deals syndicated by a lead arranger (columns 3-4) as a function of borrowers' trade secrecy activity. *Lead-Borrower Relationship* is an indicator variable equal to 1 if a lead arranger has syndicated at least 50% of a borrower's prior loan deals by volume over the five-year period preceding the loan issuance date, 0 otherwise. *Lead-Borrower # of Deals* is the number of a borrower's prior loan deals that a lead arranger has syndicated over the five-year period preceding the loan issuance date. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

I present my findings in Table 2. The first two columns show the results of estimating a logit regression estimating the probability of relationship lead bank, where the dependent variable, *Lead-Borrower Relationship,* takes 1 if a lead arranger has syndicated at least 50% of a borrowers' prior loan deals by loan volume over the last five years preceding the loan issuance date. Column 1 shows that the passage of the UTSA increased the probability that a loan is syndicated by a relationship lead arranger by 35%. Further, the results in column 2 show that USTA increases the probability of a relationship lead arranger by 12%. Both estimates are highly statistically significant at the 1% level.

In Columns 3-4, I employ a complementary measure for the lead arranger-borrower relationship, *Lead-Borrower # of Deals*, counting the number of deals between the lead arranger and the borrower over the last five years preceding the loan issuance date. The results show that the number of past deals between the lead arranger and the borrower increases in trade secrecy. With respect to control variables, the inevitable disclosure doctrine, an mechanism for trade secrets protection that operates through restrictions on employee mobility, is significant only in columns 3-4 and operates, as expected, in the same direction as the UTSA. Further, relationship lending is positively associated with borrowers' size. Surprisingly, lead-borrower relationship is negatively associated with borrowers' R&D expenditures. Being an underlying proxy for trade secrets, I would expect to find a positive estimates on R&D expenditures. Finally, the estimates on loan controls demonstrate that relationship lending is positively associated with greater credit risk. Specifically, the probability of relationship lending increases in loan size and maturity and decreases with collateral.

Taken together, my results are consistent with the framework positing that relationship lending is a mechanism to address agency conflicts associated with information asymmetries in

private lending. Specifically, my results demonstrate the trust and secret keeping aspects of relationship lending as discussed in Berger (1999). Borrowers' match with lenders with which they built trust through previous relationship, enabling a more efficient information sharing without risking a potential leakage of the secret.

5.2 Trade Secrets and The Probability of Relationships Within Loan Syndicates

After establishing the increased likelihood for relationship lead bank to address the enhanced information risks associated with borrower's secrecy, I turn next to the second layer of information asymmetry. That is, information asymmetry within loan syndicates. Syndicate participants face limitations on their ability to access to borrowers' private information. As such, they face both adverse selection and moral hazard problems in the lending process (e.g., Sufi, 2007; Ivashina, 2009). My main hypothesis in this section is that syndicate participants address the incremental information risk caused by borrowers' trade secrecy activity by entering loans with relationship lead arrangers or relationship borrowers. Thus, I expect to find a positive estimates on my two constructs for borrowers' trade secrets, reflecting an increase in the probability for relationship syndicate participants.

Table 3: *Trade Secrets and the Probability of Relationships Within Loan Syndicates*

	Participant-Lead Relationship		***Participant-Borrower Relationship***	
	(1)	(2)	(3)	(4)
UTSA	0.197***		0.036***	
	(0.021)		(0.013)	
Trade secrecy		0.189***		-0.019
		(0.021)		(0.012)
Regulatory controls				
Inevitable disclosure doctrine	0.151***	0.137***	-0.048***	-0.050***
	(0.031)	(0.031)	(0.018)	(0.018)
Noncompete enforcement index	-0.095	-0.072	0.194***	0.202***
	(0.058)	(0.058)	(0.035)	(0.035)
Borrower controls				
Size	0.209***	0.205***	0.035***	0.035***
	(0.010)	(0.010)	(0.006)	(0.006)
Leverage	-0.416***	-0.393***	0.246***	0.245***
	(0.038)	(0.038)	(0.027)	(0.027)
ROA	-0.161	-0.184	-1.483***	-1.459***
	(0.407)	(0.407)	(0.286)	(0.286)
Loss	-0.233***	-0.246***	-0.118***	-0.119***
	(0.026)	(0.026)	(0.017)	(0.017)
MTB	0.057***	0.044***	-0.042***	-0.042***
	(0.012)	(0.011)	(0.007)	(0.007)
Special items	-0.243	-0.193	2.439***	2.401***
	(0.441)	(0.442)	(0.316)	(0.316)
Z-score	-0.002***	-0.002***	0.003***	0.003***
	(0.001)	(0.001)	(0.000)	(0.000)
Interest coverage	0.000***	0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
R&D	2.023	2.080	-1.132	-1.018
	(1.402)	(1.395)	(0.896)	(0.895)
Missing R&D	-0.010	0.042	0.040**	0.036**
	(0.031)	(0.031)	(0.018)	(0.018)
Return	0.001	0.001	-0.002**	-0.002**
	(0.002)	(0.002)	(0.001)	(0.001)
Negative return	0.110***	0.107***	0.005	0.006
	(0.020)	(0.020)	(0.012)	(0.012)

Table 3 - Continued

	Participant-Lead Relationship		***Participant-Borrower Relationship***	
	(1)	(2)	(3)	(4)
Loan controls				
Maturity	0.002***	0.002***	-0.004***	-0.004***
	(0.001)	(0.001)	(0.000)	(0.000)
PP	0.127***	0.124***	-0.150***	-0.151***
	(0.023)	(0.023)	(0.014)	(0.014)
Spread	-0.192***	-0.208***	-0.299***	-0.296***
	(0.021)	(0.021)	(0.011)	(0.011)
Amount	0.168***	0.167***	0.073***	0.073***
	(0.011)	(0.011)	(0.007)	(0.007)
Collateral	-0.209***	-0.219***	-0.104***	-0.106***
	(0.032)	(0.031)	(0.016)	(0.016)
Time between	0.000***	0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
Covenants	-0.151***	-0.154***	0.001	0.000
	(0.008)	(0.008)	(0.005)	(0.005)
Revolver	0.229***	0.230***	0.246***	0.246***
	(0.037)	(0.037)	(0.021)	(0.021)
Term A	0.568***	0.568***	0.128***	0.132***
	(0.052)	(0.052)	(0.028)	(0.028)
Term B	-0.471***	-0.469***	-0.232***	-0.232***
	(0.041)	(0.041)	(0.026)	(0.026)
Model	Logit	Logit	Logit	Logit
Fixed effects	No	No	No	No
N	131,717	131,717	131,717	131,717
R^2	0.099	0.099	0.037	0.037

This table presents results from Logit regressions estimating the probability of relationship participant lenders as a function of borrowers' trade secrecy activity. *Participant-Lead (Borrower) Relationship* is an indicator variable equal to 1 if the participant has been involved in a deal with the lead arranger (borrower) over the five-year period preceding the loan issuance date, 0 otherwise. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 3 shows the results for the logit model estimating the probability of prior relationship between the syndicate participant and the lead bank in columns 1-2, and the probability of relationship between syndicate participants and the borrower columns 3-4. My

results in columns 1-2 show that the probability for a relationship between the lead arranger and syndicate participants increase with both the UTSA and for borrowers that adopt trade secrecy as measured by 10-K discussion. Both results are highly statistically significant at the 1% level. Specifically, the UTSA increased the probability for a relationship between the lead arranger and syndicate participants by 20%. Next, I study the probability of relationship between syndicate participants and the borrower. The results in column 3 indicate that the passage of the UTSA cause an increase in the probability for relationship between syndicate participants and borrowers by 3.6%. However, the estimate on the text measure in column 4 is statistically insignificant.

Taken together, my results thus far demonstrate that borrowers' trade secrecy imposes an incremental information risk on loan syndicates and conform that relationship lending is an effective tool for syndicate participants to address moral hazard and adverse selection problems associated to borrowers' secrecy. Further, with respect to economic magnitudes, the lower increase in the likelihood of a relationship between the participant and the borrower (3.6%), relative to the increase in probability for participant-lead relationship (20%), demonstrate the importance of the lead arranger in the syndicate and the importance of having a previous relationship with the lead.

5.3 Trade Secrets and Lead Arranger Share

In this section, I turn to examine the lead share in the loan as another mechanism for addressing trade secrecy. The idea is that a larger share held by the lead arrangers increases the lead's credit risk exposure and motivates the lead to screen and monitor the loan more effectively. Borrowers' secrecy activity increases information asymmetries in the syndicate and requires a greater extent of monitoring effort by the lead arranger. Moreover, an increase in the informed party's share would signal a higher quality of the underlying project (Leland and Pyle, 1977). Nevertheless, relationship lending reduces the risk that the syndicate participants are

exposed to and as a result the lead arranger might not need to hold a significantly larger share in loans with secrecy. Overall, to the extent that relationship lending does not alleviate all information asymmetries associated with trade secrets, I predict that to signal a higher-quality loan to potential participants, and to motivate monitoring, the lead arranger's share in the loan increases in borrowers' secrecy.

Table 4: *Trade Secrets and Lead Arranger Share*

	Total Leads Share		***Max Lead Share***		***Av. Lead Share***	
	(1)	(2)	(3)	(4)	(5)	(6)
UTSA	1.852***		0.980*		0.828	
	(0.676)		(0.552)		(0.547)	
Trade secrecy		2.731***		1.160**		0.756
		(0.656)		(0.536)		(0.547)
Regulatory controls						
Inevitable disclosure doctrine	0.458	0.537	-0.116	-0.077	-0.087	0.484
	(0.939)	(0.938)	(0.767)	(0.766)	(0.760)	(0.758)
Noncompete enforcement index	-3.172*	-2.977	-2.467	-2.341	-2.266	-2.226
	(1.856)	(1.849)	(1.515)	(1.511)	(1.503)	(1.503)
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	OLS	OLS	OLS	OLS	OLS	OLS
Fixed effects	Industry/Year	Industry/Year	Industry/Year	Industry/Year	Industry/Year	Industry/Year
N	6,475	6,475	6,475	6,475	6,475	6,475
R^2	0.354	0.355	0.555	0.555	0.561	0.577

This table presents results from OLS regressions estimating the lead arranger share in the loan as a function of borrowers' trade secrecy activity. *Total/Max/Av. Lead Share* is the total share, maximum share, and average share of the loan held by the lead arrangers, expressed in percentages, respectively. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

I present the results of estimating my main specification with three measures for the share retained by the lead arranger in Table 4. I start with estimating the overall lead arrangers' exposure to the loan. The results in columns 1 and 2 are positive and statistically significant at

the 1% level, indicating that the lead arrangers as a group retain a larger proportion in the loan post UTSA passage (column 1) and for borrowers that adopt trade secrecy as measured by 10-K discussions (column 2). A larger supervisory board, in the form of greater lead arrangers share, could facilitate greater monitoring ability. On the other hand, each lead arranger's incentive to monitor is tied to their relative individual exposure to the loan. Specifically, any private benefits in the form of building a relationship with the borrower or up-front fees at the origination of the loan, charged to the borrower, would not necessarily incentive the lead to originate high-quality loans (Ivashina, 2009), nor to monitor post loan origination.

To further investigate the leads' monitoring incentives, I examine the maximum share retained by a lead bank in the syndicate. The results in columns 3-4 are positive but only marginally significant at the 10% level both for the passage of the UTSA and for the text measure for trade secrecy, indicating that there is some increase in the maximum lead share in syndicates funding borrowers with trade secrecy. I continue to investigate the average share retained by the lead arrangers in columns 5 and 6 and find no significant results, suggesting that there is no significant shift in the proportion held by the average lead bank in loans with trade secrets.

5.4 Trade Secrets and Lead-Participant Configuration

My results thus far support the theoretical framework suggesting that when the borrower requires more monitoring effort the lead arrangers retain a larger stake in the loan and form a more concentrated syndicate with respect to relationship lending. I further investigate loan syndicates concentration by testing the effect of trade secrets on the total number of lenders, the number of lead arrangers, and the number of syndicate participant.

The composition of a loan syndicate is especially important for risk sharing and negotiation considerations. From a risk sharing prospective, multiple lenders, leads and

participants, facilitate an efficient risk sharing between lenders with different competitive specializations and mitigate information asymmetries (Sufi, 2007). The effect of trade secrets in this case suggests that more lenders join the lending syndicate to compensate for the increased opacity and uncertainty associated with borrowers with trade secrets.

However, for a more efficient negotiation following borrowers' financial distress (e.g., any changes to loan pricing, maturity, collateralization, amortization schedules), the case of multiple lenders is problematic as the mechanism mostly requires majority voting to reach an agreement. In that case, more opaque borrowers with higher uncertainty would suggest a smaller syndicate structure to facilitate a more efficient negotiation between fewer lenders in the process of restructuring (Bolton and Scharfstein, 1996). Moreover, multiple lenders can increase hold-up problems in debt negotiations, as lenders with less exposure to the loan have incentives to free ride while holding a strong bargaining power, since unanimity requirement makes all lenders critical in decision making (Hart, 1995). Further, agency conflicts within the syndicate are potentially more severe when the lead arranger is monitored by multiple participant lenders, as coordination problems between participant lenders induce further inefficiencies in debt restructuring (Francois and Piera, 2007). In that case, the loan syndicate should respond to the increase in uncertainty associated with borrowers' secrecy by forming a smaller syndicate with fewer lenders, and in particular fewer participant lenders.

Finally, relationship lending is shown to facilitate risk sharing and coordination between lenders (Godlewski, 2010), mediating both opposing effects. As a result of these contradicting economic forces, I do not have a clear prediction in this section. It is worth noting that trade secrets derive economic value from exclusivity. The incentive to share the secret with fewer

lenders to avoid potential misappropriation might be of particular concern in designing the structure of the syndicate.

Table 5: *Trade Secrets and Lead-Participant Configuration*

	# Lenders		***# Leads***		***# Participants***	
	(1)	(2)	(3)	(4)	(5)	(6)
UTSA	-0.335***		0.092***		-0.426***	
	(0.109)		(0.023)		(0.109)	
Trade secrecy		-0.515***		0.139***		-0.653***
		(0.103)		(0.021)		(0.103)
Regulatory controls						
Inevitable disclosure	0.355**	0.359**	-0.001	-0.002	0.357**	0.361**
	(0.152)	(0.152)	(0.032)	(0.032)	(0.153)	(0.152)
Noncompete enforcen	0.254	0.186	-0.038	-0.019	0.292	0.205
	(0.292)	(0.291)	(0.061)	(0.061)	(0.292)	(0.292)
Borrower controls	Yes	Yes	Yes	Yes	Yes	Yes
Loan controls	Yes	Yes	Yes	Yes	Yes	Yes
Model	OLS	OLS	OLS	OLS	OLS	OLS
Fixed effects	Industry/Year	Industry/Year	Industry/Year	Industry/Year	Industry/Year	Industry/Year
N	21,036	21,036	21,036	21,036	21,036	21,036
R^2	0.330	0.331	0.274	0.275	0.280	0.281

This table presents results from OLS regressions estimating the number of lenders as a function of borrowers' trade secrecy activity. *# Lenders/Leads/Participants* is the total number of lenders, the number of lead arrangers, and the number of participants in the syndicate, respectively. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

I present the results of estimating the effect of borrowers' trade secrets on syndicate size in Table 5. Results in column 1 suggest that the passage of UTSA caused a decline in the average number of total lenders in loan syndicates. The text measure for borrowers' trade secrets is also associated with a highly statistically significant decrease in the number of total lenders. Next, I examine the structure of the syndicate with respect to the number of lead arrangers and participants. My results show an interesting pattern. While the number of lead arrangers

increases as a result of both the UTSA and 10-K discussion (columns 3-4), the number of participant lenders decrease by a larger magnitude (columns 5-6), resulting in a smaller syndicate. This result could be explained by either the need to maintain the secret between fewer, inside-lenders, or alternatively, it could be the mechanical manifestation of my results in previous section. As lead arrangers maintain a larger share in the loan, there is a smaller portion to be distributed between syndicate participants, and as a result, less syndicate participants join the funding.

Overall, my results in this section suggest that exclusivity requirements for secret keeping and flexibility in negotiations cause lending syndicates to respond to borrowers' secrecy by forming a more concentrated syndicate as expressed by fewer overall lenders. Further, the syndicate structure shifts towards more lead banks in lieu of syndicate participants, emphasizing the need for flexibility in decision making within the lending syndicate. The shift towards more lead arranger might facilitate charging more up-front fees or tighter direct relationships with the borrower.[7]

5.5 Trade secrets and Institutional Lenders

After documenting the effect of borrowers' trade secrets on the design of loan syndicates with respect to lending relationships and the concentration of the loan, in this section I examine the effect of trade secrets on the configuration of the syndicate with respect to the lenders' type. The influx of nonbank institutional lenders to loan syndicates contributed, among other factors, to the growth in syndicated loan market (Ivashina and Sun, 2011). Institutional lenders are subject less stringent regulation relative to commercial banks, facilitating exploitation of private

[7] In untabulated results I test for the effects of borrowers' trade secrets on loan fees and find insignificant results. I am cautious in making the conclusion that UTSA had no effect on loan fees as DealScan data on fees is only partially populated.

information gained through lending relationships by trading in the equity and debt markets (e.g., Acharya and Johnson, 2007; Bushman et al., 2010). Syndication to borrowers with trade secrets is of potential to gain access to private information that might be valuable in trading. Consequently, I predict that institutional lenders' participation in loan syndicated increases in borrowers' trade secrecy.

Table 6: *Trade Secrets and Institutional Lenders*

	Institutional Lender	
	(1)	(2)
UTSA	0.072**	
	(0.033)	
Trade secrecy		0.014
		(0.031)
Regulatory controls		
Inevitable disclosure doctrine	0.161***	0.160***
	(0.046)	(0.046)
Noncompete enforcement index	-0.102	-0.087
	(0.088)	(0.088)
Borrower controls	Yes	Yes
Loan controls	Yes	Yes
Model	Logit	Logit
Fixed effects	No	No
N	21,036	21,036
R^2	0.0679	0.0678

This table presents results from Logit regressions estimating the probability of institutional lenders participating in the syndicate. *Institutional Lender* is an indicator variable equal to 1 if the loan is issued with at least one institutional lender that, 0. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

I examine the probability of institutional lender participation in the syndicate by estimating my main specification (Eq.1) in a Logit model, substituting the dependent variable with an indicator, *Institutional Lender*, that takes 1 in loan facilities where there is at least one institutional lender, and 0 otherwise. The results in Table 6 column 1, estimating the probability of institutional lender, show a positive and statistically significant estimate at the 5% level, indicating that institutional lenders are more likely to enter loan syndicates post the passage of the UTSA. Specifically, the passage of the UTSA caused a 7.2 percent point relative increase in the probability of institutional lender participation in lending syndicates, consistent with the notion that institutional lenders target borrowers with private information that could be later used in alternative investment opportunities. Surprisingly, while in most other sections, the estimate on the coefficient on the IDD, an indirect positive shock to trade secrecy protection, is as expected, attenuated in either magnitude or significance level relative to the effect of the UTSA, in this section the effect of the IDD is larger in magnitude and highly significant at the 1% level, enforcing my conclusion on the positive effect of borrowers' trade secrets on institutional lenders' participation. Nevertheless, the estimate on the existence of trade secrets as measured by 10-K discussions is positive but statistically insignificant.

5.6 Trade Secrets and Collateral

The asset pledgeability hypothesis maintains that riskier borrowers secure debt in riskier times. Collateral is employed as a signaling mechanism for borrower's quality and as a protection mechanism for lenders in the occurrence of a default event (e.g., Stiglitz and Weiss, 1981; Rajan and Winton, 1995; Benmelech et al., 2022). Based on this notion, UTSA increases borrowers' incentives to invest in intangibles, borrower-specific assets that increase borrowers' opacity, require lender expertise, and that are less liquid in the secondary market. Following this

argument, lenders should hedge against the incremental risk by requiring more securitization when financing borrowers that incline to secrecy activity.

However, the adoption of the UTSA restricts affected firms' access to collateral. Growing research studies the role of IP collateral in private lending and provide evidence consistent with the view that innovative firms are credit constrained due to limited access to collateral (e.g., Loumioti, 2012; Mann, 2018; Hochberg et al., 2018). Furthermore, recent studies document the positive valuation of patent and trademark collateral in the form of decrease in loan spreads (Chava et al., 2017; Liss and Noiman, 2022). The passage of the UTSA caused a decline in the relative average patenting activity (Glaeser, 2018), and consequently, reduce the IP stock available to borrowers to serve as collateral. As the UTSA affect collateral requirements in opposing directions, my prediction in this section is ambiguous.

Table 7: *Trade Secrets and Collateral*

	Collateral	
	(1)	(2)
UTSA	-0.286***	
	(0.054)	
Trade secrecy		0.047
		(0.049)
Regulatory controls	Yes	Yes
Inevitable disclosure doctrine	-0.212***	-0.227***
	(0.074)	(0.074)
Noncompete enforcement index	-0.364***	-0.423***
	(0.140)	(0.140)
Borrower controls	Yes	Yes
Loan controls	Yes	Yes
Model	Logit	Logit
Fixed effects	No	No
N	21,036	21,036
R^2	0.474	0.473

This table presents results from Logit regressions estimating the probability of securing a loan as a function of borrowers' trade secrecy activity. *Collateral* is an indicator equal to 1 if the loan is secured, 0 otherwise. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

Table 7 reports the results for the effect of trade secrets on the probability of securing a loan. As shown in column 1, the coefficient on the marginal effect of the passage of UTSA on loan securitization is negative and statistically significant at the 1% level. Specifically, the passage of the UTSA caused a 28 percentage point relative decrease in the probability that the loan is secured by collateral. The estimate on the alternative text measure for borrowers' trade secrets is positive and insignificantly different from zero, suggesting that borrowers that discuss

trade secrets in their annual reports do not vary with respect to loan securitization, relative to other borrowers. My results show that borrowers' collateral constraint dominates the additional risk that UTSA imposed on lenders.

Complementary explanation for the documented reduction in collateral requirements could be the increased probability of relationship lending post UTSA. Studies show that relationship lending alleviates collateral requirements (Berger and Udell, 1992; Peterson and Rajan, 1994; Bharath et al., 2009). My results in Tables 3-4 also support the substitutional nature between relationship lending and collateral, as the estimate on collateral, used as a loan control variable in other specifications, is negative and statistically significant at the 1% level in all 3 relationship specifications (lead arranger-borrower, lead arranger-participant, and participant-borrower). However, the academic literature is inconclusive on the effect of relationship lending on collateral requirements, as some papers argue that lenders demand collateral to "lock-in" relationship borrowers (Rajan, 1992). My findings in this section also relate to a recent study by Guernsey et al. (2022). Their main hypothesis is that firms reduce debt levels, as a result of the UTSA, because of the binding collateral constraint. My paper shows the mechanism, relationship lending, that syndicates employ to address borrowers' collateral constraint and facilitate private funding.

5.7 Trade Secrets and Loan Pricing

The price of a loan compensates syndicate lender for net credit risk exposure, after other monitoring and compensation mechanisms that lenders required (e.g., fees, covenants, performance provisions, collateral, etc.). In the case of the UTSA, there are several factors that the loan pricing should reflect. The literature documents the positive association between information risk and the cost of capital (e.g., Easley and O'hara, 2004; Hale and Santos, 2009; Ivashina, 2009; Sufi, 2007). Thus, a positive shock to borrowers' proprietary information should

increase loan pricing. Further, since collateral is used to alleviates credit risk, the decrease in the likelihood of securing loans covered by UTSA (documented in previous section) is expected to increase loan pricing as well. Finally, inconsideration of my results in previous section, institutional lenders, who are more likely to enter loans for borrowers' who rely on trade secrecy, are known to demand higher loan spreads (Bushman et al., 2010). However, according to Petersen and Rajan (1994) and Berger and Udell (1995), relationship lending also makes it possible to reduce the information asymmetry about the borrower, leading to a lower loan spread.

Table 8: *Trade Secrets and Loan Pricing*

	Spread	
	(1)	(2)
UTSA	0.026***	
	(0.008)	
Trade secrecy		0.101***
		(0.007)
Regulatory controls		
Inevitable disclosure doctrine	0.002	0.001
	(0.011)	(0.011)
Noncompete enforcement index	-0.012	-0.006
	(0.021)	(0.021)
Borrower controls	Yes	Yes
Loan controls	Yes	Yes
Model	OLS	OLS
Fixed effects	Industry/Year	Industry/Year
N	21,036	21,036
R^2	0.483	0.487

This table presents results from OLS regressions estimating the loan pricing as a function of borrowers' trade secrecy activity. *Spread* is the natural logarithm of the loan spread over LIBOR. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. *Trade secrecy* is an indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ***, **, and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

My results in Table 7 confirm prior findings (Guernsey et al., 2022), the passage of the UTSA increased the relative loan spread by 0.026 basis points. I extend current findings by showing that borrowers that adopt trade secrecy, as measured by 10-K discussion, also experience an increase in loan pricing. Though my estimates are highly statistically significant, the economic magnitude is marginal. I find this phenomenon as another illustration for the usefulness of relationship lending in mitigation information risks and collateral constraints.

5.8 Borrowers' Ex-Ante Secrecy Reliance

My results thus far provide evidence of the role of previous lending relationships, between the borrower and the lenders and within lending syndicates, in mediating information risk created by borrowers' trade secrets. To provide further evidence of the effect of the UTSA on lending syndicates structure, I study the heterogeneous effect of the UTSA on the probability of relationship lending and the cost of debt as a function of borrowers' secrecy reliance at the time of loan origination.

Borrowers who are ex ante more reliant on secrecy are more opaque before the passage of the UTSA and are likely to rely more heavily on this type of intangibles after the passage of the UTSA, resulting in greater information risk and agency conflicts for private lenders, relative to borrowers who rely less on trade secrets. Therefore, I expect to find a more pronounced increase in the probability of relationship lending around borrowers with higher pre-existing reliance on trade secrets as intellectual assets protection. I classify borrowers as having high pre-existing secrecy reliance if the borrower has nonzero R&D expenditure in the current and 3 years preceding loan origination, and zero patent application in the current and next 3 years after loan origination, and low secrecy reliance otherwise (following Guernsey et al., 2020).

Table 9: *Borrowers' Secrecy Reliance and the Effect of the UTSA*

Panel A: Secrecy reliance and the probability of a relationship lead arranger

	Dependent Variable: *Lead-Borrower Relationship*	
	Secrecy Reliance	
	High	Low
UTSA	0.299***	0.122**
	(0.076)	(0.050)
Controls	Yes	Yes
Model	Logit	Logit
N	4,821	8,554
R^2	0.146	0.100

Panel B: Secrecy reliance and the probability of relationship between the lead arranger and syndicate participants

	Dependent Variable: *Participant-Lead Relationship*	
	Secrecy Reliance	
	High	Low
UTSA	0.283***	0.165***
	(0.038)	(0.025)
Controls	Yes	Yes
Model	Logit	Logit
N	45,956	85,761
R^2	0.113	0.096

Panel C: Secrecy reliance and the probability of relationship between syndicate participants and the borrower

	Dependent Variable: *Participant-Borrower Relationship*	
	Secrecy Reliance	
	High	Low
UTSA	0.116***	0.038***
	(0.020)	(0.014)
Controls	Yes	Yes
Model	Logit	Logit
N	45,956	85,761
R^2	0.043	0.038

Table 9 - Continued

Panel D: Secrecy reliance and loan pricing

	Dependent Variable: *Spread*	
	Secrecy Reliance	
	High	Low
UTSA	0.063***	0.019**
	(0.013)	(0.008)
Controls	Yes	Yes
Model	OLS	OLS
Fixed effects	Industry/Year	Industry/Year
N	8,700	12,336
R^2	0.511	0.038

This table presents the effects of the UTSA on the probability of relationship lead arranger (*Lead-Borrower Relationship*), the probability of prior relationship between syndicate participants and the lead arranger (*Participant-Lead Relationship*), or the borrower the borrower (*Participant-Borrower Relationship*), and loan pricing (*Spread*), conditional on the borrowers' secrecy reliance. Secrecy reliance is classified as high if the borrower has nonzero R&D expenditure in the current and 3 years preceding loan origination, and 0 patent application in the current and next 3 years after loan origination, and low otherwise. *UTSA* is an indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

I estimate the effect of the UTSA on the probability for relationship lending for the two subsamples, loan facilities funding borrowers with either high or low secrecy reliance at the time of loan origination. My results in Table 10 are consistent with lenders respond to the UTSA by using more relationship lending when borrowers are ex ante more reliant on secrecy. Panel A shows that the probability for a relationship lead arranger syndicating a loan increases by 30% for the high secrecy reliance partition after the passage of the UTSA, relative to an increase of 12% for the low secrecy reliance partition. Further, while the coefficient on UTSA in the high partition is statistically significant at the 1% level, the estimated coefficient in the low partition is significant at the 5% only.

Next, I test the effect of the UTSA on the probability of lending relationships within loan syndicates. As evidenced in panel C and panel D, the increase in the probability for a previous lending relationship between syndicate participants and the lead arranger and between syndicate participants and the borrower post the passage of the UTSA is more pronounced for the high secrecy reliance partition, relative to the low secrecy reliance partition. Economically, when comparing between the results in this section (Table 9) and the effect of the UTSA on the whole sample (Table 3), the probability for a lending relationship between syndicate participants and the lead arranger increases by 28% when borrowers are more reliant on secrecy at the time of loan origination, relative to 19% when estimating the effect of the UTSA on the whole sample (Table 3).

Finally, I test whether the effect of the UTSA on the cost of debt is stronger for borrowers with high secrecy intensity. Table 6, panel D reports that post UTSA, lenders charge higher interest spreads by 0.06 basis points, relative to increase of 0.02 basis points in the case of borrowers with low secrecy reliance. Again, while the high secrecy reliance partition is significant at the 1% level, the low secrecy reliance partition is statistically significant at the 5% level only. To conclude, my results in this section support the main motivation of this study by demonstrating the importance of secrecy in assessing credit worthiness. Lenders learn of borrowers' reliance on trade secrecy as an integral part of the screening process and respond to the increased information risk in borrowers' secrecy by using more relationship lending between all sides of the deal and charging higher cost of debt.

5.9 The Parallel Trends Assumption

In this section, I test for pre-existing differential trends between loan facilities generated in states covered by the UTSA and other states. I estimate my main specification, except I substitute the main indicator for the enactment of the act, *UTSA,* with separate indicator variables

based on the year relative to the law passage. Specifically, I separate the main variable, *UTSA,* into indicator variables that take one in each year during the three years preceding the enactment of the UTSA, in the year of the passage of the act, in each of the two years following UTSA, and three years and after UTSA, alternatively.

Table 10: *The Parallel Trends Assumption*

	Lead-Borrower Relationship	***Participant-Lead Relationship***	***Participant-Borrower Relationship***
	(1)	(2)	(3)
UTSA Adoption^{-3}	0.241	0.113	0.248
	(0.189)	(0.091)	(0.441)
UTSA Adoption^{-2}	0.205	-0.008	0.074
	(0.183)	(0.080)	(0.051)
UTSA Adoption^{-1}	0.112	0.199	0.056
	(0.090)	(0.001)	(0.050)
UTSA Adoption^{0}	0.494***	0.600***	0.241***
	(0.172)	(0.106)	(0.051)
UTSA Adoption^{+1}	0.647***	0.067	0.193***
	(0.178)	(0.094)	(0.054)
UTSA Adoption^{+2}	0.432***	0.275***	0.164***
	(0.158)	(0.079)	(0.043)
UTSA Adoption^{3+}	0.349***	0.200***	0.054***
	(0.045)	(0.022)	(0.014)
Regulatory controls	Yes	Yes	Yes
Borrower controls	Yes	Yes	Yes
Loan controls	Yes	Yes	Yes
Model	Logit	Logit	Logit
Fixed effects	No	No	No
N	13,375	131,717	131,717
R^2	0.117	0.098	0.036

This Table presents results from estimating Logit differences-in-differences regressions of my main relationship lending variables function of UTSA t=−1,−2,−3; UTSA t=0; UTSA t=1,2; UTSA t≥3. All variables are defined in Appendix B. Standard errors are clustered at the borrower's headquarters state level and reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

I present the results in Table 9, where the three dependent variables are the main relationship lending results: the probability for a relationship between the lead bank and the borrower, between the lead bank and the participants, and between the syndicate participants and the borrower. I do not report the results for the control coefficients in the interest of parsimony.

For the time period prior the passage of the act, the estimates are statistically insignificant from zero. However, as of the year of the passage an after, the estimates are mostly positive and statistically significant, suggesting that the probability of relationship lending increased after the passage of the law, and are not driven by pre-existing differential trends.

CHAPTER 6: CONCLUSIONS

My study offers direct evidence on the role played by proprietary information in the form of trade secrets in private lending markets. I show the contracting and design mechanism that lending syndicates adapt to address the increased information risk associated with borrowers' secrecy activity. My main results support lenders form more concentrated syndicates around borrowers with trade secrets to facilitate trust and information sharing between borrower and lenders and within the syndicate, aiming to mitigate agency costs associated with secrecy activity. I document that borrowers' trade secrecy increase the probability of relationship lending between the lead arranger and the borrower, between the lead arranger and syndicate participants, and between the participants and the borrower.

Further, I show that lending syndicates are more concentrated around borrowers with trade secrets with respect to the share retained by the lead arrangers and the number of lenders. Specifically, my results show that to further mitigate adverse selection and moral hazard problems, the lead arrangers retain a larger share of the loan and form a syndicate with less overall lenders, and more lead arrangers in lieu of syndicate participants. I also document that institutional lenders are more likely to enter syndicates funding borrowers with secrecy activity, potentially to gain access to borrowers' private information for gaining economic rents in other venues. Next, I show that relationship lending alleviates lenders' collateral requirements, such that secrets-intensive borrowers are less likely to secure loans. To conclude, I examine loan pricing and find that borrowers experience higher cost of debt.

APPENDIX A: THE UTSA BY STATE AND YEAR

State	Year	State	Year
Alabama	1987	Montana	1985
Alaska	1988	Nebraska	1988
Arizona	1990	Nevada	1987
Arkansas	1981	New Hampshire	1990
California	1985	New Jersey	2012
Colorado	1986	New Mexico	1989
Connecticut	1983	New York	N/A
Delaware	1982	North Carolina	1981
Florida	1988	North Dakota	1983
Georgia	1990	Ohio	1994
Hawaii	1989	Oklahoma	1986
Idaho	1981	Oregon	1988
Illinois	1988	Pennsylvania	2004
Indiana	1982	Rhode Island	1986
Iowa	1990	South Carolina	1992
Kansas	1981	South Dakota	1988
Kentucky	1990	Tennessee	2000
Louisiana	1981	Texas	2013
Maine	1987	Utah	1989
Maryland	1989	Vermont	1996
Massachusetts	N/A	Virginia	1986
Michigan	1998	Washington	1982
Minnesota	1980	West Virginia	1986
Mississippi	1990	Wisconsin	1986
Missouri	1995	Wyoming	2006

APPENDIX B: VARIABLE DEFINITIONS

Variable	Definition
# Leads	The number of lead arrangers in the syndicate (DealScan).
# Lenders	The total number of lenders in the syndicate (DealScan).
# Participants	The number of participant lenders in the syndicate (DealScan).
Amount	The natural logarithm of the loan amount in US dollars (DealScan).
Av. Lead Share	The average share of the loan held by the lead arranger, expressed in percentages (DealScan).
Collateral	An indicator equal to 1 if the loan is secured, 0 otherwise (DealScan).
Covenants	The number of financial covenants (DealScan).
Institutional Lender	An indicator variable equal to 1 if the loan is issued with at least one institutional lender that, 0 otherwise (DealScan).
Interest coverage	Earnings before interest and tax divided by the interest expense, measured in the quarter preceding a loan's issuance (Compustat).
Inevitable disclosure doctrine	An indicator equal to one if the headquarters state judiciary applies the inevitable disclosure doctrine at the time of a loan's issuance, 0 otherwise.
Lead-Borrower Relationship	An indicator variable equal to 1 if a lead arranger has syndicated at least 50% of a borrower's prior loan deals by volume over the five-year period preceding the loan issuance date, 0 otherwise (DealScan).
Lead-Borrower # of Deals	The number of a borrower's prior loan deals a lead arranger has syndicated over the five-year period preceding the loan issuance date (DealScan).
Leverage	Long-term debt plus debt in current liabilities divided by total assets, estimated in the quarter preceding a loan's issuance (Compustat).
Loss	An indicator variable equal to 1 if ROA is less than zero, 0 otherwise (Compustat).
Maturity	The number of months to maturity (DealScan).
Max Lead Share	The maximum share of the loan held by the lead arranger, expressed in percentages (DealScan).
Missing R&D	An indicator equal to one if data on R&D expenditures is missing (Compustat).
MTB	The market value of equity divided by the book value of equity, measured in the quarter preceding a loan's issuance (Compustat).
Negative return	An indicator variable equal to 1 if *Return* is less than zero, 0 otherwise (CRSP).
Noncompete enforcement index	The noncompete enforcement index developed by Garmaise (2009).
Participant-Borrower Relationship	An indicator variable equal to 1 if the participant has been involved in a deal with the borrower over the five-year period preceding the loan issuance date, 0 otherwise (DealScan).
Participant-Lead Relationship	An indicator variable equal to 1 if the participant has been involved in a deal with the lead arranger over the five-year period preceding the loan issuance date, 0 otherwise (DealScan).
PP	An indicator variable equal to 1 if the loan has a performance pricing provision, 0 otherwise (DealScan).
R&D	R&D expenditures divided by total assets and measured in the quarter preceding a loan's issuance. Missing values of R&D are replaced by zeroes (Compustat).
Return	The borrower's market-adjusted (value-weighted) cumulative return over the 180-day period prior to a loan's issuance date (CRSP).
Revolver	An indicator variable equal to 1 if the loan is a revolving line of credit, 0 otherwise (DealScan).
ROA	Return on assets, defined as earnings before extraordinary items divided by total assets, measured in the quarter preceding a loan's issuance (Compustat).
Size	The natural logarithm of total assets, measured in the quarter preceding a loan's issuance (Compustat).
Special items	Special items divided by total assets, measured in the quarter preceding a loan's issuance (Compustat).

Variable	Definition
Spread	The natural logarithm of the loan spread over LIBOR (DealScan).
Secrecy Reliance	Classified as high if the borrower has nonzero R&D expenditure in the current and 3 years preceding loan origination, and 0 patent application in the current and next 3 years after loan origination, and low otherwise (US Patent and Trademark Office, Compustat).
Time between	The number of days between the loan's issuance date and the previous deal (DealScan).
Term A	An indicator variable equal to 1 if the loan type is Term loan A, 0 otherwise (DealScan).
Term B	An indicator variable equal to 1 if the loan type is Term loan B or below (C, D, E, and F), 0 otherwise (DealScan).
Total Leads Share	The total share of the loan held by the lead arrangers, expressed in percentages (DealScan).
Trade secrecy	An indicator equal to one if the firm's 10-K filing mentions "trade secret" or "trade secrecy", 0 otherwise (Compustat).
UTSA	An indicator variable equal to 1 if the borrower's headquarters state has enacted the UTSA at the time of a loan's issuance.
$UTSA\ Adoption^{t=-1,-2,-3}$	An indicator variable equal to 1 in each of the three years prior to the passage of the UTSA, 0 otherwise.
$UTSA\ Adoption^{t=0}$	An indicator variable equal to 1 in the year the UTSA was first passed, 0 otherwise.
$UTSA\ Adoption^{t=1,2}$	An indicator variable equal to 1 in each of the two years after the passage of the UTSA, 0 otherwise.
$UTSA\ Adoption^{t\geq 3}$	An indicator variable equal to 1 three years after the passage of the UTSA and thereafter, 0 otherwise.
Z-score	Altman's [1968] bankruptcy measure, estimated by the following model: $Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 0.999X_5$, where X_1 is defined as working capital (total current asset minus total current liabilities) divided by total assets. X_2 is defined as retained earnings divided by total assets. X_3 is defined as earnings before interest and taxes divided by total assets. X_4 is defined as the market value of equity divided by total liabilities. X_5 is defined as total sales divided by total assets. All measures are estimated in the quarter preceding a loan's issuance (Compustat).

REFERENCES

Almeling, D. S. (2012). Seven reasons why trade secrets are increasingly important. *Berkeley Technology Law Journal*, 1091-1117.

Altman, E. I. (1968). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. *The journal of finance*, *23*(4), 589-609.

Allen, F. (1990). The market for information and the origin of financial intermediation. *Journal of financial intermediation*, *1*(1), 3-30.

Amiram, D., Beaver, W. H., Landsman, W. R., & Zhao, J. (2017). The effects of credit default swap trading on information asymmetry in syndicated loans. *Journal of Financial Economics*, *126*(2), 364-382.

Acharya, V. V., & Johnson, T. C. (2007). Insider trading in credit derivatives. *Journal of Financial Economics*, *84*(1), 110-141.

Acharya, V. V., & Subramanian, K. V. (2009). Bankruptcy codes and innovation. *The Review of Financial Studies*, *22*(12), 4949-4988.

Acharya, V., & Xu, Z. (2017). Financial dependence and innovation: The case of public versus private firms. *Journal of Financial Economics*, *124*(2), 223-243.

Benmelech, E., Kumar, N., & Rajan, R. (2022). The secured credit premium and the issuance of secured debt. *Journal of Financial Economics*, *146*(1), 143-171.

Berger, A. N., & Udell, G. F. (1992). Some evidence on the empirical significance of credit rationing. *Journal of Political Economy*, *100*(5), 1047-1077.

Berger, A. N., & Udell, G. F. (1995). Relationship lending and lines of credit in small firm finance. *Journal of business*, 351-381.

Berger, A. (1999). The 'Big Picture' of relationship finance, *in* "Business Access to Capital and Credit" (J. L. Blanton, A.Williams, and S. L. Rhine, Eds.), pp. 390–400.AFederal Reserve System Research Conference.

Beyer, A., Cohen, D. A., Lys, T. Z., & Walther, B. R. (2010). The financial reporting environment: Review of the recent literature. *Journal of accounting and economics*, *50*(2-3), 296-343.

Bharath, S. T., Dahiya, S., Saunders, A., & Srinivasan, A. (2011). Lending relationships and loan contract terms. *The Review of Financial Studies*, *24*(4), 1141-1203.

Bolton, P., & Scharfstein, D. S. (1996). Optimal debt structure and the number of creditors. *Journal of political economy*, *104*(1), 1-25.

Bolton, P., Chen, H., & Wang, N. (2013). A dynamic tradeoff theory for financially constrained firms. *Columbia Business School*.

Bolton, P., Freixas, X., Gambacorta, L., & Mistrulli, P. E. (2016). Relationship and transaction lending in a crisis. *The Review of Financial Studies*, *29*(10), 2643-2676.

Boot, A. W. (2000). Relationship Banking: What Do We Know?. *Journal of Financial Intermediation,* 9, 7–25.

Brown, J. R., Fazzari, S. M., & Petersen, B. C. (2009). Financing innovation and growth: Cash flow, external equity, and the 1990s R&D boom. *The Journal of Finance*, *64*(1), 151-185.

Bushman, R. M., Smith, A. J., & Wittenberg-Moerman, R. (2010). Price discovery and dissemination of private information by loan syndicate participants. *Journal of Accounting Research*, *48*(5), 921-972.

Bushman, R. M., Williams, C. D., & Wittenberg-Moerman, R. (2017). The informational role of the media in private lending. *Journal of Accounting Research*, *55*(1), 115-152.

Cai, J., Eidam, F., Saunders, A., & Steffen, S. (2017). Diversification or specialization? An analysis of distance and collaboration in loan syndication networks. *An Analysis of Distance and Collaboration in Loan Syndication Networks (February 22, 2017)*.

Chava, S., Nanda, V., & Xiao, S. C. (2017). Lending to innovative firms. *The Review of Corporate Finance Studies*, *6*(2), 234-289.

Cohen, W. M. (2010). Fifty years of empirical studies of innovative activity and performance. *Handbook of the Economics of Innovation*, *1*, 129-213.

Cohen, L., Gurun, U. G., & Kominers, S. D. (2019). Patent trolls: Evidence from targeted firms. *Management Science*, *65*(12), 5461-5486.

Dechow, P., Ge, W., & Schrand, C. (2010). Understanding earnings quality: A review of the proxies, their determinants and their consequences. *Journal of accounting and economics*, *50*(2-3), 344-401.

Diamond, D. W. (1984). Financial intermediation and delegated monitoring. *The review of economic studies*, *51*(3), 393-414.

Easley, D., & O'hara, M. (2004). Information and the cost of capital. *The journal of finance*, *59*(4), 1553-1583.

François, P., & Missonier-Piera, F. (2007). The agency structure of loan syndicates. *Financial Review*, *42*(2), 227-245.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of financial economics*, *67*(2), 217-248.

Garmaise, M. J. (2011). Ties that truly bind: Noncompetition agreements, executive compensation, and firm investment. *The Journal of Law, Economics, and Organization*, *27*(2), 376-425.

Glaeser, S. (2018). The effects of proprietary information on corporate disclosure and transparency: Evidence from trade secrets. *Journal of Accounting and Economics*, *66*(1), 163-193.

Glaeser, S., & Guay, W. R. (2017). Identification and generalizability in accounting research: A discussion of Christensen, Floyd, Liu, and Maffett (2017). *Journal of Accounting and Economics*, *64*(2-3), 305-312.

Glaeser, S., Michels, J., & Verrecchia, R. E. (2020). Discretionary disclosure and manager horizon: Evidence from patenting. *Review of Accounting Studies*, *25*(2), 597-635.

Godlewski, C. J. (2010). How to get a syndicated loan fast? The role of syndicate composition and organization. *Finance*, *31*(2), 051-092.

Gopalan, R., Udell, G. F., & Yerramilli, V. (2011). Why do firms form new banking relationships?. *Journal of Financial and Quantitative Analysis*, *46*(5), 1335-1365.

Guernsey, S., John, K., & Litov, L. P. (2022). Actively keeping secrets from creditors: evidence from the uniform trade secrets act. *Journal of Financial and Quantitative Analysis*, 57(7), 2516-2558.

Hart, O. (1995). Corporate governance: some theory and implications. *The economic journal*, *105*(430), 678-689.

Hale, G., & Santos, J. A. (2009). Do banks price their informational monopoly?. *Journal of Financial Economics*, *93*(2), 185-206.

Hochberg, Y. V., Serrano, C. J., & Ziedonis, R. H. (2018). Patent collateral, investor commitment, and the market for venture lending. *Journal of Financial Economics*, *130*(1), 74-94.

Holmstrom, B. (1989). Agency costs and innovation. *Journal of Economic Behavior & Organization*, *12*(3), 305-327.

Ivashina, V. (2009). Asymmetric information effects on loan spreads. *Journal of financial Economics*, *92*(2), 300-319.

Ivashina, V., & Scharfstein, D. (2010). Loan syndication and credit cycles. *American Economic Review*, *100*(2), 57-61.

Ivashina, V., & Sun, Z. (2011). Institutional stock trading on loan market information. *Journal of financial Economics*, *100*(2), 284-303.

Jankowski, J. E. (2012). Business use of intellectual property protection documented in NSF survey. *NSF info brief, NSF*, 12-307.

Jennings, J., Lee, J., & Matsumoto, D. A. (2017). The effect of industry co-location on analysts' information acquisition costs. *The Accounting Review*, *92*(6), 103-127.

Kang, J. K. (2022). Gone with the Big Data: Institutional lender demand for private information. *Harvard Business School Accounting & Management Unit Working Paper*, (22-053).

Karolyi, S. A. (2018). Personal lending relationships. *The Journal of Finance*, *73*(1), 5-49.

Khan, U., Li, X., Williams, C. D., & Wittenberg-Moerman, R. (2019). The effect of information opacity and accounting irregularities on personal lending relationships: Evidence from lender and manager co-migration. *The Accounting Review*, *94*(4), 303-344.

Klasa, S., Ortiz-Molina, H., Serfling, M., & Srinivasan, S. (2018). Protection of trade secrets and capital structure decisions. *Journal of financial economics*, *128*(2), 266-286.

Lee, S. W., & Mullineaux, D. J. (2004). Monitoring, financial distress, and the structure of commercial lending syndicates. *Financial management*, 107-130.

Leland, H. E., & Pyle, D. H. (1977). Informational asymmetries, financial structure, and financial intermediation. *The journal of Finance*, *32*(2), 371-387.

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

Liss, A., & Noiman, B. (2022). Ownership Uncertainty and the Role of Intellectual Property as Collateral.

Loumioti, M. (2012). The use of intangible assets as loan collateral. *Available at SSRN 1748675.*

Mann, W. (2018). Creditor rights and innovation: Evidence from patent collateral. *Journal of Financial Economics*, *130*(1), 25-47.

Manso, G. (2011). Motivating innovation. *The journal of finance*, *66*(5), 1823-1860.

Peterson, M. A., & Rajan, R. G. (1994). The Benefit of Firm Creditors Relationship: Evidence From Small Business Data. *Journal of Finance*, *49*(1), 337-341.

Petersen, M. A., & Rajan, R. G. (1995). The effect of credit market competition on lending relationships. *The Quarterly Journal of Economics*, *110*(2), 407-443.

Png, I. P. L. "Law and Innovation: Evidence from State Trade Secrets Laws." Review of Economics and Statistics, 99 (2017a), 167–179.

Png, I. P. L. "Secrecy and Patents: Theory and Evidence from the Uniform Trade Secrets Act." Strategy Science, 2 (2017b), 176–193.

Peyravan, L. (2020). Financial reporting quality and dual-holding of debt and equity. *The Accounting Review*, *95*(5), 351-371.

Saidi, F., & Žaldokas, A. (2021). How does firms' innovation disclosure affect their banking relationships?. *Management Science*, *67*(2), 742-768.

Sharpe, S. A. (1990). Asymmetric information, bank lending, and implicit contracts: A stylized model of customer relationships. *The journal of finance*, *45*(4), 1069-1087.

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

Sufi, A. (2007). Information asymmetry and financing arrangements: Evidence from syndicated loans. *The Journal of Finance*, *62*(2), 629-668.

Rajan, R. G. (1992). Insiders and outsiders: The choice between informed and arm's-length debt. *The Journal of finance*, *47*(4), 1367-1400.

Rajan, R., & Winton, A. (1995). Covenants and collateral as incentives to monitor. *The Journal of Finance*, *50*(4), 1113-1146.

Ribstein, L. E., & Kobayashi, B. H. (1996). An economic analysis of uniform state laws. *The Journal of Legal Studies*, *25*(1), 131-199.

Thakor, A. V. (1995). Financial intermediation and the market for credit. *Handbooks in Operations Research and Management Science*, *9*, 1073-1103.

Winton, A. (1995). Delegated monitoring and bank structure in a finite economy. *Journal of Financial Intermediation*, *4*(2), 158-187.