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THÈSE

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L'IMPACT DU DROIT ET DE LA REGULATION SUR LES INSTITUTIONS

FINANCIERES : TROIS ESSAIS

JURY

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"Conformity can be costly in a world of uncertainty, which requires innovative institutions creation because no one can know the right path to survival. Over time, the richer the cultural context in terms of providing multiple experimentation and creative competition, the more likely the successful survival of the society"

Douglass North

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Sommaire

CHAPITRE INTRODUCTIF

1) CONTEXTE

Dans un univers où les agents économiques échangent entre eux afin de satisfaire leurs besoins, Arrow et Debreu (1954) ont démontré que l'équilibre général est atteint, sans intermédiaire, par un système de prix qui égalise l'offre et la demande. Cette conception idéale d'un marché parfait ne saurait se concrétiser dans un milieu où l'information n'est pas partagée, ne serait-ce qu'en raison de son coût. L'incertitude caractéristique des marchés financiers a pour corollaire une asymétrie d'information qui aboutit à un déséquilibre dans les relations contractuelles entre le principal et l'agent (Hart et Holmström, 1987). On distingue deux formes d'asymétrie d'information : la première, engendrant les problèmes dits de sélection adverse, précède la signature du contrat et provient du manque d'information quant à la qualité des agents (Akerlof, 1970). La seconde, à la source du problème de l'aléa moral, se concrétise après la signature du contrat. Dans ce cas spécifique, l'asymétrie d'information se traduit par la méconnaissance des intentions futures des agents. Le problème est illustré par Jensen et Meckling (1976) dans le cadre de la théorie de l'agence. Les auteurs soulignent alors les coûts liés à la relation d'agence : coût de contrôle, coûts de dédouanement et coûts résiduels.

C'est ainsi que les institutions financières interviennent essentiellement pour résoudre les problèmes d'asymétrie d'information (Leland et Pyle, 1977) et réduire les coûts des transactions. Dans cette perspective, les banques sont tout à fait légitimes sur le marché de crédit. Ainsi, elles évaluent au préalable le projet d'investissement de l'emprunteur et se chargent du suivi de son comportement. Douglas Diamond (1984) explique que les banques sont les institutions idoines pour assurer l'intermédiation financière par un contrôle efficient des débiteurs. Williamson (1985) confirme que le contrôle des comportements opportunistes des emprunteurs peut se révéler coûteux pour le prêteur. L'auteur souligne que les banques exercent un rôle essentiel en absorbant certaines externalités et en réduisant les coûts de transaction inhérents aux marchés financiers.

Le risque est cependant inhérent aux métiers de la banque. En premier lieu, l'opération de crédit bancaire implique un risque de signature en cas de défaut de l'emprunteur. Ce risque peut naturellement être diversifié par la banque.

Le risque de liquidité provient, quant à lui, de la transformation des ressources à court terme (les dépôts) en engagements à plus long terme (les crédits). Diamond et Dybvig (1983) démontrent que le risque de liquidité se réalise lorsque les clients cherchent à récupérer leurs

dépôts simultanément, soit suite à des signaux négatifs quant à la valeur des actifs bancaires, soit dans le cadre d'un mouvement général de perte de confiance des ménages engendrant des comportements de ruées fondés sur une rationalité mimétique. C'est le cas de la banque britannique Northern Rock qui a connu une ruée bancaire en 2007 suite à sa difficulté de lever des fonds sur le marché. L'intervention du gouvernement britannique, nationalisant temporairement la banque Northen Rock le 17 Février 2008, a stoppé la crise.

Enfin, les banques peuvent également investir les fonds qu'elles détiennent dans des produits dérivés exposés au risque de marché.

La dernière crise financière a toutefois révélé que la détresse d'une seule institution financière peut, en raison des relations interbancaires, en fragiliser d'autres. L'ensemble du système financier et par la suite l'économie réelle, sont susceptibles d'être affectés par la matérialisation du risque pris par un seul établissement. L'article de Brunnermeier et al. (2012) démontre que le risque systémique[1] est accentué par les banques qui investissent sur les marchés financiers plutôt que par celles qui limitent leur activité principale à l'octroi de crédit. L'accroissement des activités sur les marchés financiers est un facteur de risque systémique, notamment parce que les mêmes actifs « *toxiques* » sont détenus par plusieurs banques . La chute du prix de tels actifs génère un effet de contagion exposant l'ensemble du secteur financier à de lourdes pertes. Pour mesurer la contribution d'une banque au risque systémique, les économètres ont développé des mesures statistiques complexes. Bisias et al. (2012) fournissent une revue de littérature des mesures du risque systémique qui sont utilisées dans la recherche financière. Dans notre travail de thèse, nous nous intéresserons au risque systémique et à ses déterminants juridiques et considérerons comme outil de mesure la « Conditional Value-at-Risk » (CoVaR). Cette mesure, développée par Adrian et Brunnermeier (2016), prend en compte la dépendance dans les queues de la distribution entre les rendements de l'institution financière et ceux du marché, et fait appel à la régression quantile[2]. CoVaR peut ainsi être définie comme la Value-at-risk du marché financier conditionnelle à la « détresse » d'une institution, c'est à dire lorsque l'institution en question atteint son niveau de VaR, ou autrement dit son niveau de perte extrême. ΔCoVaR permet de mesurer la contribution d'une institution à la crise du système en faisant la différence entre la VaR du système quand une institution est en « détresse » et celle du système quand la même

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[1] "*la crise systémique est une rupture dans le fonctionnement des services financiers (i) causée par la dégradation de tout ou partie du système financier et (ii) ayant un impact négatif généralisé sur l'économie réelle*"

[2] http://www.econ.uiuc.edu/~roger/research/rq/rq.pdf

entreprise est dans un état « normal ». Cette mesure nous permettra, par la suite, d'analyser la diffusion du risque d'une institution financière à l'ensemble du système financier.

Les effets combinés de la récente crise financière de 2007 et du développement des technologies de l'information sont à l'origine de la croissance exponentielle des fintechs[3]. Celles-ci offrent des services plus rapides et plus économiques que les institutions financières traditionnelles. Il s'agit de startups qui proposent des services variés tels que des modes de paiement en ligne, blockchain[4], de la finance participative, des robots conseillers, des services financiers issus du « Big Data » etc. Les fintechs sont généralement des sociétés en phase de démarrage et ayant des difficultés pour lever des fonds. Pour financer leurs projets, les fintechs peuvent avoir recours à des fonds de capital risque. Ces derniers ont pour vocation de financer les entreprises innovantes en phase de création ou les jeunes entreprises à fort potentiel de croissance. Naturellement, le développement du marché des technologies financières a suscité, au cours de ces dernières années, l'intérêt des chercheurs, des décideurs politiques ainsi que des chercheurs. Dorfleitner et al. (2017) ont constitué une base de données unique sur le marché allemand en segmentant le marché de la fintech. L'étude a montré que les fintechs sont un moteur d'innovation dans l'industrie financière. Les auteurs ont conclu que ces entreprises contribuent à la stabilité financière et à la croissance en offrant des services simples et transparents. De façon plus générale, un récent rapport d'Accenture (2016) a constaté que le volume d'investissement global dans les entreprises fintech s'élevait à 12,21 milliards d'USD en 2014 et a augmenté de 75% en 2015 pour atteindre 22,3 milliards[5]. Le rapport a montré une hausse stable du montant injecté, partant de presque 1,7 milliards USD en 2010 et atteignant 22,3 milliards USD en 2015. Les mêmes conclusions peuvent être tirées concernant le volume de transaction, avec 338 transactions en 2010, comparé à 1108 en 2015. Les États-Unis ont clairement dominé le marché de la fintech pendant toute la période. Le rapport a également montré une hausse de la présence des entreprises fintech en Europe et dans la zone Asie-Pacifique en 2014-2015. Dans la même optique, Goldman Sachs affirme que, dans un avenir proche, les institutions financières traditionnelles pourraient observer une diminution de leurs revenus de 660 milliards USD, du

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[3] L'expression FinTech combine les termes "Finance" et "Technologie" et sera utilisée comme abréviation par la suite dans la thèse.

[4] La Blockchain est une technologie de stockage et de transmission d'informations, transparente, sécurisée, et fonctionnant sans organe central de contrôle.

[5] "Fintech and the evolving landscape: landing points for the industry", Accenture (2016), Accenture Consulting. Disponible sur : http://www.fintechinnovationlablondon.co.uk/pdf/Fintech_Evolving_Landscape_2016.pdf

fait des activités de la fintech au niveau des paiements, du financement participatif, de la gestion de patrimoine et des prêts[6]

Les fintechs, ces nouveaux entrants de la finance, porteurs d'innovation et parfois de ruptures, bouleversent les modèles classiques des services offerts par les acteurs traditionnels. D'où vient l'intérêt d'identifier les origines de la croissance de ce nouveau secteur très prometteur.

La règlementation bancaire est légitime pour prévenir la faillite des banques, limiter les risques liés aux institutions financières et préserver la stabilité générale du système financier. La régulation bancaire, basée d'abord sur les accords Bâle I et Bâle II, ne prend pas correctement en compte les événements rares comme le risque systémique. Ces accords ont notamment vocation à minimiser le risque de défaut de chaque institution financière. Le principal outil de régulation consiste à imposer un niveau minimal de capital à chaque institution en fonction du risque de ses actifs. Ce niveau minimal est calculé comme le montant minimal de capitaux nécessaires pour couvrir des risques identifiés par leurs sources. Acharya (2009) a montré que le risque systémique découle pour partie de la corrélation des rendements des actifs des bilans bancaires. Il explique dans son étude que les portefeuilles d'actifs bancaires sont corrélés en raison des comportements mimétiques des banques. Acharya recommande que la réglementation prudentielle se concentre sur le risque de faillite du système financier et conclut que les exigences d'adéquation du capital devraient augmenter avec la corrélation des risques entre les banques. Par la suite, les accords de Bâle III ont renforcé le dispositif réglementaire de fonds propres des banques. Le nouveau dispositif considère donc le levier en lien avec les fonds propres déduits du risque, et vise à limiter le recours abusif à l'endettement au sein du système bancaire. Le dispositif de Bâle III est aussi enrichi de divers éléments macro prudentiels qui contribuent à contenir les risques systémiques résultants de la procyclicité et de l'interdépendance des établissements financiers.

Les dispositions des accords de Bâle sont cependant qualifiées de droit « *souple* », et souvent dépourvues de force contraignante ; en opposition au droit « *dur* » qui crée des obligations entre les agents concernés. La régulation financière et le droit sont importants parce qu'ils conditionnent le comportement des banques en matière de prise de risque, ainsi que la dynamique de l'industrie et l'émergence de nouveaux acteurs financiers en son sein.

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[6] "The future of Finance Part 3: the Socialization of finance." Goldman Sachs Global Investment Research (March 13, 2015).

North (1990, p.3) note que « *l'ordre juridique comprend toute forme de contraintes que les êtres humains conçoivent pour donner forme à leurs interactions* ». Il peut être formel ou informel. Li et Zahra (2012) définissent l'ordre juridique formel comme « *un ensemble de règles contractuelles, politiques et économiques qui régulent les comportements individuels* ». North (1990) définit l'ordre juridique informel comme l'ensemble des coutumes, des traditions et des normes religieuses fondant une société. Les différences entre pays, à la fois pour les contraintes formelles et informelles, doivent être prises en considération pour expliquer la diversité des prises de décision en matière économique. Le droit contient les règles qui gouvernent les transactions commerciales entre les différents agents dans la société. Il soutient les transactions de marché en définissant les droits de propriété et en permettant leur transfert et protection (Arrow, 1974).

Des questions cruciales sont de nos jours encore débattues et reçoivent un éclairage renouvelé dès lors que le droit est intégré à la réflexion : pourquoi le marché de crédit est-il plus développé dans certaines sociétés que dans d'autres ? Pourquoi certaines sociétés parviennent-elles à innover plus que d'autres ? Qu'est-ce qui influence l'émergence de nouveaux acteurs financiers ?

Solow (1957) a démontré que les seuls facteurs de production ne permettent pas d'expliquer les différences de croissance économique entre les pays. Une édition revue de la publication d'Adam Smith (1976) a souligné que l'économie de marché ne peut fonctionner que lorsque les règles sont respectées, que les droits de propriété sont garantis et les contrats honorés. Cette version a ensuite conclu que le maintien de la justice et de l'État de droit sont essentiels. Dans le même champ d'étude, Hayek (1960) a attiré l'attention sur le droit de la propriété privée comme « *essentiel pour prévenir la contrainte, pour assurer la liberté et pour améliorer le bien-être personnel* ». Par ailleurs, les historiens économiques se sont intéressés, eux aussi, à l'étude du lien entre le droit et la croissance. North et Thomas (1973) considérent le droit comme le déterminant fondamental du développement. Les auteurs ont développé un modèle de régression qui a ensuite été fréquemment utilisé par les économistes pour étudier la relation entre le droit et la croissance. Des études ultérieures ont reconnu que des facteurs politiques, culturels, et juridiques pouvaient opérer en tant que variables indépendantes influençant l'organisation des entreprises, leur performance et in fine la croissance.

De récentes recherches empiriques en droit et en finance ont été initiées par les articles de La Porta et al. (par la suite LLSV, 1997). LLSV (1997,1998) abordent la question du lien entre droit et gouvernance d'entreprises. Ces études soulignent l'impact du droit sur le mode de

financement et de gouvernance des entreprises. Elles concluent à la supériorité du système de « common law » britannique sur le système de droit civil français. Elles affirment enfin que les pays de common law, protégeraient mieux les investisseurs (LLSV ; 1998, 2000), auraient des marchés d'actions et d'intermédiaires financiers plus développés (LLSV, 1997), des entreprises à l'actionnariat plus divers (LLSV 1998) et des gouvernements plus efficaces et moins corrompus (LLSV, 1999).

2) QUESTIONS DE RECHERCHE

Dans ce cadre de réflexion qu'est l'interface du droit et de la finance et dont nous avons brièvement esquissé le pourtour, la genèse et souligné le potentiel, notre réflexion aborde trois questions de recherche ayant pour commun dénominateur les conséquences de choix juridiques pour les acteurs de l'industrie financière et bancaire dans une perspective d'efficacité économique.

Dans le premier chapitre, nous examinons l'impact du droit des entreprises en difficulté sur la prise de risque des banques en utilisant une approche comparative dans un cadre d'analyse international. Nous avançons l'hypothèse que le risque systémique est influencé par le droit des entreprises en difficulté.

L'impact de la dernière crise financière systémique illustre les effets nocifs de la défaillance simultanée d'un grand nombre de banques sur l'économie réelle : un coût important est la faillite de milliers de sociétés. À titre d'exemple, Tirole et al. (2013) mentionnent que la crise financière a induit une hausse du nombre de défauts de paiement des entreprises dans les pays européens (61 000 cas de défaut en 2012, soit une hausse de 1,5% par rapport aux données de 2011). Selon la littérature, il existe un lien direct entre les procédures collectives et le financement des entreprises. Plusieurs études ont souligné les aspects positifs de procédures collectives favorables aux créanciers. Tout d'abord, une procédure collective défavorable au créancier altère l'offre de crédit[7] et rend les créanciers réticents à prêter. A l'inverse, une procédure collective favorable au créancier peut limiter le comportement opportuniste des emprunteurs et atténuer leurs investissements (Acharya et al, 2011). A titre d'exemple, un droit autorisant l'exécution des sûretés peut dissuader les emprunteurs d'une prise de risque excessive. Un tel droit renchérit le coût de la défaillance et limite ainsi le risque puisque, ex-ante, les mauvais emprunteurs craignent la liquidation. De même, en cas de défaut de l'emprunteur, un droit des entreprises en difficulté favorable aux créanciers permet une

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[7]L'endettement est la source principale de financement des sociétés (Tirole et al; 2013).

liquidation rapide des sociétés non-viables et la restructuration de celles qui le sont (Giné et Love, 2010).

Les recherches existantes indiquent qu'une amélioration de la protection des créanciers améliore le financement disponible aux sociétés saines (Qian et Strahan, 2007) et contribue à la survie des sociétés en difficulté (Rodano et al. 2016 ; Pellerin et Walter, 2012). Toutes ces études se sont focalisées sur les aspects positifs du droit des entreprises en difficulté favorisant les créanciers tandis que peu se sont intéressées à l'impact négatif. L'article de Houston et al (2010) envisage l'impact du droit des entreprises en difficulté sur la prise de risque bancaire, mais cette étude est limitée à la mesure du risque de solvabilité sans que ne soit abordé le risque de contagion.

Dans notre premier chapitre, nous comblons ce manque et étudions le rôle que joue le droit des entreprises en difficultés sur le risque systémique bancaire, lorsqu'une banque en détresse peut contaminer le système financier. Nous posons la question suivante : **Une meilleure protection des créanciers dans les procédures collectives peut-elle contribuer à la prise de risque des banques et à l'accroissement de leur contribution au risque systémique** ?

Dans le second chapitre, nous présentons la première étude empirique consacrée à la formation des startups de fintech et à leur distribution géographique. Cette étude, principalement explicative, fournit des résultats intéressants quant au développement d'un nouveau modèle d'entreprise basé sur l'interconnexion entre la finance et les nouvelles technologies via internet. Après la crise financière de 2007-2009, et la détérioration de la santé des acteurs traditionnels de l'industrie financière, nous avons assisté à la création d'un nouveau modèle d'entreprise bouleversant la manière traditionnelle dont les services financiers sont offerts. Selon un article de Bloomberg, « *sans la crise financière et la colère populaire que celle-ci a engendrée contre tout le système bancaire, le domaine de la fintech n'existerait pas*»[8] . Un autre article de Forbes affirme : «*Après la crise de 2008, les banques ont fait face aux exigences supplémentaires de fonds propres et ont également essuyé des critiques pour le non-respect des règles existantes. Même si les startups fintech sont soumises à la plupart des* règles *de leurs homologues traditionnels, elles n'ont pas les contraintes supplémentaires liées aux litiges, aux sanctions et à d'autres pénalités auxquelles plusieurs*

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[8]http://www.bloomberg.com/gadfly/articles/2016-02-22/fintech-funding-will-suffer-as-banks-tighten-reins

grandes institutions ont dû faire face au cours des dernières années »[9]. Outre la réponse réglementaire, l'émergence de la fintech pourrait être liée au manque de confiance du public envers l'industrie des services financiers, au rationnement des crédits, aux banquiers d'investissement lésés par la crise et au développement des technologies de l'information. La littérature est toutefois lacunaire concernant les facteurs qui encouragent le développement du marché mondial de la fintech. Peu d'études empiriques ont examiné en effet l'ensemble des différents segments du marché de la fintech. Dushnitsky et al. (2016) proposent un aperçu complet du marché européen de financement participatif et concluent que des aspects juridiques et culturels influencent la création des plateformes de financement participatif. Cumming et Schwienbacher (2016) examinent les investissements en fonds propres dans les startups fintech au niveau mondial. Ils attribuent les transactions en fonds propres dans le secteur de la fintech à la différence d'application des réglementations des institutions financières entre les startups et les grandes institutions financières. Dans cette perspective, nous posons les deux questions suivantes : ***Pourquoi certains pays accueillent-ils plus de startups fintech que d'autres ? Quels sont les moteurs de l'émergence du marché global de la fintech ?***

Dans le troisième chapitre, nous examinons les déterminants juridiques de l'implantation des banques à l'étranger à travers les investissements directs dans différents pays. La littérature démontre qu'un environnement juridique inefficace diminue les investissements étrangers et accroît les coûts de transaction connexes. Par ailleurs, les investisseurs sont réticents à injecter de l'argent dans de nouveaux marchés lorsque le système juridique du pays d'accueil ne prévoit pas de mécanismes peu onéreux permettant de faire valoir les droits. Globalement, de faibles coûts de transaction sont assurés lorsque la législation du pays d'accueil est de qualité, que ses tribunaux et son administration sont dotés d'une infrastructure adéquate. Une réglementation juridique et économique qui favorise les investisseurs étrangers augmente la probabilité de voir se développer des banques étrangères dans un pays d'accueil. D'autres études ont prouvé que les banques étrangères préfèrent investir dans des pays avec moins de restrictions réglementaires. En outre, des recherches ont montré que les réglementations commerciales inefficaces augmentent le coût de la conduite des affaires, ce qui décourage les entrées des investissements directs étrangers (IED). Outre le paiement des impôts, il existe des coûts liés à la conformité aux lois fiscales ; ce fardeau est considéré comme un obstacle à

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[9]http://www.forbes.com/sites/falgunidesai/2016/02/27/an-inside-look-at-fintech-marketplace-lenders/#13a2143d89ac

la conduite des affaires. Les banques étrangères préfèreraient être présentes dans des pays avec moins de contraintes administratives. Des études ont également démontré que la corruption augmente les coûts de la conduite des affaires et réduit la probabilité des investissements bancaires étrangers (Cuervo-Cazurra, 2006 ; Fisman et Svensson, 2007). De récents articles empiriques tendent à démontrer que l'IED dans le secteur bancaire peut assumer le rôle de catalyseur de développement financier et économique dans les pays d'accueil. Cela se produit par la réduction des contraintes financières, l'accroissement de la concurrence parmi les prêteurs locaux et enfin par l'exécution des contrats (Bruno et Hauswald, 2013). Dans ce cadre, Aizenman et Spiegel (2006) étudient les implications de l'exécution forcée des contrats sur les caractéristiques de l'IED. En se basant sur une analyse transversale, ils trouvent que la corruption entraîne une diminution de l'IED. Les auteurs soulignent que les agents locaux sont, plus que les agents étrangers, disposés à limiter les effets de la corruption. Un autre article, de Quéré et al. (2007), confirme lui aussi l'hypothèse selon laquelle les différences dans les entrées de l'IED dans des cadres juridiques différents sont significativement corrélées à une variété de facteurs réglementaires. Parmi ces facteurs, on trouve le niveau de corruption, le système fiscal et l'efficacité du système juridique. Or, les études antérieures ne fournissent pas de preuves suffisantes concernant l'impact des restrictions réglementaires sur les IED. Ces restrictions sont illustrées par l'impossibilité pour un investisseur étranger de détenir plus de 50% d'une filiale ou pour le personnel qualifié étranger d'exercer sa profession. Enfin, la littérature est lacunaire en ce qui concerne les coûts de transaction liés aux IED. D'où notre dernière problématique : *Quels sont les facteurs juridiques qui contribuent à la présence de banques étrangères dans un pays donné ?*

3) LES SOURCES DE DONNEES ET LA METHODOLOGIE

Une approche empirique a été adoptée pour les trois chapitres étudiés. Les données recueillies diffèrent pour chacun d'eux.

Pour le premier chapitre, nos données ont principalement été extraites de Compustat et du Center for Research in Security Prices (CRSP) afin d'obtenir les prix quotidiens historiques des banques et d'autres mesures comptables. Les données de notre échantillon concernent seulement les banques commerciales ayant le code SIC à deux chiffres 60-61. La décision de prendre en considération les seules banques commerciales cotées est basée sur la notion de diversification des risques. Le concept de diversification permet aux banques de transférer le risque de crédit en investissant dans des produits dérivés. La principale variable dépendante

est ΔCoVaR proposée par Adrian et Brunnermeier (2016), à savoir une mesure, variable dans le temps, de la quantité de risque systémique générée par une banque particulière. La principale variable indépendante est l'index des droits des créanciers, qui n'est pas variable dans le temps, développé par La Porta, Lopez-de-Silanes, Shleifer, et Vishny (1998). Des données macroéconomiques par pays ont également été extraites des World Bank's Banking and Regulation Surveys (2003)[10], ceci valant aussi pour les variables qui captent l'intensité de la réglementation bancaire. Pour compléter ces données, nous disposons également des informations fournies par la Banque mondiale, et notamment issues de Financial Development and Structure Dataset[11], World Development Indicators[12], World Governance Indicators[13], et World Economic Forum Global Competitiveness Report (2005)[14]. Afin de mener une étude comparative, une base de données de panel a été construite couvrant 34 pays sur la période de 2003 à 2011.

Une approche empirique a été adoptée pour examiner l'impact des droits des créanciers sur le niveau de contribution des banques au risque systémique. Nous avons effectué l'analyse en utilisant des régressions par la méthode des moindres carrées regroupées, en régressant le ΔCoVaR de la banque sur une variable mesurant les droits des entreprises en difficulté dans un pays, ainsi que d'autres variables de contrôle au niveau de la banque et du pays. Par ailleurs, nous avons effectué différents tests de robustesse en répartissant les échantillons dans des groupes différents (par ex. une protection juridique forte *vs* faible) et en mesurant la protection juridique à travers des variables alternatives (par ex. la corruption, la qualité de réglementation et l'efficacité juridique). Enfin, une approche instrumentale a été utilisée. Dans celle-ci, la variable muette des droits des créanciers a été instrumentée par l'origine juridique, la latitude, la fractionalisation ethnique, et la composition religieuse des pays de façon à éviter un biais de causalité inverse.

Pour le deuxième chapitre, notre principale source de données a été la base CrunchBase[15], qui contient des informations détaillées sur la formation des startups fintech et sur leurs

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[10]

http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/0,,contentMDK:20345037~pagePK:64214825~piPK:64214943~theSitePK:469382,00.html

[11] http://www.worldbank.org/en/publication/gfdr/data/financial-structure-database

[12] http://data.worldbank.org/data-catalog/world-development-indicators

[13] http://info.worldbank.org/governance/wgi/#home

[14] http://blogs.worldbank.org/psd/2005-06-global-competitiveness-report

[15] https://www.crunchbase.com/

financements. Les données utilisées dans notre analyse ont été extraites le 9 décembre 2015. Globalement, nous avons identifié 2 849 startups fintech pour la période d'échantillonnage sélectionnée. Pour analyser les déterminants économiques et technologiques qui influencent la formation des startups fintech, nous avons regroupé les informations dans une base de données de panel consistant en 690 observations, soit une période d'observation de 10 ans, de 2005 à 2014, couvrant 69 pays.

Dans notre modèle empirique, nous avons pris en considération cinq variables dépendantes. La première est le nombre de créations de startups fintech. Les quatre autres concernent elles aussi le nombre de créations de startups fintech mais par catégories ou métiers que nous avons identifiés à savoir : le financement, la gestion d'actifs, le paiement et les autres services financiers. Nous avons estimé un modèle binomial négatif à effets aléatoires (RENB), ce qui nous a permis de contrôler pour l'existence de grands centres financiers ou des écosystèmes de startups pour l'innovation technologique. Pour nos variables indépendantes, nous avons utilisé des variables extraites de différentes bases de données. Les variables utilisées dans l'analyse ont été recueillies des sources suivantes : Global Competitiveness Report[16], International Monetary Fund[17], World Telecommunication/ICT indicators Database[18], International Country Risk Guide[19] et World Development Indicators Database[20].

Dans le troisième chapitre, nous avons collecté des données sur l'environnement juridique et commercial de différents pays. Nous avons extrait les données sur les banques sous contrôle étranger de la base de données de Claessens et Van Horen (2015), laquelle couvre 139 pays dans la période 1995-2013. La base de données a été attentivement construite en croisant avec les informations issues de la base Bankscope de Bureau Van Dijk. Enfin, nous avons produit un ensemble complet de données sur les banques étrangères dans différents pays. Cette base de données a permis de construire deux variables dépendantes pour mesurer la présence de banques étrangères. La première de ces variables est le nombre de banques étrangères par rapport au nombre total de banques dans les pays d'accueil pour chaque année. La deuxième variable est le total des actifs bancaires des banques étrangères rapporté au PIB par habitant dans chaque pays d'accueil. Au total, nous avons identifié 4 137 banques

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[16] https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1
[17] http://www.imf.org/external/index.htm
[18] http://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx
[19] http://epub.prsgroup.com/products/international-country-risk-guide-icrg
[20] http://data.worldbank.org/data-catalog/world-development-indicators

étrangères pour la période d'échantillonnage sélectionnée. Afin d'analyser les déterminants juridiques de la présence de banques étrangères, les données ont été regroupées dans un ensemble de données de panel consistant en 352 observations, soit 44 pays sur 8 ans (2005-2012).

Une approche empirique a été adoptée afin d'examiner l'impact de l'environnement juridique sur la présence des banques étrangères dans les pays d'accueil. Nous avons effectué une régression par la méthode des moindres carrés à effets fixes, en régressant la mesure de présence étrangère dans les pays d'accueil sur les variables juridiques en contrôlant avec d'autres variables au niveau du pays. Pour décider quel était le modèle adéquat, un test d'Hausman a été effectué ; ce dernier a soutenu un modèle à effets fixes. Pour les variables indépendantes, nous avons utilisé différentes bases de données qui ont fourni les variables pays-année nécessaires pour construire un panel. Ces variables ont été extraites des bases de données de Claessens et Van Horen[21], des World Development Indicators[22], de l'Organisation de Coopération et de Développement Economique (OCDE)[23], du Fraser Institute[24], de la Heritage Foundation[25] et du Global Financial Development database[26].

4) LES RESULTATS EMPIRIQUES ET LES LIMITES DE LA RECHERCHE

Dans le premier chapitre, « Les droits des créanciers, le risque systémique et les réglementations bancaires : les résultats d'une étude transnationale », nous constatons qu'une meilleure protection des créanciers augmente le risque systémique des banques du pays. Nous séparons ensuite notre échantillon en deux sous-échantillons et montrons que les pays développés sont sensibles aux différences du niveau des droits des créanciers. Une protection juridique supérieure contribue de manière significative à menacer la stabilité du système financier. Dans les pays développés, les banques sont davantage engagées dans les instruments complexes, elles sont plus grandes et plus interconnectées que celles dans les pays en voie de développement. Nous trouvons un impact neutre sur le risque systémique dans les pays en voie de développement avec des protections juridiques différentes. Nous

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[21] https://www.dnb.nl/en/onderzoek-2/databases/bank.jsp
[22] http://data.worldbank.org/data-catalog/world-development-indicators
[23] http://www.oecd.org/corporate/mne/statistics.htm
[24] https://www.fraserinstitute.org/
[25] http://www.heritage.org/index/explore
[26] http://data.worldbank.org/data-catalog/global-financial-development

effectuons également une autre analyse en changeant la mesure de risque bancaire et en utilisant le Z-score. Nous trouvons alors la même tendance avec des résultats significatifs qui mettent en évidence l'impact de la protection juridique sur le risque bancaire.

Ce chapitre présente différentes limites. Le travail a été réalisé en utilisant une approche comparative et en analysant l'impact des indices de protection des créanciers au niveau national. Nous avons comparé les différences des environnements juridiques dans différents pays, et nous avons étudié empiriquement les effets de la réglementation des entreprises. Toutefois, certaines variables juridiques utilisées dans l'analyse sont généralement statiques et pourraient ne pas refléter les importantes réformes qui ont eu lieu dans différents pays. En outre, il est assez délicat de vérifier l'impact du droit car il ne varie pas de façon importante dans une période brève au niveau national. Ainsi, pour contrer ce problème, nous avons utilisé dans l'analyse un modèle de régression adapté a ce genre de cas. Une autre difficulté est le problème d'endogénéité qui découle du traitement des variables liées aux indices des différents droits considérés exogènes dans l'analyse. Des études ont avancé que, même si la réglementation juridique est importante, il serait possible que cette réglementation s'adapte à la réalité économique de façon endogène. Toutefois, pour remédier à un tel biais d'analyse, nous avons adopté la méthode des variables instrumentales. Nous avons, de plus, utilisé les origines juridiques, la latitude, la fractionalisation ethnique et la composition religieuse des pays comme instruments.

Dans le deuxième chapitre, « L'émergence du marché global de la fintech », nous proposons le premier aperçu complet des développements des marchés dans 64 pays. En catégorisant les fintech selon la chaîne de valeur du secteur bancaire traditionnel – les financements, la gestion d'actifs, le paiement, et les autres services financiers, nous montrons que, en termes de créations de startups, le financement est devenu le segment le plus important du marché émergent de la fintech. Il est suivi par les métiers des instruments de paiement, des autres services financiers et enfin par la gestion d'actifs. Nous constatons qu'au niveau mondial, les États-Unis sont le leader dans ce nouveau marché. En Europe, les marchés de la fintech les plus importants se trouvent au Royaume-Uni, en Allemagne et en France. Par ailleurs, nous constatons une montée du nombre des startups fintech suite à la crise financière. Le nombre des startups fintech fondées en 2010 était presque deux fois plus élevé qu'en 2008. Nous examinons aussi pourquoi certains pays ont un marché de la fintech plus grand que d'autres. En particulier, nous analysons certains déterminants économiques et technologiques qui ont

encouragé les formations des startups fintech sur la période de 2005 à 2014. Nous trouvons que les pays présentent davantage de créations de startups fintech quand les marchés de capitaux sont bien développés, que les nouvelles technologies sont facilement accessibles et que les personnes possèdent plus d'abonnements de téléphonie mobile. En outre, nous démontrons qu'un marché du travail de plus grande dimension attire plus d'entrepreneurs dans le domaine de la fintech. A noter que le taux de chômage n'impacte pas la création de startups fintech.

Ce deuxième chapitre présente aussi certaines limites. Premièrement, pour étudier les déterminants de l'émergence du marché des fintech, nous avons utilisé des variables indépendantes au niveau national. Certaines variables ne sont pas spécifiques au secteur du marché des fintech. Cette contrainte vient de l'absence de données à travers les nombreux pays utilisés dans l'échantillon. Deuxièmement, la base de données qui nous fournit les informations sur la création des fintechs et leur distribution géographique est plus exhaustive concernant certains pays que d'autres. Les données peuvent ne pas refléter les chiffres exacts. Enfin, puisque la littérature concernant le marché des fintechs est très limitée, nous n'avons pas eu la possibilité de nous baser sur un modèle théorique afin de valider nos résultats empiriques.

Dans le troisième chapitre, « La réglementation, les impôts commerciaux et la corruption liés à l'investissement étranger direct : une étude transnationale de la présence de banques étrangères », nous examinons l'impact des déterminants juridiques sur la présence de banques étrangères dans un pays donné. À travers un ensemble de données de panel couvrant 44 pays sur la période 2005-2012, nous constatons que certains d'entre eux accueillent plus de banques étrangères quand les restrictions réglementaires sur l'IED sont limitées, que le coût lié au paiement des impôts est plus bas et les gouvernements moins corrompus. Un test de robustesse a été appliqué et a ainsi confirmé nos résultats. De manière générale, ces données mettent en évidence l'importance des efforts entrepris par les gouvernements pour la création d'un environnement plus favorable aux IED à travers une réduction des restrictions ainsi que des coûts associés au capital étranger investi.

Ce chapitre présente aussi quelques limites. Premièrement, notre analyse est basée sur l'attractivité du cadre juridique du pays d'accueil et exclut le développement économique ainsi que le cadre juridique du pays d'origine. Deuxièmement, l'implantation de banques

étrangères peut dépendre de l'état du marché, à savoir qu'elle sera limitée dans un pays où l'offre est déjà conséquente. Le choix d'implantation dans ce cas-là ne dépend pas des critères d'assouplissement des règles du pays d'accueil. Finalement, ce chapitre présente une limite commune aux autres chapitres. Le travail été réalisé en utilisant une approche comparative et en analysant l'impact des règlementations au niveau national. Toutefois, la plupart des variables utilisées sont macroéconomiques et non pas microéconomiques.

Les trois chapitres ont une structure comparable : la question de recherche est tout d'abord développée et motivée, les contributions existantes et la littérature sont ensuite explorées et enfin, une approche empirique conséquente et des résultats détaillés sont présentés.

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CHAPTER 1: CREDITOR RIGHTS, SYSTEMIC RISK AND BANK REGULATIONS: EVIDENCE FROM A CROSS-COUNTRY STUDY

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Abstract

We investigate the extent to which creditor rights protection in bankruptcy induces banks to take more risk, leading to a higher level of systemic risk in the financial system. We apply ΔCoVaR as the measure of systemic risk. Our sample uses 744 listed commercial banks and covers 34 countries. The results show that more legal protection leads to a higher level of systemic risk, suggesting a 'dark side' of strong creditor rights in bankruptcy. Moreover, the effect of creditor protection on bank systemic risk is found in developed countries, but not in developing countries. The results hold when we apply different measures for bank risk taking and creditor rights.

1. Introduction

Many studies aim to establish a link between investor protection and financial development. La Porta *et al.* (1998; LLSV hereinafter) were the pioneers in the law and finance literature, demonstrating that legal protection is relevant for the development of the financial market. They found that both creditor rights and information sharing were associated with faster output growth. In a more recent study, Houston *et al.* (2010) show that creditor protection encourages excessive bank risk taking, which increases the probability of financial crises. They use *Z*-score as a measure for bank risk taking to obtain this result. However, the *Z*-score[27] measure seems to capture individual bank risk rather than any negative impact of a single bank on the financial system of a specific country. According to studies addressing the last financial crisis, contagion through banking linkage should not be neglected (e.g., Acharya and Yorulmazer, 2008; Goldstein and Razin, 2013).

This paper attempts to fill the gap in the literature by examining the link between creditor rights and bank systemic risk. To define bank systemic risk, the study builds on a novel procedure developed by Adrian and Brunnermeier (2016), called the CoVaR methodology. The CoVaR measure enables us to examine the effect of a single bank's distress on the financial system. Our main motivation is centered on the negative externality effects[28] caused by the 2008–2009 financial crisis. Since then, researchers have found that one institution can have a large impact on the functioning (Acharya *et al.*, 2011) of the financial system. We stress that systemic risk goes beyond the traditional view of a single bank's vulnerability to depositor run. At the heart of the concept is the notion of 'contagion', a particularly strong propagation of failures from one institution to the whole financial system.

We suspect that creditor rights protection could have an impact on the behaviors of banks. More precisely, the level of creditor rights protection could influence bank systemic risk in different ways. In a first scenario, more creditor rights could lead to a low level of bank systemic risk. As Acharya *et al.* (2011) argue, firms invest less and take low levels of risk when creditors are well protected. Banks could impose repayment or grab the collateral, which increases recovery if firms default. In a

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27The Z-score is most frequently attributed to Boyd and Graham (1986), Hannan and Hanweck (1988) and Boyd et al. (1993), though its roots can be traced back as a far as Roy (1952).

28A negative externality occurs when a transaction between two parties results in costs, which accrue, in part, to one or more third parties (e.g., society as a whole).

second scenario, we identify two channels through which more creditor rights could lead to a higher level of systemic risk. On the one hand, banks may be less worried about the default of firms and may be willing to lend more to a wider set of borrowers. On the other hand, lower demand may lead to asset substitution; banks could choose a different business model based on derivative investments and other risky projects that increase bank systemic risk (Brunnermeier *et al.*, 2012). If the effect of strong creditor protection is more negative than positive, we should find that more creditor rights lead to an increase in systemic risk at the bank level. To our knowledge, no other study has explored the link between the level of systemic risk and creditor rights.

We test empirically whether better protection for creditors induces banks to take more risk, leading to more systemic risk. We emphasize the effect of laws and legal protection on the behavior of banks by extending the law and finance literature with the use of bank-level data for commercial banks in 34 countries. We then analyze how banks respond to country-level differences in legal protection. Our analysis relies on a panel data set of 744 commercial banks from 34 countries from 2003 to 2011.

Using a random-effects model that controls for bank heterogeneity, we find that better creditor protection increases bank systemic risk. We further separate our sample into two sub-samples and show that developed countries are sensitive to differences in the level of creditor rights at the country level and that these legal protections significantly contribute to aggravating the stability of the financial system. While we find a neutral impact on systemic risk in developing countries with different legal protection, our results show that in developed countries, banks are more involved in complex instruments, are larger and are more interconnected than those in developing countries. We also conduct another analysis by changing the bank risk measure and using *Z*-score, defined as bank distance to insolvency. We find the same trend with significant results, highlighting the impact of legal protection on bank risk. Moreover, for a robustness check, we use several variables to substitute the creditor rights index and still find similar results that confirm the conclusions of the previous analyses.

This paper contributes to the literature in at least three ways. First, we add to the law and finance literature by demonstrating new evidence from bank-level data, according to which better legal protection leads to a higher level of systemic risk. We argue that, far from a neutral effect, these institutional features have a pronounced influence on bank systemic risk. Second, our study contributes to the literature that explores the

determinants of bank systemic risk. In particular, our study adds to extant literature by revealing an important determinant for bank systemic risk. Third, in addition to laws on the books, we test law enforcement by applying different measures for creditor rights protection.

Given this discussion, it is important to understand how the legal, regulatory and institutional environment influences banks' willingness to take risks. The rest of the paper proceeds as follows: Section 2 provides a brief review of the most relevant literature. In section 3, we present the data and methodology used for exploring the link between creditor protection and systemic risk and assess whether it leads to more risk taking. In section 4, we present the results. In section 5, we apply robustness checks and conclude in section 6.

2. Bank Systemic Risk and Creditor Rights

The 2008–2009 financial crisis has led bank regulators to rethink the rationale behind banking regulation. Basel I and Basel II concentrate on the individual aspects of limiting banks' exposure to risk. The global financial crisis, however, has led regulators and governments to adopt macro-prudential approaches that focus on the well-being of the banking system as a whole, with a main interest on inter-linkages between financial stability and the real economy (Borio, 2011; Tobias and Boyarchenko, 2012). As the crisis showed, the contagion in the financial system as a whole through inter-linkages between banks worldwide heightens the probability of systemic risk. The Basel Committee on Banking and Supervision 2012 employed new Basel III requirements, which include additional attention to systemically important financial institutions. The committee identified the most systemically important financial institutions as institutions that become 'too big to fail'. The criteria of identification of these financial institutions are based on five factors. We mention three that are directly related to our analysis. First, the bank size plays a major role in increasing bank systemic risk; as Hovakimian *et al.* (2012) show, large banks are more complex and more engaged in market-based activities. Second, the degree of concentration in the banking sector can have a non-neutral impact on bank systemic risk. Boyd *et al.* (2006) provide empirical evidence that bank concentration is associated with more bank risk. Third, the Basel III committee highlights bank interconnections as one of the major factors that increase systemic risk in the financial

system. Bank linkage can have three types of propagation of financial distress: (1) bank runs and financial contagion on interbank markets (Diamond and Dybvig, 1983; Allen and Gale, 2001), (2) depreciation of common assets (asset price contagion) (Kiyotaki and Moore, 1997), and (3) interlocking credit exposure (Allen and Gale, 2001, 2005). The increasing integration of the world economy and financial system implies that banking developments in one country can affect the stability of banking activity in other areas. In our study, we integrate bank size and banking concentration as control variables, in light of Basel III's suggestion that they clearly affect bank systemic risk.

Since the adoption of the LLSV (1998) aggregated creditor rights index, many researchers have employed the index of creditor rights for measuring the impact of law on capital market development. We implement the LLSV index to measure the level of creditor rights at the country level. We show that creditor rights protection can be one of the major determinants of bank systemic risk. A wealth of recent empirical research has examined the link between creditor protection and economic growth. In a study of 129 countries over 25 years, Djankov et al. (2007) find that the ratio of private credit to gross domestic product (GDP) is positively related to strong creditor rights, stronger legal protections, and information sharing among creditors. John et al. (2008) find that stronger corporate governance is linked to greater corporate risk taking. However, Acharya et al. (2011) find that strong creditor rights lead to reduced corporate risk taking in the form of diversifying acquisitions. When creditor rights are well protected, we expect borrowers to take less risk, thus investing less in the long run, especially in projects with low probability of success. Even in the case of borrower default, stronger creditor rights in bankruptcy allow creditors to employ restrictions on reorganization and to force a change in management during reorganization, which clearly has negative consequences on a firm's management if the firm enters financial distress.

In contrast, stronger protection may lead banks to grant loans to a wider set of borrowers, potentially including riskier firms. Djankov et al. (2007) find that more protection leads to more bank lending. Typically, creditor rights influence both supply and demand. Banks with better protection tend to increase credit supply; at the same time, as reported previously, strong creditor protection encourages firms to lower their long-term investments, leading to lower demand for loans. Lower demand by firms

could lead banks to engage in asset substitution, more precisely to increase their reliance on derivatives and other risky projects.

Other related literature links the change in banks' business models to the level of systemic risk. Shifting from the traditional banking role, an important area of research focuses on the increasing reliance on non-interest income and non-deposit funding in banks. To investigate banks' reliance on non-interest income and the link with bank risk, Demirguc-Kunt and Huizinga (2010) empirically test whether a change in the balance sheet and revenue sources of banks triggered the 2008 crisis. This idea is backed by financial theory, which warns of the likelihood of bank failure as a bank expands into other lines of business (Boyd *et al.*, 1998). It is beneficial for banks to rely on non-interest income in periods of prosperity but is devastating in periods of crises. Banks that ration borrowers might invest funds in risky projects that expose these banks to higher systemic risk.

In summary, our empirical results provide support for the empirical work of Houston *et al.* (2010) and the theoretical work of Boyd and Hakenes (2013), who find that more creditor rights increase bank risk. Overall, the strength of creditor rights clearly influences banks' behavior. We attempt to find a link between bank systemic risk and creditor rights protection.

3. Data and Methodology

We collect data from a large set of countries around the world. We cover the 2003–2011 period and include major developed countries. In total, our sample includes 744 listed commercial banks from up to 34 countries. Among the non-Eurozone countries, the United States accounts for roughly half the sample of listed banks. Our source data to compute CoVaR are CRSP and COMPUSTAT databases for U.S.-listed banks and the COMPUSTAT World daily price database for the rest of the sample.

Our choice of listed commercial banks is based on the notion of risk diversification. The traditional banking model involves collecting deposits and providing credits to customers for their investment needs. The concept of diversification allows banks to shift credit risk by investing in trading and derivatives that further increase bank systemic risk. The ability for banks to change their business models according to their legal protection allows us to empirically investigate the impact of creditor protection on bank systemic risk.

41

3.1. Sample construction

We collect information from two sources to construct our international panel dataset. Because our base unit of observation is the bank and because we need daily stock returns to compute the ΔCoVaR, we begin by extracting listed banks (SIC codes 60 and 61) from the CRSP database for the United States and from COMPUSTAT World daily for the rest-of-the-world countries. For each U.S.-listed bank, we collect PERMNO, returns, adjusted prices, the number of shares outstanding and SIC codes in the CRSP database. Adjusted prices and the number of shares outstanding enable us to compute market values. For the rest-of-the-world countries, we obtain prices, the number of shares outstanding, adjustment factors, location, SIC code and ISIN code from COMPUSTAT World daily. We compute returns by taking into account identifiers for U.S.-listed banks, while ISIN codes offer these for the rest-of-the-world countries. We also use the returns and market values of the banks included in our sample to compute value-weighted banking industry indices at the country level. In addition, we use the BankScope database to calculate bank size, which is the natural logarithm of a bank's total assets. We expect bank size to be an economically significant driver of systemic risk, regardless of the home of a bank. In line with the too-big-to-fail hypothesis, increased probability of a government bailout in the case of default could cause managers to engage in excessively risky projects (Gandhi and Lustig, 2015).

We collect information on the creditor index and legal formalism from Andrei Shleifer's Harvard web pages. The index was updated until 2003, so for our study, we have an unchanged creditor rights index for the whole period. We retrieve country-level 'macro' data from the World Bank's Banking and Regulation Surveys 2003 and 2007 (see Barth *et al.*, 2004, for calculation) for the proxies for bank regulation. To complete the data, we also use the World Bank's Financial Development and Structure dataset, World Development Indicator, World Governance Indicators, and World Economic Forum Global Competitiveness Report (2005). We finally merge our databases into one dataset to obtain our final panel data.

3.2. Measuring systemic risk

Research has increasingly focused on developing measures for capturing an indicator of systemic risk that bank regulators or government institutions can use. We provide three recently used measures to estimate this linkage: Adrian and Brunnermeier's (2016) conditional value at risk (CoVaR), Acharya *et al.*'s (2010) marginal expected shortfall, and Huang *et al.*'s (2011) distressed insurance premium. CoVaR measures the value at risk (VaR) of financial institutions, conditional on other institutions experiencing financial distress; marginal expected shortfall measures the expected loss of each financial institution, conditional on poor performance of the entire set of institutions; and distressed insurance premium measures the insurance premium required to cover distressed losses in the banking system. The three measures are closely related because they capture the magnitude of losses incurred by financial institutions that are strongly linked to one another.

We adopt the ΔCoVaR measure of systemic risk, implemented by Adrian and Brunnermeier (2016). A wealth of research has applied the CoVaR methodology in their analyses. For example, Wing Fong and Wong (2011) assess the interconnectivity among economies using sovereign credit default swap spreads of 11 Asia-Pacific economies. Gauthier *et al.* (2012) estimate systemic risk exposure of the Canadian banking system and define macro-prudential capital requirements as equal to an institution's contribution to systemic risk, using CoVaR as a risk allocation mechanism. De Bodt *et al.* (2013) use ΔCoVaR to show that the implementation of the euro increases systemic risk in the Eurozone. A strong correlation among commercial banks enables us to use CoVaR measures as a loss probability conditional on system-wide losses depending on correlation, even in a period of growth (which may cause such conditional loss probabilities to increase before a systemic shock).

We focus on the measure of systemic risk using CoVaR, which measures tail dependence in the stock returns of individual financial institutions and compares the magnitudes of tail dependence estimates as a measure of the systemic risk created by the institution in question. The basic idea in the systemic risk literature is that, should a systemically important financial institution suffer a large loss and become distressed, this situation will shift the lower tail of the stock return distributions of other banks in the economy. The shift occurs because the institution's distress spreads

throughout the financial sector and chokes off credit intermediation to the real economy.

We calculate CoVaR on the basis of stock return data from CRSP for U.S. banks and from COMPUSTAT World daily for the rest of the world. We target rest-of-world-listed commercial banks with SIC codes 60 and 61. The CoVaR measure of systemic risk is the difference between two 99% VaR measures applied to the conditional return distribution of a portfolio of financial institutions: the 99% CoVaR conditional on the financial institution in question experiencing a return equal to its 1% quantile and the 99% CoVaR conditional on the same institution experiencing a median return. The idea is that if there is systemic risk potential, a near-catastrophic loss by the financial institution in question will left-shift the 1% quantile of the conditional return distribution of a portfolio of financial firms. CoVaR is typically estimated using quantile regression, on the grounds that such estimates are non-parametric and free from biases that may arise from inappropriately restrictive distributional assumptions.

3.2.1. Estimation methodology

Linear regression is a statistical tool used to model the relationship between a set of predictor variables and a response variable. It estimates the mean value of the response variable for a given level of predictor variables. However, to capture the effect of an individual bank on the banking sector as a whole, the use of quantile regression is necessary. In particular, we need to capture the difference between the contribution of bank i being in distress and the same bank i being at the median level of the systemic risk of the banking sector.

To measure how much bank i contributes to the financial system's VaR during stressful times, Adrian and Brunnermeier (2016) examine the difference between the system's VaR conditional on bank i being at a VaR level less the system's VaR conditional on bank i being at a median level:

$$\Delta CoVaR^{j\vee i} = (\text{CoVaR of institutions j conditional on institution i being at a VaR level}) - (\text{CoVaR of institutions j conditional on institution i being at a median level}).$$

Furthermore,

$$X^j = a + B_q^i X^i + e,$$

where X^i measures daily equity return of each financial institution i and X^j measures the total equity returns of all the financial institutions at the country level. This equation describes the regression of X^j on X^i for every institution i. The quantile regression coefficient β_q^i estimates the change in a specified quantile q of X^j produced by a one-unit change in X^i.

We then estimate the 1% sample quantile and the median of the bank's stock return using the predicted hat-α and hat-β ($X_{system} = $ hat-α_q + hat-β_q $X_{individual}$):

$$CoVaR_q^{j|X^{j=VaR_q^i}} = \hat{a}_q^i + \hat{b}_q^i VaR_q^j$$

$$CoVaR_q^{j|X^{j=VaR_q^{50}}} = \hat{a}_q^i + \hat{b}_q^i VaR_{50}^j$$

Finally, bank i's contribution to bank j's VaR (or the financial system: j = financial system at the country level) is

$$\Delta CoVaR_q^{j|i} = \hat{b}_q^i (VaR_q^j - VaR_{50}^j).$$

Two implementation issues must be addressed: the estimation frequency and the choice between equity returns and total returns. First, we choose a yearly estimation frequency, based on daily observations. Second, Adrian and Brunnermeier (2016) use total returns to estimate ΔCoVaR. Because of the drastic reduction of our data when using total returns, we choose equity returns on a daily basis, which allows us to collect data for a large sample of countries and, for each country, for a significant number of banks. De Bodt *et al.* (2013) show that using equity returns instead of total returns gives a similar trend when using U.S. data available in the CRSP database.

3.3. Main independent variables

3.3.1. Measuring creditor rights

As mentioned previously, the line of research in law and finance has advanced in the past decade. In particular, research suggests that efficient legal systems and stronger creditor rights are positively correlated with external financing and economic development (Levine, 1998, 1999; Djankov *et al.*, 2007; Haselmann *et al.*, 2010). Focusing on banking institutions, Laeven and Levine (2009) emphasize the important role of governance structure in shaping bank risk. They find that strong shareholder power and cash flow rights are associated with greater risk-taking behavior. The

45

effects of national regulation on bank risk may also depend on the governance structure of the banks. Houston *et al.* (2010) investigate the links between creditor rights and bank risk and find that an environment featuring stronger credit rights also induces banks to take more risk.

Efficient bankruptcy procedures can *ex ante* enhance the willingness to lend and thus contribute to the development of the economy and firms. For example, when lenders can seize collateral and secured creditors are paid first, they may extend their lending to a wider set of borrowers. Creditor protection encourages lenders to extend the credit facility to borrowers, but doing so merely reflects the laws on the books. However, law enforcement also has a crucial role when firms reach insolvency, as it can make a firm's exit faster and less damaging for creditors. We implement law enforcement variables as a substitute to the LLSV index in the robustness check in section 5.1.

Following LLSV (1998), we use the creditor rights index to measure the powers of secured creditors in bankruptcy. This index consists of four components: (1) restrictions on organizations, such as creditor consent or minimum dividend; (2) no automatic stay or asset freeze imposed by a court on a creditor's ability to seize collateral; (3) secured creditors paid first (i.e., priority distribution when liquidation is enforced as secured creditors are served first); and (4) no management stay if the current management does not stay in control of the firm during reorganization (i.e., the management is no longer allowed to run the business). For each of these powers, a value of 1 is added to the index when a country's laws and regulations provide power to secured lenders. The aggregate creditor index therefore ranges from zero to four, indicating stronger creditor rights as the index increases.

3.3.2. *Contract enforcement time*

Another potential concern is that the effects of creditor rights depend not only on codified rights but also on the enforcement of those rights. For example, a country may have strong creditor protection laws, but applying these laws may be costly in terms of time or money. Contract enforcement time reflects the efficiency of the courts, the main institution enforcing the legal system. The variable represents the number of days it takes to enforce a commercial contract incurred in the enforcement process and is taken from the LLSV (1998) law and finance database. The proxy was

first developed by Djankov *et al.* (2003) and has been updated in the World Bank's Doing Business database. We suspect that having more time to resolve a dispute could have a harmful effect on banks and increase the level of systemic risk.

3.3.3. Information sharing among creditors

Following Houston *et al.* (2010), who find that information sharing increases economic growth and reduces financial instability, we employ the level of information sharing among creditors as a control variable, as it is likely to have an important influence on credit availability and bank risk taking. Banks, which retain a full history of debtors' repayments, could grant loans more easily or extend the amount of credit to borrowers. In contrast, when facing significant information asymmetry, banks prefer to ration debtors and invest elsewhere. Information sharing could be a substitute for bank monitoring, which lowers the cost for banks, resulting in lower loan rates. Prior research has examined the role of credit information sharing in enhancing credit availability (Pagano and Jappelli, 1993; Padilla and Pagano, 1997; Djankov *et al.*, 2007; Brown *et al.*, 2009).

3.3.4. Private and public information-sharing arrangements

In many countries, lenders (e.g., banks, finance companies, credit card companies, retailers, suppliers extending trade credit) routinely share information on the creditworthiness of their borrowers through credit bureaus or information brokers, which in some cases are set up and owned by the lenders themselves and in others are operated independently for profit by a third party. Lenders supply the bureaus with data on their customers; the bureaus collect this information alongside data from other sources (e.g., courts, public registers, tax authorities) and compile a file on each borrower. Lenders that provide data can later obtain a return flow of consolidated data on a credit applicant by requesting a credit report from the bureaus. Most countries have public registries for real estate collateral to protect the seniority rights of collateralized creditors, and bankruptcy information is publicly disseminated to alert present creditors and potential new lenders. These factors can be considered basic forms of publicly enforced information sharing. In several countries, however, government authorities have taken a more active role in fostering the exchange of

information between lenders by creating formal public credit registers, which operate in many respects like credit bureaus.

Indeed, empirical evidence shows that information availability has a positive effect on lending to the private sector. For example, Doblas-Madrid and Minetti (2009) find that when borrowers' history is registered and publicly available, they improve their repayment performance. Brown and Zehnder (2010) suggest that the lending market would collapse in the absence of information-sharing institutions. We expect that bureau institutions have a positive effect on bank systemic risk and help mitigate the high level of risk.

3.3.5. *Country-level bank regulation variables*

We include a series of other political and institutional quality indexes. The World Governance Indicators (Kaufmann *et al.*, 2008) come from 276 individual variables taken from 31 different sources produced by 25 different organizations. The indices measure different dimensions of governance, including control of corruption, rule of law, and government effectiveness. A description of the variables is available in the Appendix.

Next, we employ data on the power and independence of a country's banking supervision authority from Barth *et al.*'s (2006) database (and updated in Barth *et al.*, 2013). We use several indices as follows: the official Supervisory Power Index, entry barriers, and restrictions on banking activities. We expect stricter supervision and regulation to have a limiting influence on systemic risk. We use another set of control variables to capture the structure of the financial sector in each country, and because these variables are time changing, we retrieve the level and changes of structure over time. We include the following measures of the structure of the financial industry: concentration (of the banking sector); we used our own calculation for this variable— total market cap./GDP (at the country level). Using these sets of variables, we can control for micro-level factors that are based on specific business models used by banks and macro-level factors that account for the differences in economic conditions and in the structure of the financial industry across countries.

We also include several country-level variables to control for differences in economic development and institutions across countries. We retrieve two variables from the

World Economic Forum's Global Competitiveness Report (2005).[29] The first is Effbank (perceived efficiency of bankruptcy), which assesses the efficiency of bankruptcy law. The second variable is Loan (perceived access to loans), which measures the ease of accessing business loans; a higher value corresponds to more access to loans. Finally, we include natural logarithm GDP per capita and inflation (extracted from the World Bank's World Development Indicator dataset) as standard macro-economic control variables.

To clearly depict the relationship between creditor protection and systemic risk, in Figure 1 we graph the average delta CoVaR as a function of creditor rights index. As the graph shows, more creditor protection aggravates the average bank systemic risk. In addition to the link between creditor protection and bank systemic risk, we show in Figure 2 the trend of ΔCoVaR for the period from 2003 to 2011. We observe a significant increase in bank systemic risk during the 2008–2009 financial crisis.

--- TABLE 1 ABOUT HERE ---

Table 1 provides summary statistics for countries' banks and legal regulatory institutions. Our sample includes 34 countries with 744 commercial-listed banks around the world. The statistics are based on country-level averages for the period 2003–2011 and show annual data for our main dependent variable measured by ΔCoVaR. We note that for ΔCoVaR < 0, the more the values approach zero, the lower is the contribution of a bank to systemic risk. For the main independent variables, we use the LLSV creditor rights index, which is an aggregate index ranging from 0 to 4, with higher values indicating more protection. As Table 1 indicates, there is ample variation in the bank systemic risk measures and in other relevant variables across countries in the sample period. The table also shows an increase in the level of measured systemic risk when compared with the creditor rights index. It is important to explore the relationship to determine whether an increase in creditor protection may have led to more bank risk taking. We note that the average LLSV index for our sample is 1.54, and the average bank systemic risk measure is –0.04. For the rest of our control variables, we calculate the mean for each variable for the 2003–2011period.

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[29]See http://www.ios-regensburg.de/fileadmin/doc/ios_db/Global_Competitiveness_Index_scores_EU_WB_CIS_2004-2013.xls.

--- TABLE 2 ABOUT HERE ---

Table 2 reports descriptive statistics on the variables that change over time. Among these variables is our dependent variable ΔCoVaR, in addition to bank size, bank concentration, market Cap./GDP, inflation and Ln (GDP per capita). We note that the level of bank systemic risk is at its highest during the financial crisis period, mostly in 2008. We find a sharp decrease of market Cap./GDP, which is also mainly affected by the financial crisis. Moreover, inflation reaches the lowest level at 0.84 points in 2008 but begins to increase again after 2009. The rest of the variables seem to maintain the same trend throughout the period of analysis.

--- TABLE 3 ABOUT HERE ---

Table 3 divides the sample into two sub-samples depending on the level of creditor rights protection. We consider creditor protection low when the index is below 1.54 (the mean of creditor rights by country); otherwise, creditors have more power as the value increases. We then test for significance using our selected variables. We find that our dependent variable ΔCoVaR, the measure of systemic risk, is significantly higher by 0.2 points when creditors are well protected (ΔCoVaR < 0). The average bank size is significantly larger in countries with better legal protection; for banking concentration, the average is also significantly higher in countries with better legal protection. Among the regulation variables, the average of entry requirements, restrictions on activities and supervisory power is significantly higher in countries with low legal protection. Among the macro-economic variables, the average Ln (GDP per capita) is significantly higher in countries with low legal protection. The significant difference in means for most of our control variables gives us additional motivation to explore the relationship between bank systemic risk and creditor rights through a series of control variables at the country level. We now turn to providing a more empirical explanation for the link between creditor protection and the level of systemic risk.

4. Empirical Results

50

Because we analyze panel data, we cannot rely on ordinary least squares regression techniques, as our error terms would be serially correlated. Typically, researchers must choose between a fixed-effects model and a random-effects model when analyzing panel data such as ours; however, we are constrained to use a random-effects model because our primary variables of interest, our indicators of creditor rights, are invariant at both the bank and country levels. Therefore, we cannot estimate our models using fixed-effects methodology because these governance variables would be collinear with the fixed-effects dummy variables. Consequently, we estimate all models using country-level random effects.

We are also unable to treat each bank as an independent observation because we are examining governance indicators measured only at the country level. Consequently, we calculate robust standard errors clustered at the bank level as unreported results.

We estimate the effects of the power of creditors on bank systemic risk by using a panel framework, which allows us to evaluate whether creditor rights lead to higher/lower bank systemic risk over time. Our main dependent variable is ΔCoVaR, and the key independent variable is the creditor rights index. The regression analysis is expressed as follows:

$$\Delta CoVaR^{j|i} = \propto + \beta_1 \text{ Creditor rights measure} + \beta_2 \text{ Information availability measures}$$
$$+ B_3 \text{ Bank regulation control} + B_4 \text{ Bank control} + B_5 \text{ Macro controls } s_j + \varepsilon,$$

where the i and j subscripts indicate banks i and j for the bank industry at the country level, respectively; α the constant; and β_k is a vector of parameters.

- We expect the coefficient of creditor rights to be negatively significant, $\beta_1 < 0$, as more protection leads to a high level of systemic risk

- We expect the coefficient of creditor rights to be positively significant, $\beta_1 > 0$, as more protection leads to a lower level of systemic risk.

- We expect information sharing to alleviate the effect of creditor rights and to reduce the information asymmetry between borrowers and lenders, $\beta_2 > 0$.

- We expect bank regulations to reduce bank systemic risk according to Basel III, $\beta_3 > 0$.

- We expect bank size to be negative, $\beta_4 < 0$, where bank control stands for bank size. Bank size is a major determinant of bank systemic risk; larger

banks are more complex and exert more influence on the financial system in the case of distress.

- We include the macro-variables of log GDP per capita and inflation, as these variables capture a country's level of economic development.

In the following regressions, we run the regression clustered at the country level, as our variables for creditor rights are unchanged over time. Table 4 reports our regression results.

--- TABLE 4 ABOUT HERE ---

Table 4 shows that a higher creditor rights index translates into higher levels of bank systemic risk (ΔCoVaR<0; again, a higher estimated ΔCoVaR implies higher systemic bank risk). In Column (1), the coefficient of creditor rights is negative and statistically significant, indicating that more protection for lenders increases bank systemic risk. A one standard deviation increase in creditor rights (0.84) is associated with a change in ΔCoVaR of approximately –0.007, with –0.04 as the mean in ΔCoVaR. For the control variables, as expected, bank size increases bank integration into higher risks. A one standard deviation increase in bank size (2.07) is associated with a change in ΔCoVaR of approximately –0.02484. For information availability, we find no relationship between information and bank systemic risk. For Ln (number of days), which captures law enforcement, we conclude that more time needed to solve insolvency increases the cost of bankruptcy for lenders and has an impact on systemic risk. For the government and regulatory institutions, we note mainly that higher degrees of bank entry requirements reduce bank systemic risk. In columns (2) to (5) of Table 4, we treat each variable of creditor rights separately to analyze the weight of each law on bank systemic risk. We find significant results for the dummy variable 'secured creditors are paid first', with a high significant level of 5%, and the 'no automatic stay' dummy, with a level of 1%. The highly negative significance for 'the secured creditors are paid first' is quite relevant, as more legal protection encourages banks to lend more even to borrowers with risky projects (high probability of default rates). For the second legal index, 'no automatic stay', banks can seize their collateral in the case of a borrower's default to gain full recovery of their loans. The control variables still show relevant results. Finally, in column (6), we exclude U.S. banks, as some research reports that these banks contribute more to systemic risk also

52

because they have different bankruptcy procedures under chapter 7 and chapter 11. We still find significant results at the 1% level for our main independent variable. In addition, among the control variables, we find that higher banking concentration induces bank systemic risk. Our findings follow prior research that finds a link between concentration and bank stability and, therefore, the probability of financial distress (Boyd *et al.*, 2006). In all the regressions, we include a dummy for the financial crisis period (2008–2009).

However, we run a regression by clustering at the bank level (unreported results), given that we cannot assume independence between our observations. We observe the same bank each year, and by clustering at the bank level, we take into account this limitation. We still find significant results, highlighting the impact of creditor rights on bank systemic risk.

--- TABLE 5 ABOUT HERE ---

Table 5 reports the results for developed and developing countries separately. We distinguish the countries using World Bank classifications, assigning low-, middle-income, and upper-middle-income economies as developing and upper-high-income economies as developed. As banks are larger in developed countries, they may have a more complex business model, have a wider range of activities, and contribute more to systemic risk. We have data on both developed and developing countries, so we tested whether this hypothesis is true. We find that creditor rights increase systemic risk only in developed countries. However, our results may be due to the insufficient data in our sample, as we have only 700 observations for the period. According to Laeven *et al.* (2014), the size and complexity of bank activities do matter when calculating bank systemic risk.

5. Robustness Check

5.1. *Alternative proxies for creditor protection*

As our results show, better legal protection for creditors increases bank systemic risk. Still, using the LLSV aggregate index for our sample may not truly capture what we measure for three reasons. First, the index is unchanged for the whole period of our

study. Second, it captures the efficiency of laws and institutions 'on the books', while law enforcement seems to matter in resolving bankruptcy disputes (Aggarwal and Goodell, 2009). Third, one of the advantages for using these proxies for creditor protection is that we can capture both laws on the books and the efficiency of debt contract enforcement. We extend our results by using four governance indicators retrieved from the Worldwide Governance indicators: control of corruption, rule of law, regulatory quality, and government effectiveness. These governance variables include the process by which governments are selected, monitored and replaced. They also measure the capacity of the government to effectively formulate and implement sound policies. Finally, they capture the degree of respect of citizens and the state for the institutions that govern economic and social interactions. The variables used are updated on the website of the World Bank for the 2003– 2011 period and cover 34 countries studied in the sample. These variables range from –2.5 to 2.5, with higher values indicating better governance. We add to these variables the Efficiency of the Judicial System index, which assesses the judicial integrity in a certain country depending on the way it affects business. The index is produced by the Business International Corporation and ranges between 0 and 10, with lower scores indicating a less efficient legal environment. Our source is LLSV (1998).

--- TABLE 6 ABOUT HERE ---

Table 6 exhibits the pair-wise correlations between the different proxies of legal enforcement, including the judicial/legal effectiveness index (JLEI) developed by the World Bank in 2004. We propose and find that the correlations between these variables are all positive and highly significant. In particular, we find that the rule of law is positive and highly correlated with the other variables of legal enforcement, which suggests that all the variables are another aspect of the rule of law. That is, we conclude that countries that have better rule of law also have a better legal enforcement environment, lower corruption, and more efficient governments.

--- TABLE 7 ABOUT HERE ---

We divide Table 7 into two parts. In the first part, we summarize the variables used to construct our new measure for creditor rights protection. We use the governance

indicators and the JLEI, as these measures are updated on a yearly basis and capture law enforcement. In the second part, we show the different measures used to capture creditor rights protection by having the creditor rights index interact with the governance indicators and the JLEI. The variables capture the effect of law enforcement on creditor regulation. Countries with strong creditor protection could lose their advantage if rules and regulations are not enforced.

--- TABLE 8 ABOUT HERE ---

In Table 8, we replace the creditor rights index, our main independent variable, with several interaction variables, including laws on the books and law enforcement. In column (1) to column (5), we use five different variables to capture the actual creditor rights protection. Our results are highly significant for columns (2) and (3), emphasizing the importance of the rule of law and regulatory quality for the presence of laws on the books (creditor rights index). In columns (4) and (5), the main independent variables still prove significant at the 10% level. For all five columns, bank size increases the level of systemic risk as well as the time to resolve the dispute between lenders and borrowers. These results are not surprising, as we found the same in our main regression. In addition, we find that among bank regulation variables, bank entry requirements decrease the level of systemic risk, as better regulation limits bank risk taking.

5.2. Bank solvency risk (Z-score dependent variable)

Next, we calculate each bank's Z-score, a measure of risk also used in prior research, which equals the return on assets plus the capital-asset ratio divided by the standard deviation of asset returns. Specifically, Z-score = $(\text{ROA} + \text{CAR})/\sigma(\text{ROA})$, where ROA is the return on assets, CAR is the ratio of equity to assets, and $\sigma(\text{ROA})$ is an estimate of the standard deviation of the ROA, all measured with accounting data. Intuitively, the measure represents the number of standard deviations below the mean by which profits would need to fall to just deplete equity capital (Boyd *et al.*, 2006). Recent research (Laeven and Levine, 2009) has used Z-score as a measure of a bank's distance from insolvency (Roy, 1952). A higher Z-score value indicates higher bank stability. As the Z-score is highly skewed, we follow Laeven and Levine (2009) and

use the natural logarithm of the *Z*-score as the risk measure. For brevity, we use the label 'Z-score' to refer to the logged *Z*-score. We therefore calculate the ROA and capital asset ratio as the mean over 2003–2011 and σ (ROA) as the standard deviation of ROA estimated over the 2003–2011 period.

--- TABLE 9 ABOUT HERE ---

In Table 9, for columns (1)–(4), we consider the Z-score a dependent variable. In column (1), we find that a one standard deviation increase in creditor rights (0.84) is associated with a change in Z-score of approximately –.13 (–0.158*0.84). For all four columns, the coefficients of creditor rights are significant, emphasizing the importance of creditor rights at the level of bank systemic risk. We include several variables to control for law enforcement at the country level. These variables are updated on a yearly basis, and as they are highly correlated, as shown in Table (6), we use them separately, one in each regression. Table 9 reports the empirical results.

5.3. *Instrumental variable analysis (reverse causality issue)*

The issue of reverse causality could arise if law reforms are implemented after a financial crisis. Thus, the problem of endogeneity could create bias in the results. However, the potential for reverse causality is less of a concern than in pure cross-country analysis because we are examining the impact of creditor rights on bank-level systemic risk. Still, it could be argued that after each financial crisis, laws could be changed to avoid taking huge risks. We conduct a robustness test using instrumental variable analysis. We implement instrumental variables on the basis of the theoretical and empirical work in the law, institution, and finance literature (La Porta, *et al*., 1998, 1999; Beck *et al.*, 2003; Acemoglu and Johnson, 2005). La Porta *et al.* (1999) and Beck *et al.* (2003) show that differences in legal traditions help explain differences in financial systems today. In addition, legal origin is exogenous because it was forced by colonial powers in developing countries (La Porta *et al.*, 1999; Acemoglu and Johnson, 2005). We therefore include legal origin (English, French, German, and Nordic) as an instrumental variable for creditor rights using data from Djankov *et al.* (2007). Moreover, we include latitude as an instrumental variable, following Beck *et al.* (2003) in using latitude to measure creditor rights. We also

include ethnic fractionalization as an instrumental variable because economies with greater ethnic diversity tend to choose institutions that allow those in power to expropriate resources from others (Beck *et al.*, 2003, 2006). Last, research reports that a country's cultural heritage, as proxies of religious composition, has a significant impact on shaping its political and financial institutions (La Porta *et al.*, 1999; Stulz and Williamson, 2003). Thus, we include the country's religious composition as an additional instrumental variable.

--- TABLE 10 ABOUT HERE ---

As Table 10 shows, the empirical results are rather robust. The coefficients of creditor rights remain negative and significant, thus confirming our finding that stronger creditor rights induce more bank risk taking.

5.4. Financial crisis impact

It might be argued that the impact of creditor rights on bank systemic risk is only relevant during financial crisis periods. However, in periods of growth banks take more risks; they lend more to riskier borrowers, while investing more in derivatives and securities with high risks. In both cases, these activities increase the likelihood of financial crises and financial shocks. We collect a sample of 59 countries around the world with more than 1,100 commercial banks and calculate the systemic risk of each bank; we include several control variables, such as bank size and information availability, and control for contract enforcement. The tables of statistics of the countries and variables used are available in the Appendix.

--- TABLE 11 ABOUT HERE ---

In Table 11, we run regressions while separating the sample into two sub-samples: the period of the financial crisis (2008–2009) and the period of the non-financial crisis (2003–2011), excluding the crisis period. We find that a higher creditor rights index translates into higher levels of bank systemic risk. (Again, a higher estimated ΔCoVaR implies less bank risk and more stability.) In columns (1) and (2), for the non-financial crisis period, we find that the coefficient of creditor rights is negative and statistically significant, suggesting that the net effect of creditor rights on bank

systemic risk is positive and significant. We also find significant results for bank size and the contract enforcement variable. In columns (3) and (4), we show similar results; therefore, we conclude that in periods of crises, creditor rights still have an impact on bank systemic risk.

6. Summary and Conclusions

Our results provide new evidence of the importance of the legal and institutional environment on banking behaviors and, more precisely, on risk taking, as well as the implications on the financial sector. Our results are robust, as we applied several robustness checks to control for endogeneity issues and reverse causality effects. Our findings show the dark side of strong creditor rights, driving the increase of bank systemic risk.

To our knowledge, strong creditor rights can have two main channels leading to higher systemic risk. On the one hand, the traditional bank business model for investing in loans increases with high creditor protection, which encourages banks to lend to riskier borrowers. Engaging in excessive lending raises the probability of debtor defaults, which could be explained by the large amount of bank loan loss provisions in the income statement. On the other hand, firms decrease their long-term investments in countries where creditor protection is high, which in turn shifts the demand to lower levels. In this case, banks substitute bank loans with riskier investments that include trading activities, derivative products, and other financial instruments.

An important issue that could add to the literature on banking behaviors and regulation is the channels through which creditor rights protection increases bank systemic risk. We leave this question to future research.

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Table 1
Summary statistics for banks and country, legal, and institutional regulations from January 1, 2003, to December 31, 2011.

Country	(1) Nbr Obs.	(2) (ΔCoVaR)	(3) Size	(4) Bank concentration	(5) Creditor rights	(6) Pb. Bureau	(7) Priv. Bureau	(8) Info	(9) Ln(number of days)
Argentina	57	-0.07	8.62	0.61	1	1	1	1	6.25
Australia	64	-0.08	11.02	0.77	3	1	0	1	5.06
Austria	44	-0.11	10.2	0.96	3	1	1	1	5.92
Belgium	6	-0.11	12.67	1	2	0	1	1	4.72
Botswana	22	-0.04	6.88	0.86	3	1	0	1	5.04
Brazil	102	-0.06	9.28	0.87	1	1	1	1	6.34
Bulgaria	12	-0.17	7.34	0.93	2	0	1	1	6.09
Chile	14	-0.13	9.94	0.69	2	1	1	1	5.72
Colombia	48	-0.08	9.3	0.78	0	1	0	1	5.89
Croatia	39	-0.15	6.74	0.96	3	0	0	0	6.03
Denmark	173	-0.05	7.24	0.97	3	1	0	1	4.42
Egypt, Arab Rep.	98	-0.09	7.72	0.57	2	0	1	1	6.02
Finland	4	-0.05	8.95	1	1	1	0	1	5.48
France	169	-0.05	10.43	0.83	0	0	1	1	4.32
Germany	101	-0.08	10.47	0.92	3	1	1	1	5.21
Greece	63	-0.04	10.43	0.7	1	1	0	1	5.02
Ireland	2	-0.03	12.55	1	1	1	0	1	5.38
Italy	166	-0.06	9.98	0.81	2	1	1	1	7.24
Japan	862	-0.03	10.22	0.5	2	1	0	1	4.09
Korea, Rep.	51	0.07	9.75	0.95	3	1	0	1	4.32
Malaysia	90	-0.05	9.99	0.58	3	1	1	1	5.7

Table 1. Continued

Country	(1) Nbr Obs.	(2) (ΔCoVaR)	(3) Size	(4) Bank concentration	(5) Creditor rights	(6) Pb. Bureau	(7) Priv. Bureau	(8) Info	(9) Ln(number of days)
Morocco	61	-0.05	8.64	0.79	1	0	1	1	5.48
Norway	139	-0.04	8.31	0.81	2	1	0	1	4.47
Peru	22	-0.07	8.92	0.79	0	1	1	1	6.09
Poland	94	-0.06	9.24	0.57	1	1	0	1	6.91
Russian Federation	22	-0.10	9.01	0.92	2	0	0	0	5.8
Singapore	61	-0.03	9	0.98	3	1	0	1	4.23
South Africa	82	-0.05	9.23	0.7	3	1	0	1	5.62
Spain	46	-0.12	12.29	0.92	2	1	1	1	5.13
Switzerland	168	-0.03	9.48	0.53	1	1	0	1	5.14
Thailand	93	-0.04	9.07	0.59	2	1	0	1	5.97
United Kingdom	95	-0.06	10.88	0.84	4	1	0	1	5.66
United States	2,353	-0.02	7.67	0.45	1	1	0	1	5.52
Total	5,438	-0.04	8.76	0.59	1.54	0.93	0.18	0.99	5.27

Table 1. Continued

Country	Nbr Obs.	(10) Entry	(11) Restrictions	(12) Supervisory Power	(13) Market Cap./GDP	(14) Effbank	(15) Loan	(16) ln(GDP per Capita)	(17) Inflation
Argentina	57	7	1	10	25.72	3.4	1.7	8.79	9.12
Australia	64	7	2	13	117.31	6.5	4.8	10.59	2.89
Austria	44	8	3	10	27.73	6.2	3.7	10.66	1.99
Belgium	6	8	3	11	52.98	5.8	4.2	10.71	2.84
Botswana	22	8	2	5	29.77	4.7	3.3	8.73	8.41
Brazil	102	8	3	14	59.77	4.8	3.4	9.03	5.59
Bulgaria	12	8	1	11	15.23	3.3	2.7	8.8	2.97
Chile	14	4	1	11	129.91	5.6	4	9.52	2.37
Colombia	48	8	1	13	43.87	5.1	3.1	8.49	4.49
Croatia	39	7	4	10	52.23	3.3	2.9	9.56	2.78
Denmark	173	8	2	10	64.72	6.7	5.1	10.88	2.07
Egypt, Arab Rep.	98	8	2	14	55.88	3.9	3.3	7.56	9.81
Finland	4	7	3	9	47.13	6.3	5.2	10.74	2.5
France	169	7	2	8	78.01	5.9	4.2	10.53	1.9
Germany	101	6	3	8	43.53	6.3	3.5	10.55	1.73
Greece	63	7	3	10	47.01	4.8	3.8	10.09	3.27
Ireland	2	8	3	12	39.33	5.8	5	11	3.11
Italy	166	8	1	7	34.26	5	3.5	10.41	2.25
Japan	862	7	2	12	81.31	5.2	2.5	10.54	-0.14
Korea, Rep.	51	8	3	11	82.86	5	3.7	9.85	3.26
Malaysia	90	8	1	13	132.65	5.8	3.8	8.82	2.46

67

Table 1. Continued

Country	Nbr Obs.	(10) Entry	(11) Restrictions	(12) Supervisory Power	(13) Market Cap./GDP	(14) Effbank	(15) Loan	(16) ln(GDP per Capita)	(17) Inflation
Mexico	15	8	4	11	36.19	4.2	2.3	9.09	4.16
Morocco	61	8	1	13	60.66	4.5	2.8	7.77	1.77
Norway	139	8	1	8	54.75	5.8	4.7	11.25	1.89
Peru	22	6	1	12	57.07	4.7	2.6	8.51	2.46
Poland	94	8	2	9	30.32	4.2	3.3	9.2	2.74
Russian Federation	22	8	4	8	56.37	3.2	2.4	9.36	8.34
Singapore	61	8	1	13	185.71	6.3	4.3	10.44	2.37
South Africa	82	8	2	10	221.15	5.3	3.7	8.65	5.76
Spain	46	7	3	11	85.65	5	3.8	10.26	2.78
Switzerland	168	8	3	14	221.96	6	3.9	11	0.81
Thailand	93	8	0	10	66.17	5.1	3.4	8.16	3.12
United Kingdom	95	8	4	8	123.66	6.6	5.1	10.57	2.58
United States	2,353	8	2	13	121.02	6.3	4.6	10.74	2.51
Total	5,438	7.7	2.01	11.78	99.93	5.76	3.95	10.34	2.37

68

Table 2

Yearly descriptive statistics of (ΔCoVaR) and control variables used in the analysis.

	(1)	(2)	(3)	(4)	(5)	(6)		(7)
Year	(ΔCoVaR)	Market Cap./GDP	Size	Ln (GDP per capita)	Bank concentration	Inflation		Number of banks
2003	-0.01	93.46	8.54	10.2	0.63	1.87		500
2004	-0.02	104.4	8.6	10.26	0.61	2.08		534
2005	-0.02	111.27	8.57	10.32	0.61	2.58		565
2006	-0.03	118.46	8.73	10.31	0.6	2.63		566
2007	-0.05	122.48	8.77	10.35	0.57	2.47		599
2008	-0.08	98.44	8.84	10.43	0.58	3.88		617
2009	-0.04	79.48	8.83	10.34	0.6	0.84		657
2010	-0.03	91.1	8.89	10.38	0.58	1.99		690
2011	-0.04	87.06	8.96	10.45	0.55	2.96		710
Mean	-0.04	99.93	8.76	10.34	0.59	2.37	Nbr Obs.	5438

69

Table 3

Characteristics for banks and country, legal, and institutional regulations.

This table compares the mean characteristics at both the bank level and country levels. We divided the Laporta (1998) Index into two sub-groups and test equality of means between low and high creditor rights countries. The sample includes 744 commercial banks from 34 countries around the world and includes most developed countries. Our sample includes the following countries: Argentina, Australia, Austria, Belgium, Botsawana, Brazil, Bulgaria, Chile, Colombia, Croatia, Denmark, Egypt, Arab Rep., Finland, France, Germany, Greece, Ireland, Italy, Japan, Korea, Rep., Malaysia, Mexico, Morocco, Norway, Peru, Poland, Russian Federation, Singapore, South Africa, Spain, Switzerland, Thailand, United Kingdom, and United States. Variables used in this table are explained in the Table A.

Variables	Mean of bank and countries characteristics with low creditor rights protection (dummy variables equal 0, and 1)	Mean of bank and countries characteristics with high creditor rights protection (dummy variables equal 2, 3 and 4)	Difference	Test for equality of means (p---value)
Bank-level characteristics				
(ΔCoVaR)	-0.03	-0.05	0.02	0.00
Size	8.15	9.61	-1.45	0.00
Country level: Regulation, institutions				
Pb. Bureau	0.93	0.92	0.00	0.00
Priv. Bureau	0.13	0.25	-0.12	0.51
Ln(number of days)	5.52	4.94	0.58	0.00
Entry	7.89	7.44	0.45	0.00
Restrictions	2.06	1.95	0.10	0.00
Supervisory power	12.56	10.69	1.87	0.00
Market Cap. /GDP	112.89	81.97	30.91	0.00
Bank concentration	0.52	0.69	-0.18	0.00
Info	1.00	0.97	0.03	0.00
Ln(GDP per capita)	10.48	10.16	0.32	0.00
Inflation	2.65	1.98	0.67	0.00
Loan	4.31	3.44	0.87	0.00
Effbank	5.99	5.42	0.57	0.00

Table 4

(ΔCoVaR) and creditor rights including crisis dummy: Bank-level basic OLS regressions.

The dependent variable is the DeltaCovaR measure for systemic risk, with higher values implying more stability. The estimation is based on OLS regressions. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and t-statistics presented in parentheses *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

(ΔCoVaR) dependent variable	(1) Total Sample	(2) Total Sample	(3) Total Sample	(4) Total Sample	(5) Total Sample	(6) Excluded U.S.
Creditor rights	-0.009**					-0.011**
	(-2.10)					(-2.50)
Restrictions on reorganization (cr1)		0.009				
		(0.91)				
No automatic stay (cr2)			-0.047***			
			(-2.61)			
Secured creditor paid first (cr3)				-0.025**		
				(-2.05)		
No management stay (cr4)					-0.008	
					(-0.97)	
Size	-0.012***	-0.012***	-0.012***	-0.012***	-0.012***	-0.016***
	(-4.13)	(-4.13)	(-4.14)	(-4.05)	(-4.13)	(-7.69)
Pb. Bureau	0.025	0.004	0.059**	0.020	0.007	0.043***
	(1.60)	(0.18)	(2.47)	(1.16)	(0.39)	(2.66)
Priv. Bureau	0.002	-0.008	0.028	-0.007	-0.007	0.019
	(0.17)	(-0.51)	(1.64)	(-0.46)	(-0.43)	(1.41)
Ln(number of days)	-0.015**	-0.007	-0.023***	-0.013*	-0.009	-0.021**
	(-2.05)	(-1.01)	(-2.80)	(-1.66)	(-1.35)	(-2.50)
Info	0.018	0.047	-0.023	0.018	0.043	-0.011
	(0.65)	(1.42)	(-0.61)	(0.65)	(1.35)	(-0.32)

Entry	0.014***	0.009	0.012**	0.011**	0.012**	0.019***
	(2.78)	(1.44)	(2.22)	(2.37)	(2.06)	(2.79)
Restrictions	0.004	0.003	0.011*	0.001	0.003	0.011*
	(0.80)	(0.68)	(1.67)	(0.31)	(0.67)	(1.92)
Supervisory power	-0.003*	-0.001	-0.001	-0.002	-0.002	-0.005**
	(-1.70)	(-0.42)	(-0.76)	(-0.98)	(-1.31)	(-2.10)
Market Cap./GDP	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.35)	(-0.64)	(-0.79)	(-0.22)	(-0.54)	(-1.08)
Bank concentration	-0.032	-0.034	-0.010	-0.042*	-0.033	-0.103**
	(-1.35)	(-1.57)	(-0.40)	(-1.78)	(-1.39)	(-2.42)
Ln(GDP per capita)	-0.009	-0.004	-0.017	-0.005	-0.006	-0.021**
	(-0.97)	(-0.51)	(-1.55)	(-0.62)	(-0.68)	(-2.49)
Inflation	-0.001	-0.001	-0.001	-0.001	-0.001	-0.004***
	(-0.48)	(-0.44)	(-0.50)	(-0.40)	(-0.48)	(-2.67)
Effbank	0.025**	0.026**	0.026**	0.030***	0.025**	0.029***
	(2.53)	(2.16)	(2.42)	(3.02)	(2.24)	(3.02)
Loan	-0.017*	-0.019**	-0.006	-0.019**	-0.020*	-0.007
	(-1.85)	(-1.99)	(-0.62)	(-2.24)	(-1.91)	(-0.70)
Crisis dummy	-0.023***	-0.024***	-0.019**	-0.023***	-0.024***	-0.012
	(-2.77)	(-2.82)	(-2.30)	(-2.80)	(-2.86)	(-1.42)
Observations	5438	5438	5438	5438	5438	3085
R^2	0.22	0.22	0.22	0.22	0.22	0.21
Year dummies	YES	YES	YES	YES	YES	YES
Countries	34	34	34	34	34	33

Table 5

(ΔCoVaR) and creditor rights: Developed vs. developing.

The dependent variable is the DeltaCoVaR, which measures the level of systemic risk, with higher values implying more stability. Separation of countries is based on the World Bank data; countries with lower than mid-range income are classified as developing countries. The estimation is based on OLS regressions. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and t- statistics presented in parentheses *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

(ΔCoVaR) dependent variable	(1) Developing countries		(2) Developed countries	
Creditor rights	0.006	(0.13)	-0.021***	(-2.61)
Size	-0.015***	(-3.33)	-0.012***	(-4.08)
Pb. Bureau	0.061	(0.93)	0.017	(0.48)
Priv. Bureau	0.035	(0.61)	-0.033	(-1.31)
Ln(number of days)	0.012	(0.27)	-0.005	(-0.44)
Info	0.305	(1.01)	0.043	(-0.67)
Entry	0.015	(0.51)	0.013	(1.59)
Restrictions	0.025*	(1.72)	0.002	(0.28)
Supervisory power	-0.007	(-0.39)	-0.005	(-1.07)
Market Cap./GDP	-0.000	(-0.64)	-0.000	(-0.09)
Bank concentration	-0.109	(-0.85)	0.026	(0.99)
Ln(GDP per capita)	-0.058**	(2.28)	-0.025	(-1.16)
Inflation	-0.005***	(-3.06)	-0.002	(-0.77)
Effbank	0.051	(0.96)	0.042**	(2.44)
Loan	-0.029	(-0.43)	-0.034***	(-3.09)
Observations	702		4736	
Banks	107		637	
R^2	0.13		0.2	
Countries	12		22	

Table 6

Correlation of law enforcement measures.

The table presents the pairwise correlations between the variables used as alternative measures to the creditor rights protection variable. All variables proxy for the law enforcement in each of the 34 countries used in the analysis. P-values are in parentheses.

	Control of Corruption	Rule-of-Law	Regulatory Quality	Judicial Legal Effectiveness	Government Effectiveness
Control of Corruption	1				
Rule of Law	0.9229* (0.000)	1			
Regulatory Quality	0.8973* (0.000)	0.9347* (0.000)	1		
Judicial Legal Effectiveness	0.8335* (0.000)	0.8800* (0.000)	0.8100* (0.000)	1	
Government Effectiveness	0.9472* (0.000)	0.9536* (0.000)	0.9190* (0.000)	0.8886* (0.000)	1

Table 7

Summary statistics countries creditor rights and law enforcement index, calculated by the mean from January 1, 2003, to December 31, 2011

Country	Creditor rights	Government Effectiveness	Control of Corruption	Rule of law	Regulatory Quality	Judicial Legal Effectiveness
Argentina	1	-0.12	-0.44	-0.67	-0.71	1.23
Australia	3	1.79	2.04	1.76	1.71	8.9
Austria	3	1.78	1.83	1.85	1.53	8.39
Belgium	2	1.62	1.53	1.39	1.27	6.89
Botswana	3	0.5	0.95	0.64	0.48	6.02
Brazil	1	-0.1	-0.02	-0.23	0.1	4.15
Bulgaria	2	0.13	-0.23	-0.1	0.61	2.24
Chile	2	1.26	1.5	1.34	1.47	6.61
Colombia	0	-0.08	-0.23	-0.46	0.2	3
Croatia	3	0.58	-0.02	0.13	0.52	1.82
Denmark	3	2.21	2.47	1.94	1.84	9.53
Egypt, Arab Rep.	2	-0.38	-0.58	-0.12	-0.32	
Finland	1	2.25	2.2	1.97	1.86	9.21
France	0	1.57	1.41	1.44	1.24	7.64
Germany	3	1.56	1.77	1.67	1.54	8.55
Greece	1	0.65	0.18	0.76	0.82	5.56
Ireland	1	1.49	1.76	1.69	1.92	7.77
Italy	2	0.46	0.27	0.45	0.94	4.07
Japan	2	1.44	1.33	1.29	1.13	7.59
Korea, Rep.	3	1.12	0.44	0.94	0.85	
Malaysia	3	1.13	0.2	0.52	0.52	7.75
Mexico	0	0.21	-0.36	-0.58	0.27	2.98
Morocco	1	-0.14	-0.29	-0.17	-0.18	5.22
Norway	2	1.9	2.04	1.92	1.44	8.69
Peru	0	-0.3	-0.28	-0.65	0.42	1.75
Poland	1	0.51	0.3	0.51	0.84	1.83
Russian Federation	2	-0.44	-1.05	-0.76	-0.36	
Singapore	3	2.19	2.24	1.67	1.81	8.99
South Africa	3	0.52	0.26	0.1	0.54	7.14
Spain	2	1.17	1.14	1.15	1.21	5.3
Switzerland	1	1.97	2.1	1.82	1.61	9.05

Country					
Thailand	2	0.32	-0.27	-0.06	0.26	5.28
United Kingdom	4	1.67	1.75	1.68	1.72	9.21
United States	1	1.6	1.43	1.57	1.52	8.37

Table 7. Continued

Country	Creditor rights	Creditor rights x Government Effectiveness	Creditor rights x Control of corruption	Creditor rights x Rule of law	Creditor rights x Regulatory Quality	Creditor rights x Judicial Legal Effectiveness
Argentina	1	-0.1158982	-0.4418257	-0.6682701	-0.7145448	1.225028
Australia	3	5.378034	6.109915	5.27808	5.116516	26.69863
Austria	3	5.344165	5.493604	5.553075	4.597197	25.15535
Belgium	2	3.241259	3.053791	2.773504	2.534939	13.77667
Botswana	3	1.495976	2.859848	1.921396	1.431819	18.06662
Brazil	1	-0.0957223	-0.0232194	-0.2283508	0.0988695	4.153215
Bulgaria	2	0.2535666	-0.4525138	-0.2097014	1.226887	4.487502
Chile	2	2.517375	3.008947	2.680223	2.932035	13.2174
Colombia	0	0	0	0	0	0
Croatia	3	1.725105	-0.0635363	0.3944138	1.558969	5.473106
Denmark	3	6.6419	7.401382	5.834115	5.531942	28.59167
Egypt, Arab Rep.	2	-0.7592043	-1.166641	-0.2346911	-0.6342472	
Finland	1	2.251766	2.200286	1.966226	1.858104	9.212821
France	0	0	0	0	0	0
Germany	3	4.666182	5.312933	4.995878	4.616	25.66304
Greece	1	0.6456617	0.1821749	0.7554862	0.8183268	5.562152
Ireland	1	1.494773	1.75821	1.691156	1.921022	7.770074
Italy	2	0.9109466	0.5360006	0.892087	1.872418	8.139927
Japan	2	2.874234	2.668986	2.579194	2.253707	15.17712
Korea, Rep.	3	3.369821	1.307948	2.833245	2.562687	
Malaysia	3	3.396114	0.5973513	1.564468	1.548168	23.2597
Mexico	0	0	0	0	0	0
Morocco	1	-0.1431642	-0.2862684	-0.1717102	-0.1848031	5.222344
Norway	2	3.797675	4.088292	3.839174	2.882332	17.37154
Peru	0	0	0	0	0	0
Poland	1	0.5128296	0.3004286	0.510625	0.8382566	1.829907
Russian Federation	2	-0.8829057	-2.101158	-1.521685	-0.7264919	

Singapore	3	6.575935	6.710002	5.011056	5.440776	26.9836
South Africa	3	1.56785	0.7750952	0.2895247	1.628224	21.40696
Spain	2	2.332259	2.276711	2.300906	2.422942	10.59836
Switzerland	1	1.968053	2.097578	1.824246	1.612591	9.047302
Thailand	2	0.633009	-0.5476067	-0.1290756	0.5152915	10.56844
United Kingdom	4	6.699568	7.012123	6.700997	6.883929	36.82338
United States	1	1.596151	1.432865	1.566366	1.520764	8.370555

Table 8

Alternative variables for creditor protection: Bank-level basic OLS regressions.

The sample consists of 744 listed commercial banks from 34 countries for the period 2003–2011. The dependent variable is (ΔCoVaR) for the systemic risk measurement. Alternative proxies are computed using a large updated database that measures law enforcement at the country level on yearly basis. We use the effective creditor rights index as the interaction between creditor rights and law enforcement. Control variables include bank size, information sharing and bank regulation, in addition to country macro-variables. The estimation is based on OLS regressions. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and t-statistics presented in parentheses *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

(ΔCoVaR) dependent variable	(1) Total Sample		(2) Total Sample		(3) Total Sample		(4) Total Sample		(5) Total Sample	
Creditor rights x Control of Corruption	-0.002	(-0.57)								
Creditor rights x Rule of Law			-0.009***	(-2.79)						
Creditor rights x Regulatory Quality					-0.009***	(-2.70)				
Creditor rights x Judicial Legal Effectiveness							-0.002*	(-1.71)		
Creditor rights x Government Effectiveness									-0.006*	(-1.86)
Size	-0.014***	(-5.67)	-0.013***	(-5.46)	-0.013***	(-5.52)	-0.013***	(-4.73)	-0.013***	(-5.61)
Pb. Bureau	0.016	(0.70)	0.033**	(2.05)	0.027*	(1.68)	0.046**	(1.98)	0.028	(1.56)
Priv. Bureau	-0.008	(-0.41)	-0.003	(-0.17)	-0.008	(-0.45)	0.002	(0.14)	-0.003	(-0.18)
Ln(number of days)	-0.011	(-1.09)	-0.019**	(-2.23)	-0.013	(-1.56)	-0.022***	(-2.71)	-0.016*	(-1.81)
Info	0.042	(1.12)	0.033	(1.04)	0.033	(1.04)	0.038	(0.86)	0.024	(0.74)
Entry	0.010	(1.50)	0.011*	(1.82)	0.010	(1.52)	0.014**	(2.31)	0.012**	(1.98)
Restrictions	0.006	(0.83)	0.009	(1.30)	0.007	(1.05)	0.008	(1.18)	0.006	(0.91)
Supervisory power	-0.002	(-0.99)	-0.004*	(-1.81)	-0.004*	(-1.75)	-0.005	(-1.62)	-0.003	(-1.42)
Market Cap./GDP	-0.000	(-0.15)	-0.000	(-0.24)	-0.000	(-0.10)	0.000	(0.05)	-0.000	(-0.12)
Bank concentration	-0.014	(-0.31)	-0.013	(-0.30)	-0.003	(-0.07)	-0.013	(-0.28)	-0.012	(-0.27)
Ln(GDP per capita)	-0.016**	(-2.13)	-0.017**	(-2.25)	-0.016**	(-2.18)	-0.020**	(-2.20)	-0.018**	(-2.26)
Inflation	-0.004*	(-1.73)	-0.004*	(-1.76)	-0.004*	(-1.69)	-0.003	(-1.37)	-0.004*	(-1.76)
Effbank	0.030**	(2.36)	0.035***	(3.45)	0.035***	(3.37)	0.034**	(2.05)	0.033***	(2.97)
Loan	-0.016	(-1.49)	-0.014	(-1.43)	-0.016	(-1.59)	-0.015	(-1.24)	-0.015	(-1.50)
Observations	5438		5438		5438		5267		5438	
R^2	0.18		0.18		0.18		0.18		0.18	
Countries	34		34		34		34		34	

Table 9

Cross-section OLS regressions: Z-score alternative risk-taking measure.

The dependent variable is the natural logarithm of Z-score in columns (1) to (4). In line with Boyd *et al.* (2006), CAR is capital-asset ratio, averaged over 2003–2011. Higher values of Z-score imply more stability. The estimation is based on OLS regressions. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and t-statistics are presented in parentheses. *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

Z-score dependent variable	(1) Z-score	(2) Z-score	(3) Z-score	(4) Z-score
Creditor rights	-0.158**	-0.179**	-0.116*	-0.173**
	(-2.14)	(-2.22)	(-1.68)	(-2.28)
Size	0.072	0.086	0.073	0.078
	(0.63)	(0.77)	(0.65)	(0.67)
Pb. Bureau	-0.527	-0.431	-0.653	-0.474
	(-1.24)	(-0.96)	(-1.49)	(-1.11)
Priv. Bureau	0.079	0.212	0.001	0.143
	(0.20)	(0.51)	(0.00)	(0.36)
Info	-0.181	-0.350	0.038	-0.236
	(-0.21)	(-0.42)	(0.05)	(-0.28)
Entry	0.148	0.205	0.085	0.174
	(0.66)	(0.90)	(0.39)	(0.76)
Restrictions	-0.267*	-0.278*	-0.238*	-0.273*
	(-1.75)	(-1.68)	(-1.69)	(-1.72)
Market Cap. /GDP	0.002***	0.002**	0.002***	0.002**
	(3.59)	(2.53)	(2.61)	(2.55)
Ln(GDP per capita)	0.909***	0.901***	0.931***	0.909***
	(8.35)	(8.02)	(8.80)	(8.05)
Bank concentration	0.566**	0.419**	0.359	0.547*
	(2.14)	(2.10)	(1.42)	(1.90)
Effbank	-0.248	-0.418	-0.146	-0.338
	(-0.75)	(-1.28)	(-0.45)	(-1.10)
Loan	-0.012	0.028	0.032	0.007
	(-0.04)	(0.10)	(0.13)	(0.03)
Government Effectiveness	-0.125			
	(-0.92)			
Control of Corruption		0.095		
		(0.92)		
Rule of law			-0.342**	
			(-2.03)	
Regulatory Quality				-0.002
				(-0.01)
Observations	5407	5407	5407	5407
R^2	0.09	0.08	0.09	0.08
Countries	34	34	34	34

Table 10

Instrumental variables estimation: (ΔCoVaR) and creditor rights.

The dependent variable is DeltaCovaR. The results are based on instrumental variables estimations. Instrumental variables include ethnic fractionalization, latitude, religions, and legal origins; statistics are presented in parenthesis *, **, *** represent statistical significance at the 10%, 5% and 1% levels, respectively.

(ΔCoVaR) dependent variable	(1) Total Sample		(2) Total Sample	
Creditor rights	-0.010***	(-2.96)	-0.009***	(-2.74)
Size	-0.013***	(-15.47)	-0.012***	(-14.38)
Pb. Bureau	0.027**	(2.27)	0.023*	(1.91)
Priv. Bureau	-0.001	(-0.09)	-0.004	(-0.47)
Ln(number of days)	-0.014***	(-3.08)	-0.012***	(-2.68)
Entry	0.011**	(2.57)	0.012***	(2.84)
Restrictions	0.005**	(1.97)	0.005*	(1.95)
Supervisory power	-0.003***	(-2.70)	-0.002	(-1.29)
Market Cap./GDP	0.000	(0.42)	-0.000***	(-3.65)
Bank concentration	-0.020*	(-1.88)	-0.019*	(-1.81)
Ln(GDP per capita)	-0.017***	(-5.04)	-0.014***	(-4.06)
Inflation	-0.004***	(-6.98)	-0.004***	(-6.81)
Effbank	0.025***	(3.94)	0.026***	(4.17)
Loan	-0.013**	(-2.50)	-0.013**	(-2.50)
Crisis dummy			-0.027***	(-14.68)
Observations	5377		5377	
R^2	0.17		0.19	
Financial crisis dummy	NO		YES	
Banks	725		725	

Table 11

Financial crisis impact on bank systemic risk.

The dependent variable is the DeltaCoVaR, which measures the level of systemic risk, with higher values implying more stability. We divided the sample into two sub-groups: the first two columns we exclude the financial crisis periods, and the third and fourth columns we exclude the non-financial crisis periods. The estimation is based on OLS regressions. P-values are computed by the heteroskedasticity-robust standard errors clustered for countries and t-statistics presented in parentheses *, **, *** represent statistical significance at the 10%, 5%, and 1% levels, respectively.

(ΔCoVaR) dependent variable	(1) Non-financial crisis	(2) Non-financial crisis	(3) Financial crisis	(4) Financial crisis
Creditor rights	-0.006***	-0.006***	-0.009***	-0.009***
	(-2.85)	(-2.64)	(-3.38)	(-3.37)
Size	-0.011***	-0.013***	-0.014***	-0.014***
	(-11.06)	(-12.49)	(-11.19)	(-11.19)
Pb. Bureau	0.006	0.009	0.026***	0.024**
	(0.98)	(1.36)	(2.60)	(2.35)
Priv. Bureau	-0.010*	-0.009	-0.008	-0.008
	(-1.79)	(-1.58)	(-0.97)	(-0.99)
Info	0.011	0.010	0.004	0.006
	(0.90)	(0.83)	(0.28)	(0.41)
Ln(number of days)	-0.011***	-0.012***	-0.018***	-0.018***
	(-5.20)	(-5.79)	(-6.35)	(-6.14)
Observations	5960	5960	1925	1925
R^2	0.13	0.12	0.19	0.15
Banks	1122	1122	1025	1025
Countries	59	59	59	59
Year dummies	YES	NO	YES	NO

Appendix - Statistics, including 59 countries around the world.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Country	(ΔCoVaR)	Creditor rights	Size	Pb. Bureau	Priv. Bureau	info	Ln(number of days)
Argentina	-0.07	1	8.6	1	1	1	6.25
Australia	-0.08	3	11.0	1	0	1	5.06
Austria	-0.11	3	10.2	1	1	1	5.92
Bangladesh	-0.04	2	6.8	0	1	1	5.90
Belgium	-0.11	2	12.7	0	1	1	4.72
Botswana	-0.04	3	6.9	1	0	1	5.04
Brazil	-0.06	1	9.3	1	1	1	6.34
Bulgaria	-0.17	2	7.3	0	1	1	6.09
Chile	-0.10	2	9.8	1	1	1	5.72
China	-0.06	2	12.3	0	1	1	5.48
Colombia	-0.08	0	9.3	1	0	1	5.89
Croatia	-0.15	3	6.7	0	0	0	6.03
Denmark	-0.05	3	7.2	1	0	1	4.42
Egypt, Arab Rep.	-0.09	2	7.7	0	1	1	6.02
Finland	-0.05	1	8.9	1	0	1	5.48
France	-0.05	0	10.4	0	1	1	4.32
Germany	-0.08	3	10.5	1	1	1	5.21
Ghana	-0.06	1	6.4	1	0	1	5.30
Greece	-0.04	1	10.4	1	0	1	5.02
Hong Kong, China	-0.09	4	10.0	1	0	1	5.35
India	-0.05	2	9.0	0	0	0	6.05
Indonesia	-0.03	2	7.9	0	1	1	6.35
Ireland	-0.03	1	12.5	1	0	1	5.38
Israel	-0.07	3	10.0	1	0	1	6.37
Italy	-0.06	2	10.0	1	1	1	7.24
Japan	-0.03	2	10.2	1	0	1	4.09
Jordan	-0.05	1	7.6	0	1	1	5.83
Kazakhstan	-0.10	2	8.8	0	0	0	5.99
Kenya	-0.11	4	6.9	1	0	1	5.89
Korea, Rep.	-0.07	3	9.7	1	0	1	4.32
Kuwait	-0.07	3	8.7	1	0	1	5.97
Lebanon	-0.04	4	9.4	0	1	1	6.58
Malaysia	-0.05	3	10.0	1	1	1	5.70
Mexico	-0.11	0	9.4	1	0	1	6.04
Morocco	-0.05	1	8.6	0	1	1	5.48
Nigeria	-0.12	4	8.1	0	1	1	6.59
Norway	-0.04	2	8.3	1	0	1	4.47
Oman	-0.07	0	7.3	0	0	0	6.12
Pakistan	-0.08	1	7.1	1	1	1	5.98
Peru	-0.07	0	8.9	1	1	1	6.09
Philippines	-0.04	1	7.7	1	0	1	5.94
Poland	-0.06	1	9.2	1	0	1	6.91
Russian Federation	-0.10	2	9.0	0	0	0	5.80
Saudi Arabia	-0.11	3	9.8	0	1	1	5.89
Singapore	-0.03	3	9.0	1	0	1	4.23
South Africa	-0.05	3	9.2	1	0	1	5.62
Spain	-0.12	2	12.3	1	1	1	5.13
Sri Lanka	-0.07	2	6.2	1	0	1	6.09
Sweden	-0.12	1	12.6	1	0	1	5.34
Switzerland	-0.03	1	9.5	1	0	1	5.14
Taiwan, China	-0.06	2	9.8	1	1	1	5.35
Thailand	-0.04	2	9.1	1	0	1	5.97
Tunisia	-0.02	0	6.9	0	1	1	3.30
Turkey	-0.03	2	9.0	1	1	1	5.80
Ukraine	-0.24	2	8.2	0	0	0	5.59

United Arab Emirates	-0.10	2	8.8	0	1	1	6.42
United Kingdom	-0.06	4	10.9	1	0	1	5.66
United States	-0.02	1	7.7	1	0	1	5.52
Venezuela, RB	-0.05	3	9.4	0	1	1	6.10
Vietnam	-0.12	1	9.0	0	1	1	6.00
Zimbabwe	0.00	4	4.2	0	0	0	5.86

Table A

Variable Name	Description
Creditor rights	Index of components 1 through 4, where each component gets a weight of one if a country's legal system grants that creditors' right and zero otherwise. Ranges from zero to four, with higher values indicating stronger creditors rights. Source: LLSV (1998)
Restrictions on reorganization (cr1)	Restrictions, such as creditors' consent, when a debtor files for reorganization. This component gets a weight of one if a country's legal system grants that creditors' right and zero otherwise. Source: LLSV (1998)
No automatic stay (cr2)	Right of creditors to seize collateral after a debtor's filing for reorganization is approved by the court. Source: LLSV (1998)
Secured creditor paid first (cr3)	Right of creditors to be paid first out of the proceeds of a liquidating firm. This component gets a weight of one if a country's legal system grants that creditors' right and zero otherwise. Source: LLSV (1998)
No management stay (cr4)	An administrator, rather than management, takes responsibility for running a firm during reorganization. This component gets a weight of one if a country's legal system grants that creditors' right and zero otherwise. Source: LLSV (1998)
Pb. Bureau	The variable equals 1 if a public credit registry operates in country, 0 otherwise. The variable is constructed as at January for every year from 1978 to 2003. Source: Djankov, McLeish, and Shleifer (2007), World Bank "Doing Business" database
Priv. Bureau	The variable equals 1 if a private credit bureau operates in the country, 0 otherwise. The variable is constructed as a January for every year from 1978 to 2003.Source: Djankov, McLeish, and Shleifer (2007), World Bank "Doing Business" database
Info	A dummy variable that equals one if an information-sharing agency (public registry or private bureau) operates in the country during the sample period, zero otherwise. Source: Djankov, McLeish, and Shleifer (2007), World Bank "Doing Business" database
Ln(number of days)	The number of days to resolve a payment dispute through courts. The variable is constructed as at January 2003. Source : Djankov, McLeish, and Shleifer (2007), World Bank "Doing Business"

database

Entry	This index measures the stringency for entry requirements into banking. It is constructed from the following variables in the database: WBG 1.8.1-1.8.8 (see Barth et al., 2004). Higher values indicate more requirements. Source: World Bank database: Banking Regulation Surveys 2001, 2003, 2007
Restrictions	This index includes restrictions on securities, insurance, and real estate activities plus restrictions on the banks owning and controlling non-financial firms. We follow the same definition as Barth et al. (2004): WBG 4.1 + 4.2 + 4.3 + 4.4, with "Unrestricted" and "permitted" equal 1; "restricted" and "prohibited" equal 0. Higher values indicate greater power. Source: World Bank database: Banking Regulation Surveys 2001, 2003, 2007
Supervisory Power	This index measures the level of power of the official supervisory authorities: whether the supervisory authorities have the authority to take specific actions to prevent and correct problems. We follow the same definition as Barth et al. (2004): WBG 5.5 +5.6 + 5.7 + 6.1 + 10.4 + 11.2 + 11.3.1 + 11.3.2 + 11.3.3 + 11.6 + 11.7 + 11.9.1 + 11.9.2 + 11.9.3. Higher values indicate more oversight. Source: World Bank database: Banking Regulation Surveys 2001, 2003, 2007
Bank concentration	This variable gives the concentration of the banking sector in the country of the bank: assets of three largest commercial banks as a share of total commercial banking assets. Source: Own calculation
Market Cap. /GDP	This variable gives the ratio of total market capitalization to GDP in the country of the bank: total value of all listed in a stock market as a percentage of GDP. Source: World Bank database: Financial Development and structure Dataset (version of April 2013)
Ln(GDP per capita)	GDP per capita is gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Source: World Development Indicators
Inflation	Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used. Source: World Development Indicators

Control of corruption	Control of corruption captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests The aggregate indicator is reported in standard normal units, ranging from approximately -2.5 to 2.5 with higher values corresponding to better outcomes, Source: Worldwide Governance Indicators
Government Effectiveness	Government effectiveness captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The aggregate indicator is reported in standard normal units, ranging from approximately -2.5 to 2.5 with higher values corresponding to better outcomes, Source: Worldwide Governance Indicators
Rule of Law	Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The aggregate indicator is reported in standard normal units, ranging from approximately -2.5 to 2.5 with higher values corresponding to better outcomes, Source: Worldwide Governance Indicators
Regulatory quality	Regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. The aggregate indicator is reported in standard normal units, ranging from approximately -2.5 to 2.5 with higher values corresponding to better outcomes, Source: Worldwide Governance Indicators
Judicial Legal Effectiveness	Assesses the judicial integrity in a certain country in the way it affects business, foreign firms in particular. The index is produced bt the Business International Corporation and rages from 0 to 10, with lower scores indicating less efficient legal environment. Source: LLSV(1998)
Effbank, Perceived efficiency of bankruptcy (WEF)	Assessment of the efficiency of bankruptcy law. Scale from 0 to 6, where higher scores indicate higher compliance. Source: World Economic Forum Global Competitiveness Report (2005)
Loan, Perceived access to loans (WEF)	Assessment of the ease of accessing business loans. Scale from 0 to 6, where higher scores indicate higher compliance. Source: World Economic Forum Global Competitiveness Report (2005)

Fig. 1. ΔCoVaR from 2003 to 2011 by creditor rights index (LLSV, 1998).

The graph shows the relationship between the average-level ΔCoVaR during the sample period and the aggregate creditor rights index.
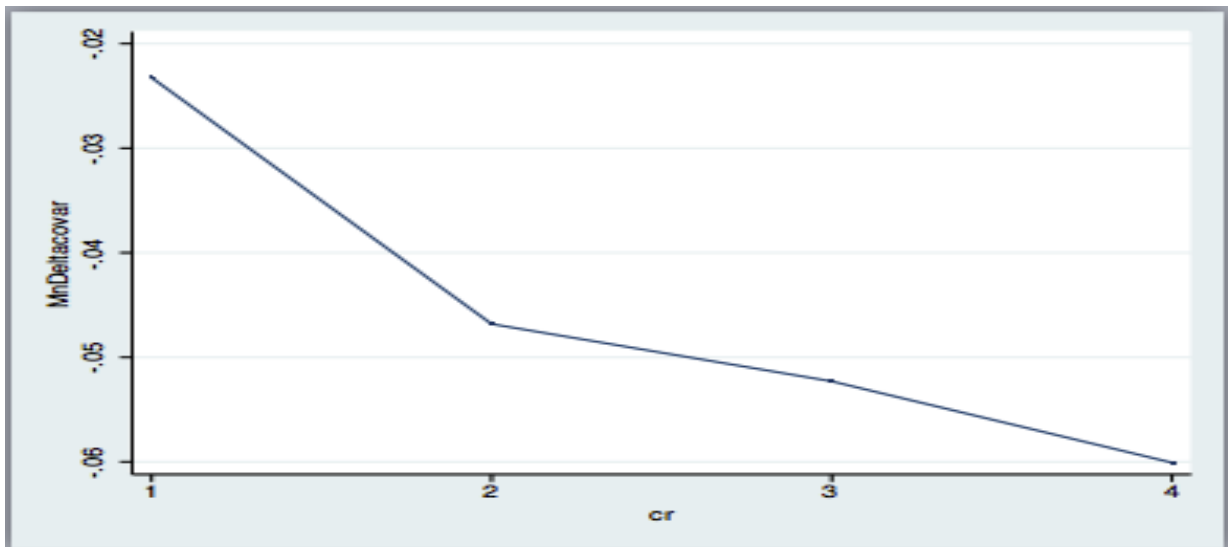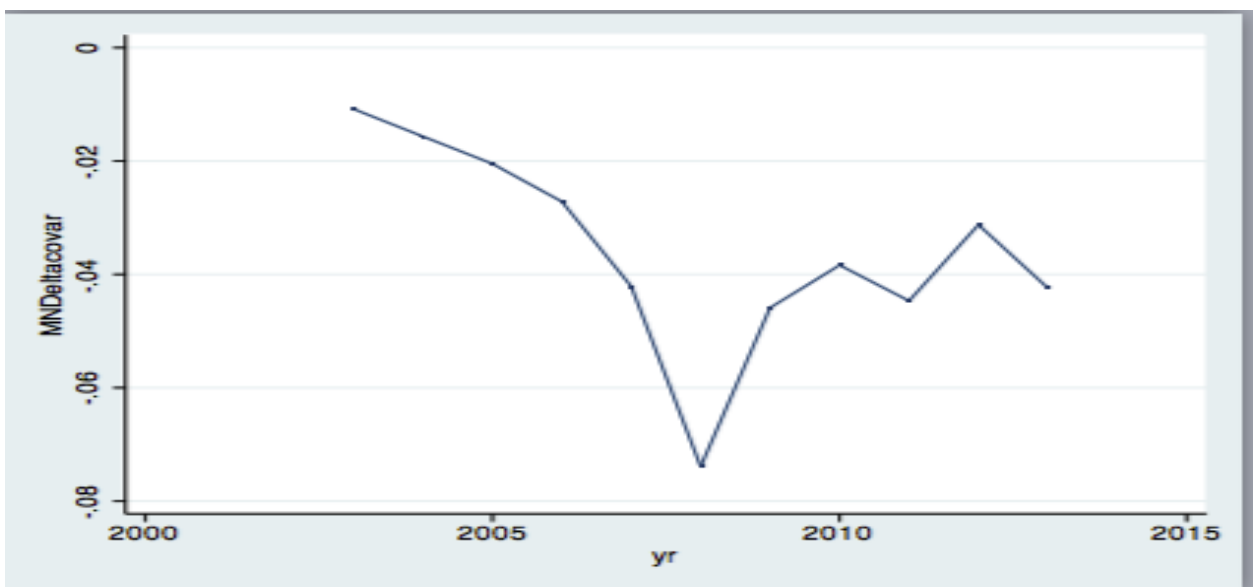

Fig. 2. ΔCoVaR from 2003 to 2011 for all the countries in the sample.

The graph shows the average-level ΔCoVaR during the sample period.

CHAPTER 2: THE EMERGENCE OF THE GLOBAL FINTECH MARKET: ECONOMIC AND TECHNOLOGICAL DETERMINANTS

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Abstract

We investigate the economic and technological determinants inducing entrepreneurs to establish ventures with the purpose of reinventing financial technology (fintech). We find that countries witness more fintech startup formations when the latest technology is readily available, the economy is well-developed, and people have more mobile telephone subscriptions. Furthermore, the available labor force has a positive impact on the development of this new market segment. Finally, the sounder the financial system, the lower the number of fintech startups in a country. Overall, the evidence suggests that fintech startup formation need not be left to chance, but active policies can influence the emergence of this new sector.

1. Introduction

Why do some countries have more startups intended to change the financial industry through innovative services and digitalization than others? For example, in certain economies there has been a large demand for financial technology (fintech) innovations, while other countries have made a more benevolent economic and regulatory environment available. In this paper, we investigate several economic and general technological determinants that have encouraged fintech startup formations in 64 countries. We find that countries witness more fintech startup formations when the latest technology is readily available, the economy is more developed, and people possess more mobile telephone subscriptions. Furthermore, we show that the available labor force has a positive impact on the fintech industry. Finally, we find that the more sound the financial system, the lower the number of fintech startups in the respective country.

Prior research on fintech mostly focuses on specific fintech sectors. In the area of crowdlending, scholars have analyzed the geography of investor behavior (Lin and Viswanathan, 2015), the likelihood of loan defaults (Serrano-Cinca et al., 2015; Iyer et al., 2016), and investors' privacy preferences when making an investment decision (Burtch et al., 2015). In equity crowdfunding and reward-based crowdfunding, researchers have investigated the dynamics of success and failure among crowdfunded ventures (Mollick, 2014), the determinants of funding success (Ahlers et al., 2015; Vulkan et al., 2016), and the regulation of equity crowdfunding (Hornuf and Schwienbacher, 2016). More generally, Bernstein et al. (2016) investigate the determinants of early-stage investments on AngelList. They find that the average investor reacts to information about the founding team, but not startup traction or existing lead investors.

Recently, scholars have also investigated platform design principles and risk and regulatory issues related to virtual currencies such as Bitcoin or Ethereum (Böhme et al., 2015; Gandal and Halaburda, 2016). Others have analyzed social trading platforms (Doering et al., 2015), robo-advisors (Fein, 2015), and mobile payment and e-wallet services (Mjølsnes and Rong, 2003; Mallat et al., 2004, Mallat, 2007). To date, only a few studies have investigated the fintech market in its entirety. Dushnitsky et al. (2016) provide a comprehensive overview of the European crowdfunding market and conclude that legal and cultural traits affect crowdfunding platform formation. Cumming and Schwienbacher (2016) examine venture capitalist investments in fintech startups around the world. They attribute venture capital

deals in the fintech sector to the differential enforcement of financial institution rules among startups versus large established financial institutions after the financial crisis.

In this paper, we investigate the formation of fintech startups more generally, rather than focusing on one particular fintech business model. In line with the classic value chain of a traditional bank, we categorize the fintech startups into four different types of startups: those that engage in *financing*, *asset management*, *payment*, and *other* business activities. The category financing entails, for example, startups that provide crowdfunding, crowdlending, and factoring solutions. We classify fintech startups as asset management companies if they offer services such as robo-advice, social trading, or personal financial management apps or software. Furthermore, various different business models provide new and innovative payment solutions, such as mobile payment systems, e-wallets, or crypto currencies. Finally, a bulk of fintech startups offer investor education and training, innovative background services (e.g., near-field communication systems, authorization services), white-label solutions for various business models, or other technical advancements classified under other fintech startups.

The remainder of the paper proceeds as follows: Section 2 introduces our hypotheses. In Section 3, we describe the data and introduce the variables used in the quantitative analysis. Section 4 presents the descriptive and multivariate results. Finally, Section 5 summarizes our contribution.

2. Hypotheses

To derive testable hypotheses regarding the drivers of fintech startup formations, we regard fintech innovations and the resulting startups as the outcome of supply and demand for this particular type of entrepreneurship in the economy. The demand for fintech startups is the number of entrepreneurial positions that can be filled by fintech innovations in an economy (Thornton, 1999; Choi and Phan, 2006). If the business model and services provided by the traditional financial industry, for example, are essentially obsolete, there might be a larger demand for new and innovative startups. The supply of fintech startups, in contrast, consists of the entrepreneurs who are ready to undertake self-employment (Choi and Phan, 2006). Such a supply might be driven by a large number of investment bankers who lost their jobs after the financial crises and are now eager to use their finance skills in a related and promising financial sector.

First, we conjecture that the more developed the economy and traditional capital market, the higher the demand for fintech startups. This hypothesis works through two channels. As in any other startup, fintech startups need sufficient financing to develop and expand their business models. If capital markets are well-developed, entrepreneurs have better access to the capital required to fund their business. Although small business financing traditionally does not take place through regular capital markets, fintech startups might be eligible to receive funds from incubators or accelerators established by the traditional financial sector.[30] However, such programs have mostly been established by large players located in well-developed economies. Moreover, the more developed the economy, the more likely it is that individuals need services such as asset management or financial education tools. Finally, Black and Gilson (1999) note that active stock markets help venture capital and, thus, entrepreneurship to prosper, because venture capitalists can exit successful portfolio companies through initial public offerings. Active stock markets might therefore have a positive effect on fintech startup formations.

In the case of firms that aim to revolutionize the financial industry, a well-developed capital market might also prompt demand for entrepreneurship simply because a larger financial market also offers greater potential to change existing business models through innovative services and digitalization. If the financial sector is small, not much can be changed through the introduction of innovative business models. Thus, for a well-developed but technically obsolescent financial sector, there are more entrepreneurial positions that can be filled by fintech innovators. We therefore hypothesize the following:

Hypothesis 1: Fintech startup formations occur more frequently in countries with well-developed economies and capital markets.

A second driver of fintech demand is the extent to which the latest technology is available in an economy so that fintech startups can build their business models on these technologies. Technical advancements are among the most important drivers of entrepreneurship (Dosi, 1982; Arend, 1999), because technological revolutions generate opportunities that may be further developed by entrepreneurial firms (Stam and Garnsey, 2007). Technological changes enable new practices and business models to emerge and, in the case of fintech startups, disrupt the traditional financial services sector. Such technology-driven changes have in the past occurred with the move from banking branches to ATM machines and from ATM

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[30] See, for example, the Main Incubatur from German Commerzbank AG (https://www.main-incubator.com), the Barclays Accelerator in the UK (http://www.barclaysaccelerator.com), or the US-based J.P. Morgan In-House Incubator (https://www.jpmorgan.com/country/US/en/in-residence).

machines to telephone and online banking (Singh and Komal, 2009; Puschmann, 2017). Moreover, modern computer-based technology has widely been used in financial markets through the implementation of trading algorithms (Government Office for Science, 2015). Fintech startups largely rely on advanced new technologies to implement faster payment services, to offer easy operations to their customers, to improve the sharing of information, and generally to cut the costs of banking transactions.

Hypothesis 2: Fintech startup formations occur more frequently in countries where the latest technology is readily available.

A third factor on the demand side of fintech startup formations concerns the soundness of banks. The sudden upsurge of fintech startups can be partly attributed to the 2008 global financial crisis. The financial crisis may have fostered the demand for fintech startups for several reasons. There is a widespread lack of trust in banks after the crisis. Guiso et al. (2013) investigate customers' trust in banks during the financial crisis and find that the lack of trust also led to strategic defaults on mortgatges, possibly initiating a vicious circle of customer distrust, defaults on morgages, even less sound banks, and again more customer distrust. Fintech startups, which largely have a clean record, might benefit from the lack of confidence in traditional banks and break the vicious circle of distrust and reduced financial soundness. In addition, the financial crisis increased the cost of debt for many small firms, and in some cases banks stopped lending money to businesses altogether, forcing them to contend with refusals on credit lines or bank loans (Schindele and Szczesny, 2016; Lopez de Silanes et al., 2015). Fintech startups in the area of crowdlending, crowdfunding, and factoring aim to fill this gap. The demand for such startups should be particularly high in countries that have extensively suffered from the financial crises and where the banking sector is less sound. Finally, some of the fintech business models are based on exemptions from securities regulation and would not work under the somewhat more strict securities regulation that applies to large firms (Hornuf and Schweinbacher, 2016). Stringent financial regulation was the outcome of the spread of systemic risk to the financial system (Brunnermeier et al., 2012). Thus, economies with a more fragile banking sector and stricter regulation should see more fintech startup formations that use the existing exemptions from banking and securities laws.

Hypothesis 3: Fintech startup formations occur more frequently in countries with a more fragile financial sector.

The fourth factor on the demand side concerns the effect of mobile telephone subscriptions on fintech startup formations. The almost inconceivable growth in mobile and smartphone

usage is placing digital services in the hands of consumers who previously could not be reached, delivering richer, value-added experiences across the globe. Mobile payment services differ across regions and countries. Many users are registered in developing countries where financial institutions are difficult to access (Ernst & Young, 2014). In emerging countries, mobile money has been used as a replacement to formal financial institutions, and as a result mobile money penetration now outstrips bank accounts in several emerging countries (GSMA, 2015; PricewaterhouseCoopers, 2016). At the same time, new technology has enabled fintech startups in developed countries to disrupt established players and accelerate change. Technologies such as near-field communication, QR codes, and Bluetooth Low Energy are being used for retail point-of-sale and mobile wallet transactions, transit payments, and retailer loyalty schemes (Ernst & Young, 2014). We argue that the higher the number of mobile telephone subscriptions, the higher the supply of fintech startups, as individuals who are seeking entrepreneurial activity based on these technologies have more opportunities to succeed.

Hypothesis 4: Fintech startup formations occur more frequently in countries with more mobile telephone subscriptions.

Fifth, on the supply side we consider the role of labor markets in fintech startup formations. In general, we assume that a rich and varied supply of labor has a positive influence on fintech startup formations. Empirical evidence supports the argument that the population size is a source of entrepreneurial supply, in the sense that countries experiencing population growth have a larger portion of entrepreneurs in their workforce than populations not experiencing growth (International Labour Organization, 1990). To evaluate the influence of the supply of labor on fintech startup formations, we account for the size of the labor force and argue that the larger the labor market, the higher the potential number of entrepreneurs who are ready to undertake self-employment.

Hypothesis 5: Fintech startups are more frequent in countries with a larger labor market.

Sixth, on the supply side we consider the impact of the unemployment rate on fintech startup formations. The decision to become an entrepreneur is mostly based on the income choice (Blau, 1987; Evans and Jovanovic, 1989; Evans and Leighton, 1990; Blanchflower and Meyer, 1994). Economies with a low unemployment rate are associated with a higher mobility between employment and self-employment because entrepreneurial failure will not be punished by unemployment later on (Choi and Phan, 2006).

Hypothesis 6: Fintech startup formations are more frequent in countries with a lower unemployment rate.

3. Data and Method

The data source for our dependent variable is the CrunchBase database, which contains detailed information on fintech startup formations and their financing. The database is assembled by more than 200,000 company contributors, 2,000 venture partners, and millions of web data points[31] and has recently been used in scholarly articles (Bernstein et al., 2016; Cumming et al., 2016). We retrieved the data used in our analysis on December 9, 2015. Because CrunchBase might collect some of the information with a time lag, the observation period in our sample ends on December 31, 2014. Overall, we identified 2,849 fintech startups for the relevant sample period. To analyze the economic and technological determinants that influence fintech startup formations, we collapsed the information into a panel dataset that consists of 690 observations given our 10-year observation period from 2005 to 2014 covering 69 countries (see Appendix Table A1 for a list of countries in the dataset).[32]

In our empirical model, we consider five dependent variables: the number of fintech startup formations in a given year and country and the number of fintech startup formations in a given year and country for each of the four categories we identified previously—*financing*, *asset management*, *payment*, and *other* business activities. Because we measure the dependent variable as a count variable and because its unconditional variance suffers from overdispersion, we decided to estimate a negative binomial regression model. In particular, we estimate a random effects negative binomial (RENB) model,[33] which allows us to remove time-invariant heterogeneity from fintech startup formations, such as the existence of large financial centers or startup ecosystems for high-tech innovation (e.g., Silicon Valley in California). In our baseline specification, we estimate the following RENB model:

$\Pr(y_{i1}, y_{i2}, ..., y_{iT}) = \mathrm{F}($*GDP per capita* $_{i,t-1}$ + *commercial bank branches* $_{i,t-1}$ + *VC financing* $_{i,t-}$

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[31] See https://about.crunchbase.com.

[32] Because of data limitations in our explanatory variables and given that we use a lag of one year, our sample reduces to the period from 2006 to 2013. However, this is precisely the period when the fintech market emerged in most countries.

[33] See York and Lenox (2014) or Dushnitzky et al. (2016) on the appropriateness of using the RENB model in a similar context.

$_1$ + *latest technology* $_{i,t-1}$ + *internet penetration* $_{i,t-1}$ + *government tech procurement* $_{i,t-1}$

+ *soundness of banks* $_{i,t-1}$ + *investment profile* $_{i,t-1}$ + *mobile telephone subscriptions* $_{i,t-1}$

+ *labor force* $_{i,t-1}$ + *unemployment rate* $_{i,t-1}$ + *new startup formation* $_{i,t-1}$ + *law and order*

$_{i,t-1}$ + *strength of legal rights* $_{i,t-1}$ + *cluster development* $_{i,t-1}$),

where y is the number of fintech startup formations in country i and year t and F(.) represents a negative binomial distribution function as in Baltagi (2008).

For our independent variables, we employ different databases that provide country-year variables to construct a panel. To test hypothesis 1, whether well-developed economies and capital markets positively affect the frequency of fintech startup formations, we include the *GDP per capita*, the number of *commercial bank branches*, and the extent of *VC financing* at the country-year level. Yartey (2008) suggests that income level is also a good proxy of capital market development. We therefore include the natural logarithm of *GDP per capita*, which came from the World Development Indicators database. To capture the physical presence of banks, which traditionally allow customers to conduct various types of transactions, we employ the variable *commercial bank branches* per 100,000 adult population extracted from the International Monetary Fund Financial Access Survey. Furthermore, to measure the development of the venture capital market, we calculate the variable *VC financing* using the data retrieved from the CrunchBase database. We construct *VC financing* as the natural logarithm of the total amount of VC funding of all the firms available in the CrunchBase database excluding the fintech startups used in our analysis over the GDP per capita at the country level.[34]

Next, to test hypothesis 2, whether the availability of the latest technology has a positive impact on fintech startup formations, we include the variables *latest technology*, *Internet penetration*, and *government tech procurement*. We retrieved the variable *latest technology* from the World Economic Forum Executive Opinion Survey at the country-year level. It is constructed from responses to the survey question from the Global Competitiveness Report Executive Opinion Survey: "In your country, to what extent are the latest technologies available?" (1 = *not available at all*, 7 = *widely available*). We further account for the *Internet penetration* in the countries studied in our analyses. The data is based on surveys carried out by national statistical offices or estimates based on the number of Internet

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[34] For the calculation, see Félix et al. (2013).

subscriptions. Internet users refer to people using the Internet from any device, including mobile phones, during the year under review. In our analyses, we use the percentage of Internet penetration at the country-year level retreived from the World Telecommunication/ICT Development report and database. To capture the level of government involvement in technology fostering in a specific country, we use the variable *government tech procurement* retrieved from the World Economic Forum Executive Opinion Survey at the country-year level. The variable is constructed from responses to the survey question from the Global Competitiveness Report Executive Opinion Survey: "In your country, to what extent do government purchasing decisions foster innovation?" (1 = *not at all*, 7 = *to a great extent*).

Furthermore, to test hypothesis 3, whether the soundness of the financial system affects fintech startup formations, we include the variables *soundness of banks* and *investment profile*. We retrieved the data measuring *soundness of banks* from the World Economic Forum Executive Opinion Survey at the country-year level. The variable is constructed from responses to the survey question from the Global Competitiveness Report Executive Opinion Survey: "How do you assess the soundness of banks?" (1 = *extremely low – banks may require recapitalization*, 7 = *extremely high – banks are generally healthy with sound balance sheets*). We retrieved the data measuring *investment profile* from the International Country Risk Guide (ICRG) database at the country-year level. We calculate the *investment profile* variable on the basis of three subcomponents: contract viability, profits repatriation, and payment delays. Each subcomponent ranges from 0 to 4 points. A score of 4 points indicates very low country risk and a score of 0 very high country risk.

To test hypothesis 4, we include *mobile telephone subscriptions* and assess the extent to which more people having access to mobile phones affects fintech startup formations. We retrieved the data from the World Telecommunication/ICT Development report and database at the country-year level. The variable measures the number of mobile telephone subscriptions per 100 adult population. To test hypothesis 5, which investigates the extent to which the size of the labor force affects fintech startup formations, we include the variable *labor force*, which we extracted from the World Development Indicators database. The variable is the natural logarithm of the total labor force, which comprises people ages 15 and older who meet the International Labour Organization definition of the economically active population. To test hypothesis 6, whether the unemployment rate affects fintech startup

formations, we use the variable *unemployment rate* as a percentage of the total labor force extracted from the World Development Indicators database.

To control for the entrepreneurial environment in a particular economy, we also control for the total number of *new startup formations*. This variable comes from the CrunchBase database and measures the number of new startups created according to CrunchBase in a given year and country. Furthermore, we use the variables *law and order* from the ICRG database to capture the efficiency of the legal system in a country, which might affect startup formations in general. The index of *law and order* runs from 0 to 6, with higher values indicating better legal systems. To control for the strength of law and institutions, we employ the *strength of legal rights* index, which we collected from the World Bank Doing Business database. The variable measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending. The index ranges from 0 to 12, with higher scores indicating that laws are better designed to expand access to credit. We also control for the state of business *cluster development* using the data retrieved from the World Economic Forum Executive Opinion Survey at the country-year level. The variable is constructed from responses to the survey question from the Global Competitiveness Report Executive Opinion Survey: "In your country, how widespread are well-developed and deep clusters" (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field) (1 = *nonexistent*, 7 = *widespread in many fields*). Definitions of all variables and their sources appear in detail in Appendix Table A2.

4. Results

4.1. Summary Statistics

Table I presents statistics, by year, except Panel B, which provides a summary by country. Panel A considers the full sample, Panel B the top European countries, Panel C the U.S. sample only, and Panel D the EU-27 sample only.

Panel A of Table I documents statistics of fintech startup formations for the period from 2005 to 2014. Column (1) in Panel A presents statistics on the number of fintech startup formations in a given year. There is a notable upsurge of fintech startups following the financial crisis, as the number of startups founded in 2010 was twice as large as in 2008. In 2014, we observe for the first time a decrease of fintech startup formations compared with the previous year. Column (2) shows the number of financing rounds fintech startup have obtained in that year, which almost reached 1,000 rounds in 2011 and 2012. In Column (3), we show the total amount fintech startups raised each year, which grew until 2011 and then steadily declined. Together with Column (2), this suggests that the average volume per funding round has recently dropped. Column (4) shows the number of fintech startups providing financing services, which constitute almost 54% from all categories, suggesting that the demand for innovation in financing activities was substantial. Column (5) shows statistics of fintech startups providing asset management services, which represents 9% from all categories. Column (6) shows statistics of fintech startups providing payment services, which constitute the second-largest group with 21% from all categories. Column (7) shows fintech startups providing other business activities, which constitutes 16% from all categories. For all categories in columns (4)–(7), we observe an increase in the number of fintech startups founded, with a slight decrease in the last year (2014), except for payment services, which continued to grow until the end.

To investigate different dynamics in developed and developing countries, we report descriptive statistics for the 10 most relevant European countries in terms of fintech activities, the U.S. sample, and the total EU-27 sample. Panel B of Table I presents statistics by country for the 10 most relevant European countries during the period 2005–2014. The United Kingdom is at the top of the list with regard to new fintech startup formations, followed by Germany and France (Column (1)). A recent study conducted by Ernst & Young (2016) ranked the United Kingdom as the number one place to flourish as a fintech startup. With the supposedly most supportive regulatory regime, effective tax incentives, and London's

position as global financial center, the country attracts more talented entrepreneurs willing to engage in fintech activity. Column (3) shows the total amount raised by new fintech startups, with firms located in the United Kingdom having raised by far the highest amount (2.3 billion USD), followed by Germany and the Netherlands. According to a report published in Computer Business Review (2016), the United Kingdom also had the highest volume of deals in 2015 outside the United States and the third-highest total VC investment after the United States and China. Columns (4)–(7) again show fintech startup formations for the four subcategories, which remain in the same order of importance as before.

As the United States has the overall largest market share in our sample, internationally followed by the United Kingdom, Canada, India, and Germany (see Appendix Tables A3 for a ranking), Panel C of Table I presents statistics for the U.S. fintech market only by year. Column (1) shows that the number of fintech startups launched in the United States, which represent almost 60% of the entire sample. Columns (4)–(7) show that fintech startups reforming financing activities constitute 57% of all fintech startups in the United States, again followed by asset management (9%), payment (19%), and other business activities (15%).

Panel D of Table I provides statistics for the EU-27 by year. Columns (1)–(7) are as described previously but calculated for the EU-27 sample only. Column (1) shows the number of fintech startups founded by year. Note that the EU-27 countries constitute only 20% of the total fintech startups we identified in our sample. The evidence shows that most financing rounds took place in the 10 most relevant EU countries, and the amounts these fintech startups raised there were also considerable, with the remaining 17 countries contributing only a tiny fraction. Fintech startups providing financing services again represent the largest share of all fintech startups in the EU-27 (50% of all fintechs), followed by payment services (23%), other business activities (18%), and asset management (9%). The importance of the fintech subcategories thus persists for all panels in Table I. Appendix Tables A3 and A4 show summary statistics and a correlation table that includes the dependent variables and the main independent variables.

--- Table I About Here ---

4.2. Country-level Determinants of Fintech Startup Formations

To analyze which country-level factors drive the formation of new fintech startups, we use multivariate panel regressions to predict the annual number of fintech startup formations in each country between 2006 and 2013. For the RENB model, we report incident rate ratios, which can conveniently be interpreted as multiplicative effects or semi-elasticities. Table II reports the estimates from the RENB models as outlined in Section 3. Column (1) shows the results on aggregate annual fintech startup formations, and columns (2)–(5) replicate the analyses for annual formation of fintech startups providing *financing*, *asset management*, *payment*, and *other* business activities.

The model in column 1 underscores the role of country-level factors in shaping the formation of new fintech startups. We find a significant, positive relationship between *GDP per capita* and fintech startup formations, with a high statistical significance ($p < 0.01$). An increase of one unit in Ln (*GDP per capita*) is associated with an 89% increase in fintech startup formations in the following year. Although we find no evidence for the impact of the number bank branches and VC financing on fintech startup formations, we cannot entirely reject hypothesis 1 that these formations occur more frequently in countries with well-developed economies. Moreover, we find a positive relationship between *latest technology* and fintech startup formations. A one-unit increase in the availability of latest technology is associated with a 112% increase in fintech startup formations in the following year. We thus cannot reject hypothesis 2 that fintech startup formations occur more frequently in countries where the latest technology is readily available. However, we find no evidence that Internet penetration and technology procurement by the government have an impact on fintech startup formations.

Furthermore, our results show a negative relationship between *the soundness of banks* and fintech startup formations. A one-unit increase in the *soundness of banks* is associated with a 16.4% decrease in the number of fintech startup formations in the following year. Although the variable *investment profile*, which captures the general risk of investing, is not significant, we cannot reject hypothesis 3 that fintech startup formations occur more frequently in countries with a more fragile financial sector. In line with hypothesis 4, we further find a positive relationship between *mobile telephone subscriptions* and fintech startup formations, with a high statistical significance ($p < 0.01$). We also find that a larger labor market is associated with an increase in fintech startup formations, which is in line with hypothesis 5.

However, we do not find any significant relationship between *unemployment rate* and fintech startup formations, and thus we reject hypothesis 6. This finding might stem from the fact that fintech startup formations are not driven by necessity entrepreneurs, who find no employment in the wage sector and therefore engage in entrepreneurial activities, but by opportunity entrepreneurs, who want to implement a new business idea and are also willing to give up their jobs to succeed.

Stand-alone analyses of each fintech category reveal nuanced dynamics. Columns (2)–(5) of Table II highlight commonalities among the factors associated with the formation of fintech startups providing *financing*, *asset management*, *payment*, and *other* business activities. Consistent with Column (1) of Table II, the coefficients of *Ln (GDP per capita)* and *Ln (Labor force)* are positive and statistically significant for all subcategories. Moreover, the variable *strength of legal rights* has a positive and statistically significant effect on the formation of fintech startups for the following three subcategories: *financing*, *asset management* and *payment*. We also find that the coefficient of *latest technology* is positive and statistically significant for *financing*, *payment*, and *other* business activities. Fintech startups providing *asset management* services such as robo-advice, social trading, or personal financial management apps apparently do not require the latest technology for their operations. The variable *soundness of banks* has a negative and statistically significant effect on fintech startup formations only for fintech startups providing *financing*. A one-unit increase in the *soundness of bank* is associated with a 20.5% decrease in the formation of new fintech startups providing *financing* ($p < 0.01$). The results highlight the substitution effect of new fintechs providing financing as a result of the deteriorations in the financial system. The variable *VC financing* has a significant effect on the formation of new fintech startups providing *payment* services. Last, we observe a positive effect of the variable *mobile telephone subscriptions* on the formation of fintech startups in all subcategories.

--- Table II About Here ---

In Table III, we run the same regression excluding the U.S. fintech market, because U.S. fintechs constitute almost 60% of the total sample in our analysis. We find the results largely consistent with Table II for our main variables: *Latest technology*, *Ln (labor force)*, *Mobile telephone subscriptions*, and *new startup formation*. Moreover, we no longer find a significant effect for the *soundness of banks* variable except for fintech startups providing *financing*.

107

--- Table III About Here ---

5. Conclusion

In this paper, we investigate economic and technological determinants that have encouraged fintech startup formations in 64 countries. We find that the United States has the largest fintech market, followed by the United Kingdom, Canada, India, and Germany at a considerable distance. Categorizing fintechs in line with the value chain of a traditional bank—*financing*, *asset management*, *payment*, and *other* business activities—we show that financing is by far the most important segment of the emerging fintech market, followed by payment, other business activities, and asset management. Financing for fintech startup formations might be important for multiple reasons, two of which could be the traditional funding gap that small firms around the globe face (Schindele and Szczesny, 2016) and funding constraints potentially due to more stringent banking regulations in the aftermath of the latest financial crisis (Campello et al., 2010; European Central Bank, 2013; European Banking Authority, 2015).

While our study is exploratory in nature, it yields important insights into the evolution of fintech startups. Although the number of fintech startup formations has steadily grown, this growth and the amount these firms have raised have recently dropped. Moreover, we generally find that countries witness more fintech startup formations when economies are well-developed, the latest technology is readily available, and people possess more mobile telephone subscriptions, suggesting that these factors are important drivers of fintech demand. Furthermore, we show that the available labor force has a positive impact on the supply of entrepreneurs in the fintech industry, whereas the unemployment rate does not. Finally, we find that the more sound the financial system, the lower the number of fintech startups in the respective country.

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Table I. Development of the fintech market by year

This table presents summary statistics on the fintech market, by year, except for Panel B, which provides a summary by country. Panel A considers the full sample, Panel B the top 10 European countries, Panel C the U.S. sample, and Panel D the EU-27 sample only. Values reported are based on the CrunchBase database for the period 2005–2014, covering 69 countries around the world.

Panel A: Summary statistics for the full sample, by year
Column (1) reports the number of fintech startups that started operating in a given year. Column (2) reports the number of financing rounds fintech startups have obtained in that year. Column (3) reports the overall amount raised by fintech startups in a given year in USD. Column (4) reports the number of fintech startups providing *financing* services. Column (5) reports the number of fintech startups providing *asset management* services. Column (6) reports the number of fintech startups providing *payment* services. Column (7) provides the number of fintech proving *other* business activities. The last row denoted "All Years" reports the sum across all years.

YEAR	TOTAL SAMPLE						
				CATEGORIES			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Nbr. Fintechs Started	Financing Rounds	Amount Raised (Millions $)	Financing	Asset Management	Payment	Other
2005	73	173	1,480	48	9	19	13
2006	96	222	2,500	65	9	19	19
2007	152	356	4,080	100	14	29	31
2008	165	330	2,270	120	19	31	30
2009	210	527	4,030	141	22	45	39
2010	305	660	4,440	199	27	77	65
2011	424	954	6,340	292	37	91	72
2012	484	961	5,190	318	57	116	88
2013	502	893	3,740	327	61	149	98
2014	438	606	1,750	289	58	152	63
All Years	2,849	5,682	35,820	1,899	313	728	518

Panel B: Summary statistics for the 10 most relevant European countries
Columns (1)–(7) are as described in Panel A, but calculated for each country separately.

COUNTRY	TOP 10 EUROPEAN COUNTRIES						
				CATEGORIES			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Nbr. Fintechs Started	Financing Rounds	Amount Raised (Millions $)	Financing	Asset Management	Payment	Other
United Kingdom	231	483	2,350	149	23	55	52
Germany	54	118	749	34	12	19	13
France	53	84	265	27	1	19	14
Spain	37	75	152	24	8	5	7
Netherlands	34	66	365	19	6	10	6
Ireland	24	46	203	17	4	8	5
Italy	24	43	68	12	3	8	5
Sweden	19	43	370	12	1	8	1
Denmark	15	21	25	9	0	7	3
Switzerland	15	34	41	12	2	4	4
Total	506	1,013	4,589	315	60	143	110

Panel C: Summary statistics for the U.S. sample by year
Columns (1)–(7) are as described in Panel A, but calculated for the U.S. sample only.

YEAR	U.S. SAMPLE						
				CATEGORIES			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Nbr. Fintechs Started	Financing Rounds	Amount Raised (Millions $)	Financing	Asset Management	Payment	Other
2005	45	110	924	34	7	10	6
2006	63	157	1,360	40	5	12	16
2007	100	260	2,960	67	10	17	19
2008	104	214	1,540	81	14	15	15
2009	142	375	3,340	101	17	26	26
2010	185	426	3,220	125	17	43	35
2011	255	619	4,780	180	24	46	43
2012	263	530	3,720	187	25	52	44
2013	273	497	2,530	177	33	77	50
2014	235	315	987	160	33	77	29
All Years	1,665	3,503	25,361	1,152	185	375	283

Panel D: Summary statistics for the EU-27, by year
Columns (1)–(7) are as described in Panel A, but calculated for the European sample only.

YEAR	EUROPEAN SAMPLE						
				CATEGORIES			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Nbr. Fintechs Started	Financing Rounds	Amount Raised (Millions $)	Financing	Asset Management	Payment	Other
2005	13	34	201	6	1	5	3
2006	11	17	326	8	1	2	1
2007	30	60	855	17	3	7	11
2008	27	59	349	15	2	7	9
2009	44	111	519	27	3	11	8
2010	63	138	675	39	5	18	17
2011	84	172	495	55	7	23	15
2012	103	205	676	56	12	29	24
2013	103	189	483	71	12	30	23
2014	92	141	169	57	16	28	16
All Years	570	1,126	4,748	351	62	160	127

Table II. Drivers of fintech startup formations, full sample

The dependent variables in column (1) pertain to the number of new fintech startups founded in a given country and year. In columns (1)–(5), we report results for fintech startups providing *financing*, *asset management*, *payment*, and *other* business activities only. The data take panel structure. We report negative binomial regressions for the columns (1)–(5) because the dependent variables are count variables. All variables are defined in Appendix Table A2. Standard errors are clustered at the country level, and the model allows dispersion to vary randomly across clusters. Columns (1)–(5) report incident rate ratios. Significance levels: ** < 5%, and *** < 1%.

	(1)	(2)	(3)	(4)	(5)
Dependent variables	Number of startups founded by year and country	Financing	Asset management	Payment	Other
L. Ln (GDP per capita)	1.890***	2.142***	3.124***	1.796***	3.156***
L. Commercial bank branches	0.995	0.995	0.991	0.993	0.995
L. VC financing	1.400	1.491	1.624	2.434***	1.748
L. Latest technology	2.124***	2.106***	1.268	2.215***	2.108***
L. Internet penetration	1.002	1.001	0.998	1.006	0.987
L. Government tech procurement	0.943	0.917	0.835	0.756	1.111
L. Soundness of banks	0.836**	0.795***	0.927	0.901	0.935
L. Investment profile	1.017	1.041	0.872	0.961	0.933
L. Mobile telephone subscriptions	1.010***	1.009***	1.010**	1.007**	1.010**
L. Ln (Labor force)	2.108***	2.191***	2.353***	1.732***	2.182***
L. Unemployment rate	1.008	1.004	1.012	0.995	1.013
L. New startup formation * 10^{-3}	1.223***	1.179**	1.376**	1.606***	1.274**
L. Ln (New startup formation)					
L. Law and order	0.893	0.840	0.989	0.794	0.918
L. Strength of legal rights	1.092	1.136**	1.188**	1.140**	1.150
L. Cluster development	0.924	0.955	1.104	0.945	0.693
Adjusted R^2	-	-	-	-	-
Wald χ^2	413.95***	324.57***	182.31***	309.57***	157.92***
Log likelihood	-670.35	-549.87	-233.11	-406.40	-325.35
Observations	399	399	399	399	399

Table III. Drivers of fintech startup formations, excluding U.S. Sample

The dependent variables in column (1) pertain to the number of new fintech startups founded in a given country and year. In columns (1)–(5), we report results for fintech startups providing *financing*, *asset management*, *payment*, and *other* business activities only. The data take panel structure. We report negative binomial regressions for the columns (1)–(5) because the dependent variables are count variables. All variables are defined in Appendix Table A2. Standard errors are clustered at the country level, and the model allows dispersion to vary randomly across clusters. Columns (1)–(5) report incident rate ratios. Significance levels: ** < 5%, and *** < 1%.

Dependent variables	(1) Number of startups founded by year and country	(2) Financing	(3) Asset Management	(4) Payment	(5) Other
L. Ln (GDP per capita)	1.369	1.522	2.513***	1.715**	2.519***
L. Commercial bank branches	0.994	0.994	0.986	0.992	0.994
L. VC financing	1.419	1.529	1.646	2.590***	2.099
L. Latest technology	1.905***	1.869***	1.104	1.735**	1.635
L. Internet penetration	1.009	1.005	0.990	1.002	0.991
L. Government tech procurement	0.812	0.784	0.948	0.860	0.946
L. Soundness of banks	0.883	0.811***	0.898	0.962	1.094
L. Investment profile	1.096	1.153**	1.002	1.008	0.982
L. Mobile telephone subscriptions	1.011***	1.010***	1.014***	1.007***	1.009***
L. Ln (Labor force)	1.877***	1.874***	1.801***	1.492***	1.747***
L. Unemployment rate	1.013	1.014	1.036	0.998	1.005
L. New startup formation	1.003***	1.004***	1.007***	1.005***	1.005***
L. Ln (New startup formation)					
L. Law and order	0.977	0.928	1.161	0.833	0.961
L. Strength of legal rights	1.034	1.062	1.014	1.079	1.082
L. Cluster development	0.947	0.977	0.992	0.860	0.658
Adjusted R^2	-	-	-	-	-
Wald χ^2	264.64***	204.79***	82.67***	186.64***	115.57***
Log likelihood	-623.82	-506.15	-202.97	-374.48	-293.24
Observations	391	391	391	391	391

Appendix

Table A1. List of countries in the dataset (ranking according to number of fintech startups)

Argentina (15)	Greece (26)	Peru (29)
Australia (9)	Hong Kong SAR	Philippines (22)
Austria (25)	China (14)	Poland (20)
Bahrain (29)	Hungary (27)	Portugal (27)
Belgium (22)	India (4)	Romania (29)
Brazil (11)	Indonesia (24)	Russian Federation (11)
Bulgaria (27)	Ireland (13)	Singapore (7)
Canada (3)	Israel (10)	Slovak Republic (29)
Chile (17)	Italy (13)	South Africa (24)
China (12)	Japan (16)	Spain (8)
Colombia (28)	Jordan (29)	Sweden (15)
Costa Rica (29)	Kenya (28)	Switzerland (18)
Croatia (29)	Korea, Rep. (25)	Thailand (26)
Cyprus (28)	Latvia (27)	Trinidad and Tobago (29)
Czech Republic (26)	Lebanon (27)	Turkey (25)
Denmark (18)	Luxembourg (27)	Uganda (29)
Dominica (29)	Malaysia (28)	Ukraine (23)
Dominican Republic (29)	Mexico (14)	United Arab Emirates (25)
Egypt, Arab Rep. (28)	Netherlands (11)	United Kingdom (2)
Estonia (23)	New Zealand (19)	United States (1)
Finland (21)	Nigeria (27)	Uruguay (28)
France (6)	Norway (26)	Vietnam (29)
Germany (5)	Pakistan (29)	
Ghana (29)	Panama (29)	

Table A2. List of variables

Variable Name	Definition
Dependent variables	
Number of fintech startups founded	The number of fintech startups founded in a given country and year. Source: CrunchBase.
Asset management	The number of new fintech startups providing asset management services founded in a given country and year. Source: CrunchBase.
Financing	The number of new fintech startups providing financing services founded in a given country and year. Source: CrunchBase.
Other business activities	The number of new fintech startups providing other fintech services founded in a given country and year. Source: CrunchBase.
Payment	The number of new fintech startups providing payment services founded in a given country and year. Source: CrunchBase.
Explanatory variables	
Cluster development	Response to the survey question: "In your country, how widespread are well-developed and deep clusters" (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field). The variable runs from 1 = *nonexistent* to 7 = *widespread in many fields*. Source: World Economic Forum, Global Competitiveness Report, Executive Opinion Survey.
Commercial bank branches	Is the (Number of institutions + number of bank branches) * 100,000 / adult population in the reporting country. Source: International Monetary Fund, Financial Access Survey.
Government tech procurement	Response to the survey question: "In your country, to what extent do government purchasing decisions foster innovation?" The variable runs from 1 = *not at all* to 7 = *to a great extent*. Source: World Economic Forum, Global Competitiveness Report, Executive Opinion Survey.
Internet penetration	Data are based on surveys carried out by national statistical offices or estimated on the basis of the number of Internet subscriptions. Internet users refer to people using the Internet from any device (including mobile phones) during the year under review. We use the percentage of residents using the Internet at the year and country level. Source: World Telecommunication/ICT Development report and database.

Investment profile	Assessment of factors affecting the risk of investment that are not covered by other political, economic, and financial risk components. The index is calculated on the basis of three subcomponents as follows: contract viability, profits repatriation, and payment delays. Each subcomponent ranges from 0 to 4 points; a score of 4 points indicates very low risk, and a score of 0 very high risk. Source: ICRG.
Latest technology	Response to the survey question: "In your country, to what extent are the latest technologies available?" (The variable runs from 1 = *not available* at all to 7 = *widely available*.) Source: World Economic Forum, Global Competitiveness Report, Executive Opinion Survey.
Law and order	Law and order form a single component, but its two elements are assessed separately, with each element being scored from 0 to 3 points. The index of *law and order* runs from 0 to 6, with higher values indicating better legal systems. Source: ICRG.
Ln (GDP per capita)	GDP per capita is the gross domestic product per capita in USD. Source: World Development Indicators database.
Ln (Labor force)	Total labor force comprises people ages 15 and older who meet the International Labour Organization definition of the economically active population: all people who supply labor for the production of goods and services during a specific period. Source: World Development Indicators database.
Mobile telephone subscriptions	A mobile telephone subscription refers to a subscription to a public mobile telephone service that provides access to the public switched telephone network using cellular technology, including the number of pre-paid SIM cards active during the last three months of the year under review. This includes both analog and digital cellular systems (IMT-2000, Third Generation, 3G) and 4G subscriptions, but excludes mobile broadband subscriptions via data cards or USB modems. The variable measures the number of mobile telephone subscriptions per 100 adult population. Source: World Telecommunication/ICT Development report and database.
New startup formation	Annual number of new startups founded in a given year and country. The data were retrieved from the CrunchBase database and measure the number of new startups created according to CrunchBase in a given year and country. Source: CrunchBase and own calculations.
Soundness of banks	Response to the survey question: "In your country, how do you assess the soundness of banks?" (The variable runs from 1 = *extremely low – banks may require recapitalization* to 7 = *extremely high – banks are generally healthy with sound balance sheets*.) World Economic Forum, Global Competitiveness Report, Executive Opinion Survey.

Strength of legal rights	The index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending in a country. The index ranges from 0 to 12, with higher scores indicating that these laws are better designed to expand access to credit. Source: World Bank, Doing Business database.
Unemployment rate	Calculated as the percentage from the total labor force. Source: World Development Indicators database.
VC financing	The natural logarithm of the total amount of VC funding of all the startups available in the CrunchBase database excluding the fintech startups used in our analysis over the GDP per capita at the country level. The variable is constructed using available data in the CrunchBase database. Source: CrunchBase and own calculations.

Table A3. Summary statistics

Variable	Nbr. Obs.	Mean	Median	Std. Dev.	Minimum	Maximum
# Fintech startups founded by year and country	690	4.13	0	22.43	0	273
# Asset management	690	0.45	0	2.54	0	33
# Financing	690	2.75	0	15.45	0	187
# Other	690	0.75	0	3.85	0	50
# Payment	690	1.06	0	5.45	0	77
Cluster development	606	4.09	4.05	0.70	2.49	5.60
Commercial bank branches	661	26.47	20.34	23.23	0.76	256.26
Government tech procurement	606	3.78	3.75	0.61	2.01	5.53
Internet penetration	672	50.55	51.52	26.11	1.74	96.3
Investment profile	680	9.61	9.50	1.92	4	12
Latest technology	606	5.25	0.91	5.25	2.62	6.87
Law and order	680	4.17	4	1.23	1	6
Ln (GDP per capita)	687	9.43	9.55	1.28	5.77	11.67
Ln (Labor force)	680	16.04	16.02	1.61	12.24	20.51
Mobile telephone subscriptions	672	103.83	108.37	36.4	4.58	239.3
New startup formation	690	52.03	6	291.19	0	3842
Soundness of banks	606	5.49	5.62	0.90	1.44	6.90
Strength of legal rights	679	6.44	6	2.32	1.80	10
Unemployment rate	680	7.51	6.90	4.32	0.70	27.2
VC financing	525	1.74	1.80	0.53	0	3.24

Table A4. Correlation matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
# Fintech startups founded by year and country	(1)	1							
Financing	(2)	0.9984	1						
Asset Management	(3)	0.9754	0.9729	1					
Payment	(4)	0.9658	0.9557	0.9694	1				
Other business activities	(5)	0.9816	0.9764	0.9426	0.9318	1			
Ln (GDP per capita)	(6)	0.1513	0.1472	0.1561	0.1515	0.1703	1		
Commercial bank branches	(7)	0.0252	0.0247	0.0249	0.0156	0.0278	0.3048	1	
VC financing	(8)	0.2073	0.2059	0.196	0.2035	0.2064	-0.0345	-0.0982	1
Latest technology	(9)	0.1893	0.1858	0.1805	0.1929	0.2042	0.7199	0.0203	0.1665
Internet penetration	(10)	0.1416	0.1367	0.1504	0.1505	0.1559	0.8838	0.1966	0.0164
Government tech procurement	(11)	0.1627	0.1638	0.154	0.151	0.1714	0.4451	-0.0412	0.1485
Soundness of banks	(12)	-0.0437	-0.0444	-0.0488	-0.0359	-0.0345	0.3132	0.0816	0.0365
Investment profile	(13)	0.1671	0.1676	0.1638	0.1584	0.1737	0.6519	0.1551	-0.0485
Mobile phone subscriptions	(14)	-0.084	-0.0862	-0.066	-0.0697	-0.077	0.4188	0.1276	-0.1628
Ln (Labor force)	(15)	0.269	0.2678	0.2632	0.2554	0.2651	-0.4218	-0.1334	0.4496
Unemployment rate	(16)	-0.0059	-0.0065	-0.0058	-0.0146	-0.008	-0.0578	0.1822	-0.1092
New startup formation	(17)	0.9898	0.9902	0.9537	0.9317	0.9814	0.1493	0.032	0.206
Law and order	(18)	0.0984	0.0963	0.0974	0.0967	0.1109	0.7555	0.095	0.0374
Strength of legal rights	(19)	0.1521	0.1529	0.1391	0.1414	0.1628	0.1181	-0.142	0.0341
Cluster development	(20)	0.2387	0.2362	0.2424	0.2398	0.2493	0.4866	-0.0502	0.3323

126

		(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
Latest technology	(9)	1								
Internet penetration	(10)	0.7355	1							
Government tech procurement	(11)	0.6016	0.4068	1						
Soundness of banks	(12)	0.3906	0.2214	0.4216	1					
Investment profile	(13)	0.559	0.5395	0.5838	0.5948	1				
Mobile phone subscriptions	(14)	0.2214	0.4309	0.1386	0.0486	0.1974	1			
Ln (Labor force)	(15)	-0.2989	-0.4457	-0.1431	-0.1689	-0.2957	-0.4038	1		
Unemployment rate	(16)	-0.0809	-0.0789	-0.3776	-0.3071	-0.2419	-0.0538	-0.091	1	
New startup formation	(17)	0.1885	0.1314	0.1773	-0.0341	0.1715	-0.0996	0.2723	-0.0017	1
Law and order	(18)	0.6728	0.7435	0.4531	0.2047	0.6037	0.1898	-0.3786	-0.1117	0.0989
Strength of legal rights	(19)	0.2156	0.2466	0.2594	0.0426	0.2923	0.0411	-0.143	-0.1284	0.1526
Cluster development	(20)	0.6671	0.4637	0.6069	0.3087	0.4317	0.1388	0.1279	-0.2955	0.238

		(18)	(19)	(20)
Law and order	(18)	1		
Strength of legal rights	(19)	0.2927	1	
Cluster development	(20)	0.4391	0.1097	1

CHAPTER 3: FOREIGN DIRECT INVESTMENT REGULATION, BUSINESS TAXES, AND CORRUPTION: CROSS-COUNTRY STUDY OF FOREIGN BANK PRESENCE

Abstract

In this study, I investigate the impact of legal determinants on the presence of foreign banks. Using a panel dataset of 44 countries for the 2005–2012 period, I find that host countries attract more foreign banks when regulatory restrictions on foreign direct investment are low, when the compliance cost for paying taxes is low, and when host-country governments are less corrupt. I apply a robustness check to confirm the results. Overall, the evidence highlights the importance of government efforts to create a more favorable foreign direct investment environment by reducing restrictions and, along with those, costs associated with foreign capital investments.

1. Introduction

A sound legal and regulatory environment attracts foreign direct investments (FDI) by reducing investments risk and uncertainty, lowering the cost of doing business, and supporting market efficiency. Within this framework, Aizenman and Spiegel (2006) examine the implications of costly enforcement of property rights on the pattern of FDI. Using a cross-section analysis, they find that corruption is negatively associated with FDI inflows. They also find that domestic agents can overcome obstacles related to corruption and weak institutions better than foreign agents. Quéré et al. (2007) also confirm the hypothesis that cross-country differences in FDI inflows are significantly related to various regulatory factors, including the level of corruption, tax system, and the efficiency of the judicial system. In this study, I investigate the impact of host countries' legal environments on the presence of foreign banks. Using a panel dataset of 44 countries for the 2005–2012 period, I find that host countries attract more foreign banks when regulatory restrictions on FDI are low, when the compliance cost for paying taxes is low, and when host-country governments are less corrupt.

The literature on financial sector FDI mostly focuses on host-country opportunities and attractiveness. Attractiveness of foreign investments is directly linked to host countries' legal and business regulation environment; legal and business regulation in favor of foreign investors increases the supply of foreign banks to penetrate new markets. A friendly legal environment toward foreign investors increases opportunities to make money. Focarelli and Pozzolo (2001) find that foreign banks prefer to invest in countries with fewer regulatory restrictions. Other researchers find a positive link among low taxation, high per capita income, and presence of foreign banks (e.g. Claessens et al., 2000). Likewise, Papi and Revoltella (2000) find that host-country attractiveness characteristics are positively and significantly correlated with FDI initiatives by foreign banks. Clarke et al. (2003) assess the link between foreign bank entry and host-country regulations and conclude that restricting foreign entry could limit competition and protect inefficient banks. Moreover, countries with stricter business regulations encourage corruption, as firms attempt to overcome the regulatory burden (Shleifer and Vishny, 1993), which creates obstacles to economic growth (Djankov et al., 2006). In the same vein, business regulations raise the cost of "doing business", which in turn deters FDI inflows. In addition to paying taxes, the cost of tax compliance is considered a major obstacle for doing business. The time taken to prepare, file, and pay corporate taxes can lead to considerable costs for foreign banks. A PwC (2010)

report [35]states that "Worldwide on average, a standard small to medium-size business still spends 3 working days a month complying with tax obligations as measured by Doing Business". Foreign banks prefer working in countries with less administrative burdens. Other research investigates the detrimental effects of corruption on economic development (Mauro, 1995; Méon and Sekkat, 2005). More specifically, studies find that corruption increases the cost of doing business and adds uncertainty and risk (Wei, 2000a). Habib and Zurawicki (2002) examine the impact of corruption on FDI in host countries and show that foreign direct investors avoid corruption because it can create operational inefficiencies. Sanyal and Samanta (2008) examine U.S. FDI outflows with respect to the level of corruption and find that U.S. firms are less likely to invest in countries in which corruption is widespread. The latter findings regarding the link between the level of corruption and FDI could lead foreign investors aiming to penetrate new markets to avoid corrupt environments and thereby invest in less corrupt countries.

This paper also relates to the growing literature in law and finance. La Porta et al. (1998), the pioneers of law and finance theory, investigate the relationship between legal institutions and financial market development. They find empirical evidence of the primordial role of legal institutions in shaping the financial markets. Strong protection of shareholders and creditors offers guaranteed legal rights to international investors that reduce the risks and transaction costs of contracting and eventually attract foreign investment (La Porta et al., 1998). In their 1997 study, La Porta et al. empirically verify the correlation between the share of external financing and the total financing of firms. They note that countries that protect shareholders benefit from more developed stock markets. Using the same framework, Levine (1998) examines the relationship between the legal system and banking development associated with long-term growth. The author finds that countries with creditor-friendly laws accompanied by legal enforcement have better-developed banks than countries that do not give priority to creditors and law enforcement. The study concludes that a better legal environment is also associated with long-term rates of economic growth. Alfaro et al. (2008) examine the link between institutional quality and net capital inflows and find that high-quality institutions have larger inflows. Thus, the law and finance literature has drawn attention to the importance of shareholders rights, creditor protection, and law enforcement in influencing the development of financial markets.

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[35] See https://www.pwc.com/gx/en/paying-taxes/assets/paying-taxes-2010.pdf.

In this paper, I investigate the presence of foreign banks as a subsidiary. Normally, foreign banks can be present in a host country under different forms, such as subsidiaries, branches, or representative offices. I define foreign presence as foreign investors that own at least 50% of shares, which in this case take the subsidiary legal form. International banks that penetrate host countries under the subsidiary form aim to have large retail operations. Subsidiaries' presence can take two forms: greenfield or acquisition. In this study, I consider both forms of presence and do not distinguish entries using greenfield or acquisition.

This work also sheds light on the impact of business regulations on the presence of foreign banks. First, I add to the literature by finding new evidence from country-level data, according to which stricter business regulations lead to lesser presence of foreign banks. I argue that, far from a neutral effect, legal environment features have a pronounced influence on the presence of foreign banks. Second, the study contributes to the law and finance literature by exploring legal determinants of foreign bank presence. Finally, the choice of variables allows to conduct a cross-country study, with time-series panel estimation controlling for country effects, which reduces the threat of omitted variable bias. For example, it is plausible that factors other than FDI restrictions, such as banking regulations, might affect foreign bank presence. In this case, the effect of FDI regulatory restrictions may also be incorrectly attributed to foreign presence. To control for the effect of such regulation, I include fixed effects at the country level.

The remainder of the paper proceeds as follows: Section 2 introduces the hypotheses. In Section 3, I describe the data and present the variables used in the quantitative analysis. Section 4 presents the descriptive statistics and results. Section 5 summarizes my contribution.

2. Hypotheses

I conjecture that the stricter the FDI regulatory restrictions, the lesser the presence of foreign banks in host countries. Prior studies emphasize the importance of globalization, which leads to significant implications for regulations and governance (Mayer and Gereffi, 2010). Business regulations have evolved over time and spread a set of regulatory norms worldwide (Drahos and Braithwaite, 2001). However, globalization does not mean global harmonization across countries (Braithwaite and Drahos, 2000). The choice of foreign banks to enter new markets is partly based on host-country characteristics in attracting foreign investments. Literature has employed many measures to capture host-country advantages in establishing

foreign presence. Among the measures that encourage foreign banks to invest abroad are entry barriers, regulations, and costs. Goldberg and Saunders (1981) explore the factors that contribute to foreign bank growth in the United States and stress the importance of regulatory restrictions, among other factors influencing foreign bank presence. Nigh et al. (1986) find that host-country openess affects U.S. banks' presence especially in less developed countries. Barth et al. (2000) evaluate banking structure and supervisory practices using a comparative approach and find that host-country entry restrictions limit the flow of bank assets. In line with the framework, Miller and Parhke (1998) argue that host-country regulations have a significant impact on foreign banks' operations. They find that stricter regulations discourage foreign bank activities. Galindo et al. (2003) use bilateral foreign data from 176 countries and find that legal and institutional differences between countries negatively affect foreign activities. Using an empirical gravity model, Papaioannou (2009) assesses international banking activity and finds that institutions and policies have a pronounced impact on banking capital flows. Focusing on institutional characteristics, Focarelli and Pozzolo (2005) find that host countries attract foreign banks in the presence of lower regulatory restrictions. Finally, using a dataset on the presence of Italian banks abroad, Birindelli and Del Prete (2010) find that regulatory contraints tend to discourage foreign bank presence.

In this paper, I examine FDI restrictions on foreign banking activity rather than the impact of banking regulations, which has been widely addressed in the literature. Therefore, I state the first hypothesis as follows:

Hypothesis 1: The stricter the FDI regulatory restriction, the lesser is the presence of foreign banks.

In addition, I investigate the impact of corruption on the presence of foreign banks in host countries. The World Bank identifies corruption as one of the greatest obstacles for economic growth, stating that greater presence of corruption weakens institutions and alters the rule of law[36]. Many studies have investigated the economic consequences of corruption and concluded that corruption increases inefficiencies and distortions, which harm the economy. Other studies have examined the effect of corruption on economic performance. Shleifer and Vishny (1993) claim that the level of corruption is linked to government institutions and policies. They find high corruption in countries in which governments do not control their agencies, which leads to reduced economic growth. Mauro (1995) analyzes institutional and political factors influencing economic growth and finds a negative association between

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[36] See http://www1.worldbank.org/publicsector/anticorrupt/corruptn/cor02.htm.

corruption and investment as well as growth. Knack and Keefer (1995) employ alternative institution measures in a cross-country test and conclude that property rights have the greatest impact on investments and growth. Similar results from Kaufmann et al.'s (1999) study show that governance matters for development outcomes. Other work explores the costs related to the presence of corruption; for example, Besley and McLaren (1993) present a theoretical model showing that corruption cannot be uncovered without costly monitoring.

Moreover, a growing body of literature suggests that corruption reduces inflows of foreign investment. Husted (1994) claims that corruption raises transaction costs. For example, to obtain licenses, tax assessments, or utility connections in some countries, foreign investors must pay extra costs, such as commission to officials, which in turn increase the cost of doing business and lower the profitability of investment. Hines (1995) was the first to report a negative effect of corruption on foreign investment; however, he examined U.S. firms, thus preventing generalizability to the whole universe. Taking into account data beyond U.S. firms Wei (2000b) then finds that corruption has a significant, negative effect on FDI. Fisman and Svensson (2007) find that corruption deteriorates investments and blocks economic growth. Finally, Cuervo-Cazurra (2006) highlights a strong link between corruption and foreign business strategies; a corrupt environment discourages investors from making a long-term commitment to the market. Therefore, I state the second hypothesis as follows:

Hypothesis 2: A host country's more corrupt environment discourages long-term investments and thus leads to a decrease in the presence of foreign banks.

I also consider the cost of tax compliance to investigate the impact of host-country tax administrative burdens on foreign bank presence. Many governments strive to attract foreign investments by offering competitive tax treatments and lower tax rates. In return, investors generally compare tax burdens in different locations, as taxes do matter in choosing investment location. A business-friendly administration is sometimes perceived as important as the effective tax rate paid. Many studies have investigated the impact of tax rate on the formation of new firms (Gordon, 1998; Cullen and Gordon, 2007), while fewer works have explored the link between the administrative burden and propensity to engage in FDI. Djankov et al. (2010) present data on corporate income tax using a sample covering 85 countries in 2004. Through a cross-country analysis, they find that tax rates have an adverse impact on FDI investments. They control for tax compliance among many other control variables. Braunerhjelm and Eklund (2014) construct a panel database covering 118 countries over a six-year period. They investigate the tax compliance impact on entrepreneurship and find that a reduction in the tax administrative burden of 10% would increase new firm

registration by approximately 3%. In a comparative analysis among different countries, the World Bank (2014) finds that the average time for a U.S. firm to report taxes is approximately 175 hours, while corresponding figures for Germany, Sweden, and Switzerland are 218, 122, and 63 hours.

I argue that compliance with tax codes and tax policies creates extra costs for investors, beyond the financial cost of tax, which may stifle FDI. Therefore, the complexity of tax codes may impose a fixed cost on foreign banks that are considering expanding their presence abroad. More specifically, I argue that tax administrative burdens may influence the level of FDI in the banking sector and can be attributed to the variation of tax compliance regimes across countries. Therefore, I state the third hypothesis as follows:

Hypothesis 3: Administrative burdens and, more precisely, the higher cost of tax compliance reduce the presence of foreign banks.

Furthermore, I investigate the relationship between credit market deregulation and the presence of foreign banks. Policies and government attitudes toward FDI inflows vary across countries. Some actively encourage international trade and capital flow, while others demonize these for various reasons. For example, governments may oppose facilitating trade freedom when they fear foreign competition or acquisition of national brands. In some developing countries, governments control many sectors, including the main financial institutions. Sinn (2003) investigates the relationship between globalization and credit market deregulation and finds that when governments impose strict equity requirements on banks, international lenders are likely to deal with banks in countries in which equity requirements are less strict. Eppinger and Potrafke (2015) investigate the relationship between globalization and credit market deregulation over the 1970–2010 period. They measure credit market deregulation using the credit market freedom indicators of the Fraser institute and find a positive correlation between globalization and credit market deregulation.

In this study, I illustrate globalization through foreign bank presence and deregulation using indicators such as interest rate control and trade barriers. I argue that credit market deregulation leads to more FDI inflows and, therefore, a higher supply of foreign banks in host countries. In contrast, countries in which governments impose trade barriers and control interest rates are less likely to attract foreign investments. Therefore, I state the fourth hypothesis as follows:

Hypothesis 4: Credit market deregulation increases the presence of foreign banks.

3. Data and Method

3.1. Database

To gauge the importance of the business and regulatory environment on foreign bank presence, I collected data on legal and business regulation environments across different countries. I extract data on foreign-owned banks from Claessens and Van Horen's (2015) database, which covers 139 countries between 1995 and 2013. The database is constructed by checking information from Bankscope Bureau Van Djik and gathers a large dataset on foreign banks across different countries.

The database allows me to construct the first dependent variable—foreign bank presence—which is the number of foreign banks over the total number of banks in host countries in each year, respectively. To obtain the second measure for foreign bank presence in host countries, I merge the data collected from Claessens and Van Horen (2015) with the Bankscope Bureau Van Djik database and extract total bank assets for each bank in the sample. Overall, I identified 4,137 foreign banks for the relevant sample period.

To analyze the legal determinants that influence foreign bank presence, I collapsed the information into a panel dataset that consists of 352 observations given the eight-year observation period (2005–2012) covering 44 countries. Appendix Table A1 provides a list of countries in the dataset.

3.2. Model Choice

Because the database covers different countries across several periods, I had the option of choosing two approaches: random-effects model or fixed-effects model. To determine the appropriate model, I performed the Hausman test, which confirmed a fixed-effect model. I decided to estimate an ordinary least squares (OLS) panel fixed-effects model; this approach allows the analysis to focus on changes within different units over time. To examine the various hypotheses regarding the host-country legal and business regulation impact on foreign bank presence, I estimate the following two OLS fixed-effects models:

$$\textit{Foreign bank ratio}_{ijt} = f(\textit{Legal and business regulations}_{jt}, \textit{Development and opportunities}_{jt},$$
$$\textit{Financial market indicators}_{jt}), \tag{1}$$

$$\textit{Foreign bank assets}_{ijt} = f(\textit{Legal and business regulations}_{jt}, \textit{Development and opportunities}_{jt},$$
$$\textit{Financial market indicators}_{jt}), \tag{2}$$

where i refers to the bank, j refers to the host country, and t refers to the year. The two models set the relationship between the foreign bank presence measures and legal regulation

environment measures and control for host-country characteristics, including development, opportunities, and financial market indicators.

In the empirical model, I consider two dependent variables. The first measure to capture foreign bank presence is *foreign bank ratio*, or the number of foreign banks in a given year and country to the total number of banks in the same given year and country. The choice for the first dependent variable is straightforward as it has often been used in prior research (Claessens et al., 2000; Focarelli and Pozzolo, 2005; Cerutti et al., 2007). The second measure to capture foreign bank presence is *foreign bank assets*, or the total amount of foreign bank assets to the gross domestic product (GDP) per capita in a given year and country. I take the natural logarithm of the ratio of total foreign bank assets to GDP per capita to normalize the data. For the choice of the second dependent variable, I follow prior studies and use the total amount of assets to capture foreign bank presence (Goldberg and Johnson, 1990; Miller and Parkhe, 1998). However, identifying the absolute dollar amount of assets is also informative; therefore, normalizing the total amount of assets on GDP per capita facilitates benchmarking the state of financial development and allows better comparison across countries at different stages of development. I argue that using only the number of foreign banks to assess the foreign bank presence in a host country would not clearly capture the size of capitalization of foreign investments—thus the advantage of using the variable *foreign bank assets*.

3.3. Main Explanatory Variables

I divide the *legal and business regulations* into a set of explanatory variables, including *regulatory restrictions*, *freedom from corruption*, *cost of tax compliance*, and *credit market deregulation*. To test hypothesis 1, whether stricter FDI restrictions in a host country negatively affect the foreign bank presence, I employ *regulatory restrictions all types* extracted from the Organisation for Economic Co-operation and Development (OECD) website. The OECD publishes an FDI Restrictiveness Index[37] that measures restrictions on FDI by country/sector over time. I extract the index measuring the *regulatory restrictions all types* in the banking sector because I'm interested in the presence of foreign banks, and I also extracted the four types of restrictions on banking activity. The highest score for any measure is 1, and the lowest is 0, with higher values indicating stricter restrictions. I use the FDI index as an aggregated measure and then separate each component to account for four types of

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[37] See http://www.oecd.org/investment/fdiindex.htm.

restrictions: *foreign equity restrictions*, *screening and approval requirements*, *restrictions on foreign key personnel*, and *other operational restrictions*. For the first component, *foreign equity limits*, limiting foreign equity in a host country constituted important barriers to FDI in the past, and many countries still apply these limits. According to the literature, restrictions on foreign entry affect productivity growth in the financial sector (World Bank, 2004). For the second component, *screening and approvals requirements*, screening mechanisms applicable only to foreign investors fulfill many functions and vary widely in scope. Approval is required for new FDI/acquisitions corresponding to the percentage of equity ownership. The third component, *restrictions on key foreign personnel*, takes into consideration restrictions on employment of key foreign personnel (a time-bound limit on employment of foreign key personnel) and nationality/residence requirements for boards of directors. The fourth component, *other operational restrictions*, covers various restrictions that affect the potential operations of foreign investors, such as restrictions on the establishment of branches, the acquisition of land for business purposes, and restrictions on profit or capital repatriation.

To test hypothesis 2, whether corruption has a negative impact on foreign bank presence, I include the variable *freedom from corruption* extracted from the Heritage foundation database. This variable is based on a 10-point scale, in which a score of 10 indicates very little corruption and a score of 0 indicates a very corrupt government.

Next, to test hypothesis 3, whether administrative burdens influence foreign bank presence, I include the variable *cost of tax compliance.* I retrieve the variable from the Fraser institute's economic freedom of the world database. The variable measures the time required each year for a business to prepare, file, and pay taxes. It is constructed using a formula with ratings from 0 to 10, where higher values indicate lower cost of tax compliance.

Finally, to test hypothesis 4, whether credit market deregulation influences foreign bank presence, I employ trade freedom and interest rate control. The variable *trade freedom* captures host countries' trade openness and measures the degree of freedom of trade in each country. Ho et al. (2013) argue that changes in trade policies, the regulatory environment, and the easing of restrictions on foreign investment are significant vehicles for expansion of FDI across the globe. I retrieved *trade freedom* also from the Heritage foundation database. The index ranges from 0 to 100, where higher values indicate more trade freedom. I expect a positive relationship between *trade freedom* and foreign bank presence. I also employ the variable *interest rate control*, extracted from the World Bank, World Development Indicators, International Monetary Fund, and International Financial Statistics. This variable

measures the extent to which governments have control of the country interest rate. Countries with interest rates determined by the market, a stable monetary policy, and reasonable real-deposit and lending-rate spread tend to attract foreign bank investments. Goldberg and Saunders (1981) find that banks go abroad to exploit favorable financial system environments and to take advantage of economic opportunities in host countries. For example, governments' inclination to fix the interest rate deteriorates countries' rating. The index ranges from 0 to 10, where higher values indicate better market conditions. I expect a positive relationship between *interest rate control* and foreign bank presence. Appendix Table A2 provides definitions of all the variables and their sources

3.4. Control Variables

3.4.1.   Development and Opportunities

To control for host-country development and opportunities in attracting FDI, I include the variables *Ln (country surface)*, *Ln (GDP per capita)*, and *bank deposits to GDP*. To control for host-country *development and opportunities*, I first use the *Ln (country surface)*, which is the natural logarithm of the surface area of a country's total area. The data come from the World Development Indicators database. The size of the country is a proxy for the inherent business opportunities of a country's economy. Available business opportunities in the host country market should attract foreign investments and thus increase the foreign bank presence. I argue that the likelihood of the presence of foreign banks increases with the size of the host country.

Next, to assess the impact of the level of development of host country on foreign bank presence, I employ *Ln (GDP per capita)*, extracted from the World Development Indicators database; this variable has been used in the literature and reflects the economic development of a country. By definition, GDP per capita measures the GDP per capita in U.S. dollars. The development of a country is a proxy for the sophistication and efficiency of the financial system. In general, foreign banks provide more innovative and technology-driven services than domestic banks; therefore, the host country's development enables foreign banks to compete more successfully. Prior studies on the banking sector have provided evidence of the impact of the size of the financial system (Goldberg and Grosse, 1994) and per capita income (Goldberg and Johnson, 1990; Yamori, 1998; Claessens et al., 2000) on the host country. Focarelli and Pozzolo (2008) find a positive relationship between a country's growth and foreign bank entry. The level of economic development reflects the volume of business that

could be achieved. This relationship is consistent with Cerutti et al.'s (2007) findings. Thus, I expect a positive relationship between GDP per capita and foreign bank presence.

Last, I employ the ratio of *bank deposits to GDP*, which measures the rate of penetration of banking services (Focarelli and Pozzolo, 2005). The data come from the Global Financial and Development database. I expect a positive relationship between the ratio of *bank deposits to GDP* and foreign bank presence.

3.4.2. *Financial Market Indicators*

To control for host country financial market indicators in attracting FDI, I include the variables *domestic credit to private sector*, *Lerner index*, *bank/market*, and *bank concentration*. To control for host-country financial market indicators, I first employ *domestic credit to private sector*, extracted from the World Bank database. This variable measures the financial resources provided to the private sector by domestic money banks as a share of GDP. Prior literature has mostly used this indicator to reflect the extent of financial sector depth in an economy. Giannettia and Ongena (2012) find a significant and positive relationship between foreign bank presence and access to credit in the host country, as do Clarke et al. (2006). Thus, I expect a positive relationship between greater financial sector depth and foreign bank presence, as the former would lead to greater availability of alternative sources of finance.

Second, I employ the *Lerner index*, which is an indicator of the financial market. Data come from the Global Financial Development Database. The *Lerner index* measures market power in the banking industry by comparing output pricing and the marginal costs and has been used in several studies (Demirguc-Kunt and Martinez Peria, 2010; Beck et al., 2011). An increase in the *Lerner index* is associated with a decline in banking competition. I'm interested in examining the impact of competition in the banking system on foreign bank presence. I expect a negative relationship because the higher the competition, the lesser is the foreign bank presence.

The third control variable, *bank/market*, captures market dependency on banking services. Data come from the World Bank database. *Bank/market* is the ratio of private credit by deposit-money banks to stock market capitalization. This ratio is a common measure of financial system orientation (Beck and Levine, 2002; Levine, 2002), and its components help assess the bank and stock market development (Levine, 1998; Levine and Zervos, 1998; Beck et al., 1999, 2000; Levine et al., 2000). I expect a positive relationship between the ratio

bank/market and foreign bank presence, because it reflects the domination of banks' activity in the host market and the need for banking services.

The final measure to control for financial market indicators is *bank concentration*, extracted from the Global Financial Development database. A high degree of concentration suggests that there is a little room for foreign bank presence in host countries. Boot (1999) argues that in some countries, foreign control of domestic insitutions is unlikely to happen, as governments want to maintain control of their largest institutions. Therefore, I expect less foreign bank entry in more concentrated markets. An appropriate variable for market concentration is the concentration ratio of the three largest banks in a country. I expect a negative relationship between banking concentration and foreign bank presence.

4. Results

4.1. Summary Statistics

Table 1 shows the descriptive statistics of the dependent and main explanatory variables used on the analysis. Column [1] shows the sample of countries employed and includes both developed and developing countries. In Column [2], I use the foreign bank ratio, which measures the number of foreign banks in a given year and country to the total number of banks in the same given year and country. This measure is the main country-level variable to proxy the importance of multinational banks in countries' banking systems. I note that Luxembourg constitutes the market with the largest share of its banking market controlled by foreign investors (95.83%). This is likely due to Luxembourg's particularly favorable institutional environment. The percentage is also high in some other small countries, such as Ireland (85.70%), New Zealand (77.78%), and Australia (42.94%). Foreign investors also control large portions of the banking markets of East European OECD countries: 79.54% in Romania, 75.80% in Poland, and 74.40% in Estonia. This could be explained by the privatization of state-owned banks, which have been opened to foreign investors. The United States and Italy have the highest degree of internationalization among the G7 countries (28.92% and 9.7%, respectively), while Japan has the lowest (1.22%). In Column [3], I also compute for a robustness check a different measure for the host-country foreign presence, defined as the natural logarithm of the ratio of total amount of foreign bank assets to GDP per capita in a given year and country. In columns [4] to [8], I present my explanatory variables to capture host-country legal and business regulation. As column [4] shows, the Russian Federation has the highest restrictions on foreign banking presence (0.69), followed by

144

Canada (0.61), China (0.50), and the Philippines (0.47). Luxembourg is among the top countries with foreign bank presence and has the lowest restrictions on foreign bank presence (0.00). As column [5] shows, Luxembourg and Switzerland have the highest scores for cost of tax compliance (9.35/10 and 9.29/10, respectively), indicating greater ease of doing business, while the Czech Republic and Brazil have the lowest scores (2.79/10 and 0/100, respectively). In column [6], New Zealand and Finland have the highest scores in freedom from corruption (95/100), followed by the two Scandinavian countries Denmark (94.13/100) and Sweden (92.38/100). Countries with the lowest scores are the Russian Federation (23.88/100), Indonesia (23.75/100), and Ukraine (23/100). Column [7] shows that many country governments have no control of the interest rate; instead, interest rates are determined by the markets. In the sample, Brazil (6/10) has the lowest score, indicating that the government still has some control over fixing the interest rate, followed by Kazakhstan (8/10) and Peru (8/10). Column [8] shows that the barriers to international trading freedom mostly pertain to developing countries. India, Tunisia, and Argentina have the lowest scores related to freedom to trade. European countries, except Switzerland, are members of a trade pact or economic union, which facilitates trading across Europe, while the United States and Canada are members of the North American Free Trade Agreement. Appendix Tables A3 and A4 show summary statistics and a correlation table that includes the dependent variables and the main independent variables.

--- Table 1 About Here ---

In Table 2, I report yearly statistics of foreign bank presence using both the dependent variables with the respective number of foreign banks. Column [2] shows the first dependent variable—the share of foreign banks to total banks in a host country. Note that the share of foreign banks to total banks did not decrease during the financial crisis; thus, I could argue that foreign banks survived better than domestic banks during the 2008–2009 period. However, a slight decrease in foreign bank share occurred in 2011 and 2012. Column [3] presents the second dependent variable—the natural logarithm of the ratio of total amount of foreign bank assets to GDP per capita in a given year and country. I observe a steady increase over the entire period studied (2005–2012). This finding means that even in the presence of fewer banks in 2011 and 2012, foreign bank assets still increased. Bank mergers and acquisitions could explain this increase, especially after the financial crisis, which decreased the number of banks without a reduction in the share of foreign bank assets. Column [4] shows a steady increase in the number of foreign banks from 2005 till 2007 and then a slight

145

decrease in the 2008–2009 period. This is not surprising given the financial crisis that hit the financial system and the contagion effects on foreign bank subsidiaries abroad.

--- Table 2 About Here ---

4.2. Country-Level Legal Determinants of Foreign Bank Presence

To analyze the impact of legal determinants on foreign bank presence, I use OLS panel regressions with fixed effects at the country level between 2005 and 2012. Table 3 reports the estimates for the (OLS) models as outlined in Section 3. Column [1] shows the results using the aggregate *regulatory restrictions all type*, and columns [2]–[5] replicate the analyses using the subcomponents showing different types of restrictions: *foreign equity*, *screening and approvals*, *key foreign personnel*, and *other restrictions*.

The model in column [1] of Table 3 underscores the role of country-level legal factors in shaping foreign bank presence. I find a significant, negative relationship between *regulatory restrictions all types* and foreign bank presence, with a high statistical significance ($p < 0.05$). Thus, I confirm hypothesis 1, which states that strict regulatory restrictions on FDI have a negative impact on foreign bank presence. Moreover, I find a positive relationship between *freedom from corruption* and foreign bank presence. I thus can confirm hypothesis 2 that foreign banks are present more in countries that enjoy greater freedom from corruption. Regarding the third explanatory variable, I also find a significant, positive relationship between cost of tax compliance and foreign bank presence, with a high statistical significance ($p < 0.01$). Thus, I confirm hypothesis 3 that foreign banks are more present in countries with lower administrative burdens and better procedures related to tax regimes. However, I do not find an impact of credit market deregulation on foreign bank presence, as both variables (interest rate control and trade freedom) have a neutral impact on foreign investments. Thus, I cannot confirm hypothesis 4, which states that credit market deregulation leads to an increase in foreign bank presence. Turning to the control variables, I find a positive and significant relationship between *Ln (country surface)* and foreign bank presence. Larger host countries tend to attract foreign banks, as opportunities for investment are frequently available. I also find a significant, positive relationship between *Ln (GDP per capita)* and foreign bank presence, with a high statistical significance ($p < 0.01$). Countries with high-income levels and more developed capital markets attract more foreign banks. Moreover, I find a positive relationship between *credit to private sector* and foreign bank presence. Prior research indicates that the presence of foreign banks increases financing to private firms (Bruno and Hauswald; 2013). I also find a significant, positive relationship between *bank/market* and

146

foreign bank presence, with a high statistical significance ($p < 0.05$). This result is not surprising, because bank-oriented countries have more international banks present than countries that rely more on capital markets. In some countries, banks are firms' main source of financing, as they do not have access to financial markets either because the markets are not developed enough or simply because of the riskiness of these firms. Last, I confirm prior research regarding the relationship between bank competition measured by the *Lerner index* and foreign bank presence. I find that the decrease in bank competition (increase in Lerner index) decreases foreign bank presence. In columns [2]–[5], I treat each variable of the *regulatory restrictions all types* index separately to analyze the weight of each regulation restriction on the foreign bank presence. Consistent with column [1], I highlight commonalities among the variables' relationships to foreign bank presence. For the main explanatory variables, the results are the same, except for *equity restriction*, which does not have an impact on foreign bank presence. An explanation could be that with globalization, most countries removed restrictions on equity ownership in banking. However, I still find a negative relationship for the other three restrictions (*screening and approvals*, *key foreign personnel*, and *other restrictions*) on foreign bank presence. For the control variables, I also still find the same results, except for the *Lerner index* in column [3], which has a neutral impact on foreign bank presence.

--- Table 3 About Here ---

As a robustness check in Table 4, I run the same regression using a different dependent variable to capture foreign bank presence. I employ foreign bank assets, which measures the ratio of foreign bank assets to the GDP per capita of the host country. I take the natural logarithm of the ratio in the analysis; I find results largely consistent with Table 3. In column [1], I find the same results as with the previous findings for the main explanatory variables: *regulatory restrictions all types*, *freedom from corruption*, and *cost of tax compliance*. In columns [2]–[5], when using the separated aggregated index by restriction type, I find similar results for both *screening and approvals* and *other restrictions*; however, I no longer find a significant effect for *key foreign personnel*. For the control variables, most remain the same as in Table 3. I also find a significant, negative relationship between *bank concentration* and foreign bank presence. Prior research confirms the results and finds that a high degree of concentration leads to lesser foreign bank presence in host countries (Boot, 1999).

--- Table 4 About Here ---

5. Conclusion

While a wealth of literature has analyzed the economic determinants of FDI, the legal determinants and, more precisely, the impact of business regulations on bank foreign presence have not, to my knowledge, been explored. Using a panel dataset covering 44 countries from 2005 to 2012, this study offers new evidence suggesting that strict host-country business regulations still constitute an obstacle for foreign bank presence. I also find that host countries attract more foreign banks when they have a lower compliance cost for paying taxes and when their governments are less corrupt. I apply a robustness check to confirm the results. Overall, the evidence highlights the importance of government efforts to create a more favorable FDI environment by reducing restrictions and, along with those, costs associated with foreign capital investments.

However, it is important for further research to evaluate foreign banks' strategies when host countries do not offer a friendly legal environment to foreign investors. How do foreign banks overcome the regulation burdens? Do these banks take more risks when facing lower legal protection? What is the impact of the legal environment on foreign bank lending? To my knowledge, few studies have investigated foreign banks' behavior when facing lower legal protection, and thus this research question should be investigated.

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Table 1. Summary statistics: Country-level variables

Column [1] shows the sample of countries used in the analysis. The sample covers both developed and developing countries. Columns [2] and [3] pertain to my two dependent variables used in the analysis. Columns [4]–[8] show the main explanatory variables used in the analysis. In columns [2]–[8], I report the mean of each variable at the country level, covering the period from 2005 to 2012. All variables are defined in Appendix Table A2.

[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]
Countries	Foreign bank ratio	Foreign bank assets	Regulatory restrictions all types	Cost of tax compliance	Freedom from corruption	Interest rate control	Trade freedom
Luxembourg	95.83%	20.45	0.00	9.35	84.50	10.00	85.40
Ireland	85.70%	19.76	0.05	9.15	75.00	10.00	84.75
Romania	79.54%	18.03	0.00	7.62	37.67	10.00	87.40
New Zealand	77.78%	19.14	0.25	8.72	95.00	10.00	82.92
Poland	75.80%	19.11	0.00	6.05	41.63	10.00	85.28
Estonia	74.40%	17.37	0.00	9.08	62.83	9.67	85.52
Lithuania	70.00%	17.22	0.01	8.10	47.20	9.60	85.66
Peru	67.71%	17.51	0.05	6.72	36.00	8.00	85.50
Czech Republic	63.07%	18.82	0.00	2.79	46.38	10.00	84.98
Latvia	57.27%	16.82	0.01	6.79	44.29	9.14	85.13
Ukraine	47.53%	17.49	0.10	5.07	23.00	9.50	84.80
Tunisia	47.06%	16.19	0.12	8.39	42.50	10.00	55.80
Indonesia	44.23%	17.47	0.12	6.61	23.75	9.88	75.10
Australia	42.94%	18.35	0.30	8.79	87.33	10.00	82.02
Belgium	41.18%	19.90	0.02	8.38	73.00	10.00	85.40
Chile	40.86%	15.07	0.00	6.46	73.67	10.00	79.73
Canada	40.18%	16.24	0.61	8.67	85.25	10.00	85.30
Jordan	40.00%	16.54	0.10	8.31	47.00	10.00	79.60
Brazil	36.83%	19.14	0.15	0.00	36.50	6.00	69.39
Colombia	36.67%	15.52	0.00	7.76	36.67	10.00	72.63
Morocco	36.36%	16.95	0.00	7.35	34.00	10.00	80.25
Kazakhstan	36.36%	16.62	0.10	7.89	28.00	8.00	74.23
Slovenia	36.36%	16.31	0.00	7.09	63.38	10.00	85.60
Turkey	35.80%	17.48	0.11	7.45	38.88	10.00	83.58
Portugal	35.15%	18.72	0.08	6.59	63.00	10.00	85.40

Argentina	32.39%	16.80	0.00	4.92	25.00	9.50	61.80
United States	28.92%	21.34	0.10	7.55	73.75	10.00	85.14
Greece	24.51%	17.82	0.10	7.34	44.33	10.00	81.42
South Africa	23.00%	18.24	0.05	7.34	46.63	10.00	75.99
Switzerland	21.79%	18.73	0.16	9.29	89.75	10.00	86.88
Finland	20.60%	19.42	0.14	7.41	95.00	10.00	84.75
Russian Federation	18.06%	18.18	0.69	6.32	23.88	8.88	62.28
China	16.21%	18.01	0.50	4.11	34.38	9.63	68.43
Germany	14.40%	20.68	0.01	7.69	79.63	10.00	85.40
Philippines	13.26%	14.27	0.47	7.82	24.63	10.00	78.44
India	11.33%	17.69	0.41	7.09	31.75	9.88	51.43
Austria	11.09%	19.63	0.00	8.10	82.13	10.00	85.41
Italy	9.17%	19.13	0.02	6.50	47.75	9.50	83.53
Denmark	8.58%	19.19	0.00	8.50	94.13	10.00	85.40
Spain	7.74%	18.32	0.03	7.53	66.50	10.00	85.40
France	4.91%	20.43	0.05	8.52	71.00	10.00	81.65
Norway	2.04%	17.91	0.15	9.02	88.50	9.00	83.90
Sweden	1.36%	15.33	0.00	8.63	92.38	10.00	84.75
Japan	1.22%	17.48	0.08	6.14	73.88	10.00	81.23
Mean	36.71%	17.97	0.12	7.25	57.08	9.69	80.10

Table 2. Yearly foreign banks statistics

Column [1] shows the periods examined in the analysis. Columns [2]–[3] show yearly statistics of the dependent variables, and column [4] shows the yearly total number of foreign banks. All variables are defined in Appendix Table A2.

[1]	[2]	[3]		[4]
Year	Foreign bank ratio	Foreign bank assets		Number of foreign banks
2005	31.40%	17.20		490
2006	34.85%	17.50		524
2007	38.27%	18.19		536
2008	38.57%	18.07		530
2009	38.98%	18.13		511
2010	38.80%	18.03		530
2011	36.95%	18.30		518
2012	35.87%	18.30		498
Mean	36.71%	17.97	Total	4137

Table 3. Legal determinants of foreign banks: Fixed-effects OLS regression

The dependent variable pertains to the number of foreign banks in a given year and country divided by the total number of banks in the same given year and country. In column [1], I report results using the aggregate *regulatory restrictions all type*, while columns [2]–[5] replicate the analyses using separately the subcomponents showing different types of restrictions: *equity restrictions*, *screening and approvals*, *key foreign personnel*, and *other restrictions*. The data take panel structure. All variables are defined in Appendix Table A2. I report OLS panel fixed effects for all the regressions results. Significance levels: $* < 10\%$, $** < 5\%$, and $*** < 1\%$.

	[1]	[2]	[3]	[4]	[5]
	Foreign bank ratio	Foreign bank ratio	Foreign bank ratio	Foreign bank ratio	Foreign bank ratio
Regulatory restrictions all types	-0.085**				
Equity restrictions		-0.010			
Screening and approval			-0.286***		
Key foreign personnel				-0.283*	
Other restrictions					-0.148*
Cost of tax compliance	0.014***	0.014***	0.014***	0.014***	0.015***
Freedom from corruption	0.001**	0.001**	0.001*	0.001**	0.001*
Interest rate controls	-0.002	-0.002	-0.002	-0.002	-0.002
Trade freedom	0.000	0.000	0.000	0.000	0.000
Ln (country surface)	2.934***	2.898***	2.930***	2.915***	2.854***
Ln (GDP per capita)	0.099***	0.102***	0.099***	0.106***	0.095***
Bank deposits to GDP (%)	0.000	0.000	0.000	0.000	0.000
Domestic credit to private sector	0.040*	0.042*	0.040*	0.042**	0.044**
Bank/market	0.003**	0.003*	0.003**	0.003**	0.003*
Bank concentration (%)	0.006	0.004	0.011	0.003	0.001
Lerner index	0.053**	0.052**	0.039	0.054**	0.050*
Adjusted R^2	0.29	0.27	0.29	0.28	0.28
p-value	0.000	0.000	0.000	0.000	0.000
Observations	247	244	244	244	244
Countries	44	44	44	44	44

Table 4. Robustness check using alternative measure of foreign bank presence: Fixed-effects OLS regression

The dependent variable pertains to the natural logarithm of the ratio of total amount of foreign bank assets to GDP per capita in a given year and country. In column [1], I report results using the aggregate *regulatory restrictions all type*, while columns [2]–[5] replicate the analyses using separately the subcomponents showing different types of restrictions: *equity restrictions*, *screening and approvals*, *key foreign personnel*, and *other restrictions*. The data take panel structure. All variables are defined in Appendix Table A2. I report OLS panel fixed effects for all the regressions results. Significance levels: * $< 10\%$, ** $< 5\%$, and *** $< 1\%$.

	[1]	[2]	[3]	[4]	[5]
	Foreign bank assets	Foreign bank assets	Foreign bank assets	Foreign bank assets	Foreign bank assets
Regulatory restrictions all types	-2.470***				
Equity restrictions		-0.164			
Screening and approval			-14.182***		
Key foreign personnel				0.356	
Other restrictions					-3.578**
Cost of tax compliance	0.181***	0.180***	0.179***	0.181***	0.198***
Freedom from corruption	0.024**	0.026**	0.009	0.025**	0.020
Interest rate controls	0.004	0.010	-0.057	0.008	-0.017
Trade freedom	-0.002	0.003	-0.007	0.003	0.006
Ln (country surface)	-11.441	-12.166	-9.968	-12.247	-13.057
Ln (GDP per capita)	3.645***	3.823***	3.648***	3.822***	3.652***
Bank deposits to GDP (%)	0.004	0.006	0.004	0.006	0.004
Domestic credit to private sector	0.653*	0.692*	0.631*	0.698*	0.764*
Bank/market	0.033	0.027	0.038	0.027	0.026
Bank concentration (%)	-0.578	-0.691*	-0.377	-0.698*	-0.784*
Lerner index	1.279**	1.204**	0.540	1.187**	1.149**
Adjusted R^2	0.41	0.37	0.51	0.37	0.38
p-value	0.000	0.000	0.000	0.000	0.000
Observations	247	244	244	244	244
Countries	44	44	44	44	44

Appendix

Table A1. List of countries in the dataset (ranking according to number of foreign banks)

Luxembourg	(552)	Slovenia	(55)
Brazil	(400)	Spain	(54)
Russian Federation	(298)	Philippines	(49)
Poland	(285)	South Africa	(48)
Indonesia	(237)	Argentina	(46)
China	(183)	Chile	(38)
Switzerland	(163)	France	(38)
United States	(149)	Estonia	(35)
Ireland	(144)	Lithuania	(35)
Germany	(112)	New Zealand	(35)
Czech Republic	(109)	Greece	(27)
Turkey	(108)	Kazakhstan	(24)
Belgium	(100)	Colombia	(22)
Latvia	(87)	Peru	(21)
Canada	(86)	Tunisia	(16)
Austria	(84)	Morocco	(12)
Portugal	(74)	Finland	(11)
Italy	(66)	Japan	(9)
Romania	(66)	Sweden	(8)
Australia	(64)	Jordan	(4)
India	(63)	Norway	(4)
Ukraine	(59)		
Denmark	(57)		

Table A2. List of variables

Variable Name	Definition
Dependent variables	
Foreign bank ratio	The number of foreign banks in a given year and country divided by the total number of banks in the same given year and country. Source: Claessens and Van Horen database on bank ownership and own calculation.
Foreign bank assets	The natural logarithm of the ratio of total amount of foreign bank assets to GDP per capita in a given year and country. Source: Bankscope database and World Development Indicators database.
Explanatory variables	
Legal and business regulations	
Regulatory restrictions all types	The FDI Restrictions Index is an aggregate index containing four types of measures: (1) foreign equity restrictions, (2) screening and prior approval requirements, (3) rules for key personnel, and (4) other restrictions on the operation of foreign banks. The highest score for any measure is 1, and the lowest is 0. I obtain the aggregate index by adding the score of the four types of measures for each country by year. Source: Organization for Economic Co-operation and Development (OECD)
Equity restrictions	"The scoring makes a difference between a full exclusion of foreign participation, restrictions on majority holdings and limits on full foreign ownership. These three thresholds are also the key limits most commonly found in legislation. If no foreign equity is permitted the sore is 1; if majority foreign control is not allowed the score is 0.5 and if there is a requirement of a domestic minority holding the score is 0.25". Source: Organization for Economic Co-operation and Development (OECD)
Screening and approval	"The scoring for the FDI Index focuses exclusively on regulatory restrictions regarding: the thresholds for the amount of the investment and share of foreign equity above which foreign investments are reviewed". Source: Organization for Economic Co-operation and Development (OECD)
Key foreign personnel	"The scoring measures include economic needs tests for the employment of foreign managers, time bound limits on the employment of foreign managers as well as nationality requirements for members of the board of directors". Source: Organization for Economic Co-operation and Development (OECD)
Other restrictions	"The measure includes: restrictions on the establishment

	of branches, the acquisition of land for business purposes, including cases where foreigners may not own property but may sign leases, reciprocity clauses in particular sectors, restrictions on profit or capital repatriation". Source: Organization for Economic Co-operation and Development (OECD)
Freedom from corruption	The corruption perceptions index is based on a 10-point scale, where a score of 10 indicates little corruption and a score of 0 indicates a very corrupt government. Source: Heritage Foundation database.
Cost of tax compliance	"It is based on the World Bank's Doing Business data on the time required per year for a business to prepare, file, and pay taxes on corporate income, value added or sales taxes, and taxes on labor". A higher value indicates a better business regulation environment. Source: Fraser institute, economic freedom of the world database
Interest rate control	"Data on credit-market controls and regulations were used to construct rating intervals. Countries with interest rates determined by the market, stable monetary policy, and reasonable real-deposit and lending-rate spreads received higher ratings. The index ranging from 10 to 0. For example, when interest rates were determined primarily by market forces as evidenced by reasonable deposit and lending-rate spreads, and when real interest rates were positive, countries were given a rating of 10". Source: World Bank, World Development Indicators; International Monetary Fund, International Financial Statistics.
Trade freedom	"Trade freedom is a composite measure of the absence of tariff and non-tariff barriers that affects imports and exports of goods and services. The trade freedom score is based on two inputs: the Trade-weighted average tariff rate and the non-tariff barriers". The index ranges between 0 and 100, where higher values indicate more trade freedom. Source: Heritage Foundation database.

Control variables

Development and opportunities

Ln (country surface)	"The natural logarithm of the Surface area is a country's total area, including areas under inland bodies of water and some coastal waterways". Source: World Development Indicators database.
Ln (GDP per capita)	GDP per capita is the gross domestic product per capita in USD. I use the natural logarithm of the GDP per capital in our analysis. Source: World Development Indicators database.

Bank deposits to GDP (%)	"The total value of demand, time and saving deposits at domestic deposit-money banks as a share of GDP. Deposit-money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits". Source: Global Financial Development Database.

Financial market indicators

Domestic credit to private sector (% of GDP)	"Domestic credit to private sector refers to financial resources provided to the private sector by financial corporations, such as through loans, purchases of nonequity securities, and trade credits and other accounts receivable that establish a claim for repayment". Source: World Bank database.
Bank/market	Ratio of private credit by deposit-money banks to stock market capitalization. Source: Financial structure and development Database, World Bank and own calculation
Bank concentration (%)	"Assets of three largest commercial banks as a share of total commercial banking assets. Total assets include total earning assets, cash and due from banks, foreclosed real estate, fixed assets, goodwill, other intangibles, current tax assets, deferred tax assets, discontinued operations and other assets". Source: Global Financial Development Database.
Lerner index	"A measure of market power in the banking market. It compares output pricing and marginal costs (that is, markup). An increase in the Lerner index indicates a deterioration of the competitive conduct of financial intermediaries. Higher values of the Lerner index indicate less bank competition. Lerner Index estimations follow the methodology described in Demirguc-Kunt and Martinez Peria (2010)". Source: Global Financial Development Database.

Table A3. Summary statistics

Variable	Nbr. Obs.	Mean	Std. Dev.	Min	Max
Foreign bank ratio	268	0.36	0.26	0.01	0.96
Foreign bank assets	268	17.97	1.66	13.10	21.56
Regulatory restrictions all types	268	0.12	0.18	0.00	0.78
Equity restrictions	265	0.05	0.12	0.00	0.50
Screening and approval	265	0.02	0.06	0.00	0.20
Key foreign personnel	265	0.02	0.03	0.00	0.10
Other restrictions	265	0.04	0.04	0.00	0.20
Cost of tax compliance	268	7.25	2.00	0.00	9.38
Freedom from corruption	268	57.08	23.24	19.00	97.00
Interest rate controls	268	9.69	0.81	5.00	10.00
Trade freedom	268	80.10	8.99	24.00	90.00
Ln (country surface)	268	12.81	2.03	7.86	16.65
Ln (GDP per capita)	268	9.57	1.21	6.61	11.36
Bank deposits to GDP (%)	268	79.76	61.60	18.34	394.60
Domestic credit to private sector	268	103.14	54.80	9.59	224.05
Bank/market	247	1.98	1.94	0.29	10.83
Bank concentration (%)	268	61.36	26.10	7.25	100.00
Lerner index	268	0.23	0.10	-0.05	0.63

Table A4. Correlation matrix

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]
Foreign bank ratio	[1]	1												
Foreign bank assets	[2]	0.115	1											
Regulatory restrictions all types	[3]	-0.2215	-0.2891	1										
Equity restrictions	[4]	-0.2026	-0.3296	0.909	1									
Screening and approval	[5]	0.0086	-0.0664	0.6022	0.35	1								
Key foreign personnel	[6]	-0.2206	-0.0785	0.5713	0.4776	0.1735	1							
Other restrictions	[7]	-0.2035	-0.1248	0.3866	0.1528	0.0681	0.1008	1						
Freedom from corruption	[8]	0.0235	0.4141	-0.3305	-0.3636	-0.1115	-0.3284	0.0293	1					
Cost of tax compliance	[9]	0.1056	0.0926	-0.1255	-0.096	-0.1329	-0.0107	-0.0654	0.4929	1				
Ln (country surface)	[10]	-0.3714	-0.0853	0.5866	0.4515	0.4496	0.4317	0.2633	-0.4096	-0.397	1			
Ln (GDP per capita)	[11]	0.0502	0.5441	-0.4298	-0.4212	-0.2799	-0.3717	0.0324	0.8654	0.3992	-0.4561	1		
Bank deposits to GDP (%)	[12]	0.2165	0.3458	-0.1985	-0.1543	-0.1576	-0.2042	-0.0381	0.4827	0.2847	-0.4758	0.5368	1	
Interest rate controls	[13]	-0.039	-0.0214	-0.1166	-0.0439	-0.0616	0.016	-0.2856	0.3148	0.5785	-0.3208	0.2444	0.1898	1
Trade freedom	[14]	0.2223	0.2581	-0.5502	-0.494	-0.4367	-0.369	-0.0549	0.5485	0.3645	-0.5188	0.6445	0.2967	0.2849
Domestic credit to private sector	[15]	-0.0181	0.4359	-0.2297	-0.2343	-0.0696	-0.1484	-0.0956	0.6685	0.3434	-0.2357	0.6628	0.6087	0.2905
Bank/market	[16]	0.1776	0.1062	-0.2942	-0.2145	-0.0771	-0.3395	-0.2753	0.1559	0.1392	-0.3766	0.2161	0.0107	0.1084
Bank concentration (%)	[17]	0.1845	-0.241	-0.2402	-0.3051	-0.0992	-0.4408	0.2965	0.1872	0.1041	-0.2136	0.1247	-0.0028	0.0277
Lerner index	[18]	-0.0129	-0.2072	-0.0542	-0.0523	-0.031	0.0291	-0.0555	-0.1771	-0.0508	0.0718	-0.1278	-0.0832	0.0438

		[14]	[15]	[16]	[17]	[18]
Trade freedom	[14]	1				
Domestic credit to private sector	[15]	0.4132	1			
Bank/market	[16]	0.3186	0.2444	1		
Bank concentration (%)	[17]	0.2985	0.1114	0.1962	1	
Lerner index	[18]	-0.0467	-0.0749	-0.1371	0.054	1

General Conclusion

This thesis contributes to the growing literature of the law and finance theory in which we provide new evidence of the importance of institutions and legal framework in explaining international differences in financial development. Countries differ significantly in their economic outcomes, which can be better explained by institutional differences. The main hypothesis is that differences in jurisdictions – of the countries where financial institutions are located – to a large extend shape the risk taking and the emergence of new players. This dissertation proceeds in testing this hypothesis along three chapters.

In the first chapter, 'Creditor rights, systemic risk and banks regulations: Evidence from cross-country study', using 744 listed commercial banks covering 34 countries, we provide empirical evidence that legal protection increases banks appetite towards risk taking. We find that better creditor protection increases bank systemic risk. We further separate our sample into two sub-samples and show that developed countries are sensitive to differences in the level of creditor rights at the country level and that these legal protections significantly contribute to aggravating the stability of the financial system. While we find a neutral impact on systemic risk in developing countries with different legal protection, our results show that in developed countries, banks are more involved in complex instruments, are larger and are more interconnected than those in developing countries. We also conduct another analysis by changing the bank risk measure and using Z-score, defined as bank distance to insolvency. We find the same trend with significant results, highlighting the impact of legal protection on bank risk. Moreover, for a robustness check, we use several variables to substitute the creditor rights index and still find similar results that confirm the conclusions of the previous analyses.

In the second chapter, 'The Emergence of the Global Fintech Market', we provide the first comprehensive overview of market developments in 64 different countries. By categorizing fintechs in line with the value chain of a traditional bank—financing, asset management, payment, and other business activities—we show that in terms of new startup formations financing has become the most important segment of the emerging fintech market, followed by payment, other business activities, and asset management. We find that globally the United

States lead the way in this new market. In Europe, the largest fintech markets are found in the United Kingdom, Germany and France. Furthermore, we document an upsurge in fintech startups following the financial crisis, as the number of fintech startups founded in 2010 was twice as large as in 2008. We also examine why some jurisdictions have a larger fintech market than others. In particular, we analyse several economic and general technological determinants that have encouraged fintech startup formations over the period from 2005 to 2014. We find that countries witness more fintech startup formations when capital markets are well-developed, the latest technology is readily available, and people possess more mobile telephone subscriptions. Moreover, we demonstrate that larger labour markets are positively associated with the supply of entrepreneurs in the fintech industry, whereas the unemployment rate is not. Hence, for fintech activities to flourish it not only suffices to have a demand for the digitalization of certain financial products; specialized entrepreneurs who can develop them are also needed.

In the third chapter, 'Foreign Direct Investment Regulation, Business Taxes and Corruption: Cross-Country Study of Foreign Bank Presence', we investigate the role of legal and regulatory environment on foreign direct investments in the banking sector. It has been documented that inefficient legal environment decreases foreign investments and increases related transaction costs. Moreover, investors are reluctant to inject money in new markets when host-countries legal and regulatory system does not provide cheap mechanisms for enforcing legal rights and obligations. Normally, low transaction costs are ensured where a host state's laws are of good quality, and its courts and bureaucracies are provided with adequate infrastructure. Legal and business regulation in favor of foreign investors increases the likelihood for the presence of foreign banks in host-countries. To investigate the legal impact on foreign bank presence and its related costs, we implement an empirical study using a panel dataset of 44 countries for the 2005-2012 period. We find that host-countries witness more foreign banks when regulatory restrictions on foreign direct investment are low, when lower the compliance cost for paying taxes, and when host countries governments are less corrupted. A robustness check has been applied and we thus confirm our results. Overall, the evidence highlights on the importance of

government's efforts to create a more favorable foreign direct investments environment by reducing restrictions and, alongside, costs associated with the foreign capital invested.

The research presents a number of limitations. The thesis was performed using a comparative approach and analyzing the impact of laws at the national level. We proceed comparing differences in legal institutional environments across countries and studying empirically the effects of corporate regulation. However, some of the legal and regulatory variables used in the analysis are mostly static and may not reflect the undergone substantial reforms of legislation across different countries. Moreover, testing empirically the impact of laws is quite challenging as laws do not vary much in a short period on the national level. Another concern is the endogeneity problem that appears from treating laws variables as exogenous in the analysis. As some studies argue that even if legal rules matter, it would be possible that these rules endogenously adjust to economic reality, and hence the differences in rules and outcomes simply reflect the differences in some other, exogenous conditions across countries. However, to dress such a bias in the analysis, we consider the instrumental variables approach using legal origins, latitude, ethnic fractionalization and countries religious composition as instruments since the latter variables could be treated as exogenous.

Taken together, findings of the thesis offer new insights of the primordial role of law and regulations in shaping financial institutions behaviors and the emergence of new financial sectors.

L'Impact du Droit et de la Régulation sur les Institutions Financières : Trois Essais

Résumé

Quels sont les effets du droit et de la régulation sur les institutions financières? Cette thèse propose d'apporter des réponses à cette question tout au long de trois chapitres. Le premier chapitre étudie l'impact du droit des entreprises en difficulté sur la prise de risque des banques. Les principaux résultats montrent qu'une meilleure protection des créanciers augmente le risque systémique des banques. Ces résultats sont observés dans les pays développés où les banques sont davantage engagées dans les instruments complexes, elles sont plus grandes et plus interconnectées que celles dans les pays en voie de développement. Le second chapitre expose l'émergence des startups fintechs et présente la première étude empirique consacrée aux déterminants technologiques et économiques de ce secteur. Les résultats indiquent que les pays présentent davantage de créations de startups fintech quand les marchés de capitaux sont bien développés, que les nouvelles technologies sont facilement accessibles et que les personnes possèdent plus d'abonnements de téléphonie mobile. Le troisième examine les déterminants juridiques de l'implantation des banques à l'étranger à travers les investissements directs. L'étude constate que certains pays accueillent plus de banques étrangères quand les restrictions réglementaires sur l'investissement étranger direct sont limitées, que le coût lié au paiement des impôts est plus bas et les gouvernements moins corrompus.

Mots clefs français : Institutions Financières, Droits des Créanciers, Risque Systémique Bancaire, Fintech, Investissement Direct Étranger

The Impact of Law and Regulation on Financial Institutions : Three Essays

Abstract

What are the effects of law and regulation on financial institutions? The thesis proceeds in answering this question along three chapters. The first chapter investigates the effect of creditor rights on banks systemic risk. It provides evidence that countries adopting laws with more favorable protection to creditors in bankruptcy have higher contribution to systemic risk. The effect of creditor protection on bank systemic risk is found in developed countries, but not in developing countries. The second chapter explores the emergence of fintech startups and presents empirical evidence on the technological and economic determinants of this financial sector. The main findings show that countries witness more fintech startup formations when the latest technology is readily available, the economy is well-developed, and people have more mobile telephone subscriptions. The third chapter examines the legal determinants of the presence of foreign banks. The results show that host countries attract more foreign banks when regulatory restrictions on foreign direct investment are low, when the compliance cost for paying taxes is low, and when host-country governments are less corrupt.

Keywords : Financial Institutions, Creditor Rights, Bank Systemic Risk, Fintech, Foreign Direct Investment