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Thomas David

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THÈSE DE DOCTORAT

de l'Université de recherche Paris Sciences et Lettres
PSL Research University

Préparée à l'Université Paris-Dauphine

Trois essais autour de la trésorerie des entreprises

École Doctorale de Dauphine — ED 543

Spécialité **Sciences de gestion**

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**Soutenue le 24.11.2016
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THÈSE DE DOCTORAT

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présentée et soutenue publiquement par

Thomas DAVID

le 24 novembre 2016

Trois essais autour de la trésorerie des entreprises

Directrice de thèse : **Pr Edith GINGLINGER**

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A la mémoire de Jean-Marie Borderiou.

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Introduction générale

Les nombreuses crises qui se sont succédées ces vingt dernières années (notamment le krach d'octobre 1987, la crise bancaire japonaise des années 90, la crise asiatique de 1997, la crise russe de 1998, l'explosion de la bulle Télécom et Internet de 2001, ou encore la crise de 2008) ont fortement impacté la stratégie financière des entreprises¹. En mettant à mal les repères *a priori* établis, les crises obligent les firmes à repenser leurs pratiques.

Remise au centre des débats par la dernière crise financière, la trésorerie détenue par les entreprises est ainsi apparue comme une ressource précieuse, seule à même de garantir le financement des firmes et de les prémunir contre les risques du marché. Dans un environnement économique toujours plus compétitif, tendu et incertain, les entreprises doivent parvenir à un niveau accru de flexibilité financière. En effet, elles sont tenues de limiter leur taux d'endettement, si elles souhaitent pouvoir à tout moment être en mesure de saisir des opportunités d'investissements inattendues et de faire face à d'éventuelles menaces. Dès lors, il est primordial pour les entreprises de faire preuve de précaution et d'anticipation : c'est-à-dire notamment de négocier promptement leurs lignes de financement, d'optimiser leurs relations avec leurs clients et leurs fournisseurs, ou encore d'avoir des politiques opportunes d'émission de titres et de rémunération des actionnaires.

Cette thèse aborde ainsi plusieurs de ces thématiques qui touchent de près la notion de gestion de trésorerie : la gestion des réserves de liquidités des entreprises, leur politique de versement de dividendes ou encore les relations entre clients et fournisseurs. Ces problématiques essentielles font l'objet d'une littérature certes riche, mais incomplète et parfois insuffisamment diversifiée.

Au sein de cette introduction, il conviendra ainsi de présenter l'évolution de la stratégie financière des entreprises en matière de trésorerie. Nous mettrons alors en évidence l'omniprésence de la notion de précaution dans les études théoriques et empiriques portant sur ce sujet (1). Ensuite, nous aborderons la littérature en ce qui concerne les lignes de crédit en tant que substitut à la trésorerie, mais également celle analysant l'impact des relations clients-fournisseurs sur la gestion des liquidités des firmes (2). Enfin, nous présenterons plus précisément les trois articles qui constituent ce manuscrit (3).

1. Tannery Franck, « Stratégie en temps de crise », Revue française de gestion 3/2009 (n°193), p. 21-27.

1 La trésorerie des entreprises : état des lieux

La gestion de trésorerie constitue ainsi un enjeu crucial pour les entreprises. Nous verrons en premier lieu, que les entreprises ont eu tendance ces dernières années à accroître leur niveau de liquidités (1). En second lieu, nous constaterons que le principe de précaution permet d'expliquer la présence de liquidités dans le bilan des entreprises (2).

1.1 Du principe de trésorerie zéro à l'accroissement des niveaux de liquidités

La présence de trésorerie au bilan d'une entreprise a toujours fait débat (que ce soit en période de pleine croissance ou au cours d'une grave récession). Ainsi, dans un monde « à la Modigliani-Miller », les firmes n'ont pas besoin de détenir un niveau élevé de trésorerie. En effet en l'absence de friction, ces dernières peuvent se tourner librement et à moindre coût vers les marchés financiers pour financer leurs projets (Modigliani et Miller, 1958). Dans de telles conditions, les entreprises cherchent alors à optimiser leur niveau de cash disponible. Un montant de trésorerie trop élevé témoigne de ressources inexploitées et donc de liquidités insuffisamment placées. A contrario, un niveau négatif génère des frais. Pour autant, de nombreuses firmes sont assises sur un véritable "trésor de guerre", allant dès lors à l'encontre même du concept de trésorerie zéro. Ainsi, on notera notamment les exemples de Microsoft et Apple. A la fin du 3e trimestre 2013, ces derniers détenaient respectivement 74.5 et 146.6 milliards de dollars de trésorerie. A la même période, Google affichait des liquidités représentant 55.6% de ses actifs, soit 58.4 milliards de dollars. Or, ces cas certes extrêmes ne sont pas isolés.

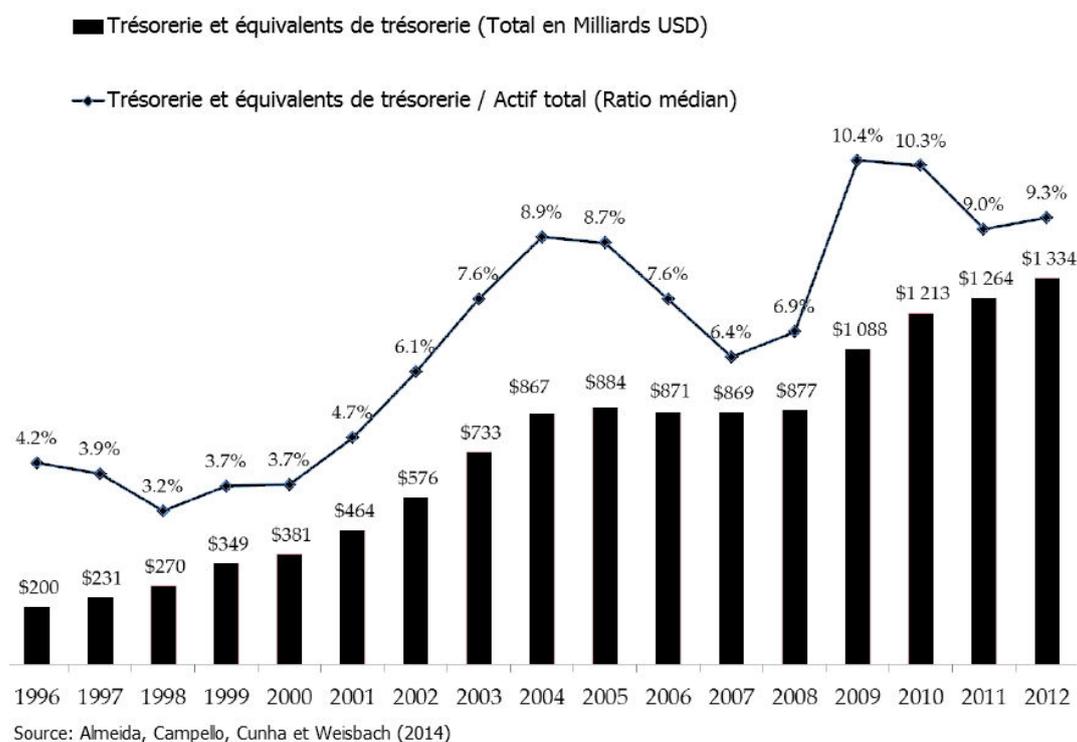
Ainsi, le matelas de trésorerie dont disposait l'ensemble des grands groupes mondiaux en 2013 s'élevait à 2 800 milliards de dollars². Ces niveaux élevés de réserves de liquidités sont le reflet d'une politique historique globale d'accumulation de trésorerie par les entreprises³. Bates, Kahle et Stulz (2009) montrent par exemple, que les firmes cotées américaines détenaient en moyenne 23.2% de leurs actifs sous forme de trésorerie en 2006, contre 10.5% en 1980. Néanmoins, cette tendance semble s'être accélérée au cours des vingt dernières années. Almeida, Campello, Cunha et Weisbach (2014) mettent notamment en lumière une augmentation sans précédent des montants de trésorerie détenus par les entreprises du S&P 500 (hors établissements financiers) : de 200 milliards de dollars en 1996 à 1 334 milliards en 2012 (voir Figure 1), soit une augmentation du ratio médian de trésorerie de 4.2% à 9.3%. A la suite d'une période de crise, cette accumulation de liquidités semble d'autant plus importante (Eisfeldt et Muir, 2015). La Figure 1 montre ainsi que près de 700 milliards de dollars de trésorerie ont été mis en réserve par les plus grands groupes américains entre 2007 et 2012, soit autant qu'entre 1996 et 2007. Signalons enfin, que parmi ces entreprises, l'indus-

2. Source : Deloitte

3. Voir par exemple : Bates, Kahle et Stulz (2009), Karabarbounis and Neiman (2012), Falato, Kadyrzhanova et Sim (2014), ou Graham et Leary (2016)

trie pharmaceutique et les sociétés spécialisées dans les nouvelles technologies concentrent la majeure partie de ces nouvelles liquidités (Graham et Leary, 2016).

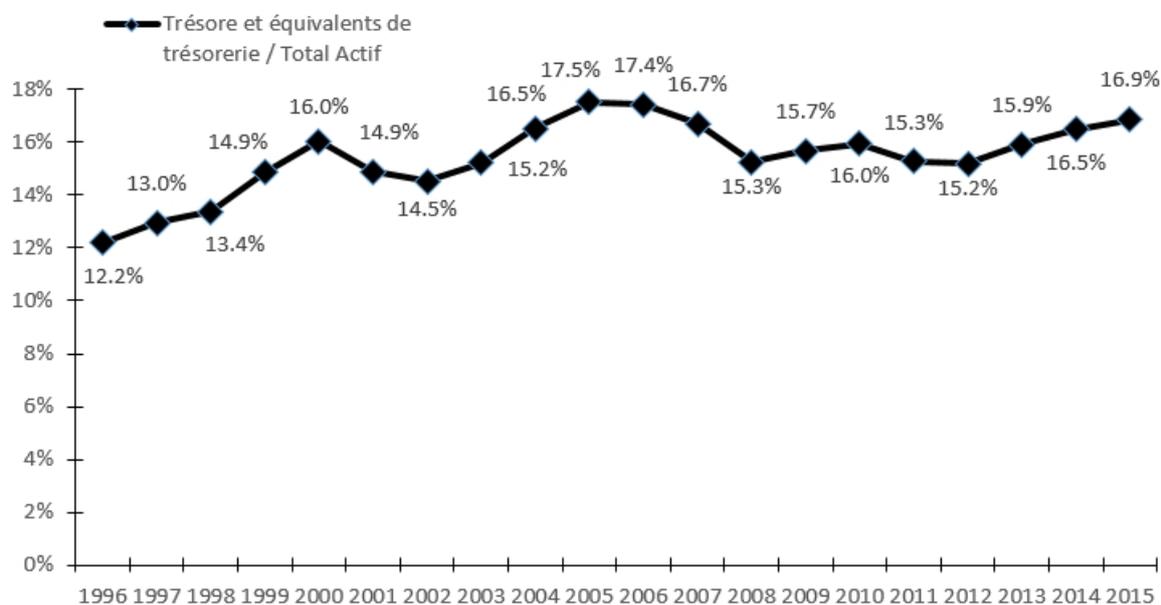
FIGURE 1 – Evolution de la trésorerie des grandes entreprises américaines (S&P 500)



En Europe, la politique en matière de gestion de trésorerie des entreprises semble historiquement plus nuancée. Les travaux de Ferreira et Vilela (2004) suggèrent notamment que le constat tiré par Bates, Kahle et Stulz (2009) pour ce qui est des grandes entreprises américaines ne peut être étendu aux firmes européennes. Le ratio moyen de liquidités détenu par ces dernières semble en effet presque constamment compris en 12% et 15% de leurs actifs sur la période 1987-2000. Nous pouvons néanmoins noter une augmentation significative des réserves de liquidités détenues par les entreprises de la zone Euro, au cours des vingt dernières années. Cette évolution est notamment vérifiable depuis 1996, année au cours de laquelle Ferreira et Vilela enregistre le ratio moyen de trésorerie le plus faible en Europe. La Figure 2 montre alors une augmentation de ce ratio, qui est passé de 12% en 1996, à près de 17% en 2015⁴. Les entreprises de la zone Euro ont ainsi vu leur trésorerie doubler au cours des deux dernières décennies (comme le montre la Figure 3) : détenant 1 219 milliards de dollars de réserves de liquidités en 2015 (contre un peu moins de 500 milliards de dollars en 1996). Signalons néanmoins qu'en comparaison, les entreprises américaines affichaient un montant total de trésorerie de plus de 2 000 milliards de dollars au cours de la même année.

4. Etude réalisée à partir d'un échantillon d'entreprise de la zone Euro, sur la période 1996-2015 et dont les données comptables sont disponibles sur Compustat

FIGURE 2 – Ratio moyen de trésorerie des entreprises de la zone Euro



Source: Compustat Global

La présence de trésorerie dans le bilan des entreprises semble donc résulter d'une politique historique de conservation de liquidités de la part des entreprises. En outre, les niveaux de trésorerie ici mis en évidence soulignent l'importance et le caractère stratégique de ces réserves. A titre d'exemple, les liquidités détenues en 2013 par les entreprises américaines et européennes (3 323 milliards de dollars) représentaient près d'1.2 fois le PIB annuel de la France (2 806 milliards de dollars). Dès lors, il convient de s'interroger sur les raisons et les déterminants d'une telle accumulation de liquidités.

1.2 Principe de précaution et détention de trésorerie

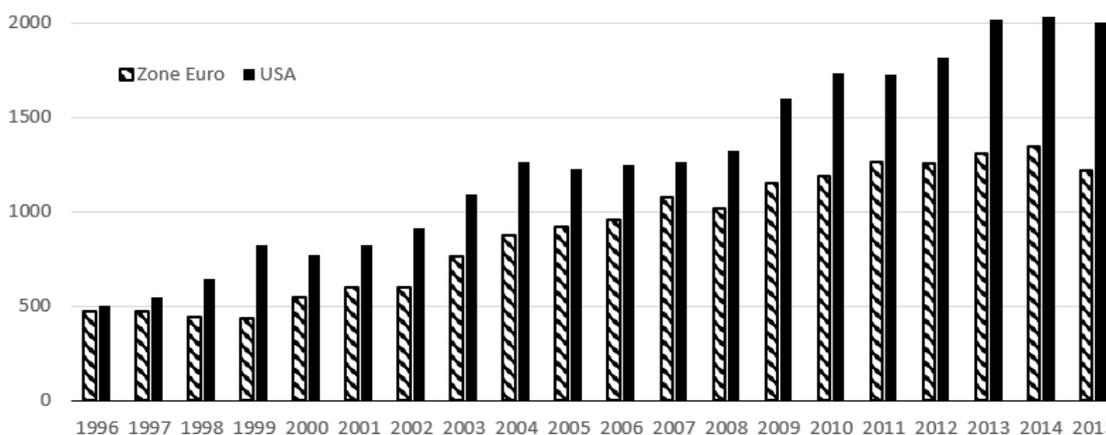
Historiquement, Keynes (1936) pose le premier cadre permettant d'expliquer l'existence de trésorerie au bilan des entreprises. Il postule qu'en présence de frictions sur les marchés, quelle que soit leur nature, les entreprises ne sont plus à même de se tourner librement vers des apporteurs de fonds extérieurs pour financer leur activité. Le "transaction cost model" met alors en évidence l'existence de coûts liés à la levée de capitaux, ainsi qu'à la cession d'actifs, qu'ils soient fixes (paiement de commissions de montage, de mise en place, etc.)⁵, ou variables⁶.

Avoir des liquidités en réserve, permet alors de procurer plus de flexibilité aux dirigeants. Par conséquent, une entreprise détiendra d'autant plus de trésorerie que les coûts de tran-

5. Tel que dans les modèles de Baumol (1956) et Miller et Orr (1966).

6. Tel que dans le cadre théorique développé par Constantinides (1976).

FIGURE 3 – Evolution de la trésorerie des entreprises en Europe et aux USA



Source: Compustat Global

saction auxquels elle fait face sont élevés. Par ailleurs, sous réserve qu'au moins une partie de ces coûts de transaction soit fixe, les grandes entreprises sont à même de bénéficier d'économies d'échelle sur l'ensemble de leurs transactions. Toutes choses égales par ailleurs, celles-ci devraient donc se reposer sur des niveaux plus faibles de liquidités (Bates, Kahle et Stulz, 2009). Les travaux de Mulligan (1997), qui sont relatifs aux niveaux de trésorerie des entreprises américaines entre 1961 et 1992, mettent alors en évidence l'existence de ces économies d'échelle, au travers d'une corrélation négative entre liquidités et taille des entreprises.

Prendre en compte l'existence de frictions sur les marchés financiers implique par ailleurs que les entreprises puissent ne pas pouvoir recourir à des sources externes de financement, en particulier si le coût de ces dernières est trop élevé. Ainsi, détenir de la trésorerie permet de se protéger contre d'éventuels chocs économiques qui rendent particulièrement coûteux l'accès aux marchés. La présence de liquidités en excès dans le bilan des entreprises relève alors du *principe de précaution*. Sur ce même modèle, Opler, Pinkowitz, Stulz et Williamson (1999) (noté OPSW par la suite) montrent, à partir d'un échantillon de firmes américaines étudié sur la période 1971-1994, qu'un niveau de trésorerie suffisant permet aux entreprises de réduire leur risque de se retrouver en état de sous-investissement⁷. Pareillement, OPSW soulignent qu'une entreprise détiendra d'autant plus de liquidités, que ses flux futurs seront risqués (i.e. volatiles) ou que ses conditions d'accès à un financement externe seront mauvaises.

Toujours selon le principe de précaution, nous pouvons également noter que les firmes

7. Voir Myers (1977) pour plus de détails théoriques. En l'espèce, une entreprise fait face à un problème de sous-investissement dès lors qu'elle renonce à lever des fonds pour saisir des opportunités rentables d'investissement, et ce, pour maximiser la richesse des actionnaires au détriment des autres pourvoyeurs de capitaux (par exemple, les créanciers).

de croissance détiennent plus de trésorerie, dans la mesure où elles sont plus sensibles aux chocs économiques. Cette prévision est alors validée par OPSW, qui utilisent les dépenses en R&D et le ratio market-to-book comme variables proxy des options d'investissement. Sur le même modèle, Falato, Kadyrzhanova et Sim (2014), mettent en évidence une corrélation significative entre les actifs intangibles détenus par les entreprises américaines (en l'espèce, les dépenses de R&D) et leur niveau de trésorerie. En particulier, la hausse du poids des actifs intangibles dans le bilan de ces firmes semble expliquer la majeure partie de l'augmentation historique de leurs réserves de liquidités (entre 1970 et 2010).

Plus récemment, Almeida, Campello et Weisbach (2004) modélisent explicitement le principe de précaution et mettent en évidence une propension accrue des entreprises contraintes financièrement, à accumuler des réserves de liquidités à partir de la part non distribuée de leurs bénéfices (on parle alors de *cash-flow sensitivity of cash*). Han and Qiu (2007) développent un modèle connexe en continu et montrent, théoriquement, que seules les entreprises contraintes financièrement augmentent leurs niveaux de trésorerie en réponse à une augmentation de la volatilité de leurs cash-flows. Han and Qiu (2007) confirment empiriquement cette prédiction, à partir d'un échantillon de firmes américaines au cours de la période 1998-2002 (voir également Riddick et Whited, 2009).

Nous constatons enfin, que le principe de précaution prend tout son sens lorsque l'ensemble de l'économie est touché par une crise. Certaines entreprises préfèrent alors faire preuve de prévoyance. Dans ce sens, Acharya, Almeida et Campello (2007) montrent, à partir d'un échantillon d'entreprises américaines observé sur la période 1971-2001, que les firmes accumulent des liquidités lorsque les conditions sont favorables. Elles cherchent ainsi à garantir leur capacité de financement de leurs investissements, en cas de détérioration du milieu économique environnant. Plus précisément, le modèle ici développé met en évidence la préférence des entreprises pour une augmentation du niveau de trésorerie, en lieu et place d'une réduction de l'endettement, lorsque leurs besoins de couverture sont élevés.

Pour sa part, McLean (2011) souligne une tendance croissante des entreprises américaines à accumuler par précaution de la trésorerie au cours des dernières décennies, même s'il leur est nécessaire de se tourner vers les marchés financiers. Ainsi, entre 1998 et 2008, pour chaque dollar levé au cours d'une augmentation de capital, près de 60 cents étaient en moyenne mis de côté par les firmes américaines, contre 23 cents en moyenne au début des années 1970. Parallèlement, McLean (2011) constate que ce phénomène s'accompagne d'une augmentation, en moyenne, de l'importance du principe de précaution pour les entreprises (mesurée par les dépenses de R&D, ou la volatilité des cash-flows par exemple).

Que l'on étudie la détention de trésorerie au travers du prisme de la théorie des coûts de transaction ou de celui du principe de précaution, le niveau optimal de liquidités pour une entreprise apparaît ainsi comme la frontière assurant l'équilibre entre la faible renta-

bilité des actifs liquides (et le coût d'opportunité associé) et la minimisation du besoin de recourir à des sources externes de financement, coûteuses voire difficiles d'accès (voir Kim, Mauer et Sherman, 1998). Ces deux approches supposent alors que les intérêts soient identiques, entre les différentes parties prenantes de l'entreprise en matière de trésorerie. Pourtant, l'existence de divergences entre instances dirigeantes et propriétaires d'une entreprise sont au coeur de la théorie de l'agence, notamment mise en lumière par Jensen et Meckling (1976). Le fonctionnement d'une firme fait alors l'objet de conflits d'agence, opposant d'une part les dirigeants, qui souhaitent accroître leur pouvoir et consolider leur position au sein de l'entreprise (on parle alors d'enracinement), et d'autre part les actionnaires, qui cherchent avant tout la création de valeur, qui ne contrôlent pas la totalité des mesures prises par le top management et qui ne possèdent pas la même compréhension ni le même niveau d'information sur les projets potentiellement réalisables par l'entreprise.

Ainsi, les conflits d'intérêt entre dirigeants et actionnaires sont également au coeur de la théorie du *free cash flow*, développée par Jensen (1986). Dans ce modèle, les dirigeants poursuivant leurs propres intérêts ont une tendance naturelle à accumuler du cash, lorsque les opportunités d'investissement d'une entreprise se font rares, au lieu d'augmenter la part redistribuée aux actionnaires (notamment sous forme de dividendes)⁸. Dans le même sens, Dittmar, Mahrt-Smith et Servaes (2003) mettent en lumière une corrélation négative entre le ratio de trésorerie d'une entreprise et le niveau de protection des actionnaires au sein d'un pays (proxy des conflits d'agence). Ces auteurs montrent alors par exemple, que les entreprises localisées dans les pays où les actionnaires sont les moins protégés détiennent en moyenne 25% plus de liquidités que celles situées dans des pays à forts droits de protection des actionnaires. Sur le même modèle, Pinkowitz, Stulz et Williamson (2006) montrent qu'une unité monétaire supplémentaire de trésorerie est moins bien valorisée dans les pays où le niveau de protection des investisseurs est plus faible. De façon similaire, Dittmar et Mahrt-Smith (2007) estiment, à partir d'un échantillon de firmes américaines observé sur la période 1990-2003, qu'une augmentation d'un dollar de la trésorerie d'une entreprise siège de forts conflits dirigeants-actionnaires⁹ est accompagnée, au mieux, d'une hausse de 0.88 dollars de sa valeur de marché. En comparaison, cela représente une augmentation deux fois plus faible que celle mesurée (en moyenne) pour une entreprise moins sujette à ce type de frictions. Harford, Mansi, and Maxwell (2008) mettent par ailleurs en lumière, une propension importante des dirigeants les plus enracinés à accumuler des réserves de liquidités, mais également à dépenser la trésorerie de leur entreprise dès lors qu'une opportunité se présente à eux.

Enfin, notons que la composante juridique et fiscale associée à la notion de trésorerie

8. Voir par exemple, Nikolov et Whited (2014)

9. Les auteurs se reposent ici sur les indices respectivement développés par Gompers, Ishii et Metrick (2003) et Bebchuk, Cohen, and Ferrell (2005) pour mesurer la "qualité" de la gouvernance d'une entreprise. En pratique, une "bonne" gouvernance d'entreprise assure la convergence des intérêts des dirigeants et de ceux des actionnaires.

fait aussi l'objet de l'attention des chercheurs. Néanmoins, la multitude et la complexité des réglementations fiscales dans le monde, ainsi que la sensibilité des données fiscales des entreprises, rendent difficile l'analyse systématique du lien entre législation et politiques de gestion de trésorerie¹⁰. Nous retiendrons ici les travaux de Foley, Hartzell, Titman, and Twite (2007), qui mettent en lumière des niveaux consolidés de trésorerie plus élevés pour les multinationales américaines sur la période 1982-2004. Ces entreprises détiennent alors des réserves notables de liquidités dans leurs filiales étrangères, limitant ainsi les conséquences fiscales du rapatriement des bénéfices réalisés hors du sol américain.

Ainsi, la littérature financière semble s'accorder pour expliquer la présence de trésorerie dans le bilan des entreprises, par la volonté de se prémunir d'éventuelles difficultés de financement. Les différences de niveaux de trésorerie entre les entreprises dépendent alors des opportunités d'investissement disponibles, de la sévérité des conflits entre les différentes parties prenantes de la firme, ou encore de la fiscalité en vigueur.

2 Lignes de crédit, relations clients-fournisseurs et gestion des liquidités : revue de littérature

En l'espèce, nous venons donc de dégager une problématique essentielle : celle de la prépondérance de la notion de précaution en ce qui concerne la gestion des liquidités des entreprises. Dès lors, nous aborderons ici les réflexions théoriques existantes en matière de recours aux lignes de crédit. Effectivement en permettant aux entreprises de disposer de réserves externes de liquidités, les lignes de crédit constituent un outil financier qui s'inscrit parfaitement dans cette stratégie de précaution. Enfin, nous traiterons des analyses réalisées sur les relations clients-fournisseurs. En effet, la nature de ces relations peut s'avérer être déterminante, lorsqu'il devient nécessaire de prévoir et d'anticiper en matière de trésorerie.

2.1 Lignes de crédit et réserves de liquidités

Toutes les études citées précédemment présentent la trésorerie interne (*cash* et *cash equivalents*) comme unique réserve de liquidités des entreprises¹¹. Or, ces dernières peuvent notamment bénéficier de lignes de crédits. On parle alors dans ce cas de réserves de liquidi-

10. Signalons ici l'étude menée par l'Agence Française des Trésoriers d'Entreprise en 2008, qui met en évidence que plus de 85% des firmes interrogées utilisent un système de centralisation des soldes de trésorerie (*cash pooling*). Ainsi, près de 50% des sociétés mères de l'échantillon réalisent des activités de paiement pour le compte de leurs filiales et près de 35% des activités d'encaissements. Ces firmes recherchent alors un effet taille, une optimisation des ressources, ou encore une réduction du risque de change. L'absence de données détaillées empêche cependant d'analyser plus précisément le comportement des entreprises en la matière.

11. On entend par réserves de liquidités, l'ensemble des fonds dont dispose déjà l'entreprise, qu'ils soient reportés dans son bilan (comme la trésorerie disponible), ou non (telle que les lignes de crédit déjà ouvertes mais non utilisées par l'entreprise). Ces fonds sont alors à opposer aux ressources de liquidités, qui regroupent pour leur part l'ensemble des mécanismes permettant à l'entreprise de constituer des réserves effective de liquidités (flux opérationnels de trésorerie, augmentation de capital, endettement bancaire, etc.).

tés externes.

L'attention des chercheurs a ainsi longtemps été tournée vers le rôle et les déterminants de la trésorerie issue de l'activité des entreprises. Or, l'importance croissante donnée par les firmes (notamment dans leur rapports annuels) aux lignes de crédit offertes par les établissements bancaires a entraîné le développement d'un pan entier de la littérature s'attachant à identifier et à étudier, théoriquement et empiriquement, les enjeux liés à un tel mécanisme de financement. Les principaux modèles qui expliquent le rôle des lignes de crédit dans le fonctionnement des entreprises, reposent alors également majoritairement sur le principe de précaution : en cas de risque de dégradation des circuits de financement, les entreprises cherchent en l'espèce à garantir leur accès à une source de liquidités. En d'autres termes, les firmes souhaitent grâce aux lignes de crédit qui leur sont accordées, disposer de réserves de liquidités.

Ainsi, Boot, Thakor et Udell (1987) proposent un premier cadre théorique justifiant l'intérêt de l'utilisation des lignes de crédit en présence d'un aléa moral. Dans ce modèle, le risque d'une hausse du taux d'intérêt (c'est à dire du coût des ressources disponibles) réduit le rendement final espéré du projet d'investissement mis à la disposition d'un entrepreneur. Par conséquent, relativement au niveau optimal théoriquement attendu (soit en l'absence de frictions), tout entrepreneur préférera fournir un effort moindre. Sécuriser *ex ante* l'accès à des liquidités (à un taux fixe et inférieur ou égal au taux en vigueur sur le marché) assure alors à ce dernier de fournir un niveau d'effort plus efficient (voire optimal). En outre, la mise en place d'une commission payée au moment de la signature du contrat assure, que le pourvoyeur de fonds (typiquement, une banque) bénéficie d'un rendement au moins égal au seuil minimum attendu (soit, un rendement au moins égal au taux alors en vigueur sur les marchés, au moment de la fourniture effective des liquidités). Dès lors, les lignes de crédit apparaissent comme une assurance crédible contre la hausse du coût des ressources externes.

Holmstrom et Tirole (1998) emploient une approche similaire. Néanmoins, au lieu d'une hausse des taux d'intérêts, ils basent leur analyse sur le risque d'un choc de liquidité. Ainsi, un tel événement pourrait pousser un entrepreneur à interrompre un projet (en liquidant les actifs existant par exemple), et cela, même si ce dernier est *a priori* rentable. En effet, l'existence d'un aléa moral peut l'empêcher de se tourner vers les marchés pour lever des fonds. Dès lors, l'entrepreneur est contraint de détenir un certain niveau de liquidités, soit sous la forme de *cash*, soit en disposant d'un accès à une ligne de crédit. Holmstrom et Tirole (1998) montrent alors, que sous réserve que l'offre globale de liquidités soit limitée et que les chocs de liquidité touchant différentes firmes ne soient que peu corrélés (le cas extrême étant l'existence de chocs indépendants et idiosyncratiques aux différentes entreprises), la seule détention de trésorerie n'est pas une stratégie optimale. En effet, les entreprises exemptes de tout choc détiendraient alors des montants de trésorerie trop importants, tandis que les

firmes qui en subissent devraient faire face à une pénurie de liquidités. Dans ce cadre, l'intervention des banques en tant que pourvoyeurs globaux de liquidités (via la mise à disposition de contrats assurant l'accès à un montant pré-défini de liquidités aux seules firmes victimes de chocs) assure une répartition globale plus efficiente des richesses. En d'autres termes, l'utilisation de lignes de crédit permet aux entreprises d'assurer la continuité de leur activité, *si et seulement si* celles-ci doivent faire face à un choc de liquidité. En ce sens, les lignes de crédit apparaissent comme un substitut à la trésorerie plus efficient d'un point de vue économique.

Ainsi, les théories initiales traitant des lignes de crédit décrivent ces dernières comme des mécanismes d'assurance efficaces et complets contre l'augmentation du coût ou la raréfaction des sources de financement. Elles peuvent par ailleurs parfaitement se substituer aux réserves internes de liquidités (i.e. à la trésorerie telle qu'initialement définie). Dès lors, les entreprises peuvent librement choisir entre l'une ou l'autre de ses solutions pour s'assurer un accès en toutes circonstances à une source de financement. Pourtant, la réalité de l'utilisation des lignes de crédit (notamment telle qu'elle est empiriquement étudiée par les chercheurs) est très différente de cet idéal théorique¹².

Plusieurs frictions nuancent effectivement le caractère complet de l'assurance qu'offrent les lignes de crédit. En particulier, en tant que contrat de dette entre un créancier (la banque) et un débiteur (l'entreprise), les lignes de crédit font souvent l'objet de clauses restrictives (ou *covenants*), qui rendent l'accès aux liquidités subordonné à différents scénarii. Roberts et Sufi (2009) soulignent ainsi, à partir d'un échantillon d'entreprises américaines sur la période 1996-2005, que 97% des contrats de ligne de crédit contiennent au moins une clause restrictive. Ces auteurs signalent par ailleurs, que 74% de ces contrats prévoient une clause concernant le ratio de couverture des frais financiers de l'entreprise emprunteuse, tandis que 58% font l'objet d'une provision relative au rapport entre niveau de dette et cash flows opérationnel (typiquement, l'excédent brut d'exploitation ou EBE)¹³. Enfin, Demiroglu et James (2009) mettent en évidence que les entreprises les plus risquées font face à des clauses restrictives plus strictes (c'est-à-dire dont le seuil est plus proche du niveau effectivement constaté pour le ratio financier considéré). Le recours effectif aux lignes de crédit apparaît dès lors, comme majoritairement subordonné à la performance et, plus généralement, à

12. Un sondage réalisé par Lins, Servaes et Tufano (2010) auprès de directeurs financiers répartis dans près de 30 pays met par ailleurs en évidence que, sur 204 dirigeants interrogés, moins de 50% sont convaincus que trésorerie et lignes de crédit peuvent être considérés comme interchangeables. Les résultats de cette étude révèlent également que certains dirigeants d'entreprises voient avant tout la trésorerie comme un "cousin contracyclique", que l'utilisation de lignes de crédit permet alors de laisser intact au cours de périodes favorables à leur entreprise.

13. On notera ici par exemple, le cas de Faurecia (comptant parmi les principaux acteurs du marché de l'équipement automobile), qui a pu ouvrir en juin 2014, une ligne de crédit d'un montant d'1.2 milliards d'euros. Afin de pouvoir pleinement accéder à ces fonds, Faurecia devra s'assurer que le montant de sa dette nette restera inférieur à 2.5 fois son Excédent Brut d'Exploitation, conformément à une des clauses restrictives prévues dans le contrat signé entre Faurecia et les différentes banques mandatées par cette dernière.

la santé financière de l'emprunteur. Par conséquent, une entreprise en situation de violation d'une ou plusieurs clauses restrictives fait face à un potentiel tarissement de l'accès aux lignes de crédit initialement disponibles.

En outre, ces violations de clauses restrictives ne sont pas des événements isolés. Nini, Smith et Sufi (2012) soulignent ainsi qu'entre 1996 et 2007, 10% à 20% des entreprises cotées américaines étaient en violation d'une ou plusieurs clauses restrictives au cours de la même année, tandis que près de 40% des entreprises étudiées n'ont pas pu respecter au moins une fois au cours de la période considérée les seuils définis dans leurs contrats de dette. Or, les conséquences de ces violations sont réelles. Roberts et Sufi (2009) soulignent ainsi que ces défauts techniques sont accompagnés d'une réduction significative de la capacité d'endettement des entreprises, mais également d'une diminution du poids de la dette dans leur bilan. En pratique, les auteurs estiment la réduction de l'endettement à 3% en moyenne dans les deux années suivant la violation d'une clause restrictive. Enfin, Nini, Smith et Sufi (2012) mettent en évidence une plus grande propension des entreprises américaines (sur la période 1996-2005) à réduire leurs dépenses d'investissement, en réponse à la violation d'une ou plusieurs clauses restrictives liées à leurs contrats d'emprunt ¹⁴.

Ainsi, il apparaît que les lignes de crédit ne puissent être considérées comme des assurances parfaitement efficaces pour les entreprises ¹⁵. Notons néanmoins, que le caractère incomplet des lignes de crédit en tant que source de liquidités, est également lié à la capacité des établissements créanciers, à fournir les fonds théoriquement disponibles, dès lors qu'une entreprise en fait la demande. Or, la récente crise financière, qui s'est traduite par une contraction presque sans précédent de l'accès au crédit des entreprises, a mis en évidence les limites des banques dans leur rôle de pourvoyeur de liquidités ¹⁶. Par conséquent, les lignes de crédit ne peuvent pas en pratique, parfaitement se substituer à la trésorerie en tant que sources de liquidités (et donc, de flexibilité). Les entreprises sont donc, mécaniquement amenées à fixer un niveau relatif d'équilibre entre liquidités internes (trésorerie) et externes (lignes de crédit). Cela leur permet ainsi d'optimiser leur capacité à faire face à toute situation inattendue.

Les travaux de Sufi (2009) sont alors les premiers à évaluer empiriquement les déterminants de ce choix entre *cash* et lignes de crédit. A partir d'un échantillon d'entreprise amé-

14. Beneish et Press (1993) et Dichev et Skinner (2002) montrent par ailleurs que de tels événements entraînent un durcissement significatif des conditions d'accès futur au crédit, notamment au travers de taux d'intérêts plus élevés.

15. Flannery et Lockhart (2009) montrent empiriquement que les lignes de crédit sont une alternative au *cash* mieux valorisée par les investisseurs des entreprises libres de toutes contraintes financières. A l'inverse, lignes de crédit et trésorerie n'apparaissent pas comme interchangeables pour les entreprises financièrement contraintes.

16. Le cas de Ford en 2009 constitue un des principaux exemples d'une telle limite des lignes de crédit. Ce sont ainsi 890 millions de dollars de ligne de crédit dont le constructeur automobile américain n'a pu disposer (sur un total de 10.9 milliards de dollars), en raison de la faillite de Lehman Commercial Paper Inc. en 2008.

ricaines côtées observées sur la période 1996-2003, l'auteur montre ainsi que les grandes entreprises dégagant des *cash flows* substantiels ont une probabilité accrue de recourir à des lignes de crédit. En outre, le poids des liquidités externes dans l'enveloppe globale de liquidités disponibles apparaît comme plus élevé pour ces firmes. Les entreprises exhibant une probabilité de faillite élevée (soit les entreprises les plus risquées) semblent par ailleurs, privilégier l'accumulation de réserves internes de trésorerie, sauf si elles sont à même de générer des flux de trésorerie opérationnels élevés. Sufi (2009) met ainsi en lumière le rôle crucial du niveau de *cash flows* des entreprises. En particulier, celles qui ne peuvent pas générer des flux de trésorerie suffisamment élevés, présentent une probabilité accrue de ne pas respecter les clauses restrictives prévues dans leurs contrats de ligne de crédit. En d'autres termes, les firmes risquées qui dégagent une faible performance opérationnelle, sont obligées de limiter l'importance des lignes de crédit dans leur stratégie de gestion des liquidités, dans la mesure où l'accès à ces dernières sera potentiellement limité.

Acharya, Almeida et Campello (2013) montrent par ailleurs, que l'exposition d'une firme au risque systématique impacte également la manière dont celle-ci choisit de gérer ses liquidités. En particulier, les entreprises les plus exposées à ce type de risque (global) sont parmi les plus susceptibles de se tourner vers les banques pour obtenir des fonds, alors même que l'ensemble de l'économie est atteint par un choc de liquidité (comme par exemple lors de la crise financière de 2007). Dès lors, le coût des lignes de crédit imposé par les banques à ces firmes est mécaniquement plus élevé. Empiriquement, une telle relation se traduit par des niveaux relatifs de *cash* plus élevés pour les entreprises présentant un fort risque systématique (en particulier en période de crise).

La crise de 2007, qui se caractérise notamment par le passage d'une crise financière à une crise de financement pour les entreprises, permet alors de mettre davantage en lumière les limites potentielles de l'utilisation des lignes de crédit comme réserve de liquidités. Rappelons tout d'abord qu'au cours de cette période, la capacité des banques à honorer leur rôle de pourvoyeurs globaux de liquidités s'est vu grandement réduite. Ivashina et Scharstein (2008) soulignent par exemple, que le crédit accordé aux entreprises au cours du quatrième trimestre de 2008 était 79% plus faible que celui enregistré au cours du deuxième trimestre de 2007 (soit au plus fort de ce que les économistes et les financiers qualifient désormais de *credit boom*).

Dès lors, les inquiétudes généralisées concernant la solvabilité des banques, mêlées à l'incertitude et au marasme économique ambiants, ont poussé la plupart des entreprises à faire usage de leurs lignes de crédit disponibles, et ce, afin de se prémunir contre un éventuel tarissement complet de la liquidité bancaire (voir Ivashina et Scharfstein, 2008). Ivashina et Scharfstein (2010) montrent alors, qu'une portion significative de ces retraits (notamment au cours du dernier trimestre de 2008) avait pour seul et unique but de renforcer la trésorerie des entreprises. En d'autres termes, le principe de précaution a poussé certaines en-

treprises à convertir leurs réserves de liquidités externes, en réserves internes effectivement accessibles en toutes circonstances. Ivashina et Scharfstein (2010) soulignent par ailleurs, au cours de la même période, l'impossibilité pour de nombreuses firmes de renouveler les lignes de crédit arrivant à échéance. En outre, l'étude réalisée par Campello, Murillo, Graham et Harvey (2010) auprès d'un large échantillon international de directeurs financiers révèle que ces difficultés d'accès aux lignes de crédit étaient avant tout concentrées parmi les firmes les plus contraintes financièrement.

Les lignes de crédit permettent ainsi aux entreprises de conserver leur trésorerie en période de croissance, mais également de maintenir la continuité de leurs activités en période de crise. Pour autant, les lignes de crédit constituent un substitut imparfait aux réserves internes de liquidités. L'ensemble des études ici mentionnées met alors en lumière la nécessité pour les entreprises (notamment en ce qui concerne les plus petites et les plus risquées) de négocier les termes de l'accès à leurs lignes de crédit au cours de périodes favorables économiquement. Celles-ci doivent ainsi, encore une fois, faire preuve de prévoyance et d'anticipation.

Cependant, la stratégie des entreprises en matière de gestion des liquidités (notamment en période de crise) ne saurait être limitée aux seules relations entre ces dernières et leurs pourvoyeurs de fonds. Il est effectivement désormais opportun de se pencher sur l'impact des relations entre une firme et les autres parties prenantes de son activité, en particulier ses clients et ses fournisseurs.

2.2 Relations clients-fournisseurs et anticipation

Une large partie de la littérature financière considère l'entreprise comme un ensemble de contrats explicites (voir Jensen et Meckling, 1976) entre elle-même et les différents acteurs assurant son financement (en l'espèce, ses actionnaires et ses créanciers). Néanmoins, chercheurs et praticiens s'accordent désormais pour reconnaître le rôle crucial de l'ensemble des partenaires d'une entreprise : qu'il s'agisse de ses clients, de ses fournisseurs, de ses employés ou encore des entreprises rivales¹⁷. Dès lors, si nous reconnaissons que la question des ressources humaines, ainsi que le jeu de la concurrence sur le marché des biens (ou des services) peuvent impacter la gestion des liquidités d'une entreprise, nous avons néanmoins choisi de concentrer notre analyse sur les relations entre une firme et les autres acteurs majeurs de son cycle d'exploitation. De nombreuses études théoriques et empiriques ont ainsi mis en avant l'importance des relations clients-fournisseurs dans la volonté des entreprises de se prémunir contre tout aléa éventuel.

Notons tout d'abord, que le décalage entre livraison d'un bien (ou d'un service) de la part d'un fournisseur et le paiement effectif par le client fait partie intégrante des échanges

17. Voir par exemple, Coase (1937) ou plus récemment, Zingales (2000).

inter-entreprises. On parle alors de crédit commercial (*trade credit*). Tirole (2006) souligne ainsi que seuls 20% des entreprises américaines exigent un règlement comptant pour leurs services. Du point de vue d'un fournisseur, offrir des délais de paiement à ses partenaires commerciaux revient à se substituer aux banques, dans leur rôle de pourvoyeur de liquidités à court terme (voir Scwhartz, 1974, ou Burkart et Ellingsen, 2004). En théorie, le fournisseur bénéficie en effet d'un triple avantage justifiant ce rôle de créancier. En premier lieu, l'entreprise peut plus facilement s'informer sur la qualité intrinsèque de son client, que ce soit via des échanges plus fréquents, ou encore via la capacité du client à honorer rapidement (voire en avance) ses engagements. En second lieu, un fournisseur est dans ce cas plus à même de s'assurer que les actions de son client lui permettront de payer ses dettes. En particulier, la menace de cessation de la relation commerciale lui offre un mécanisme de défense crédible. Enfin en cas de défaut de paiement d'un client, un fournisseur dispose d'une capacité accrue à tout de même retirer un profit des biens initialement délivrés (Mian et Smith, 1992), notamment s'il dispose d'un circuit de distribution pré-établi efficace¹⁸. En d'autres termes, le crédit commercial peut permettre à un fournisseur d'anticiper l'évolution de son activité et ainsi d'en assurer la continuité, par exemple en optimisant sa politique de gestion des stocks (Emery, 1987).

De leur côté, les entreprises clientes peuvent utiliser le crédit commercial pour réduire le coût global du règlement de leurs engagements. Ferris (1981) souligne ainsi, l'intérêt potentiel des entreprises à payer l'ensemble de leurs dettes à intervalle régulier (tous les mois par exemple) et non à la livraison de chaque commande. Ce lissage de l'échéancier de paiements d'une entreprise prend par ailleurs tout son sens, dès lors que l'activité de celle-ci est saisonnière. En séparant son calendrier de paiement de celui de ses livraisons, une entreprise pourra alors s'assurer d'être en capacité d'honorer ses dettes lorsque celle-ci dispose de liquidités suffisantes (après un pic d'activité par exemple). S'assurer des délais de paiements suffisants et cohérents peut ainsi permettre à une entreprise de rationaliser les entrées et les sorties de liquidités au cours de son cycle d'exploitation¹⁹.

Si le crédit commercial peut permettre aux entreprises d'optimiser le fonctionnement de leur cycle d'exploitation, il crée néanmoins un décalage de trésorerie. Ce décalage peut s'avérer particulièrement important dès lors qu'une firme utilise majoritairement ses fournisseurs comme source de liquidités. Nous retiendrons ici l'exemple de Walmart, dont les dettes fournisseurs représentaient, en 2009, près de l'intégralité de ses dettes à court terme

18. Notons que les arguments ici avancés ne peuvent être valides que si un client ne représente qu'une minorité de l'activité de son fournisseur et si les transactions entre les deux parties impliquent des biens (potentiellement durables).

19. Ce constat est d'autant plus vrai que l'accès au financement court terme se fait difficile. En n'exigeant pas un règlement comptant, une entreprise offre ainsi à ses clients, une assurance contre une éventuelle restriction de leur accès au crédit bancaire (par exemple, leurs lignes de crédit). Sur ce même modèle, Garcia-Appendini et Montoriol-Garriga (2013) mettent en évidence une extension du crédit commercial accordé par les fournisseurs disposant de larges réserves de trésorerie à leurs clients les plus en difficulté au cours de la crise financière de 2007.

et plus de trois quarts de sa dette totale²⁰. Limiter ce besoin mécanique de liquidités apparaît ainsi comme un enjeu crucial pour les entreprises. De la sorte, des entretiens individuels, réalisés par l'AFTE en 2008, auprès de 40 trésoriers d'entreprise, mettent en avant l'importance de la gestion du BFR²¹. Notons ici les travaux de Kieschnick, LaPlante et Moussawi (2013), qui constituent la première étude empirique du lien entre la gestion du BFR et la valeur d'une entreprise. A cette occasion, les auteurs mettent notamment en évidence, qu'un dollar investi dans le fonds de roulement d'exploitation net n'est valorisé qu'à hauteur de 0.56 dollar par le marché, soit moins que le dollar investi. C'est alors également beaucoup moins que le 1.49 dollar à hauteur duquel est valorisé un dollar incrémental de trésorerie. Ces résultats expliquent ainsi pourquoi les entreprises sont à ce point soucieuses de la gestion de leur BFR, et soulignent l'importance pour les actionnaires d'une gestion aussi efficiente que possible.

Cette recherche d'efficience dans le cycle opérationnel des firmes pose par ailleurs la question de l'organisation de ces dernières. Les travaux de Coase (1937) constituent alors la première tentative de définition de la nature de l'entreprise, mais également d'identification de cette dernière. Il ressort de cette étude que les choix organisationnels des entreprises ont pour principal objectif de minimiser les différents coûts de transaction associés à leurs activités. Dès lors, Lustgarten (1975), Klein, Crawford et Alchian (1978), ou Williamson (1979) soulignent que la nature des opérations d'une entreprise poussera cette dernière soit à internaliser l'intégralité de son processus de production (on parle alors d'intégration verticale), soit à se limiter à établir des relations commerciales avec un nombre limité de partenaires principaux (au lieu de systématiquement se tourner vers le marché).

Plusieurs études justifient alors de l'intérêt d'établir des partenariats stratégiques avec des clients clairement identifiés. Alchian et Demetz (1972) soulignent ainsi que la spécialisation de l'outil de production permet aux entreprises d'augmenter la richesse qu'elles génèrent. En effet, ces dernières peuvent par exemple réduire les coûts d'approvisionnement des matières premières nécessaires à leur activité. Bettis, Bradley et Hamel (1992) mettent également en lumière, une réactivité accrue des entreprises face aux évolutions du marché, ainsi qu'une réduction globale des coûts de leur activité (approvisionnement, production et distribution).

L'existence d'un partenariat commercial entre deux entités distinctes peut néanmoins générer des comportements inefficients de la part des entreprises. En la matière, les études de Klein, Crawford et Alchian (1978) et Williamson (1979) mettent en évidence le risque d'établissement d'un rapport de force entre un fournisseur et son client. En particulier, une entreprise en position de force peut décider de tirer avantage de son pouvoir de négociation supérieur, afin de forcer une redéfinition *ex post* des termes d'un contrat établi avec un de

20. Source : Rapport annuel de Wal-Mart Stores Inc. pour l'année fiscale 2009.

21. Source : "Enquête de Mai 2008 sur la trésorerie des grandes entreprises et des ETI", réalisée par l'AFTE.

ses fournisseurs. En outre, dépendre d'un ou plusieurs clients majeurs expose les entreprises à un risque accru en cas de détérioration de leur santé. Ce risque se traduit alors par la perte potentielle de revenus futurs, mais également par un défaut de paiement généralisé d'un client en difficulté. Les travaux de Hertzfel, Li, Officer et Rodgers (2008) ou Kolay, Lemmon et Tashjian (2015) montrent ainsi que ces pertes anticipées de revenus sont quasi instantanément sanctionnées par les marchés financiers. Les auteurs constatent en effet, à partir d'échantillons de firmes américaines observés sur des périodes similaires²², une baisse significative de la valeur boursière des entreprises en réponse au dépôt de bilan d'un ou plusieurs de leurs principaux clients. Dès lors, le principe de précaution pousse les entreprises à se prémunir contre un tel risque en accumulant des réserves de liquidités. Ainsi, à partir d'un échantillon d'entreprises américaines sur la période 1979-2006, Itzkowitz (2013) met en évidence des niveaux de trésorerie plus élevés pour les firmes dépendant d'un nombre limité de clients.

La littérature met ainsi le principe de précaution au coeur de la stratégie des entreprises en matière de gestion des liquidités. Pourtant, en dépit de sa richesse, elle laisse également de nombreuses questions en suspens. Ce constat est alors au centre de ce projet thèse. Il convient donc désormais de présenter plus précisément les trois chapitres qui composent ce manuscrit.

3 Présentation des travaux de recherche

L'objectif de cette thèse est d'apporter une contribution aux travaux existants en matière de trésorerie. Nos recherches bibliographiques et nos études préliminaires ont ainsi soulignées l'importance en l'espèce du principe de précaution. Notons à ce titre que si cette notion ne constitue pas notre objet d'étude en tant que tel, celle-ci représente cependant un prisme d'analyse important.

Les enjeux pratiques et théoriques soulevés depuis plusieurs décennies et développés ici, nous permettent de mettre en lumière trois pistes majeures de réflexion. Dans un premier temps, nous nous interrogerons sur la capacité des entreprises à accorder les intérêts divergents des actionnaires (qui souhaitent avant tout créer de la valeur) et des dirigeants (qui ont tendance à faire preuve de plus de précaution), pour ce qui est de l'utilisation de leurs réserves de trésorerie. Nous porterons alors un intérêt certain à la politique de versement de dividendes des entreprises. Dans un second temps, nous étudierons la relation entre le risque client et la propension des firmes à accumuler des réserves de liquidités (en *cash*, mais également sous la forme de lignes de crédit). Enfin, nous nous attacherons à établir si (et dans quelles mesures) entrer dans des partenariats commerciaux de long-terme avec un ou plusieurs clients peut être profitable pour les entreprises (notamment en matière d'optimisation de la gestion de trésorerie).

22. En pratique, 1978-2004 pour Hertzfel *et al.* (2008) et 1980-2009 pour Koley *et al.* (2015).

Ainsi, le premier chapitre de cette thèse s'appuie sur l'existence d'intérêts opposés entre les actionnaires d'une entreprise et les dirigeants qu'ils ont mandaté pour en superviser l'activité. Ceux-ci cherchent en effet avant tout, à obtenir un retour sur investissement maximal et stable. Dès lors, la continuité et la stabilité de la politique de rémunération des actionnaires apparaissent comme des enjeux majeurs (Lintner, 1956). En particulier, nous pouvons observer une sanction systématique des marchés financiers en réponse à une baisse du dividende versé par une entreprise (Pettit, 1972 et Aharony et Swary, 1980). Par conséquent, les dirigeants d'une entreprise seront souvent réticents à diminuer les rémunérations accordées à leurs actionnaires. Nous pouvons pourtant noter un désir accru des chefs d'entreprise de s'affranchir de la contrainte que représentent les dividendes. Une telle liberté leur permettrait alors de suivre leur objectif premier, qui est de maintenir un niveau élevé de flexibilité financière (Jannagathan, Stephens et Weisbach, 2000, Blau et Fuller, 2008, et Denis, 2011).

Nous montrons alors dans ce premier chapitre que les entreprises peuvent temporairement et efficacement limiter les décaissements liés à un versement de dividendes, en offrant à leurs actionnaires la possibilité d'être rémunérés en actions et non en numéraire. Pour cela, nous étudions le cas du dividende en actions, que les entreprises françaises sont autorisées à payer depuis 1983²³. En particulier, nous utilisons des données collectées sur 287 firmes Françaises cotées sur la période 2003-2012, afin d'identifier les caractéristiques des entreprises choisissant ce type de dividende, et afin d'observer les conséquences que celui-ci implique pour les actionnaires. Notre étude met alors en avant une propension accrue des entreprises ayant une politique historique de rémunération de leurs actionnaires, à opter pour le paiement d'un dividende en actions, au cours des périodes de récession économiques ou lorsque se tourner vers les marchés de capitaux est trop coûteux. En outre, les réactions boursières à l'annonce du paiement d'un dividende en actions sont en moyenne positives. Ainsi, en dépit d'une diminution des liquidités effectivement redistribués, le dividende en actions semble être valorisé comme une bonne nouvelle par les investisseurs. Ces derniers acceptent par ailleurs quasi unanimement, de recevoir cette option dès lors qu'elle leur est proposée au cours de l'Assemblée Générale des actionnaires. Au terme de l'opération, une part substantielle d'entre eux choisit alors d'être rémunérée en actions, et cela, même si un paiement en numéraire leur aurait assuré un revenu supérieur. Enfin, nos résultats suggèrent que les investisseurs les plus informés (c'est-à-dire les investisseurs institutionnels ou les blocs d'actionariat) sont prêt à supporter une baisse temporaire des liquidités qui leur sont effectivement reversées.

Cette étude contribue ainsi à étendre l'ensemble de la littérature traitant des *scrip dividends*, (notamment Lasfer, 1997a et 1997b), jusqu'à présent basée sur l'existence d'un avan-

23. Des outils similaires sont également à la disposition des entreprises dans plusieurs pays d'Europe (Royaume-Uni, Espagne, Pays-Bas) et connus sous le nom de *scrip dividends*. Les détails réglementaires d'un tel mécanisme peuvent cependant varier d'un pays à l'autre. En outre, seul le cadre Français garantit la neutralité fiscale du dividende en actions.

tage fiscal lié au paiement d'un dividende en actions. Pareillement, les études existantes qui traitent du paiement du dividende en actions en France (voir Jacquillat, 1992, et Jacquemet, 1998), exploitent des périodes au cours desquelles ce type de dividende bénéficiait d'un traitement fiscal préférentiel²⁴. Par ailleurs, nous complétons également la littérature relative aux distributions d'actions gratuites (*stock dividends*), qui constituent un autre substitut potentiel aux dividendes en numéraire (voir Lakonishok et Lev, 1987, Grinblatt, Masulis et Titman, 1984, ou Bessembinder and Zhang, 2015, entre autres). Ces distributions d'actions n'impliquent cependant pas de réinvestissement effectif du dividende, comme dans le cas du dividende en actions. Ainsi, ce premier chapitre offre un cadre unique d'analyse de la préférence des actionnaires pour une rémunération en actions ou en numéraire. Il complète opportunément la littérature en matière de réaction des investisseurs face à la diminution des excédents de trésorerie qui leur sont redistribués.

Le second chapitre s'interroge ensuite, sur la nature des déterminants explicites de la stratégie des entreprises en matière de gestion des liquidités. En la matière, la littérature financière met en évidence le *cash* et les lignes de crédit comme deux sources de liquidités majeures (Lins *et al.*, 2010, ou Campello *et al.*, 2011 et 2012) et partiellement substituables (Sufi, 2009, ou Achary *et al.*, 2013). La performance opérationnelle des entreprises et le risque systématique auxquelles celles-ci font face, apparaissent comme les deux facteurs majeurs motivant leur choix entre l'une ou l'autre de ces alternatives. Pourtant, la crise financière de 2007 et un courant entier de la littérature²⁵ mettent en évidence l'impact majeur des relations entre une firme et ses clients, sur les décisions stratégiques de celle-ci.

Les résultats présentés dans ce second chapitre montrent dans quelles mesures le risque client affecte le choix des entreprises entre réserves internes (*cash*) et réserves externes (lignes de crédit) de liquidités. Notre étude repose alors sur un échantillon liant les entreprises américaines à leurs principaux clients²⁶ et pour lesquelles les fonds débloqués sous forme de lignes de crédit sont identifiables (sur la période 1987-2013). En l'espèce, les entreprises faisant face aux clients les plus risqués semblent détenir une plus grande partie de leurs réserves de liquidités sous forme de *cash*. Ce faisant, elles réduisent ainsi le risque et les conséquences d'un non-respect de l'ensemble des clauses incluses dans leurs contrats de lignes de crédit. En outre, les établissements bancaires semblent prendre en compte ce risque, lors de la négociation des termes d'une ligne de crédit. En particulier, notre étude met en lumière des taux d'intérêts plus élevés ainsi qu'un nombre plus important de clauses restrictives imposées aux entreprises qui présentent un risque client élevé.

24. En l'espèce, ces deux études sont réalisées sur des périodes incluant tout ou partie des années 1989 à 1992. Le taux alors en vigueur sur les dividendes versés sous formes d'actions était de 39%, tandis qu'il était de 42% pour les dividendes versés en numéraire.

25. Titman (1984) et Titman et Wessels (1988) posent les bases de la théorie liant explicitement les relations clients-fournisseurs (entre autres) et la stratégie financière des entreprises. Voir Kale et Shahrur (2007), Hennessey et Livdan (2009), ou encore Hoberg, Phillips and Prabhala (2014) pour plus détails.

26. La réglementation en vigueur aux Etats-Unis oblige les entreprises cotées à fournir l'identité des clients représentant plus de 10% de leur chiffre d'affaire annuel.

Plusieurs études récentes se penchent sur le rôle des relations clients-fournisseurs dans la gestion de trésorerie des entreprises (Itzkowitz, 2013, ou Garcia-Appendini and Montoriol-Garriga, 2013). Le point central y est alors la présence de trésorerie au bilan des entreprises. En d'autres termes, le choix explicite entre différentes réserves de liquidités n'y est pas abordé. En outre, le risque client ne fait l'objet que d'un traitement limité dans la littérature financière (voir par exemple Dhaliwal *et al.*, 2015, ou Demirci, 2015). Ce second chapitre constitue ainsi la première étude empirique mettant en lumière l'impact des relations clients-fournisseurs sur la façon dont les entreprises choisissent de gérer leurs liquidités.

Enfin, le troisième chapitre traite des conséquences des choix organisationnels des entreprises. Ainsi, Klein *et al.* (1978) et Williamson (1979) soulignent les inefficiences potentiellement générées par la mise en place de partenariats commerciaux avec des clients clairement identifiés. L'internalisation de la chaîne de production d'une entreprise apparaît alors comme une solution optimale, qui permet de minimiser l'ensemble des coûts affectant l'activité de celle-ci. Pourtant, Coase (1937) suggère que le maintien d'une relation de long terme entre deux partenaires commerciaux peut leur permettre d'améliorer l'efficacité de leur partenariat.

Dès lors, ce troisième chapitre s'attache à justifier de l'intérêt pour les entreprises d'entrer dans une relation commerciale de long-terme avec leurs clients. L'étude ainsi présentée se repose alors sur un échantillon d'entreprises cotées américaines, dont l'identité des principaux clients est clairement définie (sur la période 1977-2014). En particulier, notre analyse met en regard des entreprises en tout point similaires, sauf en ce qui concerne la durée des relations avec leurs principaux clients. Une telle stratégie permet en effet d'isoler, l'impact de la durée des relations clients-fournisseurs sur la performance et l'efficacité des entreprises²⁷. Nos résultats suggèrent tout d'abord, que les entreprises souhaitant établir des partenariats de long terme doivent renoncer à certaines opportunités d'investissement extérieures au cours des premières années de la relation. Cet engagement initial permet ensuite aux entreprises de bénéficier d'une performance accrue, notamment une fois que la relation client-fournisseur est arrivée à maturité. Cette hausse de profitabilité semble en outre être associée à une plus grande efficacité du cycle opérationnel des entreprises (notamment *via* un raccourcissement des délais de paiement clients). Enfin, parvenir à maintenir une relation de long-terme avec leurs clients semble affranchir les entreprises du besoin de conserver un niveau plus élevé de trésorerie. En d'autres termes, établir des partenariats commerciaux durables semblent traduire une volonté des entreprises d'assurer l'efficacité future de leur activité et ainsi, de diminuer leur besoin d'accumuler des réserves de liquidités (par précaution).

27. En pratique, les échantillons sont constitués au moyen d'une procédure dite de *propensity score matching*.

La nature des relations entre une entreprise et ses partenaires commerciaux fait l'objet d'une littérature riche et variée. Il est alors particulièrement étudié l'impact d'une diversification plus ou moins importante de la base de clients d'une entreprise, sur ses choix stratégiques (voir Fee et Thomas, 2004, Patatoukas, 2012, Itzkowitz, 2013, ou Irvine *et al.* 2016). La dimension temporelle des échanges entre les entreprises n'est cependant que peu abordée, voire négligée. On notera par ailleurs que Dwyer *et al.* (1987) et Ring and Van de Ven (1994) tentent de proposer un cadre théorique d'étude de l'évolution des partenariats commerciaux. Cependant, les études s'attachant à valider empiriquement ces modèles sont rares et bien souvent basées sur des sondages réalisés auprès des dirigeants d'entreprise. En ce sens, le troisième chapitre de cette thèse constitue une des premières tentatives (nous retiendrons ici les travaux de Costello, 2013) d'étude systématique de l'impact de la durée des relations clients-fournisseurs sur les entreprises.

Chapter 1

When cutting dividends is not bad news : The case of optional stock dividends ^{*}

Abstract

We provide evidence on optional stock dividends, a mechanism that allows shareholders to choose between cash dividends and the equivalent number of new shares in lieu of cash. We find that, in contrast to dividend cuts, shareholders do not view this option as bad news. When firms offer optional stock dividend in lieu of cash dividends, the market does not react negatively. Facing the choice between cash and stock dividend, shareholders choose 55% of the total dividend in the form of stock dividend. Our findings suggest that firms that are more committed to paying dividends are more likely to offer optional stock dividends to their shareholders.

^{*}. Co-authored by Pr. Edith Ginglinger. Published in the *Journal of Corporate Finance*, Volume 40, (October) 2016, p. 174-191.

1.1 Introduction

Since Lintner (1956), several studies have documented the dividend smoothing phenomena and have reported that managers view dividend stability as one of the most important factors in payout policy. Firms that decrease or omit dividends suffer a severe decline in value (Pettit, 1972 and Aharony and Swary, 1980), making managers reluctant to cut dividends. Based on a survey of executives, Brav, Graham, Harvey, and Michaely (2005) note that "many of the interviewed executives would like to cut dividends but feel constrained by their historic policy. Some of these firms look for opportunities for a stealth cut in dividends". Dividends create a constraint for managers that conflicts with their common objective of conserving cash and maintaining financial flexibility (Jannagathan, Stephens and Weisbach, 2000, Blau and Fuller, 2008, and Denis, 2011).

Companies can temporarily reduce their cash outflows by offering their shareholders the option to receive new shares in lieu of cash. The purpose of this paper is to study shareholders' perception of this method of paying dividends, which enables firms to refrain from decreasing their dividend per share, and, at the same time, maintain their cash balance and their financial flexibility. This practice, commonly known in Europe as scrip dividends, is popular in several countries. However, its institutional setting is not homogeneous, particularly in terms of option length, reference price and tax treatment. In this paper, we focus on France—a major western country with the sixth-largest economy in the world and a well-developed corporate sector—where firms offer this option in a tax-neutral environment. For example, Bouygues offered optional stock dividends (OSDs) for the first time in 2014 (fiscal year 2013), after its BBB+ credit rating was placed on negative watch. Accepted by 79.1% of its shareholders, this option enabled the firm to increase its capital by 5%. Optional stock dividends share some features with dividend reinvestment plans (DRIPs), which are used by a large proportion of U.S. dividend paying firms.¹

Optional stock dividends provide a valuable framework to investigate firms' reluctance to decrease dividends and a unique opportunity to measure shareholders' willingness to receive stocks instead of cash. Exploiting this opportunity, we address three questions. First, which firms use optional stock dividends rather than decrease their dividends? Second, why do firms prefer optional stock dividends to paying a cash dividend and simultaneously raising external capital? Third, do shareholders exercise the option of receiving stock dividends, and do they value this option?

1. In both cases, shareholders renounce cash to receive more shares of the firm. However, only registered shareholders can enter DRIPs, and in most cases, they receive shares bought by the firm in the stock market. Further, most programs limit the maximum dollar amount of dividends that can be reinvested by any individual shareholder, and DRIPs are therefore effectively intended for retail investors only. In contrast, in offering optional stock dividends, the firm issues new shares, often at a discount, and the option is available for all shareholders, including institutional investors. Further, DRIPs are multiannual programs, whereas optional stock dividends are voted on each year that the firm intends to offer the option.

In this paper, we use a hand-collected dataset of 287 French firms for the 2003-2012 period to analyze the decision to pay optional stock dividends in a tax-neutral environment. We perform a multinomial logit analysis to examine the three-way choice among cash dividends, optional stock dividends, and dividend cuts. We find that firms with a high past dividend yield and a large percentage of their capital held by institutional investors offer optional stock dividends to their shareholders ; these firms are the most committed to paying dividends. The main difference between optional stock dividend payers and dividend cutters relates to net income variation : optional stock dividend payers show positive net income variation, whereas dividend cutters' suffer a 40% decrease in their net income on average. Further, higher leverage and lower cash holdings distinguish optional stock dividend payers from cash dividend payers. Optional stock dividend payers are therefore firms committed to paying dividends that are in need of cash and equity, and optional stock dividends provide these firms with an opportunity to temporarily cut their cash outflows while maintaining their commitment for future dividends.

In addition, we find that optional stock dividends are used primarily during recession periods, when seasoned equity offerings are penalized by significant discounts on the issue price. Optional stock dividends can therefore be viewed as backdoor equity during periods of economic downturns, when SEOs are expensive and when banks are reluctant to take the risk of underwriting them.

In the second part of our analysis, we study the market reaction to optional stock dividend announcements. In contrast to dividend cuts, shareholders do not view this option as bad news : we document a positive market reaction on the announcement day of optional stock dividends and find that shareholders value nominal dividends as if they were cash dividends for the total amount. Further, the average approval rate of optional stock dividends at general meetings, during which the stock dividend option has to be presented and adopted as a specific resolution, is 97.48%. Besides general meetings, the most convincing way to measure shareholders' approval is to examine their participation rate. Optional stock dividends provide us with a unique opportunity to measure shareholders' takeup of stocks rather than cash. As better-informed shareholders should be able to take advantage of their superior information to opt for stock when it is worth more than the offer price and to opt for cash when it is worth less, we expect the takeup of stock to increase with the fraction of the capital owned by informed shareholders. We find that the shareholders' takeup is on average 55.4% and that the takeup increases with the fraction of capital held by institutional investors and blockholders, who can be viewed as informed investors. These findings further suggest that optional stock dividends signal favorable prospects. We also find that the takeup is larger the first time the optional stock dividend is offered, suggesting that shareholders are more willing to accept temporary dividend cuts.

Finally, we examine whether our results are robust to considering share repurchases. We

find that firms that offer optional stock dividends repurchase shares less frequently and for a lower amount than firms that pay cash dividends. Our results regarding the choice between cash dividends and optional stock dividends are qualitatively unchanged when the subsamples of repurchasing and non-repurchasing firms are analyzed separately.

A small body of empirical literature focuses on optional stock dividends. Lasfer (1997a) investigates optional stock dividends in the UK over the 1987-1992 period. During this period, stock dividends were not subject to the advanced corporation tax payable on cash dividends, and the study results reject the tax motivation for the choice to pay optional stock dividends. On the other hand, Lasfer (1997b) conducts a survey among a sample of UK companies that offered their shareholders this option and a control sample of firms that paid only cash dividends. The majority of the respondents feel that the stock dividend option is driven by tax issues. Jacquillat (1992) investigates informational effects related to optional stock dividends in France, and Jacquemet (1998) proposes and tests a valuation model for the option to take dividends in stock. However, both papers examine a period that includes several years (1989 to 1992), during which optional stock dividends enjoyed a tax benefit for French firms.²

Also related to our study are a few papers that analyze tax motivations for different classes of shares that offer access to either stock or cash dividends but that do not offer options for both. Ang, Blackwell, and Megginson (1991) study British investment trusts with one class of shares entitled only to stock dividends and another class entitled to cash dividends. They find that after the tax advantage of stock dividend shares is eliminated, investors express a preference for cash dividend shares and convert all stock dividend shares into cash dividend shares. Similarly, Hubbard and Michaely (1997) examine the case of Citizens Utilities Company, which also offers two classes of stock, one that pays cash dividends and one that pays stock dividends. They find that the relative price of both classes varies over time and does not adjust to changes in relative taxation. However, these papers rely on tax differences between stock dividends and cash dividends, whereas our paper is based on a tax-neutral environment.

Our paper is also related to the literature on DRIPs. For example, according to Scholes and Wolfson (1989), DRIPs provide an investment banking function in issuing equity. Dammann and Spatt (1992) analyze the value of options and the optimal exercise policy in DRIPs, whereby most firms allow shareholders to make voluntary cash investments with a monthly, quarterly or annual maximum amount. Berkman and Koch (2016) examine the behavior of stock prices around the time that dividends are paid and find a significant price increase concentrated among stocks with DRIPs. However, DRIPs are mainly for retail investors, and data on firm-specific DRIP participation rates are not available, rendering an analysis of sha-

2. The tax rate on corporate profits paid out to shareholders in the form of stock has been 39%, compared to 42% on profits paid out in cash.

reholders' preferences for stocks over cash difficult.

Our study is also related to the literature on traditional stock dividends, which are offered to all shareholders on a pro-rata basis. Within this literature stream, Lakonishok and Lev (1987) find evidence showing that stock dividends provide a temporary substitute for cash dividends for firms that are unable to pay cash dividends, whereas other authors view stock dividends, similar to stock splits, as a way to keep the stock price within an acceptable trading range or as a device to increase stock market liquidity (Copeland, 1979). Stock dividends are viewed as good news for shareholders (Grinblatt, Masulis and Titman, 1984, McNicols and Dravid, 1990, and Bessembinder and Zhang, 2015). Recently Zhang and Kallay (2016) argue that investors overreact to a firm's initial stock dividend announcements, and then subsequently learn that post-dividend firm performance is poor, explaining the near extinction of stock dividends in recent years. Pure stock dividends are mainly cosmetic changes and intrinsically differ from OSDs which imply a dividend reinvestment decision. Thus, pure stock dividends do not permit one to observe the decision of shareholders between stock and cash.

The remainder of the paper is organized as follows. In Section 2, institutional settings are presented. Section 3 reviews various theories that have implications for the decision to pay optional stock dividends and develops testable hypotheses. Section 4 describes our data and explains the construction of various variables that are used in the study. Empirical results are reported in Section 5. Our conclusions are presented in Section 6.

1.2 Institutional settings for the stock dividend option in France

Since the law of 1983 (no.83-1 - 3 January 1983), French firms have been allowed to pay dividends in either cash or stock. Firms have no tax motivation for optional stock dividends in France, as both stock and cash dividends have been taxed similarly since 1993. The stock dividend option has to be explicitly voted upon each year that it is to be offered. At the annual general meeting approving the payment of a dividend, a separate resolution giving shareholders the option to receive dividends in either cash or newly created shares thus has to be approved. Shareholders have to define the new share issue price. According to the current legislation, this issue price must exceed 90% of the average closing stock price over the 20 trading days prior to the general meeting, less the net amount of the dividend to be paid. In practice, most firms tend to apply an exact 10% discount on the reference stock price. In 2009, more than 25% of the firms belonging to the CAC40 index (the major French index) used optional stock dividends.

The timing of the stock dividend option is voted upon during the general meeting. Shareholders agree on the conversion period, starting from the ex-dividend date, during which

they can individually opt for a dividend in cash or in stocks for the total amount of their dividend and decide on the date of the dividend payment at which, when appropriate, new shares are to be issued and can be sold. Optional stock dividends can thus provide valuable options for shareholders, who can decide whether to invest given the available price information on the last date of the conversion period. However, shares are available only at the dividend payment date.

Shareholders exercising their option receive the nearest whole number of shares lower than or equal to the product of the net dividend per share (DPS) and the number of shares held, divided by the new share issue price.³ Unlike pure stock dividends, which are not taxable, stock dividends received as part of the optional mechanism follow the same taxation rules as cash dividends.

Thus, every shareholder can choose whether to receive a dividend in stock or in cash. Moreover, the stock dividend option applies only to dividends for the past fiscal year. However, the option can concern all or part of dividends. Despite being inherently similar to SEOs - which are limited to the amount of dividends - stock dividends are not subject to SEO regulation. The stock dividend decision has to be made at the ordinary general meeting (a majority of 50%), whereas SEOs are authorized at the extraordinary general meeting (supermajority of 2/3). Registration by AMF⁴ and information regulation for SEOs are not applicable to optional stock dividends. Finally, in contrast to the accounting of traditional stock dividends for which firms reduce their retained earnings account and increase their common stock account, the accounting of optional stock dividends acknowledges the distribution of a dividend for the total amount and increases the common stock account for the fraction of the dividend paid in stock.

To illustrate the optional stock dividend process, let us take the example of SANOFI in 2011. In the annual report, the firm managers expressed their willingness to offer shareholders the stock dividend option to retain part of the 5.7 billion euro net profit realized in 2010. During the General Meeting of Shareholders (May 6, 2011), the payment of a DPS of 2.50€ was approved, and shareholders were offered the option to receive new shares instead of cash. The issue price was set at 49.60€, which represented the 20-day average stock price measured the day before the general meeting minus the net DPS, without a discount (the majority of other firms offer the maximum discount of 10%). The conversion period was set from May 16, 2011 (the ex-dividend date) to June 3, 2011 (the share price on June 3 was 52.43€). Any shareholder who had not exercised the option at this date will receive the dividend in cash. The new shares, entitled to dividends on January 1, 2011, were listed on the Euronext Paris Stock Exchange on June 16, 2011 - with an opening price of 51.68€. In all,

3. The cash adjustment can be paid either by the firm or by the shareholder, who then receives a supplementary share.

4. Autorité des Marchés Financiers, the French financial market regulator.

38,139,730 new shares were listed on the market, representing a 58% takeup and 2.9% of the capital. Not all shareholders exercised the conversion option, although the Sanofi stock price had remained above the issue price during the entire conversion period. Figure 1.1 presents the timeline of the optional stock dividend process for Sanofi.

1.3 Hypotheses and predictions

Our empirical work on optional stock dividends draws on two approaches. In the first approach, optional stock dividends are viewed as an alternative to dividend cuts. Paying optional stock dividends instead of cash dividends allows a firm to payout a dividend while preserving cash equal to the fraction of the total dividend that shareholders choose to receive as stock. If all shareholders choose stock dividends, the result is equivalent in terms of cash flow and stock equity balance to the firm retaining earnings. Retaining earnings saves on taxes and transaction costs, specifically the administrative cost of running the stock dividend option and the transaction costs of reselling shares in the secondary market. However, cutting dividends may not be an acceptable option for a large fraction of firms, given the observed inflexibility in corporate dividend policies and the negative market reaction to the reduction or omission of dividends.

In the second approach, OSDs are viewed as an alternative to issuing equity. Firms in need of cash can either pay dividends and independently raise equity, before or after the dividend payout, or offer OSDs. In the second case, if all shareholders take the dividend in stock, the firm is left with as much cash as if it had paid a cash dividend and then clawed it back from the same shareholders via a rights offering.

We examine the consequences of these alternative views concerning the choice among cash dividends, dividend cuts and OSDs, the market reaction to optional stock dividend announcements and the preference of shareholders for stock over cash.

1.3.1 The choice among cash dividends, dividend cuts and optional stock dividends

To explain the choice among cash dividends, dividend cuts and OSDs, we first examine agency conflict reasons. We then focus on OSDs being an alternative to cash dividends associated with an SEO.

Agency costs

In agency-based models, dividends are used to control the agency costs of free cash flow. According to Easterbrook (1984), paying high dividends forces firms to constantly stay in the market for capital, which allows current investors to monitor firm managers. As growth firms

regularly raise capital, paying dividends would not help reduce agency costs. Dividends thus play a monitoring role for older and more mature firms, with less need for capital, by forcing them onto the market. Allen, Bernardo, and Welch (2000) and Leary and Michaely (2011) find evidence showing that institutional investors are more likely to hold dividend smoothing stocks. In contrast, Javakhade, Ferris and Sen (2014) document that ownership concentration negatively affects dividend smoothing. In closely held firms, blockholders strongly monitor and discipline managers. These firms do not need to use dividend smoothing to mitigate agency problems between shareholders and managers. Furthermore, for undiversified blockholders (families for example), dividends represent a critical income (Isakov and Weisskopf, 2015), and these shareholders may prefer effective cash payouts rather than stock dividends.

According to the smoothing clientele view, firms that are committed to paying dividends to satisfy their investor clientele should use optional stock dividends to display a dividend payout while saving cash rather than cutting dividends.⁵

Our first hypothesis is as follows : Optional stock dividends are an alternative to dividend cuts for firms committed to paying smoothed dividends, essentially mature, widely held firms, with a large institutional investor ownership, when their level of cash holdings does not enable them to pay cash dividends.

Optional stock dividends as an alternative to issuing new equity

Firms intending to issue new equity incur several direct and indirect costs. According to Eckbo et al. (2007), expected flotation costs include the underwriter spread and out-of-pocket expenses (e.g., listing fees, fees to law firms and accountants, advertising costs, and management time devoted to the issue process), expected underpricing and the probability of offer cancellation multiplied by the expected cost of cancellation. Optional stock dividends allow firms to issue new shares directly to shareholders without the help of an investment bank (e.g., Scholes and Wolfson (1989), and Eckbo and Masulis (1992), for U.S. DRIPS) and thus save firms a large part of the flotation costs. A major cost associated with optional stock dividends is the discount offered to shareholders opting for stock dividends, the average of which is 8.5% (the legal maximum is 10%). The discount is earned by current shareholders who opt for stock dividends, whereas it is earned by external investors in public offerings. This discount is larger than the discount documented by Corwin (2003) for U.S. SEOs (a 3% discount for firm commitments in the 1990s). In France, the discount varies

5. Shefrin and Statman (1984), based on Thaler and Shefrin's (1981) theory of self-control, suggest that irrational individual investors can adopt the rule of devoting dividends to their consumption and avoid having to make decisions about how much to consume. The decision to offer optional stock dividends has a number of advantages with respect to these aspects. Dividends are declared for the total amount, and even if the investor chooses to receive the dividend in stock, he does not have to break his "do not consume out of capital" rule. Dong, Robinson and Veld (2005) survey a panel of Dutch investors and confirm that individual investors prefer companies to pay a stock dividend rather than no dividend at all.

according to the flotation method. For example, Gajewski et al. (2007) find a 22% discount for standby rights issues and 7% for public offerings, but these discounts vary over time depending on market conditions. Discounts in rights offerings should be offset by the value of rights for shareholders. However, several studies document that shareholders who sell their rights suffer a substantial loss because the market for rights lacks liquidity (see, e.g., Massa, Vermaelen and Xu, 2013). Discounts in optional stock dividends and in SEOs are therefore of similar magnitude. However, OSDs can be an alternative to SEOs during recession periods. SEOs are highly dependent on market conditions (Bayless and Chaplinsky, 1996). In bear markets, volatility is high, stock prices are low, and flotation costs, especially underwriting fees, are large. In addition, both the probability of cancellation and underpricing required to sell equity are likely to be high.

Our second hypothesis is as follows : French firms will use optional stock dividends as backdoor equity during periods of economic downturns when they are unable to raise equity on the market at an acceptable cost. Under this hypothesis, leveraged firms seeking equity should use optional stock dividends during recession periods.

1.3.2 The market reaction to an optional stock dividend announcement

The market reaction to the announcement of optional stock dividends is a combination of three components : reaction to the cash dividend, reaction to the option to get stock and reaction to the equity offering part of the stock dividend.

The signaling function of dividends

Dividend-signaling models analyze the role of dividends in communicating relevant information about firm value beyond the information contained in earnings (for example, Bhattacharya, 1979, Miller and Rock, 1985, or John and Williams, 1985). Managers use dividends to communicate their private information to the market. Favorable information can help eliminate underpricing, and selling shareholders -or firms issuing equity- will receive a higher price. Several models for dividend-smoothing policies are also based on information asymmetry (for example, Kumar ,1988, and Guttman, Kadan and Kandel, 2010). The observed market reaction to changes in dividends is consistent with signaling models' predictions. However, there is little empirical evidence that changes in dividends predict future changes in earnings. In Kumar (1988)'s model, dividend changes reflect only broad changes in a firm's prospects. Dividend decreases signal substantial deterioration in firms' prospects, but dividends are nevertheless a poor predictor of firms' earnings. A firm paying optional stock dividends, by maintaining nominal dividends and offering shareholders to reinvest their dividends, is still committed to paying the total dividend if all shareholders prefer cash, which signals better prospects than a dividend decrease. Furthermore, because each shareholder can opt for a cash dividend if he prefers cash, the dividend signaling view implies that the market reaction to optional stock dividends should not differ from the one associated with

pure cash dividends, which mainly depends on the magnitude of dividend variations.

The option to receive stock instead of cash

Shareholders are granted an option to convert their dividend into stock instead of receiving cash. The market reaction should reflect the value of the option (a warrant, to be more precise, as new shares are issued). To give an idea of the magnitude of the warrant value, let us consider average values : the new shares are issued at a mean 8.5% discount, and the number of new shares represents on average 2.3% of the previous number of shares. If we consider the time value of the warrant to be zero, given its short maturity (19 days), the value of the warrant is about 8.5% of the share price ; thus, the average fraction of the market reaction reflecting the warrant value should be approximately 0.20%.

Adverse selection costs : optional stock dividends as backdoor equity

OSDs can also be analyzed as a 100% cash dividend associated with an equity offering. The average market reaction to SEOs documented in the literature is approximately -1% to -1.5% for equity issues representing an average 10% to 20% of the total market value of a firm (see Eckbo, Masulis and Norli, 2007). There are three reasons why the magnitude of the negative component of the market reaction associated with the equity features of OSDs should be small. One, in our sample of OSDs, the equity issue represents on average 2.3% of the market value, which is only a small fraction of usual SEO proceeds. Two, since only current shareholders are able to elect the stock dividend option, the adverse selection problem noted in Myers and Majluf (1984) is reduced. Three, similarly to convertible bonds in Stein (1992)'s model, OSDs can be viewed as a device to obtain equity through the backdoor in situations in which conventional equity offerings are unattractive. In presence of costly distress, a company that is already substantially leveraged will choose OSDs only if it is optimistic about its prospects and if it believes that shareholders share its optimism. Firms cannot force shareholders to choose stock dividends, but they can induce them to do so by offering a discount on the issue price. Firms with unfavorable prospects will prefer straight dividend cuts as OSDs offer no guarantee that shareholders will choose stocks over cash. Firms with low leverage do not need equity, and they will prefer cash dividends. Thus, the market should react less negatively to the announcement of an OSD compared with the announcement of a SEO.

We argue that the positive market reaction due to the option value and the negative market reaction to the equity part of the OSD should be of similar magnitude ; thus, their sum should be approximately zero. After controlling for dividend variations, the market reaction to announcements of OSDs should therefore be similar to the reaction to cash dividends.

Our third hypothesis is as follows :

- Optional stock dividends signal more favorable prospects than dividend cuts. Therefore, the market reaction to OSD announcements should be less negative than the reaction to dividend cuts.

- The market reaction to OSDs should be similar to the market reaction to cash dividends.

1.3.3 Ownership and shareholders' takeup

According to both the dividend signaling view and the backdoor equity view, optional stock dividends should convey more favorable information on firms' prospects than dividend decreases or a conventional equity offering. These positive prospects should translate in future stock price increase, and informed shareholders should therefore be willing to choose stock dividends rather than cash. As Barclay and Smith (1988) and Brennan and Thakor (1990) suggest for the choice between repurchases and dividends, when cash dividends are paid, informed and uninformed investors receive a pro-rata amount. When the stock dividend option is available, better-informed shareholders may be able to take advantage of this information to opt for stock when it is worth more than the offer price and to opt for cash when it is worth less.⁶ Because of the fixed cost of collecting information, large shareholders will have a greater incentive than small shareholders to become informed. Hence, large shareholders should be more willing to choose stock dividends than small shareholders. The takeup of stock in optional stock dividends should increase with the fraction of the capital owned by informed shareholders-whether blockholders or institutional investors.⁷ An alternative explanation following Shefrin and Statman (1984) would be that institutions choose stock not because they know more but rather because in contrast to individual investors, they do not need the money for consumption. They act like mutual fund investors who reinvest their dividends.

Our fourth hypothesis can be declined as follows : As offering optional stock dividends may signal that a firm's prospects are favorable, shareholders should be willing to receive stock dividends rather than cash. In addition, stock dividend takeup should increase with the proportion of informed shareholders, whether institutional investors or blockholders.

1.4 Sample

Our primary data source for dividend payments is the Eurofidai-OST database, which provides unique and detailed historical data on cash and stock dividends paid by French

6. However, as the proportion of stock dividend depends on shareholder demand, the wealth transfer from uninformed to informed shareholders is lower in the case of optional stock dividends than in the case of share repurchases.

7. We cannot rule out the possibility that the discount may attract arbitrageurs. Some funds (e.g., index trackers) are unwilling to take the stock dividend option because their holdings would become larger than their investment guidelines permit. In such instances, stock can be lent out, and the borrower can choose the stock and sell the newly issued shares on the market. The proceeds from selling the shares are then used to pay the lender the cash dividend that they have forgone by lending the shares. The borrower makes a profit equal to the difference between the market value of the shares and the cash dividend, less the stock lending fee.

firms. We select firms listed on the CAC All Tradable index (former SBF 250) for the 2003-2012 period.⁸ The aggregate market value of these firms represents on average 92.5% of the market capitalization of all public firms in France. We further obtain data on 2033 dividend payments initiated by 287 firms, including 168 cases of optional stock dividends.⁹ Most French firms only pay annual dividends. There are 46 interim dividend-paying firms (113 firm-years) in our sample. For these firms, we focus on the first dividend payout following the firm's general meeting at which the option to receive a stock dividend is decided.

For each stock dividend payment option, the expiry date of the conversion option is manually extracted from either the Factiva database or firms official reports. We are able to identify all characteristic dates for 148 optional stocks dividends ; however, the expiry date of the conversion option is not available for the remaining observations. In addition, the Eurofidai database allows us to extract, for each observation, the total DPS, the reinvested DPS, and the issue price for new shares.

We complete our data by using vote results from firm shareholders' meetings. For every CAC All Tradable firm that uses the stock dividend option during a given year, we hand collect the corresponding vote results from shareholders' meetings and extract the percentage of votes in favor of the dividend payment and the proportion of votes in favor of the stock dividend option.¹⁰ We also collect the percentage of votes in favor of each resolution relative to a SEO, either a rights issue or a public offering.

Accounting and market data for the CAC All Tradable firms are extracted from the Thomson Reuters Datastream and Thomson Reuters Worldscope databases. We collect data for the fiscal years 2002 to 2011, corresponding to dividends initiated between 2003 and 2012. Because the Eurofidai database alone allows us to sort only between cash and stock dividends, we use Datastream data types to identify absences of dividends. In other words, we cross-reference the two databases to identify listed firms that choose not to pay a dividend to their shareholders. For the same fiscal period, we also extract ownership data from the Thomson One Banker database for the CAC All Tradable firms. The final panel data have 2,446 firm-years (287 unique firms).¹¹

Table 1.1, Panel A, reports the distribution of all dividend payments over the 2003-2012 period. The table presents the total number of dividend payments, the number of observations without dividends, and the number and proportion of optional stock dividends. Optional stock dividends represent 8.26% of the observations over the entire period. Column

8. Very few French firms use optional stock dividends outside the CAC All tradable index.

9. We exclude hedge funds from our sample. As a robustness check, we also run our tests excluding all financial firms.

10. We thank Proxinvest for providing data regarding optional stock dividend resolutions.

11. In our different tests, the sample size may vary depending on the restrictions we impose on the subsample relied on.

(5) highlights a strong increase in optional stock dividends in 2009 and 2010, with more than 15% of the dividend payments offered as optional stock dividends.

Table 1.1, Panel B, details the characteristics of the stock dividend option. On average, if all shareholders chose to receive their dividend in stocks, optional stock dividend paying firms would have increased their capital by 4.2% (median 3.5%). The average subscription rate (shareholder takeup) is 55.4% (median 63.1%), which means that more than half of the shareholders choose stocks rather than cash. Moreover, the actual mean capital increase is 2.3% (median 1.9%), and the mean discount at the end of the conversion period is 8.5% (median 8.1%). The conversion period (from the ex-dividend day to the last day when the choice for stocks is possible) lasts on average 19.06 days (median 17 days), and the conversion to issue date (date when shareholders effectively receive and can sell their stock dividend) period lasts 11.56 days (median 11 days). At the issue date, the discount is still 8.5% on average (median 7.9%).

The use of stock dividends is temporary. Figure 1.2 shows that while just over half of the firms resort to this mechanism for a second year, firms that use it more than three consecutive times are relatively infrequent.

We construct variables for firm profitability, size, cash holding, leverage, payout ratio, dividend yield, market-to-book ratio, stock return volatility, liquidity, and ownership by following the standard procedures in the literature. The variable construction and sources are described in the Appendix.

Table 1.2 reports the summary statistics and univariate comparison of various firm characteristics across the three categories of dividend payments : cash dividends, optional stock dividends, and dividend cuts (omissions or dividend cuts by more than 30% for former dividend paying firms). Firms offering optional stock dividends are larger, and they have a lower market-to-book ratio, less cash, and more debt than firms offering cash dividends only. The results in Table 1.2 also suggest that firms offering optional stock dividends have a higher dividend yield and a higher median payout ratio than firms offering cash dividends only. Optional stock dividend firms have a large fraction of their capital held by institutional investors, and they are large, mature firms, which typically have an implicit contract to pay smoothed cash dividends. They are less frequently closely held : the largest shareholder holds 30.3% (38.8%) of the capital for optional stock dividend payers (cash dividend payers). Further, optional stock dividends are more frequently used during recessions : the mean GDP variation during the year that the dividend is offered is 1.1% for cash dividends and 0.6% for optional stock dividends.

The last column of Table 1.2 compares the characteristics of firms offering optional stock dividend with those of firms cutting dividends by at least 30%. Optional stock dividend firms

are larger, on average, than dividend cutters. Moreover, optional stock dividend firms hold less cash and have more debt than firms that cut dividends. Whereas net income variation is not significantly different between cash dividend payers and optional stock dividend payers, firms cutting dividends significantly differ from the other firms by having a mean negative net income variation.

1.5 Empirical results

1.5.1 Why do firms use optional stock dividends ?

We first investigate whether the institutional variables and firm characteristics discussed in Sections 1.2 and 3.2 influence the likelihood that firms use optional stock dividends. French firms can choose to pay an optional stock dividend rather than cutting dividends or paying a 100% cash dividend. Each firm faces this discrete choice each year during the sample period. To examine the factors driving the payout choice, we estimate a multinomial logit model. The choice set consists of a dividend cut, a cash dividend, and an optional stock dividend. The sample comprises OSD-paying firms, dividend cutters (omissions or dividend decreases by more than 30% for former dividend paying firms), cash dividend payers with a non-negative change in DPS. We exclude dividend initiations¹² and all observations prior to the initiation of dividends, firms that never paid any dividend, and firm-years with zero-dividend corresponding to a repeated dividend omission. The resulting sample contains 1,715 firm-year observations.¹³ We assume that there is no natural ordering of the alternative payout channels. Because clustering effects could bias the statistical significance of the results owing to time series dependence (residuals for a given firm could be correlated over time), in estimating our regressions, we adjust the standard errors for clustering by firm.

Table 1.3 reports the multinomial logit regression results, with cash dividends being the baseline category. The coefficients for cash variables (either the continuous variable or the dummy for cash-rich firms) are negative, thus suggesting that the likelihood of offering OSDs decreases when firms are not cash-constrained.

The results show that firms with high past dividend yields are more likely to offer OSDs than other firms. The impact of institutional investors on firms' likelihoods of offering OSDs is weakly yet significantly positive. Closely held firms prefer paying cash dividends to offering OSDs. In additional tests comparing dividend cuts with OSDs, we find that closely-held firms prefer dividend cuts rather than OSDs. Unlike in the U.S. and the U.K., where dispersed ownership predominates, in France, a considerable proportion of listed firms are closely

12. We identify a dividend initiation as the first strictly positive DPS reported in Datastream.

13. We also repeat our multinomial logit analysis on a sample including all no-dividend observations instead of dividend cuts only, and the results remain similar.

held, reflecting ownership by multiple family branches that may have continued for decades. Large blockholders monitor the firm well ; thus, these firms can choose a dividend policy without the need to use cash dividends as a monitoring device. These findings broadly confirm our first hypothesis that OSDs are used by the firms that are the most committed to paying dividends when they do not have enough cash to pay cash dividends.

Further, our results show that firms that offer OSDs are in a similar position to cash dividend payers in terms of their net income variation. However, these firms have significantly more debt than firms that offer cash dividends. In unreported tests, we find that net income variation increases the likelihood that firms use OSDs rather than cut dividends. These results suggest that firms that offer OSDs need equity to rebalance their capital structure, but that they do not exhibit deteriorated earnings. They reduce their cash outflows before getting in trouble and being subject to negative earnings. OSDs provide them with flexibility ahead of potential earnings deterioration. The results also show that firms are more likely to use OSDs during recession periods (negative GDP growth) or when SEO discounts are large. These findings confirm our second hypothesis that firms use OSDs as backdoor equity when they are unable to raise equity on the market under acceptable conditions.

Overall, the evidence supports the view that firm characteristics have an important influence on the choice to offer optional stock dividends. Specifically, a stronger commitment to paying dividends or needs for equity are associated with a greater likelihood of offering OSDs.

1.5.2 Announcement effects

We examine equity market reactions to optional stock dividend, cash dividend, and dividend cut announcements. Our sample comprises all dividend announcements between 2003 and 2012, and we restrict our sample to events in which the announcement date is a nonmissing trading date. Daily abnormal returns are computed by using the market model for CAC All Tradable index, and market model parameters are estimated over 250 trading days ending 11 trading days before the dividend announcement. Table 1.4 reports the CAR results on the announcement days. We observe that the stock price drops significantly at the announcement of a dividend cut. On average, the CARs in the $[-1,0]$ event window are -0.68% . By contrast, the CARs on the announcement of an optional stock dividend are significantly positive, $+0.59\%$, and this value is not significantly different from the CARs for traditional cash dividends ($+0.64\%$). These results provide support for both the signaling view that OSDs signal a commitment to future dividends and the backdoor equity view that firms using OSDs are in a better position than issuers of equity.

We then run multivariate regressions with CARs on the dividend announcement day as

the dependent variable and report the results in Table 1.5. Our variable of interest is the optional stock dividend dummy. We first run our regressions on the subsample of OSDs and dividend cuts. On average, when we control for the variation of dividends and other firm characteristics, OSDs experience a 1.7% larger market reaction than dividend cuts (Table 1.5, OLS regressions, models (1) and (2)). This result underlines that two mechanisms leading to comparable consequences in terms of cash outflows may incur different market reactions. Two reasons may justify our findings : first, shareholders can still take cash if they prefer cash ; thus, they explicitly accept cuts in cash outflows. Second, in a signaling framework, because OSDs represent a temporary cut in cash outflows but the firm still being committed to a long-term dividend, the signal is more favorable.

We then compare OSDs and cash dividends. The market reaction to the announcement of OSDs reflects three components : reaction to cash dividends, reaction to the option to get stock and reaction to the SEO triggered by the stock dividend option exercise. We argue that the option value and the market reaction to the equity issue component of OSDs are of same magnitude but opposite sign and that these two effects are likely to cancel.

To verify our hypothesis that the market reaction to OSDs is similar to the market reaction to cash dividends, we run our regressions on the subsample of OSDs and cash dividends with a non-negative change in DPS. Because of the dividend-smoothing policy usually observed, the market reacts in the event of significant variations in dividends that bring new information to the market. In our analysis comparing the market reactions to announcements of pure cash dividends and OSDs, we include a variable that captures changes in dividends. The coefficient for the dummy variable OSD in the multivariate regression measures the market reaction to OSDs, after controlling for the information content of changes in dividends. The market reaction to OSDs does not appear to differ from the market reaction to cash dividends (Table 1.5, OLS regressions, models (5) and (6)).

Our models are estimated on the implicit assumption that the optional stock dividend dummy is exogenous. However, firms that may incur a more negative market reaction from cutting dividends are likely to prefer optional stock dividends. Therefore, we employ two-stage least-squares regressions to account for endogeneity. The results of the second stage are reported in Table 1.5, models (3) to (4) and models (7) to (8).

We consider two instruments for optional stock dividends (OSD dummy) : the one-year lag of *Largest Shareholder* and a *Past OSD Activity* dummy that is equal to 1 when the company offered the option for stock dividends at least once over the sample period before the current year. These two variables are likely to be relevant and valid (exogenous) instruments. First, firms that paid an OSD in the past are most likely to resort to offering an OSD when the need arises. Yet, there is no ex ante reason that suggests that a firm's past OSD activity should

be correlated to the market reaction to contemporaneous payout policy announcements (especially because this information should already be incorporated in a firm's stock price). Second, because blockholders (e.g., family investors) are unlikely to drastically change their holdings in a given firm over a short-term horizon (except in the case of "extreme" corporate events, such as a merger or a takeover), the one-year lagged share of capital held by the largest shareholder is likely to be correlated with contemporaneous OSD policy choices. However, one can also reasonably expect this lagged variable not to be directly correlated with investors' reactions to payout policy announcements, especially after controlling for contemporaneously disclosed information.

To be valid, our instruments should be uncorrelated with the error terms in our regression model but correlated with optional stock dividends. The first statistic that we consider to assess the validity of our instrument is the first-stage exclusion F-test for our two instruments. The high F-stats (associated with p-values lower than 1%) confirm the explanatory power of our instruments. We also examine the validity of the restrictions associated with our instruments. To do so, we rely on the Sargan-Hansen J-test statistic. The associated p-values are reported in the last row of columns (3) to (4) and columns (7) to (8) in Table 1.5. All p-values are above the 10% level; thus, we do not reject the null hypothesis that our instruments are uncorrelated with the error term in the second-stage regressions and that our model is well specified. Once we control for endogeneity issues, we find that the stock market reacts 3.1% more favorably to optional stock dividend announcements than to dividend cut announcements. The announcement effect does not differ between optional stock dividends and cash dividends.

Our evidence is consistent with our prediction that optional stock dividends are not bad news for shareholders : shareholders are willing to receive lower cash amounts if the firm is committed to paying the total amount of announced dividends either in stock or in cash.

1.5.3 Shareholder takeover

Shareholders rarely have a choice between stock and cash dividends. In our setting, we are able to directly observe shareholders' willingness to receive stock dividends. First, on average, at the shareholders' general meeting, the percentage vote in favor of optional stock dividends is 97.48%, which is slightly lower than but not significantly different from the percentage vote in favor of cash dividends (98.1%). However, this percentage vote is significantly larger than the percentage vote in favor of SEOs with rights (94.7%) and SEOs without rights (85.6%).

We are able to observe shareholder takeover, which captures shareholders' willingness to receive stock instead of cash. Shares are proposed with a mean 8.5% discount (median 8.1%).

In perfect markets, the takeover should be either 0% or 100% depending on the stock price at the end of the option period. In our sample, the mean shareholder takeover is 55.4% (median 63.1%). Table 1.6, Panel A, reports the values of takeover for several classes of discount. The takeover varies from 54.6% to 65.3% (with a median of 61.4% to 68.6%) as long as the discount is positive at the end of the conversion period. Even when the discount is negative, the takeover is still positive, with a mean of 35.2% (median 23.6%). These findings suggest that shareholders do not choose stock dividends to obtain a pure arbitrage gain.

We run multivariate regressions with takeover as the dependent variable (Table 1.6, Panel B). The results show that the coefficient for discount is significantly positive, suggesting that shareholders choose stock rather than cash when the discount is high. The takeover increases with the fraction of capital held by institutional investors and by blockholders, confirming our hypothesis that the takeover should increase with the fraction of capital owned by informed shareholders. Our previous results highlight that closely held firms are less likely to use optional stock dividends. However, once they have decided to use the optional stock dividend mechanism, blockholders subscribe to the new shares to avoid diluting their control and to use their positive information about the prospects of the firm. Further, the takeover is larger when the market for the stock is more liquid and when the period from the general meeting to the ex-dividend day is longer, suggesting that shareholders have more time to decide and a better ability to trade on the stock.

The takeover is also larger when a firm switches to optional stock dividends for the first time. This result suggests that shareholders favorably view optional stock dividends as temporary dividend cuts or backdoor equity, during exceptional situations, but that they are less willing to receive stocks when the mechanism is renewed.

1.5.4 Share repurchasing and optional stock dividends

In our final set of tests, we examine whether our results are robust to considering share repurchases. It could be that companies that opt for OSDs also rely more on buybacks than those that reduce their dividend or pay a cash dividend. This could distort both our assessment of the reasons why these companies offer OSDs and the market reaction to the announcement of these operations. Indeed, firms that offer OSDs could payout in the form of cash, when including repurchases, a larger amount than that paid out with pure cash dividends.

To verify that the share buyback policy does not change our results, we collect information on share buybacks in the Bloomberg database. The Bloomberg database provides actual repurchases, which correspond to an effective outflow of funds to shareholders, not just announced repurchases. The difference between announced and actual repurchases is im-

portant because on average, only half of the companies that announce buyback programs actually perform effective repurchases (Ginglinger and Hamon (2009) for France) and only 25% of the announced buybacks are realized in the first year after announcement (Manconi, Peyer and Vermaelen (2015) for 33 countries including the U.S.).

The option for stock dividends

Table 1.7 reports the repurchase activity of firms according to their dividend policy : cash dividends, OSDs, and dividend cuts. Approximately 41% of firm-years conduct share repurchases, which are more common among firms paying cash dividend. Firms that reduce their dividend and those that opt for optional stock dividend do not significantly differ in terms of repurchasing activity. We then examine the repurchase intensity (ratio of repurchases to market capitalization). Firms that opt for a cash dividend repurchase significantly more than firms that opt for OSDs, the latter being comparable to firms that reduce their dividend. These results suggest that in terms of buyback strategies, firms that use OSDs are much more similar to dividend cutters than to cash dividend payers. These firms may be short of cash and unable or unwilling to conduct intensive share buybacks. In unreported tests, we find that the likelihood of choosing OSDs is negatively related to the existence of effective repurchases during a given year and to the intensity of repurchases, thus suggesting that a lower amount of repurchases is associated to optional stock dividends. However, these findings have the potential to incorporate some element of endogeneity bias to the extent that even if actual repurchases are spread over the whole year, they may be decided given the adopted dividend policy.

In Table 1.8, we reproduce our results regarding the choice between cash dividends, OSDs and dividends cuts for the subsamples of firms with and without repurchases in a given year. For the two subsamples, our results are broadly similar to our previous findings regarding the main determinants of the choice of OSDs (leverage, recession, largest shareholders and cash, the latter variable having a significantly negative coefficient only for the subsample of non-repurchasing firms).

Finally, in unreported results, we run a multinomial logit analysis on the choice among cash dividends, cash dividends associated with repurchases, OSDs and OSDs associated with repurchases, for a subsample restricted to dividend paying firms. The determinants of OSDs, regardless of whether they are associated with repurchases, remain qualitatively unchanged. Overall, our results suggest that the reasons why firms choose OSDs are not affected by considering repurchases. However, a decrease in repurchases and the choice of OSDs may be two complementary mechanisms that provide flexibility to payout policies when cash becomes rare or during periods of economic downturn.

The market reaction to OSDs

To verify that the market reactions to OSD announcements are not related to the repurchase activity, we present the CARs for two sub-samples of firms that have/have not repurchased shares in a given year. The results are qualitatively unchanged (Table 1.9, panel A). CARs to dividend cuts are significantly more negative than CARs to OSDs. There is no significant difference in the CARs to cash dividends and to OSDs. We then reproduce the regressions explaining market reactions to announcements of dividend distribution arrangements, including a dummy variable that is equal to one if the firm repurchases shares during a given year. The results are similar. Finally, we interact the OSD dummy variable with a buy-back dummy and find that the market reaction to OSDs is not different for firms that have a contemporaneous share repurchase activity, regardless of the counterfactual, i.e., paying a cash dividend or cutting the dividend (Table 1.9, Panel B).

1.5.5 Robustness checks

In this section, we perform several additional robustness checks to ensure that our results are not sensitive to our specific variable definitions or empirical design.

To provide further evidence on the characteristics that are important in firm's decision to use optional stock dividends, we perform several tests on a restricted subsample that is matched on firm size, year and industry characteristics. We are able to obtain 282 (238) observations from 141 (119) unique pairs of matched firms for the choice between optional stock dividends and cash dividends (dividend cuts by more than 30% for former dividend paying firms). We estimate several binomial logit models to investigate which factors determine the choice for cash dividend paying firms between paying optional stock dividends and cutting dividends or between paying optional stock dividends and paying cash dividends.

Table 1.10, columns (1) and (2), presents the regression results regarding firms' choice between optional stock dividends and dividend cuts. The dependent variable is a dummy that equals 1 in case of an optional stock dividend payment and 0 otherwise. Consistent with our previous results, we find that net income variations and blockholdings are the main drivers of the preference for OSDs over dividend cuts. Table 1.10, columns (3) and (4), reports the regression results regarding firms' choice between optional stock dividends and cash dividends, and the results confirm the findings highlighted by the multinomial logit analysis. In particular, the coefficients for debt and institutional investors are positive, whereas the coefficients for cash and largest shareholder are negative, suggesting that leveraged firms with low cash holdings that are held by institutional investors are more likely to use optional stock dividends. Further, we rerun our multinomial logit analysis on only the matched sample, and our findings are broadly confirmed.

We conduct several other robustness checks regarding firms' dividend policy choices : we focus solely on nonfinancial firms, consider thresholds of 40% and 50% for dividend cuts (instead of 30%) in our dividend cut subsample, and use alternative measures of firm profitability with different definitions of net income and EBITDA, and in each case, we obtain similar results. We also use alternative measures of firm size, e.g., market value instead of total assets, and the results are unchanged. We then use several dummies to measure blockholders with more than 5%, 10%, and 20% instead of the percentage of the capital held by the largest shareholder, and our results are again qualitatively unchanged. We re-run the regressions on the subsample of firms that offer only an annual dividend, and the results remain unchanged. We also verify that the pattern of our results is unaltered by the inclusion of all no-dividend observations. Finally, we reproduce our analysis using variables winsorized at the 1st and 99th percentiles or the 5th and 95th percentiles. Our results are again similar to our earlier results.

1.6 Conclusions

This paper presents an empirical analysis of the choice to offer optional stock dividends by French firms. We use a hand-collected dataset of firms offering optional stock dividends to investigate why firms choose this particular form of dividend and what the consequences are for shareholders. We find that firms that are the most committed to paying dividends are the most likely firms to use optional stock dividends when providing cash dividends becomes difficult : when recessions occur or when high leverage increases the need for equity. We further find that the abnormal stock returns upon the announcement of an optional stock dividend are positive : even if the cash payout decreases, optional stock dividends are good news for shareholders. Shareholders approve optional stock dividends, and a substantial portion of them subscribe to the new shares even if the discount is negative. Finally, the takeup increases with the fraction of the capital held by institutional investors and blockholders, thus suggesting that informed shareholders are willing to accept temporary dividend cuts.

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Appendix 1.A Variable definitions and data sources

Name	Description
Economic conditions (Sources : INSEE, AMF)	
GDP Growth	Yearly change in the French GDP, as published by the INSEE (French National Statistics Office)
Recession	Dummy variable that equals one if the economy is in recession according to the INSEE definition (i.e., negative GDP Growth) and 0 otherwise.
Median Discount on SEOs	Yearly median discount on SEOs made by firms listed on compartment A of the Eurolist by NYSE-Euronext (Source : registration notices, AMF)
Firm characteristics (source : Thomson Reuters Worldscope)	
Size	Logarithm of the book value of total assets (in thousand Euros)
MtoB	Aggregate market value of the firm divided by the aggregate book value
Cash	Cash and cash equivalents divided by the book value of total assets
Cash Rich	Dummy variable that equals one if a firm's cash ratio (Cash) is in the top tertile of the overall sample yearly distribution of cash ratios
Debt	Sum of short-term and long-term debt divided by the book value of total assets
EBITDA/Assets	Earnings Before Interests, Tax, Depreciation and Amortization, divided by the book value of total assets
Net Income Variation	Change in net income between two subsequent years, expressed as a percentage.

(Continued on next page)

WHEN CUTTING DIVIDENDS IS NOT BAD NEWS : THE CASE OF OPTIONAL STOCK DIVIDENDS

Name	Description
Amihud Illiquidity Factor	Amihud factor, computed for firm i as : $(1/D_i) \times \sum_{t=0}^{D_i} |r_{it}| \times /EVol_{it}$
	where r_{it} is firm's i stock return on date t, $EVol_{it}$ is the exchanged volume - expressed in Euros - on date t, and D_i is the number of days with available data during the fiscal year prior to a dividend payment.
Short Term Illiquidity	Amihud factor computed for the conversion period of an optional stock dividend (OSD) payment. Computed for OSD payers only.
Dividend policy variables (source : Thomson Reuters Worldscope)	
Dividend Yield	Dividend per share (DPS) divided by the contemporaneous year-end stock price
Payout Ratio	DPS divided by earning per share for the contemporaneous fiscal period
OSD	Dummy variable that equals one in the case of an OSD payment and zero otherwise. Used to identify OSD paying firms.
Dividend Cut	Dummy variable that equals one if a firm decreases its DPS by more than 30%, including dividend omissions (100% decrease), and zero otherwise. Used to identify dividend cutters
Share repurchase activity variables (source : Bloomberg)	
Repurchase (dummy)	Dummy variable that equals one if a firm has effectively repurchased shares during a given year
Ownership variables (Source : Thomson Reuters One Banker)	
Institutional Ownership	Number of shares held by institutional investors at the end of a given fiscal year divided by the total number of traded shares
Employee Ownership	Number of shares held by a firm's employees at the end of a given fiscal year divided by the total of number of traded shares

(Continued on next page)

WHEN CUTTING DIVIDENDS IS NOT BAD NEWS : THE CASE OF OPTIONAL STOCK
DIVIDENDS

Name	Description
Government Ownership	Number of shares held by the French Government at the end of a given fiscal year divided by the total number of traded shares
Largest Shareholder	Number of shares held by the largest shareholder at the end of a given fiscal year divided by the total number of traded shares
Optional stock dividend characteristics	
% Votes in Favor of OSD	Percentage of votes in favor of an OSD, as expressed during the shareholders' general meeting
Conversion Period (Days)	Length of the conversion period, i.e., the number of days between the ex-dividend date and the expiry date of the OSD conversion option
Conversion to Issue Period (Days)	Number of days between the end of the conversion period and the date at which new shares are delivered to the shareholders who elected to receive their dividend in shares (hereafter, the effective payment date)
Takeup	Shareholders' subscription rate to an OSD
OSD % Capital (Maximum)	Maximum (i.e., in the case of a 100% takeup) number of shares issued through an OSD payment, expressed as a percentage of a firm's total number of shares
OSD % Capital (Effective)	Number of shares effectively issued through an OSD payment, expressed as a percentage of a firm's total number of shares
Discount (End of Conv. Period)	Relative difference between the effective stock price at the end of the conversion period and the issue price for shares issued through an OSD payment
Effective Discount	Relative difference between the effective stock price at the effective payment date and the issue price for shares issued through an OSD payment

FIGURE 1.1 – The timeline of an Optional Stock Dividend (OSD) payment - The example of Sanofi (2011)

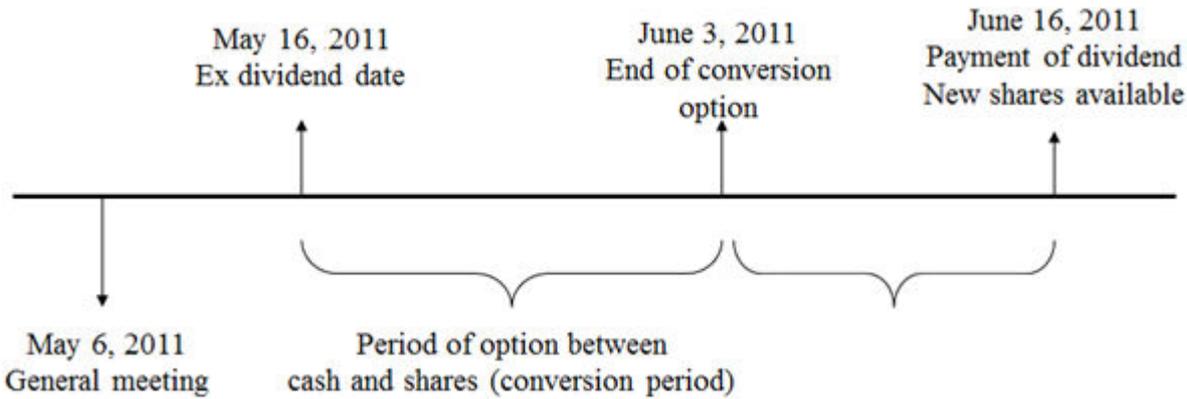


FIGURE 1.2 – The distribution of consecutive Optional Stock Dividend (OSD) payments over the sample period (2003-2012)

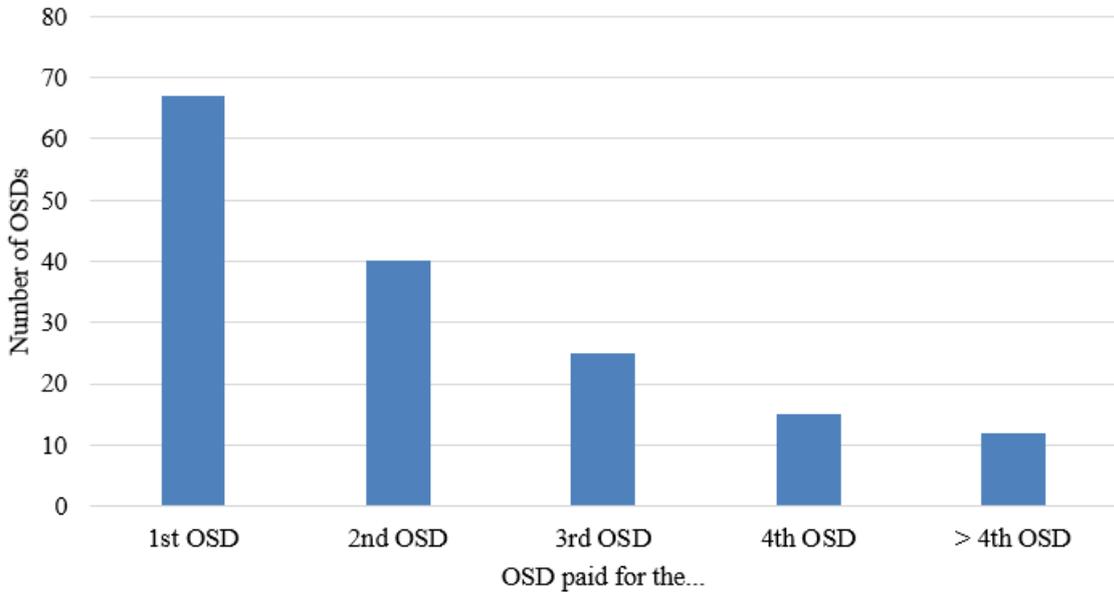


TABLE 1.1 – Optional Stocks Dividends - Summary Statistics

Panel A : Yearly distribution of dividend payments

The sample consists of 287 listed (CAC All Tradable) French firms for the period 2003-2012. Column (1) presents the number of available observations in each year. Column (2) presents the number of dividend payments-including optional stock dividends (hereafter OSD)-in each year. Column (3) presents the number of dividend omissions in each year. Columns (4) and (5) present the number of OSD and OSD as percentage of the total number of dividend payments in each year.

	(1)	(2)	(3)	(4)	(5)
Year	Obs.	Dividend Payments (All)	No Dividend	OSD	% OSD
2003	245	176	69	10	5.68%
2004	253	178	75	10	5.62%
2005	260	191	69	11	5.76%
2006	268	204	64	8	3.92%
2007	278	219	59	11	5.02%
2008	279	231	48	12	5.19%
2009	279	201	78	32	15.92%
2010	282	198	84	31	15.66%
2011	285	219	66	25	11.42%
2012	283	216	67	18	8.33%
Total	2712	2033	679	168	8.26%

Panel B : Optional Stock Dividends - Characteristics

This table presents summary statistics for the key characteristics of optional stock dividends (hereafter OSD) payments. The sample consists of 168 OSD paid by French listed firms during the period 2003-2012. Definitions of all variables are reported in Appendix 1.A.

	(1)	(2)	(3)	(4)
Variables	Obs.	Mean	Me- dian	Std Dev
% Votes in Favor of OSD	168	98.475	99.5	0.027
Conversion Period (Days)	145	19.062	17	9.187
Conversion to Issue Period (Days)	145	11.559	11	4.136
Takeup	160	0.554	0.631	0.254
OSD % Capital (Maximum)	150	0.042	0.035	0.034
OSD % Capital (Effective)	142	0.023	0.019	0.02
Discount (End of Conversion Period)	145	0.085	0.081	0.104
Effective Discount	165	0.085	0.079	0.117

WHEN CUTTING DIVIDENDS IS NOT BAD NEWS : THE CASE OF OPTIONAL STOCK DIVIDENDS

TABLE 1.2 – Dividend policy - Univariate comparisons

This table presents the summary statistics and univariate comparisons of various firm characteristics across three categories of dividend payments : (i) cash dividends (excluding dividend initiations), (ii) optional stock dividends (hereafter OSD) and (iii) dividend cuts (omissions or dividend decreases by more than 30% for former dividend paying firms). Definitions of all variables are reported in the Appendix. ***, ** and * indicate significance of t-statistics (chi-squared) for the test of a difference in means (medians) between two subsamples at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cash Dividends		OSD		Dividend Cuts		T-stats	
Variables	Obs	Mean [Median]	Obs	Mean [Median]	Obs	Mean [Median]	Cash vs OSD	Cuts vs OSD
GDP Growth	1865	0.011 [0.018]	168	0.006 [0.017]	208	0.001 [0]	2.926*** [8.927***]	-2.378** [1.233]
Recession	1865	0.208 [0]	168	0.262 [0]	208	0.394 [0]	-1.526 [2.672]	2.752*** [7.304***]
Median SEO Disc.	1865	0.312 [0.284]	168	0.411 [0.331]	208	0.457 [0.316]	-2.494** [9.890***]	0.849 [0.800]
<i>Financials</i>								
Size	1850	13.91 [13.579]	168	14.718 [14.282]	207	13.025 [12.614]	-3.669*** [-3.654***]	-6.382*** [-5.704***]
MtoB	1839	1.95 [1.62]	168	1.461 [1.23]	203	1.456 [1.13]	7.000*** [4.098***]	-0.043 [-2.229**]
Cash	1850	0.136 [0.104]	168	0.094 [0.077]	207	0.128 [0.1]	6.538*** [4.224***]	3.221*** [3.51***]
Cash Rich	1850	0.358 [0]	168	0.167 [0]	207	0.343 [0]	6.183*** [5.000***]	4.018*** [3.847***]
Debt	1865	0.356 [0.359]	168	0.454 [0.429]	208	0.379 [0.374]	-5.774*** [-5.791***]	-3.389*** [-4.231***]
?Net Income	1742	0.247 [0.123]	155	0.244 [0.099]	176	-0.212 [-0.468]	0.041 [0.86]	-5.683*** [-5.437***]
Amihud Factor	1841	1.692 [0.045]	164	1.646 [0.01]	207	3.524 [0.314]	0.072 [3.169***]	2.215** [5.878***]
<i>Dividend Policy</i>								
Past Yield	1845	0.031 [0.025]	164	0.049 [0.039]	208	0.051 [0.036]	-3.14*** [-6.742***]	0.336 [0.187]
Yield	1859	0.035 [0.027]	164	0.046 [0.039]	208	0.019 [0.012]	-2.867*** [-4.96***]	-6.136*** [-7.474***]
Payout Ratio	1774	0.648 [0.373]	145	0.679 [0.5]	143	0.56 [0.247]	-0.34 [-4.837***]	-0.894 [-6.17***]
<i>Ownership Structure</i>								
Instit. Ownership	1727	0.402 [0.376]	138	0.453 [0.472]	189	0.358 [0.262]	-2.479** [-2.221**]	-3.414*** [-3.338***]
Larg. Shareholder	1727	0.388 [0.387]	138	0.303 [0.231]	189	0.408 [0.361]	4.554*** [4.458***]	4.49*** [4.745***]

TABLE 1.3 – Dividend policy choice model

This table presents a multinomial logit analysis of the choice of dividend policy. The sample consists of 287 French firms belonging to the CAC All Tradable index during the period 2003-2012. We exclude dividend initiations and all observations prior to the initiation of dividends, firms that never paid any dividend, and firm-years with zero-dividend corresponding to a repeated dividend omission. In columns (1) to (5), the dependent variable is equal to 0 in the case of a dividend cut greater than 30% or an omission for former dividend paying firms (Div cut), 1 in the case of cash dividend payment with a non-negative change in DPS (Cash) and 2 in the case of an optional stock dividend (OSD). In all specifications, the baseline group is outcome 1 (cash dividend). Definitions of all variables are reported in Appendix 1.A. Robust standard errors clustered at the firm level are used. The corresponding p-values are reported between brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

(Table continued on next page)

TABLE 1.3 – Dividend policy choice model (cont'd)

Variables	(1)		(2)		(3)		(4)		(5)	
	Div Cut	OSD	Div Cut	OSD	Div Cut	OSD	Div Cut	OSD	Div Cut	OSD
Cash	0.534 (0.604)	-2.473* (0.090)								
Cash Rich			0.152 (0.415)	-0.667** (0.017)	0.162 (0.374)	-0.621** (0.021)	0.209 (0.275)	-0.593** (0.034)	0.197 (0.310)	-0.506* (0.085)
Debt	1.987*** (0.000)	2.040*** (0.003)	2.022*** (0.000)	1.997*** (0.004)	2.033*** (0.000)	1.742*** (0.007)	2.227*** (0.000)	2.101*** (0.002)	2.021*** (0.000)	2.217*** (0.004)
Size	-0.294*** (0.000)	-0.068 (0.323)	-0.294*** (0.000)	-0.073 (0.284)	-0.281*** (0.000)	-0.057 (0.386)	-0.285*** (0.000)	-0.072 (0.284)	-0.263*** (0.000)	-0.195** (0.014)
MtoB	-0.284*** (0.009)	-0.216 (0.214)	-0.284*** (0.009)	-0.220 (0.203)	-0.259** (0.011)	-0.245 (0.121)	-0.230** (0.043)	-0.152 (0.375)	-0.224** (0.043)	-0.239 (0.228)
ΔNet Income	-1.621*** (0.000)	-0.049 (0.763)	-1.621*** (0.000)	-0.047 (0.772)	-1.796*** (0.000)	-0.156 (0.342)	-1.530*** (0.000)	0.027 (0.872)	-1.695*** (0.000)	0.007 (0.972)
Median discount on SEOs					3.825*** (0.000)	3.467*** (0.004)				
Recession							1.058*** (0.001)	1.737*** (0.000)	0.947*** (0.002)	1.845*** (0.000)
Past Yield							-9.822 (0.159)	17.951*** (0.000)		
Institutional Ownership									-0.228 (0.531)	1.137* (0.088)
Largest Shareholder									0.079 (0.864)	-2.561*** (0.002)
Constant	1.874** (0.011)	-2.649** (0.020)	1.872*** (0.008)	-2.670** (0.016)	0.430 (0.566)	-2.983*** (0.009)	0.686 (0.358)	-3.889*** (0.001)	1.381* (0.097)	-0.738 (0.556)
Observations	1,715	1,715	1,715	1,715	1,715	1,715	1,705	1,705	1,583	1,583
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.202	0.202	0.205	0.205	0.169	0.169	0.226	0.226	0.224	0.224

TABLE 1.4 – Market reaction to dividend announcements - Summary statistics by type of dividend

This table reports the equity market price reaction to optional stock dividend (OSD) announcements, dividend cut (omissions or dividend decreases by more than 30% for former dividend paying firms) announcements and cash dividend announcements. The equity market price reaction is computed as the cumulative abnormal returns (CARs) for a particular window around the announcement day. Daily abnormal returns are computed by using the market model for the CAC-All Tradable index and are reported in columns (1) and (2). Market model parameters are estimated over a 250-day window ending 11 days before the announcement date. The announcement day is denoted as date 0. Patel t-statistics are reported between brackets for each series of CARs. In columns (3) and (4), t-statistics for the test of a difference in means with the subsample of OSDs are reported for each subsample of dividend cuts and cash dividends. ***, ** and * indicate significance of t-statistics at the 1%, 5% and 10% levels, respectively.

Dividend Type	N	(1)	(2)	(3)	(4)
		CAR[0] Mean (%) (t-stat)	CAR[-1;0] Mean (%) (t-stat)	Diff. with OSD (t-stat) CAR[0] CAR[-1;0]	
Optional Stock Dividend (All)	166	0.30** (2.30)	0.59** (2.54)		
Dividends cuts (All)	145	-0.69*** (-3.37)	-0.68* (-1.98)	-2.06**	-2.37**
Positive DPS only	97	-0.5* (-1.86)	-0.36 (-0.79)	-1.36	-1.58
No dividend only	48	-1.17*** (-3.06)	-1.29** (-2.32)	-1.90*	-2.11**
Cash dividends (All)	1276	0.48*** (9.15)	0.64*** (8.96)	0.67	0.18
Cash dividends (with a non-negative change in the DPS)	1099	0.54*** (9.54)	0.73*** (9.35)	0.87	0.45

TABLE 1.5 – Announcement effect of Optional Stocks Dividends

This table reports the regression results of abnormal stock returns upon the announcement of a dividend payment. Abnormal stock returns for each dividend announcement are computed as the cumulative abnormal returns (CARs) for a particular window around the announcement day. Daily abnormal returns are computed by using the market model for the CAC-All Tradable index. Market model parameters are estimated over a 250-day window ending 11 days before the announcement date. The announcement day is denoted as date 0. Our variable of interest is the OSD dummy that is equal to 1 in case of an optional stock dividend (OSD) payment. Columns (1) to (4) present the results for the subsample of dividend cutters (omissions or dividend decreases by more than 30% for former dividend paying firms) and OSD paying firms. Columns (5) to (8) present the results for the subsample of OSD and cash dividend payers (with non-negative changes in DPS). We run both OLS and IV-2SLS regressions on each subsample. In the IV-2SLS specifications (i.e., columns (3) to (4) and (7) to (8)), the results for the 2nd stage regressions are reported. The OSD dummy variable is instrumented using a dummy variable that equals one if a firm has paid at least one OSD over the sample period before the current year and the one-year lagged share of a company's equity held by its largest shareholder (Largest Shareholder). Definitions of all variables are reported in Appendix 1.A. Robust standard errors clustered at the firm level are used. The corresponding p-values are reported between brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

(Table continued on next page)

TABLE 1.5 – Announcement effect of Optional Stocks Dividends (cont'd)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dividend Cuts vs OSD				Cash Dividend vs OSD			
	OLS		IV 2SLS - 2nd Stage		OLS		IV 2SLS - 2nd Stage	
Variables	CAR[0]	CAR[-1;0]	CAR[0]	CAR[-1;0]	CAR[0]	CAR[-1;0]	CAR[0]	CAR[-1;0]
Change in DPS (%)	0.006 (0.155)	0.006 (0.204)	0.002 (0.779)	0.002 (0.767)	0.007*** (0.004)	0.007*** (0.010)	0.009*** (0.000)	0.007*** (0.003)
OSD	0.017** (0.032)	0.017* (0.050)	0.031** (0.020)	0.031* (0.051)	0.004 (0.264)	0.006 (0.139)	0.009 (0.410)	0.011 (0.382)
MtoB	-0.001 (0.836)	-0.003 (0.372)	-0.002 (0.513)	-0.006 (0.190)	-0.000 (0.796)	-0.001 (0.523)	-0.000 (0.695)	-0.001 (0.396)
EBITDA/Assets	-0.065 (0.294)	0.009 (0.890)	-0.093 (0.139)	-0.009 (0.905)	0.005 (0.784)	0.015 (0.495)	-0.008 (0.726)	0.013 (0.598)
Size	-0.002 (0.121)	-0.002 (0.162)	-0.003** (0.036)	-0.003 (0.106)	-0.001** (0.031)	-0.001** (0.033)	-0.001** (0.044)	-0.001* (0.068)
Constant	0.057** (0.034)	0.055 (0.113)	0.036 (0.499)	0.016 (0.799)	0.027*** (0.001)	0.033*** (0.000)	0.025* (0.084)	0.024 (0.133)
Observations	225	225	188	188	1,168	1,168	994	994
R ²	0.102	0.090	0.126	0.110	0.038	0.044	0.043	0.039
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First Stage F-stat			68.41	68.41			91.47	91.47
Sargan test (p-value)			0.242	0.396			0.698	0.820

TABLE 1.6 – Shareholders’ choice between cash and Optional Stock Dividends - Determinants of shareholder takeover

Panel A : Summary statistics - Shareholder takeover

This table reports summary statistics for several classes of discounts at the end of the conversion period. The sample consists of 174 optional stock dividend payments for which we are able to compute the effective shareholder takeover during the period 2003-2012. Definitions of all variables are reported in Appendix 1.A.

	(1)	(2)	(3)	(4)
Variables	Obs.	Mean	Median	Std. Dev
Takeup	174	0.548	0.631	0.264
<i>Discount at the end of the conversion period</i>				
Discount < 0%	24	0.339	0.232	0.299
Discount ∈ [0%;5%[	31	0.533	0.614	0.242
Discount ∈ [5%;10%[	31	0.551	0.631	0.251
Discount ∈ [10%;15%[	24	0.670	0.652	0.11
Discount ∈ [15%;20%[	12	0.653	0.686	0.174
Discount > 20%	52	0.569	0.665	0.285

(Table continued on next page)

TABLE 1.6 – Shareholders’ choice between cash and Optional Stock Dividends - Determinants of shareholder takeover (cont’d)

Panel B : Determinants of shareholder takeover

This table reports the OLS estimation of shareholder takeover in the case of an optional stock dividend (OSD). The sample consists of OSD payments during the period 2003-2012 for which we are able to (i) compute the effective takeover and (ii) identify the end of the conversion period. GM to Ex-Div is the natural logarithm of the number of days between the general meeting and the ex-dividend date. Duration of Option is the natural logarithm of the length in days of the conversion period. Switch to OSD is a dummy that is equal to 1 when a cash dividend paying firm switches to paying an OSD and 0 otherwise. Definitions of all other variables are reported in Appendix 1.A. Heteroskedasticity-robust standard errors are used. The corresponding p-values are reported between brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Takeup	Takeup	Takeup	Takeup	Takeup	Takeup	Takeup
Discount (End conv. period)	1.768*** (0.000)	1.684*** (0.000)	1.680*** (0.000)	1.693*** (0.000)	1.688*** (0.000)	1.760*** (0.000)
Size	0.011 (0.270)	0.002 (0.882)	0.002 (0.884)	0.001 (0.954)	0.001 (0.944)	0.009 (0.379)
MtoB	-0.003 (0.889)	0.003 (0.902)	0.012 (0.545)	0.001 (0.957)	0.010 (0.604)	0.004 (0.829)
Switch	0.108** (0.024)	0.105** (0.030)	0.100** (0.030)	0.110** (0.038)	0.105** (0.041)	0.112** (0.024)
Instit. Ownership	0.332*** (0.001)	0.272** (0.012)	0.224** (0.033)	0.290*** (0.009)	0.239** (0.024)	0.307*** (0.001)
Largest Shareholder	0.176* (0.071)	0.203** (0.040)	0.199** (0.040)	0.205** (0.041)	0.200** (0.040)	0.173* (0.074)
Amihud factor (Conv. per.)		-0.040* (0.092)	-0.040* (0.050)	-0.038 (0.128)	-0.039* (0.078)	
GM to Ex-Div			0.051** (0.020)		0.050** (0.022)	0.050** (0.018)
Duration of Option				-0.038 (0.681)	-0.032 (0.712)	-0.053 (0.498)
Constant	-0.253 (0.120)	-0.032 (0.867)	-0.147 (0.432)	0.068 (0.819)	-0.062 (0.826)	-0.207 (0.439)
Observations	111	106	106	106	106	111
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	No	No	No
R ²	0.520	0.516	0.546	0.518	0.547	0.552

TABLE 1.7 – Dividend policy and share repurchase activity - Summary statistics

This table presents summary statistics and univariate comparisons of the yearly share repurchase activity for 287 listed (CAC All Tradable) French firms across three categories of dividend payments : (i) cash dividends with non-negative changes in DPS (excluding dividend initiations), (ii) optional stock dividends (OSD) and (iii) dividend cuts (omissions or dividend decreases by more than 30% for former dividend paying firms). Columns (2), (5) and (8) report the yearly share of firms that effectively repurchased shares for each category of dividend payment. Columns (3), (6) and (9) report the yearly mean volumes of share repurchases, expressed in percentages of market capitalization. In columns (10) and (11), t-statistics for the test of a difference in means with the subsample of OSDs are reported for the cash dividends and dividend cuts subsamples, respectively. ***, ** and * indicate significance of t-statistics at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	Cash Div			OSD			Div Cuts			Mean Repurch. (% Mkt Cap)- Diff. (T-stat)	
Year	Obs.	% Firms w/ Repurch. Activity	Mean Repurch. (% Mkt Cap)	Obs.	% Firms w/ Repurch. Activity	Mean Repurch. (% Mkt Cap)	Obs.	% Firms w/ Repurch. Activity	Mean Repurch. (% Mkt Cap)	Cash vs OSD	Cuts vs OSD
2003	120	19.167%	0.237%	10	0.000%	0.000%	16	18.750%	0.441%	3.468***	1.032
2004	138	42.754%	0.927%	10	20.000%	0.176%	22	18.182%	0.123%	2.303**	-0.278
2005	150	40.000%	0.826%	11	27.273%	0.059%	10	30.000%	0.317%	4.189***	0.834
2006	158	51.899%	0.639%	8	25.000%	0.912%	17	27.778%	0.456%	-0.300	-0.483
2007	170	60.000%	0.985%	11	36.364%	0.415%	11	45.455%	0.303%	2.225**	-0.437
2008	178	70.787%	0.855%	12	83.333%	0.457%	19	45.000%	0.422%	1.675	-0.119
2009	104	27.885%	0.265%	32	21.875%	0.201%	61	37.500%	0.324%	0.419	0.720
2010	114	50.000%	0.745%	31	54.839%	0.310%	37	27.027%	0.424%	1.769*	0.344
2011	151	62.252%	0.727%	25	56.000%	0.857%	13	46.154%	1.081%	-0.354	0.344
2012	151	54.305%	0.725%	18	22.222%	0.010%	26	46.154%	0.232%	4.001***	1.859*
Total	1434	49.791%	0.719%	168	39.161%	0.338%	232	34.177%	0.378%	3.824***	0.829

TABLE 1.8 – Dividend policy and share repurchase activity - Choice model

This table presents a multinomial logit analysis of the choice of dividend policy that accounts for contemporaneous share repurchase activity. The sample consists of 287 French firms belonging to the CAC All Tradable index during the period 2003-2012. We exclude dividend initiations and all observations prior to the initiation of dividends, firms that never paid any dividend, and firm-years with zero-dividend corresponding to a repeated dividend omission. In columns (1) to (5), the dependent variable is equal to 0 in the case of a dividend cut greater than 30% or an omission for former dividend paying firms (Div cut), 1 in the case of cash dividend payment with a non-negative change in DPS (Cash) and 2 in the case of an optional stock dividend (OSD). In all specifications, the baseline group is outcome 1 (cash dividend). Column (1) reports results for the subsample of firms that effectively repurchased shares during a given year. Column (2) reports results for the subsample of firms that do not exhibit any share repurchase activity during a given year. Dividend initiations are excluded. Definitions of all variables are reported in Appendix 1.A. Robust standard errors clustered at the firm level are used. The corresponding p-values are reported between brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Variables	(1)		(2)	
	Firms w/ repurchase activity		Firms w/o repurchase activity	
	Div Cut	OSD	Div Cut	OSD
Cash Rich	0.137 (0.744)	-0.690 (0.153)	0.052 (0.836)	-0.748** (0.040)
Debt	2.117** (0.020)	1.906* (0.067)	1.205* (0.074)	2.301*** (0.006)
Size	-0.437*** (0.000)	-0.266** (0.034)	-0.159** (0.026)	-0.130 (0.114)
MtoB	-0.129 (0.495)	-0.356 (0.147)	-0.324** (0.035)	-0.140 (0.557)
Δ Net Income	-2.253*** (0.000)	-0.026 (0.929)	-1.416*** (0.000)	0.028 (0.907)
Recession	2.486*** (0.002)	2.015* (0.083)	0.780* (0.061)	1.791*** (0.002)
Institutional Ownership	-0.739 (0.277)	0.942 (0.284)	-0.014 (0.973)	1.125 (0.214)
Largest Shareholder	-0.775 (0.322)	-3.054** (0.016)	0.437 (0.416)	-2.742*** (0.003)
Constant	2.490 (0.132)	-0.536 (0.775)	0.255 (0.796)	-1.389 (0.318)
Observations	725		841	
Year dummies	Yes		Yes	
Industry dummies	Yes		Yes	
Pseudo R ²	0.301		0.210	

TABLE 1.9 – Market reaction to dividend announcements and share repurchase activity

Panel A : Summary statistics and univariate comparisons

This table reports the equity market price reaction to optional stock dividend (OSD) announcements, dividend cut (omissions or dividend decreases by more than 30% for former dividend-paying firms) announcements and cash dividend announcements (with a non-negative change in the DPS). Firms are sorted based on their contemporaneous share repurchase activity. The equity market price reaction is computed as the cumulative abnormal returns (CARs) for a particular window around the announcement day. Daily abnormal returns are computed by using the market model for the CAC-All Tradable index and are reported in columns (2), (4) and (6). Market model parameters are estimated over a 250-day window ending 11 days before the announcement date. The announcement day is denoted as date 0. Patel t-statistics are reported between brackets for each series of CARs. In columns (7) and (8), t-statistics for the test of a difference in means with the subsample of OSDs are reported for each subsample of dividend cuts and cash dividends. ***, ** and * indicate significance of t-statistics at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Cash Dividends		OSD		Dividend Cuts		T-stats	
Variables	Obs.	Mean	Obs.	Mean	Obs.	Mean	Cash vs OSD	Cuts vs OSD
<i>Firms with contemporaneous repurchase activity</i>								
CAR[0]	595	0.26%	63	0.21%	45	-1.24%	0.193	-2.058**
CAR[-1 ;0]	595	0.41%	63	0.55%	45	-1.20%	-0.443	-2.063**
<i>Firms without contemporaneous repurchase activity</i>								
CAR[0]	504	0.87%	103	0.35%	100	-0.45%	1.21	-1.836*
CAR[-1 ;0]	504	1.10%	103	0.62%	100	-0.45%	1.086	-1.689*

(Table continued on next page)

TABLE 1.9 – Market reaction to dividend announcements and share repurchase activity (cont'd)**Panel B : Announcement effect of OSDs and share repurchase activity**

This table reports the regression results of abnormal stock returns upon the announcement of a dividend payment. Abnormal stock returns for each dividend announcement are computed as the cumulative abnormal returns (CARs) for a particular window around the announcement day. Daily abnormal returns are computed by using the market model for the CAC-All Tradable index. Market model parameters are estimated over a 250-day window ending 11 days before the announcement date. The announcement day is denoted as date 0. Our variable of interest is the OSD dummy that is equal to 1 in case of an optional stock dividend (OSD) payment. Columns (1) to (4) present the results for the subsample of dividend cutters (omissions or dividend decreases by more than 30% for former dividend-paying firms) and OSD-paying firms. Columns (5) to (8) present the results for the subsample of OSD and cash dividend payers (with non-negative changes in DPS). Definitions of all variables are reported in Appendix 1.A. Robust standard errors clustered at the firm level are used. The corresponding p-values are reported between brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

(Table continued on next page)

TABLE 1.9 – Market reaction to dividend announcements and share repurchase activity (cont'd)

Panel B : Announcement effect of OSDs and share repurchase activity (cont'd)

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dividend Cuts and OSD				Cash Dividends and OSD			
	CAR[0]	CAR[-1;0]	CAR[0]	CAR[-1;0]	CAR[0]	CAR[-1;0]	CAR[0]	CAR[-1;0]
Change in DPS (%)	0.006 (0.140)	0.006 (0.186)	0.005 (0.163)	0.005 (0.234)	0.007*** (0.004)	0.007*** (0.010)	0.007*** (0.004)	0.007** (0.011)
OSD	0.017** (0.032)	0.016* (0.053)	0.015* (0.089)	0.013* (0.084)	0.004 (0.335)	0.006 (0.181)	0.005 (0.361)	0.005 (0.407)
MtoB	-0.000 (0.941)	-0.003 (0.454)	-0.000 (0.959)	-0.003 (0.478)	-0.000 (0.816)	-0.001 (0.535)	-0.000 (0.821)	-0.001 (0.534)
EBITDA/Assets	-0.056 (0.343)	0.018 (0.783)	-0.056 (0.339)	0.019 (0.779)	0.008 (0.644)	0.018 (0.410)	0.008 (0.647)	0.018 (0.409)
Size	-0.002 (0.130)	-0.002 (0.176)	-0.002 (0.136)	-0.002 (0.189)	-0.001* (0.100)	-0.001* (0.097)	-0.001* (0.094)	-0.001* (0.099)
Repurchase (dummy)	-0.009 (0.194)	-0.009 (0.252)	-0.011 (0.281)	-0.013 (0.277)	-0.005** (0.019)	-0.005** (0.037)	-0.004** (0.031)	-0.005** (0.034)
Repurchase (dummy) × OSD			0.006 (0.631)	0.010 (0.497)			-0.004 (0.556)	0.002 (0.793)
Constant	0.060** (0.027)	0.058* (0.088)	0.060** (0.026)	0.058* (0.085)	0.025*** (0.003)	0.031*** (0.001)	0.025*** (0.003)	0.031*** (0.001)
Observations	225	225	225	225	1,168	1,168	1,168	1,168
R ²	0.108	0.096	0.109	0.098	0.042	0.047	0.042	0.048
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 1.10 – Robustness checks : The likelihood of firms paying Optional Stock Dividends - Matched sample

This table reports the conditional logistic regressions estimating the probability of paying an optional stock dividend (hereafter OSD). The overall sample comprises French listed firms (CAC All Tradable) during the period 2003-2012. Each OSD paying firm is matched with a similar non-OSD paying firm, in terms of size, industry (measured as 1-digit SIC Code) and year of payment. In columns (1) and (2), each OSD paying firm is matched with a similar dividend cutter, and the dependent variable is a dummy variable that equals 1 in case of an OSD payment and 0 otherwise. In columns (3) and (4), each OSD paying firm is matched with a similar cash dividend paying firm (with non-negative changes in DPS), and the dependent variable is a dummy variable that equals 1 in case of an OSD payment and 0 otherwise. Definitions of all variables are reported in Appendix 1.A. Robust standard errors are used. The corresponding p-values are reported between brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively.

Variables	Dividend Cuts vs OSD		Cash Dividend vs OSD	
	(1)	(2)	(3)	(4)
Cash	-1.684 (0.464)	-0.074 (0.980)	-4.207*** (0.005)	-4.303** (0.016)
Debt	1.942** (0.034)	1.488 (0.230)	1.623** (0.023)	1.427 (0.102)
Size	0.794** (0.028)	1.230** (0.036)	1.135* (0.083)	0.693 (0.341)
MtoB	-0.116 (0.472)	-0.449** (0.037)	-0.637*** (0.000)	-0.553*** (0.002)
ΔNet Income	1.194*** (0.000)	1.616*** (0.000)	-0.234 (0.184)	-0.307 (0.126)
Largest Shareholder		-4.084*** (0.000)		-1.260* (0.097)
Institutional Ownership		0.896 (0.543)		1.409* (0.093)
Observations	238	186	282	226
Year dummies	No	No	No	No
Industry dummies	No	No	No	No
Pseudo R ²	0.343	0.516	0.197	0.234

Chapter 2

Customer risk and the choice between cash and bank credit lines

Abstract

I use a matched buyer-supplier sample of U.S. industrial firms to investigate the impact of customer risk on suppliers' choice between cash and lines of credit as a source of liquidity. I find that customer risk decreases the reliance on bank-managed liquidity insurance relative to cash. This effect appears to be economically significant compared to previously documented factors affecting the choice between cash and lines of credit. High customer risk suppliers also appear to pay a higher cost for new credit lines and to be subject to more non-financial covenants. These results are consistent with the hypothesis that customer-supplier relationships can significantly shape corporate financial decisions.

2.1 Introduction

Corporate liquidity management has for a long time drawn the attention of both corporate finance academics and practitioners. Survey-based studies (see Lins *et al.*, 2010, and Campello *et al.*, 2011 and 2012) show that, in practice, cash and lines of credit are two essential components of a firm's cash management policy. Sufi (2009), Demiroglu and James (2010) and Acharya *et al.* (2013), among others, suggest that firms hold bank credit lines as substitutes to internal cash reserves. These studies highlight that operating performance, cash-flow variability, as well as aggregate risk, are the key determinants of firms choosing between these two sources of liquidity.

In this paper, I focus on customer risk as a determinant of the choice between cash and lines of credit as sources of liquidity. I find that supplier firms facing higher risk on the customer side of their activities should shy away from revolving credit facilities and hold relatively more cash. The underlying rationale is that customer risk increases the cost of bank credit lines, either through tighter contractual terms (e.g. higher spread, shorter maturity) or a higher threat of covenant violation. This study aims at shedding further light on the crucial role customer-supplier relationships in determining firms' financing decisions.

Starting with Titman (1984) and Titman and Wessels (1988), an entire stream of literature has for long developed and investigated the idea that conditions on the product market can shape corporate financing policies¹. Most of these studies, however, mainly focus on capital structure choices. Meanwhile, the existing liquidity management literature has also often left aside the potential effect of customer-supplier relationships on how firms choose to meet their liquidity needs. However, recent empirical evidence suggest that supplier firms' performance, risk and costs of financing are not neutral to customer-related risks, whether it be to the extreme case of default at the customer level (Hertzel *et al.*, 2008), or to customer-base concentration (Dhaliwal *et al.*, 2015). In addition, the existing trade credit literature highlights how supplier firms are likely to act as substitute credit providers for their suppliers (see Burkart and Ellingsen, 2004, or Tirole, 2006, for example), but also how external financing, especially credit lines (Petersen and Rajan, 1997), is used to meet mechanically generated liquidity needs. Reconciling these two streams of literature to the existing research on lines of credit (Sufi, 2009, Acharya *et al.*, 2013, among others) points to the existence of a relationship, regardless of its nature, between customer risk and the choice between cash and lines of credit.

The recent financial crisis provides concrete examples of such a link between financing

1. See also Poitevein (1989), Banerjee, Dasgupta and Kim (2008) and Hennessy and Livdan (2009) for further theoretical approach, and Kale and Shahrur (2007), Matsa (2011) or Hoberg, Phillips and Prabhala (2014), among others, for recent empirical evidence.

decisions and customer risk. For example, the generalized failure of the Chrysler, Ford and General Motors at the end of the 2000's threw into turmoil most of their suppliers, which suffered from a sudden impairment of their access to liquidity, even before recording effective operating losses. In particular, reports of banks « refusing to extend credit to parts makers who do lots of business with GM, Ford or Chrysler »² or « [cutting] back credit lines extended to [auto-part makers] »³ were not uncommon between 2008 and 2010. Despite their anecdotal nature, these pieces of evidence further emphasize how dealing with potentially distressed large customers might shape financing decisions at the supplier firm level.

In this study, I rely on the Loan Pricing Corporation's (LPC) Dealscan database to build a comprehensive sample of credit lines initiations for a sample of Compustat U.S. industrial firms, from 1987 to 2013. I also use customer data available from the Compustat Segment File to build a matched sample of LPC-Dealscan suppliers and their major corporate customers. I follow Sufi (2009) and Acharya *et al.* (2013) to measure credit line availability at the supplier firm level. Customer risk is defined, for each supplier firm, as the weighted average expected probability of default of all identified customers'.

My results show that higher customer risk is associated with a lower reliance on bank lines of credit as a source of liquidity. This effect is robust to explicitly controlling for previously documented determinants, as well as for a supplier's ability to collect pending invoices, which proxies a crucial risk stemming from supplier-customer relationships. Quantitatively, my findings suggest that a one standard deviation increase in customer risk is associated to a significant 1.48% up to 2.44% decrease of the ratio of available lines of credit to total available liquidity. To put this in perspective, a one standard deviation decrease in the past realized operating profitability is associated with, at worst, a 1.9% decrease in the credit lines ratio (the effect varies depending on the tested regression model). These results highlight the importance of customer risk relative to operating performance, with respect to a firm's cash management decisions. I further perform a 2-SLS instrumental variables analysis to ensure that these results are not driven by omitted variables, especially at the bank level. I rely on two IVs that are idiosyncratic to customer firms and restrict my sample to supplier firms that do not share the same lead bank on any of their outstanding loans, with any of their customers. This analysis still exhibits a lower reliance on lines of credit as a source of liquidity for high customer risk firms.

In the second part of my analysis, I study the effect of customer risk on various dimensions of the cost of lines of credit. I first document a positive correlation between customer risk and the spread paid on new lines of credit, which implies that the risk of losing a sub-

2. « Bankruptcy Fears Grip Auto-Parts Suppliers », *The Wall Street Journal*, January 26th 2009

3. « The Auto Industry's Other Crisis », *Businessweek*, Marchth 2009

stantial portion of revenues is explicitly priced by banks when granting supplier firms access to a « pre-comitted » source of funds. Higher customer risk, however, does not appear to be associated with a greater number of covenants attached to credit lines agreements. My findings indeed exhibit a mixed and weakly negative effect of customer risk on the number of performance-based covenants, and suggest that this effect is concentrated among small firms with low operating performance. These results are likely to reflect the « relative importance of future cash flows versus collateral in repaying a line of credit » brought forward in Flannery and Wang (2011) or, in a similar vein, the difference between performance and capital covenants, as presented in Aghion and Bolton (1992) or Christensen and Nikolaev (2011), among others. On the one hand, when lending to weaker firms with lower financial ratios, banks are likely to primarily focus on the underlying collateral (e.g. inventories or account receivables), or non-operating cash-flows, to ensure repayment and thus give less importance to restrictive covenants. On the other hand, cash flows may be an important component of expected repayment for financially healthy firms exhibiting higher operating performance. Were cash-flows to fall short of expectations, financial covenants would then allow the lender to re-negotiate the terms of a loan agreement. Consistently, I find that banks impose a higher number of non financial covenants (*i.e.* borrowing base provision, dividend restrictions, asset sweep, equity sweep, and debt sweep) on high customer risk firms with low operating cash-flows.

I also perform additional tests to ensure the robustness of my results to several potential endogeneity issues. In particular, I implement a propensity score matched sample approach, which controls for all the observables relied on in this paper, as well as the cash and leverage ratios. The results of this analysis remain consistent with my predictions, and exhibit a lower reliance on lines of credit as a source of liquidity, as well as a higher cost of bank credit lines for high customer risk firms. Additionally, this analysis shows that variations in the reliance on lines of credit do not solely reflect different capital structure choices. Altogether, these results strengthen the idea that customer risk is another key determinant of corporate liquidity management policies.

This paper contributes to two areas of the corporate finance literature. First, the results contribute to extend the understanding of corporate cash management decisions, namely the choice between internal and external « pre-comitted » sources of funds⁴ (*i.e.* cash and lines of credit, respectively). Sufi (2009) finds that lines of credit are mostly used by large, mature, profitable firms with steady cash flows. Acharya *et al.* (2013) further show that high exposure to systematic risk both increases the cost of available lines of credit, and reduces the reliance on lines of credit as a source of liquidity. My results complement and extend this

4. Itzkowitz (2013) studies the effect of customer-base concentration on cash holdings at the supplier level, and Garcia-Appendini and Montoriol-Garriga (2013) focus on suppliers as liquidity providers during the financial crisis. These studies, however, do not analyze the trade-off between cash and lines of credit.

research, by showing that buyer-induced risk leads to firms shying away from credit lines, and increases the cost of bank liquidity, even after controlling for previously documented sources of risk.

Additionally, this study adds to the growing body of literature which investigates how corporate decisions are shaped by strategic interactions between a supplier firm and its customers. Titman (1984) theorizes how capital structure can mitigate agency conflicts between suppliers and customers, by forcing a supplier firm to implement a liquidation policy that maximizes the wealth of all its stakeholders. Low leverage then arises as a commitment mechanism to a firm's buyers. Consistently, Titman and Wessels (1988) and Banerjee *et al.* (2008) find that firms with unique or specialized products have relatively lower debt ratios. Similarly, Kale and Shahrur (2007) find that firms relationship-investments are negatively correlated with leverage. More recently, Hoberg, Phillips and Prabhala (2014) bring forward evidence regarding product market conditions and, respectively, cash holdings and payout decisions. In addition, Hertzl *et al.* (2008) and Kolay *et al.* (2015) study how distress at the customer level can impact supplier firms, and exhibit negative wealth effects. Fee and Thomas (2004) and Brown *et al.* (2009) focus on the effect of customer-base concentration on the relative bargaining power of suppliers and customers. Cen *et al.* (2016) further document how the implicit certification resulting from maintaining a relationship with one or more principal customers allows supplier firms to obtain less restrictive terms on bank loans. Dhaliwal *et al.* (2015) and Demirci (2015) are the most recent attempts at examining empirically the effect of customer risk. Dhaliwal *et al.* (2015) focus on the cost of equity of supplier firms. Demirci (2015) studies the effect of customer risk on capital structure at the supplier firm level. In addition, this paper further differs from Demirci (2015) in how customer risk is proxied. While I rely on explicit measures of a customer's probability of default, Demirci (2015) measures customer risk using either a customer's credit rating, return volatility or industry-adjusted book leverage.

The remainder of this paper is organized as follows. Section 2.2 presents the main hypotheses linking customer risk to the choice between cash and lines of credit. Section 2.3 describes the construction of the main sample and variables that this study relies on. Section 3.4 reports my main empirical findings. Section 2.5 presents various robustness tests, while Section 3.5 contains concluding remarks.

2.2 Hypotheses development

Since Keynes (1936), it has been a commonly known fact that liquidity is crucial when it comes to firms ensuring the continuity of their business. In the presence of market fric-

tions (agency conflicts, asymmetric information, transaction costs, etc.), firms cannot freely turn to capital markets to finance themselves, and thus need to hold some form of liquidity. Consistently, a large body of the financial literature focuses on cash as a liquidity buffer⁵ in presence of imperfect markets. More recently, using bank lines of credit as an alternative source of liquidity has been given growing attention, both theoretically and empirically⁶.

The use of revolving credit facilities provides borrowing firms with both higher financial flexibility and greater capacity to meet their liquidity needs. On the one hand, lines of credit allow firms to seize investment opportunities without burning cash or raising external capital in good states of nature (Lins, Servaes and Tufano, 2010). On the other hand, lines of credit can be used by borrowing firms as an insurance against liquidity shocks (Holmstrom and Tirole, 1998, Thakor, 2005), especially in order to ensure the continuity of their activities in the midst of a financial crisis (Ivashina and Sharfstein, 2010, Campello, Giambona, Graham and Harvey, 2011 and 2012, Berrospide and Meisenzahl, 2015).

As such, credit lines appear as a credible and potentially valuable substitute for cash as a source of liquidity. Yet, they can only serve as an imperfect substitute for cash, as pointed out by Demiroglu and James (2011) or Acharya, Almeida and Campello (2013). Declines in the borrower's operating performance might trigger the violation of one or several covenants attached to a credit lines agreement. Such violations have been shown to significantly decrease a firm's debt capacity (Roberts and Sufi, 2009), restrict firm decision-making in the future and even lead to higher management turnover (Nini, Smith and Sufi, 2012). In addition, as highlighted in Acharya *et al.* (2013), lenders (*i.e.* banks or financial institutions) might not be able to provide liquidity at all times. This could be the case following a global liquidity shock, such as the recent financial crisis. There thus exists a trade-off between cash and lines of credit as a source of liquidity. In other words, firms are more likely to rely on revolving credit facilities when the benefits of doing so (*i.e.* financial flexibility, liquidity insurance) outweigh the associated costs.

Sufi (2009) suggests that the threat of covenant violation is one of the main costs associated with lines of credit. As a consequence, a firm's operating performance arises as a key determinant to both accessing and maintaining a line of credit. Similarly, Acharya, Almeida, Ippolito and Perez (2014) document the effect of lines of credit covenant violations and show that such events lead to both a reduction in the size of existing lines of credit, and stricter

5. See Opler *et al.* (1999), Almeida, Campello and Weisbach (2004), Faulkender and Wang (2006), or Acharya, Almeida and Campello (2007), among others.

6. For theoretical evidence, see Holmstrom and Tirole, 1998, Thakor, 2005, Acharya, Almeida and Campello, 2013. Empirical evidence on the reliance on credit lines as a source of liquidity can be found in Sufi, 2009, Lins, Servaes and Tufano, 2010, Campello, Giambona, Graham and Harvey, 2011 and 2012, Acharya Almeida and Campello, 2013, Disatnik, Duchin and Schmidt, 2014, or Acharya, Almeida, Ippolito and Perez, 2014

contractual terms on future lines of credit (i.e. higher spreads, lower maturities, etc.). Acharya, Almeida and Campello (2013) further investigate corporate cash management decisions through a model linking aggregate risk to the choice between cash and lines of credit. Their model suggests that firms with greater exposure to aggregate risk rely more heavily on cash. The rationale behind this result is that bank lines of credit are explicitly more expensive for riskier firms, either through higher spreads or shorter maturities. These studies altogether shed light on both the direct costs (which are contracted upon) and the underlying indirect costs (the threat of covenant violation and its consequences) of lines of credit. Overall, the existing empirical and theoretical literature on lines of credit has reached a consensus stating that riskier firms should rely less on bank credit lines. Yet, most of these studies rely on rather general definitions of risk, whether they are market or accounting-based.

There exist numerous channels through which a firm can be exposed to risk and that are likely to affect its financing decisions. Traditionally, the underlying risk of assets in place, the relative importance of intangible assets, as well as the risk of growth opportunities, have been documented as determinants of both capital structure (Jensen and Meckling, 1976, Myers, 1977, Harris and Raviv, 1990a) and cash holdings choices (Kim, Mauer and Sherman, 1998, Opler *et al.*, 1999 or Almeida, Campello and Weisbach, 2004). Yet, risk is also likely to arise from the « current » part of a firm's balance sheet. In particular, current assets and liabilities reflect the structure of a firm's operating cycle, including the liquidity need it generates. In order to finance its day-to-day operations, a firm can then rely on cash, as well as on alternative financing tools, such as factoring and account receivables securitization.⁷ These last two solutions allow firms to capitalize on their (credit-worthy) account receivables. Meanwhile, the cost of such financing sources is mechanically subject to the quality and riskiness of borrowing firms' customers. Provided that lines of credit are used to finance receivables, as documented in Petersen and Rajan (1997), their overall cost should also be impacted by customer risk and quality. In other words, supplier-customer relationships are likely to be a source of risk exposure for supplier firms and should thus affect their choice between cash and bank lines of credit as sources of liquidity.

Drawing on these results, I further investigate how customer risk might affect its choice between cash and lines of credit as sources of liquidity. One of the major determinants of customer quality is the ability of a customer firm to honor its debts in time, if at all. As riskier or distressed customers are more likely not to honor their debts, supplier firms face a higher operating risk through the potential loss of future cash flows. This is all the more true for firms which sales depend on one or several major customers. For example, Hertzfel *et al.* (2008) and Kolay *et al.* (2015) exhibit negative abnormal returns for supplier firms fol-

7. See Klapper (2005) and Ketkar and Ratha (2001) detailed presentations of the factoring and receivables securitization mechanisms, respectively.

lowing the extreme event of a major customer filing for bankruptcy. As such, firms facing higher uncertainty on the customer side of their activity should be more likely to miss debt repayment deadlines, or to violate credit line (or, more broadly, debt) covenants. In addition, Demiroglu and James (2010) and Flannery and Wang (2011) show that the terms of credit line agreements are often subject to the quality (most often, on the age) of a firm's account receivables.⁸ Thus, banks are most likely to tighten the conditions under which they grant lines of credit to firms operating with riskier customers, either through higher spreads, lower maturities or more restrictive covenants.

Building on these rationales, my main testable hypothesis is as follows :

Hypothesis 1 *Ceteris paribus, firms facing higher customer risk rely less on lines of credit as a source of liquidity (as opposed to relying on cash).*

Similarly, the marginal cost (e.g. the overall spread, or the tightness of covenants and the associated threat of violation) of opening and holding a line of credit is thus more likely to outweigh the related benefits (e.g. financial flexibility) for supplier firms facing high customer risk. As such, the previous hypothesis can be restated as follows :

Hypothesis 1 bis *Ceteris paribus, the cost of a line of credit is higher for firms facing higher customer risk.*

2.3 Data

2.3.1 Sample selection

I draw my main sample (hereafter *Line of Credit Sample*, or *LC sample*) from the LPC-Dealscan database. LPC has been collecting information on loans to large U.S. corporations, primarily through SEC filings (e.g. 8-K and 10-K filings), reports from loan originators and the financial press. The LPC-Dealscan database thus contains detail information on commercial loans made to U.S. firm, with data from the mid-1980's to 2013, which allows me to construct a large sample of credit lines initiations. As reported in Acharya, Almeida and Campello (2013), the data are mostly based on syndicated loans and might thus be biased toward larger deals and, consequently, towards larger firms. Nevertheless, Carey and Hrycay (1999) report that the loans report in the DealScan database account for 50% to 75% of the total value of commercial loans issued in the U.S. by 1992 and a greater fraction from 1995 onward⁹.

8. Anecdotal evidence linking the access to revolving credit facilities and a supplier's receivables can be found in « Bankruptcy Fears Grip Auto-Parts Suppliers », published in the *Wall Street Journal* on January 26th 2009.

9. Although no recent study assesses the actual coverage of commercial loans by the LPC-Dealscan database, we can assume that the trend reported in Carey and Hrycay (1999) as at least been constant until today.

The *LC sample* is constructed starting from a sample of corporate loans reported in LPC-Dealscan during the period 1987-2013 for which the borrowing firm can be matched to a Compustat firm-identifier¹⁰. I drop utilities, quasi-public and financial firms (i.e. firms with SIC codes greater than 5999 and lower than 7000, greater than 4899 and lower than 5000 and greater than 8999). I consider only long-term and short term lines of credit, which are defined as loans with the the LPC field «*loantype*» equal to «364-day Facility», «Revolver/Line < 1 Yr», «Revolver/Line > = 1 Yr», or «Revolver/Line». I drop facilities that appear to be repeated (same borrowing firm and LPC loan identifier).¹¹ As loans are reported at the deal level, a given firm can have more than one line of credit initiation in the same quarter. In these cases, I sum the individual facility amounts for each firm-quarter observation and average the other variables (maturity, spread, fees, ...) using the individual facility amounts as weights.

Then, following the methodology described in section 2.3.2, I compute the yearly total amount of available line of credit for every sample firm. For each firm, I exclude every observation prior to the first reported line of credit initiation and after the last non-zero amount of available line of credit. This sample is then matched to Compustat annual data, as described in section 3.3.3. Altogether, the *LC sample* is composed of 8,222 unique firms, representing a total of 67,145 firm-year observations over the 1987-2013 period.

Next, I need to match each *LC sample* supplier firm to its customers. The regulatory environment in the United States allows me to construct a sample of customer firms (hereafter *Customer Sample*). In accordance with the Statement of Financial Accounting Standards (SFAS) No. 14 and 131, U.S. public firms are indeed required to disclose the identity of any customer that contributes at least to 10% of their respective revenues, although some firms choose to report customers that contribute to less than 10% of their revenues. These data are reported in firms annual 10-K filings and re available in the Compustat Customer Segment File. The database, however, only contains the name of the main customers reported by U.S. public firms.

The most efficient procedure used in the literature to identify the customer firms reported in the Compustat Customer Segment File is described in Fee and Thomas (2004) or Kale and Shahrur (2007). The first step consists in using a fuzzy-matching algorithm that compares the reported customer names (either complete or abbreviated) to the company names listed on CRSP (historical name structure) or Compustat.¹² Overall, the *Customer sample* is composed of 2,520 unique customer firms for 3,564 unique supplier-firms within the *LC*

10. To do so, I rely on the file provided by Michael Roberts and used in Chava and Roberts (2008).

11. I do not make any distinction between secured and unsecured loans. Given all these restrictions, the average new line of credit is as follows : it amounts to \$315 millions, has a maturity of roughly 14 quarters, an average spread on drawn amounts of 1.89% and an commitment fee of 33bps.

12. More details regarding this procedure can be found on pp. 436-437 of Fee and Thomas (2004)

sample. The details of the main variables included in this sample are reported in section 2.3.2.

Table 3.1 presents the distribution of *LC sample* (supplier) firms across industries. As reported in column (1), manufacturing firms (4-digit SIC code between 2000 and 3999) account for almost half of the overall firm-year observations (49.35%), while the second most represented industry, i.e. the service industry (including firms with a 4-digit SIC code between 7000 and 8999), only represents 19.86% of the total sample. Regardless of the industry, the proportion of firms in each industry that report at least one identifiable major customer is relatively low, and only reaches a maximum of 26.4% for the manufacturing industry. This observation first stems from the restrictions I impose on customer firms, which have to be reported in the Compustat database. This implies that firms reporting only private firms as their major customers do not appear in the *Customer sample* as having identifiable main customers. In addition, as I chose to follow a conservative approach in identifying customer firms in order to limit Type I errors¹³, I mechanically reduce the subsample of firms that appear to report at least one main client. Finally, firms might deliberately choose not to report identifiable customer names. In particular, Ellis, Fee and Thomas (2012) find evidence of potential strategic behavior of firms that choose not to disclose information about their customers that meet the minimum requirements of the U.S. Securities and Exchange Commission regulations.

Column (8) of Table 3.1 reports the industry mean relative size of main customers compared to their suppliers. I measure a customer firm relative size as the ratio between the book value of total assets of a given firm and the total value of its suppliers total assets. Depending on the supplier industry, customer firms appear to be on average 23.412 to around 78 times larger than their suppliers. In other words, supplier firms in my sample are on average much smaller than their major customers. This suggests that my final sample is most likely to be composed of relatively small intermediate goods producers or subcontractors. This is all the more true that half of my sample is composed of manufacturers. A typical example would be that of Cherry Corp., which mainly sold sensors and other electronic components to the automobile industry during the sample period, and which had Ford and General Motors as major clients.

2.3.2 Main variables

My tests combine data that come from multiple sources. It is thus useful to explain in detail how I construct the main variables used in this article.

13. A Type I error, or false positive, occurs when I wrongfully identify a firm as a major client for a given supplier firm.

Line of credit data

I measure the reliance on lines of credit following Acharya, Almeida and Campello (2013). For each firm-quarter observation, I measure line of credit availability by summing all existing credit lines that have not yet matured. To do so, I assume that all credit facilities remain open until they mature. Thus, credit line availability for each firm-quarter (i, q) is defined as :

$$Quarterly LC_{i,q} = \sum_{t \leq q} LC_{i,t} \mathbb{1}_{\{Maturity_{i,t} \geq q-t\}} \quad (2.1)$$

where $LC_{i,t}$ is the total value of lines of credit initiated by firm i in quarter t , $Maturity_{i,t}$ is the maturity of credit lines initiated by firm i in quarter t , and $\mathbb{1}_{\{ \cdot \}}$ is the indicator function. I convert this firm-quarter measure into a firm-year measure of credit line availability by computing the yearly average *Quarterly LC* for each firm. This firm-year measure is denoted *Total LC*. The fraction of corporate liquidity that is provided by revolving credit facilities for firm i in year t is then computed as :

$$LC-to-Cash_{i,t} = \frac{Total LC_{i,t}}{Total LC_{i,t} + Cash_{i,t}} \quad (2.2)$$

In addition, I build a proxy for the financial cost of a firm's lines of credit. The cost of credit lines can be divided into two distinct but yet related sources. The first cost measure is the all-in drawn spread, which is defined as the annual spread (expressed in percentage) over LIBOR paid for drawing down funds from an existing line of credit. The second measure for the cost of lines of credit is the annual fees (also expressed in percentage) paid on undrawn amounts, more often called amortization fees or commitment fees. For each firm, I compute the yearly weighted average all-in drawn spread and the yearly weighted average commitment fee paid on available lines of credit, using individual facility amounts as weights. Following previous studies (see Booth and Booth, 2006, Carey and Nini, 2007, or Flannery and Wang, 2011), I aggregate these two costs to build an overall measure for the yearly average cost of lines of credit, which will be referred to as *LC Cost* hereafter. I also construct the *LC Maturity* variables as the maturity in quarters of yearly available lines of credit for each sample firm. If more than one line of credit is available for a given firm during a given year, *LC Maturity* is computed as the weighted averages of maturities of the available lines of credit, using individual facility amounts as weights. Similarly, I define the *Number of Covenants* variable as the number of covenants included in credit line agreements. The *LPC Dealscan* database identifies up to twenty one specific covenant types that are included in debt contracts and regroups them into two main groups, namely financial covenants and net worth covenants. Financial covenants regroup, for example, capital expenditures, debt to EBITDA, EBITDA, interest coverage or leverage covenants. Net worth covenants regroup either net worth or tangible net worth provisions. I aggregate the number of distinct covenants included in each credit line agreement, and define the yearly number of covenants for each sample firm as the yearly average

number of covenants attached to all lines of credit opened in a given year.

Table 2.2 Panel A presents the descriptive statistics for all the line of credit variables. *LC-to-Cash* is computed for all sample firms, while the cost (*Cost of LCs*), maturity (*LC Maturity*) and covenants (*Number of Covenants*) variables are only computed for firms exhibiting a non-zero amount of available line of credit during a given year.

Customer risk data

To proxy for customer risk, I use three measure of default probability that capture the likelihood that a major customer will default or declare bankruptcy during a given year. My first measure is computed in the spirit of Hillegeist *et al.* (2004), and is computed as the weighted average expected default probability of a supplier firm's major customers, based on the KMV-Merton¹⁴ structural model, and where the weights are the percentages of the supplier firm's sales to each major customer. This variable is denoted by *Customer Risk - Merton* hereafter. My second measure is based on Campbell, Hilsher and Szilayi's (2008) (hereafter CHS) probability of default that uses both accounting ratios and market-related variables to assess the likelihood of corporate bankruptcy through a hazard model. Similarly, the overall risk measure is the weighted average probability of default of a given supplier's major customers, and is referred to as *Customer Risk - CHS*.

My last measure is derived from a principal component analysis (hereafter PCA) and uses the first principal component from Altman's (1968) modified weighted average Z-score of a supplier firm's major customers¹⁵, KMV-Merton's based customer risk measure and CHS-based customer risk measure (see Kim *et al.*, 2011, and Dhaliwal *et al.*, 2015, for similar approaches). This customer risk measure is denoted by *Customer Risk - PC*. Appendix 2.A and Appendix 2.B contain the detailed computation process of my first two customer risk proxies, respectively.

Table 2.2 Panel B reports the summary statistics for the customer risk variables based on the Merton (1974) structural model and the CHS empirical hazard model, respectively.

14. The model was originally designed and presented in Merton (1974)

15. At the individual firm level, Altman's (1968) Z-score is computed as $1.2(\text{WCR}/\text{Total Assets}) + 1.4(\text{Retained Earnings}/\text{Total Assets}) + 3.3(\text{EBIT}/\text{Total Assets}) + 0.6(\text{Market Value of Equity}/\text{Total Liabilities}) + 0.999(\text{Sales}/\text{Total Assets})$ for manufacturing firms, and as $6.56(\text{WCR}/\text{Total Assets}) + 3.26(\text{Retained Earnings}/\text{Total Assets}) + 6.72(\text{EBIT}/\text{Total Assets}) + 1.05(\text{Market Value of Equity}/\text{Total Liabilities})$ for non-manufacturing firms.

Control variables

I follow Sufi (2009) in the definition of the main Compustat-based control variables that I use in the line of credit tests. I thus rely on a measure of book assets that is net of cash holdings, i.e. firm *Assets* are defined as *at - che*. The other Compustat-based variables are defined as follows (in terms of Compustat annual variable names). *Cash* is measured using *che*. *Asset Tangibility* is computed as *ppent* scaled by *Assets*. *Firm Size* is defined as the natural logarithm of *Assets*. Following Acharya, Almeida and Campello (2013), Tobin's Q is defined as the cash-adjusted market-to-book ratio, and is given by $(Assets + prcc_fc * sho - ceq)/Assets$. *Net Worth* is defined as $(ceq - che) / Assets$. *ROA* is the return on asset and is proxied by the EBITDA scaled by non-cash total assets, i.e. $oibdpl/Assets$. *Industry Sales Volatility* is the 3-digit SIC industry median value of the within-year standard deviation of quarterly changes in firm sales scaled by the industry average asset value during the same year. *Cash-flow volatility (CF Variability)* is based on the measure used in Mackie-Mason (1990), and is computed as the firm-level standard deviation of annual change in the level of EBITDA, calculated over a lagged four-year period and scaled by average assets in the lagged period. I use two measures of information asymmetry. *Firm Age* is measured as the difference between the current year and the first year in which a firm appeared in the Compustat. *S&P* is a dummy variable that is equal to one if a firm is included in one of the main S&P indices, i.e. the S&P 500, the S&P Midcap 400, and the S&P Smallcap 600. I also use two variables related to a supplier's trade credit. *Receivables* is measured as the ratio of a firm's total receivables to its total revenues, and is computed as $rect/sale$. *Doubtful* is defined as the estimated proportion of annual sales accounted for by doubtful receivables and is given by $recd/sale$. All Compustat variables are winsorized at the 5th and 95th percentiles.

Following Acharya, Almeida and Campello (2013), I measure *LC sample* firms' exposure to systematic risk using asset unlevered beta. To do so, I unlever equity betas using the KMV-Merton model. Firm value is thus computed following the process described in Section 2.3.2. Asset betas are computed using the following formula :

$$\beta_{KMV} = \beta_{Equity} \frac{E}{V} N(d_1) \quad (2.3)$$

where β_{Equity} is the equity beta computed using the past twelve monthly stock returns (extracted from CRSP) for each *LC sample* firm. In addition, I measure asset volatility using the numerical results yielded by the KMV-Merton model and denote it σ_{KMV} . As Acharya, Almeida and Campello (2013) find evidence that σ_{KMV} is a better measure of total risk than *CF Variability*, I'll use it as a control variable in some regression specifications.

The descriptive statistics of all the aforementioned control variables are reported in Table 2.2 Panel C.

2.4 Empirical results

2.4.1 Customer risk and the choice between cash and lines of credit

Univariate results

Table 2.3 reports the univariate comparisons of the main line of credit variables (as described in Section 2.3.2) between a sample of low customer risk firms and a sample of high customer risk firms. Low customer risk firms are identified as those ranked in the bottom quartile of the relevant customer risk measure, while high customer risk firms are those ranked in the top quartile of the relevant customer risk measure.

Panel A of Table 2.3 presents the univariate comparisons of the LC-to-Cash variable. The bottom and top quartiles of each customer risk variable are drawn from the entire *LC Sample*. Firms in the bottom quartile of the Merton- (CHS-) based customer risk variable exhibit a mean ratio of available line of credit to total liquidity of 54.9%(54.3%), which is significantly different at the 1% level from the 48.6% (48.8%) mean ratio observed for high customer risk firms. These results remain robust to exclusion of firm-years for which the amount of available line of credit is equal to zero, as reported in Table 2.3 Panel B. In addition, results remain unchanged when proxying customer risk with the PCA-based measure.

Firms facing high customer risk also appear to bear the highest costs for bank liquidity. As shown in Table 2.3 Panel C, low customer risk firms pay an average spread lower by 33.8 bps to 48 bps, compared to their high customer risk counterparts. In addition, Panel D suggests that firms facing the highest levels of customer risk tend to have more covenants attached to credit lines agreement, compared to their counterparts that face lower customer risk levels. However, this differences appear to be small and even insignificant, depending on the customer risk proxy relied on. Finally, Panel E shows that high customer risk supplier firms tend to obtain shorter maturities for its new credit lines. The average maturity significantly drops from almost 15 quarters (i.e. almost 4 years) for firms facing low Merton-based customer risk to barely 11.5 quarters (i.e. less than 3 years) for high Merton-based customer risk firms. The average difference in maturities is much smaller when relying on the other customer risk measures, and is only significant at the 10% percent level when measuring customer risk through a CHS-based proxy.

Overall, these preliminary results suggest that firms facing higher customer risk rely on average less on lines of credit as a source of liquidity, and are only able to obtain bank liquidity under less favorable terms. However, univariate results alone are not enough to conclude

either that customer risk *does* increase the cost of bank liquidity, or that it leads firm to rely more heavily on cash. The remainder of Section 3.4 thus focuses on various multivariate tests designed to tests the hypotheses brought forward in this paper.

Firm-level regressions

My benchmark regression model includes all previously identified determinants of the choice between cash and lines of credit, as well as my customer risks measures. Each customer risk proxy is included separately. Overall, the regression equation is as follows :

$$\begin{aligned}
 LC\text{-}to\text{-}Cash_{i,t} = & \alpha + \beta_1 Customer\ Risk_{i,t} + \beta_2 Beta\ KMV_{i,t} \\
 & + \beta_3 ROA_{i,t-1} + \beta_4 Tangibility_{i,t-1} + \beta_5 Size_{i,t-1} \\
 & + \beta_6 Net\ Worth_{i,t-1} + \beta_7 Q_{i,t-1} + \beta_8 Ind.\ Sales\ Vol_{i,t} \\
 & + \beta_9 CF\ Variability_{i,t} + \beta_{10} SP\ dummy_{i,t} \\
 & + \beta_{11} Firm\ Age_{i,t} + \lambda_t + \gamma_i + \epsilon_{i,t}
 \end{aligned} \tag{2.4}$$

where λ_t and γ_i represent year and industry fixed-effects, respectively. Industry fixed effects are coded at the 2-digit SIC code level. Because clustering effects could bias the statistical significance of the results owing to time series dependence, I adjust the standard errors in all regressions for clustering by firm.

Table 2.4 reports the results for the preliminary regressions. Regardless of the specification, I find that profitable, large, mature and low net worth firms with stable cash flows are more likely to rely on bank lines of credit as a source of liquidity. In Columns (1) to (3), I alternatively introduce the three customers risk variables presented in Section 2.3.2. Results consistently exhibit a negative and significant correlation between customer risk and the relative reliance on credit lines. The magnitude of the coefficient associated with the Merton-based measure of customer risk (-0.560) implies that a one-standard-deviation increase in customer risk (approximately 2.9%) decreases on average a firm's reliance on bank lines of credit by 1.624%, *ceteris paribus*. The effect of a one-standard-deviation increase is relatively similar when using alternate definitions of customer risk : -1.44% for the CHS-based measure, and -2.14% for the PCA-based variable¹⁶. Although the economic significance of these results might seem relatively small, this result suggests that even minor (in magnitude) changes in customer risk affect a firm's choice between cash and bank credit lines. This is all the more true for extreme changes in the risk faced by supplier firms from the customer side of their activity, i.e. when main customers are close to financial distress.

As customer risk proxies are most likely correlated to a firm's asset beta, my initial results

16. The unreported standard deviation of the *Customer Risk - First PC* variable is approximately 1.02.

could simply capture the correlation between corporate cash management choices and systematic risk exposure. I thus control for the (unlevered) beta of a supplier firm's asset (*Beta KMV*) and report regression results in columns (1) to (3) of Table 2.5. Regardless of the specification, the coefficient associated with *Beta KMV* appears to be significantly negative at the 1% level. This is consistent with the assumption that firms with high exposure to systematic risk rely more intensively on cash to meet their liquidity needs. As in Table 2.4, the evidence tends to suggest that customer risk is negatively correlated with the reliance on bank credit lines. The inclusion of systematic risk exposure only marginally affects both the magnitude and significance of customer risk estimates, which remains significantly negative at the 1% level. Furthermore, the economic significance of my results remains qualitatively unchanged, as a one-standard-deviation in customer risk is associated to a 1.48% (for the Merton-based measure) up to 2.44% (for the PCA-based measure) decrease in the *LC-to-Cash* ratio. Out of completeness, I also control for asset volatility by including the *Var KMV* variable. The corresponding regression estimates are reported in Columns (4) to (6), and show that controlling for asset volatility does not affect my results. Altogether, these results suggest that the effect of customer risk on the choice between cash and lines of credit do not solely reflect the impact of systematic risk exposure on firm's financing decisions.

In addition, being able to collect receivables is closely related to customer quality and, consequently, to customer risk. As such, I next investigate the effect of trade credit on the choice between cash and lines of credit, and to which extent it could affect my results regarding customer risk. Customers are usually deemed « bad » when they fail to honor their debts within the period contractually set with their supplier. Thus, dealing with such customers mechanically increases the share of a supplier's sales accounted for by pending invoices, and potentially decreases the overall quality of its receivables. As the access to bank lines of credit is often dependent on the quality of a firm's receivables, firms for which receivables represent a high share of their annual sales should thus exhibit lower *LC-to-Cash* ratios. This is all the more for true supplier firms which rely on a limited number of customers to generate a significant portion of their sales. Therefore, part of my results are likely to stem solely from the lower ability of firms with high customer risk to convert receivables into revenues, should my customer risk measures fail at capturing other dimensions of risk.

To address this issue, I extend the regression model described in Equation 2.4 and control for the lagged receivables-to-sales ratio, which is defined as the total year-end total receivables scaled by the amount of total sales. I also control for the lagged estimated doubtful-to-sales ratio which measures, albeit imperfectly, the share of pending invoices that are most likely not to be recovered. The corresponding regression estimates are reported in Table 2.6. These results exhibit an insignificant correlation between estimated doubtful and the choice between cash and lines of credit. Conversely, they suggest that firms with high receivables-

to-sales ratios rely more heavily on cash as a source of liquidity. This is consistent with the assumption that the ability to convert pending invoices into actual sales is positively correlated to the reliance on bank lines of credit. The evidence in Table 2.6 further shows that the negative effect of customer risk on the choice between cash and revolving credit facilities is robust to controlling for account receivables and doubtful accounts.

Instrumental variables regressions

Despite my initial results being so far robust, endogeneity is still likely to arise from unobserved omitted variables. In particular, I am unable to observe either part of all of the nexus of implicit contracts that is likely to exist between a firm and its customers (see Coase, 1937, Zingales, 2000, or Kale, Menaghetti and Shahrur, 2012). Provided that these factors are both more prevalent among major customers and correlated with a supplier's choice between cash and bank lines of credit, my previous findings might thus be biased. However, most concerning is the fact that I am also unable to observe determinants of bank credit supply that are also correlated to a firm's customer risk. Banks are indeed likely to redirect part of all of their credit supply towards firms with safer receivables for internal strategic reasons which are only partially, if at all, observable (e.g. following a change in risk management policy during a recession). I am, for example, unable to measure the extent to which lending banks are exposed to capital flows reversals. Banks that are most sensitive to funding shocks (e.g. international commercial banks), are most likely to reduce credit availability and increase the cost of funds during economic downturns (see Puri *et al.*, 2011). In addition, there now exists a significant body of evidence showing that bank credit shortages do have a negative impact on the economy, and in particular on borrowing firms' output (see Jiménez *et al.*, 2012, or Paravisini *et al.*, 2014). Thus, not being able to observe banks' exposure to funding shocks might lead me to omit factors that are likely to simultaneously induce banks to ration available credit, and impair the performance of a supplier firm's major customers. In order to tackle this issue, I use an instrumental variable approach.

I consider two main instruments. First, I rely on the lagged average idiosyncratic risk (volatility) of a supplier firm's main customers. Following Ang *et al.* (2009), idiosyncratic risk at the customer firm-year level is defined as the yearly standard deviation of regression residuals of the daily Fama and French (1992,1993) three-factor model. Daily stock returns are extracted from the CRSP database. The daily Fama-French factors are obtained from Kenneth R. French's website. For each year, a supplier's customer idiosyncratic risk is then defined as the one year lagged weighted average idiosyncratic volatility of all identifiable major customers, using the contemporaneous percentages of the supplier firm's sales to each main customer as weights. In addition, I instrument my customer risk measures using a measure of credit line availability at the customer level. In particular, for each year, I build an indicator

variable that is equal to one if an individual customer has firm access to a line of credit and zero otherwise. At the supplier level, customer credit line availability is computed as the one year lagged weighted average of the aforementioned dummy variable.

Customer idiosyncratic volatility should be a valid instrument for two reasons. First, as it is specific to each customer firm, it is highly likely to be correlated with the probability of default at the individual supplier level. As such, my aggregated measure of customer idiosyncratic risk at the supplier firm level should also be correlated with each measure of customer risk. Furthermore, to the extent that idiosyncratic risk is diversifiable, it is unlikely to be directly reflected in a supplier firm's risk, and thus in its choice between cash and lines of credit. In addition, due to its inherent nature, aggregate customer idiosyncratic volatility is unlikely to be correlated to banks' credit line supply towards supplier firms. To some extent, banks are, unlikely to acquire specific information about the customers (even major ones) of a potential client. Rather similar arguments apply when assessing the *ex ante* validity of credit line availability at the customer level as an instrument. In particular, not having access to a line of credit can be viewed as a characteristic of financially constrained firms (see Sufi, 2009). Customer credit line availability is thus likely to be correlated to a supplier firm's customer risk. Yet, it is very unlikely that the sole (lack of) access to a credit line of customer firms is directly correlated to neither bank credit supply towards supplier firms, nor financing decisions at the supplier level.

The use of lagged variables should further alleviate concerns that my instruments are correlated with financing choices made at the individual supplier level. However, these lagged variables should still be correlated with the contemporaneous expected average probability of default of a firm's main customers, i.e. customer risk. Finally, in order to strengthen the *ex ante* validity of my instruments, I restrict my sample to supplier firms which do not share the same lead bank on any of their outstanding loans, with any of their customers, during a given year. To do so, I rely on the Dealscan database to identify all loans opened by Compustat firms, as well as the lead bank for each loan. I assume that loans remain open until they mature and that a lead bank does not change over the term of a loan. Although this leads to a much smaller sample size, relying on this restricted sample should ensure that my results are not due to banks using specific information about customer firms to set the supply of credit lines they are willing to redirect towards supplier firms.

Table 2.7 reports the result of the first stage (Columns (1), (3) and (5)) and second stage (Columns (2), (4) and (6)) regressions for each customer risk measure. In order to assess the *ex post* validity of my instruments, I report various test statistics. I first consider the first-stage exclusion F-test for my instruments, which are reported in columns (1),(3) and (5). For two out of three customer risk proxies, the high F-stats (which are associated with p-values

just above 1%) confirm the explanatory power of my instruments. In addition, first stage regression results mostly suggest that customer idiosyncratic risk and customer credit line availability are correlated with an individual supplier firm's customer risk. Yet, all F-stats are below the heuristic threshold of 10, thus revealing a potential weak instrumental variable issue. To alleviate such concern, I report the Anderson-Rubin weak IV robust test for each specification, in columns (2), (4) and (6), respectively.¹⁷ Under the null hypothesis, IVs are jointly equal to zero in the reduced form model and overidentification restrictions are valid. Most important, this test is robust to the presence of weak instruments. Here, I am never able to reject the null hypothesis, which suggests that my instruments are indeed valid. I also control for whether my instrumental variables meet the under-identification restriction. To do so, I report the Kleibergen-Paap rank LM statistic for each second stage regression in columns (2), (4) and (6). The high test statistics suggest that I can reject the null hypothesis that my equations are under-identified, regardless of the customer risk measure relied on, and thus that my instruments are relevant. Finally, I focus on the Hansen J-test statistic and report the associated p-values in columns (2), (4) and (6). All p-values are above the 10% threshold; thus, regardless of the customer risk proxy used, I do not reject the null hypothesis that my instruments are uncorrelated with the error-term in the second stage regression and that my model is well specified. This implies that my instrumental variables are exogenous with respect to a supplier's choice between cash and lines of credit. The second stage results reported in columns (2), (4) and (6) exhibit a negative correlation between customer risk and the choice between cash and bank lines of credit. Overall, to the extent that my instruments are valid, the results in Table 2.7 suggest that greater customer risk leads supplier firms to rely less on lines of credit relative to cash.

Overall, the evidence here highlights how the conditions under which a firm operates on the product market are a specific key driver of its liquidity management decisions. Specifically, supplier firms facing high customer appear to rely less on bank-managed liquidity insurance. This effect appears to be economically significant compared to previously documented determinants of the reliance on credit lines.

2.4.2 Customer risk and the cost of bank credit lines

The empirical evidence in Section 2.4.1 is based on the underlying rationale that firms facing higher risk on the customer side of their activity face a higher cost for bank credit lines. In order to validate this assumption, this section focuses on the correlation between custo-

17. Another solution would be to compare the first-stage F-stats to the Stock and Yogo critical values (see Stock and Yogo (2005)). However, these critical values are only computed for i.i.d standard errors, which I do not assume here. As such, I choose to solely focus on the Anderson-Rubin weak IV test to assess the validity of my instruments, given a potential weak IV issue.

mer risk and various dimensions of the cost of bank liquidity for supplier firms.

Monetary cost of credit lines

I first focus on the monetary cost of lines, which is proxied through an aggregated cost measure (*LC Cost*). I take the natural logarithm of this measure to allow for a non-linear relation between the cost of bank credit lines and the set of chosen explanatory variables. The empirical model tested in this section then has the following form :

$$\begin{aligned}
 \text{Log}(\text{LC Cost}_{i,t}) = & \alpha + \beta_1 \text{Customer Risk}_{i,t} + \beta_2 \text{New LC}_{i,t} + \beta_3 \text{LIBOR}_{i,t} \\
 & + \beta_4 \text{Leverage}_{i,t-1} + \beta_5 \text{Beta KMV}_{i,t} + \beta_6 \text{ROA}_{i,t-1} \\
 & + \beta_7 \text{Tangibility}_{i,t-1} + \beta_8 \text{Size}_{i,t-1} + \beta_9 \text{Net Worth}_{i,t-1} \\
 & + \beta_{10} \text{Q}_{i,t-1} + \beta_{11} \text{Ind. Sales Vol}_{i,t} \\
 & + \beta_{12} \text{CF Variability}_{i,t} + \beta_{13} \text{SP dummy}_{i,t} + \beta_{14} \text{Firm Age}_{i,t} \\
 & + \lambda_t + \gamma_i + \epsilon_{i,t}
 \end{aligned} \tag{2.5}$$

where *New LC* is the total amount of lines of credit raised during a given year scaled to total non-cash assets¹⁸, *LIBOR* is the annualized weighted average level of the LIBOR in the quarter during which a line of credit was raised and *Leverage* is past book leverage. All other controls variables are defined as in Equation 2.4. I control for firm and industry fixed effects by including year dummies (λ_t) and industry dummies (γ_i), where industries are identified at the 2-digit SIC code level. Finally, standard errors are clustered by firms.

Table 2.8 reports results for the cost regression models. The coefficients on the customer risk proxies reported in columns (1) to (3) suggest that the cost of lines of credit is on average greater for firms that operate with riskier customers, although statistical significance for the estimate on *Customer Risk - Merton* is weaker (with a p-value of 0.174). As these results could be driven by the chosen form for the cost of bank credit lines, I re-run the regression models described in columns (1) to (3) of Table 2.8, using *LC Cost* as a dependent variable and report the corresponding results in columns (4) to (6) of Table 2.8. The overall significance of the different customer risk estimates appears to be improved, although the p-value remain above the 10% threshold when relying on the Merton-based measure of customer risk (and is equal to 0.102). Altogether, these results suggest that the cost of obtaining new lines of credit is higher for supplier firms that face a higher customer risk, through higher spreads paid on either withdrawn or outstanding amounts.

18. This measure differs from the *Total LC* variable. *New LC* only includes new lines of credit, while *Total LC* is computed using new lines of credit and existing lines of credit that have not yet matured.

Credit line covenants

I further investigate the correlation between customer risk and the terms of bank credit lines, and first focus on the number of performance-based (or "financial") covenants included in credit line agreements. The *LPC Dealscan* database identifies up to twenty one specific performance-based covenant types that are included in debt contracts. The yearly number of covenants for each sample firm is defined as the yearly average number of covenants attached to all lines of credit opened in a given year. My final measure of the number of covenants is then defined as the natural logarithm of the total number of covenants. I then regress this covenant intensity measure on the set of explanatory variables described in Equation 2.5.

Table 2.9 reports regression estimates for the financial covenants models. Panel A presents results for the baseline regression model. The coefficient on customer risk is insignificant in two out of three cases (columns (1) and (3)), and is only significant when defining customer risk through the CHS hazard model (column (2)). Although these results do not allow to derive any consistent conclusion regarding the effect of customer risk on the number of covenants attached to credit line agreements, the customer risk estimate in column (2) (and, to a lesser extent, columns (1) and (3)) suggests that firms facing higher customer risk are on average subject to less covenants. In addition, the coefficient on *ROA* is consistently negative and significant at the 1% level. This implies that some weaker firms obtain credit line agreements that include a lower number of covenants.

Although they might seem counter-intuitive, these results may reflect the « relative importance of future cash flows versus collateral in repaying a line of credit » (see Flannery and Wang, 2011). In particular, financial covenants are less likely to be relevant for firms with low operating cash-flows. To test this possibility, I sort firms depending on whether their EBITDA is above or below the median of the overall yearly EBITDA distribution and report results in Panel B of Table 2.9. Consistent with the aforementioned hypothesis, the coefficients on the customer risk proxies and *ROA* are only significant in the low EBITDA subsample.

More broadly, the latter hypothesis implies that banks are more prone to imposing non performance-based covenants on firms with low operating performance and high customer risk. To test this implication, I rely on the *LPC Dealscan* database to collect information regarding non-financial covenants (these covenants include borrowing base provisions, dividend restrictions, asset sweeps, equity sweeps and debt sweeps). Definitions of non-financial covenants are reported in Appendix 3.A. Table 2.10 Panel A reports detailed univariate comparisons of the yearly mean number of non-financial covenants attached to new credit line contracts between a sample of low customer risk and a sample of high customer risk *LC sample* firms. These two subsamples are defined following Section 2.4.1.

Results almost consistently suggest that non-financial covenants are more often included in credit line contracts open by high customer risk supplier firms. Around 29.50% of credit lines opened by firms in the sample firms in the top quartile of the Merton-based measure of customer risk include a borrowing base provision. This number drops to 16.50% when focusing on supplier firms in the bottom quartile of the distribution, and the difference is significant at the 1% level. In other words, lenders are more likely to tie the value of a line of credit to the value of pre-specified collateral when customer risk is high. High customer risk firms also appear to be more often subject to dividend restrictions in their credit line contracts. Table 2.10 Panel A further suggests that banks are more keen on including sweep covenants in credit line agreements opened by riskier suppliers, although results are only significant for two out of three customer risk measures. This nonetheless highlights how lenders are most willing to ensure that cash-flows are used to repay opened loans when dealing with high customer risk suppliers.¹⁹

Next, I repeat the analysis presented in Table 2.9 Panel B on non-financial covenants and report regression estimates in Table 2.10 Panel B. The dependent variable is here defined as the natural logarithm of the total number of non-financial covenants (sweep covenants, dividend restrictions and borrowing base provisions) attached to credit line contracts opened during a given year. The coefficients on the customer risk proxies appear to be significantly positive only for low EBITDA firms, although this result holds for two out three customer risk measures. This suggests that lending institutions are more likely to either ensure that cash-flows are used to redeem outstanding debts, or to tie the value of available funds to that of pre-specified collateral, when dealing with risky supplier firms. In addition, the ROA estimate is consistently significant and negative for the sole subsample of low EBITDA suppliers.

Overall, results so far suggest that high customer risk supplier firms are only able to open lines of credit at a higher cost. In particular, lending institutions charge higher overall spreads to riskier suppliers. Customer risk and covenants, however, do not appear to be equally relevant for all firms. Banks indeed appear to impose more non-financial covenants only on high customer risk suppliers with low operating cash flows. Consequently, financial covenants seem to be less relevant for such firms. These tighter conditions on the access to lines of credit are likely to explain why high customer risk supplier firms appear to shy away from bank credit lines.

19. In unreported tests, I repeat the same univariate comparisons on the covenant strictness measure defined by Murfin (2012), but find no significant difference between high and low customer risk suppliers.

2.5 Robustness tests

2.5.1 Propensity score analysis

One potential endogeneity issue that might affect my model stems from the existence of omitted variables that are correlated with both customer risk and the choice between cash and bank lines of credit. In particular, the measures relied on to assess customer risk are likely to capture nonlinear effects if the controls used in the different regression models do not adequately account for differences between supplier firms facing low customer risk and those facing high customer risk. I thus use a propensity score matched sample to correct for any potential endogenous selection on observed variables (see Dehejia and Wahba, 2002).

Therefore, I first estimate the probability that a supplier firm faces low customer risk during a given year. The dependent variable is equal to one if a supplier firm is in the bottom quartile of the distribution for a given customer risk measure during a given year, and is equal to zero if a firm is in the related top quartile. I use the set of control variables used in the LC-to-Cash model described in Equation 2.4. I also include *Cash* and *Leverage* as control variables. This allows me to control for potential differences in both cash holdings and capital structure between suppliers facing low customer risk, and suppliers facing high customer risk. Columns (1), (3) and (5) of Table 2.11 Panel A report the marginal effects of these regressions. Next, I match each observation in the bottom quartile of each customer risk variable (i.e. with low customer risk) to a firm in the top quartile of the same customer risk variable (i.e. with high customer risk) with the closest propensity score. I match without replacement and require the propensity scores for each matched pair to be within $\pm 1\%$. Depending on the customer risk measure used, the resulting sample consists of 947 (for the PCA based measure) up to 1253 (for the CHS based measure) low customer risk supplier-years matched, respectively, to 947 up to 1253 high customer risk supplier-years.

I perform several diagnostic tests to assess validity of the matching procedure (see Fang *et al.*, 2014, or Dhaliwal *et al.*, 2015). If the matching procedure is indeed successful, I should find that: (i) the control variables used to create the matched sample do not explain any variation in whether matched supplier firms face low or high customer risk, (ii) the means of the matched control variables are not statistically different for suppliers with low and high customer risk, and (iii) the difference in propensity scores between low customer risk suppliers and high customer risk suppliers is on average insignificant and in the $[-1\%; 1\%]$ interval.

To test the first prediction, I run the regression model presented in Columns (1), (3) and (5) of Table 2.11 on the suitable matched sample and report the results in Columns (2), (4) and (6), respectively. The results show that none of the control variables remain statistically

significant, and thus do not explain any variation in whether a supplier faces low or high customer risk. Next, I examine the difference between the propensity scores and matched control variables of suppliers facing low customer risk and those facing high customer risk. The related univariate comparisons of the means are reported in Panel B of Table 2.11. The results show that the mean difference in propensity scores is not statistically significant, and therefore trivial. In addition, the means of the matched control variables appear not to be statistically different across each pair of matched subsamples. Overall, these tests suggest that the matching procedure is valid and successful.

Panel C of Table 2.11 presents the results from my main LC-to-Cash regression model described in Equation 2.4. Consistent with previous findings, the results suggest that firms facing higher customer risk rely less on bank on lines of credit relative to cash, on average. In addition, using cash holdings as a control variable in the matching procedure ensures that, at least to some extent, the results cannot be attributed to high customer risk suppliers holding more cash than their low customer risk counterparts. Similarly, controlling for leverage when building the matched samples allows me to conclude that firms reliance on lines of credit as a source of liquidity is, even to a limited extent, distinct

In order to further assess the robustness of my initial regression results, I run the matching procedure on the subsample of firms for which I am able to measure the cost of opened lines of credit (i.e. to measure compute *LC Cost*). For each customer risk measure, each firm-year observation corresponding to a low customer risk supplier is matched with a firm-year observation associated to a "similar" high customer risk supplier. Firms are matched without replacement using the same probit regression model than that described above, and I require the propensity scores for each matched pair to be within $\pm 1\%$. Depending on the customer risk measure used, the resulting sample consists of 96 (for the Merton based measure) up to 270 (for the CHS based measure) low customer risk supplier-years matched, respectively, to 96 up to 270 high customer risk supplier-years²⁰. I then run the regression model described in Equation 2.5 on each matched sample and report results in Panel D of Table 2.11. Despite the drastically reduced sample sizes, results globally suggest that supplier facing higher customer risk are only able to obtain lines of credit at a higher cost than supplier firms operating with safer customers. The statistical significance is however weaker, especially for the Merton based customer risk measure.

20. In unreported tests, I find that the matching procedure is successful, regardless of the customer risk proxy relied on.

2.5.2 Major customer reporting

As described in Section 3.3.1, Financial Accounting Standards (SFAS) No. 14 and No. 131 of the Financial Accounting Standards Board (FASB) allow me to identify major customers for a subsample of Compustat - LPC Dealscan supplier firms (i.e. LC sample firms). SFAS No. 14 of the FASB requires that firms report information for segments including principal customers that account for at least 10% of their overall consolidated sales, for fiscal years ending after 1977. In addition, prior to 1997, supplier firms were also required to report all customers they considered important to their overall business operations. In other words, firms were allowed to disclose the identity of customer firms that accounted for less than 10% of their total revenues. In 1997, FASB revised the SFAS No. 14 through the issuance of SFAS No. 131, which rendered optional the disclosure of customers representing less than 10% of consolidated sales.

In order to alleviate potential endogeneity concerns due to strategic disclosure choices for customers that are below the 10% cut-off, and to ensure consistency over time, I exclude from the sample firms which report customers that account for less than 10% of sales. I then run the *LC-to-Cash* and *LC Cost* regression models described respectively in Equations 2.4 and 2.5. Results are report in Table 2.12. Columns (1) to (3) present regression estimates for the LC-to-Cash empirical model. Excluding firms which report customers below the 10% threshold slightly changes the magnitude of the estimated correlation between customer risk and the choice between cash and bank lines of credit, but does not impact its direction or overall significance (regardless of the definition of risk relied on). In addition, Columns (4) to (6) suggest that the positive correlation between customer risk and the cost of bank lines of credit is globally robust to the use of a tighter definition of major customers. In unreported tests, I also test the covenant regression model on the restricted sample and find qualitatively similar results. Altogether, the evidence reported in this section suggest that my initial results were not driven by firms choosing to report customers accounting for less than 10% of their aggregated revenues.

2.5.3 Customer risk and customer concentration

While the previous section alleviates part of the endogeneity concerns that my results might suffer from, it also highlights an important feature of my sample : customer risk is only computed for firms that report the existence (and identity) of major customers.

Winning the business of a major customer is a non-trivial event in the life of firm. Depending on a single large customer for a significant portion of firms allows firm to enter long-lasting trading relationships, which could for example foster innovation at the supplier firm

level and increase product quality. Despite these potential benefits, pieces of evidence in both the economic and the financial literature suggest that high customer concentration also induces costs for the supplier (see Lustgarten, 1975 or Williamson, 1979), which mainly stem from the advantageous bargaining position held by major customers. In this spirit, Klapper, Laeven, and Rajan (2012) find that large, financially stable firms borrow via trade credit from their smaller suppliers, but also obtain their most favorable trade credit terms from those same small suppliers. For example, Walmart's account payables accounted for nearly all its short-term funding and around three-quarters of its total debt at the end of the fiscal year 2009. Overall, the existing literature suggests that customer concentration can either reduce (Lustgarten, 1975) or increase (Patatoukas, 2012) profitability at the supplier level²¹, but also increases risk and is, consequently, associated with higher cost of equity and cost of debt (Dhaliwal *et al.*, 2015).

As such, the effect of customer risk on either the choice between cash and lines of credit, or the cost of bank credit lines, that is exhibited in this study could be artificially caused by (or biased by) the so far unobserved potential underlying effect of customer concentration on liquidity management decisions at the supplier firm level. To alleviate this concern, I extend the regression models defined through Equation 2.4 and Equation 2.5 by explicitly controlling for a supplier firm's customer-base concentration. I measure annual customer concentration following Patatoukas (2012), and define it as the sum of the squared sales shares to each major customer during a given year. Regression estimates are reported in Table 2.13.

Columns (1) to (3) of Table 2.13 present the results for the *LC-to-Cash* regression model. The negative correlation between customer risk and the choice between cash and lines of credit remains significant at the 1% level across all three measures of customer risk. Meanwhile, these results fail to exhibit any statistically significant effect of customer concentration on the reliance on credit lines as a source of liquidity. This suggests that the riskiness of major customers is indeed an important determinant of firms' cash management choices, beyond the sole fact that a supplier firm relies on a limited number of customer for a large portion of sales. In addition, columns (4) to (6) report the regression estimates for the *LC Cost* empirical model. The evidence here suggests that higher customer risk is indeed associated to a higher cost of lines of credit. Meanwhile, my results exhibit a positive but weak correlation between the cost of bank credit lines and customer concentration. Altogether, the evidence reported in this section suggests that the effect of customer risk on cash management decisions cannot be attributed to the sole underlying impact of customer concentration.

21. Irvine, Park and Yildizhan (2016) further investigate this issue, and find that the negative effect of customer concentration on profitability is concentrated in the early years of the business relationship, but becomes positive as the relationship matures.

2.5.4 Other robustness tests

I conduct several other robustness checks regarding firms' relative reliance on lines of credit as a source of liquidity : I include book leverage and capital expenditures in all the *LC-to-Cash* and *LC Cost* OLS regression models, and find similar results. I also explicitly take into account the presence of crisis years (2007-2008) in my data. In particular, my results are robust to the exclusion of these years from the sample, as well as to the inclusion of crisis, post-crisis and pre-crisis dummy variables. I then control for customer customer-base concentration risk, asset volatility and trade credit components (account receivables, doubtful accounts and inventories) in the *LC-to-Cash* IV-2SLS analysis. Overall, my results remain qualitatively unchanged. I re-run the covenant analysis, sorting firms alternatively on size, profitability, net sales, or ordinary income and, in each case, find similar results. I further replace the unlevered beta of asset by the beta of equity in all regression models. This does not affect my results. Finally, I reproduce my analysis using varying monthly probabilities for the CHS-based measure of customer risk. In particular, I rely on the regression estimates reported by CHS for 1-month,6-month and 12-month horizons, respectively. My results are again unchanged.

2.6 Conclusions

Corporate cash management policies have long been focused on by financial practitioners and academics. While the literature on cash holdings can be dated back to the first half of the 20th century, the recent financial crisis lead researchers to shift their attention towards other major sources of liquidity, namely lines of credit. Meanwhile, the role of non-financial stakeholders in corporate decisions has received significant consideration, both theoretically and empirically. This paper aims at reconciling part of these two bodies of the financial literature, and examines the impact of customer risk on cash management decisions at the supplier firm level. I use a matched supplier-major customer sample of US industrial firms to examine whether dealing with potentially distressed customers affects a supplier's choice between cash and lines of credit. I find that firms facing higher customer risk hold on average more cash relative to bank credit lines, even after controlling for previously documented risk factors. My results further suggest that customer risk increases the direct cost of lines of credit, namely the spread paid to access bank-managed liquidity insurance (*i.e.* credit lines), thus highlighting one channel through which supplier-customer relationships can shape corporate decisions. Overall, my results are consistent with the idea that customer risk is an important determinant of firms' financial policies.

While this study is based on a sample of public US firms with major customers, the evi-

dence that is here documented can be extended to a broader set of firms. First, the ongoing decline in the vertical integration of firms (see, for example, Dimitrov and Tice, 2006), and the growing trend in firms focusing on a limited number of key partners, lead to a drastic increase in the prevalence and importance of buyer-supplier relationships for most US firms. Furthermore, the importance of customers in how suppliers set their liquidity management policies, and are able to access credit, has become a major point of focus for SMEs, in the U.S. and all over the world. As SMEs account for a vast majority of firms and a significant fraction of several major countries' gross domestic product (GDP), their impact on the economy is non-trivial and not be underrated. As of March 2015, SMEs directly accounted for roughly 13.2% of the U.S. GDP, 16.5% of the French GDP, 13.7% of the Chinese GDP and 13.7% of the Brazilian GDP²². Understanding their operating environment and financing possibilities thus appears as crucial issues. As such, although it brings new insight on firms' financial decisions, this study leaves the door open to further detailed research on this topic.

22. See «La face méconnue des entreprises de taille moyenne : une contribution vitale à l'économie», carried out by Oxford Economics for HSBC.

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Appendix 2.A Computing the KMV-Merton probability of default

Under the KMV-Model (see Merton, 1974), the total value of a firm is supposed to follow :

$$\frac{dV}{V} = \mu dt + \sigma_V dW \quad (2.6)$$

where V is the total value, μ is the expected continuously compounded return on V , σ_V is the volatility of firm value and W is a standard Wiener process. In addition, assume that the firm issued one discount bond maturing in T periods. Under these assumptions, the equity of the firm is a call option on the underlying value of the firm, with a strike price equal to the face value of the firm's debt and a time-to-maturity T . Following the Black and Scholes (1973) pricing model, the value of the equity is then :

$$E = VN(d_1) - e^{-rT}FN(d_2) \quad (2.7)$$

where E is the market value of a firm's equity, F is the value of a firm's debt, r is the instantaneous risk-free rate, $N(\cdot)$ is the cumulative standard normal distribution function, d_1 and d_2 are given by :

$$d_1 = \frac{\ln(V/F) + (r + \frac{1}{2}\sigma_V^2)T}{\sigma_V\sqrt{T}} \quad (2.8)$$

$$d_2 = d_1 - \sigma_V T \quad (2.9)$$

Given the value of equity, the underlying value of the firm's total assets is given by :

$$V = \frac{E + e^{-rT}FN(d_2)}{N(d_1)} \quad (2.10)$$

Since the market value of equity is a function of the total value of the firm and time, the volatility of the firm's equity can be computed using Ito's Lemma :

$$\sigma_E = \frac{V}{E} \frac{\partial E}{\partial V} \sigma_V = \frac{V}{E} \frac{1}{N(d_1)} \sigma_V \quad (2.11)$$

To implement the model, I need to numerically solve simultaneously equations (2.10) and (2.11). First, following Crosbie and Bohn (2001) and Vassalou and Wing (2004), I assume $T = 1$ and thus consider a 1-year horizon, and use short-term debt plus one half of long-term debt to proxy for the face value of debt F . Such a convention is a known rule of thumb that allows to fit the KMV-Merton model to an annual horizon, and that takes into account the fact that long-term debt may not mature until after the horizon of the default probability computa-

tion. Equity volatility is estimated as the historical yearly volatility of stock returns. I measure the risk-free rate r as the Treasury-Bill rate, which is provided by the U.S. Department of the Treasury.

As starting values for firm value and asset volatility, I respectively use $V = F + E$ and $\sigma_V = \sigma_E(E/(F + E))$. I iterate on V and σ_V until the procedures converges, i.e. until I obtain values of V and σ_V that are consistent with the observed values of E , F and σ_E . I then compute the implied expected return on asset μ . Using these numerical solutions, the firm's distance-to-default is given by :

$$DD = \frac{\ln(V/F) + (\mu - \frac{1}{2}\sigma_V^2)T}{\sigma_V\sqrt{T}} \quad (2.12)$$

Finally, the corresponding probability of default is :

$$\pi_{\text{KMV},T=1} = -N(DD) \quad (2.13)$$

As the KMV-Merton model only yields point estimates, I use the yearly cumulative probability of default to proxy for customer risk during a given year. To do so, I use the estimated μ and σ_V to compute the implied probability of default for a 1-quarter, 2-quarter and 3-quarter horizon. The yearly cumulative probability of default for each client firm is then given by :

$$\pi_{\text{KMV}} = 1 - \prod_{t \in \mathbb{T}} (1 - \pi_{\text{KMV},T=t}) \quad (2.14)$$

where $\mathbb{T} = \{0.25; 0.5; 0.75; 1\}$.

Finally, since firms might report several customers for a given year, I construct a weighted average of the client firms' probability of default as follows :

$$\text{Customer Risk}_{\text{KMV}} = \sum_{j=1}^n \pi_{\text{KMV},j} \cdot \text{KeyCustomerPercentageSold}_j \quad (2.15)$$

where n is the number of client firms reported by a given supplier firm, $\pi_{\text{KMV},j}$ is the probability of default of the j^{th} customer, and $\text{KeyCustomerPercentageSold}_j$ is the percentage of the firm's sales to the j^{th} customer.

Appendix 2.B Computing the CHS probability of default

Campbell, Hilsher and Szilagyi (2008) build a dynamic logit model to estimate the probability of bankruptcy of U.S. firms. More precisely, according to their model, the probability of bankruptcy at a 1-year horizon, using quarterly data, is computed as :

$$\pi_{\text{CHS}, T=1 \text{ year}} = \frac{1}{1 + e^{-\text{CHSScore}}} \quad (2.16)$$

where :

$$\begin{aligned} \text{CHSScore} = & -9.164 - 20.264 \cdot \text{NIMTAAVG} + 1.416 \cdot \text{TLTMTA} \\ & - 7.129 \cdot \text{EXRETA VG} + 1.411 \cdot \text{SIGMA} - 0.045 \cdot \text{RELSIZE} \\ & - 2.132 \cdot \text{CASHMTA} + 0.075 \cdot \text{MB} - 0.058 \cdot \text{PRICE} \end{aligned} \quad (2.17)$$

CHS define NIMTAAVG as the average quarterly net income to market value of total assets ratio in the past twelve months, TLTMTA as total liabilities scaled by the market value of total assets, EXRETA VG the yearly average quarterly excess return on a firm's equity compared to the S&P 500 in the past twelve months, SIGMA as the quarterly volatility of stock returns, RELSIZE as firm size (its market capitalization) relative to the S&P 500 entire market value, CASHMTA as total cash to the market value of total assets, MB as the market-to-book ratio, and PRICE as a firm's stock price.

In order to measure customer risk in a given year, I compute the cumulative probability of default at a 1-year horizon. To do so, I assume that the probability of default for each client firm within each month in a given year does not vary with the horizon.²³ Given the marginal probability of default, the yearly cumulative probability of bankruptcy is given by :

$$\pi_{\text{CHS}} = 1 - (1 - \pi_{\text{CHS}, T=1 \text{ year}})^{12} = 1 - \left(\frac{e^{-\text{CHSScore}}}{1 + e^{-\text{CHSScore}}} \right)^{12} \quad (2.18)$$

Similarly to Section 2.A, yearly customer risk is then defined as follows :

$$\text{Customer Risk}_{\text{CHS}} = \sum_{j=1}^n \pi_{\text{CHS}, j} \cdot \text{Key Customer Percentage Sold}_j \quad (2.19)$$

23. In unreported test, I compute a cumulative probability of default that relies on varying monthly probabilities of default, using the regression estimates reported by CHS for 1-month, 6-month and 12-month horizons, respectively.

Appendix 2.C Variable definitions and data sources

This table presents variable definitions. Variables are computed for each firm and each year. * indicates that the variable is defined using Compustat data items.

Name	Description
Credit Lines Variables (Source(s) : LPC Dealscan)	
- LC-to-Cash	Proportion of yearly available liquidity accounted for by bank lines of credit. Includes all credit lines opened during a given year, as well as existing lines of credit that have not yet matured. For further details, see Acharya, Almedia and Campello (2013)
- LC Cost	Yearly weighted average overall cost of newly opened lines of credit, using individual facility amounts as weights. At the individual facility level, it is defined as the sum of the fixed commitment cost and the spread over LIBOR paid on withdrawn amounts
- LC Maturity	Yearly weighted average maturity of <i>newly opened</i> lines of credit, using individual facility amounts as weights.
- New LC	Yearly total amount of <i>newly opened</i> credit lines scaled by non-cash total assets
- Number of (Fin.) Covenants	Yearly average number of both financial and net worth covenants attached to newly opened lines of credit.
Non Financial Covenants Variables (Source(s) : LPC Dealscan)	
- Borrowing Base	This covenant ensures that the loan is backed by adequate collateral which can either be transferred to the lender in case of default or limit the amount of available funds.
- Dividend Restriction	This covenant limits the magnitude and type of corporate payouts in the form of dividends and repurchases.
- Asset Sweep	This covenant requires that a part of the proceeds from asset sales should first be used to pay down the loan.
- Debt Sweep	This covenant requires that a part of the proceeds from debt offerings should first be used to pay down the loan.
- Equity Sweep	This covenant requires that a part of the proceeds from equity offerings should first be used to pay down the loan.
Customer Risk Variables (Source(s) : COMPUSTAT, CRSP, LPC Dealscan)	

(Continued on next page)

CUSTOMER RISK AND THE CHOICE BETWEEN CASH AND BANK CREDIT LINES

Name	Description
- (Customer) Risk - Merton	Yearly weighted average expected default probability of a supplier firm's major customers, based on the KMV-Merton structural (see Merton, 1974) model, and where the weights are the percentages of the supplier firm's sales to each major customer
- (Customer) Risk - CHS	Yearly weighted average expected default probability of a supplier firm's major customers, based on Campbell, Hilsher and Szilagyi's (2008) hazard model, and where the weights are the percentages of the supplier firm's sales to each major customer.
- (Customer) Risk - PC	First principal component from Altman's (1968) modified weighted average Z-score of a supplier firm's major customers, KMV-Merton's based customer risk measure and CHS-based customer risk measure.
- Customer Idiosyncratic Risk	One year lagged weighted average idiosyncratic volatility of all identifiable major customers, using the contemporaneous percentages of the supplier firm's sales to each main customer as weights. Idiosyncratic volatility is computed, following Ang et al. (2009), as the standard deviation of regression residuals of the daily Fama and French (1992,1993) three-factor model. Also referred to as "Cust. Idio. Vol.".
- Customer LC dummy	One year lagged weighted average of majors customers who have access to a line of credit, using the percentages of the supplier firm's sales to each major customer as weights. Also referred to as "Cust. LC dummy".

Supplier Firm Characteristics (Source(s) : COMPUSTAT, CRSP)

- ROA	$oibdp / (at - che) *$
- Tangibility	$ppent / (at - che) *$
- Size	$\log(at - che) *$
- Leverage	$blev / (at - che) *$
- Net Worth	$(ceq - che) / (at - che)$
- Q	$[(at - che) + prcc_fc sho - ceq] / (at - che) *$
- Receivables	$rect / sale *$
- Doubtful	$recd / sale *$

(Continued on next page)

Name	Description
- Industry Sales Volatility	Three-digit SIC industry median value of the within-year standard deviation of quarterly changes in firm sales scaled by the industry average asset value during the same year. Also referred to as "Ind. Sales Vol."
- CF Variability	Firm-level standard deviation of annual change in the level of EBITDA, calculated over a lagged four-year period and scaled by average assets in the lagged period. See Mackie-Mason (1990) for further details.
- S&P dummy	Dummy variable that is equal to one if a firm is included in one of the main S&P indices, i.e. the S&P 500, the S&P Midcap 400, and the S&P Smallcap 600.
- Firm Age	Difference between the current year and the first year in which a firm appeared in the COMPUSTAT.
- Beta KMV	Exposure to systematic risk, computed as the unlevered beta of assets. Equity betas are unlevered using the KMV-Merton model. See Merton (1974), Acharya et al. (2013) and Appendix A for further details.
- Var KMV	Asset volatility, as induced by the KMV-Merton model when computing the unlevered beta of a firm's assets.

TABLE 2.1 – Distribution of sample firms across industries

The sample consists of up 8,222 unique industrial Compustat firms (utilities, quasi-public and financial firms are excluded) that are included in the LPC-Dealscan database from 1987 to 2013. This table presents various statistics at the industry level. Industry are identified at the 4-digit SIC code level : *Agriculture, minerals and construction* corresponds to SIC codes between 0000 and 1999, *Manufacturing* corresponds to SIC codes between 2000 and 3999, *Transportation and communications* corresponds to SIC codes between 4000 and 4899, *Trade - Wholesale* corresponds to SIC codes between 5000 and 5199, *Trade - retail* corresponds to SIC codes between 2500 and 5999, and *Services* corresponds to SIC codes between 7000 and 8999. Column (1) reports the proportion of the *LC sample* accounted for by each industry. Column (2) reports the industry average proportion of the *LC sample* corresponding to firms with non-zero available line of credit. Column (3) presents the the industry average proportion of the *LC sample* corresponding to firms that reported at least one major client. Column (4) reports the industry average *LC-to-Cash* ratio for firms with non-zero available line of credit. Column (5) reports the industry average proportion of firms that reported at least one major client within the subsample of firms that have a non-zero available line of credit. Column (6) presents the industry average proportion of firms with non-zero available line of credit within the subsample of firms that reported at least one major customer. Column (7) reports the industry average *LC-to-Cash* ratio for firms that reported at least one major customer. Column (8) reports the industry average relative size of disclosed major customers relative to their respective suppliers. Size is here defined as the total book value of assets.

<i>Industry</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Total LC Sample			LC > 0		# major clients > 0		
	% of sample	Has LC	Reports Clients	LC/Cash	Reports Clients	Has LC	LC/Cash	Cust. Rel. Size
Agriculture, Minerals and Construction	8.45%	0.853	0.227	0.782	0.239	0.897	0.730	23.412
Manufacturing	49.35%	0.761	0.264	0.723	0.255	0.735	0.514	60.021
Transportation and Communication	7.27%	0.831	0.117	0.757	0.119	0.844	0.625	28.601
Trade - Wholesale	5.24%	0.790	0.130	0.810	0.132	0.803	0.632	36.256
Trade - Retail	9.83%	0.833	0.018	0.757	0.018	0.828	0.587	38.040
Services	19.86%	0.733	0.139	0.652	0.130	0.687	0.398	78.838

TABLE 2.2 – Summary statistics

This table reports the summary statistics for variables of interest for up to 8,222 Compustat industrial firms (utilities, quasi-public and financial firms are excluded) that are included in the LPC-Dealscan database from 1987 to 2013. *Panel A* presents descriptive statistics for the line of credit variables. *LC-to-Cash* is computed for all sample firms, while the cost (*LC Cost*, expressed in percentage points), maturity (*LC Maturity*) and covenants (*Number of Covenants*) variables are only computed for firms exhibiting a non-zero amount of available line of credit during a given year. *Panel B* reports the summary statistics for the customer risk variables. These variables are computed for a subsample of 3,564 unique firms for which at least one major customer is identifiable during a given year. *Panel C* presents summary statistics for the main control variables, i.e. all other firm characteristics of interest. All variables are winsorized at the 5th and 95th percentiles. Definitions of all line of credit and control variables are reported in Appendix 3.A. Definitions of the customer risk variables are reported in Appendices 2.A and 2.B.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Mean	Std. Dev.	Min	Median	Max	Firm-Years
<i>Panel A : LC Variables</i>						
LC-to-Cash	0.563	0.385	0.000	0.694	1.000	66429
LC Cost (%)	2.127	1.359	-0.888	2.000	12.000	18521
LC Maturity (Quarters)	13.909	7.378	0	12	94	23529
Nb. of Fin. Covenants	2.623	1.145	1	3	8	15045
<i>Panel B : Customer Risk Variables</i>						
Customer Risk - Merton	0.006	0.029	0.000	0.000	0.860	10132
Customer Risk - CHS	0.003	0.021	0.000	0.000	0.691	10730
<i>Panel C : Firm Characteristics</i>						
ROA	0.122	0.268	-1.474	0.147	0.477	63176
Tangibility	0.331	0.242	0.005	0.269	0.877	65381
Size	5.612	2.017	0.528	5.616	9.128	65552
Net Worth	0.297	0.382	-1.290	0.365	0.791	65430
Q	2.151	2.146	0.689	1.460	13.858	59912
Industry Sales Volatility	0.046	0.036	0.000	0.036	0.383	66680
CF Variability	0.084	0.198	0.000	0.043	13.829	60707
S&P dummy	0.293	0.455	0	0	1	66685
log(Firm Age)	2.539	0.901	0.000	2.565	4.143	66631
Beta KMV	0.677	0.485	0.467	0.647	1.457	44917
Var KMV	0.379	0.229	0.025	0.323	1.562	45316
Receivables	0.174	0.288	0.000	0.149	7.762	65648
Doubtful	0.008	0.011	0.000	0.005	0.059	51543

TABLE 2.3 – Univariate tests - Customer risk and lines of credit

This table presents the univariate comparisons of the main line of credit variables (as described in Appendix 3.A) between a sample of low customer risk and a sample of high customer risk Compustat firms. Low customer risk firms are identified as those ranked in the bottom quartile of the relevant customer risk measure, while high customer risk firms are those ranked in the top quartile of the relevant customer risk measure. Customer risk measures are described in Section 2.3.2 and in Appendices 2.A and 2.B. *Panel A* and *Panel B* report the univariate comparisons of the *LC-to-Cash* variable. In *Panel A*, the bottom and top quartiles of each customer risk variable are drawn from the entire *Customer sample*, which is composed of 3,564 unique industrial Compustat firms. The composition of the *Customer sample* is detailed in Section 3.3.1. In *Panel B*, the bottom and top quartiles of each customer risk measure are computed based on a subsample of firms within the *Customer sample* that have a non-zero amount of available line of credit during a given year. *Panel C* reports the univariate comparisons of the *Cost* measure. *Panel D* reports the univariate comparisons of the *Number of Covenants* variable. *Panel E* reports the univariate comparisons of the *LC Maturity* variable. ***,** and * indicate significance of t-statistics (chi-squared) for the test of a difference in means (medians) between two subsamples at the 1%, 5% and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	Bottom Quartile of customer risk measure		Top quartile of customer risk measure		
Customer Risk Measures	Obs.	Mean [Median]	Obs.	Mean [Median]	T-stat [Z-stat]
<i>Panel A : Measured variable = LC-to-Cash (All observations)</i>					
Customer Risk - Merton	2530	0.549 [0.673]	2533	0.486 [0.533]	-5.605*** [-4.427***]
Customer Risk - CHS	2681	0.543 [0.65]	2678	0.488 [0.541]	-5.114*** [-5.055***]
Customer Risk - PC	2301	0.563 [0.65]	2296	0.476 [0.539]	-7.514*** [-5.16***]
<i>Panel B : Measured variable = LC-to-Cash (Firms with LC-to-Cash > 0)</i>					
Customer Risk - Merton	1915	0.725 [0.821]	1824	0.675 [0.769]	-5.21*** [-3.495***]
Customer Risk - CHS	2079	0.700 [0.802]	1913	0.683 [0.785]	-1.827* [-1.772]
Customer Risk - PC	1777	0.730 [0.802]	1627	0.672 [0.782]	-5.799*** [-1.861]

(Table continued on next page)

TABLE 2.3 – Univariate tests - Customer risk and lines of credit (cont'd)

	(1)	(2)	(3)	(4)	(5)
	Bottom Quartile of customer risk measure		Top quartile of customer risk measure		
Customer risk measures	Obs.	Mean [Median]	Obs.	Mean [Median]	T-stat [Z-stat]
<i>Panel C : Measured variable = LC Cost (overall spread)</i>					
Customer Risk - Merton	677	2.033 [1.875]	619	2.513 [2.5]	6.421*** [6.907***]
Customer Risk - CHS	739	2.126 [2]	646	2.464 [2.313]	4.594*** [4.237***]
Customer Risk - PC	587	2.095 [2]	540	2.475 [2.375]	4.73*** [4.983***]
<i>Panel D : Measured variable = Number of financial covenants</i>					
Customer Risk - Merton	481	2.513 [2]	520	2.634 [2]	1.725* [1.064]
Customer Risk - CHS	576	2.649 [2.5]	509	2.628 [3]	-0.31 [0.022]
Customer Risk - PC	503	2.472 [2]	431	2.639 [3]	2.216** [2.109**]
<i>Panel E : Measured variable = LC Maturity (in quarters)</i>					
Customer Risk - Merton	847	14.966 [16]	790	11.493 [12]	-10.501*** [-10.423***]
Customer Risk - CHS	948	13.006 [12]	828	12.443 [12]	-1.695* [-1.605*]
Customer Risk - PC	763	13.884 [14]	694	11.939 [12]	-5.551*** [-6.116***]

TABLE 2.4 – Customer risk and the choice between cash and lines of credit

This table reports pooled OLS regression results relating the choice between cash and bank lines of credit and customer risk using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The dependent variable is the *LC-to-Cash* measure, as defined in Appendix 3.A and Section 2.3.2. Definitions of customer risk variables are reported in Appendices 2.A and 2.B, while definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	Dependent Variable : LC-to-Cash			
	(1)	(2)	(3)	(4)
Customer Risk - Merton		-0.560*** (-3.281)		
Customer Risk - CHS			-0.688*** (-3.296)	
Customer Risk - PC				-0.021*** (-4.009)
ROA	0.021** (2.052)	0.048** (2.499)	0.039** (2.111)	0.048** (2.475)
Tangibility	-0.025 (-1.120)	-0.036 (-0.742)	-0.051 (-1.077)	-0.009 (-0.190)
Size	0.056*** (20.055)	0.066*** (12.402)	0.066*** (12.815)	0.065*** (11.793)
Net Worth	-0.046*** (-4.951)	-0.074*** (-3.931)	-0.071*** (-3.935)	-0.070*** (-3.657)
Q	-0.032*** (-24.137)	-0.034*** (-14.567)	-0.033*** (-14.323)	-0.034*** (-13.985)
Ind. Sales Vol.	0.069 (0.434)	0.694** (1.978)	0.748** (2.121)	0.680* (1.896)
CF Variability	-0.061*** (-2.806)	-0.116*** (-2.605)	-0.128*** (-2.929)	-0.105** (-2.448)
S&P dummy	0.036*** (3.622)	-0.031 (-1.568)	-0.030 (-1.565)	-0.032 (-1.552)
Firm Age	-0.024*** (-4.549)	-0.014 (-1.346)	-0.010 (-0.937)	-0.015 (-1.324)
Constant	0.357*** (8.179)	0.399*** (3.243)	0.400*** (3.502)	0.405*** (3.288)
Observations	57,295	9,008	9,555	8,218
R-squared	0.233	0.306	0.310	0.311
Year dummies	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes

TABLE 2.5 – Customer risk, aggregate risk and the choice between cash and credit lines

This table reports pooled OLS regression results relating the choice between cash and bank lines of credit and customer risk, after controlling for aggregate risk, using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The dependent variable is the *LC-to-Cash* measure, as defined in Appendix 3.A and Section 2.3.2. Aggregate risk is proxied using the *Beta KMV* and *Var KMV* variables. *Beta KMV* is defined as the unlevered asset beta and is computed using the Merton (1974) model. *Var KMV* is the implied asset volatility obtained when computing *Beta KMV*. Detailed definitions of *Beta KMV* and *Var KMV* are reported in Section 2.3.2. Definitions of customer risk variables are reported in Appendices 2.A and 2.B, while definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

(Table continued on next page).

TABLE 2.5 – Customer risk, aggregate risk and the choice between cash and credit lines (cont'd)

Variables	Dependent variable : LC-to-Cash					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Customer Risk Variables</i>						
Risk-Merton	-0.685*** (-3.285)			-0.662*** (-3.182)		
Risk-CHS		-0.707*** (-2.676)			-0.684*** (-2.582)	
Risk-PC			-0.024*** (-3.774)			-0.023*** (-3.675)
<i>Control Variables</i>						
Beta KMV	-0.111*** (-6.100)	-0.114*** (-6.372)	-0.114*** (-5.958)	-0.094*** (-4.946)	-0.096*** (-5.160)	-0.097*** (-4.870)
Var KMV				-0.087** (-2.270)	-0.092** (-2.498)	-0.083** (-2.095)
ROA	0.067*** (3.033)	0.060*** (2.848)	0.071*** (3.129)	0.060*** (2.689)	0.052** (2.472)	0.064*** (2.810)
Tangibility	-0.105** (-2.082)	-0.117** (-2.347)	-0.078 (-1.514)	-0.108** (-2.149)	-0.119** (-2.408)	-0.081 (-1.565)
Size	0.062*** (9.649)	0.061*** (9.849)	0.060*** (8.841)	0.059*** (8.785)	0.058*** (8.919)	0.057*** (8.061)
Net Worth	-0.024 (-1.043)	-0.020 (-0.900)	-0.029 (-1.239)	-0.024 (-1.078)	-0.021 (-0.939)	-0.030 (-1.268)
Q	-0.029*** (-9.267)	-0.028*** (-9.391)	-0.029*** (-9.116)	-0.029*** (-9.371)	-0.028*** (-9.499)	-0.029*** (-9.221)
Ind. Sales Vol.	1.019*** (2.725)	1.073*** (2.836)	0.989*** (2.583)	1.017*** (2.717)	1.073*** (2.834)	0.990** (2.579)
CF Variability	-0.224*** (-2.873)	-0.246*** (-3.270)	-0.207*** (-2.674)	-0.208*** (-2.753)	-0.230*** (-3.150)	-0.193** (-2.569)
S&P dummy	-0.012 (-0.563)	-0.008 (-0.401)	-0.013 (-0.553)	-0.015 (-0.691)	-0.011 (-0.533)	-0.015 (-0.666)
Firm Age	-0.018 (-1.500)	-0.015 (-1.282)	-0.016 (-1.259)	-0.019 (-1.615)	-0.016 (-1.409)	-0.017 (-1.353)
Constant	0.513*** (3.727)	0.513*** (3.912)	0.514*** (3.763)	0.554*** (4.051)	0.560*** (4.283)	0.553*** (4.083)
Observations	6,765	7,158	6,154	6,765	7,158	6,154
R-squared	0.295	0.298	0.302	0.296	0.299	0.303
Ind. dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 2.6 – Customer risk, trade credit and the choice between cash and lines of credit

This table reports pooled OLS regression results relating the choice between cash and bank lines of credit and both customer risk, after controlling for various dimensions of trade credit, using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The dependent variable is the *LC-to-Cash* measure, as defined in Section 2.3.2. Trade credit is proxied using the *Receivables* and *Doubtful* variables. *Receivables* is defined as the ratio of annual total account receivables to aggregated annual sales. *Doubtful* is the annual ratio of estimated doubtful accounts to aggregated sales. Detailed definitions of *Receivables* and *Doubtful* are reported in Section 2.3.2. Definitions of customer risk variables are reported in Appendices 2.A and 2.B, while definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

(Table continued on next page)

TABLE 2.6 – Customer risk, trade credit and the choice between cash and lines of credit (cont'd)

Variables	Dependent variable : LC-to-Cash		
	(1)	(2)	(3)
Customer Risk - Merton	-0.731*** (-3.498)		
Customer Risk - CHS		-0.701*** (-2.585)	
Customer Risk - PC			-0.022*** (-3.541)
Receivables	-0.166** (-1.999)	-0.145* (-1.873)	-0.204** (-2.235)
Doubtful	-0.934 (-0.950)	-0.426 (-0.462)	-0.510 (-0.507)
Beta KMV	-0.112*** (-5.703)	-0.119*** (-6.188)	-0.114*** (-5.582)
ROA	0.064** (2.442)	0.065*** (2.675)	0.069** (2.578)
Tangibility	-0.118** (-2.032)	-0.128** (-2.287)	-0.102* (-1.730)
Size	0.067*** (9.744)	0.066*** (9.938)	0.065*** (8.969)
Net Worth	-0.035 (-1.363)	-0.033 (-1.347)	-0.040 (-1.527)
Q	-0.032*** (-9.493)	-0.031*** (-9.684)	-0.032*** (-9.423)
Ind. Sales Vol.	1.258*** (3.141)	1.341*** (3.388)	1.242*** (3.024)
CF Variability	-0.183** (-2.310)	-0.217*** (-2.780)	-0.171** (-2.153)
S&P dummy	-0.028 (-1.192)	-0.025 (-1.106)	-0.026 (-1.033)
Firm Age	-0.014 (-1.052)	-0.012 (-0.946)	-0.013 (-0.922)
Constant	0.429*** (2.706)	0.400** (2.457)	0.435*** (2.709)
Observations	5,472	5,783	4,979
R-squared	0.298	0.304	0.303
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes

TABLE 2.7 – Instrumental variable regressions

This table reports the results from 2-Stage Least Square regressions relating the choice between cash and lines of credit to customer risk measures and a set of control variables using instrumental variables. The sample consists of Compustat industrial firms, that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. I use the predicted values from the first-stage in the second-stage regressions. Columns (1), (3) and (5) present first-stage results, while columns (2), (4) and (6) present second-stage results. In columns (1) and (2), customer risk is measured using the Merton (1974) structural model. In columns(3) and (4), customer risk is measured using Campbell, Hilsher and Szilagyi's (2008) - hereafter CHS - hazard model. In columns (5) and (6), customer risk is measured as the first principal component resulting from a principal component (PC) analysis between Altman's (1968) modified weighted average Z-score of a supplier firm's major customers, Merton's based customer risk measure and CHS-based customer risk measure. The dependent variable in columns (1), (3) and (5) is the relevant customer risk measure. In columns (2), (4) and (6), the dependent variable is the *LC-to-Cash* measure, as defined in Appendix 3.A and Section 2.3.2. Control variables are included following Equation 2.4, as defined in Section 2.4.1. Definitions of all control variables are reported in Appendix 3.A. Definitions of the customer risk variables are reported in Appendices 2.A and 2.B. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1%level, respectively.

(Table continued on next page)

TABLE 2.7 – Instrumental variable regressions (Cont'd)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Merton Model		CHS Model		PC Analysis	
	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage
<i>Instrumental Variables</i>						
Cust. Idio. Vol.	0.216** (2.105)		0.115* (1.714)		7.467** (2.402)	
Cust. LC Dummy	-0.014** (-2.126)		-0.014* (-1.680)		-0.820*** (-2.592)	
<i>Customer Risk Variables</i>						
Risk - Merton		-0.997* (-1.895)				
Risk - CHS				-2.426* (-1.900)		
Risk - First PC						-0.030* (-1.890)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	784	784	808	808	751	751
Log Likelihood	.	60.42	.	39.88	.	49.95
1 st -stage F-stat	4.441	.	1.412	.	4.180	.
Weak IV robust test ⁽¹⁾	.	0.489	.	0.264	.	0.347
Underid. stat. ⁽²⁾	.	10.67	.	3.397	.	10.05
Overid. test ⁽³⁾	.	0.723	.	0.339	.	0.403
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

⁽¹⁾Anderson-Rubin weak IV robust test; ⁽²⁾Kleibergen-Paap rank LM statistic;

⁽³⁾P-value of the Hansen J-statistic

TABLE 2.8 – Customer risk and the cost of lines of credit

This table reports pooled OLS regression results relating the cost of lines of credit and customer risk, using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The dependent variable is the natural logarithm of *LC Cost*, measured as the overall spread paid on newly opened lines of credit. Appendix 3.A and Section 2.3.2 present a detailed definition of LC Cost. Definitions of customer risk variables are reported in Appendices 2.A and 2.B, while definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

(Table continued on next page)

TABLE 2.8 – Customer risk and the cost of lines of credit (cont'd)

Variables	Dependent Var. = Log(LC Cost)			Dependent var. = LC Cost		
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Customer Risk Variables</i>						
Risk - Merton	0.704 (1.361)			1.877 (1.643)		
Risk - CHS		0.932** (2.144)			2.183** (2.298)	
Risk - PC			0.028** (2.370)			0.073*** (2.730)
<i>Control Variables</i>						
Beta KMV	0.039 (0.870)	0.063 (1.411)	0.074 (1.594)	-0.062 (-0.815)	-0.059 (-0.780)	-0.024 (-0.307)
Leverage	0.677*** (5.265)	0.694*** (5.573)	0.768*** (6.101)	0.823*** (3.749)	0.899*** (4.094)	0.952*** (4.516)
LIBOR	-0.020 (-0.680)	-0.014 (-0.489)	-0.013 (-0.420)	-0.045 (-0.797)	-0.030 (-0.526)	-0.042 (-0.701)
New LC	-0.407*** (-8.896)	-0.389*** (-8.423)	-0.437*** (-9.512)	-0.652*** (-6.375)	-0.625*** (-6.282)	-0.702*** (-6.386)
ROA	-0.356*** (-4.070)	-0.333*** (-3.903)	-0.371*** (-3.893)	-0.862*** (-4.564)	-0.814*** (-4.262)	-0.889*** (-4.317)
Tangibility	-0.149 (-1.285)	-0.168 (-1.544)	-0.204* (-1.803)	0.005 (0.036)	-0.034 (-0.277)	-0.046 (-0.350)
Size	-0.319*** (-22.559)	-0.315*** (-23.049)	-0.322*** (-21.745)	-0.437*** (-22.313)	-0.436*** (-23.320)	-0.439*** (-21.522)
Net Worth	-0.241*** (-2.716)	-0.240*** (-2.810)	-0.140 (-1.640)	-0.658*** (-4.120)	-0.623*** (-3.918)	-0.489*** (-3.245)
Q	-0.100*** (-8.014)	-0.100*** (-8.224)	-0.104*** (-8.417)	-0.139*** (-7.010)	-0.137*** (-7.143)	-0.143*** (-7.558)
Ind. Sales Vol.	-0.003 (-0.004)	-0.160 (-0.207)	0.169 (0.213)	-1.459 (-1.518)	-1.677* (-1.773)	-1.533 (-1.544)
CF Variability	1.119*** (4.684)	1.156*** (5.064)	1.150*** (4.874)	2.504*** (4.817)	2.544*** (5.256)	2.613*** (4.903)
Constant	2.689*** (8.304)	2.516*** (7.664)	2.618*** (7.585)	4.823*** (8.259)	4.649*** (7.945)	4.709*** (7.590)
Observations	1,802	1,901	1,619	1,802	1,901	1,619
R-squared	0.633	0.629	0.650	0.535	0.533	0.547
Ind. dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 2.9 – Customer risk and credit lines covenants

This table reports pooled OLS regression results relating customer risk and the number of covenants attached to lines of credit agreements, using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The dependent variable is the natural logarithm of the number of financial and net worth covenants attached to credit lines contracts reported in the LPC-Dealscan database. Panel A presents regressions estimates computed for the entire sample. In Panel B, firms are sorted depending on whether their EBITDA is above or below the median of the overall yearly EBITDA distribution. Definitions of customer risk variables are reported in Appendices 2.A and 2.B. *New LC* is the total amount of lines of credit raised during a given year scaled total non-cash assets, *LIBOR* is the annualized weighted average level of the LIBOR in the quarter during which a line of credit was raised and *Leverage* is past book leverage. Definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

(Table continued on next page)

TABLE 2.9 – Customer risk and credit lines covenants (cont'd)

Panel A : Baseline regression specification

Variables	Dependent variable = Log(1+ Nb of covenants)		
	(1)	(2)	(3)
Customer Risk - Merton	-0.300 (-1.106)		
Customer Risk - CHS		-0.840*** (-2.673)	
Customer Risk - First PC			-0.014 (-1.508)
Beta KMV	0.018 (0.667)	0.032 (1.196)	0.021 (0.753)
Leverage	0.117 (1.353)	0.145* (1.751)	0.144 (1.595)
LIBOR	-0.032 (-1.517)	-0.033 (-1.634)	-0.031 (-1.435)
New LC	-0.044 (-1.284)	-0.035 (-1.081)	-0.041 (-1.103)
ROA	0.181*** (3.276)	0.163*** (3.326)	0.171*** (2.984)
Tangibility	-0.012 (-0.163)	-0.032 (-0.430)	-0.021 (-0.260)
Size	-0.067*** (-7.806)	-0.063*** (-7.569)	-0.066*** (-7.318)
Net Worth	0.047 (0.816)	0.067 (1.226)	0.062 (1.006)
Q	-0.023*** (-3.857)	-0.023*** (-4.169)	-0.024*** (-3.913)
Industry Sales Volatility	-0.167 (-0.381)	-0.100 (-0.231)	-0.187 (-0.408)
CF Variability	-0.210* (-1.694)	-0.117 (-0.959)	-0.178 (-1.459)
Constant	1.669*** (4.968)	1.491*** (4.308)	1.639*** (4.916)
Observations	1,413	1,499	1,298
R-squared	0.264	0.252	0.271
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes

(Table continued on next page)

TABLE 2.9 – Customer risk and credit lines covenants (cont'd)

Panel B : Customer risk, financial covenants and operating cash-flows

Variables	Dependent Variable = Log(1+Nb of Covenants)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Low EBITDA	High EBITDA	Low EBITDA	High EBITDA	Low EBITDA	High EBITDA
<i>Customer risk variables</i>						
Risk - Merton	-0.348 (-1.240)	-0.380 (-0.326)				
Risk - CHS			-0.994*** (-4.018)	1.093 (0.930)		
Risk - PC					-0.021** (-2.462)	0.016 (0.500)
<i>Control Variable(s)</i>						
ROA	0.154** (2.551)	-0.126 (-0.969)	0.139** (2.547)	-0.096 (-0.784)	0.154** (2.517)	-0.117 (-0.859)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	539	874	582	917	501	797
R-squared	0.263	0.400	0.247	0.390	0.293	0.392
Ind. dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 2.10 – Customer risk and non-financial covenants

Panel A : Univariate statistics

This table presents the univariate comparisons of the mean yearly number of various non financial covenants attached to credit line contracts between a sample of low customer risk and a sample of high customer risk Compustat firms. All covenants are defined in Appendix 3.A. Low customer risk firms are identified as those ranked in the bottom quartile of the relevant customer risk measure, while high customer risk firms are those ranked in the top quartile of the relevant customer risk measure. Customer risk measures are described in Section 3.2.2 and in Appendices A and B. ***, ** and * indicate significance of t-statistics for the test of a difference in means between two subsamples at the 1%, 5% and 10% levels, respectively.

Variables	(1) Low customer risk		(3) High customer risk		(5) T-stat
	Obs	Mean	Obs	Mean	
<i>Merton-based Customer Risk Measure</i>					
Borrowing Base	847	0.165	790	0.295	6.333***
Dividend Restrictions	490	0.811	505	0.850	1.664*
Asset Sales Sweep	237	0.711	185	0.892	4.868***
Equity Issuance Sweep	184	0.514	144	0.729	4.131***
Debt Issuance Sweep	203	0.574	152	0.789	4.502***
<i>CHS-based Customer Risk Measure</i>					
Borrowing Base	948	0.220	828	0.270	2.444**
Dividend Restrictions	571	0.806	515	0.852	2.025**
Asset Sales Sweep	254	0.752	210	0.760	0.189
Equity Issuance Sweep	220	0.561	171	0.599	0.761
Debt Issuance Sweep	219	0.594	184	0.658	1.334
<i>PCA-based Customer Risk Measure</i>					
Borrowing Base	763	0.256	694	0.276	0.871
Dividend Restrictions	504	0.791	422	0.840	1.949*
Asset Sales Sweep	185	0.816	158	0.924	2.969***
Equity Issuance Sweep	135	0.673	130	0.837	3.15***
Debt Issuance Sweep	159	0.715	135	0.874	3.396***

(Table continued on next page)

TABLE 2.10 – Customer risk and non-financial covenants (cont'd)

Panel B : Non-financial covenants, customer risk and operating cash-flows

This table reports pooled OLS regression results relating customer risk and the number of non financial covenants attached to lines of credit agreements, using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The dependent variable is the natural logarithm of the number of non financial covenants attached to credit lines contracts reported in the LPC-Dealscan database. Firms are sorted depending on whether their EBITDA is above or below the median of the overall yearly EBITDA distribution. Definitions of customer risk variables are reported in Appendices 2.A and 2.B. *New LC* is the total amount of lines of credit raised during a given year scaled total non-cash assets, *LIBOR* is the annualized weighted average level of the LIBOR in the quarter during which a line of credit was raised and *Leverage* is past book leverage. Definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable : Log(1 + Nb non-financial covenants)					
	Low EBITDA	High EBITDA	Low EBITDA	High EBITDA	Low EBITDA	High EBITDA
<i>Customer Risk Variables</i>						
Risk - Merton	1.727* (1.698)	-5.181 (-0.841)				
Risk - CHS			1.173* (1.920)	-5.701 (-1.089)		
Risk - First PC					0.012 (0.949)	-0.178 (-1.380)
<i>Control Variable(s)</i>						
ROA	-0.281*** (-2.822)	-0.117 (-0.345)	-0.150* (-1.842)	-0.059 (-0.174)	-0.415** (-2.193)	-0.202 (-0.571)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	159	247	171	257	144	208
R-squared	0.728	0.675	0.710	0.650	0.703	0.699
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 2.11 – Propensity score matched sample analysis

This table reports results relating the choice between cash and lines of credit to customer risk measures and a set of control variables for a propensity score matched sample using Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. The matching procedure is described in Section 2.5.1. Panel A presents pre- and post-matching regression results of customer risk dummy variables on various control variables. In each regression specification, the dependent variable is a dummy variable that is equal to one if a supplier firm faces low customer risk, and zero if it faces high customer risk. Low customer risk firms are identified as those ranked in the bottom quartile of the relevant customer risk measure, while high customer risk firms are those ranked in the top quartile of the relevant customer risk measure. In columns (1) and (2), customer risk is measured using the Merton (1974) structural model (Merton Sample). In columns (3) and (4), customer risk is measured using Campbell, Hilsher and Szilagyi's (2008) - hereafter CHS - hazard model (CHS Sample). In columns (5) and (6), customer risk is measured as the first principal component resulting from a principal component (PC) analysis between Altman's (1968) modified weighted average Z-score of a supplier firm's major customers, Merton's based customer risk measure and CHS-based customer risk measure (PCA Sample). Columns (1), (3) and (5) of Panel A show the first-stage marginal effects from a probit regression used to compute the propensity scores for the matching procedure. Columns (2), (4) and (6) of Panel A show the marginal effects from the probit regressions in columns (1), (3) and (5), respectively, using the appropriate subsample of matched suppliers. Panel B reports the univariate statistics comparing the mean propensity scores and characteristics of supplier for each appropriate matched subsamples. Panel C reports multivariate results relating the choice between cash and lines of credit to customer risk for each matched sample. The dependent variable is *LC-to-Cash*, as defined in Appendix 3.A and Section 2.3.2. Panel D reports multivariate results relating the cost of bank lines of credit to customer risk for each matched sample. The dependent variable is the natural logarithm of *LC Cost*, as defined in Appendix 3.A and Section 2.3.2.

Definitions of customer risk variables are reported in Appendices 2.A and 2.B. Definitions of all other control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

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TABLE 2.11 – Propensity score matched sample analysis (cont'd)

Panel A : Pre-matching propensity score regression and post-matching diagnosis regression

	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent variable : $\mathbb{1}_{Low\ Customer\ Risk}$					
	Merton Model		CHS Model		PC Analysis	
Variables	Pre-Matching	Post-Matching	Pre-Matching	Post-Matching	Pre-Matching	Post-Matching
Leverage	-0.929** (-2.095)	0.030 (0.066)	-0.032 (-0.089)	-0.093 (-0.248)	0.128 (0.247)	0.277 (0.504)
Cash	-1.380*** (-3.104)	-0.090 (-0.175)	-1.295*** (-3.475)	-0.145 (-0.352)	-0.901* (-1.691)	-0.129 (-0.226)
Beta KMV	0.215 (1.595)	0.080 (0.553)	0.227* (1.889)	0.059 (0.435)	-0.160 (-1.074)	0.042 (0.259)
Var KMV	-3.503*** (-12.527)	-0.254 (-0.822)	-0.450** (-2.002)	-0.013 (-0.049)	-1.575*** (-5.535)	0.036 (0.108)
ROA	-0.053 (-0.249)	-0.018 (-0.073)	0.360** (2.020)	0.159 (0.840)	-0.592** (-2.282)	0.012 (0.046)
Tangibility	-0.354 (-1.379)	-0.054 (-0.198)	0.108 (0.501)	-0.191 (-0.816)	-1.182*** (-3.650)	0.043 (0.123)
Size	-0.140*** (-3.072)	-0.007 (-0.135)	0.048 (1.200)	-0.013 (-0.313)	0.068 (1.259)	0.008 (0.136)
Net Worth	-0.207 (-0.830)	0.092 (0.337)	0.352* (1.805)	-0.006 (-0.030)	0.368 (1.226)	0.205 (0.681)
Ind. Sales Vol.	-7.712*** (-3.581)	-0.140 (-0.071)	-3.406* (-1.951)	-1.732 (-0.922)	-5.784** (-2.271)	-0.342 (-0.128)
CF Variability	-0.680 (-1.232)	-0.073 (-0.135)	0.012 (0.026)	-0.243 (-0.470)	-0.094 (-0.179)	0.255 (0.501)
S&P dummy	0.217 (1.481)	-0.007 (-0.040)	0.012 (0.098)	-0.031 (-0.232)	0.185 (1.006)	0.011 (0.052)
Firm Age	0.287*** (3.463)	-0.003 (-0.032)	0.041 (0.609)	0.053 (0.730)	0.304*** (2.947)	-0.018 (-0.162)
Constant	2.085*** (4.610)	0.006 (0.012)	-0.352 (-0.906)	0.079 (0.187)	0.074 (0.135)	-0.219 (-0.367)
Observations	3,424	2,034	3,511	2,802	3,121	1,916
Observations	3,422	2,340	3,505	2,506	3,117	1,894
Pseudo R-squared	0.096	0.001	0.023	0.001	0.067	0.001
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

TABLE 2.11 – Propensity score matched sample analysis (cont'd)

Panel B : Differences in propensity scores and observed variables

Variables	(1)	(2)	(3)	(4)	(5)
	Low Customer Risk		High Customer Risk		T-stat
	Obs	Mean	Obs	Mean	
<i>Merton-based Customer Risk Measure</i>					
Propensity score	1170	0.522	1170	0.527	-0.643
Leverage	1170	0.261	1170	0.258	0.376
Cash	1170	0.127	1170	0.13	-0.558
Beta KMV	1170	0.723	1170	0.738	-0.82
Var KMV	1170	0.386	1170	0.383	0.446
ROA	1170	0.133	1170	0.133	-0.013
Tangibility	1170	0.323	1170	0.322	0.168
Size	1170	5.784	1170	5.796	-0.156
Net worth	1170	0.361	1170	0.364	-0.213
Q	1170	1.987	1170	2.117	-1.583
Industry Sales Volatility	1170	0.042	1170	0.041	0.222
CF Variability	1170	0.08	1170	0.08	-0.028
S&P dummy	1170	0.374	1170	0.38	-0.298
Firm Age	1170	2.71	1170	2.71	0.001
<i>CHS-based Customer Risk Measure</i>					
Propensity score	1253	0.507	1253	0.513	-0.906
Leverage	1253	0.249	1253	0.244	0.655
Cash	1253	0.141	1253	0.139	0.245
Beta KMV	1253	0.734	1253	0.743	-0.544
Var KMV	1253	0.423	1253	0.422	0.122
ROA	1253	0.114	1253	0.125	-1.024
Tangibility	1253	0.321	1253	0.314	0.788
Size	1253	5.645	1253	5.659	-0.183
Net worth	1253	0.363	1253	0.372	-0.707
Q	1253	2.147	1253	2.138	0.109
Industry Sales Volatility	1253	0.042	1253	0.041	0.864
CF Variability	1253	0.089	1253	0.086	0.678
S&P dummy	1253	0.346	1253	0.35	-0.21
Firm Age	1253	2.643	1253	2.677	-1.078

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TABLE 2.11 – Propensity score matched sample analysis (cont'd)

Panel B : Differences in propensity scores and observed variables (cont'd)

Variables	(1)	(2)	(3)	(4)	(5)
	Low Customer Risk		High Customer Risk		T-stat
	Obs	Mean	Obs	Mean	
<i>PCA-based Customer Risk Measure</i>					
Propensity score	947	0.492	947	0.498	-0.825
Leverage	947	0.246	947	0.25	-0.409
Cash	947	0.153	947	0.147	0.707
Beta KMV	947	0.751	947	0.758	-0.326
Var KMV	947	0.427	947	0.426	0.099
ROA	947	0.104	947	0.11	-0.514
Tangibility	947	0.317	947	0.324	-0.672
Size	947	5.574	947	5.611	-0.425
Net worth	947	0.361	947	0.372	-0.703
Q	947	2.105	947	2.107	-0.018
Industry Sales Volatility	947	0.044	947	0.043	0.376
CF Variability	947	0.093	947	0.094	-0.231
S&P dummy	947	0.338	947	0.34	-0.097
Firm Age	947	2.624	947	2.61	0.412

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TABLE 2.11 – Propensity score matched sample analysis (cont'd)

Panel C : LC-to-Cash regressions - Matched sample

Variables	(1)	(2)	(3)
	Dependent Variable : LC-to-Cash		
	Merton Sample	CHS Sample	PCA Sample
Customer Risk - Merton	-0.513* (-1.843)		
Customer Risk - CHS		-0.747*** (-3.817)	
Customer Risk - First PC			-0.019** (-2.196)
Beta KMV	-0.075*** (-3.005)	-0.120*** (-5.238)	-0.172*** (-6.255)
ROA	0.071** (2.045)	0.007 (0.226)	0.083** (2.309)
Tangibility	-0.078 (-1.196)	-0.171*** (-2.897)	-0.049 (-0.621)
Size	0.066*** (7.798)	0.058*** (8.177)	0.070*** (7.576)
Net Worth	-0.030 (-0.958)	-0.039 (-1.444)	-0.039 (-1.133)
Q	-0.031*** (-6.447)	-0.028*** (-7.351)	-0.021*** (-4.723)
Industry Sales Volatility	1.375*** (2.791)	0.503 (1.150)	0.910* (1.818)
MMCF	-0.112 (-1.079)	-0.320*** (-3.323)	-0.219** (-2.208)
S&P dummy	-0.013 (-0.452)	0.024 (0.994)	-0.058* (-1.775)
Firm Age	-0.015 (-1.022)	-0.027** (-2.020)	-0.030 (-1.629)
Constant	0.286* (1.802)	0.425*** (2.775)	0.481** (1.979)
Observations	2,340	2,506	1,894
R-squared	0.310	0.311	0.332
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes

TABLE 2.11 – Propensity score matched sample analysis (cont'd)

Panel D : LC Cost regressions - Matched sample

Variables	(1)	(2)	(3)
	Dependent variable : Log(LC Cost)		
	Merton Sample	CHS Sample	PCA Sample
Customer Risk - Merton	1.511 (1.159)		
Customer Risk - CHS		0.999** (2.146)	
Customer Risk - First PC			0.032** (2.428)
Beta KMV	0.028 (0.250)	0.094 (1.089)	0.189** (1.991)
Leverage	0.709* (1.927)	0.892*** (4.308)	1.030*** (4.436)
LIBOR	-0.141 (-0.814)	0.003 (0.042)	-0.036 (-0.488)
New LC	-0.426*** (-4.640)	-0.464*** (-7.697)	-0.389*** (-3.927)
ROA	-0.817** (-2.038)	-0.413** (-2.515)	-0.457*** (-2.886)
Tangibility	-0.243 (-0.949)	-0.157 (-0.881)	-0.389* (-1.893)
Size	-0.305*** (-8.320)	-0.294*** (-13.014)	-0.300*** (-10.178)
Net Worth	-0.090 (-0.373)	-0.164 (-1.272)	-0.062 (-0.410)
Q	-0.064* (-1.735)	-0.080*** (-4.617)	-0.121*** (-4.656)
Industry Sales Volatility	0.301 (0.120)	0.691 (0.414)	0.260 (0.183)
MMCF	1.054 (1.483)	1.056*** (2.841)	0.855* (1.812)
Constant	3.281** (2.271)	1.755*** (3.009)	2.644*** (3.944)
Observations	192	540	342
R-squared	0.731	0.592	0.665
Industry dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes

TABLE 2.12 – Major customers and the choice between cash and lines of credit

This table reports pooled OLS regression results relating customer risk and both the choice between cash and lines of credit, and the cost of bank credit lines, using a sample of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. The initial major customer identification procedure is described in Section 3.3.1. The sample is further restricted to supplier firms reporting only customers that account for 10% or more of their annual aggregate sales (i.e. that are subject to mandatory disclosure, as defined by SFAS No. 14 and No.131). In columns (1) to (3), the dependent variable is the *LC-to-Cash* measure, as defined in Appendix 3.A and Section 2.3.2. Control variables are included following Equation 2.4, as defined in Section 2.4.1. In columns (4) to (6), the dependent variable is the natural logarithm of *LC Cost*, measured as the overall spread paid on newly opened lines of credit. Appendix 3.A and Section 2.3.2 present a detailed definition of LC Cost. Control variables are included following Equation 2.5, as defined in Section 2.4.2. Definitions of customer risk variables are reported in Appendices 2.A and 2.B. Definitions of all control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	Dependent variable = LC-to-Cash			Dependent variable = Ln(LC Cost)		
	(1)	(2)	(3)	(4)	(5)	(6)
Customer Risk - Merton	-0.705*** (-3.254)			0.948 (1.532)		
Customer Risk - CHS		-0.644** (-2.285)			1.058** (2.270)	
Customer Risk - First PC			-0.021*** (-3.488)			0.034*** (2.614)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,047	5,260	4,424	1,325	1,378	1,147
R-squared	0.320	0.324	0.330	0.622	0.618	0.651
Ind. dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 2.13 – Customer risk, customer concentration and the choice between cash and lines of credit

This table reports pooled OLS regression results relating customer risk and both the choice between cash and lines of credit, and the cost of bank credit lines, after controlling for customer-base concentration. The sample is composed of Compustat industrial firms that are included in the LPC-Dealscan database and that reported the existence and identity of at least one major customer, from 1987 to 2013. Major customer identification is described in Section 3.3.1. In columns (1) to (3), the dependent variable is the *LC-to-Cash* measure, as defined in Appendix 3.A and Section 2.3.2. Control variables are included following Equation 2.4, as defined in Section 2.4.1. In columns (4) to (6), the dependent variable is the natural logarithm of *LC Cost*, measured as the overall spread paid on newly opened lines of credit. Section 2.3.2 presents a detailed definition of LC Cost. Control variables are included following Equation 2.5, as defined in Section 2.4.2. Customer-base concentration is defined following Patatoukas (2012). Definitions of customer risk variables are reported in Appendices 2.A and 2.B. Definitions of all control variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Variables	Dependent variable = LC-to-Cash			Dependent variable = Ln(LC Cost)		
	(1)	(2)	(3)	(4)	(5)	(6)
Customer Risk - Merton	-0.672*** (-3.188)			0.510 (0.902)		
Customer Risk - CHS		-0.688*** (-2.597)			0.826* (1.883)	
Customer Risk - First PC			-0.024*** (-3.761)			0.028** (2.227)
Customer Conc.	-0.050 (-0.792)	-0.065 (-1.095)	-0.023 (-0.359)	0.317* (1.829)	0.303* (1.822)	0.101 (0.697)
Control Variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,756	7,149	6,150	1,801	1,900	1,618
R-squared	0.295	0.299	0.302	0.634	0.630	0.650
Ind. dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes

Chapter 3

Is marriage the key to happiness ? The effect of long-term customer-supplier relationships on supplier firms ^{*}

Abstract

We use a matched buyer-supplier sample of U.S. industrial firms to investigate the impact of long-term relationships on supplier firms. We find that, in the cross-section of suppliers, firms engaging in long-term business relationships invest more heavily in relationship specific investments, especially during early-stage relationships, and simultaneously pass on other investment opportunities. This commitment in the early stages of buyer-supplier relationships allows firms to enjoy higher profitability and higher efficiency once relationships mature. Overall, our results suggest that maintaining an enduring relationship with a limited number of major customers is beneficial to supplier firms in several ways, both in the short and the long run.

*. This paper is now a joint project with Pr. Jayant Kale.

3.1 Introduction

In this paper, we examine the effect of engaging on long-term business relationships with customers on organizational choices and performance at the supplier. We find that such long-term suppliers invest more heavily in relationship-specific investments, especially during early-stage relationships, and simultaneously pass on other investment opportunities. This commitment in the early stages of the buyer-supplier relationships allows firms to enjoy higher profitability and higher efficiency once relationships mature. Overall, these cross-sectional results suggest that maintaining an enduring relationship with a limited number of major customers is beneficial to supplier firms in several ways, both in the short and the long run.

The nature of inter-organizational relationships is of large interest to researchers in economics, finance, accounting and management. Starting with Coase (1937), a wide stream of the literature in economics tries to identify the determinants of the boundaries of the firm, including the decision to internalize the production process, or to engage in transaction with outside business partners (see Lustgarten, 1975, Klein *et al.*, 1978, or Williamson, 1979). Prior studies cite the benefits (see Alchian and Demsetz, 1972, or Bettis *et al.*, 1992) of using external suppliers, while others point out that such interactions might result in inefficient behavior (e.g. Klein *et al.*, 1978 and Williamson, 1979) and thus be detrimental to both parties¹. However, these studies do not fully investigate if engaging in long-term relationships² can mitigate these costs and thus be beneficial for both sides of the agreement, as suggested in Coase (1937)³.

Prior accounting and finance literature further investigate how customer-base concentration affects supplier firms (see Fee and Thomas, 2004, Patatoukas, 2012, Itzkowitz, 2013 or Irvine *et al.* 2016). Yet, Almost all these studies are silent on how the life cycle of buyer-supplier relationships can either mitigate or increase the costs and benefits of selling production to a major outside partner. The marketing and management literature do provide several theoretical frameworks for inter-firm relationships (Dwyer *et al.*, 1987, or Ring and Van de Ven, 1994). Empirical validation of these models, however, remains scarce and mostly relies on survey data (Eggert *et al.*, 2006, Jap and Andersen, 2007, Kalwani and Narayandas, 1995, being the exception). Understanding the cross-sectional implications of long-term business partnership on supplier firms is particularly crucial as supply relationships have long been proven to be economically significant (see Rajan and Zingales, 1995, for instance), par-

1. In particular, major customer are likely to recognize their preferential bargaining power to engage in ex-post renegotiation of contract terms.

2. hereafter, long-term suppliers, as opposed to short-term suppliers who still rely on more or less discrete transactions.

3. Although his argument mainly focuses on cost reduction at the customer level.

ticularly in light of the recent decrease in vertical integration (see Denis *et al.*, 2002, and Dimitrov and Tice, 2006). Furthermore, the U.S. regulatory environment provide a rather unique opportunity to track customer-supplier relationships over time, and thus to identify their nature and assess their impact on supplier firms.

In this study, we rely on the Compustat Segment File to build a matched sample of supplier firms to their major customers. This data allows me to distinguish long-term relationships from partnerships based on more discrete exchanges. To alleviate identification issues, long-term suppliers are defined as firms only reporting one or several customers persistently during at least a ten-year period. Following a similar rationale, the population of short-term suppliers is restricted to firms who never report any customer for more that five consecutive years. We further match supplier-year observations between these groups on observable supplier and customer characteristics, in order to assess the effect of long-term business relationships on supplier firms.

Our results exhibit a mixed effect of long-term business partnerships on suppliers. The average long-term supplier firms indeed appear to invest less in fixed assets than its short-term counterpart, regardless of the measure considered. Yet, results also show that long-term suppliers invest more as the buyer-supplier relationships mature and as customers account for higher share of their total revenues. In addition, these effects are stronger in early-stage long-term relationships and are overall economically significant. We interpret these results as a sign of long-term suppliers committing to investing in relationship fixed assets during the early stages of the customer-supplier relationship in order to ensure its success, whilst facing restriction on other outside opportunities. In the later stages, i.e. once relationships reach maturity, we interpret these results as evidence of long-term supplier firms investing to simply maintain a successful relationship, whilst avoiding the cost of exploring other outside investment opportunities.

Next, we investigate whether these are translated in term of operating performance, margins and efficiency. We find that long-term suppliers are able to reach higher levels of profitability and revenues, especially in the early stages of buyer-supplier relationships. Our results further show that long-term suppliers are able to generate higher gross, EBITDA and profit margins. These gains appear to be higher in the later stage of customer-supplier relationships. Overall, these results shed light on supplier firms putting high effort into long-term relationships during the early stages, resulting in higher performance, in order to obtain higher margins once partnership become stable and durable. We also find evidence suggesting that long-term customers offer slightly more favorable trade credit terms to their suppliers, through short receivables conversion periods, but do not exhibit any trend over the customer-supplier relationship life cycle. Similarly, we do not find any effect of long-

term partnerships on inventories conversion periods at the supplier level. However, focusing on the extreme of Just-In-Time (JIT) manufacturing, allows me to shed some light of potential heterogeneous behavior of long-term suppliers throughout the life cycle of their buyer-supplier relationships. In the early stages, suppliers commit to long-term relationships through flexible higher inventories holdings⁴. In the later stages, suppliers are able to engage into more efficient inventories management, either as the overall efficiency of the production process increases, or as the discrepancy in bargaining power decreases.

In our final set of tests, we investigate whether all the aforementioned results translate into differences in cash management choices between long-term and short-term suppliers. We find that these two groups do not accumulate cash reserve differently, when considering early-stage long-term relationships. In addition, firms in both groups appear to hold more cash, as a response to operating with a concentrated customer-base. This result is consistent with firms accumulating precautionary cash reserves in order to face the higher operating risk incurred either through relying on a limited number of partners to generate a large fraction of total revenues (for both short-term and long-term revenues) or to make up for the increase inventories holding costs (for long-term suppliers). As long-term relationships reach the maturity phase, the profitability and efficiency gains obtained by long-term suppliers translate into lower cash holdings. Put together, all our results seems at odds with the popular view that relationships with major customers are necessarily detrimental to suppliers who hold only little bargaining power⁵, as finding ways to develop and maintain a successful relationship (and increase its scope over time) with one or several allows appears to be a superior strategy in the long-run⁶.

This study contributes to several areas of the literature. First, the results contribute to extend the understanding on how the life cycle of customer-supplier relationships can affect corporate performance and organization decisions for involved parties, and especially at the supplier level. Dwyer *et al.* (1987) characterize the buyer-supplier relationship as a marriage of buyer and seller that moves through several distinct stages during its life cycle, in particular the early build-up phase and the subsequent maturity stage. Wilson (1995) further argues that dynamics of buyer-supplier relationships vary with the relationship life cycle, thus exposing supplier firms to different costs and benefits. Wilson (1995), further specifies that relationship-specific investments are maximized early in the relationship, and that, just like in a marriage, a major customer relationship implies some restrictions on outside

4. An alternative explanation follows Balakrishnan *et al.* (1996) and states that as major customers are aware of the supplier firm's cost savings from JIT adoption, and subsequently use their superior bargaining power to demand for concessions preventing suppliers from increasing their operating margin. These two explanations are not mutually exclusive

5. A typical being that of WalMart, which account payables accounted for nearly all its short-term funding and around three-quarters of its total debt at the end of the fiscal year 2009.

6. Conditional on the relationship not being terminated

opportunities. Eggert *et al.* (2006) and Jap and Anderson (2007) rely on survey data to empirically validate distinct stages in the supplier-customer relationship theorized by Dwyer *et al.* (1987) and shed light on how costs and profitability change as the customer-supplier relationship evolves through different phases. Eggert *et al.* (2006) conclude that the value created from major customer relationships can increase over time, provided that both parties greatly commit to the relationship during the early build-up stage. Jap and Anderson (2007) find that relationship-specific investments can provide long-term benefits over time for supplier firms. This study extends these results by bringing forward cross-sectional evidence on both supplier firms' investment behavior and performance throughout the buyer-supplier life cycle.

This study also directly extends the work of Kalwani and Narayandas (1995) and Irvine *et al.* (2016). To our knowledge, these are the only attempts at assessing the valuation, performance and organizational implications of the duration of customer-supplier relationships for supplier firms. However, Kalwani and Narayandas (1995) only focus on a limited sample of exclusively manufacturing firms over a fixed six-year period (1986-1991), and only report univariate evidence. Irvine *et al.* (2016) investigate the cross-sectional effect of customer-base concentration throughout the life cycle of buyer-supplier relationships. Yet, the authors focus on changes in customer-concentration and do not explicitly bring forward the impact of engaging in long-term relationships on suppliers, only partially control for the characteristic of both supplier firms and customer-supplier relationships, and do not account for the heterogeneity among supplier firms that engage in different types of relationships with their customers (i.e. short-term *vs* long-term).

More broadly, this study adds to the growing body of literature that investigates how corporate decisions are shaped by strategic interactions between a supplier firm and its customers. Titman (1984) theorizes how capital structure can mitigate agency conflicts between suppliers and customers, by forcing a supplier firm to implement a liquidation policy that maximizes the wealth of all its stakeholders. Low leverage then arises as a commitment mechanism to a firm's buyers. Consistently, Titman and Wessels (1988) and Banerjee *et al.* (2008) find that firms with unique or specialized products have relatively lower debt ratios⁷. Similarly, Kale and Shahrur (2007) find that firms relationship-investments are negatively correlated with leverage. More recently, Hoberg, Phillips and Prabhala (2014) bring forward evidence regarding product market conditions and, respectively, cash holdings and payout decisions. Costello (2013) finds that the terms of supply contracts allow firms to mitigate adverse selection and moral hazard issues. In addition, our study relates to the literature on the effects of customer-base concentration, starting with Lustgarten (1975) or William-

7. These empirical findings can be seen as an *ex ante* empirical validation of Maksimovic and Titman (1991).

son (1979)⁸. Fee and Thomas (2004) and Brown *et al.* (2009) further focus on the effect of customer-base concentration on the relative bargaining power of suppliers and customers. Dhaliwal *et al.* (2015) focus on the cost of equity of supplier firms. Patatoukas (2012) investigates how customer-base concentration affects performance at the supplier firms level. Itzkowitz (2013) studies the effect of customer-base concentration on cash holdings at the supplier level. Our results complement and extend this research, by showing how the nature of customer-supplier relationship impacts the supplier firms' overall asset structure and performance over time.

The remainder of this paper is organized as follows. Section 3.2 presents the main hypotheses linking long and short-term buyer-supplier relationships to various outcomes at the supplier level. In Section 3.3, the construction of our main samples and variables is detailed. Section 3.4 reports our main findings regarding the impact of long-term customer-supplier relationships on supplier firms. Finally, Section 3.5 contains concluding remarks.

3.2 Hypotheses development

There exist inherent tensions in buyer-supplier relationships between major firms and their providers. The traditional view build on the consensus that major customers use their higher bargaining power to extract benefits from their suppliers, thus decreasing their overall profitability. However, there are several reasons why major customers could also be beneficial to the supplying firm. In particular, all orders are peculiar, in some combination of either their overall design, manufacturing or logistical delivery process. As such, firms can for instance, achieve economies of scale either from dealing with a few major customers, or from standardizing their production and distribution process without relying on a limited number of major partners to generate a large fraction of total revenues. Whilst the latter solution does not lack interest, this study focuses on the first one.

Although a number of small orders can produce the same total sales as a single large order, the supplying firm faces the problem of customer retention and acquisition. As customer acquisition is costly process (either due to prospecting or advertising expenses, for instance), firms can potentially benefit from reducing the number of business partners they operated with (see Carlton, 1978, or Cohen and Schmidt, 2009). In addition, adverse selection, hold-up or moral hazard are likely to arise when contracting upon a supply agreement. These concerns can be alleviated either through cross equity ownership (Fee *et al.*, 2006) or

8. These studies mainly suggest that high customer concentration induces high costs for the supplier, which mainly stem from the advantageous bargaining position held by major customers.

adequately defined contractual terms (see Costello, 2013).

Yet, provided that a customer-supplier relationship is effectively contracted up, the existing literature in finance or accounting provides only limited theoretical or empirical evidence regarding the duration and life cycle of such a relationship and how they might affect supplier firms. As such, we derive our different hypothesis from reconciling the existing literature in management, marketing, finance and accounting, and the intuition.

3.2.1 Investment behavior

One of the most cited life cycle theories of customer-supplier relationships is that of Dwyer *et al.* (1987), who characterize business partnerships as a marriage between a buyer and a seller that evolves through various distinct stages. Like a marriage, a major customer relationship implies certain restrictions on the nature and availability of outside investment opportunities. Wilson (1995) argues that relationship-investment are a key aspect of these restrictions. Wilson (1995) further states that these relationship-specific investments are maximized relatively early in the life cycle of the buyer-customer relationship (i.e. during the "build-up" phase) as they are necessary to maximize value creation in the later "maturity" stage. In terms of investment behavior, these results suggest that firms engaging in long term relationships are most likely to pass on outside investment opportunity that are not specific to the relationship they are trying to build, and thus exhibit lower level of investment in fixed assets.

Additionally, there is limited evidence on the relation between relation-specific investments and the duration of supply agreements (which can be viewed as an *ex ante* proxy for the expected length of a customer-supplier relationship). For instance, Goldberg and Erickson (1987) find that petroleum coke contracts are longer and include more contractual restrictions when the initial required investment is high. Joskow (1985, 1987 and 1988a) investigates whether the location of electric utilities with respect to coal mines impacts the duration coal supply contracts. He finds that when plants are located near a "specific" mine, the duration of coal supply agreements is significantly longer than for "non-site-specific" plants. More recently, Costello (2013) finds cross sectional evidence suggesting that firms agree upon longer supply agreements when the level of relationship-specific investment required is higher.

These results suggest that long-term relationship are most likely to be correlated ex-post to the level of relationship-specific investments in (i.e. to the effective amount of such assets invested in). Long-term suppliers are thus most likely to invest in relationship-fixed assets than their short-term counterparts. As long-term suppliers have higher incentives to com-

mit to making these relationship-specific investment over time, we predict that this higher level of investment in relationship-specific fixed assets should be reflected in higher capital expenditures over time compared to short-term suppliers⁹. Similarly, long-term suppliers have higher incentives to ensure the success of a relationship with customer that accounts for large fractions of their total revenues. We predict that this translates into higher capital expenditures for long-term suppliers with a more concentrated customer-base. Overall, our first hypothesis is as follows¹⁰ :

Hypothesis 1 *Ceteris paribus, long-term suppliers exhibit lower level of investment in fixed assets than short-term suppliers.*

However, conditional on a supplier being engaged in a long-term relationships with one or several major customers, the level of investment in fixed assets is positively correlated, ceteris paribus, to : (i) the age of the relationship and (ii) customer-base concentration. Furthermore, as relationship-specific investments are most crucial during the early stages of a relationship, these positive correlations are higher during the "build-up" phase.

3.2.2 Profitability

Evidence of the impact of the life cycle of customer-supplier relationships on performance at the supplier level are rather limited. Dwyer *et al.* (1987), Wilson (1995) and Kalwani and Narayandas (1995) suggest that higher profitability is reached once the customer-supplier relationship is mature enough, i.e. when initial relationship-specific investment end up paying-off. This suggests that long-term suppliers in late-stage relationships experience higher profitability than short-term supplier firms. However, for supplier firms choosing to commit to a buyer-supplier relationship, one can rationally expect profitability to also be higher, compared to short-term suppliers, in the early-stage long-term relationship.

In addition, we choose to be agnostic regarding the relative magnitude of the increase in operating performance in early-stage long-term relationships with respect to the increase in profitability obtained once relationships reach maturity. One can indeed reasonably expect that profits are maximized when suppliers exert the highest level of efforts in the customer-supplier relationship, i.e. in the earlier stages (which would be consistent with Hypothesis 1. Yet, one can also conjecture that the highest levels of profitability are reached once the customer-supplier relationship is successful in the long-run.

9. Otherwise stated, short-term suppliers have only little incentives to keep investing throughout the buyer-supplier relationship

10. In unreported tests, we also follow Williamson (1979), Kalwani and Narayandas (1995) and Anderson *et al.* (2003), and proxy relationship-specific investments using Selling, General & Administrative expenses. We find weaker but qualitatively similar results.

Finally, Irvine *et al.* (2016) find evidence suggesting that customer-base concentration increases firm performance for suppliers over the life cycle of their buyer-seller relationships. This should be all the more true when comparing long-term suppliers in late-stage relationships and short-term shareholders. Building on these rationales, our second hypothesis is as follows :

Hypothesis 2 *Ceteris paribus, long-term suppliers should exhibit higher levels of profitability than short-term suppliers, regardless of the stage of the relationship they are in.*

In addition, the effect of customer-base concentration on firm performance should be more positive for long-term suppliers in late-stage relationships than for short-term suppliers.

3.2.3 Operating margins

Our hypothesis regarding the effect of long-term relationship on operating margins at the supplier level is an almost direct corollary of Hypothesis 1 and Hypothesis 2, and follows closely Dwyer *et al.* (1987), Kalwani and Narayandas (1995) and Irvine *et al.* (2016), which show that, even to a limited extent, long-term relationships become more efficient over time. This allows customer firms to mitigate, even partially, the discrepancy in bargaining power with respect to its major customers. As a result, they might obtain both better selling terms and to decrease their overall expenses.

However, we choose not to take a stand on the direction, nor on the magnitude, of the effect of customer-base concentration on operating margins for long-term supplier firms. It is indeed not clear whether long-term suppliers would benefit or not from operating with a more concentrated customer-base. On the one hand, suppliers might be able to better overcome the asymmetry in bargaining power with their major customers (than short-term suppliers), as relationships have proven to be durable and successful. On the other hand, one can also rationally anticipate that long-term suppliers in late-stage relationship with a major customer accounting for a significantly large proportion of asset have close to zero bargaining power. A possible rationale for this is that the cost of switching to another customer is most likely too high to be bearable ¹¹.

As such, our third hypothesis is as follows :

Hypothesis 3 *Ceteris paribus, long-term suppliers exhibit higher operating than short-term suppliers, regardless of the stage of the relationship they are in.*

11. This assumes that major customers can have incentives to terminate a relationship with their suppliers. Anecdotal evidence of such a termination case can be found in "Airbus Lands Japan Airlines Jet Order", published by the Wall Street Journal on October, 7th 2013.

3.2.4 Operating cycle efficiency

To our knowledge, there exists no unifying theoretical or empirical evidence allowing to derive consistent predictions regarding the effect of long-term supplier relationships on working capital efficiencies. In particular, the traditional view of large customers using their smaller suppliers as sources of liquidity (e.g. WalMart) has almost as much merit as the alternative view of large customers acting a liquidity providers to their supplier, which they need in order to ensure the continuity of their operations (e.g. Airbus, in Europe). The answer to this questions most likely relies on non-trivial arguments regarding product market uniqueness, interconnectedness and competition. We thus choose to remain agnostic on the question of the impact of long-term buyer-seller relationships on one crucial aspect of working capital efficiency : namely, receivables conversion periods.

While we could also choose not to take a stand on the equally relevant issue of long-term customer-supplier relationships on inventories management at the supplier level, we find that rather elementary arguments allow me to derive rational testable empirical predictions.

First, supplier firms operating with a limited number of short-term major customers are most likely no to know the exact level of demand of their customers. At the same time, they cannot bear the cost of holding high levels of inventories that they might not be able to liquidate, should the relationship with their customers end (regardless of the reason). In addition, the relationships with their customers are not designed to last (either *ex ante*, or because they ended up not being enough of a success for either one of the two parties). As a consequence, such suppliers are less likely to be sensitive to the costs associated with not being able to meet their customers demand in time¹². Customer themselves might also no be to sensitive to their demand being met efficiently, as the overall supply agreement is not designed to be a durable one. Overall, short-term suppliers are thus more likely to look for cost reduction and hold lower inventories when operating with major customers.

Similarly, long-term suppliers in early-stage relationships also most likely lack information regarding the demand of their major customers. However, as they commit to making relationship-specific investment with their major customers, the incentives of meeting the demand of these customers, either in time or in level, increase. As a consequence, the costs of holding inventories are likely to be offset by the expected costs of not being to efficiently deliver the output to their customers. Additionally, as suggested in Balakrishnan *et al.* (1996), major customers are most likely of potential inventories cost reduction policies put in place by their suppliers. Should such a strategy be implemented by a supplier firm, its customers would subsequently react by demanding concessions on future conditions. This could lead

12. These costs can be both reputational, e.g. bad press among potential business partners, or financial, e.g. due to customers demanding discount on their current or future invoices.

to lower profitability at the firm level and might deteriorate the existing customer-supplier relationship. As a consequence, long-term supplier firms are more likely to choose the flexibility of holding inventories over the immediate cost reduction they might benefit from resorting to more "lean" inventories management choices, regardless of the importance of their customers.

In the long run, relying on a limited number of customers to generate a large fraction of yearly revenues can, have multiple effects on inventories management strategies at the supplier level. One can think that, as buyer-customer relationships mature, long-term suppliers learn about both the demand of their customers and the overall efficiency of their production process (which is supposed to improve over time). As such, long-term suppliers are able to meet demand without relying on inventories. They can thus reduce their operating costs. At the same time, long-term suppliers might still have high incentives to efficiently deliver their output (e.g. on time). The costs of re-organizing their entire production in the extreme event of a relationship termination are, indeed, also likely to be high, provided that such re-organization is at all possible. Even absent of termination, the Balakrishnan *et al.* (1996) argument is still likely to hold. This could lead long-term supplier firms to have to bear the costs of holding higher levels of inventories in any case, for flexibility reasons. At this stage, we thus choose to remain agnostic regarding the long-term implications of customer-concentration on inventories management choices at the supplier level.

Overall, our fourth hypothesis is as follows :

Hypothesis 4 *Ceteris paribus, long-term suppliers hold more inventories than short-term suppliers, regardless of the stage of the relationship they are in.*

However, conditional on a supplier being a short-term one, customer-concentration should be negatively correlated to inventories at the supplier level, ceteris paribus.

3.2.5 Cash holdings

Iitzkowitz (2013) shows that customer-base concentration leads supplier to hold higher precautionary reserves of cash. The rationale is here that supplier firms use cash holdings as a hedging tool against the risk of potentially losing a significant stream of revenues¹³. As they commit to making significant relationship-specific investments during early-stage partnerships, which have a zero value outside of the relationship, long-term suppliers should be most sensitive to the threat of one of its major customers terminating (either voluntarily or due to financial distress) the buyer-seller agreement. They should, as a consequence, hold

13. For anecdotal evidence of firms coping differently with the loss of a major customer depending on their cash management choices, see Hays, C., April 3, 2003. "Big Grocery Supplier Files for Bankruptcy Protection", *New York Times* and Barbaro, M., April 15, 2008. "Retailing Chains Caught in a Wave of Bankruptcies", *New York Times*.

more cash relative to short-term suppliers.

Additionally, according Hypothesis 4, long-term suppliers hold higher inventories in the early-stages of buyer-supplier relationships. *Ceteris paribus*, this suggests that long-term suppliers have a less efficient cash conversion cycle than their short-term counterparts. In other words, these suppliers need to finance a more important liquidity needs in the early-stages of long-term relationships. One can easily and rationally predict that this should translate into higher cash holdings. Conversely, as long-term relationships reach the maturity phase, the profitability and efficiency gains predicted in Hypothesis 1 to 4 for long-term suppliers most likely translate into lower cash holdings.

Overall, our last hypothesis is as follows :

Hypothesis 5 *Ceteris paribus, long-term suppliers in early-stage relationship hold more cash than short-term suppliers.*

Ceteris paribus, customer-concentration is positively correlated to cash holdings (consistent with Itzkowitz, 2013).

Conditional on being in a long term relationship, suppliers hold less cash in the later stages of the relationship, ceteris paribus.

3.3 Data

3.3.1 Sample selection

The regulatory environment in the United States allows me to construct a sample of corporate customers of Compustat firms (hereafter *Customer Sample*). In accordance with the Statement of Financial Accounting Standards (SFAS) No. 14 and 131, U.S. public firms are indeed required to disclose the identity of any customer that contributes at least to 10% of their respective revenues. Notably, some firms choose to report customers that contribute to less than 10% of their revenues¹⁴. These data are reported in firms annual 10-K filings and are available in the Compustat Customer Segment File for the 1977-2014 period. The database, however, only contains the name of the main customers reported by U.S. public firms.

The most efficient procedure used in the literature to identify the customer firms reported in the Compustat Customer Segment File is described in Fee and Thomas (2004) or Kale and Shahrur (2007). The first step consists in using a fuzzy-matching algorithm that compares the reported customer names (either complete or abbreviated) to the company names

14. In both reported and unreported robustness checks, and to alleviate potential endogeneity concerns, we exclude these customers from the sample and rerun all tests and regression models described in this article.

listed on CRSP (historical name structure) or Compustat¹⁵. We exclude financial and quasi-public supplier firms, as well as suppliers operating in the utilities industry (i.e. firms with SIC codes greater than 5999 and lower than 7000, greater than 4899 and lower than 5000 and greater than 8999) and suppliers that are headquartered outside the United States. We also drop all observations corresponding to a supplier firms doing business with a non-U.S. customer firm or being a contractor for the U.S. Government. Overall, the *Customer sample* is composed of 3,493 unique customer firms for 7,917 unique Compustat supplier-firms over the 1977-2014 period.

Table 3.1 presents the distribution of supplier firms within the *Customer Sample* across industries. As reported in column (3), manufacturing firms (4-digit SIC code between 2000 and 3999) account for almost two-thirds the overall firm-year observations (63.71%), while the second most represented industry, i.e. the services industry (including firms with a 4-digit SIC code between 7000 and 8999), only represents 16.85% of the total sample. Regardless of the industry, the proportion of firms in each industry that report at least one identifiable major customer is relatively low, and only reaches a maximum of 28.27% for the manufacturing industry, as presented in column (2). This observation first stems from the restrictions we impose on customer firms, which have to be reported in the Compustat database. This implies that firms reporting only private firms as their major customers do not appear in the *Customer sample* as having identifiable main customers. In addition, as we choose to follow a conservative approach in identifying customer firms in order to limit Type I errors¹⁶, we mechanically reduce the subsample of firms that appear to report at least one main client. Finally, firms might deliberately choose not to report identifiable customer names. In particular, Ellis, Fee and Thomas (2012) find evidence of potential strategic behavior of firms that choose not to disclose information about their customers that meet the minimum requirements of the U.S. Securities and Exchange Commission regulations.

Column (5) of Table 3.1 reports the industry mean relative size of main customers compared to their suppliers. We measure a customer firm relative size as the ratio between the book value of total assets of a given firm and the total value of its suppliers total assets. Depending on the supplier industry, customer firms appear to be on average 24 to around 90 times larger than their suppliers. In other words, supplier firms in our sample are on average much smaller than their major customers. This suggests that our final sample is most likely to be composed of relatively small intermediate goods producers or subcontractors. This is all the more true that more than 60% of our sample is composed of manufacturers. A typical example would be that of Cherry Corp., which mainly sold sensors and other electronic components to the automobile industry during the sample period, and which had Ford and

15. More details regarding this procedure can be found on pp. 436-437 of Fee and Thomas (2004)

16. A Type I error, or false positive, occurs when we wrongfully identify as firm as a major client for a given supplier firm.

General Motors as major clients.

3.3.2 Identifying long-term customer-supplier relationships

Since this article aims at assessing the effect of long-term buyer-supplier relationships on supplier firms, we need to carefully describe how we define and identify long-term relationships between a supplier and its customer firms.

There exists no theoretical framework allowing to formally define at which point a business relationship can be empirically identified as a long-term one. In particular, all existing theories of the life cycle of customer-supplier relationships (e.g. Dwyer *et al.*, 1987, or Ring and Van de Ven, 1994) are silent on the actual number of consecutive years required for a business relationship to be deemed mature, enduring or successful. To our knowledge, Kalwani and Narayandas (1995) is the only study proposing an empirical definition of long-term relationships. In particular, the authors define as being in a long-term relationship (hereafter, "long-term suppliers") suppliers firms that consistently reported the existence of the same major during over the fixed 1986-1991 period.

Here, we choose a more dynamic and conservative approach. In order to be defined as "long-term", a supplier firm needs to report the existence of the same major customer every year over any period of at least ten years during the sample period, regardless of the fraction of yearly sales accounted for by this customer. Long-term relationships are identified as the disaggregated supplier-customer level. In other words, supplier firms can be operating with both long-term and short-term customers during each sample year. An example of a long-term relationship would that of R.G. Barry Corp, which produces footwear and generated more than 10% of its annual sales between 1992 and 2013 doing business with Walmart (the mean share of annual shares accounted for by Walmart over this period is just shy of 25%).

Additionally, we choose to identify suppliers meeting the aforementioned requirements as "long-term" ones for the entire period during which they report the existence of the same customer. This leads me to identify early-stage long-term relations conditional on their future success, i.e. before they are actual long-term relationships. Although potentially surprising, this approach is consistent with Macneil (1980) and, especially, Dwyer *et al.* (1987) who highlight that "[m]ost important is the fact that relational exchange transpires over time; each transaction must be viewed in terms of its history and its anticipated future". In other words, long-term buyer-supplier relationships do not arise overnight, and understanding the potential effects of such relationships on supplier firms requires taking into consideration the fact that firms are most likely to plan ahead when engaging in a business relationship with a customer or supplier. Section 3.3.3 and Section 3.3.4 further detail how we

characterize customer-supplier relationships and how we build the different samples used throughout this study.

3.3.3 Main variables

We use several variables to characterize supplier-customer relationships. We first identify long-term relationships through the *LT Customer* dummy variable that equals 1 when a supplier firm reports the same customer every year over at least a ten-year period, and 0 otherwise. Such firms are classified as being in a long-term business relationship with a customer firm only for the entire period during which the same customer is reported. Next, we proxy customer-base concentration following Patatoukas (2012), and define *CC* in the spirit of the Herfindhal-Hirschman index, which is thus computed as the sum of the squares of the sales shares to each major customer for each year. *Linkage* proxies the length of customer-supplier relationships, and is computed as the yearly weighted average length (in years) of the relationships of a supplier firms with its major customer, where the weights are the percentages of the supplier firm's sales to each major customer. We also use a measure of competition at the customer industry level, and compute *Customer HHI* as the yearly weighted average Herfindhal-Hirschman index (hereafter, HHI) of a supplier's major customer firms' industry, where the weights are the percentages of the supplier firm's sales to each major customer and industries are identified using 3-digit SIC codes. Finally, *Relative Cust/Supp Sive* measures the relative size of a supplier firms with respect to its major customers and is defined as the yearly weighted average ratio between the book value of total assets of a given customer firm and the total value of its suppliers total assets. All continuous variables are winsorized at the 1th and 99th percentiles. Table 3.2 presents descriptive statistics of the aforementioned variables.

Accounting variables at the supplier firm level are extracted from Compustat. All variables are defined in Appendix 3.A and are winsorized at the 1th and 99th percentiles. Table 3.2 presents descriptive statistics for our main dependent and independent variables.

Panel A of Table 3.2 reports summary statistics for the overall *Customer Sample*. Panel B reports univariate comparisons between firms that are in a long-term relationship with at least one major customer (i.e *LT Customer* = 1) and firms that do not appear as having a long-term customer, that are never classified as being in a long-term relationship during the entire sample period (i.e *LT Customer* = 0 for the entire sample period) and that never reported the same customer for more than five consecutive years. The latter restrictions ensure that none of the firms in a long-term business relationship is also identified as not having a long-term customer at some point during the sample period. This should alleviate, even partially, the concern that the absence of long-term customers is wrongfully identified for

these firms, as a customer not being reported does not necessarily signal the absence of a business relationship. In order to further alleviate misidentification concerns, we finally restrict the subsample of suppliers in a long-term business relationship (LT Customer = 1) to firms for which all identifiable customers are long-term ones.

Results in Panel B suggest that customer-base concentration is not, on average, different whether suppliers are in a long-term business relationship or not. However, firms in a long-term relationship with at least one major customer are relatively larger compared to their customers. In practice, customers of such firms are on average 47 times larger than their supplier, while customers are on average around 70 times larger than their supplier for the subsample short-term suppliers. The weighted average length supplier-customer relationships is mechanically higher for supplier firms with long-term customers. Competition at the customer level seems to be slightly lower for suppliers with long-term customers, as they exhibit a higher mean HHI score than their counterparts with no long-term customer.

Suppliers with long-term customers (long-term suppliers) also appear almost systematically different, on average, than firms that are not in any long-term relationship with a major customer (hereafter, "short-term suppliers"). In particular, these suppliers seem to be much larger in terms of total assets. In practice, the (unreported) average asset size of supplier firms operating with at least one long-term major customer is 1.361 billion USD, which is statistically and significantly higher than the (unreported) 452 million USD average total book assets exhibit by suppliers that did not engage in a long-term relationship with any of their major customers. Long-term suppliers also appear to be more levered, more profitable (higher average ROA, ROE and profit margin) firms. They, however, exhibit a lower average gross margin (as measured by the ratio of sales minus the cost of goods sold to total sales). This preliminary pieces of evidence suggest that long-term major customers continue to exercise some bargaining power throughout the duration of the relationship.

In addition, long-term suppliers hold on average significantly less cash (12.9%) than short-term supplier firms (21.9%). This is consistent with supplier firms accumulating precautionary reserves of cash when operating with a major customer (e.g. to hedge against the higher induced operating risk or due to existing information asymmetry between the supplier firm and its customer). Conversely, suppliers are likely to reduce their cash holdings as they engage in long-term, potentially more efficient and more transparent, relationships. Adding to the idea of efficient long-term relationships, short-term suppliers exhibit a significantly longer receivables conversion period (around 70 days of total sales) than their long-term counterparts (around 56 days of total sales). Yet, long-term buyer-supplier relationships do not appear to be associated with better inventory management. Inventories, indeed, account for

51 days of sales for long-term suppliers and for only 46 days for short-term supplier firms¹⁷.

3.3.4 Matching long-term and short-term suppliers

Table 3.2 Panel B suggests that long-term and short-term are inherently different across various dimensions of either performance, risk or organizational choices. In other words, a "naive" regression model comparing the effect of being in a long-term relationship on, for instance, investment decisions at the supplier level would inadequately account for the heterogeneity between long-term and short-term suppliers (i.e. the "treatment" and "control" group, respectively). We thus use a propensity score matched sample to correct for any potential endogenous selection on observed variables (see Dehejia and Wahba, 2002).

Therefore, we first use a probit regression framework to regress the indicator variable for whether a supplier firm is in a long-term relationship with at least one of its major customers during a given year. The regression model is the following¹⁸ :

$$\begin{aligned}
 LT\ Customer_{i,t} = & \alpha + \beta_1 Linkage_{i,t-1} + \beta_2 Customer\ Concentration_{i,t-1} \\
 & + \beta_3 Cust.\ HHI_{i,t-1} + \beta_4 Relative\ Size_{i,t-1} + \beta_5 Size_{i,t-1} \\
 & + \beta_6 HHI_{i,t-1} + \beta_7 ROA_{i,t-1} + \beta_8 Q_{i,t-1} \\
 & + \beta_9 Log(Age)_{i,t} + \beta_{10} Tangibility_{i,t-1} + \beta_{10} Leverage_{i,t-1} \\
 & + \beta_{12} Cash_{i,t-1} + \beta_{13} Market\ Share_{i,t-1} + \lambda_t + \gamma_i + \epsilon_{i,t}
 \end{aligned} \tag{3.1}$$

Where a subscript "t-1" signals the use of the one-year lag of a given variable. All variables are defined in Appendix 3.A. We control for firm and industry fixed effects by including year dummies (λ_t) and industry dummies (γ_i), where industries are identified at the 2-digit SIC code level. This allows me to ensure that matched observations are extracted from the same year and industry.

We start by applying this regression model to the sample of firms used in Table 3.2 Panel B. Long-term suppliers are thus firms which customers are all long-term ones, and short-term suppliers never reported the same customer for more than five consecutive years during the entire sample period. Column (1) of Table 3.3 reports the marginal effects of this regression. Next, we match each long-term supplier to a short-term supplier with the clo-

17. The unreported cash conversion cycle (defined as *Days of Inventories + Days of Receivables + Days of Payables*) is significantly higher for long-term suppliers (60 days) than for short-term suppliers (43 days). In particular, long-term suppliers appear to pay their own suppliers on average much faster (47 days) than their short-term counterparts (72 days).

18. As a robustness test, we also include measures of sales seasonality and cash-flow variability as control variables. This does not affect qualitatively our results.

best estimated propensity score. We match without replacement and require the propensity scores for each matched pair to be within $\pm 0.5\%$ ¹⁹. The resulting sample consists of 1,515 long-term supplier-years matched with 1,515 short-term supplier-years. This sample is referred to as the *LT-ST Sample* hereafter.

While the latter approach aims at correcting potential endogenous selection biases, it also assumes that long-term relationships are homogenous through time. Yet, Wilson (1995) and Dwyer *et al.* (1987) (among others) argue and show that customer-supplier relationships have their own life cycle. In particular, *et al.* (1987) characterize this type of business relationships as a marriage that moves through several distinct stages. Not all of Dwyer *et al.*'s (1987) stages have been confirmed empirically, nor are they all relevant for this study. For instance, the earlier stages of the buyer-supplier relationship include, but are not necessarily limited to, "awareness" and "exploration", that most likely precede the Compustat Segment File data for supplier firms to already be providing at least 10% of their total sales to a particular customer. Here, we follow Irvine *et al.* (2016) and choose to ignore these early stages, but keep in mind that firm are still likely to invest significantly in a given supplier-customer relationship during these stages (in particular when switching from the "exploration" stage to actually changing their production process in order to render the relationship effective). We thus focus on two later and distinct stages brought forward by Dwyer *et al.* (1987) and documented in Jap and Anderson (2007) : namely, the build-up (expansion) phase and the subsequent relationship-maintenance (maturity) stage. Consistent with the previous comments, we acknowledge that the earlier years of the build-up stage might not be represented in the available data and that all results are conditional on a customer firm accounting for more than 10% of its supplier's yearly total revenues.

As such, we build two distinct matched sample, referred to as *Early LT-ST Sample* and *Late LT-ST Sample hereafter*. The first sample is obtained by repeating the previous procedure to match short-term suppliers (as defined in the initial *LT-ST Sample*) to long-term supplier firms which relationships are only at an early stage, i.e. in the build-up phase. As there exists no unifying theory detailing how long this phase should last, we choose to limit it to the five first years of the customer-supplier relationship^{20, 21}. Column (3) of Table 3.3 reports the marginal effects of the probit model used to compute the propensity scores allowing to match long-term and short-term suppliers. The resulting *Early LT-ST Sample* consists of 1,123 long-term supplier-years matched with 1,123 short-term supplier-years.

19. In unreported tests, we repeat the matching using a $\pm 1\%$ threshold, and find similar results.

20. If a supplier firm has several major clients during the same year, we drop all supplier-year observations corresponding at least one of the relationships exceeding the five-year mark.

21. We also repeat the analysis using a threshold of six, eight and 10 years, alternatively, and find qualitatively similar results.

The *Late LT-ST Sample* is build under the assumption that firms move to the maturity stage right after going through the build-up phase (provided it is successful). We thus restrict the population of long-term suppliers to those who have been in a business relationship for at least six years with their customer(s)²². Column (3) of Table 3.3 reports the marginal effects of the probit model used to estimate the propensity scores. As the length of customer-supplier relationships is mechanically different between the two samples which matched observations are drawn from, we choose to exclude *Linkage* as a control variable and replace it with the quartile of its yearly distribution it falls into²³. Overall, the *Late LT-ST Sample* is composed of 789 long-term supplier-years corresponding to relationships that entered the maturity stage, matched with 789 short-term supplier-year observations²⁴.

We perform several diagnostic tests to assess validity of the matching procedure (see Fang *et al.*, 2014, or Dhaliwal *et al.*,2015). If the matching procedure is indeed successful, we should find, regardless of the sample, that : (i) the control variables used to create the matched sample do not explain any variation in whether matched supplier firms are in a long-term relationship with their majors customers, (ii) the means of the matched control variables are not statistically different for short-term and long-term suppliers, and (iii) the difference in propensity scores between these two subsamples of suppliers is on average insignificant and in the [-0.5% ;0.5%] interval.

To test the first prediction, we run the regression model presented in columns (1), (3) and (5) of Table 3.3 on the suitable matched sample and report the results in Columns (2), (4) and (6), respectively. The results show that none of the control variables remain statistically significant²⁵, and thus do not explain any variation in whether a supplier is in a long-term relationship or not. Next, we examine the difference between the propensity scores and matched control variables of short-term suppliers and long-term suppliers. The related univariate comparisons of the means are reported in Panel B of Table 3.3. The results show that the mean difference in propensity scores is not statistically significant, and therefore trivial. In addition, the means of the matched control variables appear not to be statistically different across each pair of matched subsamples²⁶. Overall, these tests suggest that the matching

22. We apply similar restrictions than for the Early LT-ST Sample in the case when a supplier firm reports the existence of several major customers

23. This allows observations corresponding to very long-term relationships (those that reached the twenty-year mark, for instance) not to be systematically excluded from the *Late LT-ST Sample*.

24. The number of observations in the regressions throughout this paper might vary, as all outcome variables are not necessarily always available for all supplier-year observations. In the case where we are missing an observation for one firm in either one of the three samples, the associated matched supplier-year observation is dropped from the corresponding regression.

25. Except for *CC*, in column (2), which is weakly significant.

26. Only *Linkage* is significantly (and mechanically) higher for long-term suppliers in the *Late LT-ST Sample*. Yet, matched observations are drawn from the same quartile of the yearly *Linkage* distribution.

procedure is valid and successful²⁷.

3.4 Empirical results

This section reports results from the analysis of the impact of long-term supplier-customer relationships on various corporate decision making, performance and efficiency indicators at the supplier level. All tests are performed on either one of the three matched samples described in Section 3.3.4 and include customer-related measures as well as supplier-level characteristic as control variables. Overall, the general regression equation used throughout this section is the following²⁸ :

$$\begin{aligned}
 Outcome_{i,t} = & \alpha + \beta_0 LT\ Customer_{i,t} + \beta_1 LT\ Cust. \times Cust\ Charac_{i,t} + \beta_2 CC_{i,t} \\
 & + \beta_3 Cust.\ HHI_{i,t} + \beta_4 Linkage_{i,t} + \beta_5 Size_{i,t-1} \\
 & + \beta_6 HHI_{i,t-1} + \beta_7 ROA_{i,t-1} + \beta_8 Q_{i,t-1} \\
 & + \beta_9 Log(Age)_{i,t} + \beta_{10} Tangibility_{i,t-1} + \beta_{10} Leverage_{i,t-1} \\
 & + \beta_{12} Cash_{i,t-1} + \beta_{13} Market\ Share_{i,t-1} + \lambda_t + \gamma_i + \epsilon_{i,t}
 \end{aligned} \tag{3.2}$$

Where a subscript "t-1" signals the use of the one-year lag of a given variable. All variables are defined in Appendix 3.A. *Cust. Charac.* refers to either *Linkage* or *CC*, depending on the specification. We control for firm and industry fixed effects by including year dummies (λ_t) and industry dummies (γ_i), where industries are identified at the 2-digit SIC code level. Because clustering effects could bias the statistical significance of the results owing to time series dependence, we adjust the standard errors in all regressions for clustering by firm.

3.4.1 Long-term buyer-supplier relationships and corporate investment

We begin our analysis by examining whether being in a long-term business relationship with one or several major customers affects the investment behavior of supplier firms. We

27. One key caveat is here that the unconfoundedness condition must hold for any outcome variable to be truly independent from our proxy for long-term customer supplier relationships, even after matching on observed variables (see Rosenbaum and Rubin, 1983a or Imbens and Wooldridge, 2009). In addition, even in the ideal situation where this condition holds and the "treatment" is here, indeed, more or less randomized after controlling for all the observables (which, as the reader can easily understand, is not the case), one can reasonably be concerned about the existence of unobserved variables causing further endogeneity issues. These variables include, but are not limited to, the actual nature of the contract between a supplier and its customer, implicit contracts existing between the two firms (see Coase, 1937, Zingales, 2000, or Kale, Menaghetti and Shahrur, 2012), or cross-ownership between customer and supplier firms (Fee et al., 2006). As such, the endogeneity of the treatment effect deserves more careful attention, for instance through an instrumental variable analysis. At this stage, this is still work in progress.

28. In unreported tests, we also test regression models using the lag value of *LT Customer*, *Linkage*, *CC*, and *Cust. HHI*. This does not qualitatively change our results

use two measures of corporate investment : (i) capital expenditures to total assets, (ii) net capital expenditures to total assets and (iii) net capital expenditures to fixed assets. While the first proxy is classically used in the literature, the second one allows me to account for potential differences in fixed asset disposal behavior across firms. Furthermore, scaling investment to fixed ensures that our measure is not impacted by the impact of customer-supplier relationships on supplier firms' operating cycle, i.e. on the current portion of their balance sheets (Patatoukas, 2012 and Irvine *et al.*, 2016, among others, document some aspects of this impact). All variables are defined in Appendix 3.A. We apply the regression model defined in Equation 3.2 on each of these outcome variables.

Table 3.4 reports the results for the investment regressions, for each of the matched samples. As our hypothesis predict two potential opposite effects of being in a long-term relationship on supplier firms, we choose to only report estimates of regressions including interaction terms between the *LT Customer* dummy and either *Linkage*, or *CC*²⁹. Panel A of Table 3.4 presents the estimates for the CapEx-to-assets regressions. Regardless of the sample, results suggest that profitable supplier firms, suppliers with more investment opportunities and firms relying on more tangible assets to operate engage in more investment activities, on average. Conversely, older, more levered supplier firms appear to invest less, on average.

Results in Panel A further show that competition at the customer-industry level is negatively correlated to investment behavior at the individual supplier level. As such a measure is likely to proxy, even imperfectly, for customer firms bargaining power (and is thus negatively correlated to suppliers bargaining power), this suggests that firms held up in a partnership in which they have only little bargaining power face more severe restrictions on investment opportunities that arise outside the relationships with major customers (see Wilson, 1995, for instance)³⁰. Consistently, columns (1) and (2) of Table 3.4 Panel A show that long-term suppliers invest less than their short-term counterparts by -0.4% up to -0.5%. As the (unreported) mean total assets for the *LT-ST Sample* amount to 900 million USD, this suggests that yearly investment is lower by 3.6 million USD to 4.5 million USD for supplier firms operating with at least one long-term customer. Although these numbers might appear to be rather low, they are respectively equivalent to 8.95% and 11.88% of the mean 40.22 million USD yearly capital expenditures for firms in the *LT-ST sample*. Columns (2) to (6), however, suggest that this effect is mostly concentrated in the later years of long-term relationships. These somewhat counter-intuitive results most likely stem from the use of total capital expenditures to total assets as a measure of corporate investment. With this caveat in mind, this first set of results tends to suggest that supplier firms engaging in long-term relation-

29. Unreported results are available upon request.

30. We obtain similar (unreported) results when replacing *Cust. HHI* by the weighted average market share of customer firms for a given supplier. In particular, higher customer market power is associated with lower capital expenditures at the supplier firm level.

ships with their customers suffer, just like in a marriage, from more severe restrictions on outside opportunities (regardless of which party imposes these restrictions), as the required commitment in order to benefit from a successful long-term business relationship is higher.

In addition, columns (1), (3) and (5) of Table 3.4 Panel A show that while short-term suppliers invest less as the relationship with their major customers matures, long-term suppliers exhibit higher levels of capital expenditures. To some extent, this suggests that supplier firms engaging in long-term relationship most likely commit to making relationship-specific investments in order to ensure the success or to maintain the relationship with their customer(s) over time. Similarly, we find that customer-base concentration is significantly and positively correlated to investment, but that this effect is concentrated within long-term suppliers, regardless of the sample. This is also consistent, even partially, with the idea of firms committing to engaging in more relationship-specific investments with their major business partners in order to either maximize the value of the relationship during early stages (as suggested by results for the *Early LT-ST Sample*), or to maintain existing major business relationships, provided that they reached the maturity stage (as suggested by results for the *Late ST-LT Sample*). Furthermore, in unreported Wald tests, we find that the estimate interaction term between *LC Customer* and either *Linkage* or *CC* is significantly higher in the regressions on the *Early LT-ST Sample* than the corresponding estimate obtained for the *Late LT-ST Sample*³¹. This suggests that long-term suppliers are indeed most committed to investing into relationship-specific investment in the early stages of the relationships with their major customers.

Panel B and Panel C of Table 3.4 report regression estimates for the net capital expenditures to total assets and net capital expenditures to fixed assets regression models, respectively. Regardless of the proxy for corporate investment relied on or the sample considered, results regarding suppliers in long-term relationships remain globally unchanged. In other words, long-term suppliers seem to invest less, on average, which is consistent with the hypothesis of more severe restrictions on outside investment opportunities being imposed on such firms which committed to a specific and long-term relationship with one or several of their customers. However, these firms also appear to be mostly committed to investing more intensively in relationship-specific assets, in early and late stages of the relationship, both as the relationship matures and as major customers represent a larger fraction of their revenues³². The (unreported) Wald tests for the difference in the interaction terms estimates between the *Early LT-ST Sample* and *Late LT-ST Sample* further confirm that long-term suppliers invest more heavily in relation-specific investments in early-stage relationships³³.

31. The associated p-value is 0.064 for the *Linkage* interactions terms and 0.082 for the *CC* interaction terms.

32. Only the estimate on the interaction term between *LC Customer* and *CC* is not statistically different from zero in column (6) of Table 3.4 Panel C.

33. In Panel B, the associated p-values are 0.074 and 0.056 for the *Linkage* and *CC* interaction

3.4.2 Long-term buyer-supplier relationships and performance at the supplier level

Next, we examine whether long-term business relationships affect operating performance at the supplier firm level, through the regression model defined in Equation 3.2. We use two usual measures of performance : (i) return on assets (ROA), and (ii) asset turnover. Both variables are defined in Appendix 3.A.

Table 3.5 reports the corresponding results. Estimates reported columns (1) to (4) of Panel A consistently show that customer-base concentration is detrimental to supplier firms' operating performance, whether it operates with a long-term customer or not. These appear to be statistically significant, as a one standard deviation increase in *CC* is associated to an average 0.69% up 0.87% decrease in yearly ROA, depending on the sample, which is equivalent to 8.72% to 11.01% of the mean ROA over the corresponding sample. In particular, results on the *Early LT-ST Sample* (columns (3) and (4) of Panel A) suggest that long-term suppliers are not able to immediately benefit from doing business with a major partner. A potential explanation could be that efficiency in the supply chain can only offset the gap in relative bargaining power (between a supplier and its major customer) over time, or otherwise stated, that the relationship-specific investments required when committing to a business relationship with a major business partner only fully pay-off once the relationship matures. Consistent with this idea, column (6) of Panel A show that, while customer-base concentration is associated with lower profitability for short-term supplier firms, long-term suppliers benefit from having a major business partner. This effect appears to be non trivial, since a one standard increase in customer-base concentration is associated with a 1.43% increase in ROA (18.1% of the mean ROA over the *Late LT-ST Sample*).

However, Panel A of Table 3.5 also shows that, regardless of the sample, suppliers in a long-term relationship with one or several major customers are able to obtain a higher ROA, on average. In particular, this effect varies from an increase in 1.8% to an increase in 3.1%, depending on the specification. This represents 16.4% to 28.3% of the mean ROA, depending on the sample. Most important, the increase in operating performance due to long-term relationships is higher during the build-up phase, as suggested by columns (3) and (4) which report the highest *LT Customer* estimates. Overall, these results are consistent with the idea of long-term relationships allowing supplier firms to be more profitable by securing a more efficient and safer stream of operating income, despite the potential costs associated with

terms, respectively. In Panel C, the associated p-values are 0.047 and 0.031 for the *Linkage* and *CC* interaction terms, respectively.

operating with a limited number of major customers. In addition, the benefits of committing to a potentially long-term relationship (through higher relationship-specific investments, for instance) are higher in the early stages, during which both parties need to establish that the relationship can effectively be profitable over the long run.

Panel B of Table 3.5 further reports results for the asset turnover regressions. Such tests allow me to investigate whether the effects of long-term relationships on profitability at the supplier level documented in Panel A stem from similar impacts on overall sales. While we do not find that customer-base concentration is significantly correlated to supplier firms' asset turnover in either the *LT-ST Sample* or *Early LT-ST Sample*, we still find that long-term suppliers are able to reach higher sales (to total assets) than their short-term counterparts. This effect also appears to be stronger during the early stage of the customer-supplier relationships, which might suggest that supplier firms are able to obtain better terms (e.g. set higher sale prices) when selling their output to a customer when both parties are committed to engaging in a durable relationship. In addition, results in column (6) of Panel suggest that customer-base concentration is detrimental to short-term suppliers' sales, whilst long-term supplier firms are able to benefit from having a major partner once the relationship reaches maturity. Results also show that the average long-term supplier in a late-stage relationship is able to generate higher revenues than its short-term counterpart. Overall, the somewhat mixed results in Table 3.5 Panel B can be interpreted as a sign of suppliers being able to overcome the discrepancy in bargaining power with their major customers only through enduring business relationships.

3.4.3 Long-term buyer-supplier relationships, margins and efficiency

Taken as whole, our results so far suggest, even to a limited extent, that supplier engaging in long-term relationships with one or several customer firms commit to such relationships through lower outside corporate investment and higher relationship-specific investments, both at the early and late stage of the relationship. This allows these suppliers to increase their operating profitability relative to other suppliers which did not engage in a long-term business relationship with any of their buyers, especially in early-stage partnerships. The underlying rationale is here that long-term suppliers put high effort into early-stage buyer-supplier relationships in order to obtain better selling terms from their customers and, overall, reach higher operating efficiency once relationships reach maturity. In order to test this hypothesis, we alternatively examine whether suppliers in long-term relationships with one or several customers are able to obtain better operating margins, and to increase the efficiency of their operating cycle.

Operating margins at the supplier level

We start by examining the impact of customer-supplier relationships on various operating margins, alternatively : (i) the gross margin, (ii) the EBITDA margin and (iii) the profit margin. All variables are defined in Appendix 3.A and the regression models are based on Equation 3.2.

Table 3.6 presents the results. For expositional simplicity, we choose to only tabulate selected results ; in particular those related to the effect of customer related variables. Estimates for the gross margin regressions are reported in Panel A. Results for the *LT-ST Sample* shed light on the detrimental effect of customer-base concentration on supplier firms' gross margin. For instance, the *CC* estimate in column (1) suggests that a one increase standard deviation in customer-base concentration is associated with a 3.45% decrease in gross margins for the average supplier firm. Columns (1) and (2), however, only show a mixed results regarding the correlation between long-term relationships and gross margin at the supplier level for the *LT-ST Sample*. Only after controlling for the potential heterogeneous effect customer-base concentration on supplier firms depending on the type (long or short-term) of relationships they are engaged into, are we able to exhibit a 2.3% significant correlation between long-term relationships and the gross margin for supplier firm, as reported in column (2). In addition, results in column (2) show that the adverse effect of customer-base concentration on gross margin is not negated for supplier firms that engaged in long-term relationships. This suggests that major customers continue to exercise some bargaining power over their suppliers, even when building an enduring business relationship. Overall, this first set of results suggests that long-term relationships can allow supplier firms to improve their gross margin, but most likely through a lower cost of goods sold rather than higher selling prices³⁴.

Next, we investigate whether the life cycle of customer-supplier relationships has an effective effect on supplier firms' gross margin. Columns (3) and (4) of Table 3.6 Panel A present regression estimates for the *Early LT-ST Sample*. Consistent with the idea of major customers exercising their superior bargaining power over their suppliers, even in the context of long-term relationships, we find that customer-base concentration is negatively and significantly correlated to gross margin at the supplier level, and that this effect is not mitigated for long-term suppliers in early-stage relationships. In addition, suppliers do not appear to experience an improved gross margin in the early years of a long-term relationship. Conversely, results reported in columns (5) and (6) of Panel B suggest that suppliers are able to obtain a higher gross margin from long-term buyer-supplier relationships, provided that these relationships are successful enough to reach the maturity stage. One possible explanation, besides long-term customer firms granting better selling terms over time, would be

34. In unreported tests, we find that the ratio of cost of goods sold to sales is indeed lower for long-term suppliers, but only for relationships that reached maturity (i.e. for the *Late LT-ST Sample*).

that supplier firms simply need time to derive efficiency gains from buyer-customer relationships, especially through lower Selling, General and Administrative (SG&A) Expenses or cost of goods sold³⁵.

We further examine the impact of long-term customer-supplier relationships on, alternatively, the EBITDA and profit margin at the supplier firm level. Results are reported in Panel B and Panel C of Table 3.6, respectively, and appear to be more persistent than those presented in Panel A. We, indeed, consistently find an adverse effect of customer-base concentration on operating margins at the supplier firm level. In addition, this effect does not appear to be mitigated for suppliers in the early stage of long-term relationships. Results further show that long-term suppliers are able to reach higher operating margins, relative to short-term suppliers. Whilst this effect does not appear to stem from being in a relationship with a limited number of major customer during early-stage relationships, columns (6) of Panel B and Panel C both suggest the increase in operating margins experienced by suppliers in late-stage relationships is mostly the result of being able to build a successful and lasting relationship with a major customer.

To summarize, Table 3.5 suggests that suppliers are indeed able to obtain higher operating margins through long-term relationships with their customers. In later-stage relationships, these improved margins appear to stem from being able to maintain an enduring business relationship with a major partner (either through better selling terms or increased efficiency, in the form of lower SG&A expenses or cost of goods sold). The sources of these gains are, however, not clearly brought forward. In order to further investigate this question, we focus on the potential effects of long-term relationships on the operating cycle of supplier firms.

Working capital efficiency at the supplier level

In this section, we examine whether the positive effect of long-term relationships on supplier firms' operating performance results from a more efficient operating cycle. To do so, we focus on three indicators of working capital efficiency : (i) the days of trade receivables, and (ii) the days of inventories. All variables are defined in Appendix 3.A. Out of consistency, all regressions follow the empirical model defined in Equation 3.2.

Table 3.7 presents the results. As before, we only report selected results for expositional simplicity. Panel A shows that long-term suppliers are able to improve their receivables tur-

35. See Footnote 34. In unreported tests, we also find weakly significant results suggesting that long-term suppliers are indeed able to decrease their SG&A expenses over time, provided that customer-supplier relationships reach the maturity stage.

nover, regardless of whether the relationship is at an early or late stage. In practice, long-term supplier is able to collect pending invoices six days to eight calendar days faster than its short-term counterpart in the early stage of the customer-supplier relationship, on average, as presented in columns (3) and (4). While one calendar week improvement in receivables turnover might appear rather small, it represents a 12.70% reduction in settlement periods compared the mean days of receivables ratio over the *Early LT-ST Sample*. Most important, the average days of receivables ratio for long-term suppliers falls under the sixty days threshold, often used by financing companies as a rule of thumb in order to determine which receivables are eligible either as collateral for loan agreements, or for factoring agreements. This increase in efficiency for long-term supplier firms during early-stage relationships most likely stems from joint efforts from both suppliers and their customers to ensure the success and duration of their relationships (compared to more "discrete", as opposed to continuous, business relationships). Columns (5) and (6) further suggest that these efficiency gains in terms of receivables turnover are persistent over time and is rather similar in magnitude when comparing late-stage to early-stage relationships³⁶. Overall, these results are, to some extent, in contrast with the existing literature that arguing that and documenting how firms are likely to use their suppliers as sources of liquidity (see Scherer, 1970, Klapper, Laeven, and Rajan, 2012, or Gao, 2015 among others), and shed some further light on customer firms acting as liquidity providers (see, for instance, Garcia-Appendini and Montoriol-Garriga, 2013).

We also consider the effect of long-term relationships on inventories management at the supplier level. Results are reported in Panel B of Table 3.7. Regardless of either the regression specification, or the considered matched sample, suppliers in long-term relationships do not appear to directly benefit from shorter inventories conversion periods. We also find that customer-base concentration is systematically associated with lower days of outstanding inventories ratios, as reported in columns (1), (3) and (5). The economic significance of these results is, however, quite small. The highest estimate (in absolute value) indeed implies that a one standard deviation increase in customer-base concentration is associated to a five-day decrease of the inventories conversion period, on average. Columns (2) and (4) further suggests that while customer-base concentration is negatively correlated to the ratio of outstanding inventories to sales, it is associated to longer inventories conversion periods for long-term suppliers, especially in early-stage relationships. Column (6), however, does not allow me to draw consistent conclusions regarding long-term suppliers in late-stage relationships. The *CC* estimate remains, nonetheless, negative and statistically significant, and its magnitude is similar to the customer-base concentration reported in Panel A. Overall, results regarding inventories management and long-term relationships appear, so far, rather mixed and might deserve more careful attention.

36. In unreported tests, we find that the *LT Customer* estimate is not statistically different between columns (3) and (5), and columns (4) and (6), respectively.

To further investigate this issue, we focus on the extreme case of supplier firms choosing "just-in-time" manufacturing and how it might be affected by long-term relationships. The rationale is here that the effect of long-term relationships on inventories management choices at the supplier level, should there be any, should be stronger when looking at the trade-off between holding some inventories, or none (rather than examining the variation in the level of inventories). To do so, we rebuilt the *LT-ST Sample*, the *Early LT-ST Sample* and *Late LT-ST Sample*, including only manufacturing firms (i.e. firms with 4-digit primary SIC codes higher than 2000 and lower than 3999)³⁷. This allows me to restrict our analysis to firms for which inventories management is particularly crucial. As we are unable to directly observe actual inventories management choices made by supplier firms, we proxy "just-in-time" (hereafter, JIT) manufacturing using firms that exhibit zero inventories at the end of a given fiscal year. We thus build a *JIT* dummy variable that is equal one if a firm reports zero inventories for a given year, and zero otherwise. Although this only allows me to imperfectly identify firms that resort to JIT manufacturing, one can easily acknowledge that this variable is most likely to be positively and significantly correlated to the unobservable choice of firms to follow the JIT approach. Given the dichotomous nature of the *JIT* variable, we use a probit analysis to examine the impact of customer-supplier relationships on the probability of supplier firms resort to JIT production. Out of consistency, all the JIT regressions include the same control variables as those described in Equation 3.2.

Panel C of Table 3.7 presents the corresponding results. As before, only selected results are tabulated for expositional simplicity. In addition, we choose to report results excluding year fixed-effects, as the inclusion of both industry and year fixed-effects drastically reduces all of our sample sizes, and renders any attempt at proper statistical inference quasi impossible³⁸.

Column (1) of Panel C shows that whilst customer-base concentration is positively correlated to the probability of supplier firms operating with zero inventories, long-term suppliers

37. Out of completeness, we repeat the tests presented in Panel B of Table 3.7 on these new samples. The unreported results remains globally unchanged.

38. This issue mostly stems from the restrictive matching procedure we use, which is implemented using the "without replacement" restriction and imposes matched supplier-year observations to be drawn from the same year and industry. This highly reduces the probability of matching long-term suppliers using JIT manufacturing to short-term suppliers that do not follow the JIT principle, and vice-versa. As a result, a significant fraction of matched supplier-years are dropped from the probit regressions, as some of the fixed-effects perfectly predict the outcome variable. Imposing matched observations to be in different categories of the *JIT* dummy, however, also severely decreases our different sample sizes and potentially increases the bias of our matching strategy. Here, we choose the least of two evils and do not modify our matching procedure (also out of consistency), but change the *JIT* probit regression models (we do not consider increasing the number of matched observations, nor do we implement a matching with replacement procedure, which would also increase the bias affecting of our strategy).

exhibit a lower probability of applying the JIT principle to their production process. Results reported in column (2), however, do not confirm these results, as the *LT Customer* estimate appears not to be statistically different from zero. Given that the *LT-ST Sample* makes no distinction between early and late-stage relationships, this absence of statistically significant result could signal an heterogeneous effect of customer-supplier relationships throughout their life cycle. Results for the *Early LT-ST Sample*, reported in columns (2) and (4) of Panel C, show that long-term suppliers in early-stage relationships consistently exhibit a lower propensity to operate with zero inventories. However, customer-base concentration does not affect long-term and short-term suppliers differently, and is still associated with a higher propensity to follow the JIT principle. Switching the focus towards later-stage long-term relationships partially confirms these results, as suggested by columns (5) and (6). On the one hand, suppliers engaged in long-term relationship appear to have a lower propensity of holding zero inventories, and customer-base concentration is positively correlated to the probability of supplier firms choosing JIT production (see column (5)). On the other hand, results in column (6) show that long-term suppliers are even more likely to operate with zero inventories in the later stages of customer-supplier relationships, as suggested by the significantly positive estimate on the interaction term between *CC* and *LC Customer*.

Overall, these results are in line with several rationales. In particular, they are consistent with the idea of firms reducing inventories in order to reduce costs when engaging in business relationships that are designed no to last. On the other hands, they confirm the hypothesis of an heterogeneous effect of the life cycle of long-term customer-supplier relationships on working capital management choices made by supplier firms. During early-stage relationships, long-term suppliers are willing to bear the cost of holding inventories for flexibility purposes, in order to ensure the success of these relationships over time through efficiently meeting customers' demand. As relationships mature and gain in efficiency and, long-term suppliers are able to operate with lower inventories without threatening the continuation of the relationships with their long-term major customers. Yet, the threat of termination, and the associated expected costs, are not fully offset by these gains in profitability and efficiency, even in late-stage relationships.

3.4.4 Long-term buyer-supplier relationships and cash holdings

Finally, we examine whether the nature of customer-supplier relationships leads firm to behave differently in terms of cash management choices. In particular, we focus on overall cash holdings, as measured by the ratio of cash and cash equivalents to total assets. We do so because we are interested in whether long-term supplier firms exhibit a fully peculiar asset structure, besides investing differently in fixed assets and in non-cash current assets (namely, inventories and receivables). As before, we rely on Equation 3.2 to design our em-

pirical tests.

Table 3.8 presents the results. Out of completeness, we report all regression estimates. We find that cash holdings are positively correlated to Tobin's Q and to firm size. Although they might look counter-intuitive, these results are consistent with large U.S. firms accumulating cash over time (see Bates *et al.*, 2009, or Dittmar and Duchin, 2012, for instance) and with growth firms holding cash in order to seize valuable investment opportunities (Kim, Mauer and Sherman, 1998, or Opler *et al.*, 1999 for instance). Conversely, older, profitable firms and firms with more market power hold less cash, on average. While not of direct interest to this study, these results are mostly in line with the existing literature on precautionary cash savings (see Keynes, 1936, for an early development of this theory).

Results reported in Table 3.8 also show that customer-base concentration is consistently associated with higher cash holdings at the supplier firm level. This effect is statistically and economically significant. For instance, the lowest estimate (0.126, in column (5)) implies that a one-standard deviation is associated to a 1.64% increase in yearly average cash holdings. This represents 11.14% of the mean cash over the *Late LT-ST Sample*, and amounts to 14 million USD worth of additional cash holdings for the average firm. Results for the *LT-ST Sample* further suggest that long-term suppliers hold, on average, 1.7% to 2.1% less cash than their short-term counterparts. Yet, explicitly controlling for the different stages of customer-supplier relationships reveals that these lower cash holdings are concentrated among long-term suppliers in later-stage relationships. Additionally, column (6) shows that the positive effect of customer-base concentration is mitigated for these suppliers³⁹.

Finally, although this is not the main point of focus of this study, Table 3.8 exhibits a consistently negative correlation between competition at the customer industry level and cash holdings at the supplier level. In other words, supplier firms operating with major customers in more competitive industries save more cash on average. A possible explanation for this result could be that as competition in customer industries pushes down selling prices set by customer firms for their own output, it also gives them incentives to take advantage of their potentially preferential position as major customers to also push their own suppliers to lower their prices. As a consequence, supplier firms need to hold more cash reserves to finance their own operating cycle. This phenomenon would in particular be relevant for small intermediate good producers or subcontractors, which our different samples are most likely composed of.

Overall, results reported in Table 3.8, although partially at odds with our initially hypothesis, are consistent with the idea of supplier firms only benefit from long-term buyer-

39. The unreported Wald test of the overall estimate on *CC* for long-term suppliers yields a p-value of 0.085

supplier relationships, through lower cash holdings, only once these relationships reach maturity. This lower propensity to accumulated cash reserves most likely due to long-term suppliers achieving higher profitability, and a more efficient operating cycle in the later stages of their business relationships.

3.5 Concluding remarks

This paper presents an empirical analysis of the effect of long-term buyer-seller relationships on performance and organizational choices on a sample of matched industrial suppliers firms with identifiable major customers. We find that, in the cross section of suppliers, firms engaging in long-term business relationships invest more heavily in relationship-specific investments, especially during early-stage relationships, and simultaneously pass on other investment opportunities. This commitment in the early stages of the buyer-supplier relationships allows firms to enjoy higher profitability and higher efficiency once relationships mature. Overall, our results suggest that maintaining an enduring relationship with a limited number of major customers is beneficial to supplier firms in several ways, both in the short and the long run.

These results leave the room for future research. For instance, customer risk might affect long-term suppliers differently over the life cycle of buyer-seller relationships. More broadly, taking risk into more careful consideration might be crucial in shedding light on why only some supplier firms commit to durable business relationships. In addition, results so far suggest that supplier firms benefit from long-term relationship. Do they impact customers symmetrically? Do they allow firms to overcome adverse shocks? Do they affect corporate financing choices? At first glance, these question remains open and might be worth investigating.

References for Chapter 3

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Appendix 3.A Data definition

This table presents variable definitions. Variables are computed for each firm and each year. * indicates that the variable is defined using Compustat data items, while "l." indicates one-year lagged variables.

Name	Description
<i>Customer Firm Level Variables (Source(s) : Compustat)</i>	
- LT Customer	Dummy variable that equals 1 if a given supplier firm reports the existence of the same major customer every year over at least a ten-year period
- CC	Customer-base concentration measure defined following Patatoukas (2012). It is build in the spirit of the Herfindhal-Hirschman index, and is computed as the sum of the squares of the sales shares to each major customer for each year.
- Linkage	Yearly weighted average length (in years) of the relationships of a supplier firms with its major customer, where the weights are the percentages of the supplier firm's sales to each major customer.
- Customer HHI	Yearly weighted average Herfindhal-Hirschman index of a supplier's major customer firms' industry, where the weights are the percentages of the supplier firm's sales to each major customer.
- Relative Cust/Supp Size	Yearly weighted average relative size of a given supplier firm compared to its customer firms, where the weights are the percentages of the supplier firm's sales to each major customer. Relative size is computed as the ratio between the book value of total assets of a given customer firm and the total value of its suppliers total assets. Also denote "Relative Size".
<i>Supplier Firm Characteristics (Source(s) : COMPUSTAT)</i>	
- ROA	oibdp / l.at *
- ROE	ni / (l.prcc_f · l.csho) *
- Tangibility	ppent / at *
- Size	log(at) *
- CapEx	capx / at *

(Continued on next page)

IS MARRIAGE THE KEY TO HAPPINESS? THE EFFECT OF LONG-TERM
CUSTOMER-SUPPLIER RELATIONSHIPS ON SUPPLIER FIRMS

Name	Description
- Net CapEx	$(\text{capx} - \text{sppe}) / \text{at} *$
- Net CapEx to Fixed Assets	$(\text{capex} - \text{sppe}) / \text{ppent} *$
- Leverage	$\text{blev} / \text{at} - \text{che} *$
- Q	$[\text{at} + \text{prcc_fc sho} - \text{ceq}] / \text{at} *$
- Cash	$\text{che} / \text{at} *$
- Inventories	$\text{invt} / \text{at} *$
- Days of Inventories	$\text{invt} * 365 / \text{sale} *$
- Days of Receivables	$\text{rect} * 365 / \text{sale} *$
- Doubtful	$\text{recd} / \text{rect} *$
- Gross Margin	$(\text{sale} - \text{cogs}) / \text{sale} *$
- EBITDA Margin	$\text{oibdp} / \text{sale} *$
- Profit Margin	$\text{ibcom} / \text{sale} *$
- HHI	Yearly Herfindhal-Hirschman index, computed at the 3-digit SIC industry code level.
- Market Share	Yearly ratio of a firm sales to the total sales in its primary industry, where industries are identified using 3-digit SIC codes.
- Firm Age	Difference between the current year and the first year in which a firm appeared in the COMPUSTAT.

TABLE 3.1 – Distribution of sample firms across industries

The *Customer Sample* consists of 7,917 unique industrial Compustat firms (utilities, quasi-public and financial firms are excluded) that report at least one Compustat major customer from 1987 to 2013. This table presents various statistics at the industry level. Industry are identified at the 4-digit SIC code level : *Agriculture, minerals and construction* corresponds to SIC codes between 0000 and 1999, *Manufacturing* corresponds to SIC codes between 2000 and 3999, *Transportation and communications* corresponds to SIC codes between 4000 and 4899, *Trade - Wholesale* corresponds to SIC codes between 5000 and 5199, *Trade - retail* corresponds to SIC codes between 2500 and 5999, and *Services* corresponds to SIC codes between 7000 and 8999. Column (1) reports the proportion of Compustat firms accounted for by each industry. Column (2) reports the industry average proportion of Compustat firms that report the existence of a least one identifiable major customer firm. Column (3) presents proportion of *Customer Sample* firms accounted for by each industry. Column (4) reports the industry average of *Customer Sample* firms that are in a long-term relationship with at least one customer during the sample period. Column (5) reports the industry average relative size of disclosed major customers relative to their respective suppliers. Size is here defined as the total book value of assets. Column (6) presents the distribution across industries of firms that are in a long-term relationship with at least one customer at some point during the sample period. Column (7) reports the distribution across industries of firms that do not share a long-term relationship with any of their customers at some point during the sample period.

Industry	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All Compustat Firms		Customer Sample				
	All firms		All Firms			# LT Cust > 0	No LT Cust.
	% Sample	Reports Client	% Sample	Has LT Cust.	Cust. Rel. Size	% Sample	% % Sample
Agriculture, minerals and construction	8.88%	20.65%	9.07%	9.94%	71.82	3.91%	10.62%
Manufacturing	52.36%	28.27%	63.71%	26.69%	60.65	73.68%	60.72%
Transportations and communications	6.83%	18.08%	5.97%	36.07%	26.20	9.33%	4.96%
Trade - wholesale	4.57%	14.88%	3.48%	18.16%	51.56	2.74%	3.70%
Trade - retail	7.28%	2.66%	0.92%	11.08%	65.31	0.44%	1.07%
Services	20.09%	19.17%	16.85%	13.56%	90.52	9.90%	18.93%

TABLE 3.2 – Summary statistics

This table reports the summary statistics for variables of interest for up to 7,917 unique Compustat industrial firms (utilities, quasi-public and financial firms are excluded) from 1977 to 2014. Panel A presents descriptive statistics for the various variables used throughout this study for the overall *Customer Sample*. Panel B reports univariate comparisons between firms that are in a long-term relationship with at least one major customer (i.e. *LT Customer* = 1) and for which all identifiable customers are long-term ones, and firms that do not appear as having a long-term customer, that are never classified as being in a long-term relationship during the entire sample period (i.e. *LT Customer* = 0 for the entire sample period) and that never reported the same customer for more than five consecutive years.

All variables are winsorized at the 5th and 95th percentiles. Definitions of all variables are reported in Appendix 3.A.

(Table continued on next page)

TABLE 3.2 – Summary statistics (cont'd)

Panel A : Descriptive statistics - Customer Sample

Variables	(1) Mean	(2) Std Dev	(3) Min	(4) Median	(5) Max	(6) Obs
<i>Customer Variables</i>						
LT Customer (dummy)	0.262	0.44	0	0	1	27189
CC	0.105	0.174	0.000	0.04	0.987	27189
Relative Cust/Supp Size	64.42	118.672	0.000	10.843	446.807	27189
Linkage	1.372	1.68	0.017	0.75	8.749	27189
Cust. HHI	0.020	0.028	0.000	0.01	0.158	27189
<i>Supplier Level Variables</i>						
CapEx	0.06	0.056	0.000	0.041	0.221	26984
Leverage	0.241	0.228	0.000	0.195	0.84	25681
Cash	0.189	0.207	0.002	0.098	0.67	25746
ROA	0.075	0.221	-0.641	0.12	0.362	23849
ROE	-0.021	0.214	-0.715	0.037	0.281	20419
Tangility	0.262	0.21	0.004	0.207	0.825	25743
Q	1.987	1.475	0.732	1.438	6.992	22124
Size	4.627	2.074	0.791	4.46	9.209	25758
Gross Margin	0.341	0.224	-0.117	0.316	0.797	27188
Profit Margin	-0.172	0.562	-2.302	0.02	0.229	27189
Days of Receivables	64.867	42.2	4.514	57.108	499.131	27009
Days of Inventories	47.752	39.686	0.000	42.162	157.035	27073
Doubtful	0.042	0.052	0.000	0.025	0.259	20632
Mkt Share	0.034	0.098	0.000	0.003	1	25072
HHI	0.086	0.137	0.000	0.023	1	25771
Log(Age)	2.241	0.962	0.000	2.303	4.159	26354
Age	13.73	12.585	0.000	9	64	27108

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TABLE 3.2 – Summary statistics (cont'd)

Panel B : Long-term relationships - Univariate comparisons

Variables	(1)	(2)	(3)	(4)	(5)
	LT Cust. = 0		LT Cust. = 1		T-stat
	Obs	Mean	Obs	Mean	
<i>Customer Variables</i>					
CC	13777	0.106	4076	0.107	-0.371
Relative Cust/Supp Size	13777	73.602	4076	47.502	13.286***
Linkage	13777	0.752	4076	2.467	-47.613***
Cust. HHI	13777	0.018	4076	0.023	-9.343***
<i>Supplier Level Variables</i>					
CapEx	13678	0.063	4041	0.055	9.09***
Leverage	12602	0.239	4018	0.255	-4.174***
Cash	12640	0.216	4019	0.129	27.129***
ROA	11167	0.030	3944	0.140	-33.563***
ROE	8966	-0.055	3631	0.025	-20.628***
Tangibility	12638	0.259	4020	0.277	-5.226***
Size	12646	4.124	4023	5.483	-36.705***
Gross Margin	13776	0.345	4076	0.333	3.288***
Profit Margin	13777	-0.280	4076	-0.005	-38.924***
Days of Receivables	13646	69.648	4062	55.991	20.915***
Days of Inventories	13705	46.033	4071	51.458	-8.357***
Doubtful	10052	0.047	3312	0.033	15.734***
Mkt Share	10203	2.228	3715	1.696	21.294***
HHI	12268	0.019	3964	0.068	-21.175***
Q	12880	0.074	3968	0.113	-14.039***
Log(Age)	13168	1.951	4025	2.716	-48.93***
Age	13699	10.133	4076	19.966	-41.632***

TABLE 3.3 – Supplier-customer relationships - Matched sample

This table reports results of a propensity score matching procedure on Compustat industrial supplier firms for which I am able to determine the long-term or short-term nature of buyer-seller relationships from 1977 to 2014. Long-term relationships identification is described in Section 3.3.2, from 1977 to 2014. The matching procedure is described in Section 3.3.4. Panel A presents pre- and post-matching regression results of the *LT Customer* dummy variable on various control variables. In each regression specification, the dependent variable is a dummy variable that is equal to 1 if a firm is in a long-term relationship with at least one major customer and only reports the existence of long-term customers during a given year (LT suppliers), 0 for firms that do not have any long-term customer during a given, that are never classified as being in a long-term relationship during the entire sample period, and that never reported the same customer for more than five consecutive years (ST suppliers). In columns (1) and (2), the sample is composed of all LT suppliers and ST suppliers (*LT-ST Sample*). In columns (3) and (4), the sample is composed of all ST suppliers and restricted to LT suppliers in the five first years of the relationships with their customers (*Early LT-ST Sample*). In columns (5) and (6), the sample is composed of all ST suppliers and restricted to LT suppliers that have been in a relationship with their customers for at least 6 years (*Late LT-ST Sample*). Columns (1), (3) and (5) of Panel A show the first-stage marginal effects from a probit regression used to compute the propensity scores for the matching procedure. Columns (2), (4) and (6) of Panel A show the marginal effects from the probit regressions in columns (1), (3) and (5), respectively, using the appropriate subsample of matched suppliers. Panel B reports the univariate statistics comparing the mean propensity scores and characteristics of supplier for each appropriate matched subsamples.

Definitions of all variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

(Table continued on next page)

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TABLE 3.3 – Propensity score matched sample analysis (cont'd)

Panel A : Pre-matching propensity score regression and post-matching diagnosis Regression						
	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable = LT Customer (dummy)						
Variables	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	Pre Matching	Post Matching	Pre Matching	Post Matching	Pre Matching	Post Matching
Linkage	1.673*** (18.135)	0.067 (0.869)	0.824*** (10.119)	0.029 (0.318)		
Rank(Linkage)					2.500*** (20.097)	-0.032 (-0.234)
CC	-5.228*** (-6.883)	-1.139* (-1.808)	-1.038* (-1.887)	-0.283 (-0.453)	-1.706*** (-3.163)	0.330 (0.536)
Cust. HHI	-5.642** (-1.975)	0.440 (0.150)	0.686 (0.272)	0.529 (0.175)	-7.290*** (-2.628)	0.374 (0.122)
Relative Size	0.000 (1.100)	-0.000 (-0.117)	0.001** (2.096)	0.000 (0.369)	0.000 (0.129)	0.000 (0.277)
Size	0.343*** (6.756)	-0.011 (-0.201)	0.367*** (7.164)	0.002 (0.038)	0.322*** (5.158)	-0.001 (-0.021)
HHI	-0.272 (-0.450)	-0.190 (-0.271)	-0.454 (-0.686)	0.068 (0.089)	0.018 (0.025)	-0.526 (-0.621)
ROA	1.871*** (4.743)	0.154 (0.389)	2.271*** (6.058)	0.504 (1.240)	2.135*** (4.249)	0.324 (0.637)
Q	0.036 (0.695)	0.022 (0.409)	0.002 (0.048)	-0.057 (-1.072)	-0.071 (-0.985)	-0.055 (-0.728)
Leverage	-0.358 (-1.058)	0.188 (0.542)	-0.544 (-1.480)	-0.215 (-0.569)	-0.039 (-0.096)	0.024 (0.054)
Cash	-0.995** (-2.265)	0.119 (0.250)	-0.568 (-1.265)	0.434 (0.893)	-1.607*** (-3.260)	-0.104 (-0.177)
Log(Age)	0.366*** (3.766)	-0.042 (-0.406)	0.202** (2.040)	-0.004 (-0.040)	1.190*** (9.179)	-0.095 (-0.663)
Tangibility	0.341 (0.749)	-0.180 (-0.361)	0.513 (1.070)	0.061 (0.113)	0.467 (0.829)	-0.087 (-0.148)
Mkt Share	1.408* (1.674)	-0.383 (-0.422)	1.767** (2.081)	-0.201 (-0.210)	0.485 (0.456)	0.437 (0.349)
Constant	-4.325*** (-2.969)	-0.459 (-0.274)	-5.036*** (-3.291)	0.762 (0.591)	-12.684*** (-8.848)	-1.065 (-0.663)
Obs.	10,996	3,030	8,055	2,244	9,138	1,577
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

TABLE 3.3 – Propensity score matched sample analysis (Cont'd)

Panel B : Differences in propensity scores and observed variables

Variables	(1)	(2)	(3)	(4)	(5)
	LT Customer = 0		LT Customer = 1		T-stat
	Obs	Mean	Obs	Mean	
<i>LT-ST Sample</i>					
Pscore	1515	0.400	1515	0.403	-0.355
Linkage	1515	1.108	1515	1.117	-0.26
CC	1515	0.086	1515	0.073	0.269
Cust. HHI	1515	0.019	1515	0.018	0.321
Size	1515	5.028	1515	5.052	-0.352
ROA	1515	0.118	1515	0.125	-1.195
Q	1515	1.832	1515	1.859	-0.558
Leverage	1515	0.233	1515	0.235	-0.248
Cash	1515	0.160	1515	0.160	-0.028
Log(Age)	1515	2.515	1515	2.501	0.501
Tangibility	1515	0.262	1515	0.255	1.07
HHI	1515	0.099	1515	0.097	0.396
Mkt Share	1515	0.044	1515	0.041	0.64
Relative Cust/Supp Size	1515	78.792	1515	65.828	1.401
<i>Early LT-ST Sample</i>					
Pscore	1123	0.318	1123	0.322	-0.448
Linkage	1123	0.934	1123	0.933	0.033
CC	1123	0.088	1123	0.086	0.308
Cust. HHI	1123	0.020	1123	0.020	-0.155
Size	1123	5.019	1123	5.003	0.2
ROA	1123	0.132	1123	0.143	-1.546
Q	1123	1.920	1123	1.874	0.787
Leverage	1123	0.242	1123	0.230	1.363
Cash	1123	0.154	1123	0.159	-0.769
Log(Age)	1123	2.446	1123	2.447	-0.035
Tangibility	1123	0.268	1123	0.266	0.258
HHI	1123	0.098	1123	0.099	-0.171
Mkt Share	1123	0.044	1123	0.044	0.037
Relative Cust/Supp Size	1123	75.255	1123	75.294	-0.003

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TABLE 3.3 – Propensity score matched sample analysis (cont'd)

Panel B : Differences in propensity scores and observed variables (cont'd)

Variables	(1)	(2)	(3)	(4)	(5)
	LT Customer = 0		LT Customer = 1		T-stat
	Obs	Mean	Obs	Mean	
<i>Late LT-ST Sample</i>					
Pscore	789	0.4528932	789	0.4555407	-0.199
Linkage	789	1.558954	789	2.874795	-13.213***
Rank(Linkage)	789	3.499366	789	3.510773	-0.342
CC	789	0.118905	789	0.125242	-0.724
Cust. HHI	789	0.0216985	789	0.0233356	-1.012
Size	789	4.945716	789	5.033229	-0.883
ROA	789	0.0938667	789	0.1013021	-0.903
Q	789	1.743962	789	1.712685	0.522
Leverage	789	0.2392219	789	0.2428667	-0.339
Cash	789	0.1595954	789	0.1562937	0.366
Log(Age)	789	2.612303	789	2.597254	0.45
Tangibility	789	0.2571109	789	0.2516641	0.564
HHI	789	0.0914232	789	0.0897207	0.251
Mkt Share	789	0.0367748	789	0.0383673	-0.335
Relative Cust/Supp Size	789	96.12278	789	95.93537	0.014

TABLE 3.4 – LT buyer-supplier relationships and investment behavior

This table reports results relating investment in fixed assets to long-term buyer-supplier relationships for three matched samples of Compustat industrial supplier firms with identifiable major customers from 1977 to 2014. Long-term relationships identification is described in Section 3.3.2, from 1977 to 2014. The matching procedure is described in Section 3.3.4. In Panel A, the dependent variable is equal to the ratio of capital expenditures to total assets. In Panel B, the dependent variable is equal to the ratio of net capital expenditures to total assets. In Panel C, the dependent variable is the ratio of net capital expenditures to fixed assets.

In columns (1) and (2) of Panel A, B and C, the sample is composed of all LT suppliers and ST suppliers (*LT-ST Sample*). In columns (3) and (4) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers in the five first years of the relationships with their customers (*Early LT-ST Sample*). In columns (5) and (6) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers that have been in a relationship with their customers for at least 6 years (*Late LT-ST Sample*).

Definitions of all variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

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TABLE 3.4 – LT buyer-supplier relationships and investment behavior (cont'd)

Panel A : Matched samples - Capital expenditure

Variables	Dependent Variable = CapEx/Assets					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	-0.005*	-0.004*	-0.004	-0.003	-0.007*	-0.004*
	(-1.918)	(-1.837)	(-1.525)	(-1.532)	(-1.669)	(-1.712)
Linkage	-0.004***	-0.003**	-0.004**	-0.002	-0.004**	-0.001
	(-3.122)	(-2.315)	(-2.293)	(-1.198)	(-2.302)	(-0.764)
CC	0.027***	0.010	0.026**	0.005	0.003	-0.016
	(2.891)	(1.093)	(2.418)	(0.441)	(0.301)	(-1.226)
LT Cust. × Linkage	0.004**		0.005**		0.005***	
	(2.109)		(2.214)		(2.778)	
LT Cust. × CC		0.037**		0.046***		0.040**
		(2.466)		(2.674)		(2.476)
Cust. HHI	-0.096**	-0.100***	-0.093*	-0.084*	-0.074**	-0.072**
	(-2.429)	(-2.605)	(-1.961)	(-1.805)	(-2.190)	(-2.060)
Size	-0.001	-0.001	0.000	0.000	0.000	0.000
	(-1.213)	(-1.277)	(0.671)	(0.684)	(0.110)	(0.091)
ROA	0.061***	0.061***	0.058***	0.059***	0.042***	0.042***
	(9.768)	(9.822)	(7.385)	(7.652)	(5.332)	(5.290)
Q	0.005***	0.005***	0.004***	0.004***	0.005***	0.005***
	(5.175)	(5.305)	(4.100)	(4.093)	(3.405)	(3.308)
Leverage	-0.016***	-0.017***	-0.023***	-0.023***	-0.017***	-0.018***
	(-3.241)	(-3.315)	(-4.212)	(-4.284)	(-2.870)	(-3.031)
Cash	0.006	0.005	0.011	0.010	0.009	0.009
	(0.888)	(0.815)	(1.491)	(1.350)	(1.049)	(1.127)
Log(Age)	-0.004***	-0.004***	-0.006***	-0.006***	-0.005***	-0.005***
	(-3.093)	(-3.126)	(-3.983)	(-4.059)	(-2.814)	(-2.746)
Tangibility	0.127***	0.127***	0.124***	0.123***	0.114***	0.113***
	(15.427)	(15.431)	(13.459)	(13.416)	(10.804)	(10.885)
HHI	0.003	0.003	0.010	0.009	-0.003	-0.004
	(0.413)	(0.343)	(0.972)	(0.921)	(-0.286)	(-0.323)
Mkt Share	-0.013	-0.013	-0.021**	-0.022**	-0.027**	-0.028**
	(-1.506)	(-1.520)	(-2.032)	(-2.144)	(-2.171)	(-2.241)
Constant	-0.002	-0.001	-0.023**	-0.024**	0.070***	0.070***
	(-0.106)	(-0.063)	(-2.198)	(-2.227)	(3.029)	(3.201)
Obs.	3,030	3,030	2,246	2,246	1,578	1,578
R-squared	0.396	0.397	0.381	0.383	0.407	0.408
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

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TABLE 3.4 – LT buyer-supplier relationships and investment behavior (cont'd)

Panel B : Matched samples - Net CAPEX to total assets

Variables	Dependent Variable = Net CapEx / PPE					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	-0.004*	-0.003*	-0.006**	-0.005*	-0.003*	-0.002*
	(-1.833)	(-1.784)	(-2.110)	(-1.903)	(-1.827)	(-1.739)
Linkage	-0.002*	-0.001	-0.006***	-0.004***	-0.002	-0.000
	(-1.691)	(-0.531)	(-3.396)	(-2.629)	(-1.150)	(-0.368)
CC	0.028***	0.007	0.042***	0.024**	0.005	-0.010
	(2.743)	(0.640)	(4.047)	(2.335)	(0.524)	(-0.801)
LT Cust. × Linkage	0.004**		0.006**		0.003*	
	(2.079)		(2.430)		(1.696)	
LT Cust. × CC		0.044***		0.041**		0.033*
		(2.726)		(2.528)		(1.961)
Cust. HHI	-0.072	-0.072*	-0.061	-0.063	-0.049	-0.046
	(-1.601)	(-1.648)	(-1.239)	(-1.310)	(-1.354)	(-1.284)
Size	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.128)	(0.022)	(-0.008)	(-0.058)	(0.394)	(0.326)
ROA	0.053***	0.052***	0.055***	0.057***	0.043***	0.043***
	(7.726)	(7.755)	(7.070)	(7.421)	(4.873)	(4.906)
Q	0.004***	0.004***	0.005***	0.005***	0.003**	0.003**
	(4.323)	(4.457)	(4.625)	(4.612)	(2.363)	(2.242)
Leverage	-0.016***	-0.016***	-0.028***	-0.028***	-0.015**	-0.016**
	(-2.906)	(-2.971)	(-4.669)	(-4.809)	(-2.359)	(-2.425)
Cash	0.013*	0.012	-0.004	-0.005	0.013	0.014*
	(1.795)	(1.639)	(-0.590)	(-0.735)	(1.597)	(1.687)
Log(Age)	-0.005***	-0.005***	-0.005***	-0.005***	-0.008***	-0.008***
	(-3.260)	(-3.238)	(-3.155)	(-3.195)	(-3.865)	(-3.882)
Tangility	0.107***	0.107***	0.114***	0.113***	0.105***	0.105***
	(11.601)	(11.580)	(11.017)	(10.975)	(8.690)	(8.740)
HHI	-0.003	-0.003	-0.000	-0.001	-0.022*	-0.022**
	(-0.317)	(-0.381)	(-0.041)	(-0.124)	(-1.944)	(-2.011)
Mkt Share	-0.005	-0.005	-0.001	-0.003	0.009	0.008
	(-0.382)	(-0.451)	(-0.050)	(-0.203)	(0.690)	(0.672)
Constant	-0.016	-0.014	-0.016	-0.018	0.099***	0.098***
	(-0.971)	(-0.873)	(-1.178)	(-1.334)	(4.220)	(4.226)
Obs.	2,414	2,414	1,778	1,778	1,260	1,260
R-squared	0.308	0.310	0.368	0.369	0.372	0.373
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

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TABLE 3.4 – LT buyer-supplier relationships and investment behavior (cont'd)

Panel C : Matched samples - Net CAPEX to fixed assets

Variables	Dependent Variable = Net CapEx / PPE					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	-0.038** (-2.060)	-0.027* (-1.852)	-0.059*** (-2.917)	-0.031* (-1.793)	-0.062*** (-2.933)	-0.043** (-2.445)
Linkage	-0.018* (-1.791)	-0.008 (-0.907)	-0.041*** (-3.245)	-0.021* (-1.734)	-0.015 (-1.479)	0.005 (1.090)
CC	0.035 (0.474)	-0.059 (-0.593)	0.105 (1.140)	0.012 (0.096)	-0.001 (-0.009)	-0.051 (-0.683)
LT Cust. × Linkage	0.024* (1.895)		0.046*** (2.594)		0.024** (2.297)	
LT Cust. × CC		0.207* (1.807)		0.189* (1.750)		0.082 (0.855)
Cust. HHI	-0.352 (-1.153)	-0.361 (-1.204)	0.220 (0.646)	0.210 (0.619)	-0.487** (-2.062)	-0.534** (-2.272)
Size	-0.012*** (-2.726)	-0.013*** (-2.853)	-0.022*** (-3.619)	-0.022*** (-3.585)	-0.011** (-2.146)	-0.011** (-2.165)
ROA	0.288*** (4.656)	0.286*** (4.690)	0.341*** (5.011)	0.342*** (5.011)	0.309*** (3.739)	0.310*** (3.739)
Q	0.061*** (6.648)	0.061*** (6.783)	0.055*** (5.783)	0.055*** (5.800)	0.059*** (4.780)	0.060*** (4.836)
Leverage	-0.101** (-2.569)	-0.103*** (-2.619)	-0.126*** (-3.415)	-0.129*** (-3.472)	-0.098** (-2.311)	-0.099** (-2.306)
Cash	0.140** (2.258)	0.132** (2.119)	0.091 (1.465)	0.087 (1.378)	0.163** (2.501)	0.165** (2.537)
Log(Age)	-0.056*** (-6.101)	-0.056*** (-6.119)	-0.053*** (-5.332)	-0.053*** (-5.362)	-0.077*** (-7.222)	-0.075*** (-7.140)
Tangility	-0.432*** (-8.789)	-0.432*** (-8.752)	-0.437*** (-7.905)	-0.439*** (-7.918)	-0.439*** (-8.212)	-0.441*** (-8.212)
HHI	-0.060 (-1.318)	-0.063 (-1.396)	-0.106** (-2.070)	-0.107** (-2.105)	-0.108* (-1.746)	-0.110* (-1.776)
Mkt Share	-0.068 (-1.182)	-0.071 (-1.254)	0.058 (0.628)	0.043 (0.471)	-0.064 (-0.967)	-0.068 (-1.009)
Constant	0.466*** (4.123)	0.477*** (4.245)	0.620*** (3.913)	0.597*** (3.754)	1.123*** (5.140)	1.112*** (5.064)
Obs.	2,420	2,420	1,780	1,780	1,254	1,254
R-squared	0.303	0.303	0.309	0.306	0.291	0.289
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 3.5 – LT buyer-supplier relationships and firm performance

This table reports results relating firm performance to long-term buyer-supplier relationships for three matched samples of Compustat industrial supplier firms with identifiable major customers from 1977 to 2014. Long-term relationships identification is described in Section 3.3.2, from 1977 to 2014. The matching procedure is described in Section 3.3.4. In Panel A, the dependent variable is equal to the ratio of EBITDA to total one-year lagged assets. In Panel B, the dependent variable is equal to the ratio of net sales to total one-year lagged assets.

In columns (1) and (2) of Panel A and B, the sample is composed of all LT suppliers and ST suppliers (*LT-ST Sample*). In columns (3) and (4) of Panel A and B, the sample is composed of all ST suppliers and restricted to LT suppliers in the five first years of the relationships with their customers (*Early LT-ST Sample*). In columns (5) and (6) of Panel A and B, the sample is composed of all ST suppliers and restricted to LT suppliers that have been in a relationship with their customers for at least 6 years (*Late LT-ST Sample*).

Definitions of all variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

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TABLE 3.5 – LT buyer-supplier relationships and firm performance (cont'd)

Panel A : Matched samples - Return On Assets (ROA)

Variables	Dependent Variable = Return On Assets (ROA)					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	0.024*** (5.859)	0.026*** (5.781)	0.031*** (7.009)	0.032*** (6.577)	0.029*** (4.864)	0.018*** (2.774)
Linkage	-0.003 (-0.871)	-0.003 (-0.888)	-0.001 (-0.268)	-0.001 (-0.265)	0.003 (1.416)	-0.000 (-0.071)
CC	-0.063** (-2.244)	-0.053** (-2.123)	-0.067** (-2.058)	-0.063* (-1.703)	-0.028 (-1.001)	-0.074** (-2.006)
LT Cust. × CC		-0.022 (-0.444)		-0.009 (-0.238)		0.114*** (2.749)
Cust. HHI	0.156 (1.605)	0.156 (1.609)	0.278** (2.445)	0.276*** (2.586)	-0.104 (-0.937)	-0.104 (-0.941)
Size	0.007*** (4.124)	0.007*** (4.101)	0.006*** (3.366)	0.006*** (3.733)	0.007*** (3.178)	0.007*** (3.130)
ROA	0.643*** (24.464)	0.643*** (24.389)	0.664*** (25.266)	0.664*** (27.916)	0.679*** (20.344)	0.677*** (20.266)
Q	0.009*** (2.764)	0.009*** (2.764)	0.010*** (3.448)	0.010*** (3.569)	-0.001 (-0.116)	-0.001 (-0.232)
Leverage	-0.016 (-1.366)	-0.016 (-1.348)	-0.037*** (-2.939)	-0.037*** (-2.774)	-0.016 (-0.997)	-0.017 (-1.050)
Cash	-0.056*** (-3.207)	-0.055*** (-3.152)	-0.076*** (-3.995)	-0.076*** (-4.030)	-0.081*** (-3.191)	-0.080*** (-3.159)
Log(Age)	0.005* (1.945)	0.005** (1.995)	0.010*** (3.335)	0.010*** (3.425)	0.004 (0.915)	0.003 (0.604)
Tangibility	0.060*** (4.529)	0.060*** (4.530)	0.065*** (3.883)	0.065*** (4.170)	0.045** (2.346)	0.048** (2.520)
HHI	0.020 (1.167)	0.021 (1.201)	0.020 (0.966)	0.020 (1.019)	0.016 (0.609)	0.016 (0.589)
Mkt Share	-0.037* (-1.771)	-0.037* (-1.785)	-0.027 (-1.153)	-0.027 (-1.246)	-0.000 (-0.000)	-0.006 (-0.195)
Constant	0.020 (0.621)	0.018 (0.567)	-0.041 (-1.573)	-0.041 (-1.480)	-0.042 (-1.158)	-0.037 (-0.853)
Obs.	3,030	3,030	2,246	2,246	1,578	1,578
R-squared	0.604	0.604	0.628	0.628	0.584	0.586
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

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TABLE 3.5 – LT buyer-supplier relationships and firm performance (cont'd)

Panel B : Matched samples - Asset turnover						
Variables	Dependent Variable = Asset Turnover					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	0.087** (2.460)	0.068* (1.679)	0.164*** (4.541)	0.144*** (3.456)	0.072** (2.277)	0.040* (1.789)
Linkage	0.030 (1.634)	0.030 (1.646)	0.051** (2.148)	0.052** (2.156)	0.033*** (3.054)	0.023** (2.018)
CC	-0.123 (-0.905)	-0.233 (-1.362)	-0.203 (-1.068)	-0.306 (-1.168)	-0.131 (-0.958)	-0.280* (-1.685)
LT Cust. × CC		0.243 (1.140)		0.233 (0.884)		0.361* (1.701)
Cust. HHI	-0.979 (-1.428)	-0.981 (-1.432)	-0.994 (-1.202)	-0.944 (-1.131)	-1.582*** (-3.240)	-1.581*** (-3.240)
Size	-0.128*** (-9.785)	-0.128*** (-9.796)	-0.115*** (-8.323)	-0.115*** (-8.303)	-0.134*** (-12.569)	-0.134*** (-12.667)
ROA	1.010*** (10.339)	1.006*** (10.236)	1.014*** (8.158)	1.021*** (8.331)	1.102*** (11.014)	1.096*** (10.850)
Q	0.053*** (3.851)	0.054*** (3.848)	0.048*** (2.899)	0.048*** (2.904)	0.024 (1.572)	0.022 (1.437)
Leverage	-0.273*** (-2.841)	-0.274*** (-2.858)	-0.382*** (-3.946)	-0.386*** (-3.986)	-0.101 (-1.203)	-0.104 (-1.238)
Cash	-1.503*** (-13.555)	-1.507*** (-13.582)	-1.540*** (-12.410)	-1.550*** (-12.515)	-1.368*** (-13.274)	-1.363*** (-13.154)
Log(Age)	-0.014 (-0.523)	-0.015 (-0.559)	-0.004 (-0.165)	-0.005 (-0.184)	-0.030 (-1.302)	-0.034 (-1.483)
Tangility	-0.708*** (-5.285)	-0.705*** (-5.275)	-0.624*** (-4.262)	-0.625*** (-4.277)	-0.634*** (-5.698)	-0.623*** (-5.570)
HHI	-0.215 (-1.221)	-0.223 (-1.259)	-0.139 (-0.793)	-0.142 (-0.809)	-0.383** (-2.526)	-0.385** (-2.535)
Mkt Share	0.272 (1.058)	0.275 (1.065)	0.317 (1.300)	0.316 (1.299)	0.486** (2.212)	0.466** (2.127)
Constant	2.550*** (8.282)	2.567*** (8.338)	1.903*** (6.230)	1.921*** (6.284)	1.334*** (5.471)	1.350*** (5.446)
Obs.	3,030	3,030	2,246	2,246	1,578	1,578
R-squared	0.419	0.420	0.427	0.427	0.426	0.427
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 3.6 – LT buyer-supplier relationships and operating margins

This table reports results relating operating margins to long-term buyer-supplier relationships for three matched samples of Compustat industrial supplier firms with identifiable major customers from 1977 to 2014. Long-term relationships identification is described in Section 3.3.2, from 1977 to 2014. The matching procedure is described in Section 3.3.4. In Panel A, the dependent variable is equal to the gross margin, i.e. the ratio of net sales minus cost of goods sold to net sales. In Panel B, the dependent variable is equal to the EBITDA margin, i.e. the ratio of EBITDA to net sales. In Panel C, the dependent variable is the profit margin, i.e. the ratio of income before extraordinary items to net sales.

In columns (1) and (2) of Panel A, B and C, the sample is composed of all LT suppliers and ST suppliers (*LT-ST Sample*). In columns (3) and (4) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers in the five first years of the relationships with their customers (*Early LT-ST Sample*). In columns (5) and (6) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers that have been in a relationship with their customers for at least 6 years (*Late LT-ST Sample*).

Definitions of all variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

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TABLE 3.6 – LT buyer-supplier relationships and operating margins (cont'd)

Panel A : Matched samples - Gross margin

Variables	Dependent Variable = Gross Margin					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	0.010 (1.045)	0.023** (2.196)	-0.000 (-0.015)	0.006 (0.510)	0.042*** (2.937)	0.048*** (4.438)
Linkage	-0.003 (-0.498)	-0.004 (-0.569)	0.003 (0.366)	0.002 (0.345)	-0.019** (-2.093)	-0.019*** (-2.742)
CC	-0.296*** (-6.352)	-0.223*** (-3.547)	-0.294*** (-5.534)	-0.265*** (-4.226)	-0.117 (-1.383)	-0.047 (-0.435)
LT Cust. × CC		-0.160 (-1.413)		-0.066 (-0.840)		-0.089 (-0.838)
Cust. HHI	0.710*** (2.900)	0.711*** (2.942)	0.567** (2.442)	0.552** (2.395)	0.480 (1.460)	0.445** (2.012)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,030	3,030	2,246	2,246	1,102	1,102
R-squared	0.374	0.377	0.387	0.387	0.403	0.403
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

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TABLE 3.6 – LT buyer-supplier relationships and operating margins (cont'd)

Panel B : Matched samples - EBITDA margin

Variables	Dependent Variable = EBITDA Margin					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	0.018*	0.023**	0.027**	0.026**	0.040**	0.001
	(1.716)	(2.176)	(2.573)	(2.221)	(2.580)	(0.055)
Linkage	0.022**	0.022**	0.027***	0.027***	0.013**	0.001
	(2.503)	(2.483)	(2.734)	(2.719)	(2.128)	(0.212)
CC	-0.425***	-0.396***	-0.456***	-0.461***	-0.265***	-0.445***
	(-5.359)	(-3.475)	(-4.605)	(-3.609)	(-2.784)	(-3.358)
LT Cust. × CC		-0.064		0.012		0.438***
		(-0.432)		(0.083)		(3.021)
Cust. HHI	0.851***	0.852***	0.829***	0.831***	0.326	0.328
	(3.335)	(3.345)	(3.234)	(3.252)	(1.206)	(1.187)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,030	3,030	2,246	2,246	1,578	1,578
R-squared	0.531	0.531	0.541	0.541	0.506	0.516
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

TABLE 3.6 – LT buyer-supplier relationships and operating margins (cont'd)

Panel C : Matched samples - Profit margin

Variables	Dependent Variable = Profit Margin					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	0.031** (2.488)	0.029** (2.373)	0.029** (2.286)	0.032** (2.500)	0.034* (1.863)	-0.017 (-0.804)
Linkage	0.040*** (3.438)	0.040*** (3.431)	0.038*** (3.077)	0.038*** (3.073)	0.018** (2.028)	0.006 (0.953)
CC	-0.592*** (-5.642)	-0.604*** (-3.842)	-0.483*** (-4.389)	-0.467*** (-3.598)	-0.403*** (-2.700)	-0.729*** (-3.699)
LT Cust. × CC		0.025 (0.128)		-0.033 (-0.187)		0.580*** (3.126)
Cust. HHI	0.755** (2.305)	0.755** (2.300)	0.362 (0.899)	0.359 (0.900)	0.487 (1.510)	0.932*** (2.904)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,030	3,030	2,094	2,094	1,536	1,536
R-squared	0.435	0.435	0.426	0.426	0.357	0.236
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 3.7 – LT buyer-supplier relationships and the operating cycle

This table reports results relating operating margins to long-term buyer-supplier relationships for three matched samples of Compustat industrial supplier firms with identifiable major customers from 1977 to 2014. Long-term relationships identification is described in Section 3.3.2, from 1977 to 2014. The matching procedure for Panel A and B is described in Section 3.3.4. The matching procedure for Panel C is described in Section 3.4.3. In Panel A, the dependent variable is equal to the ratio of total trade receivables to net sales, times 365. In Panel B, the dependent variable is equal to the ratio of total inventories to net sales, times 365. In Panel C, the dependent variable is a dummy variable that is equal to 1 if a firm operates with zero outstanding inventories at the end of a given year, and 0 otherwise.

In columns (1) and (2) of Panel A, B and C, the sample is composed of all LT suppliers and ST suppliers (*LT-ST Sample*). In columns (3) and (4) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers in the five first years of the relationships with their customers (*Early LT-ST Sample*). In columns (5) and (6) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers that have been in a relationship with their customers for at least 6 years (*Late LT-ST Sample*).

Definitions of all variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

(Table continued on next page)

TABLE 3.7 – LT buyer-supplier relationships and the operating cycle (cont'd)

Panel A : Matched samples - Days of receivables

Variables	Dependent Variable = Days of Receivables					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	-7.187*** (-4.473)	-8.604*** (-4.610)	-7.951*** (-4.275)	-6.237*** (-2.812)	-8.514*** (-3.858)	-7.109*** (-2.627)
Linkage	-1.201 (-0.952)	-1.156 (-0.917)	-2.782 (-1.462)	-2.794 (-1.479)	-0.087 (-0.089)	0.376 (0.438)
CC	-11.717 (-1.206)	-20.554 (-1.566)	8.389 (0.565)	17.031 (0.821)	-2.296 (-0.164)	4.082 (0.210)
LT Cust. × CC		18.133 (1.097)		-19.375 (-0.880)		-16.230 (-0.893)
Cust. HHI	24.359 (0.616)	25.783 (0.657)	60.491 (1.107)	56.611 (1.061)	-33.336 (-0.699)	-35.345 (-0.738)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,028	3,028	2,244	2,244	1,568	1,568
R-squared	0.173	0.174	0.184	0.186	0.192	0.193
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

TABLE 3.7 – LT buyer-supplier relationships and the operating cycle (cont'd)

Panel B : Days of inventories

Variables	Dependent Variable = Days of Inventories					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	1.407 (0.721)	-0.701 (-0.325)	0.816 (0.421)	-1.565 (-0.707)	0.224 (0.080)	-0.948 (-0.310)
Linkage	0.524 (0.517)	0.570 (0.570)	-0.013 (-0.011)	0.130 (0.110)	0.345 (0.459)	-0.095 (-0.113)
CC	-25.845*** (-3.456)	-37.658*** (-5.052)	-20.908** (-2.230)	-33.172*** (-3.443)	-25.483*** (-2.784)	-30.431*** (-2.902)
LT Cust. × CC		26.578* (1.926)		26.611* (1.863)		13.996 (0.920)
Cust. HHI	11.686 (0.282)	12.863 (0.310)	22.090 (0.540)	26.056 (0.633)	-3.324 (-0.077)	-1.019 (-0.024)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,024	3,024	2,244	2,244	1,578	1,578
R-squared	0.349	0.351	0.334	0.337	0.307	0.308
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

(Table continued on next page)

TABLE 3.7 – LT buyer-supplier relationships and the operating cycle (cont'd)

Panel C : Matched samples of manufacturing firms - Just in Time Production

Variables	Dependent Variable = Zero Outstanding Inventories (dummy)					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	-0.657** (-2.179)	-0.471 (-1.261)	-1.041*** (-3.121)	-0.896** (-2.566)	-1.537** (-2.041)	-3.745*** (-2.639)
Linkage	0.092 (0.786)	0.098 (0.832)	-0.092 (-0.650)	-0.092 (-0.643)	-0.121 (-0.568)	-0.288 (-1.158)
CC	1.519** (2.189)	1.760** (2.034)	1.698** (2.242)	1.843** (2.001)	2.826** (2.245)	2.969** (2.382)
LT Cust. × CC		-0.753 (-0.587)		-0.553 (-0.440)		6.750** (2.315)
Cust. HHI	-4.040 (-1.274)	-4.208 (-1.360)	-3.278 (-0.654)	-3.257 (-0.652)	-1.735 (-0.438)	-0.957 (-0.235)
Other Controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	1,282	1,282	1,354	1,354	494	494
Pseudo R-squared	0.579	0.581	0.563	0.564	0.674	0.687
Year dummies	Yes	Yes	Yes	Yes	No	No
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 3.8 – LT buyer-supplier relationships and cash holdings

This table reports results relating cash holdings to long-term buyer-supplier relationships for three matched samples of Compustat industrial supplier firms with identifiable major customers from 1977 to 2014. Long-term relationships identification is described in Section 3.3.2, from 1977 to 2014. The matching procedure is described in Section 3.3.4. The dependent variable is equal to the ratio of total cash plus cash equivalents to total assets.

In columns (1) and (2) of Panel A, B and C, the sample is composed of all LT suppliers and ST suppliers (*LT-ST Sample*). In columns (3) and (4) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers in the five first years of the relationships with their customers (*Early LT-ST Sample*). In columns (5) and (6) of Panel A, B and C, the sample is composed of all ST suppliers and restricted to LT suppliers that have been in a relationship with their customers for at least 6 years (*Late LT-ST Sample*).

Definitions of all variables are reported in Appendix 3.A. Standard errors are corrected for heteroskedasticity and clustering at the supplier firm level (robust t-statistics are reported between brackets). *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

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CUSTOMER-SUPPLIER RELATIONSHIPS ON SUPPLIER FIRMS

TABLE 3.8 – LT buyer-supplier relationships and cash holdings (cont'd)

Variables	Dependent Variable = Cash					
	LT-ST Sample		Early LT-ST Sample		Late LT-ST Sample	
	(1)	(2)	(3)	(4)	(5)	(6)
LT Customer	-0.017** (-2.106)	-0.021*** (-3.561)	-0.008 (-0.929)	-0.010 (-1.484)	-0.042*** (-3.859)	-0.034*** (-3.909)
Linkage	0.003 (0.553)	0.003 (0.758)	-0.006 (-1.111)	-0.006 (-1.337)	0.002 (0.500)	0.005 (1.420)
CC	0.163*** (3.936)	0.140*** (3.104)	0.194*** (4.808)	0.184*** (4.997)	0.126*** (3.029)	0.162*** (3.682)
LT Cust. × CC		0.046 (0.819)		0.021 (0.397)		-0.092* (-1.723)
Cust. HHI	-0.553*** (-3.041)	-0.547*** (-3.840)	-0.474** (-2.315)	-0.472*** (-3.110)	-0.481*** (-2.876)	-0.485*** (-3.829)
Size	0.009*** (3.215)	0.009*** (4.906)	0.010*** (3.608)	0.010*** (4.857)	0.004 (1.253)	0.004* (1.779)
ROA	-0.130*** (-4.580)	-0.131*** (-6.009)	-0.148*** (-4.852)	-0.148*** (-5.640)	-0.149*** (-4.121)	-0.148*** (-5.019)
Q	0.033*** (7.478)	0.033*** (11.426)	0.037*** (8.600)	0.037*** (10.805)	0.028*** (4.082)	0.028*** (5.739)
Leverage	-0.277*** (-12.731)	-0.277*** (-18.865)	-0.275*** (-11.003)	-0.276*** (-15.738)	-0.281*** (-11.559)	-0.280*** (-15.109)
Log(Age)	-0.012** (-2.034)	-0.013*** (-3.498)	-0.013** (-2.110)	-0.013*** (-3.113)	-0.025*** (-3.156)	-0.024*** (-4.055)
Tangibility	-0.188*** (-7.607)	-0.188*** (-10.922)	-0.201*** (-6.536)	-0.201*** (-9.278)	-0.216*** (-6.788)	-0.215*** (-9.279)
HHI	-0.035 (-1.187)	-0.036* (-1.846)	-0.013 (-0.384)	-0.013 (-0.554)	-0.064 (-1.512)	-0.064* (-1.847)
Mkt Share	-0.079** (-1.990)	-0.078*** (-3.124)	-0.116*** (-2.719)	-0.116*** (-4.027)	-0.060 (-1.121)	-0.057 (-1.517)
Constant	0.182*** (3.278)	0.185*** (5.818)	0.200** (2.493)	0.201*** (4.078)	0.216** (2.582)	0.216*** (2.945)
Obs.	3,020	3,020	2,244	2,244	1,594	1,594
R-squared	0.470	0.470	0.479	0.479	0.457	0.459
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes

Conclusion

Dans un climat économique devenu incertain et extrêmement concurrentiel, les entreprises doivent faire preuve, en ce qui concerne la gestion de leur trésorerie, d'anticipation et de précaution. Cette flexibilité traduit alors la capacité des firmes à s'adapter aux transformations de leur cadre d'activité. Limiter le recours à la dette (afin de disposer d'une marge de manœuvre appréciable) et diversifier les sources de financement deviennent essentiels. Nous avons ici mis en avant qu'une telle démarche nécessite notamment de négocier en amont ses conditions d'emprunt (en disposant par exemple de lignes de crédit), d'être prévoyant en ce qui concerne ses relations clients-fournisseurs (c'est-à-dire de se prémunir du risque client, mais également de s'assurer de relations clients long terme qui améliorent l'efficacité du cycle opérationnel du producteur et garantissent un niveau minimum d'activité), d'être réceptif aux attentes des investisseurs (notamment en diversifiant ses sources de financement), ou encore de veiller à une communication financière efficace (afin de paraître attractif pour les éventuels investisseurs, notamment à travers le versement de dividendes).

Le premier chapitre de ce manuscrit met ainsi en regard les intérêts divergents en matière de trésorerie des actionnaires d'une entreprise et des dirigeants qu'ils ont mandaté pour en diriger les opérations. Nous montrons alors que la distribution d'un dividende en actions permet aux entreprises de temporairement réduire la rémunération de leurs actionnaires, sans pour autant être sanctionnées par ces derniers. En particulier, ce mécanisme offre aux firmes la possibilité de conserver des liquidités et de la flexibilité en période de contraction de l'économie.

Cependant, l'étude réalisée au cours de ce premier chapitre ne permet pas de déterminer l'identité exacte des investisseurs optant pour le paiement d'un dividende sous forme d'actions. De même, les données disponibles ne permettent pas d'observer si ces actionnaires choisissent de conserver les actions nouvellement acquises, ou s'ils préfèrent les revendre immédiatement sur le marché. En ce sens, l'identification et l'impact d'éventuelles stratégies d'arbitrage autour de la distribution d'un dividende en actions apparaissent comme des questions ici laissées en suspens.

A travers le second chapitre, nous nous sommes interrogés sur la relation entre l'envi-

ronnement opérationnel des entreprises et leurs choix en matière de gestion des liquidités. Nous y abordons notamment la question de l'impact du risque client, sur la préférence des entreprises en matière de réserves de liquidités, entre trésorerie et lignes de crédit. Un risque client accru semble ainsi inciter les entreprises à détenir plus de trésorerie et à moins recourir aux lignes de crédit. En outre, l'accès aux liquidités bancaires apparaît comme plus coûteux pour les firmes devant supporter un risque client élevé. Ce coût se traduit notamment par des taux d'intérêts plus élevés, mais également par une augmentation du nombre de clauses restrictives pour les entreprises les plus risquées.

En l'espèce, signalons l'absence d'analyse portant sur l'utilisation effective des liquidités des entreprises au cours de leur cycle d'exploitation. En l'état, les travaux réalisés dans ce second essai ne permettent pas en effet d'identifier si une augmentation du risque client conduit les entreprises à financer leurs créances clients en utilisant leurs réserves de trésorerie, ou en appelant tout ou partie des fonds disponibles sur leurs lignes de crédit. En outre, le recours à des sources dites alternatives de financement (titrisation des créances clients, affacturage, etc.) n'est ici pas abordé.

Enfin, le troisième article de cette thèse se concentre sur les conséquences des choix organisationnels des entreprises. Nous y traitons notamment de l'intérêt pour une firme d'établir des relations de long terme avec ses clients. En premier lieu, l'établissement de tels partenariats semblent requérir un engagement initial important de la part du fournisseur. Ce dernier doit en effet renoncer à saisir une partie des opportunités externes d'investissement s'offrant à lui au cours des premières années de la relation. Une fois arrivés à maturité, les partenariats de long-terme apparaissent alors comme une source d'efficience (réduction des délais clients) et de profitabilité accrues, pour ce qui est du cycle opérationnel des entreprises.

Dès lors, si ce troisième chapitre met en évidence plusieurs aspects positifs des relations clients-fournisseurs de long terme, il ne constitue qu'une première étape vers l'établissement de l'éventuelle optimalité de tels partenariats. L'étude plus précise des coûts opérationnels supportés par les fournisseurs dits "de long-terme", ainsi que de l'évolution de leur élasticité au cours du temps, devra notamment y être réalisée. De même, l'impact de ces contrats implicites sur la stratégie des entreprises en matière d'innovation semble mériter d'être analysé en détail. Enfin, notons que les travaux ici réalisés ne considèrent pas la possibilité pour les entreprises d'internaliser leur cycle de production. En d'autres termes, les résultats mis en avant ne permettent pas de remettre en question l'optimalité du processus d'intégration, soulignée par la théorie des coûts de transaction.

Au-delà des axes d'étude suggérés par ces différentes limites, cette thèse semble mener à

plusieurs autres pistes de réflexion relatives à la gestion de trésorerie des entreprises. Notons par exemple, l'absence récurrente de la composante fiscale dans l'analyse des choix des entreprises en matière de détention de liquidités. Pourtant, l'existence de nombreux dispositifs incitatifs dans les différents régimes fiscaux constitue un sujet d'étude potentiellement crucial. En particulier, de nombreuses administrations fiscales semblent accorder une importance certaine aux dispositifs basés sur le système du crédit d'impôt⁴⁰. Or, la portée souvent politique de ces dispositifs et leur récurrent manque de pérennité dans le temps créent des incertitudes réelles pour les entreprises destinées à en bénéficier. Surtout, à l'instar du crédit commercial, ces mécanismes créent des décalages mécaniques de trésorerie pour les firmes, qui nécessitent d'être compensés. Faisant suite à ce travail de thèse, il serait alors opportun de s'interroger sur l'impact des mises en place et des retraits successifs des dispositifs de crédit d'impôt, sur le comportement des entreprises en matière de gestion de leurs liquidités. Plus généralement, il se pose la question de l'évolution de la stratégie des firmes en ce qui concerne la gestion de leur trésorerie, dès lors que le régime fiscal auquel elles sont soumises connaît une réforme.

40. Notons ici : les crédits d'impôt sur les frais de R&D et sur les bénéfices réalisés à l'étranger accordés aux firmes américaines, ou encore, le crédit d'impôt recherche (CIR) et le crédit d'impôt pour la compétitivité et l'emploi (CICE) en France.

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Résumé

Dans un environnement économique toujours plus compétitif, tendu et incertain, les entreprises doivent faire preuve d'adaptabilité, de précaution et d'anticipation.

Ce manuscrit aborde ainsi plusieurs thématiques liées à ce constat, qui touchent de près la notion de gestion de trésorerie.

Le premier essai de cette thèse montre que la distribution d'un dividende en actions permet aux entreprises de temporairement réduire la rémunération de leurs actionnaires, sans être sanctionnées par ces derniers. Ce mécanisme permet aux entreprises de conserver liquidités et flexibilité en période de contraction de l'économie.

Le second essai traite du lien entre risque client et politique de gestion des liquidités. Un risque client accru semble alors pousser les entreprises à détenir plus de trésorerie et à moins recourir aux lignes de crédit.

Enfin, le troisième essai justifie de l'intérêt d'établir des relations clients-fournisseurs de long terme. Ces partenariats apparaissent alors comme une source d'efficacité et de profitabilité accrues du cycle opérationnel des entreprises.

Mots Clés

Trésorerie ; Rémunération des actionnaires ; Dividende en actions ; Lignes de crédit ; Relations clients/fournisseurs ; Risque client ; Principe de précaution

Abstract

The increasingly competitive and uncertain economic environment requires firms to show caution and to anticipate their needs.

Based on this observation, this thesis discusses several topics that are closely related to corporate cash management choices.

The first chapter of this thesis shows that offering an optional stock dividend enables firms to temporarily reduce cash outflows to shareholders without being penalized by the market. This peculiar type of payout then allows firms to maintain their levels of liquidity and flexibility during economic downturns.

The second chapter focuses on the link between customer risk and corporate liquidity management choices. High customer risk then appears to lead firms to hold higher cash reserves compared to credit lines.

Finally, the third chapter highlights the benefits of maintaining long-term buyer-supplier relationships. These partnerships then arise as sources of increased operating efficiency and profitability for supplier firms.

Keywords

Cash Management ; Payout Policy ; Optional stock dividends ; Bank credit lines ; Buyer-supplier relationships ; Customer risk ; Precautionary principle