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## Three Essays in Private Equity

Sara Ain Tommar

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# THÈSE DE DOCTORAT

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## COMPOSITION DU JURY :

M. Serge DAROLLES  
Université Paris-Dauphine  
Directeur de thèse

Jean-François GAJEWSKI  
Université Lyon 3  
Rapporteur

José-Miguel GASPAR  
ESSEC Business School  
Rapporteur

Mme. Edith GINGLINGER  
Université Paris-Dauphine  
Présidente du jury

M. Ludovic PHALIPPOU  
Saïd Business School - University of Oxford  
Membre du jury

**Soutenu le 11.12.2018**  
**par Sara AIN TOMMAR**

Dirigée par **Serge DAROLLES**



L'Université Paris-Dauphine n'entend donner aucune approbation, ni improbation aux opinions émises dans cette thèse ; elles doivent être considérées comme propres à leur auteur.

Aux trois hommes de ma vie.

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# Introduction Générale

Le *private equity* est un investissement de long terme dans des entreprises privées, destiné à subvenir aux besoins de financement en capital de ces entreprises et susceptibles de réaliser par la même occasion des rendements sur investissement intéressants pour leurs investisseurs. Le *private equity* est souvent organisé en structures à responsabilité limitée (dites *limited liability partnerships*), où les investisseurs, souvent institutionnels (dits *limited partners* ou *LPs*), s'engagent à verser des capitaux à un ou plusieurs fonds gérés par une société de gestion (dite *general partner* ou *GP*), dont la mission est de rentabiliser les fonds de ces investisseurs sur le long terme. La structure de rémunération du GP comprend des frais de gestion (souvent 1 à 2% des fonds sous gestion), et une prime de performance (dite *carried interest*), qui revient au GP dès lors qu'il atteint le taux de rentabilité minimum exigé par les investisseurs (*hurdle rate* – souvent 8%). La prime de performance est d'environ 20% des produits de cession des investissements du fonds, après retour des fonds initiaux. La durée dont dispose le GP pour rentabiliser les fonds engagés par les LPs est d'environ 10 ans. Cette période correspond à la durée de vie légale du fonds d'investissement et peut exceptionnellement être étendue de 2 à 4 ans supplémentaires. Le *private equity* est souvent entendu à deux catégories principales d'investissement : les *leveraged buyouts* ou *LBO*, qui sont des prises de participation par des fonds d'investissement dans des entreprises matures, souvent moyennant un fort effet de levier ; et le *venture capital* ou *VC*, qui correspond à des prises de participation minoritaires dans des entreprises très jeunes et plus risquées.

Jensen (1989) avait prédit que les *LBO* seraient la forme dominante des organisations futures. Il avait soutenu que cette forme d'acquisition serait le modèle d'affaires de référence du *private equity* moderne, où les sociétés de *private equity* créeraient de la valeur en apportant leur savoir-faire en matière de finances, d'opérations et de gouvernance aux entreprises dans lesquelles elles investissent ; et où elles réussiraient, ce faisant, grâce à leur système de rémunération basé sur la performance, une optimisation des coûts liée à l'utilisation de l'effet de levier et à un système fiscal avantageux. Selon Jensen (1989), ces structures bénéficiant d'un actionnariat

majoritairement unique et d'un accompagnement stratégique, sont supérieures aux entreprises cotées en bourse, caractérisées par une faible gouvernance et un actionnariat dispersé. Ce postulat, alors considéré hors contexte, est remis aujourd'hui au centre du débat dans un environnement marqué par le manque de dynamisme des marchés boursiers, une baisse des introductions en bourse et une diminution accrue des sociétés cotées (Doidge et al., 2018).

Le marché du *private equity* est estimé aujourd'hui à plus de 2.8 billions de dollars<sup>1</sup>. Quoique la taille du marché reste faible comparée à la valeur des marchés boursiers dans le monde (estimée à 40 billions<sup>2</sup>), le *private equity* continue de bénéficier d'un intérêt particulier de la part des investisseurs, pour des raisons liées entre-autres (i) à des coûts de transaction de plus en plus élevés sur les marchés boursiers du fait de leur concentration accrue – suite du déclin du nombre de sociétés cotées –, (ii) à un manque de diversification sectorielle des indices de marché, combinée à leur volatilité plus importante, et (iii) au court-termisme qui caractérise les marchés boursiers et qui est incompatible avec les objectifs et les horizons d'investissement des investisseurs des marchés privés (Phalippou, 2018).

Cette thèse aborde ainsi des thématiques qui caractérisent les mutations que connaît aujourd'hui le marché du *private equity*: une recherche de liquidité relative, une quête de rendements supérieurs dans de nouveaux marchés et une stabilité des ressources humaines qui restent un vecteur de communication important des discours de levées de fonds du *private equity*.

Il convient d'abord de décrire le contexte de développement des marchés privés et ses évolutions récentes, de dresser les avancées de recherche en matière de *private equity*, avant d'exposer les trois pistes de recherche développées dans ce manuscrit.

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<sup>1</sup> Données Preqin.

<sup>2</sup> Ludovic Phalippou, (2018). The future of private markets.

## 1. Développement des marchés privés et évolutions récentes

L'élargissement de la base des investisseurs du *private equity* aux investisseurs institutionnels, en plus des *family offices* et des riches individus (*High Net Worth Individuals*), conjugué au développement des méga-fonds, témoigne du succès que connaît l'industrie malgré sa taille relativement faible comparée aux marchés boursiers. Selon les statistiques de la banque mondiale, il y aurait 43.036 entreprises intérieures (i.e. nationales) cotées en bourse dans le monde à fin 2017, alors que rien qu'en France, le nombre d'entreprises privées est de l'ordre de 3 millions. C'est dire le rôle que peut avoir le *private equity* dans la réalisation du potentiel de croissance des entreprises privées. De plus, aux Etats-Unis, le nombre moyen de créations d'entreprises par an selon les derniers chiffres de la SBA (Small Business Administration, 2017), est de l'ordre de 414.000. La même année, environ 1.500 entreprises ont bénéficié d'un premier financement de la part des fonds de *private equity* selon les données Preqin. Bien que 0,4% seulement des start-ups soient financées par les fonds de *private equity*, la recherche académique a montré que ces derniers contribuent de plus de 3 à 4 fois à l'innovation des entreprises que les ressources propres de ces dernières en R&D (Kortum et Lerner, 2000), et que plus de 50% des introductions en bourse étaient initiées par des fonds de private equity (Kaplan et Lerner, 2010).

Plusieurs changements réglementaires au cours des années 2000, notamment les lois *Sarbanes-Oxley* en 2002 ou le *Global Settlement* en 2003, ont attisé le débat l'intérêt de la cotation pour une entreprise privée. Certaines ont argué que ces lois augmenteraient les coûts des entreprises cotées et seraient des facteurs déterminants de l'allongement de l'âge moyen de l'entreprise privée<sup>3</sup>. Les travaux académiques récents ont pourtant montré que le manque de dynamisme des marchés publics était dû au progrès technologique (Gao *et al.*, 2013), et que les changements réglementaires avaient peu ou pas d'impact sur la chute du nombre de sociétés cotées (Doidge *et al.*, 2017).

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<sup>3</sup> Voir à titre d'exemple: "The demise of the IPO, and ideas on how to revive it", The Wall Street Journal, 25 juin 2010.

Ces transformations sont concomitantes aux mutations qui ont récemment marqué le *private equity*. D'abord, la chute des marchés boursiers durant la crise financière de 2008 a provoqué une augmentation mécanique du niveau des allocations au *private equity*, au-delà des limites réglementaires. Cette forte demande, dite *effet dénominateur*, a provoqué des ventes forcées de la part des investisseurs en fonds de *private equity*. Ceci a contribué au développement d'un marché secondaire de parts de fonds (Kleyменова *et al.* (2012), Bollen et Sensoy (2015), Nadauld *et al.* (2017) et Albuquerque *et al.* (2017)).

Ensuite, les années récentes sont marquées par une maturité accrue des marchés développés, où les opportunités d'investissement se font plus rares, engendrant une spécialisation accrue (Gejadze *et al.*, 2017, Hochberg *et al.*, 2014), une concurrence plus importante entre fonds sur les deals disponibles et une valorisation plus élevée de ces derniers (Braun et Stoff, 2016). Les années récentes ont ainsi vu un nombre accru d'investisseurs se tourner vers les marchés émergents, attirés par les perspectives de croissance de leur économie souvent sous-financés<sup>4</sup> et par une volatilité des rendements du *private equity* moins importante que celle des marchés développés (Lerner, 2017).

Enfin, comme le *private equity* est une industrie à forte intensité en capital humain, où les qualités et les qualifications des équipes de gestion sont largement mises en avant dans les prospectus de levées de fonds auprès des investisseurs, ces derniers ont exigé des clauses dites de *keymen provisions* ou *keymen clauses* dans les contrats de gestion, qui assurent une stabilité des équipes de gestion tout au long de la vie du fonds ; et les autorisent à sortir de leur investissement voire dissoudre le fonds en cas de départ de personnes clés. En l'absence d'un benchmark de mobilité des professionnels du *private equity*, et dans un contexte où les firmes de *private equity* s'arrachent les managers, et où beaucoup d'entre elles ont vu le départ d'un nombre conséquent de leurs personnels<sup>5</sup>, l'impact que pourraient avoir ces départs sur les performances attendues

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<sup>4</sup> Global Economic Prospects, The Turning of the Tide? The World Bank, June 2018

<sup>5</sup> Voir à titre d'exemple: "Apax, a Private Equity Firm with a Revolving Door", Reuters, 6 juin 2012.

des fonds, et les relations futures des LPs avec leurs GPs est au centre des préoccupations des investisseurs.

Tous ces éléments constituent un terrain de recherche riche sur la pertinence du *private equity* comme vecteur de financement de l'entreprise privée, et comme source de diversification à rendement supérieur pour les investisseurs.

## 2. Avancées de recherche en matière de *private equity*

Contrairement à d'autres classes d'actifs, le *private equity* n'est pas soumis aux dispositions de l'Investment Company Act de 1940, ce qui l'exempte des obligations d'information aux autorités de marché. La problématique de la disponibilité de données a ainsi longtemps limité la recherche empirique en *private equity*<sup>6</sup>, sans freiner l'intérêt du travail théorique qui y trouvait un cadre d'analyse idéal à l'étude de thématiques importantes en *corporate finance*, notamment la théorie des contrats, l'asymétrie d'information et l'investissement en environnement incertain. Ce n'est qu'avec l'arrivée des fonds de pension publics dans le tour de table des investisseurs du *private equity* qu'ont émergées les premières données. Soumis au *FOIA – Freedom Of Information Act*, qui confère aux contribuables des fonds de pension le droit à l'information sur les investissements de ces derniers, les gérants de fonds PE ont été dans l'obligation de communiquer publiquement leurs performances. L'évolution technologique et le développement des méthodes de communication des firmes de *private equity*, qui se signalent à leurs investisseurs notamment via des plateformes commerciales de levée de fonds, a ensuite contribué à l'émergence de nouvelles bases de données qui ont rendu possible d'autres travaux de recherche. Enfin, la sophistication des investisseurs du *private equity* et l'allocation accrue de capitaux des investisseurs à cette classe d'actif a nécessité la mise en place de dispositifs de suivi internes de leurs investissements, et une formalisation des reportings dont leur font part leurs managers. Cette activité, externalisée dans un premier temps, a permis également l'obtention d'un pool de données provenant des LPs,

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<sup>6</sup> Les données disponibles à ce stade se limitaient aux prospectus d'introduction en bourse et à d'autres documents (le *S1 statement* par exemple) des entreprises backées par des fonds de *private equity* qui devenaient cotées en bourse.

relativement de meilleure qualité comme elles ne souffriraient pas des biais de sélection ou de surestimation dont pourraient souffrir les données provenant des GPs<sup>7</sup>.

De nombreuses études se sont alors intéressées à la qualité des données disponibles à la recherche en *private equity* : Kaplan et al. (2002), Maats et al. (2011), Stücker (2011), Harris et al. (2014), etc. Ces études sont unanimes sur la fragilité des premières bases (les ensembles de données connues aujourd'hui sous le nom *Thomson Venture Economics*) et arrivent à la conclusion principale que les bases plus récentes développées à partir des données des GPs (*Preqin, Pitchbook*) et celles développées à partir des données des LPs (*Burgiss, PCRI*) ou encore des bases mixtes, provenant des deux (comme Cambridge Associates), sont de meilleure qualité que *Thomson Venture Economics*.

Aujourd'hui, bien que la couverture de ces bases ne soit pas encore optimale et qu'elles continuent de présenter certaines limites, leur disponibilité ainsi que le développement d'autres initiatives, telles *e-Front*, assurent la répliquabilité des travaux de recherche existants et permettent le développement de pistes de recherche supplémentaires.

### 3. Présentation des travaux de recherche

Le développement des marchés privés en général et du *private equity* en particulier, dans un contexte marqué par un manque de dynamisme des marchés publiques, soulève la question naturelle de la pertinence de ces investissements et la portée réelle de leur valeur ajoutée. Notre analyse des évolutions récentes du marché du *private equity* et nos lectures des travaux conduits en la matière nous a permis d'identifier un angle d'analyse important non encore suffisamment exploré et susceptible de contribuer à la littérature existante. Trois pistes de réflexion importantes ont suscité notre intérêt. D'abord, nous nous intéressons à la question de la

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<sup>7</sup> Brown et al. (2016) montrent que les gérants de fonds sont conservateurs dans leur reportings de performance dans un souci d'entretien de leur réputation auprès de leurs investisseurs. Barber et Yasuda (2017) trouvent que les performances intermédiaires des fonds sont déterminantes dans la manière avec laquelle les gérants de fonds communiquent sur leurs performances à leurs investisseurs pour les levées de fonds futures, et que leurs comportements varient en fonction de leurs rangs et de leurs réputations.

recherche d'une « quasi-liquidité » par les fonds de private equity et posons la question de la pertinence de ce nouveau business-modèle en termes de rendements pour les investisseurs (chapitre 1). Ensuite, nous nous interrogeons sur la qualité de la diversification géographique des gérants de fonds de *private equity*. Nous étudions alors la question importante de la performance des investissements sur les marchés émergents et comment les proximités géographique et culturelle sont des facteurs déterminants de la réussite de ces investissements (chapitre 2). Enfin, au-delà des mutations organisationnelles et de marché, nous analysons en dernier lieu si la mobilité individuelle des professionnels du private equity est un enjeu pour les rendements futurs des fonds et les transactions effectuées par ces fonds (chapitre 3).

Cette thèse est ainsi articulée autour de ces trois thèmes de réflexion. Elle cherche à établir si ces nouvelles tendances changent fondamentalement le constat par lequel le *private equity* continue d'offrir des opportunités d'investissement à rendements supérieurs aux autres classes d'actifs. Cette idée est largement débattue dans la littérature, où l'absence d'un consensus sur un benchmark d'analyse commun et la sensibilité des rendements aux choix des mesures de performance et des méthodes de comparaison (entre autres, Harris, Jenkinson et Kaplan (2014), Stücker (2011) et Phalippou (2014)) reste un problème. Soulignons à ce titre que si cette problématique n'est pas notre prisme d'analyse principal ou encore moins que nous cherchions à la résoudre, elle reste toutefois une question sous-jacente aux pistes de recherches développées ici. Nous avons essayé de la satisfaire au mieux en répliquant nos tests et spécifications autant que possible sur plusieurs mesures et benchmarks de performance, afin d'assurer à minima une consistance des résultats et un spectre de comparaison plus large avec la littérature existante.

Le premier chapitre de cette thèse s'interroge sur l'impact sur la performance de l'introduction en bourse de véhicules de *private equity* (*private equity listé*), en le comparant à celle des structures opérationnelles traditionnelles privées (*private equity traditionnel ou standard*). Comme exposé précédemment, le *private equity standard* consiste en la mise en commun de fonds levés auprès d'investisseurs principalement institutionnels dans une structure à responsabilité limitée (i.e. fond d'investissement) gérée par une société de gestion dont le but est de faire fructifier ces fonds sur le long terme à travers des investissements dans des entreprises privées.



On parle de *private equity listé* lorsque l'un ou plusieurs des trois acteurs du *private equity standard* fait un appel public à l'épargne. En découlent alors trois structures ou formes organisationnelles génériques de *listing* : (i) *le private equity listé direct*, où l'entité introduite en bourse est le fond d'investissement lui-même, offrant ainsi à ses actionnaires une exposition directe aux entreprises en portefeuille ; (ii) *le private equity listé indirect*, où l'entité introduite en bourse est « l'investisseur », en l'occurrence sous forme d'un fond de fonds, offrant à ses actionnaires une exposition au portefeuille de fonds sous-jacents – et indirectement, une exposition à leurs investissements respectifs – ; et (iii) *la société de gestion listée* ou *manager listé*, où l'entité introduite en bourse est la société de gestion, avec une exposition pour les actionnaires aux revenus (frais de gestion) sur les fonds de *private equity* gérés.

La littérature sur les introductions en bourse met en évidence que la transition vers les marchés publics détériore la performance opérationnelle des firmes et leurs performances à long terme (Ritter (1991), Jain et Kini (1994), Loughran et Ritter (1995)), et altère leur réactivité aux opportunités d'investissement (Asker, Farre-Mensa et Ljungqvist, 2015). Dans un marché estimé à 2,8 billions de dollars<sup>8</sup>, le *private equity listé* constitue 10% des actifs sous gestion de l'ensemble de la classe d'actifs, où le *private equity indirect* par exemple gère près de 38% des fonds de *private equity* traditionnels selon nos estimations<sup>9</sup>. Au moment où de plus en plus de structures de *private equity* deviennent cotées en bourse, peu d'études se sont intéressées aux conséquences que peut avoir cette transition vers les marchés publics sur les performances des investissements entrepris, notamment comparées à celles du *private equity* traditionnel.

Avec un échantillon exhaustif et représentatif de l'univers du *private equity listé*, nos résultats montrent que l'introduction en bourse induit une diminution significative du taux de sortie<sup>10</sup> des

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<sup>8</sup> Données Preqin, fin 2017.

<sup>9</sup> Dans leur étude, Jegadeesh *et al.* (2015) rapportent 29% de fonds de *private equity* traditionnels investis par des fonds de fonds listés.

<sup>10</sup> Le taux de sortie est défini comme étant le nombre d'investissements liquidés avec succès rapporté au nombre total d'investissements, normalisé. Dans la profession, une sortie réussie est celle qui se fait par voie d'IPO ou, dans une moindre mesure, via une vente secondaire à un acquéreur stratégique, souvent une entreprise opérant dans le même secteur que l'entreprise détenue par le fond d'investissement. La vente secondaire est devenue de plus en plus pertinente comme moyen de sortie réussi sur les dernières années vu

véhicules listés (-17%), combinée à une probabilité significativement réduite (-7%) de réaliser une sortie réussie par entreprise investie. De plus, alors que le *private equity* listé semble délivrer de meilleurs rendements que le *private equity* traditionnel en termes de multiples d'investissements (+2 centimes par dollar investi), cette tendance s'inverse une fois ajustée des rendements de l'indice de référence du marché<sup>11</sup> (+1% de rendement supérieur – par rapport à l'indice de marché – est significativement associé à une perte de près de 6 points de base chez les véhicules listés comparés au *private equity* traditionnel). Ces résultats sont compatibles avec la littérature sur les introductions en bourse et la performance opérationnelle des firmes. Une ou plusieurs explications possibles peuvent être liées aux conflits qui suivent le changement de structure de propriété d'une entreprise suite à son introduction en bourse, notamment un *short termism* émanant d'un niveau sous-optimal d'investissement à long terme, du fait de l'interaction des décisions managériales avec les marchés financiers (Stein (1989), Shleifer et Vishny (1991), Graham *et al.* (2005), Asker *et al.* (2015)) et du conflit d'intérêt entre les investisseurs (à horizon d'investissement long terme) et les nouveaux actionnaires (à horizon d'investissement court terme) du *private equity* listé. Par conséquent, les managers du *private equity* listé auraient tendance à avoir un comportement de « collecte » d'actifs qui, via les frais de gestion, servirait leurs nouveaux actionnaires et moins leurs investisseurs à long terme pour qui les rendements à long terme sont détériorés. Une première confirmation de cette hypothèse est soutenue par une relation positive et significative entre les performances constatées du *private equity* listé et les périodes de détention étendue de leurs investissements. Ces explications sont autant des pistes de recherche intéressantes possibles.

Le deuxième chapitre de cette thèse s'intéresse aux implications de la diversification géographique du *private equity* sur les marchés émergents. Dans un contexte marqué par des rendements ralentis sur les marchés développés (Harris *et al.*, 2014), de plus en plus de firmes de *private equity* se sont orientées vers les marchés émergents à la recherche de performances supérieures. Nous examinons alors si les rendements des firmes de *private equity* basées dans

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les gains fiscaux qui y sont rattachés et le nombre décroissant de sorties sur les marchés publics (Karolyi et Kim (2017), Doidge *et al.* (2018)). Nous considérons ainsi les deux dans le calcul des taux de sortie.

<sup>11</sup> Cette mesure, dite PME (Public Market Equivalent), compare le rendement d'un investissement PE à ce qu'aurait été le rendement sur le même investissement dans un indice de marché.

des marchés développés (notées DMPE – *Developed Markets Private Equity*) sont significativement supérieurs aux rendements des firmes de private equity opérant uniquement dans les marchés émergents (notées EMPE – *Emerging Markets Private Equity*), et explorons particulièrement si les proximités géographique et culturelle sont déterminantes pour les performances réalisées. En effet, la littérature sur l'investissement international a mis en l'évidence l'importance de la proximité géographique (Coval and Moskowitz (1999, 2001), Choe et al. (2005), Teo (2009)) et des facteurs culturels (Licht, Goldschmidt, and Schwartz (2005, 2007), Hau (2005), Teo (2009)) sur la réussite de ces investissements.

Sur un échantillon exhaustif de transactions de firmes DMPE et EMPE, couvrant la période 2000-2016, 26 pays émergents et 32 pays développés, nos résultats montrent que les firmes DMPE sous-performent significativement les firmes EMPE. Conformément à la littérature sur la géographie des investissements, nous trouvons une relation négative entre les performances réalisées des firmes DMPE et leur éloignement géographique de leurs cibles<sup>12</sup>, résultat que renchérit la relation significativement négative entre ces performances et la différence dans les valeurs culturelles nationales des pays d'origine des firmes DMPE et de leurs cibles<sup>13</sup>. Le différentiel de performance des firmes DMPE est rattrapé dès lors que celles-ci ont des équipes d'investissement et de gestion culturellement plus proches<sup>14</sup>, et qu'elles acquièrent plus d'expérience sur ces marchés.

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<sup>12</sup> Nous utilisons une variable catégorique où on classe les investissements des firmes DMPE comme étant locaux (même pays que la firme), frontalier (dans un pays qui partage une frontière terrestre ou maritime avec celui de la firme), ou lointain (ne partageant aucune frontière avec le pays de la firme).

<sup>13</sup> La culture nationale est mesurée avec l'indice de Schwartz, développé par le modèle culturel de Schwartz (1994, 2004)

<sup>14</sup> La proximité culturelle au niveau individuel est mesurée en analysant textuellement les biographies et les noms des professionnels au sein des firmes DMPE intervenant sur les fonds dédiés aux marchés émergents. L'analyse des textes de biographie attribue un score de proximité culturelle aux professionnels selon qu'ils aient eu par le passé des liens avec les pays émergents des cibles (par exemple, études effectuées dans un pays émergent ou expérience professionnelle dans ce pays). L'analyse des noms se base sur la langue comme vecteur culturel et identifie leurs résonances, afin d'établir une probabilité que les professionnels en question soient binationaux ou aient une maîtrise des langues officielles ou locales des pays émergents concernés, ce qui procurerait un avantage à leurs firmes.

L'étude de la proximité culturelle des individus a fortement inspiré l'idée par laquelle la performance des investissements en *private equity* dépendrait également de la qualité des personnes qui les produisent et qui les gèrent. Dans la continuité de ce raisonnement, si les qualités d'un individu se reflètent sur les performances des investissements, qu'auraient été ces performances sans cet individu ? Nous étudions alors dans le dernier chapitre comment la mobilité des individus dans les firmes de *private equity* est susceptible d'affecter leurs performances. Avec un échantillon de plus de 9000 professionnels de *private equity*, nous montrons que le départ d'un professionnel engendre une perte de 14 centimes par dollar investi, et que la performance est plus affectée quand il s'agit d'une personne clé, ou lorsque le départ intervient en phase d'investissement du fond et lorsque la mobilité concerne un fond de capital-risque. En utilisant un modèle d'estimation et de séparation d'effets fixes, les résultats montrent en outre que le capital humain est deux fois plus important que les caractéristiques des firmes de *private equity* lorsqu'il s'agit d'investissements en capital-risque (*venture capital*), tandis que les caractéristiques des firmes et des individus partagent quasiment à parts égales le pouvoir explicatif des rendements lorsqu'il s'agit d'investissements en capital-développement (*buyouts*).

# Chapter 1

## **On the Performance of Listed Private Equity: How does the transition to public equity markets impact investment outcomes? \***

### **Abstract**

Listed private equity (LPE) refers to publicly-traded investment companies whose activity is to invest in privately-held companies or in traditional private equity funds. The recent years have witnessed a slew of public private equity listings and many investors were offered exposure to traditional private equity investments (TPE) through LPE. While listed private equity and traditional private equity have the same investment universe, we argue that the documented performance of the latter may not pertain to LPE. We build a representative dataset of the LPE universe and compare their performance to TPE. We examine whether index membership is linked to performance. Our results suggest that listing significantly deteriorates absolute performance measures but is positively and significantly related to better unadjusted investment multiples. Index membership is relevant to performance only through listing structures, where the more listed PE managers in an index, the lower the performance.

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Why IPO a venture firm? [...] That's PERMANENT capital – i.e. money we can grow and invest over and over again in generations of startups, not a one-time fund. [...] The current popular VC structure, the Limited Partnership (LP) was first used nearly 60 years ago [...] Whilst the 5+5 year LP model has been largely unchanged since 1957, and it clearly works for many successful VC funds, there are some interesting new “patient capital” models [...] we wanted to be able to invest for much longer in our winning companies than a typical 5+5 year LP fund allows, and to be able to build bigger stakes as companies remain private for longer periods. The pressure to show returns in Europe continues to force funds to sell out early after just a few years, and we believe the best global technology businesses take much longer to build to their maximum potential. We've gone public so our portfolio companies don't have to until they are ready. [...]

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Draper Esprit Plc, “So we just IPO'd our Venture Capital Firm”, June 15<sup>th</sup>, 2016<sup>15</sup>

## 1.1. Introduction

Listed private equity (LPE) refer to publicly-traded investment companies whose activity is to invest in privately-held companies or in traditional private equity funds. In 2006, private equity firm Kohlberg, Kravis and Roberts (KKR) took the private equity industry by surprise when they announced and completed their initial public offering. Other private equity firms, such as Blackstone, Apollo and Carlyle, went public in the following years. In a 2.8 trillion dollars industry<sup>16</sup>, listed private equity currently accounts for 10% of assets under management by our estimates. Additionally, our data reveal that 38% traditional private equity funds are managed by listed funds-of-funds (in their study, Jegadeesh et al. (2015) report 29%). With the growing numbers of private equity public listings over the recent years, investors were offered a myriad of “liquid exposures” to private equity investments through listed private equity indices. Examples include Thomson Reuters listed private equity index (launched in 2008), Dow Jones Stoxx private equity 20 (started in 2007), and mutual fund's ALPS-Red Rocks LPE index family. Investors' appetite for these indices is driven by the attractiveness of having a liquid exposure to private equity, combined to the diversification benefits PE is reputable for<sup>17</sup>. Investors regard private equity as an asset class and have long been attracted by the documented superior

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<sup>15</sup> Full statement available [here](#) (visited January 9<sup>th</sup>, 2018)

<sup>16</sup> According to Preqin data – the 2018 Preqin Global Private Equity and Venture Capital Report.

<sup>17</sup> However, in their study, Franzoni, Nowak and Phalippou (2012) investigate whether traditional (unlisted) private equity truly provides diversification benefits and find that it suffers from the same exposure to liquidity risk as public equity and other asset classes.

performance of the industry<sup>18</sup>. While the superior performance of private equity is highly debated (Kaplan et al. (2014), Stucke (2011) and Phalippou (2014), among others), the question of whether listed private equity truly replicates the documented performances of traditional private equity has not been addressed. In this paper, we investigate whether the performance of public private equity-led deals differs significantly from that of traditional private equity. Moreover, as investors are offered LPE-based investment products, we further examine whether selection into indices delivers higher returns.

After controlling for firm, fund and deal characteristics and including year fixed effects, country fixed effects, deal structure fixed effects and listing structure fixed effects, our results suggest that public listing significantly induces a 7% lower probability of achieving a successful exit through IPO or trade sale at the deal level, supported by significantly lower exit rates at the fund level (measured as the total number of successfully exited investments – by way of IPO or trade sale – to the total number of invested deals). In value terms, listed private equity have slightly higher absolute investment multiples (total unadjusted values of proceeds from exiting investments to the total invested amount<sup>19</sup>), but this result is reversed after market-adjusting the realized values using the PME measure at the deal level. The aforementioned results are sensitive to the listing structure. As private equity is traditionally structured as a limited liability partnership, where investors (LPs) commit capital to a fund under the management of a private equity firm (GP), the mechanism by which private equity becomes public has three generic forms: through publicly listing (i) the management firm, (ii) the “fund” and/or (iii) the “fund of fund”. Following the exposure level that they provide investors with to the underlying portfolio companies, we refer to those respectively as a listed manager, a Direct listed PE vehicle, and an Indirect listed PE vehicle. In that regard, there is no evidence that Direct listed private equity entities have lower exit success probability nor lower exit rates, while they show significantly higher market-adjusted multiples. Indirect listed private equity entities have almost twice as much chance of successfully exiting an investment than traditional private equity, but they significantly underperform across all other performance measures. Finally, listed managers are consistent

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<sup>18</sup> See Kaplan and Sensoy (2015) and Harris, Jenkinson and Kaplan (2014) for a survey.

<sup>19</sup> This measure is not risk-adjusted but remains highly used among private equity practitioners.

with the mainstream results, except that they do not significantly do better in unadjusted money multiple terms. Furthermore, as – institutional – investors are offered exposure to listed private equity through dedicated market indices, our results show that performance conditional on index membership is more relevant when the included entity is a listed manager. As private equity investments are privately-held companies that are illiquid and more exposed to risks of bankruptcy or financial distress, we further note that the listing structure (with regards to the level of exposure to private equity investments) significantly influences LPE performance. Increasing the complexity of the listing structure (i.e. having less direct exposure to the underlying portfolio companies) significantly increases the exit rate by 3%.

Although listed private equity entities are publicly traded companies, they are not easily identifiable. We put effort into mitigating the possible selection bias from simply studying existing index constituents and construct a representative dataset of the universe of listed private equity. To this end, we textually process the business descriptions of companies in SDC, Eikon and Orbis-BvD databases and assess the relevance of the obtained sample to the private equity business model (fund design, private and limited-life investments, fee structures, etc.). We then restrict the sample to public entities by matching the resulting sample to the universe of listed companies on Datastream. Hence, we are able to identify 825 unique listed private equity entities, exceeding by far the number of studied entities in the nascent literature on listed private equity, and further covering the estimated universe of listed private equity by industry professionals and index providers<sup>20</sup>.

We collect performance data from several vendor databases and account for issues documented in existing studies on the quality of data available for private equity research. Our initial performance dataset is comprised of portfolio company-level data on more than 450,000 private equity transactions involving 89,252 portfolio companies between 1952 and 2016. We are able to identify these investments to their corresponding funds (16,152 unique funds and 9,369

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<sup>20</sup> While there is no consensus on the number of listed private equity entities, the smallest index in number of constituents comprises 20 entities and the largest has a count of 118 listed private equity entities. On their websites, many mutual funds such as ALPS Red Rocks report tracking between 500 and 600 listed entities worldwide.



unique fund-of-funds) and GPs (10,947 over the performance sample period). We match 324 LPE by name to this performance dataset, that is 39% of the identified population of listed private equity.

Evidence on private equity outperformance is mitigated as to the considered time periods, the data used and the performance metrics. Recent research debates previously documented private equity outperformance compared to the public market. Using Burgiss data for vintage years 1984-2008, Harris, Jencksinson and Kaplan (2014) find that private equity outperforms the market (S&P500) by 3% on average annually. With Preqin data for vintages 1993 to 2011, Phalippou (2014) documents a -3.1% annual underperformance after adjusting for size, value and leverage, using the Fama-French small value 1.3x leveraged index, which is closer in nature to the characteristics of the companies that private equity invests in. Jegadeesh et al. (2015) study listed fund of funds that invest in traditional private equity funds to infer the market's expectations of private equity returns. Our paper adds up to these growing efforts by challenging the performance of private equity using listed private equity as a similar liquid benchmark. There is an extensive body of literature examining whether indices replicate the performance of their underlying assets, such as studies on hedge fund indices or REITs indices, but the question of whether a listed private equity index is related to the performance of the underlying private equity investments has not been examined, especially given the gap in the pricing frequency between the index constituent (LPE is marked-to-market) and the underlying investment (self-reported – quarterly – net asset values).

The rest of the paper proceeds as follows. Section 2 describes the features of listed private equity and discusses the issues related to data available for private equity research. Data and methodology are described respectively in sections 3 and 4. In section 5, we examine the relationship between private equity performance and listing, and study performance drivers within the LPE subsample with regards to liquidity, being part of an index and other related factors. Section 6 concludes.

## 1.2. Background

Private equity is a long-term investment in privately held companies, aimed to provide equity or equity-like financing in order to help develop these companies and generate attractive long-term returns to their investors. Private equity investments are usually organized in limited liability partnerships (LLP), where investors, the limited partners (LPs), commit capital to a fund that is managed by a management company, the General Partners (GPs). The General Partners' compensation structure includes a management fee (usually 1 to 2% of the committed capital), and a performance fee (carried interest) that is earned if the GPs reach the investors' preferred rate of return (hurdle rate, usually 8%). Carried interest typically amounts to 20% of the proceeds from exiting the investments when the fund is liquidated. Limited liability partnerships are limited-life investment vehicles. The fund's life is about 10 years, extendable to an additional 2 to 4 years<sup>21</sup>.

Listed private equity are publicly-traded investment companies whose main activity is to invest in privately-held companies or in traditional private equity funds. Listed private equity first drew attention when some of the industry's big players completed their initial public offerings. Examples include KKR in 2006, Blackstone in 2007, and Carlyle in 2012. There has been a slew of similar public listings in the past decade and in the recent years, with Hamilton Lane's USD 200 million IPO on Nasdaq in February 2017<sup>22</sup>, and Draper Esprit's GBP 120 million (~USD 154 million) IPO on London and Dublin Stock Exchanges in June 2016<sup>23</sup>.

There are several ways we observe listed private equity. The underlying asset is a private equity investment (privately-held company), either managed by a listed GP (listed management firm), sponsored by a listed LP (listed fund of funds or LP firm) or directly held by a listed fund or investment company<sup>24</sup>. In the following, we refer to any of the three listing options indifferently

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<sup>21</sup> See Phalippou (2007) for an overview of private equity fund structure and business cycle.

<sup>22</sup> See "Hamilton Lane files for IPO", The Wall Street Journal, February 1<sup>st</sup>, 2017.

<sup>23</sup> See "Draper Esprit says IPO back on, prepares to ring the bell on Wednesday", The Telegraph.

<sup>24</sup> Unlike in the UK for example, listed funds are not allowed in the US, therefore many direct investment vehicles take the form of BDCs or other regular listing form (PLC, LLC, etc.)

as *listed private equity* (or *LPE*). We also use the terminology traditional private equity, or TPE to qualify investments in private equity limited liability partnerships where none of the GP, LP or the investment vehicle are publicly traded.

Appendices S1.2 and S1.3. provide details on the properties of listed private equity, the types of exposures they provide investors and how they compare to traditional private equity.

The body of existing literature can be divided into two sets: research examining private equity performance gross of fees (at the portfolio company level), and research examining private equity performance net of fees (at the fund level). Table 1 reviews some of the pioneering work on private equity performance based on this classification<sup>25</sup>. The literature on private equity performance debates the superior performance of private equity over time (private equity performance has been decreasing, Kaplan and Sensoy, 2015); and over the nature of the reference benchmark (the marginal gain of one dollar invested in private equity compared to the public market benchmark). Some studies use the S&P500 as the reference benchmark for calculating the public market equivalent (Kaplan and Schoar, 2005) while others tailor that measure using the Russell3000 or the Fama-French Size Tercile Index, which exhibit similar attributes to the private equity's target companies (Phalippou, 2014, L'Her et al., 2016). At the median, the typical fund roughly outperforms the S&P500 by 1%. The average private equity fund performance is highly skewed by the top decile funds that largely deliver the 3% spread to the S&P500, which are required by investors to compensate for the risks associated with the illiquid nature of private equity investments. The rest of the average fund returns fail to reach this requirement, and their performance is worse if other small public companies benchmarks are used as reference points. Moreover, investors often rely on the track-record of the GP to allocate capital to private equity funds. Another strand of literature has examined whether performance was persistent across funds managed by the same GP over time. The recent survey by Kaplan and Sensoy (2015) establishes that private equity performance is sensitive to performance metrics (notably the benchmark used for comparison) and that despite consistent evidence of superior performance, this performance has been decreasing over time. Earlier research established

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<sup>25</sup> See Gilligan and Wright (2014) for a comprehensive overview of private equity literature.

persistence in private equity returns (Kaplan and Schoar, 2005), yet recent papers showed that past performance no longer predicts future performance (Harris et al., 2014, and Braun et al., 2017). Using listed private equity, Jegadeesh et al. (2015) establish with a sample of 29 listed funds-of-funds that invest in traditional private equity funds, and a subsample of 115 direct listed private equity vehicles, that the market expects the investors of listed private equity to earn an abnormal return of 0.5% per annum and that returns of listed private equity are a good predictor of changes in reported net asset values of traditional private equity.

Listed private equity often cite substantial benefits to their IPOs. Access to a permanent source provides LPE with readily-available funds to invest from, with indefinitely re-investable capital gains. Listing is also associated with investment performance and investment horizons flexibility as it lifts the pressure of having to exit investments early at the end of the fund's life. Moreover, the liquidity benefits associated with LPE would exempt investors from the 10-year lock-up periods associated with traditional private equity partnerships, and standardize access to this asset class as there is no conditional minimum required capital amount for commitments.

Many investment professionals have constructed indices for listed private equity to provide investors with exposure to private equity investments<sup>26</sup>. The objective of our paper is two-fold. First, we challenge the outperformance claims of listed private equity by comparing their performance to that of a matched sample of traditional private equity (as counterfactual). Second, we attempt to identify the sources of possible performance differentials and discuss the rationale of the decision to list.

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<sup>26</sup> Examples include LPX index family, ALPS - Red Rocks GLPE index, S&P Listed Private Equity Index, Dow Jones STOXX PE 20 and Société Générale Private Equity Index (PRIVEX). Our screened sample contains all LPE index constituents that we were able to identify, namely Listed Private Equity Index (provided by Switzerland-based LPX GmbH), DJ STOXX PE 20 (Dow Jones), Thomson Reuters Buyout Index and Société Générale Privex index. Other products offer private equity exposure to investors via listed vehicles, such as mutual funds ALPS-Red Rocks Listed Private Equity and Vista Listed Private Equity Plus. These mutual funds invest in a diversified portfolio of listed private equity entities and we were able to match their holdings by name to our screened sample.

## 1.3. Data

### 1.3.1. Data issues in private equity research

Previous literature has pointed out biases in vendor and proprietary datasets used for private equity research. The key rebuke is that most of these commercial databases gather data from GPs rather than from LPs<sup>27</sup>, hence increasing selection and survivorship biases. Several private equity studies assessed the scope of such biases. Kaplan, Strömberg and Sensoy (2002) evaluate VenturExpert and Venture Economics from comparing the actual contracts of 143 financings to their reported data in the databases and find that they roughly exclude 15% of the financing rounds. Jeng and Lerner (2011) review and comment the exiting data for private equity research and suggest alternative data sources. Stücker (2011) assesses the data in Thomson Reuter's VenturExpert<sup>28</sup> and finds that it suffers from a significant downward bias in presented performances. Harris, Jenkinson and Kaplan (2014) study private equity performance using different databases (Burgiss, Preqin, Cambridge Associates (CA) and Venture Economics (VE)) and find that performance is similar across Burgiss, Preqin and CA, but reach similar conclusions in Stücker (2011) about VE.

Recent initiatives such as the Private Capital Research Institute (Jeng and Lerner (2011), Kaplan and Lerner (2016)), e-Front and Burgiss illustrate growing efforts to mitigate biases in previously used databases and provide researchers with better quality data. However, data is anonymized. A trade-off we had to make is to rely on other vendor databases because we needed the identity of the listed private equity entities to allow for merging with other datasets and establishing a link with the portfolio companies in order to construct our performance dataset. We still give special care to data quality in using the afore mentioned datasets. In their recent study, Harris,

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<sup>27</sup> Disclosure from LPs is mainly a consequence of the Freedom Of Information Act (FOIA), to which public investors, such as pension funds, are subject to. Other LP sourced data in other jurisdictions uses FOIA-like requirements. LP sourced data is -a priori- of better quality because, unlike GPs, limited partners would not be inclined to overstate returns.

<sup>28</sup> Became Venture Economics. The data have been discontinued since 2013 and Thomson Reuters give access to Cambridge Associates fund performance data through their platform.

Jenkinson and Kaplan (2014) show using Burgiss (LP reported data), that GP-reported data in Preqin and Cambridge Associates is similar to what they find in Burgiss. They conclude that given the different sourcing methodologies of the studied providers, it would be unlikely that GPs overstate reported returns.

### 1.3.2. Sample construction

We identify listed private equity vehicles by textually processing the business descriptions, histories and overviews of companies in Securities Data Company (SDC), Orbis – Bureau Van Dijk, and Eikon databases. Because of the different listing structures highlighted in the previous section, LPE is not a homogenous universe and it becomes challenging to identify these entities using traditional screening methods such as industry codes, peer groups or constituents of LPE indices. This search results in 5,782 hits in SDC, 21,215 hits in Orbis and 59,991 hits in Eikon. To account for listed entities alone, we cross-reference the SDC sample by name to their New Issues universe, we filter companies whose status is “listed” or “delisted” in Orbis, and we limit the Eikon sample to entities with a “public” flag. We also consider companies with a “private” flag which we are able to match to the universe of delisted entities in Datastream. This returns 253 LPE entities in SDC, 475 matches in Orbis and 706 matches in Eikon. We thoroughly examine available company filings and websites to verify the investment business model of the screened entities and make sure their holdings consist of private companies. We also eliminate listed corporate private equity arms and corporate venture capital, shell companies, tax-optimization structures and early SPACs or SPACs which did not succeed<sup>29</sup>. This results in 150 hits in SDC, 273 hits in

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<sup>29</sup> Listed private equity entities can list under usual listing structures as any publicly-traded company. Special Purpose Acquisition Companies or SPACs are one form of listing such that they are registered with the SEC for an acquisition purpose or target yet to be defined. SPACs are immediately liquidated if targets are not found within a specified period but they continue to trade under specific conditions, which gives them the reputation of being “shell companies” in their first stages. However, SPACs operate like buyout funds when they succeed. Other special listing structures that we carefully consider in our sample are Special Trust Acquisition Companies (STACs), Venture Capital Trusts (VCTs) and Business Development Companies (BDCs). Unlike SPACs, STACs have the particularity to be tax-structured entities which raise money on the public markets with the purpose of acquiring private companies that they identify prior to going public. They benefit from management and advisory services similar to private equity funds, and have long holding periods of their portfolio companies. The tax benefits are such that the STAC owners pay income tax on the firm’s income and not the STAC itself (pass-through taxation), as in limited liability partnerships. VCTs primarily developed in the

Orbis and 402 hits in Eikon. Our end sample consists of 825 unique international listed private equity entities.

Figure 1.1. illustrates the final LPE sample composition across the databases used for screening (SDC, Orbis, Eikon and Datastream) and the databases used for performance data crunching (Pitchbook and Preqin). The venn diagram shows common observations across the different datasets used. While some databases have a majority of common observations, one reason why they might vary in coverage is because of the different collection processes and the differences in the reporting mechanisms by the GPs and LPs. While we do check that the data common to two or more sources are similar, it is not possible to verify how the values compare for unique instances to every database. However, findings by Harris *et al.* (2014) suggest that the performance databases used in this paper yield similar results.

[Figure 1.1. about here]

There is no consensus as to the exact number of listed private equity entities. Industry professionals and index providers give estimates ranging from few dozens to more than 500 vehicles globally. With our identification procedure, we believe we largely cover the universe of

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UK with the purpose of investing in seed, early stage and growth companies. Their investments are not required to be private as they can also invest in companies which trade on the AIM, but some do have strictly or a majority of private holdings. They also benefit from several tax relieves provided they hold their investments for a certain period of time. Finally, BDCs are listed closed-end entities which invest in small and medium enterprises. They are bound by the regulators to provide significant assistance to the investee companies in order to insure their development and have the particularity to allow access to these companies to non-accredited investors. BDCs are highly regulated in a way that can make them comparable to private equity funds in many aspects. For instance, at least 70% of their assets must be private companies and they must distribute a minimum 90% of their income to their shareholders.

listed private equity considering industry professionals or recent academic work as reference points<sup>30</sup>.

Initially, traditional private equity managers are not required to publicly report information on their performance and they share data with their investors only as part of their business relationships. Public reporting surfaced when public investors such as pension funds became interested in private equity, subjecting them to public reporting. Yet, many court rulings have granted private equity managers the privacy of sensitive information<sup>31</sup>. Therefore, Investment and performance privacy mostly remains after the IPO unless willingly disclosed by the GPs or their LPs in financial databases or corporate communication.

Because of the diversity of listed private equity, we use firm-level performance measures. We source and merge deal-level data from Pitchbook, Securities Data Company and Zephyr – Bureau Van Dijk. The resulting performance dataset comprises 451,450 private equity deals involving 94,992 portfolio companies, 10,947 GPs and 16,152 Funds (including 9,369 funds-of-funds).

We match the investor names of the identified private equity investments to our screened universe of LPE. Overall, we are able to match 324 LPE (39% of the identified LPE universe) entities that went public between 1965 and 2013<sup>32</sup>, to deal-level data between 1916 and 2016.

We obtain market data on the identified LPE entities by matching them by name to the universe of listed companies on Datastream<sup>33</sup>. We account for name changes, *Frequently Known As* (FKAs)

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<sup>30</sup> To the best of our knowledge, mutual fund ALPS-Red Rocks tracks the largest number of LPE, estimated to about 500 entities. The Swiss-based LPX is the second largest provider with a family of LPE indices, tracking 118 listed private equity vehicles. LPEQ, a body aimed at shaping awareness of the profession and bringing together LPEs and investors, counts a dozen LPE members. Jegadeesh et al. (2015) use a sample of 144 LPEs (29 listed funds-of-funds and 115 LPE entities) in their study.

<sup>31</sup> For example, see “Freedom of Information Act Clarification for Private Equity, Portfolio Company Information”, Illinois Venture Capital Association, 2006.

<sup>32</sup> We have records of IPOs and investments until 2017 but we only consider IPOs up to 2013 to make sure all investments are exited.

<sup>33</sup> We account for data quality issues with using Datastream that are highlighted in Ince and Porter (2006) and carefully check for unusual market data changes and the accuracy of the IPO dates across Stock Exchanges in which entities are or were traded, as well as specialized media coverage.



names and *Also Known As names* (AKAs). We also consider to be the IPO date, the day in which we observe the first effective trading in Datastream and the delisting date the date in which Datastream returns {dead}, {delisted} or {merged} substrings for the considered entity.

### 1.3.3. Variable definition and descriptive statistics

We use four performance measures as dependant variables: (1) the exit rate, computed as the ratio of successful exits to the number of total investments in number. Following Hochberg, Ljunqvist and Lu (2007) and Phalippou and Gottschalg (2009) we define a successful exit as an exit by way of either an IPO or a Trade Sale<sup>34</sup>. (2) The exit multiple, which is computed as the ratio of successful exits to the number of total investments in value; (3) a dummy variable, which is equal to one if the exit is successful and zero otherwise and (4) a deal-level PME, computed as the market adjusted investment multiple for the same holding period investment in the public benchmark of where the portfolio company is located (we use the MSCI of where the portfolio company is located as a reference benchmark).

Our variables of interest are four dummy variables that take the values of 0s and 1s depending on the structure of the listed entity. We consider the variable *traditional* which takes the value of one if the portfolio company is backed by traditional private equity at a given investment date and zero otherwise. The remaining three dummy variables related to listed private equity (i.e. *direct*, *indirect* and *manager*), and take the value of one if the considered portfolio company is respectively invested by a direct listed investment vehicle, an indirect listed investment vehicle or a listed private equity manager, and zero otherwise. We exclude from the sample three observations where the portfolio company is invested by cross-listed entities, that is for example a company which is backed simultaneously by a listed direct investment vehicle (“fund”) and a listed manager. We also make sure that investments are fully exited with regards to the

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<sup>34</sup> In non-tabulated results, we find the measures of performance insignificant using IPO or M&A individually as successful exits, but we do find the joined measure to be significant.

considered LPE IPO date, that is both the investment and exit dates are either before the IPO date or after the IPO date, as we do not observe the returns until the investment is liquidated.

Following the literature on private equity performance, our control variables include size, measured as the total invested capital; experience, proxied by total number of deals (Sorensen, 2007); the time to exit, measured as the difference between the exit completion date and the investment date in years; the age of the portfolio company at the time of financing, measured as the difference between the investment date and the company's founding date in years; the sequence of the investment, a dummy variable that takes the value of 1 if it is a first-time investment and zero otherwise; and the number of affiliations or memberships to investor clubs, private equity associations or similar bodies. We add a dummy variable for venture investments which takes the value of one if the investment type is venture capital and zero otherwise. We include a variable *geography*, which a category variable that takes the value of 1 if the investment is local, the value of 2 if the investment is nearby and the value of 3 if the investment is distant. We transform this variable into three dummy variables for the regression analysis: *Local*, *Nearby*, and *Distant*. We consider an investment to be local if both the portfolio company and the GP are located in the same country based on their headquarters locations. An investment is considered nearby if the portfolio company is located in a country that shares either a land or a maritime border with the country where the GP is headquartered. Finally, the investment is considered distant if its location is not adjacent to the GP's via land or maritime borders. For further analysis, we gather market data on the LPE subsample: *liquidity*, measured as the turnover of the traded LPE entity; *Home*, a dummy variable that takes the value of one if the considered LPE trades in its home exchange and zero otherwise; and *index*, a dummy variable that takes the value of one if the LPE entity a constituent of a LPE index and zero otherwise. Table 1.2 provides sample summary statistics for the TPE and LPE.

[Table 1.2 about here]

Traditional private equity tend to have higher exit rates on average (41%). Average exit rates range from 18% (indirect listed private equity) to 36% (direct private equity). However, listed private equity performs better on average in terms of value multiples when the listing structure is similar to that of a private equity fund (direct investing). In median terms, the typical listed direct investment vehicle outperforms traditional private equity and other listing structures considering both measures. Listed private equity entities invest in mature companies and have higher holding periods than traditional private equity (from 5.5 years to 6.4 years compared to 3.1 years on average for traditional private equity). LPEs also strike less deals on average and are not particularly connected except for top-quartile indirect LPE and listed managers which tend to be highly affiliated. In terms of exit success, investment preferences, investment style and proximity, less than half of our traditional private equity sample exit their investments successfully via an IPO or a trade sale, and this rate is higher than listed private equity's. Both traditional and listed private equity prefer to invest in companies they invested in before, with traditional private equity and listed direct private equity being keener to have venture capital holdings, which may partly explain their higher returns. Finally, almost all considered entities invest locally, except for listed indirect investment vehicles which almost equally weigh their investments between local and distant portfolio companies. Table 1.2 shows summary statistics for the TPE and LPE subsamples.

[Table 1.2 about here]

## 1.4. Methodology

### 1.4.1. The evaluation problem and estimation techniques

In this paper, we aim to examine the effect of going public on the performance of private equity. Endogeneity and selection problems arise as the decision to go public may be driven by, rather than a determinant of, variation in returns. Also, significant differences in the performance measures of listed and traditional (unlisted) private equity may pertain to unmeasured or omitted control variables that determine private equity performance. Else, not including such variables can conceal significant heterogeneity between the studied entities which stems from differences in their incentives to go public. To mitigate endogeneity and selection concerns, we use a two-pronged approach: (i) implementing a matching technique and (ii) estimating an extended linear model which allows to account simultaneously for endogeneity, selection and non-random treatment assignment<sup>35</sup>. Our estimation choices are mainly driven by alleviating data constraints that arise from restricting the analysis to subsamples, which add up to the existing data availability issues discussed in the previous section.

#### 1.4.1.1. Propensity score matching

We study the causal relationship between the decision to go public and the performance of private equity. Our goal is to examine whether there are significant differences in performance between the population of listed private equity and that of traditional private equity which is due to the state of being a publicly traded company (i.e. the average treatment effect).

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<sup>35</sup> A fairly similar approach in the literature is the one by Graham and Rogers (2002), who estimate simultaneous equations in a structural model framework to link the extent of derivatives hedging use with firm debt levels. Another example is Lowry and Shu (2002) who also use simultaneous equations to account for the endogeneity of initial IPO returns and litigation risk.

Rosenbaum and Rubin (1983) define the average treatment effect in a counterfactual framework as :

Equation 1

$$\Delta_i = Y_i^L - Y_i^U$$

Where,  $Y_i^L$  is the performance measure of the listed private equity entity  $i$  and  $Y_i^U$  is the performance measure of the unlisted private equity entity. In estimating  $\Delta_i$  in equation (1), we are confronted with the fact that either  $Y_i^L$  or  $Y_i^U$  is observed, but not both of them for the same private equity entity<sup>36</sup>. Observable performances  $Y_i$  for the listed and the unlisted entities can be expressed as :

Equation 2

$$Y_i = L \cdot Y_i^L + (1 - L) \cdot Y_i^U \quad L = 0,1$$

Where  $L$  is an indicator for performance being observable in either state.

Let  $p$  be the probability of observing a listed private equity (i.e.  $L=1$ ), the average treatment effect (ATE) writes:

Equation 3

$$ATE = p \cdot [E(Y^L|L = 1) - [E(Y^U|L = 1)]] + (1 - p) \cdot [E(Y^U|L = 0) - [E(Y^U|L = 0)]]$$

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<sup>36</sup> Only 31 entities in our sample have full performance data in both private and public states.

Hence, the average listing effect on performance for the entire population of private equity entities according to equation 3 is the weighted average of the effect of going public for the listed entities (i.e. the treatment group) and the private (unlisted) entities (i.e. the control group). Proper causal inference in that regard is confronted with the fact that most counterfactuals are not observed in the data. Hence,  $E(Y^U|L = 1)$  (i.e. performance had TPE listed) and  $E(Y^L|L = 0)$  (i.e. performance had LPE not listed) cannot be estimated (Smith and Todd, 2005, Dehejia, 2005a, Dehejia 2005b). In this situation, estimating the effect of listing on performance requires statistical matching, using the variation in investment outcomes from the two groups (Blundell and Costa-Dias, 2000). Propensity score matching (PSM) addresses this problem by using probabilistic methods to build a group of counterfactual matches to assess the average treatment effect. In that regard, instead of matching our identified group of listed private equity entities to their private peers based on a large set of individual characteristics, propensity score matching uses pre-IPO determinant characteristics to provide a likelihood score for a given private firm to go public, then match listed and non-listed private equity entities based on how close their propensity scores are. In that sense, we control for the bias induced by endogeneity and firms self-selecting into listing : firms weigh in the costs and benefits of staying private or going public, for incentives that are likely correlated with their performance (Asker et al. 2012, Bharath and Dittmar, 2010).

The propensity score  $p$ , which is the probability that a private equity entity in the sample goes public, can be written :

Equation 4

$$p(X) = Pr[L = 1|X] = E(L|X)$$

Where  $X$  is a vector of determinant pre-IPO characteristics and where  $p$  can follow either a logistic or a normal cumulative distribution. The average treatment effect for the treated (ATT) is then given by :

Equation 5

$$\begin{aligned}
 ATT &= E \{ Y_i^L - Y_i^U \mid L = 1 \}, \\
 &= E [ E \{ Y_i^L - Y_i^U \mid L_i = 1, p(X) \}], \\
 &= E [ E \{ Y_i^L \mid L_i = 1, p(X) \} - E \{ Y_i^U \mid L_i = 0, p(X) \} \mid L = 1 ]
 \end{aligned}$$

The underlying assumptions of estimating average treatment effects from PSM in equation 5 are twofold. First, the ATT is only defined within the region of common support, meaning that private equity entities with similar vectors of characteristics have positive probabilities of going public. We account for this condition in estimating the propensity scores by allowing for matching only within the region of common support. Second, PSM is bounded by the Conditional Independence Assumption (CIA), meaning that the selection into IPO is independent of potential investment outcomes controlling for a given set of covariates. Smith and Todd (2005) outline that the CIA is not always satisfied as systematic differences in investment outcomes between the treatment and the control groups may persist even after controlling for observable covariates<sup>37</sup>. One plausible reason why this may occur is because of unmeasured unobservable confounding. In section 9, we discuss and provide evidence supporting our results in the presence of such bias.

Average treatment effects are estimated using different matching approaches. We use a distance-based approach and a weighted average approach. The earlier is nearest neighbor matching, which considers as matches entities in the control group that have the closest propensity score

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<sup>37</sup> This problem is similar to that of weak instruments in an IV estimation.

to the treated entities. The average treatment effect is then computed as the differences in outcomes between each matched pair then averaged across all the pairs. The latter is kernel matching, which consider the entire set of identified possible matches as a single weighted average match for the considered entity, with attributed weights being inversely proportional to how close the propensity score of each control within the population of possible matches is to the treated entity. The average treatment effect in that case is the difference in outcomes between the treated unit and the weighted average of all matches with the closest propensity scores. Overall, using matching with our data, covering larger samples in both the treated and the control groups, increases the likelihood of finding suitable matches, hence providing more statistical power for our tests.

#### 1.4.1.2. Extended linear regressions

Following the extended linear model approach, the relationship between being public and private equity performance is modeled as:

Equation 6

$$Y_i = X\beta + Listed\beta_0 + \varepsilon,$$

$$Listed^* = z\gamma + \mu,$$

$$\text{With } \begin{cases} Listed = 1 \text{ if } Listed^* > 0 \\ Listed = 0 \text{ if otherwise} \end{cases}$$

$Y_i$  is the performance measure of private equity entity  $i$ .  $X$  is a vector of pre-IPO controls and  $Listed$  is a dummy variable that is equal to one if the entity is listed and 0 otherwise. For every



estimation using performance measure  $Y_i$ , the coefficient of interest in the extended regression estimation is  $\beta_0$ .  $Listed^*$  is a latent variable indicating the likelihood that a private equity entity goes public. The identification strategy uses the state of the local public market one trading month prior to the IPO as an instrumental variable,  $z$ . The choice and justification of the instrumental variable is discussed in the following paragraph. In that regard, the extended regression modeled in equation 6 fundamentally accounts for selection and endogeneity simultaneously in that it estimates a selection equation and allows for the listing variable to be endogenous (i.e. allowing for  $corr(\varepsilon, \mu) \neq 0$ ). We estimate the model coefficients using Stata15 procedures *eregress* for the continuous performance measures (Exit Rate, MOIC and PME) and *eprobit* for the exit success dummy as a performance measure.

#### **1.4.2. Theoretical explanations of why firms go public and definition of the instrumental and matching variables**

The IPO literature studies several determinants to IPO underpricing (IPO cost) to issuers<sup>38</sup>, with mixed evidence on how important these drivers are to the IPO decision. One strand of literature links IPO underpricing to information asymmetry and externalities of prior IPO underpricing. In that regard, information from prior IPOs convey private information to the market that reduces listing costs for the next IPOs (Alti, 2005). This theory would also explain the IPO cycles and why IPOs cluster over time. However, there is mixed empirical evidence of how information spillovers affect initial returns. For example, Lowry and Schwert (2002) find that the information available on previous IPO underpricing does not affect follow-on IPO underpricing, contrary to Butler et al. (2014) in their benchmark study, who report that the previous pricing of IPOs does influence current IPO pricing.

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<sup>38</sup> Ibbotson and Ritter (1995), Ritter and Welch (2002) as well as Ljunqvist (2007) review this literature.

Another set of empirical papers establishes a relationship between investment bank characteristics and IPO first-day returns. Building on Rock (1986)'s argument that underpricing is a compensation for the uninformed investor for the risk undertaken by investing in uncertain IPOs, Carter and Manaster (1990) establish that reputable underwriters are associated with higher underpricing, as low risk firms market their IPOs through highly reputable investment banks to signal their low risk profile to the market. This finding is however debated by other studies on underwriter quality (e.g. Loughran and Ritter (2004) reach similar conclusions to Carter and Manaster (1990) while Michaely and Shaw (1994) find that IPOs underwritten by reputable underwriters exhibit less underpricing).

Other IPO determinants include firm and ownership factors. Several studies establish a significant relationship between measures of firm and ownership characteristics and the severity of underpricing. Examples include size and age (Loughran and Ritter, 2004), growth rate (Purnanandam and Swaminathan, 2004), dual class IPOs (Smart and Zutter, 2003) and shares overhang (Loughran and Ritter, 2004).

While the IPO literature is sometimes conflicted on patterns by which companies go public<sup>39</sup>, the general sense is that companies 'time' their IPOs, in that they are more inclined to go public in favorable market conditions characterized by increased investor sentiment, to profit from higher valuations. We follow this literature in choosing a valid instrumental variable (IV) for our extended linear regression estimations. The IV should be chosen such that it favors the likelihood that a private equity entity goes public, without influencing its performance measure other than through the fact that the considered entity is listed. We choose our instrumental variable so that is it compliant with the literature on IPO determinants and in a way that satisfies this condition. Butler et al. (2014) review the published literature on IPO underpricing and find that only 15 out of the 48 most used variables employed in previous research truly explain initial IPO returns. Our

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<sup>39</sup> For example, Loughran and Ritter (2004) and Carter and Manaster (1990) find that top-tier underwriters are associated with higher underpricing, while Michaely and Shaw (1994) find that IPOs underwritten by reputable underwriters exhibit less underpricing. Lowry and Schwert (2002) find that the information available on previous IPO underpricing does not affect follow-on IPO underpricing, whereas Butler et al. (2014) reach the opposite conclusion.

instrumental variable compares to two of those robust measures (the Prior 30 Day CRSP EW Index and Prior 30 Day NASDAQ Return). Since our sample is international, we consider the prior 30 Day regional MSCI index return as an instrument for estimating the selection equation in the extended linear regression. The regional MSCI index is allocated to the private equity entities based on the headquarter regions of their respective investments (MSCI North America, MSCI Europe, and MSCI World<sup>40</sup>). Furthermore, this instrument passes the restriction condition as it is difficult to imagine how it would affect investment outcomes. Indeed, the state of the market one month prior to the IPO is not likely to affect performance in a context where private equity firms hold their investments for 3.1 to 6.4 years on average by our estimates, and where sponsors increasingly exit their investments by way of trade sales instead of public equity offerings from 2002 onward.

A number of the above-mentioned IPO determinants are measurable in our setting and we use them as matching variables in our propensity score estimation. We mainly focus on variables that are documented in the literature to (i) have a negative impact on IPO underpricing (i.e. decrease the IPO cost and therefore increase the propensity to list), (ii) are measurable in our context and (iii) are deemed robust and persistent in explaining IPO initial return in the sense of Butler et al., 2014 (i.e. are not sensitive to time periods and are consistently powerful in explaining IPO underpricing across different specifications in different studies). These matching variables are: size (measured as pre-IPO total deal value), experience (measured as the number of pre-IPO contracted deals), and age at IPO (measured as the difference between the IPO year and either the founding or incorporation year of the considered entity).

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<sup>40</sup> 42.4% of listed private equity concentrate in the USA and 19.5% in the UK.

## 1.5. Main findings

### 1.5.1. Private equity performance and listing

As previously discussed, assessing performance in our context raises concerns of endogeneity and selection. The literature on the determinants of IPOs shows that companies time the market (Lowry, 2003). There is an increased number of firms going public in times of favourable market conditions (“hot markets”) and increased proceeds associated with those cycles. The IPO activity is related to periods of higher market valuations that allow for lower costs of equity. He (2007) further establishes that the observed pro-cyclical IPO market is mainly due to information asymmetry and investor sentiment rather than the companies’ financing needs. As explained earlier, we use extended regression models (ERMs) to address these issues (Blundell and Powell, 2004). ERMs rely on structural predictions or average structural functions to address problems of endogenous covariates.

Table 1.3.a shows results of the extended regression model for four performance variables against the listing dummies and control variables.

*[Table 1.3.a about here]*

Results indicate that listing deteriorates the exit rate by 17% compared to traditional private equity and by 7% lower probability of successfully exiting the investment at the deal level. There is evidence supporting that listed private equity have higher investment multiples, which significantly and negatively reverses once we adjust for the market return (a 6% lower return compared to the same amount invested in the market benchmark relative to traditional private equity).

Across the listing structures and as shown in table 1.3.b., the negative effect of listing on performance measures is especially pronounced for listed managers and listed indirect private equity, although the latter show a strong probability for successfully exiting an investment compared to traditional private equity. Listed direct PE on the other hand significantly realize lower absolute value multiples but significantly higher market adjusted returns (deal level PME). Consistent with Teo (2009), we find evidence of proximity on performance: the farther the investment from the location of the management firm, the lower the performance.

*[Table 1.3.b. about here]*

Consistent with the previous results, there is evidence of negative impact of listing on private equity performance using propensity score matching, as shown in tables 1.4. and 1.5.

LPE significantly underperform TPE in exiting investments by 7.9% on average, but significantly deliver higher multiples (+0.4x on average). Results on higher probability success are however mixed.

*[Tables 1.4. and 1.5. about here]*

### 1.5.2. Listed private equity performance and liquidity

Indices impose minimum liquidity requirements for a constituent to be eligible for inclusion. We investigate the possible relationship between the underlying private equity performance and the liquidity of the listed entity. We then particularly investigate that relationship for index constituents that we were able to identify by name in our screened LPE sample.

The individual measure of liquidity for index providers is the turnover in volume (average annual trading volume)<sup>41</sup>. We use that measure for our sample between the IPO date and 2010. For the entities which did not survive until 2010, we compute the average annual trading volume from their IPO date until the date they withdrew from the market.

Table 1.6. shows summary statistics for LPE conditional on being part on an index. Index-LPE are almost similar in performance to non-Index LPE despite significant differentials in liquidity. Index-LPE are almost twice bigger in size than non-Index LPE, are 20% more affiliated and strike higher deal numbers compared to non-Index LPE. Index-LPE and Non-Index LPE are similar on average in holding periods (5.5 years) and organizational structures (both offer indirect exposure to private equity investment on average).

*[Table 1.6. about here]*

To identify specific LPE effects on performance, we regress the performance measure<sup>42</sup> against a liquidity dummy that is equal to 1 if the liquidity measure is higher than the minimum index inclusion threshold and 0 otherwise, a home exchange binary variable that is equal to one if the

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<sup>41</sup> Index providers either consider the turnover in volume or in value. We use the first because it is common to most index providers.

<sup>42</sup> We only use the Exit Rate in this analysis for lack of observations for the other performance measures.

LPE is primarily traded in its home country and zero otherwise, and previously defined control variables. Table 1.7. reports the extended linear regression results using the level variable for liquidity, measured as the average daily trading volume in a year from the IPO until 2010 or the delisting event.

[Table 1.7. about here]

Performance still pertains to size, investment sequence, investment type, time to exit, proximity and the listing structure. Taken individually, liquidity and home-trading do not have a significant effect on performance. We note the significant effect of the choice of the listing structure on performance. The higher the complexity of the structure (i.e. the lesser the exposure to private equity investments), the lesser the performance. This means that increasing the complexity of the listing structure relative to direct exposure to private equity companies (Direct >Indirect>listed GP), significantly decreases performance measured as the exit rate by 5%.

## 1.6. Conclusion

We study the performance of listed private equity compared to traditional private equity. On average, we find that listing negatively affects the investment exit rates but positively delivers better unadjusted returns in value. We assess the possible explanations of performance differentials and find that organizational structures significantly affect the performance of listed private equity. Our results are partly consistent with similar findings in Lin and Teo, (2016): Hedge funds managed by listed firms underperform hedge funds managed by unlisted firms.

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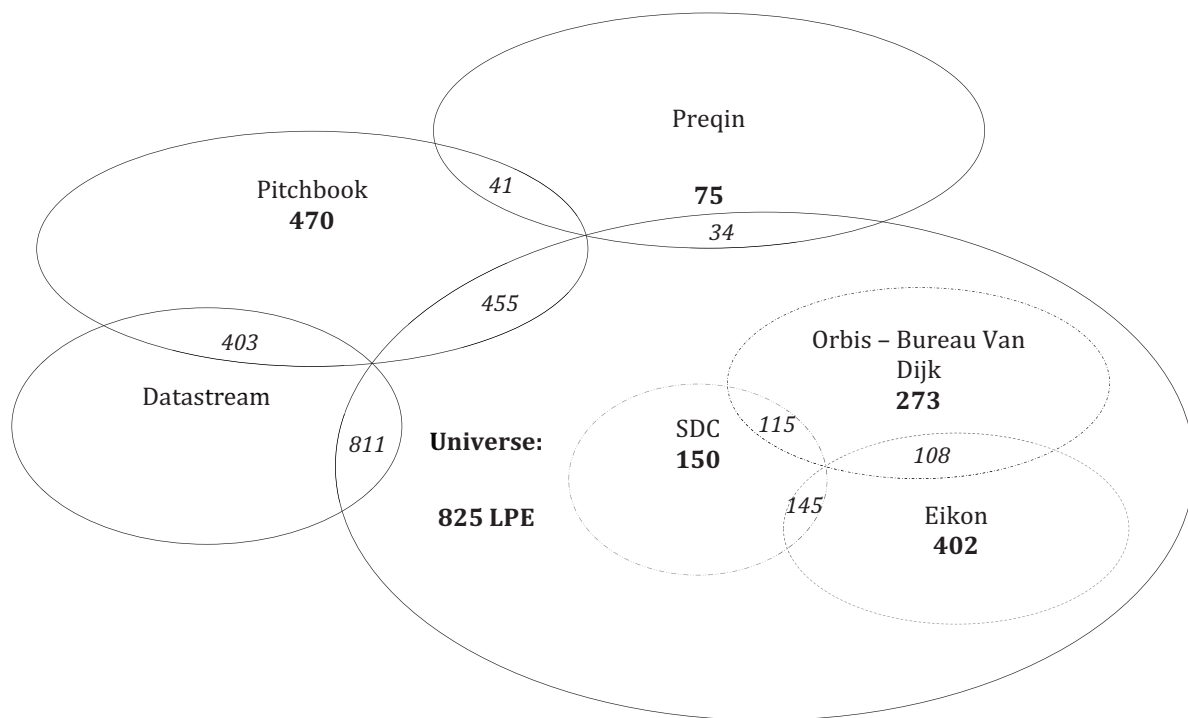
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## 1.8. Tables and figures

**Figure 1.1 : identifying listed private equity.** This figure summarizes the identification process of listed private equity using different datasets. The numbers in bold below each database's name refer to the identified LPE sample in each dataset's universe. Each intersection number in italics highlights the common observations to two or more datasets.



**Table 1.1 : Selected literature on private equity performance.**

Study	Sample size	Time period	Performance measures	Main findings
<b>Panel A: At the fund level</b>				
Robinson and Sensoy (2016)	Data on 837 funds from one large LP	1984-2008	PME and tailored PME <sup>43</sup>	Private equity performance is cyclical. Funds raised in boom times underperform funds raised in bad times. Fund investors earn a liquidity premium in bad times.
Harris, Jenckinson and Kaplan (2015)	781 US buyouts invested by 300 LPs + 300 European buyouts	1984-2010	PME	Private equity funds outperform the S&P500 and is persistent in time. However, private equity performance is declining: net outperformance before 2006, but performance became roughly equal to that of the S&P500 from 2006 onward.
Harris, Jenckinson and Kaplan (2014)	1,400 US buyouts and VC funds invested by 200 LPs	1984-2008	PME	
Phalippou and Gottschalg (2009)	1,345 funds	1980-1993	Profitability Index (PI), Adjusted IRR, and Portion of investments that are successfully exited through an IPO or a sale to another company	Private equity's superior performance documented in previous studies drops to -3.83% per annum compared to the S&P500 after correcting for data bias.
Kaplan and Schoar (2005)	1,841 funds	1980-1997	IRR and PME	Returns net-of-fees to private equity investors are equal to the S&P500. Performance is persistent in time and is cyclical, with top performing funds being less sensitive to cyclicity effects.
<b>Panel B: At the firm level</b>				
Braun, Jenckinson and Stoff (2017)	Data derived from three large fund-of-fund managers: 13,523 portfolio company investments by 865 buyout funds	1974-2010	GPME <sup>44</sup>	Performance of private equity persistence has significantly declined as the industry has matured and competition grew for interesting deals.
L'Her, Stoyanova, Shaw, Scott, and Lai (2016)	Company data invested by 906 US buyout funds	1986-2014	Tailored PME	Private equity performance is consistent with previous literature findings using the PME, but private equity funds fail to outperform the market using tailored PME.
Kaplan and Stromberg (2009)	17,171 worldwide leveraged buyout transactions	1985-2007	Vintage year return, and annual capital commitment to U.S. private equity funds as a fraction of the U.S. stock market	Private equity fund returns tend to decline with increasing capital commitments, and capital commitments decline when realized returns decline
Hochberg, Ljunqvist and Lu (2007)	3,469 VC funds managed by 1,974 VC firms, involving 16,315 portfolio companies	1980-1999	Portion of investments that are successfully exited through an IPO or a sale to another company	Better-networked VC firms have better performance, and portfolio companies of better-networked VCs are significantly more likely to survive after the exit.

<sup>43</sup> Kaplan and Schoar's (2005) Public Market Equivalent. It compares the return on the invested capital for private equity to what the investors would have earned for the same invested amount in the S&P500. Tailored PME is calculated the same way as the PME but using other public benchmarks than the S&P500. Tailored PME compares private equity performance to that of other developed market indices of publicly-traded companies which are similar to those invested by private equity funds.

<sup>44</sup> Generalized PME, See Korteweg and Nagel (2016)

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**Table 1.2 : Sample summary statistics.** *Exit Rate*, is the ratio of successful exits to total exits in number. *Value Multiple*, is the ratio of the successful exits to total exits in value. *Exit dummy*, is a dummy that takes the value of one if the exit is either by way of IPO or M&A. The variables of interest are four dummy variables that take the values of 0s and 1s depending on the backing type of the portfolio company: traditional which takes the value of one if the portfolio company is backed by traditional private equity and zero otherwise. The remaining three dummy variables are direct, indirect and manager, which take the value of one if the considered portfolio company is invested by a direct listed investment vehicle, an indirect listed investment vehicle or a listed private equity manager respectively, and zero otherwise. Size is the total invested capital in 2016 million USD. Experience is proxied by the total number of deals up to the investment date. Affiliation is the number of investor memberships to PE associations or investor clubs and similar bodies. Time is the time to exit in years. Age is age of the portfolio company in years at the time of financing. Sequence is a dummy variable that takes the value of 1 if it is a first-time investment and zero otherwise. Venture is a dummy variable that takes the value of one if the investment is venture-backed and zero otherwise. Geography is a category variable that takes the value of 1 if the investment is local, the value of 2 if the investment is nearby and the value of 3 if the investment is distant.

	Exit Rate	Value Multiple	Size	Experience	Affiliation	Time	Age		Exit Rate	Value Multiple	Size	Experience	Affiliation	Time	Age
<b>Panel A: Traditional Private Equity</b>								<b>Panel C: Listed Indirect Private Equity</b>							
<b># Obs.</b>	427 857	427 857	380 435	427 857	427 857	427 155	374 459	<b># Obs.</b>	199	199	159	199	199	68	164
<b>mean</b>	41%	9,1x	53,6	3 545	1	3,1	98,5	<b>mean</b>	18%	2,6x	31,2	257	1	6,4	147,3
<b>sd</b>	21%	9,5x	196,7	9 131	2	0,5	167,7	<b>sd</b>	13%	4,3x	64,3	1 165	2	4,5	24,1
<b>min</b>	0%	0,0x	0,0	1	0	1,0	1,0	<b>min</b>	0%	0,0x	0,3	1	0	1,0	1,0
<b>p25</b>	25%	1,8x	7,0	86	0	3,0	26,0	<b>p25</b>	10%	0,1x	3,5	18	0	2,9	36,0
<b>p50</b>	42%	4,8x	22,8	328	0	3,5	53,0	<b>p50</b>	17%	1,1x	9,7	63	1	5,4	85,5
<b>p75</b>	61%	20,4x	57,4	1 452	1	4,6	101,0	<b>p75</b>	25%	2,4x	30,5	120	2	9,0	146,5
<b>max</b>	89%	50,0x	37 605,0	37 929	13	15,4	314,0	<b>max</b>	73%	23,4x	619,8	13 192	14	16,0	160,0
<b>Panel B: Listed Direct Private Equity</b>								<b>Panel D: Listed Private Equity Manager</b>							
<b># Obs.</b>	1 683	1 683	1 511	1 683	1 683	757	1 513	<b># Obs.</b>	13 372	13 372	10 469	13 372	13 372	12 777	11 522
<b>mean</b>	36%	13,4x	29,0	1 027	1	6,2	102,4	<b>mean</b>	33%	5,9x	99,9	831	5	5,5	167,9
<b>sd</b>	17%	14,6x	104,3	2 344	1	4,2	73,4	<b>sd</b>	13%	9,0x	621,7	962	6	1,5	206,6
<b>min</b>	0%	0,0x	0,0	1	0	1,0	1,0	<b>min</b>	0%	0,0x	0,0	1	0	1,0	1,0
<b>p25</b>	20%	1,8x	3,6	71	0	3,1	27,0	<b>p25</b>	23%	1,5x	6,1	137	1	2,0	31,0
<b>p50</b>	45%	5,8x	11,3	162	1	6,0	54,0	<b>p50</b>	36%	2,0x	23,8	342	2	4,0	69,0
<b>p75</b>	47%	35,0x	30,3	2 715	1	8,3	109,0	<b>p75</b>	42%	6,3x	71,2	1 452	13	10,6	164,0
<b>max</b>	76%	44,5x	3 600,0	37 929	5	19,9	202,0	<b>max</b>	71%	47,5x	38 605,0	37 926	14	24,9	309,0

Table continued on next page

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**Table 1.2. : Sample summary statistics – Continued.** *Sequence* is a dummy variable that takes the value of 1 if the deal is a first-time investment and zero otherwise. *Venture* is a dummy variable that takes the value of one if the investment is venture-backed and zero otherwise. *Geography* is a category variable that takes the value of 1 if the investment is local, the value of 2 if the investment is nearby and the value of 3 if the investment is distant.

Panel E: Traditional Private Equity											
Exit Dummy	Frequency	%	Sequence	Frequency	%	Venture	Frequency	%	Geo	Frequency	%
0	236 313	55,23%	0	179 895	42,05%	0	97 811	22,86%	1	297 122	69,44%
1	191 544	44,77%	1	247 962	57,95%	1	330 046	77,14%	2	21 861	5,11%
<b>Total</b>	<b>427 857</b>	<b>100%</b>	<b>Total</b>	<b>427 857</b>	<b>100%</b>	<b>Total</b>	<b>427 857</b>	<b>100%</b>	<b>Total</b>	<b>427 857</b>	<b>100%</b>
Panel F: Listed Direct Private Equity											
Exit Dummy	Frequency	%	Sequence	Frequency	%	Venture	Frequency	%	Geo	Frequency	%
0	1 061	63,04%	0	31	15,58%	0	188	11,17%	1	1 470	87,34%
1	622	36,96%	1	168	84,42%	1	1 495	88,83%	2	76	4,52%
<b>Total</b>	<b>1 683</b>	<b>100%</b>	<b>Total</b>	<b>199</b>	<b>100%</b>	<b>Total</b>	<b>1 683</b>	<b>100%</b>	<b>Total</b>	<b>1 683</b>	<b>100%</b>
Panel G: Listed Indirect Private Equity											
Exit Dummy	Frequency	%	Sequence	Frequency	%	Venture	Frequency	%	Geo	Frequency	%
0	145	72,86%	0	749	44,50%	0	149	74,87%	1	78	39,20%
1	54	27,14%	1	934	55,50%	1	50	25,13%	2	43	21,61%
<b>Total</b>	<b>199</b>	<b>100%</b>	<b>Total</b>	<b>1 683</b>	<b>100%</b>	<b>Total</b>	<b>199</b>	<b>100%</b>	<b>Total</b>	<b>199</b>	<b>100%</b>
Panel H: Listed Private Equity Manager											
Exit Dummy	Frequency	%	Sequence	Frequency	%	Venture	Frequency	%	Geo	Frequency	%
0	8 568	64,07%	0	4 450	33,28%	0	7 355	55,00%	1	9 797	73,27%
1	4 804	35,93%	1	8 922	66,72%	1	6 017	45,00%	2	779	5,83%
<b>Total</b>	<b>13 372</b>	<b>100%</b>	<b>Total</b>	<b>13 372</b>	<b>100%</b>	<b>Total</b>	<b>13 372</b>	<b>100%</b>	<b>Total</b>	<b>13 372</b>	<b>100%</b>



**Table 1.3.a : Extended regression estimates for the effect of Listing on Performance.** This table shows the following model estimates using Stata15 *eregress* and *eprobit*:

$$Y_i = X\beta + Listed\beta_0 + \varepsilon,$$

$$Listed^* = z\gamma + \mu,$$

$$\text{With } \begin{cases} Listed = 1 \text{ if } Listed^* > 0 \\ Listed = 0 \text{ if otherwise} \end{cases}$$

The model accounts simultaneously for endogeneity and selection problems of being a publicly listed entity by allowing for  $corr(\mu, \varepsilon) \neq 0$ , and by estimating a selection equation using 1-trading month index return prior to the IPO of the considered entity as an instrument. *Performance*  $Y_i$  is measured in 4 ways: the *Exit Rate*, which is the ratio of successful exits to total exits in number at the fund level (Panel A), the *Multiple of Invested Capital (MOIC)*, which is the ratio of the successful exits to total exits in value at the fund level (Panel B), the *Deal-level Public Market Equivalent (Deal PME)*, calculated as the ratio of the return multiple of the deal against the regional MSCI benchmark of where the portfolio company is located (Panel C), and *Exit Success*, which is a binary variable that takes the value of one if the exit is either by way of IPO or M&A and zero otherwise (Panel D). Our variable of interest is *Listed*, which takes the value of 1 if the deal is backed by a listed private equity structure and 0 otherwise. The vector of controls  $X$  includes: *Size* (deal relevant fund size in 2016 dollars), *Experience* (number of deals), *Affiliation* (number of professional organizations and investor clubs the private equity entity is connected to), *Time to Exit* (the holding period in years), *Time to Invest* (investment speed in years, expressed as the difference between the deal investment date and the fund inception date), *Age* (age of the portfolio company at financing), *Deal Sequence* (the sequence number of the deal within the relevant fund). *Venture* is a dummy for whether the investment is Venture Capital and 0 otherwise, *Nearby* and *Distant* (compared to *Local*) are indicator variables for whether the investee company is located in a nearby or distant country, based on whether the respective headquarter countries of the sponsor and the portfolio company are established. All continuous variables are transformed in the regressions using the natural logarithm. Robust standard errors are reported in parentheses. \*\*\*, \*\* and \* denote significance levels for  $p < 0.01$ ,  $p < 0.05$  and  $p < 0.1$  respectively.

*Table continued on next page*

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	<b>(1)</b> <b>LN Exit Rate</b>	<b>(2)</b> <b>MOIC</b>	<b>(3)</b> <b>Deal-level PME</b>	<b>(4)</b> <b>Successful Exit Dummy</b>
Listed	-0.170*** (0.007)	0.020* (0.011)	-0.058*** (0.012)	-0.072** (0.028)
LN Size	0.016*** (0.001)	-0.050*** (0.002)	0.039*** (0.002)	-0.033*** (0.004)
LN Experience	-0.166*** (0.003)	0.150*** (0.005)	0.063*** (0.005)	0.035*** (0.010)
LN Affiliation	0.017*** (0.002)	-0.132*** (0.005)	-0.024*** (0.005)	0.022** (0.011)
Time to Exit	0.042*** (0.002)	0.026*** (0.004)	0.003 (0.004)	0.041*** (0.009)
Time to Invest	0.018*** (0.001)	0.010*** (0.003)	-0.014*** (0.003)	0.010 (0.007)
LN Age	-0.047*** (0.002)	-0.021*** (0.003)	0.007** (0.003)	-0.101*** (0.006)
LN Deal Sequence	0.233*** (0.002)	0.050*** (0.004)	-0.041*** (0.004)	-0.009 (0.008)
Venture Dummy	0.274*** (0.004)	0.325*** (0.008)	0.025*** (0.007)	0.343*** (0.014)
Nearby Dummy	-0.192*** (0.010)	-0.343*** (0.018)	-0.086*** (0.015)	0.026 (0.036)
Distant Dummy	-0.119*** (0.006)	-0.126*** (0.015)	0.004 (0.011)	-0.109*** (0.025)
Intercept	-1.481*** (0.012)	-0.109*** (0.023)	0.758*** (0.258)	-0.143 (0.357)
Observations	111,091	106,898	105,826	112,097
Country FE	Y	Y	Y	Y
Investment Year FE	Y	Y	Y	Y
Firm-Fund-Deal FE	Y	Y	Y	Y
Listing Structure FE	Y	Y	Y	Y
Adjusted R-squared	0.487	0.181	0.20	
Pseudo R-squared				0.59

**Table 1.3.b : Extended regression estimates for the effect of the Listing Structures on Performance.** This table shows the following model estimates using Stata15 *eregress* and *eprbit*:

$$Y_i = X\beta + Listed_i\beta_0 + \varepsilon,$$

$$Listed_i^* = z\gamma + \mu,$$

$$\text{With } \begin{cases} Listed_i = 1 \text{ if } Listed_i^* > 0 \\ Listed_i = 0 \text{ if otherwise} \end{cases}$$

The model accounts simultaneously for endogeneity and selection problems of being a publicly listed entity by allowing for  $corr(\mu, \varepsilon) \neq 0$ , and by estimating a selection equation using 1-trading month index return prior to the IPO of the considered entity as an instrument.  $Listed_i$  takes the values  $Listed_1 = Direct$  if the listed structure is a fund,  $Listed_2 = Indirect$  if the listed structure is a fund-of-funds, and  $Listed_3 = Manager$  if the listed structure is the Management Firm. Performance  $Y_i$  is measured in 4 ways: the *Exit Rate*, which is the ratio of successful exits to total exits in number at the fund level (Panel A), the *Multiple of Invested Capital (MOIC)*, which is the ratio of the successful exits to total exits in value at the fund level (Panel B), the *Deal-level Public Market Equivalent (Deal PME)*, calculated as the ratio of the return multiple of the deal against the regional MSCI benchmark of where the portfolio company is located (Panel C), and *Exit Success*, which is a binary variable that takes the value of one if the exit is either by way of IPO or M&A and zero otherwise (Panel D). Our variable of interest is *Listed*, which takes the value of 1 if the deal is backed by a listed private equity structure and 0 otherwise. The vector of controls  $X$  includes: *Size* (deal relevant fund size in 2016 dollars), *Experience* (number of deals), *Affiliation* (number of professional organizations and investor clubs the private equity entity is connected to), *Time to Exit* (the holding period in years), *Time to Invest* (investment speed in years, expressed as the difference between the deal investment date and the fund inception date), *Age* (age of the portfolio company at financing), *Deal Sequence* (the sequence number of the deal within the relevant fund). *Venture* is a dummy for whether the investment is Venture Capital and 0 otherwise, *Nearby* and *Distant* (compared to *Local*) are indicator variables for whether the investee company is located in a nearby or distant country, based on whether the respective headquarter countries of the sponsor and the portfolio company are established. All continuous variables are transformed in the regressions using the natural logarithm. Robust standard errors are reported in parentheses. \*\*\*, \*\* and \* denote significance levels for  $p < 0.01$ ,  $p < 0.05$  and  $p < 0.1$  respectively.

*Table continued on next page*

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	<b>(1)</b> <b>LN Exit Rate</b>	<b>(2)</b> <b>MOIC</b>	<b>(3)</b> <b>Deal-level PME</b>	<b>(4)</b> <b>Successful Exit Dummy</b>
Direct	-0.011 (0.026)	-0.463*** (0.028)	0.460*** (0.045)	0.391 (0.242)
Indirect	-0.916*** (0.052)	-1.181*** (0.058)	-0.648*** (0.050)	0.949*** (0.242)
Manager	-0.170*** (0.007)	0.013 (0.011)	-0.065*** (0.012)	-0.077*** (0.028)
LN Size	0.016*** (0.001)	-0.050*** (0.002)	0.039*** (0.002)	-0.033*** (0.004)
LN Experience	-0.166*** (0.003)	0.151*** (0.005)	0.063*** (0.005)	0.035*** (0.010)
LN Affiliation	0.017*** (0.002)	-0.131*** (0.005)	-0.023*** (0.005)	0.023** (0.011)
Time to Exit	0.042*** (0.002)	0.026*** (0.004)	0.003 (0.004)	0.041*** (0.009)
Time to Invest	0.018*** (0.001)	0.010*** (0.003)	-0.014*** (0.003)	0.010 (0.007)
LN Age	-0.047*** (0.002)	-0.021*** (0.003)	0.007** (0.003)	-0.101*** (0.006)
LN Deal Sequence	0.233*** (0.002)	0.050*** (0.004)	-0.041*** (0.004)	-0.009 (0.008)
Venture Dummy	0.274*** (0.004)	0.324*** (0.008)	0.024*** (0.007)	0.342*** (0.014)
Nearby Dummy	-0.192*** (0.010)	-0.342*** (0.018)	-0.086*** (0.015)	0.026 (0.036)
Distant Dummy	-0.119*** (0.006)	-0.126*** (0.015)	0.004 (0.011)	-0.108*** (0.025)
Intercept	-1.481*** (0.012)	-0.113*** (0.023)	0.757*** (0.258)	-0.145 (0.357)
Observations	111,091	106,898	105,826	112,097
Country FE	Y	Y	Y	Y
Investment Year FE	Y	Y	Y	Y
Firm-Fund-Deal FE	Y	Y	Y	Y
Listing Structure FE	Y	Y	Y	Y
Adjusted R-squared	0.487	0.181	0.207	
Pseudo R-squared				0.593

**Table 1.4.: Average effect of listing on performance using propensity score.** This table shows the average treatment effect of going public on the performance measures of the listed entities (ATET), using nearest neighbor matching. Listed and Traditional Private Equity are matched on Size (AUM), Age (time in years between founding and IPO dates), experience (number of deals up to IPO date), Performance measures for the propensity score include the *Exit Rate*, which is the ratio of successful exits to total exits in number, *MOIC*, which the ratio of the successful exits to total exits in value, and *Exit Success*, which is the probability to exit the investment by way of an IPO or a trade sale. Bootstrapped standard errors.

<b>Performance measure</b>	<b>Treated</b>	<b>Controls</b>	<b>ATET</b>	<b>Std. Err.</b>	<b>t-statistic</b>
Exit Rate	666	403	-0.079	0.0041	-3.183***
Value Multiple	666	403	0.376	0.0073	4.001***
Successful Exit	666	403	-0.009	0.022	-0.404

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**Table 1.5: Average effect of listing on performance using OLS on propensity score matched sample.** The entities are matched on size, age, and experience, without allowing for replacement. Performance measures include the *Exit Rate*, which is the ratio of successful exits to total exits in number, *MOIC*, which the ratio of the successful exits to total exits in value, *Deal PME*, calculated as the market adjusted return of the deal investment multiple relative to a same holding period investment in the public benchmark, and *Exit Success*, which is the probability to exit the investment by way of an IPO or a trade sale. Robust standard errors are reported between brackets.

**Panel A: Total matched sample**

	(1) LN Exit Rate	(2) LN MOIC	(3) LN Deal PME	(4) Exit Success Dummy
Listed	-0.532*** (0.044)	0.324*** (0.075)	-0.090 (0.062)	-0.362 (0.254)
lnSize	0.011*** (0.003)	-0.077*** (0.006)	-0.009** (0.004)	0.001 (0.018)
lnExperience	-0.139*** (0.016)	0.073*** (0.022)	0.060*** (0.015)	0.128** (0.062)
lnAffiliation	0.046*** (0.008)	-0.294*** (0.016)	0.060*** (0.012)	-0.048 (0.045)
lnTimeExit	0.008 (0.009)	0.011 (0.013)	-0.012 (0.010)	-0.068* (0.041)
lnTimeInvest	-0.007 (0.008)	-0.008 (0.012)	-0.011 (0.008)	-0.038 (0.033)
lnAge	-0.007 (0.005)	-0.008 (0.007)	0.015*** (0.005)	-0.162*** (0.024)
lnDealSequence	0.205*** (0.013)	0.072*** (0.015)	-0.047*** (0.011)	-0.059 (0.046)
Venture	0.160*** (0.017)	0.024 (0.025)	0.035** (0.015)	0.517*** (0.074)
Nearby	-0.141** (0.063)	-0.183*** (0.064)	0.056 (0.042)	0.401** (0.163)
Distant	-0.060* (0.031)	-0.014 (0.051)	-0.022 (0.023)	0.331*** (0.108)
Constant	-0.839*** (0.076)	-0.172 (0.143)	2.316*** (0.096)	1.011** (0.423)
Observations	4,082	3,998	3,965	3,969
Country FE	Y	Y	Y	Y
Investment Year FE	Y	Y	Y	Y
Firm-Fund-Deal FE	Y	Y	Y	Y
Listing Structure FE	Y	Y	Y	Y
Adjusted R-squared	0.353	0.319	0.164	
Pseudo R-squared				0.0957

*Continued on next page*

Chapter 1: On the Performance of Listed Private Equity: How does the transition to public markets impact investment outcomes?

**Panel B: Total matched sample by listing structure**

VARIABLES	(1) Exit Rate	(2) LN MOIC	(3) LN Deal PME	(4) Exit Success Dummy
Direct	0.147*** (0.031)	0.208*** (0.040)	0.117* (0.065)	0.338 (0.253)
Indirect	-1.508*** (0.119)	-1.632*** (0.147)	-0.368*** (0.079)	-0.362*** (0.464)
Manager	0.541*** (0.045)	0.311*** (0.075)	-0.098 (0.063)	-0.383 (0.254)
LN Size	0.010*** (0.003)	-0.077*** (0.006)	-0.009** (0.004)	0.003 (0.018)
LN Experience	-0.137*** (0.016)	0.076*** (0.022)	0.062*** (0.015)	0.134** (0.062)
LN Affiliation	0.049*** (0.008)	-0.289*** (0.016)	0.062*** (0.012)	-0.043 (0.045)
Time to Exit	0.007 (0.009)	0.010 (0.013)	-0.012 (0.010)	-0.067 (0.041)
Time to Invest	-0.007 (0.008)	-0.008 (0.012)	-0.011 (0.008)	-0.037 (0.033)
LN Age	-0.006 (0.005)	-0.007 (0.007)	0.015*** (0.005)	-0.161*** (0.023)
LN Deal Sequence	0.201*** (0.013)	0.068*** (0.015)	-0.049*** (0.011)	-0.067 (0.046)
Venture Dummy	0.153*** (0.018)	0.015 (0.026)	0.030* (0.016)	0.507*** (0.075)
Nearby Dummy	-0.137** (0.063)	-0.177*** (0.064)	0.060 (0.042)	0.412** (0.163)
Distant Dummy	-0.055* (0.031)	-0.008 (0.052)	-0.020 (0.023)	0.334*** (0.108)
Intercept	-0.821*** (0.076)	-0.152 (0.143)	2.325*** (0.096)	0.999** (0.423)
Observations	4,082	3,998	3,965	3,969
Country FE	Y	Y	Y	Y
Investment Year FE	Y	Y	Y	Y
Firm-Fund-Deal FE	Y	Y	Y	Y
Listing Structure FE	Y	Y	Y	Y
Adjusted R-squared	0.357	0.322	0.165	
Pseudo R-squared				0.0963

**Table 1.6: Summary statistics for LPE conditional on being an index constituent.** *Performance* is the ratio of successful exits to total number of exits. *Liquidity* is average daily trading volume in a year from the IPO until 2010 or the delisting event, *Size* is the total invested capital in 2016 million USD up to the investment date. *Affiliation* is the number of investor memberships to PE associations or investor clubs and similar bodies up to the investment date. *Experience* is proxied by the total number of deals up to the investment date. *Time* is the time to exit in years. *Listing structure* is a category variable which takes the value of 1 for listed direct private equity, 2 for listed indirect private equity and 3 for listed private equity managers.

	<b>Exit Rate</b>	<b>Liquidity</b>	<b>Size</b>	<b>Affiliation</b>	<b>Experience</b>	<b>Time</b>
<b>Nb. Obs.</b>	169	117	113	169	169	165
<b>Mean</b>	0.3172	85,583.63	2,636.60	0.4497	61.2307	5.5096
<b>SD</b>	0.2131	23,6471.1	11,596.63	0.4989	122.0675	2.4304
<b>Min.</b>	0	7.95	0.8179	0	1	0.6
<b>25<sup>th</sup> p.</b>	0.1796	830.71	19.8609	0	9	3.8
<b>Median</b>	0.2727	5,140.1	61.5752	0	24	5.4
<b>75<sup>th</sup> p.</b>	0.3928	56,728.47	245.8615	1	66	6.95
<b>Max.</b>	1	1,564,506	87,807.58	1	1,221	13.2
<b>Nb. Obs.</b>	37	31	34	37	37	37
<b>Mean</b>	0.3365	126,120.5	5,238.50	0.6486	216.64	5.5
<b>SD</b>	0.1223	229,713.2	13,833.65	0.4839	416.74	1.7096
<b>Min.</b>	0.1444	473.70	12.2930	0	6	0.3
<b>25<sup>th</sup> p.</b>	0.2244	18,594.04	162.09	0	61	4.65
<b>Median</b>	0.3333	52,015.98	577.09	1	89	5.4
<b>75<sup>th</sup> p.</b>	0.3896	126,149.8	3,231.84	1	225	6.3
<b>Max.</b>	0.5915	967,152.7	62,963.68	1	2,514	11



**Table 1.7: Extended linear regression results of the performance of the LPE subsample with regards to liquidity, index composition and home trading.** *Performance* is the ratio of successful exits to total exits in number. *Liquidity* is the average daily trading volume in a year from the IPO until 2010 or delisting event. *Quoted* is a dummy variable that takes the value of one if the entity is listed primarily in its home country and zero otherwise. *Size* is the total invested capital in 2016 million USD up to the investment date. *Experience* is proxied by the total number of deals up to the investment date. *Affiliation* is the number of investor memberships to PE associations or investor clubs and similar bodies up to the investment date. *Time* is the time to exit in years. *Age* is age of the portfolio company in years at the time of financing. *Sequence* is a dummy variable that takes the value of 1 if the company is a first-time investment and zero otherwise. *Venture* is a dummy variable that takes the value of one if the investment is venture-backed and zero otherwise. We measure proximity to investments using binary variables *Local*, *Nearby* and *Distant*, which respectively take the value of one if they are realized (ie. The investment is local to the GP's, nearby in a neighbouring country or distant from the GP's headquarters) and zero otherwise. *Indirect* is a dummy that takes the value of one if the listed entity is a listed indirect PE vehicle, and *Manager* is a binary variable that takes the value of one if the listed entity is a listed private equity manager. T-statistics are reported between brackets.

	<b>Exit Rate</b>
Liquidity	0.01 (0.62)
Quoted	-0.02 (0.53)
Size	0.00** (2.62)
Affiliation	-0.03 (0.70)
Experience	-0.12 (0.63)
Age	0.14 (0.59)
Sequence	-0.05** (-4.25)
Venture	-0.22*** (-3.02)
Time	0.11 (-0.18)
Nearby	-0.015** (-0.07)
Distant	-0.02** (-3.16)
Indirect	-0.1** (-2.45)
Manager	-0.05** (-1.99)
Constant	0.31*** (4.26)
N	148
Adjusted R-squared	0.23

## **1.9. Additional Supporting Information**

Additional information supporting the results can be found in Appendix S1.1 with robustness tests of propensity score matching to remaining hidden bias.

More information on the mechanisms by which listed private equity works, the listing structures and their exposure levels with examples can be found in Appendix S1.2

**Appendix S1.1: robustness tests of propensity score matching to unobserved confounding and hidden bias of potentially increased selection into public listing.**

As discussed in section 1.4, estimating the average treatment effect using propensity score relies on the conditional independence assumption, which posits that selection into IPO is independent of potential investment outcomes controlling for a given set of covariates (this property is referred to as confoundedness). In this appendix, we provide the reader with additional tests on the robustness of our results to such potential remaining bias.

We conduct two simulation-based exercises to assess the sensitivity of the average treatment effect to unobserved confounders, referred to as *calibrated* and *killer* confoundedness by Ichino, Mealli and Nannicini (2008). *Calibrated confounders* are unobserved or unmeasurable variables whose behavior mimics that of a given observable variable. We conduct these simulations to measure the extent to which the baseline estimates are robust to deviations from the conditional independence assumption induced by the impossibility of observing factors similar to the ones used to calibrate the distribution. *Killer confounders* are sets of probability parameters under which selection into treatment would favor a *killer scenario*. A « killer » scenario in our setting is to have a case where there is a high probability of having considerable listings that could have underperformed their matches and omitted listings that could have outperformed their matches. Panel A of Table S1.1.1. shows the simulation results for calibrated confounder simulations, and Panel B shows the results for the killer confounder simulations.

**Table S.1.1.1. Simulation-based robustness checks**

**Panel A – Calibrated confounders Simulation results for a confounder that would mimic a given observable covariate (1,000 iterations each time)**

	<b>ATT</b>	<b>Sel. Eff.</b>	<b>Eff. On ATT</b>
Baseline	-0.079***	-	-
U=Experience	-0.074***	3.235	0,55%
U=Size	-0.069***	3.408	0,97%

**Panel B – Simulation results for given parameters  $p_{ij}$  and the relative effect on ATT (1,000 iterations each time)**

Unobserved confounder U such that:

p11: probability so that Listed = 1 | Outcome = 1 (entity is selected to list and outperforms match)

p10: probability so that Listed = 1 | Outcome = 0 (entity is selected to list and underperforms match)

p01: probability so that Listed = 0 | Outcome = 1 (entity is not selected to list and outperforms match)

p00: probability so that Listed = 0 | Outcome = 0 (entity is not selected to list and underperforms match)

	<b>ATT</b>	<b>p11</b>	<b>p10</b>	<b>p01</b>	<b>p00</b>	<b>Out. Eff.</b>	<b>Sel. Eff.</b>	<b>% Kill</b>
Baseline	-0.079***	-	-	-	-	-	-	-
U1	-0.073***	0.5	0.5	0.5	0.5	1.024	1.09	0.4%
U2	-0.072***	0.8	0.8	0.8	0.8	1.020	0.991	0.7%
<b>U<sub>killer</sub></b>	<b>-0.034</b>	<b>1</b>	<b>0.5</b>	<b>1</b>	<b>0.5</b>	-	<b>1.248</b>	<b>56.9%</b>

The effect on the estimated average treatment effect from simulating unobserved confounding variables that could affect the selection into IPO (in that they mimic the behavior of the identified matching variables used in estimating the propensity scores) is minimal on the average treatment effect. For example, the average bias from having a confounder that would affect selection into IPO the way the variable *Size* amounts to about 1% (i.e. effect on ATT). Such effect would have to influence selection into IPO by a factor greater than 3 (i.e. Sel. Eff.). In economic terms, it would require each private equity firm a match three times its size to induce a 1% bias of the estimated average treatment effect, which is unlikely.

The second set of simulations, “killer” confounders, is based on establishing a configuration of parameters that would significantly deteriorate the observed effect and then estimate the plausibility of such a scenario. A “killer” scenario in our case would be to have higher probabilities of having considerable listings that would have outperformed their matches, and omitted listings that could have outperformed their matches. We assign 100% probabilities for such scenarios to be possible and observe indeed that this drives the effect to an insignificant -3.4% (t-stat = -0.104) – i.e. the initial ATT is killed by about 57%. Such an effect would have to increase the selection into listing by a factor greater than 1. In order to assess the plausibility of of such a scenario, we construct an upper bound (Rosenbaum and Rubin, 1983) and compute Mantel-Haenszel (1959) statistic to assesses the sensitivity of the observed average treatment effect to an increase of selection into treatment: DiPrete and Gangl (2004), Becker and Caliendo (2007) and report the results in the below table (S1.1.2.)

In a scenario free of hidden bias ( $\Gamma=1$ ), the  $Q_{MH}$  test statistic is 2,23 and is evidence that listing decreases performance. The upper bounds on the significance levels for  $\Gamma = 1, 1.5,$  and  $2$  are 0.012669, 0.000447, and 0.000016 and are very small afterwards, further asserting that the public listing effect on the exit rate is insensitive to a bias that would increase the odds to list by a 50% chance each time.

Chapter 1: On the Performance of Listed Private Equity: How does the transition to public markets impact investment outcomes?

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**Table S.1.1.2. Rosenbaum bounding-based robustness checks**

Mantel-Haenszel (1959) bounds for variable Exit Rate				
Gamma	Q_mh+	Q_mh-	p_mh+	p_mh-
1	2.2362	2.2362	.012669	.012669
1.5	3.3221	1.23031	.000447	.10929
2	4.15613	.541483	.000016	.294087
2.5	4.85195	.014185	6.1e-07	.494341
3	5.45864	.022089	2.4e-08	.508811
3.5	6.00244	.329092	9.7e-10	.371043
4	6.49911	.634634	4.0e-11	.262834
4.5	6.95891	.906213	1.7e-12	.182412
5	7.3889	1.15155	7.4e-14	.124754

Gamma : odds of differential assignment due to unobserved factors

Q\_mh+ : Mantel-Haenszel statistic (assumption: overestimation of treatment effect)

Q\_mh- : Mantel-Haenszel statistic (assumption: underestimation of treatment effect)

p\_mh+ : significance level (assumption: overestimation of treatment effect)

p\_mh- : significance level (assumption: underestimation of treatment effect)

**Appendix S1.2: On the properties of listed private equity and how they compare to traditional private equity**

In this appendix, we provide an example using excerpts from the listing prospectus of a UK-based fund of funds (Aberdeen Private Equity Global Fund of Funds PLC)<sup>45</sup> to highlight the properties of listed private equity that prove it fundamentally comparable to traditional private equity as highlighted in the below example registration document:

- The subscription period is quite close to the typical fundraising period for traditional private equity (1.5 years vs. a typical 2 years).
- Similar to traditional private equity, listed private equity charge management and performance fees
- Listed private equity are limited-life investment vehicles

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<sup>45</sup> We hand collect as much available reports and listing prospectuses on the identified listed private equity entities in ours ample to ensure the studied entities differ from traditional private equity only by being public. We have information on 345 listed private equity entities (about 40% of the screened population of LPE) including annual reports, audit reports, listing prospectuses, private placement memoranda, factsheets from index providers, information on their holdings, etc.

## REGISTRATION DOCUMENT

### ABERDEEN PRIVATE EQUITY GLOBAL FUND OF FUNDS PLC

(a company incorporated with limited liability as a closed-ended investment company with variable capital under the laws of Ireland with registered number 520254)

With Investment Management provided by Aberdeen Asset Managers Limited

This Registration Document is dated the 19 May 2016

This document (the **Registration Document**) constitutes a registration document for the purpose of Article 5.3 of Directive 2003/71/EC, as amended (which includes the amendments made by Directive 2010/73/EU to the extent that such amendments have been implemented in a relevant Member State of the European Economic Area) (the **Prospectus Directive**). This Registration Document, together with each securities note (the **Securities Note**) drawn up for use only in connection with the issue of Shares by the Fund constitutes a prospectus for the purposes of Article 5.3 of the Prospectus Directive. This Registration Document is to be read in conjunction with the Securities Note.

The Fund and its Directors, whose names appear in Part V, accept responsibility for the information contained in this Registration Document. To the best of the knowledge and belief of the Fund and its Directors (who have taken all reasonable care to ensure such is the case), the information contained in this document is in accordance with the facts and does not omit anything likely to affect the import of such information.

The interim financial statements for the period ended 30 September 2015, which are unaudited, form part of this Registration Document. The Directors confirm there has been no significant change in the financial or trading position of the Company since the date of the interim financial statements. The Schedule of Investments as at 31 December 2015 in Appendix 7 of the Registration Document and the Statement of Capitalisation and Indebtedness as at 29 February 2016 in Appendix 3 of the Registration Document provide additional information.

Application shall be made to the Irish Stock Exchange for the D Shares and E Shares to be admitted to the Official List and to trading on its regulated market.

## 2. FUND DESIGN

Aberdeen has structured the Fund to provide investors with a convenient single point of access to the current private equity market opportunity:

- 2.1. The Fund shall invest globally, principally in Primary Investments but with the flexibility to invest in Secondaries (particularly those managed by managers that are well known to Aberdeen) and Co-Investment Arrangements;
- 2.2. Aberdeen Fund Managers Limited plans to fully commit the Fund over three years with potential investments in Secondaries expected to accelerate both the deployment of cash from, and return of distributions to, Shareholders;
- 2.3. The investment duration is expected to be reduced compared to the previous Fund of Fund programmes advised by Aberdeen SVG, through a shorter three year Investment Period and a limited Over-Commitment Strategy of approximately 110 per cent. of Total Subscriptions; and
- 2.4. Competitive overall Fund expenses with reduced management fees versus previous Fund of Fund programmes advised by Aberdeen SVG, is expected to reduce the valuation j-curve in the early years of the Fund's life.

## 5.3. Offer Period

- 5.3.1. The offer period (the **Offer Period**) opened at 9 a.m. on 23 June 2014 and closed at 5 p.m. on 30 March 2016.



Chapter 1: On the Performance of Listed Private Equity: How does the transition to public markets impact investment outcomes?

Management:	No more than 15 per cent. of the Fund's Investment Capacity will be committed to Underlying Funds advised by one management group with no more than 10 per cent. of Investment Capacity in a single Underlying Fund
Geography:	The majority of Underlying Funds will be investing primarily in Europe, the US and Asia, although commitments may be made to Underlying Funds that invest in the Rest of the World if the Investment Manager considers it is appropriate. Of the Primary Investments, 35 to 40 per cent. are expected to be in Europe, 35 to 40 per cent. are expected to be in the United States and the balance in the Rest of the World, primarily Asia.
Vintage Year:	No more than 40 per cent. of the Fund's Investment Capacity will be committed to Underlying Funds that hold a first closing in the same calendar year.
Industry:	The Fund will seek to diversify across a wide range of industries through the Underlying Fund selection process and on-going monitoring of investments made by Underlying Funds.
Stage:	The Fund will have the flexibility to invest in venture capital, development capital, buyouts/buy-ins, debt and special situations funds, with a minimum of 90 per cent. of Investment Capacity in buyouts and development capital funds and a maximum of 10 per cent. of Investment Capacity in venture capital, distressed debt, and special situation funds.
Secondary Investments:	Up to 40 per cent of Investment Capacity may be committed to Secondary Investments which will be opportunistic as to geography although the focus will be predominantly on managers where the Investment Manager has an existing relationship.
Co-Investments	Up to 20 per cent. of the Investment Capacity of the Fund may be committed to Co-Investment Arrangements with no more than 5 per cent. of the Investment Capacity of the Fund being invested in any individual Co-Investment Arrangement, predominantly where Aberdeen has an existing relationship with the sponsor leading the co-investment transaction and therefore the co-investment is being made alongside a fund in which an entity managed by Aberdeen holds a primary investment

**9. FEES AND EXPENSES**

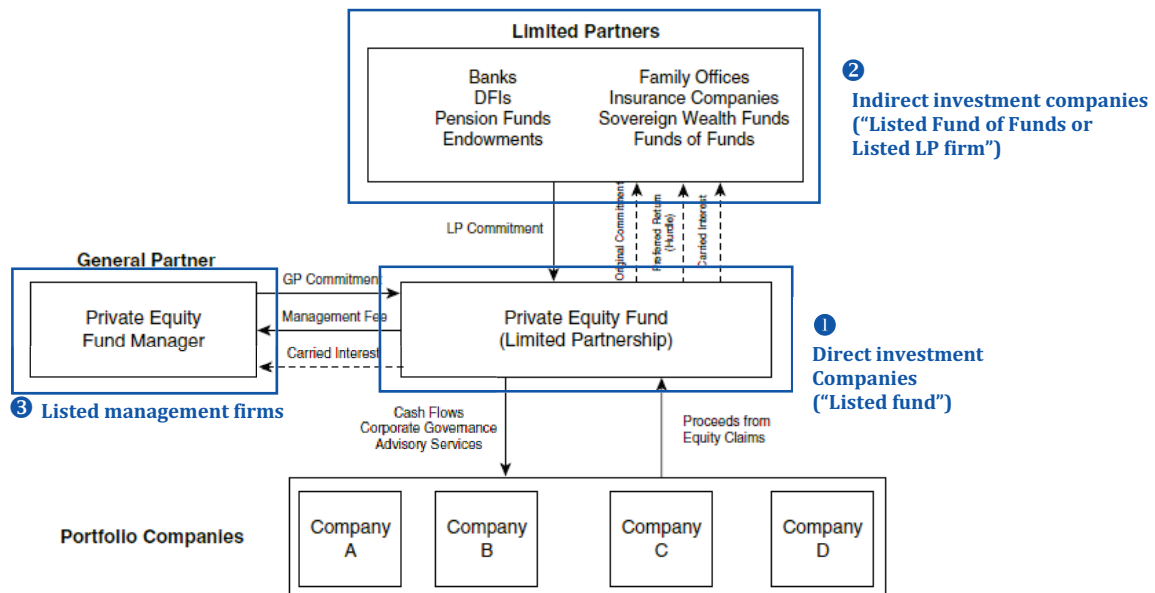
- 9.1. Under the AIFM agreement, the AIFM shall be entitled to the following annual fee:
- 9.1.1. for the period from the First Closing Date to the fifth anniversary of the Final Closing Date, the sum, per annum, of 0.475 per cent. of the Total Subscriptions of the A Shares, 0.575 per cent. of Total Subscriptions of the B Shares, 0.65 per cent. of Total Subscriptions of C Shares and D Shares and 0.75 per cent. of Total Subscriptions of E Shares; and
  - 9.1.2. thereafter, the sum, per annum, of 0.30 per cent. of the Adjusted Net Asset Value, as set out below, of the A Shares, 0.45 per cent. of the Adjusted Net Asset Value of the B Shares 0.55 per cent. of C Shares and D Shares and 0.65 per cent. of the Adjusted Net Asset Value of E Shares provided that, for the purposes of calculating the Management Fee only, the Adjusted Net Asset Values of the A Shares, B Shares, C Shares, D Shares and E Shares shall not exceed the Total Subscriptions in respect of the relevant Class of Shares. The Adjusted Net Asset Value shall in each case be the most recently published Net Asset Value per Share adjusted to exclude therefrom: (1) any current or accrued liability for derivatives or borrowings incurred by the Fund; and (2) any cash at bank and short-term deposits of the Fund.
- 9.2. The Management Fee is payable to the AIFM quarterly in advance and is calculated, where appropriate by reference to the most recently calculated Adjusted Net Asset Value of the Fund attributable to the relevant Share Class at the most recent Valuation Point. The Investment Manager shall be paid by the AIFM out of its fees.

**11. LIFE OF THE FUND**

Unless the life of the Fund is terminated early, the Fund will have a finite life of 15 years from the Final Closing Date following which it will be liquidated. Details of the procedures on the liquidation of the Fund are contained in Part VII.

**Appendix S1.3: LPE listing structures and their exposure levels to the underlying investments**

In a limited liability partnership (LLP), private equity investors or the limited partners (pension funds, university endowments, insurance companies, etc.) commit capital to a fund, raised and managed by the general partners. The general partners source, identify, invest in, monitor and exit the portfolio companies over the fund’s life (usually 10 years). The general partners perceive a management fee (usually 2% of the committed capital), and a performance fee or carried interest (usually 20% of the proceeds from liquidating the fund) which is earned if the managers reach a certain hurdle rate (the investors’ preferred rate of return, usually 8%). Listed private equity refers to publicly-traded investment companies whose activity is to invest in privately-held companies or in traditional private equity funds. We also consider -as listed private equity- GP firms that are traded on stock exchanges. Listed and traditional private equity have the same type of underlying assets (privately held companies) and follow the same business model (finite-life investments). To roughly approximate listed private equity to a typical limited liability partnership, a listed private equity investment vehicle can either take form of (1) a direct investment company (as if a traditional private equity fund were listed), (2) an indirect investment company (as if LPs either took stakes in a traditional private equity fund following a fund-of-fund strategy, or invested directly in private companies), or (3) a listed private equity management firm (GP).



Source: adapted from Leeds (2015)

## Chapter 2

# Is Destiny Worth the Distance? On Private Equity in Emerging Markets<sup>\*</sup>

### Abstract

We study the performance of developed markets (DM)-based private equity firms in emerging markets (EM) compared to EM-based private equity firms. Using a novel dataset and a multilevel linear model specification, our results suggest that DM-based private equity firms either underperform or do not deliver significantly higher returns than EM-based private equity firms using the deal-level PME as a return measure. A significant driver of this underperformance is geographical and cultural distance, controlling for other performance determinants. DM-based private equity firms overcome the geographically-driven performance gap when their teams are culturally proximate. Our results also show that the realized returns are highly dependent on the investment period, the investment style and the GP's experience on each market.

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<sup>\*</sup> This research is joint work with Serge Darolles and Emmanuel Jurczenko and is inspired by a suggestion from Zsuzsanna Fluck. Sara Ain Tommar acknowledges support from the Private Equity and Venture Capital Research Initiative, under the aegis of the Europlace Institute of Finance. All opinions are our own.

We thank Cyril Demaria, Tobias Dieler (Discussant), Edith Ginglinger, Tim Jenckinson, William Megginson, Tamara Nefedova, Per Strömberg, as well as participants from the European FMA Doctoral Student Consortium (Kristiansand, Norway) and the 2<sup>nd</sup> Private Markets Research Conference (Lausanne, Switzerland) for helpful comments and suggestions.

“Much of the growth of venture capital and private equity activity is going to take place in emerging markets”.

*Josh Lerner, The Future of Private Equity, European Financial Management, Vol. 17, Issue 3, pp. 423-435, 2011.*

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## 2.1. Introduction

Recent years have seen steady growth of private equity (PE) investing in emerging markets (EM), attracted by the growing population, the steadily developing middle-class and GDP growth perspectives. In the aftermath of the financial crisis, many of the industry’s giants were tempted by the potential of these markets, where financial markets and banking systems are often not sufficiently developed to meet the needs of local companies, and where capital markets offer more exit opportunities with the growing numbers of IPOs (Lerner, 2016). Largely mediated examples of private equity investing in emerging markets include KKR and Carlyle, who struck multi-million-dollar deals in Africa among other emerging markets destinations. Additionally, according to EMPEA’s LP survey<sup>46</sup>, 75% of limited partners (LPs) with private equity allocation to emerging markets-focused funds declare still eyeing investments in these markets.

Vendor databases and the business press note the growing interest in emerging markets private equity, with mitigated results about their prospected outperformance<sup>47</sup>. Research on private equity in emerging markets has long been challenged by the scarcity of data. Most existing studies use country-level data (e.g. Mexico (Charvel, 2012), India (Gohil, 2014), Brazil (Minardi et al., 2014) with mitigated results on private equity’s performance in these countries. More recent research looks at larger sets of emerging markets economies: Johan and Zhang (2016) study private equity exits in emerging markets and find that the culture and business environment are positively related to exit success. Lerner and Baker (2017) compare return dispersion in developed economies to that of emerging markets and establish that the latter is less volatile.

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<sup>46</sup> 2017 Limited Partners Survey, EMPEA (Emerging Markets Private Equity Association).

<sup>47</sup> See Preqin Special Reports, “Private Equity in Emerging Markets”, July 2017 and Forbes, “Private Equity shifting gears in emerging markets”, April 22, 2014, among others.

In this paper, we contribute to the growing body of literature on emerging markets in general (Karolyi, 2016) and on private equity in particular; using opportunities offered by new data. We contrast and compare the performance of developed markets (DM)-based private equity firms and that of locally-based private equity firms (pure emerging markets players). Specifically, we investigate whether DM-based private equity firms achieve higher returns when they target an emerging country (or group of emerging countries) compared to the local private equity firms (or other regional EM-based firms that invest in the same set of emerging countries). We argue that geographical and cultural distances are important drivers of performance, controlling for a range of potential confounders.

Using the deal-level PME as a performance measure, where the benchmark is the regional MSCI of where the portfolio company is located, our results show that DM-based private equity firms underperform EM-based private equity firms, controlling for a set of firm, fund and deal characteristics and accounting for time and industry fixed effects. This performance gap is further enhanced when the geographical and cultural distances are higher (the farther the EM-based investee companies from the DM-based private equity firms geographically, the worse the performance, and the higher the difference in national values, the worse is performance as well). Our results further suggest that geographically-driven underperformance is compensated when the operating teams are culturally close using language as a proxy for culture (Teo, 2009 and Hau, 2001, among others). We provide evidence that there are significant cultural and geographical effects that shape the investment outcomes of private equity, alongside previously documented performance drivers in the private equity literature. Our results are especially true for the most significant economic sub-period on both markets (i.e. investments made after 2000) and show predictability over time. These results are robust to a correction for possible gaps in deal sequences and to the use of other performance measures.

Our contribution is three-fold. First, we study and compare performance on both markets at the portfolio company level as deal and fee structures vary greatly across geographies. Indeed, as pointed out by Braun et al. (2016, 2017), “uncovering underlying investments rather than looking at the funds is a substantial advantage when studying private equity performance”. Second, our study is large scale. Private equity is a dynamic asset class in a naturally growing global

investment universe. Therefore, comparing realized returns across a large set of emerging countries provides insights into how differences are shaped in the structuring of a private equity fund and within the backing channel<sup>48</sup>. Third, we contribute to the nascent body of literature on emerging markets with opportunities offered by new data and through a new lens. We uncover the drivers of performance outcomes using proximity in its broader sense, and direction of fund flows indicators. We argue that even though private markets grow more global, and even within seemingly homogenous economic groups, geographical and cultural differences may have a role in shaping business relationships and in encouraging investment flows from a country to another. Moreover, we argue that beyond the convenience of geographical proximity, the cultural proximity – measured at both the national and the individual levels – may further accentuate this effect. This view further extends the one in Johan and Zhang (2016) by contributing to the conclusions drawn on the effect of institutional quality at the country level on achieving better exits. We examine culture and geography as ex-ante investment determinants from observing realized returns ex-post, controlling for possible performance differentials confounders. We also regard emerging markets as a given diversified portfolio for investors, where country and deal attributes vary greatly within seemingly homogenous regions. As discussed earlier, seemingly homogenous investment universes vary greatly in local cultural dimensions, which might offer diversification benefits combined to geography. Nevertheless, the risks associated with investment in new markets require knowledge and experience from the GP, which we identify both at the private equity firm level and the individual managers level. Indeed, firms that have been established longer are prone to be more experienced, therefore exhibiting possible superior business knowledge than relatively younger firms. Likewise, firms with managers that are natives of the target countries or have previous links to emerging markets (through education or work for example) can also be expected to have a competitive advantage when they target a country that is known in such ways to their managers.

Our data is unique in that we combine various datasets on private equity investment performance and augment them with cultural and geographical data. We source all deals on

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<sup>48</sup> By *backing channel* we mean the trajectory of capital from the GP to the target portfolio company. Our approach allows us to track the investors of private equity-backed companies in emerging markets and identify the funds that served as vehicles for such investments.

companies that are established in emerging markets mainly from Preqin and Pitchbook databases and merge the resulting sample with additional deal data from Capital IQ transactions database and Bureau van Dijk's Zephyr. We complement with data on funds and the managing GPs using the same sources and additional information from Bureau van Dijk's Orbis and Thomson Financials. The identification strategy for culture uses a country-level metric (Schwartz's cultural dimensions) and managers' name resonance to establish a cultural proximity measure using language. We collect data on managers primarily from Capital IQ Professionals database through WRDS, along with data available on fund management teams in Pitchbook. All in all, our final sample comprises 5,035 EM-based portfolio companies, invested between 1990 and 2010, and fully exited up to 2016, by 780 DM-based GPs (through 1,879 funds) and 503 EM-based GPs (through 1,874 funds). The data span 26 target emerging economies with capital flows from 23 developed countries.

We use a multilevel linear model approach to account for this hierarchy in our data structure (i.e. GPs investing in companies that are nested in different countries) and to separate each level's effect on performance; in a top down approach: GP effects, country effects and portfolio company effects<sup>49</sup>. We categorize the GP's and portfolio companies' countries geographically as local, nearby or distant depending on whether the GP and portfolio company countries are the same, do, or do not share a maritime or land border respectively. We textually process the profiles of investment individuals and cross-interact them with country-level cultural and geographical dimensions to uncover effects of closer (respectively more distant) teams culturally on farther (respectively closer) investments geographically. We also test whether previous geographical concentration of the GP prior to the follow-on investments affects the outcome of those investments, using a Hirschman-Herfindahl measure of geographical allocation of capital across countries.

The rest of the paper is organized as follows: section 2 provides the background of our study and discusses the literature, section 3 describes the data and methodology of our study and provides

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<sup>49</sup> This approach is validated by looking at the variance decomposition of private equity returns, showing heterogeneity across levels.



summary statistics from our sample. Empirical findings are provided in section 4 and section 5 concludes.

## 2.2. Background

### 2.2.1. Emerging markets and Private Equity performance

The term *emerging market* was first mentioned by Dutch economist Antoine W. Van Agtmael in 1981 and was picked up since to loosely designate a “country with low income per capita and high expected economic growth”. There are no official listings of emerging economies, but investment professionals usually refer to one of the following five listings: the international monetary fund (23 countries), Morgan Stanley Capital International (23 countries), the Dow Jones (22 countries), Standard and Poor’s (21 countries), and Russel (also 21 countries).

The recent years witnessed a growing interest in emerging markets in an attempt to leverage on their growth perspectives in a highly matured developed economy. However, the risks associated with those markets on the one hand, and the needed adjustment effort from foreign GPs on the other hand<sup>50</sup>, lead to mitigated investment experiences and mixed conclusions among investors on how emerging markets are truly a valuable investment opportunity<sup>51</sup>. In the literature, issues related to scarcity and quality of data often held back the development of this yet interesting research field, with most studies often restricted to single-country level studies (Charvel, 2012, Gohil, 2014, Minardi et al., 2014 among others). Recent efforts initiated larger-scale studies (Johan and Zhang, 2016, Lerner and Becker, 2017), offered by new data opportunities. This paper is in the continuum of this nascent literature and takes advantage of the granularity of our newly structured dataset to disentangle GP, country and deal characteristics effects on private equity performance.

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<sup>50</sup> E.g. KKR stepped out of the African market when they failed to source sufficiently sizeable deals. The Carlyle Group, historically a buyout firm, shifted to growth strategies and minority positions in some of emerging markets’ most conservative, family-dominated countries.

<sup>51</sup> See for example the Financial Times’ November 6<sup>th</sup>, 2017 article: *Private Equity turns to Asia’s frontier market for growth* (Visited December 20<sup>th</sup>, 2017)

## **2.2.2. Geography, Culture, and Private Equity performance**

### **2.2.2.1. Investment performance and geographical influences**

There is a grown body of literature on distance and investment performance in the asset management literature. Coval and Moskowitz (2001) show that mutual fund managers earn higher returns from nearby investments compared to distant investments. Investors also prefer geographically proximate investments and overweigh domestic holdings in their portfolios (Coval and Moskowitz, 1999). In equity analysis, Malloy (2005) shows that US equity analysts are better at earnings forecasts for nearby firms than for distant firms. Instances of geographical preferences in the field of private equity are documented in Chen et al. (2010), where the authors show increased geographical concentration of VC investors and VC-backed portfolio companies in three major US cities, and where VC investments outperform where VC firms are in VC centers. The scopes of such studies increased both in terms of geographical focus and country coverage. Using Korean data, Choe et al. (2005) show that local investors outperform foreign investors in trading local stocks. In Germany, local traders have an edge over foreign traders (Hau, 2001). Following the findings of Malloy (2005) in the US market, Bae et al. (2008) show that local analysts issue better earnings forecasts than geographically distant analysts, with data on 32 countries. An interesting side-result is that the observed effect is stronger for emerging markets, where they argue firms are highly opaque and disclose less information. In the hedge fund literature, Teo (2009) documents significant outperformance of hedge funds which are geographically proximate to their investments.

Besides differences induced by geographical effects, the literature has also documented cultural influences on investment performance.

### **2.2.2.2. Investment performance and cultural influences**

Countries have been shown to significantly impact investment and doing business in the seminal papers of Shleifer and Vishny (1997) and La Porta et al. (1997, 2012), depending on factors such as the legal origin or the level of investor protection. Subsequent literature has shown that these values are shaped by cultural dimensions (Licht, Goldschmidt, and Schwartz, 2005, 2007).

As culture is a complex and a multi-dimensional construct, researchers often rely on models and scores developed in sociology to gauge the complexity of cultural values. Research papers often use four cultural models, Hofstede's (2001) dimensions, Schwartz's (1994) cultural model, The World Value Survey and The Global Leadership & Organizational Behavior Effectiveness (GLOBE) study (House et al. 2004). Language as a driver for cultural values has also been used in the literature: traders from outside Germany in non-speaking German cities underperform traders located in Germany and in financial centers such as Frankfurt (Hau, 2005). Teo (2009) also documents that hedge funds with native speaking managers in the Asian market overperform. Following this literature, we use language at the individual level as a proxy for cultural proximity within the investment teams of the GPs, and rely on Schwartz's cultural dimensions for cultural values at the country level (Ng et al. 2006).

## **2.3. Data and Methodology**

### **2.3.1. Data and variable definitions**

To assess performance differentials between emerging markets private equity and developed markets private equity, we focus on GPs with investment experience on both markets (treatment group) and study their performance determinants relative to GPs with observed investment histories in emerging markets alone (control group). To this end, we start by geographically grouping the GPs and the portfolio companies based on their respective headquarters location. To classify countries as either a developed or emerging market, we source the previously cited EM listings dynamically over time and cross-reference them with the World Bank's Income

Groups (i.e. economic regions) to account for the most common criteria of each EM listing. We consider only the World Bank sovereign member countries (189 out of 196 currently).

As we conjecture about cultural proximity being a driver of private equity performance in emerging markets, we give special care to within-country cultural differences and assign GPs and portfolio companies geographically by city when applicable<sup>52</sup> and where the amount of invested capital is significant. Next, we establish a *deal direction* and an *investment direction*. The deal direction takes the values DMtoDM, DMtoEM, EMtoDM and EMtoEM following the regional location of the origin of capital (GP) and the destination of capital (portfolio company). Next, we aggregate the deal directions by GP to establish an investment direction, which takes the values DMtoDM, DMtoDM&EM, and DMtoEM. The investment direction depends on observed instances of one or multiple deal directions for each GP. We note the treatment group DMtoDM&EM (i.e. DM-based GPs with observable investment history in both DM and EM), and the control groups respectively DMtoDM (i.e. DM-based GPs with observable investment history in DM only) and EMtoEM (i.e. EM-based GPs with observable investment history is EM only). Cases where EM-based GPs invest exclusively in developed markets (EMtoDM), or those headquartered in DM with observed investments in EM only (DMtoEM) are excluded from the analysis because of their small sizes (11 DM-based GPs with less than 10 million dollars invested in EM over the sample period, and 6 EM-based GPs with an aggregated 7 million dollars investments in DM). Figure 2.1 provides a visual for our sample structure by deal and investment directions.

[ *Figure 2.1 about here* ]

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<sup>52</sup> In developed markets, examples include English- vs. French-speaking Canada, or Wallonia and Flanders in Belgium. In emerging markets, an example is India, where Hindi and English are both considered official languages (as stated by the Official Languages Act, 1963 – amended 1987, viewed on the Indian Ministry of Electronics and Information Technology.)

These groupings allow us to assess whether performance differentials pertain to GP characteristics -in which case significant effects would be noted in the cross-section of GPs between the treatment group and the control groups- or to portfolio company, country and/or region characteristics. In the latter case, significant performance differentials would be observed in the cross-section of investments within the treatment group, controlling for GP, country, and company characteristics. In this paper, we only focus on two groups of private equity firms: EM-based private equity managers (i.e. Local or regional emerging markets investors), and DM-based private equity firms with investment histories in both developed and emerging markets.

Our data is unique in that we combine various datasets on private equity investment performance and augment them with cultural and geographical data. We source all deals on companies that are established in emerging markets mainly from Preqin and Pitchbook databases and merge the resulting sample with additional deal data from Capital IQ transactions database and Bureau van Dijk's Zephyr. We complement with data on funds and the managing GPs using the same sources and additional information from Bureau van Dijk's Orbis and Thomson Financials. The identification strategy for culture uses a country-level metric (Schwartz's cultural dimensions) and managers' name resonance to establish a cultural proximity measure using language. We collect data on managers primarily from Capital IQ Professionals database through WRDS, along with data available on fund management teams in Pitchbook.

With regards to investment determinants, we conjecture whether proximity plays a role in targeting these markets. We use two measures for proximity: geographical proximity and cultural proximity. Geographical proximity is measured using a category variable on whether the GP is local, nearby or distant to/from their investment, following common land or maritime borders shared by the headquarter countries of the GP and the portfolio company. Cultural proximity is proxied in linguistic and reference model terms. Using language<sup>53</sup>, we look for target-investment-country language speakers within the investment teams of the GP at the time of the deal. On the target country side, we collect information on locally spoken languages from the

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<sup>53</sup> Language and culture are embedded in the history of countries and would take considerable amounts of time in order to change, which works against endogeneity.

World Fact Book<sup>54</sup>. An interesting feature of these data is that it provides the *lingua franca* and the *commonly understood* languages for each country alongside the official languages. On the GP side, we start by looking for investment professionals with the “deal makers” tag in the universe of Capital IQ’s People Intelligence Database and we name-match the companies in their employment histories to our list of GP firms, accounting for name changes, AKAs, FKAs<sup>55</sup> and M&A events. We also cross-reference the obtained list of GP investment professionals to their available biographies from Pitchbook<sup>56</sup> and professional social networks such as LinkedIn. We assess the probability for an investment professional to speak the language of the target country at two levels: the name level and the biography level. Using names, we use a language identification API to textually process the names of the investment professionals and assess their *resonance* to establish native languages. Using biographies, we consider that the investment professionals speak the languages of where every company in their employment history is located as well as their schools’ locations. The People Intelligence database also gives the employment start dates and end dates. When available, we cross-reference these dates to the deal making (exit) window at the portfolio company level to assess how the presence of a language-proficient team member within the GP investment teams can close a possible cultural gap in the deal making (exit) process.

We use three measures to assess the intensity of cultural proximity at the GP level. A dummy variable for whether there is a language proficient speaker among the teams of the GP at the time of the deal. A level variable for the number of language proficient speakers in the GP’s investment teams (normalized), and a concentration variable using a Hirschman-Herfindahl ratio (i.e. the number of language proficient team members relative to the investment team size). Appendix 1 provides a detailed review of all used variables and table 8 shows the correlations between the GP-level characteristics, the country-level characteristics and the portfolio company-level characteristics.

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<sup>54</sup> <https://www.cia.gov/library/publications/the-world-factbook/fields/2098.html>, visited on June 6<sup>th</sup>, 2017.

<sup>55</sup> « Also Known As » and « Frequently Known As » names.

<sup>56</sup> Pitchbook lists the investment professionals at the fund level. Given our data structure we are able to identify them to the GPs and deals respectively.

Using a reference cultural model, we base our analysis on Schwartz's (1994, 2004) cultural dimensions and we focus on values which are more likely to reflect institutional quality: embeddedness, hierarchy, mastery and intellectual intelligence. Definitions of these cultural dimensions are given in appendix 1 and their scores are available for 80 countries<sup>57</sup>. We use the difference of these scores between the country where the GP is located and the country of the portfolio company as independent variables at the country level. We measure performance using the deal-level PME.

As highlighted before, we investigate whether private equity returns in emerging markets are substantially different from those in developed markets, across the two groups of GPs that invest in EM and within the same group of GPs that have investment experience on both markets. To assess whether DM- based GP deliver higher performances following investment in emerging markets, we estimate a multilevel linear model of our return measures against GP, country, and portfolio company level characteristics respectively, augmented by performance drivers and investment determinants variables used in the literature. Appendix 2.1. provides a description of the used variables.

### 2.3.2. Descriptive statistics

Our data span investments in both developed and emerging countries since 1930. To focus on the most significant period, we restrict the sample to investments starting from 1980 (years in which private equity institutionalized in developed markets) to 2010; and exited up to 2016<sup>58</sup>. Although allocation of private equity to emerging markets accounts for only 10% of global allocated capital in dollar value during our sample period<sup>59</sup>, developed markets PE contributes by as much as 59%

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<sup>57</sup><https://www.researchgate.net/publication/304715744> The 7 Schwartz cultural value orientation scores for 80 countries, visited on February 3<sup>rd</sup>, 2018.

<sup>58</sup> In our data, the maximum time to exit an investment on both markets averages 6 years (5,8 in median terms). Our investment period is then 1980-2010 and our performance measurement period is 1986-2016.

<sup>59</sup> Accounting for all investment styles. On average, for illustrative purposes, 7% is allocated to VC funds and 6% to buyout funds in emerging markets across our sample period.

to the capital invested in these markets. That is, local GPs contribute to less than half private equity deals in their local markets.

We clearly identify each private equity deal to each company it involves, the relevant fund's and GP's names and characteristics and the types of their LPs. While 68% of funds in developed markets are organized into independent private partnerships in our sample, emerging markets funds are structured this way in only 44% of the cases, and about equally into structures financed by DFIs. Both occurrences are observed for foreign private equity investing in these markets with structures being 57% independent private partnerships and 23% being backed by DFIs.

Table 2.1. shows the growth patterns of private equity investment in emerging markets. Table 2.1.a. shows that emerging markets private equity boomed in the early 2000's, boosted by contribution from DM-based GPs. The investment trends highlight a size effect, by which DM-based GPs target fewer deals with higher valuations, while local private equity finances more deals with smaller capital allocations.

[ *Table 2.1. about here* ]

Panel A of table 2.1.b. shows the average and median returns of private equity investments by style and GP groups. Almost all average and median GPs invested in both markets outperform pure local GPs on almost all styles and across different return measures. As highlighted panel B, DM-based GPs take longer to invest in a portfolio company and have higher holding periods than the average or typical local GP. Consistent with the trends of emerging markets investments, DM-based GP's funds are larger in size. Also, DM-based GPs finance relatively younger emerging markets companies than local GPs, and exhibit similar exit styles as shown in panel C (41% of exits for DM-based GPs are via IPO, compared to 49% for local GPs).



Looking at the return distributions as well as the intensity of deal sequences on both markets in figures 2.2. and 2.3. shows that the returns for both investor groups follow relatively similar distributions, while the investment activity following the deal sequences exhibits similar trends.

[ Figures 2.2. and 2.3. about here ]

### 2.3.3. A Multilevel linear model

Motivations for using a multilevel linear model is simultaneously driven by the structure of the data and the nature of our study. First, our data is multilevel. The total sample contains 70,696 portfolio companies are nested in 165 countries which are either developed or emerging and are differently “proximate” to 11,807 GPs, for up to 50 years. To separate within-country and across-country effects of GP-level variables on GP performance, we use the following multilevel linear model specification:

$$y_{ijkt} = \alpha_{jk} + \mathbf{x}'_{it} \boldsymbol{\beta} + \varepsilon_{ijkt}$$

$$\alpha_{jk} = \mathbf{v}_k + \mathbf{w}'_j \boldsymbol{\gamma} + u_{jk}$$

$$\mathbf{v}_k = \mathbf{z}'_k \boldsymbol{\gamma} + \eta_k$$

Where  $y_{ijkt}$  is the deal-level performance measure of GP  $i$  in country  $j$  and company  $k$  at time  $t$ ,  $\mathbf{x}_{it}$  is a vector of GP-level characteristics,  $\alpha_{jk}$  is a country-level intercept term,  $\mathbf{w}_j$  is a vector of country-level characteristics including distance measures,  $\mathbf{v}_k$  is a company-level intercept term and  $\mathbf{z}_k$  is a vector if company characteristics. The portfolio companies within countries represent the base-level observations, the countries and the GPs the upper-levels observations. The multilevel linear model approach is validated by looking at the explained variance in returns by level for the studied GP groups, as shown in table 2.3.

[ Table 2.3. about here ]

A multilevel linear model specification comes with a number of advantages. First, we are able to capture the GP-level (within country) relation between  $x_{ijkt}$  and performance in  $\beta$  by removing the country means of performance measures from all GP-level observations in  $x_{ijkt}$ . We include these means alongside the country-level variables to capture the country-level relation between  $w_j$  and the country intercept term  $\alpha_j$  in  $\gamma$ . We proceed the same way for portfolio companies by averaging their relevant variables by industry at the country level. Emerging markets are not a homogenous group and an EM region is often regarded as an already set diversified portfolio by investors (e.g. same continent countries such as Russia and China are not regarded the same although both Asian). By decomposing the GP-level variables in  $x_{ijt}$  into country means of returns and deviations from these means across GPs, then adding these means to the country characteristics in  $w_j$ , we can cleanly separate the within-country and across-country effects at the GP level (Bell and Jones, 2015). Furthermore, multilevel linear models correct for false positives in coefficient significance induced by pooled OLS. Indeed, varying sample sizes of GP investments across countries may falsely weigh in coefficients at the country level simply because of higher observation numbers, whereas multilevel linear models weigh in the coefficients by the precision of the sample observations at each level, which is for example inversely related to the invested portfolio size within a country for the GP-level. Multilevel linear models are also better in correctly estimating and better interpreting the interaction terms when using mean-centered independent variables (Aiken et al., 1991). Table 2.4. provides the correlation matrix for GP-, country- and company-level characteristics and the level means.

[ Table 2.4. about here ]

## 2.4. Findings

In this section, we discuss the results of our estimation analysis with regards to investment destination and the possible effects of geographical and cultural proximity on private equity returns.

### 2.4.1. The geography of private equity performance

We estimate our multilevel linear model and show the results in table 2.5.

[ Table 2.5. about here ]

Accounting for all GP, country and portfolio company characteristics, our results show that DM-based GPs underperform EM-based GPs on the deal-level PME (42 cents loss for every dollar invested relative to the public benchmark). The positive sign on the affiliation variable suggests that connected GPs mitigate information asymmetry from investing in new markets, which translates into better returns. Consistent with this story, longer investment speed (time to invest) and holding periods (time to exit) deliver significantly higher performances. Unlike developed markets, where higher capital inflows drive up deal valuations resulting in lower performances (i.e. *the money chasing hypothesis* – Gompers and Lerner, 2000), higher capital inflows into emerging markets do not reflect negatively on the realized returns. A log dollar increase in fund inflows to emerging markets results in a positive and significant 0.03 higher PME compared to the public benchmark of where the portfolio company is located. Furthermore, consistent with the literature on geography and investment performance, closer locations are associated with better returns, while the national culture measures do not matter relative to investments by EM-based GPs.

### **2.4.1.1. Are there any crossed geographical and cultural effects between the GPs and the investment countries?**

We introduce two interaction terms at the country level of GP characteristics. The first term is the Hirschman-Herfindahl measure for the GP's geographical concentration in an emerging country, in terms of invested capital. This measure is considered high (respectively low) when the GP's capital allocation to companies in a considered country exceeds (respectively falls below) 50% of all relevant funds' size. The second term is the cultural proximity of individuals within the investment teams of the GP. We use three measures for individual cultural proximity: (i) a dummy variable for whether the GP's investment teams count one or more speakers of the target country's language, (ii) a level variable for the number of language-proficient individuals within the private equity firm, and (iii) a concentration measure of language-proficient individuals in the investment teams of the GPs, normalized by the average team size.

We interact those variables respectively with the geographical measure at the country level; and investigate how higher previous geographical concentration of the GP interacts with a follow-on investment in the same geography, and how culturally proximate individuals within the GP's investment team may close possible gaps occasioned by geographically distant investments. Results are given in table 2.6.

[ *Table 2.6. about here* ]

With regards to pure geographical interaction terms, investing in nearby countries with previous high GP presence results in positive and significant effects on performance. The opposite effect (low concentration in follow-on nearby invested countries) is reversely negative and significant, highlighting a possible shortfall from missing investment opportunities in nearby emerging markets destinations. In distant investment locations, overweighing capital allocation while

being previously heavily invested in those locations results in significantly negative returns for foreign GPs investing in emerging markets, unlike EM-based GPs.

Simultaneous cultural and geographical distance, having culturally closer investment teams in distant investment destinations positively and significantly reflects in realized returns and particularly closes the gap from investing in new and farther destinations for DM-based GPs.

#### **2.4.1.2. Does change in investment style when targeting emerging markets affect performance?**

Given the previously highlighted cultural differences between countries, DM-based GPs may deviate from their historically observed investment style to be closer in style to the target country. We use a style shift measure that is equal to one if the DM-GP's investment style in the target emerging country is the least observed style to their historical DM investments. Table 2.7. shows that there is no evidence of style shifting on deal-level PME, which rules out the adaptation story.

*[ Table 2.7. about here ]*

### **2.4.2. The geography of private equity performance and return predictability**

In this section, we examine whether success on a previous deal in an emerging markets conditions success in the follow-on deals. As this is often studied in the private equity literature as *persistence*, we are careful not to use this terminology as our data may not contain the full sequence of private equity deals for a given GP in a geography. Therefore, we analyze the performance of observed deal sequences in our dataset (sorted by investment dates, controlling for relevant fund vintages), and use the switch from a market to another in the DMtoDM&EM GP subgroup as robustness.

Table 2.8. shows the estimation results of the deal-level PME returns on the lagged deal-level PME returns by GP group. The results point out a significant positive relation between the previous deal return and the follow-on deal return for both GP groups in emerging markets. Assuming a causal relation, for DM-based GPs investing in emerging markets, a 1% higher return on the previous deal (relative to the public benchmark) is associated with 0.25 increase in the following deal, controlling for GP-, country- and company-level characteristics. The effect is significantly higher for EM-based GPs (0.75 higher return on the next deal for a 1% increase in the previous deal return).

[ Table 2.8. about here ]

As pointed out earlier, because we may not have the full sequence of deals for each GP, we back the results using the DMtoDM&EM GP subsample. One reason why GPs list on databases is to generate deal flow, which is often associated with tendency to list only successful deals and funds on commercial databases for investors to see. We argue however that there is a little chance for GPs to list deals with attention paid to how subsequent (or previous) deals on different markets

compare. To this end, we rearrange the deal order by GP in the DMtoDM&EM group by sequence within a fund in a market and we keep the deal associated with the first observed investment date. A fund is considered EM or DM-focused based on the highest frequency observed for either EM or DM within its portfolio companies' locations. We focus on first investments as they may reflect for either EMs or DMs a pressure to spend capital (Arcot et al., 2014). Then, we sort the funds on their vintage years in the fund family of each GP. We assign a sequence number for first investments as shown in figure 2.4.

[ *Figure 2.4. about here* ]

We re-run the regressions using these new sequences and find consistent results as shown in table 2.9.

[ *Table 2.9. about here* ]

## **2.5. Conclusion**

This paper investigates the performance of private equity investing in emerging markets. Using a uniquely structured dataset, we show that cultural and geographical effects shape the investment directions of private equity capital flows into emerging markets, alongside previously documented performance drivers in the private equity literature. This effect is especially true for GPs investing in both markets compared to pure EM-players. Our results show predictability in returns along deal sequences on both markets. Cross-cultural and geographical effects are enhanced at the individual level for DM-based GPs, who catch up on low performance when investment teams are culturally close using language speakers as an indicator for cultural values.



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## 2.7. Tables and figures

### Appendix 2.1: Variable definition

<b>Variable</b>	<b>Definition</b>
<b>Performance</b>	
Deal-level PME	Tailored public market equivalent calculated at the deal level using regional MSCI indices of where the GP is located (North America, Europe, Asia, Pacific and Emerging Markets).
<b>GP-level Characteristics</b>	
Size	Log of each deal's relevant fund size.
Local Affiliation	Indicator variable for whether the GP is affiliated with a local private equity organization (professional association or network of professionals).
GP Direct Investment	Indicator variable for whether the deal is a direct investment by the GP.
Co-investment	Indicator variable for whether the GP offered the deal for co-investment with the LP.
Pre-EM Experience	Number of deals in the GP track-record prior to its first EM investment date.
Time to Exit	The difference between the company's exit date and its investment date.
Time to Invest	The difference between the company's investment date and the relevant fund's first capital call date.
<b>Country-level Characteristics</b>	
Capital Inflow	Log of total capital allocated to private equity funds during the vintage year of each deal's relevant fund by country.
<b>Geographical Distance</b>	
Local	Indicator variable for whether the GP's HQ country and the invested company's HQ country are the same.
Nearby	Indicator variable for whether the GP's HQ country and the invested company's HQ country share a land or a maritime border.
Distant	Indicator variable for whether the GP's HQ country and the invested company's HQ country do not share a land or a maritime border.

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*Cultural Distance using Schwartz's Cultural model, with scores available for 80 countries from Shalom H Schwartz's website*

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Embeddedness	Sustaining the social order, of avoiding change and retaining tradition. Our variable is the embeddedness distance, measured as the difference between the Embeddedness scores of the GP's and company's respective HQ countries.
Mastery	Success through individual personal action (as opposed to group action). Our variable is the mastery distance, measured as the difference between the mastery scores of the GP's and company's respective HQ countries.
Hierarchy	Existence of clear social order, with people in superior positions and others in inferior positions. Our variable is the hierarchy distance, measured as the difference between the hierarchy scores of the GP's and company's respective HQ countries.
Intellectual Autonomy	Independence and openness of ideas and thoughts (individual, political, etc.) Our variable is the intellectual autonomy distance, measured as the difference between the intellectual autonomy scores of the GP's and company's respective HQ countries.

**Company-level Characteristics**

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First Time Deal	Indicator variable for whether the company has never been previously PE-backed
VC Dummy	Indicator variable for whether the deal is Venture Capital
Age	Log of company age at financing in years
Invested Capital	Log of invested capital in deal
Deal Sequence	The Sequence of the deal in the GP fund program
Club Deal Dummy	Indicator variable for whether the deal is invested by more than one PE firm

**Other variables**

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Style Shift	Indicator variable for whether the company's investment style characteristics (e.g. VC vs. Buyout, minority stake vs. majority stake, etc.) are the least observed deal structure characteristics compared the GP's historical deals.
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*GP-level geographical proximity measures*

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HH GP Geo Concentration	Hirschman-Herfindahl measure for a GP's geographical concentration in a country relative to other countries in the same group (EM or DM), in terms of total allocated private equity capital. The measure is considered High (respectively Low) when the GP capital allocation to companies in the considered country exceeds (respectively falls below) 50% of the fund size through which investments were made.
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*GP-level cultural*

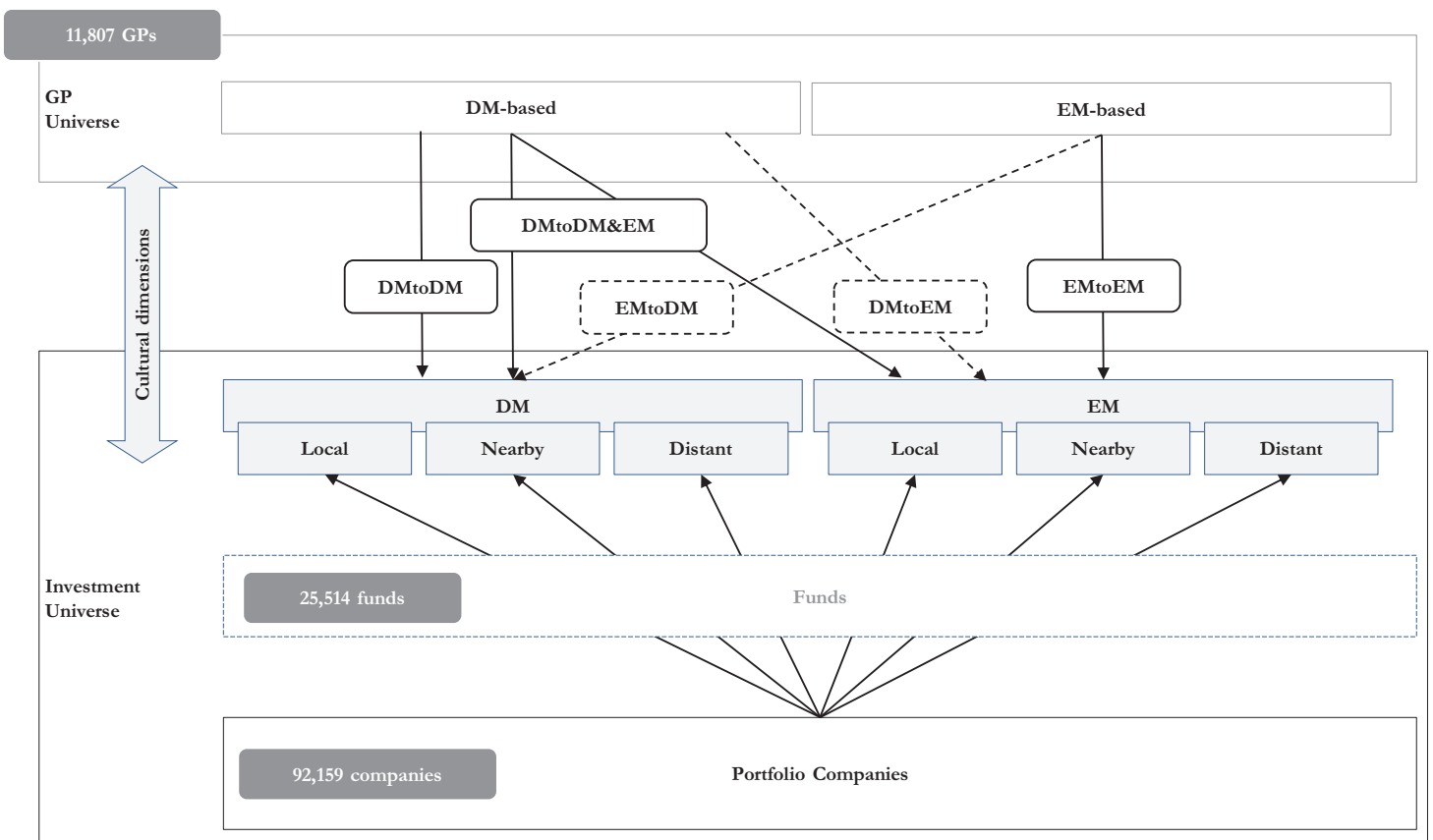
*proximity measures*

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Language Speakers Dummy	Indicator variable for whether the GP has an investment professional who speaks the language of the target company's country at the time of the deal.
Language Speakers	Number of investment professionals in the investment teams of the GP at the time of the deal.
HH Language Speakers	Hirschman-Herfindahl measure for culturally proximate professionals within the investment team of the GP at the time of the deal.

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**Figure 2.1.: Total Sample Structure.** The figure shows the structure of our sample groups following investment and deal directions, and nesting properties by geography and culture. GPs and companies are either DM-based or EM-based following their respective headquarters locations. Following this classification, we first establish a *deal direction*, from the GP to the Portfolio company: DMtoDM, DMtoEM, EMtoDM and EMtoEM. We further aggregate the deal directions by GP to establish an *investment direction*, that is groups of GPs who either invest in DMs only, in EMs only, or in both (solid-line groups in the figure). We have instances of DM-based GPs investing solely in EMs and of EM-based GPs investing solely in DMs (dashed-line groups), but we do not consider those as they are negligible in number and in the value of invested capital. Our distance measure is twofold: a geographical distance and a cultural distance. See Appendix 2.1 for distance variable definitions. The two focus groups of this study are the groups that have emerging markets investment history – i.e. (1) the subgroup of DMtoDM&EM who invest in EM and (2) pure emerging markets players (EMtoEM).





**Table 2.1.a.: Summary Statistics – Number of deals and amounts invested by Investment year and Investment Direction.** The Investment Direction describes the GP investment flow based on where the GP and the target company are headquartered respectively. DMtoEM refers to investments by DM-based GPs in EM-based companies. EMtoEM designates investments by EM-based GPs in EM-based companies.

Investment year	DMtoEM		EMtoEM	
	Number of deals	Invested capital – M\$	Number of deals	Invested capital – M\$
Pre-1990	318	231.9	18	5.3
1990	55	70.3	12	11.2
1991	10	62.1	23	12.4
1992	22	61.5	43	11.4
1993	36	405.2	50	29.5
1994	65	184.5	84	42.4
1995	116	572.8	107	38.0
1996	258	1 421.6	172	102.2
1997	229	1 040.5	174	140.9
1998	234	2 645.4	248	508.2
1999	348	5 837.3	597	603.9
2000	760	5 929.1	1 779	2 165.8
2001	459	7 620.0	820	1 431.0
2002	255	3 613.1	577	943.4
2003	340	3 682.9	712	974.6
2004	390	2 376.9	730	3 368.5
2005	505	2 429.7	797	1 617.3
2006	718	7 670.8	905	6 314.7
2007	887	7 651.3	1 243	4 612.1
2008	812	12 504.5	1 303	4 956.9
2009	223	2 882.4	486	2 073.6
2010	512	8 445.3	1 001	4 506.4
2011	291	4 774.2	529	3 550.4
2012	209	3 666.5	288	2 125.0
2013	124	1 706.6	153	917.4
2014	106	1 908.5	126	1 055.2
2015	76	2 865.1	86	1 146.6
2016	34	296.6	35	500.5
<b>Total</b>	<b>8 392</b>	<b>92 495.1</b>	<b>13 098</b>	<b>43 764.8</b>

**Table 2.1.b.: Summary Statistics – Continued**

**Panel A: Average and Median Returns by Investment Style and Investment Direction.** Only the fully exited investments are considered. DMtoEM is the subgroup of DM-based GPs with investment history in both developed and emerging markets, that invest in EMs. EMtoEM is the group of EM-based GPs who invest in EM alone. Deal PME is the multiple of invested capital at the deal level relative to what would have delivered the same investment in the regional MSCI of where the company is located, for the same holding period. The last three columns provide the t-test for differences in means and the Mann-Whitney-Wilcoxon test for the differences in medians on Deal-level PME between the two groups.

Style		Deal PME		Test for differences in means and medians		
		DMtoEM	EMtoEM	Difference in means	t-statistic (means)	p-values
				Difference in medians	z-statistic (medians)	
Buyout	Mean	1.64	1.32	0.32***	-4.112	0.0000
	Median	0.83	0.84	-0.01	-0.807	0.6501
Venture Capital	Mean	1.51	1.44	0.07**	-2.146	0.0318
	Median	0.85	0.62	0.23***	-18.21	0.0000
Fund of Funds	Mean	1.48	1.23	0.25	-1.828	0.0700
	Median	1.11	1.27	-0.16	-0.656	0.5116
Generalist Private Equity	Mean	1.73	1.42	0.31***	-4.032	0.0001
	Median	0.90	0.57	0.33***	-9.935	0.0000
Mezzanine	Mean	1.62	1.96	-0.29	1.262	0.2089
	Median	0.93	0.93	~0	1.067	0.2861
Other Private Equity	Mean	0.95	0.81	0.14	-0.480	0.6327
	Median	0.79	0.59	0.2	-0.445	0.6560
<b>Total</b>	<b>Mean</b>	<b>1.57</b>	<b>1.43</b>	<b>0.14***</b>	<b>-5.092</b>	<b>0.0000</b>
	<b>Median</b>	<b>0.86</b>	<b>0.64</b>	<b>0.22***</b>	<b>-22.103</b>	<b>0.0000</b>

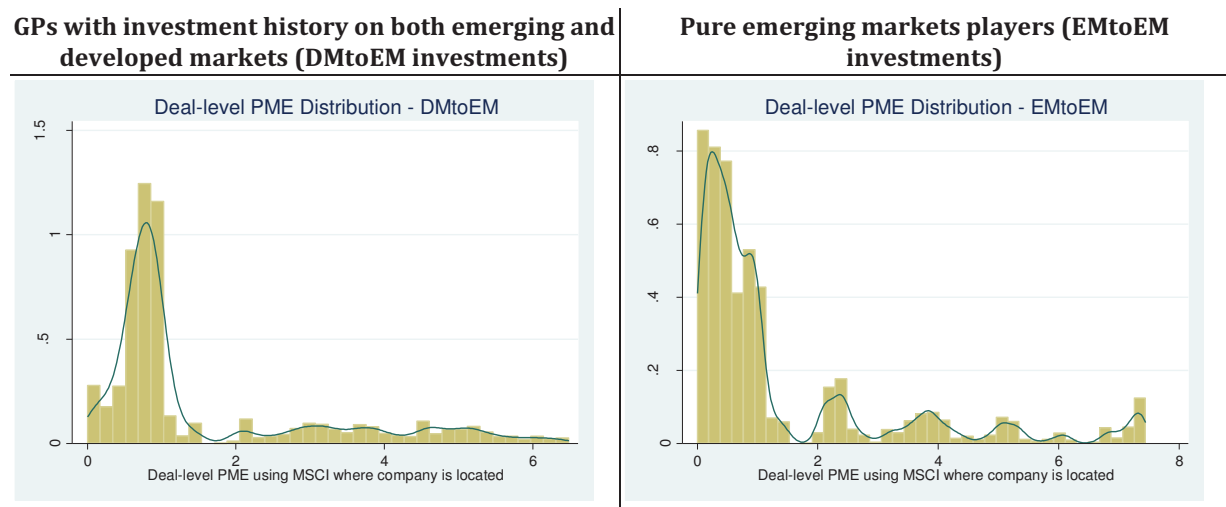
**Panel B – Median investment characteristics by style and Deal Direction.** Fund size (in \$M), portfolio size (number of portfolio companies), age of companies at financing (in years), investment speed (time in years between fund inception and first investment) and holding period (time in years between company investment and exit dates) by Investment Direction and Deal Direction. This table shows sample average fund size, average portfolio size and average portfolio company age at financing by investment style, investment direction and deal direction. Variable definitions are detailed in appendix 1.

<b>Investment Style</b>		<b>DMtoEM</b>	<b>EMtoEM</b>
Buyout	Fund Size	523.00	152.69
	Portfolio Size	23.00	8.00
	Age of company at financing	9.58	12.67
	Investment Speed	3.04	2.92
	Holding Period	5.10	3.80
Venture Capital	Fund Size	132.87	25.00
	Portfolio Size	44.00	19.00
	Age of company at financing	5.00	5.00
	Investment Speed	4.17	3.05
	Holding Period	5.35	3.90
Fund of Funds	Fund Size	313.39	94.67
	Portfolio Size	24.00	71.50
	Age of company at financing	4.67	6.50
	Investment Speed	2.41	2.06
	Holding Period	5.70	3.95
Generalist Private Equity	Fund Size	405.81	91.00
	Portfolio Size	171.00	20.00
	Age of company at financing	7.58	8.42
	Investment Speed	3.50	4.57
	Holding Period	4.30	4.40
Mezzanine	Fund Size	204.10	28.86
	Portfolio Size	10.00	14.00
	Age of company at financing	10.71	7.83
	Investment Speed	3.09	2.58
	Holding Period	4.50	3.80
Other Private Equity	Fund Size	115.00	95.06
	Portfolio Size	19.00	5.00
	Age of company at financing	5.04	9.08
	Investment Speed	4.28	1.54
	Holding Period	3.95	6.40
<b>Total</b>	<b>Fund Size</b>	<b>217.75</b>	<b>31.29</b>
	<b>Portfolio Size</b>	<b>42.00</b>	<b>17.00</b>
	<b>Age of company at financing</b>	<b>6.00</b>	<b>5.50</b>
	<b>Investment Speed</b>	<b>4.45</b>	<b>3.15</b>
	<b>Holding Period</b>	<b>5.10</b>	<b>3.90</b>

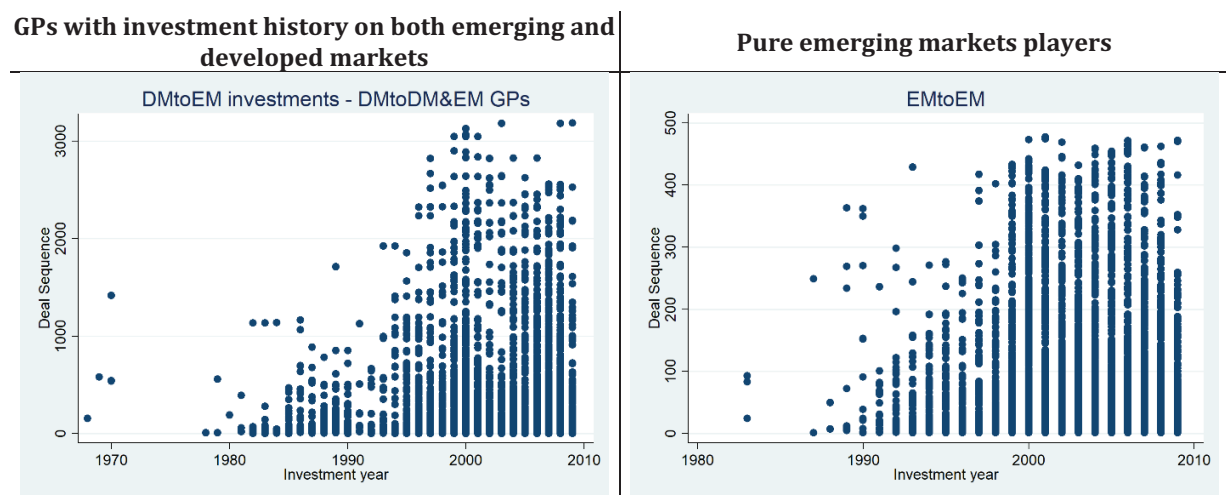
**Panel C – Exit Strategies by Deal Direction.**

Exit Type	DMtoEM	EMtoEM
Buyback	0.01	0.01
IPO	0.41	0.49
Reverse Takeover	0.00	0.02
Secondary Sale	0.10	0.06
Trade Sale	0.46	0.41
Write Off	0.01	0.01

**Figure 2.2.: Distribution of return measures by deal directions.**



**Figure 2.3 : Deal Sequences sorted on GPs and investment year by deal direction.**



**Table 2.3.: Percentage of explained variance in returns by level.** This table shows the percentage of explained variance pertaining to each data level using variance decomposition.

	DMtoEM			EMtoEM		
	GP level	Country level	Company level	GP level	Country level	Company level
Deal-level PME	3%	22%	75%	6%	16%	78%

**Table 2.4.: Correlation tables of GP, Country and Company level characteristics.** This table shows the correlations between the GP-level characteristics, the Country-level characteristics, and the Company-level characteristics. Variable definitions are given in Appendix 1.

<b>Panel A : Correlations between GP-level characteristics</b>							
	Size	Local Affiliation	GP Direct Investment	Co-investment	Pre-EM Experience	Time to Exit	Time to Invest
Size	1.0000						
Local Affiliation	0.2874	1.0000					
GP Direct Investment	0.0472	0.0221	1.0000				
Co-investment	0.0488	0.0207	-0.0160	1.0000			
Pre-EM Experience	0.2176	0.3919	-0.0278	-0.0283	1.0000		
Time to Exit	-0.0181	-0.0110	-0.0054	-0.0032	0.0129	1.0000	
Time to Invest	-0.0203	0.0139	0.1618	0.1443	0.0433	0.0678	1.0000

<b>Panel B : Correlations between Country-level characteristics and GP means of Country-level variables</b>										
	Capital Inflow	Nearby	Distant	Embeddedness distance	Hierarchy distance	Mastery distance	Intellectual autonomy distance	GP Mean Exit Rate	GP Mean Multiple of Invested Capital	GP Mean Deal PME
Capital Inflow	1.0000									
Nearby	-0.0408	1.0000								
Distant	-0.0972	-0.0631	1.0000							
Embeddedness distance	-0.0140	0.2743	0.1384	1.0000						
Hierarchy distance	0.0406	0.1677	0.1830	0.5059	1.0000					
Mastery distance	-0.0683	0.1416	-0.0159	0.5027	-0.3867	1.0000				
Intellectual autonomy distance	-0.0628	0.0264	-0.0710	-0.0618	-0.7273	0.7407	1.0000			
GP mean Exit Rate	0.1725	-0.1904	-0.2288	-0.1012	-0.1040	-0.0029	0.0729	1.0000		
GP mean Multiple of Invested Capital	-0.0106	-0.0990	-0.1187	-0.0746	-0.0889	0.0051	0.0509	0.1587	1.0000	
GP mean Deal PME	0.0206	-0.1917	-0.2594	-0.1725	-0.1830	-0.0141	0.0767	0.2756	0.9312	1.0000

*Table continued on next page*

Panel C : Correlations between Company-level Characteristics and Country means of Company-level variables (by company industry)

	First Time PE deal	VC dummy	LN Age at financing	LN invested capital	Deal Sequence	Club deal dummy	Country mean Exit Rate	Country mean Multiple of invested capital	Country mean Deal PME
First Time PE deal	1.0000								
VC dummy	-0.0009	1.0000							
LN Age at financing	-0.0023	-0.2666	1.0000						
LN invested capital	-0.1037	-0.0138	-0.0163	1.0000					
Deal Sequence	-0.1307	0.0538	-0.0488	0.0895	1.0000				
Club deal dummy	-0.0125	0.1546	-0.0888	0.3532	0.0400	1.0000			
Country mean Exit Rate	0.0063	0.2209	-0.1619	0.2333	0.1021	0.2366	1.0000		
Country mean Multiple of invested capital	0.0090	0.2631	-0.1760	0.2088	0.1034	0.2084	0.7670	1.0000	
Country mean Deal PME	0.0127	0.2262	-0.1639	0.2359	0.1118	0.2293	0.9126	0.8751	1.0000

**Table 2.5. : Multilevel Linear Model Estimates for the effect of investment destination and GP, Country and Portfolio Company effects on Deal-level PME.**

This table provides the following model estimates:

$$y_{ijkt} = \alpha_{jk} + x'_{it} \beta + \varepsilon_{ijkt}$$

$$\alpha_{jk} = v_k + w'_j \gamma + u_{jk}$$

$$v_k = z'_k \gamma + \eta_k$$

Where  $y_{ijkt}$  is the deal-level performance measure of GP  $i$  in country  $j$  and company  $k$  at time  $t$ ,  $x_{it}$  is a vector of GP-level characteristics,  $\alpha_{jk}$  is a country-level intercept term,  $w_j$  is a vector of country-level characteristics including distance measures,  $v_k$  is a company-level intercept term and  $z_k$  is a vector of company characteristics. The portfolio companies within countries represent the base-level observations, the countries and the GPs the upper-level observations. Variable definitions are given in Appendix 2.1.

	<b>Dependent variable = LN Deal-level PME</b>
<b>DMGP</b>	-0.418*** (-5.03)
<b>GP-level Characteristics</b>	
LN Size	0.000 (0.21)
LN (1+ Local Affiliation)	0.813*** (5.60)
Time to Exit	0.013*** (4.58)
Time to Invest	-0.002* (-2.06)
<b>Country-level Characteristics</b>	
LN Capital Inflow	0.0328** (3.04)
Nearby	0.584* (2.12)
Distant	0.0341 (0.19)
Embeddedness Distance	0.312 (1.04)
Hierarchy Distance	0.101 (1.03)
Mastery Distance	-0.405 (-1.40)
Int. Autonomy Distance	0.150 (0.95)

*Continued on next page*



**Company-level Characteristics**

First Time Investment Dummy	0.0157 (0.99)
VC Dummy	-0.0588* (-2.43)
LN (1+ Age)	0.000 (0.23)
LN Invested Capital	0.0228* (2.04)
LN Deal Sequence	0.000*** (7.56)
Club Deal Dummy	-0.131* (-2.15)
Intercept	Yes
Investment year FE	Yes
Industry FE	Yes
Number of observations	99,282

**Table 2.6. : Multilevel Linear Model Estimates for GP, Country and Portfolio Company effects on Deal-level PME, with cross-level effects of Distance measures at the country and GP levels.** This table shows the interaction between the geographic distance of the company's country from the GP's country and the intensity of cultural proximity of the GP investment teams on the one hand, and the interaction between the geographic distance of the company's country from the GP's country and the geographical investment concentration of the GP in the portfolio company country on the other hand. Variable definitions are given in Appendix 2.1. T-statistics are given between brackets. One, two and three asterisks denote a 10%, 5% and 1% significance level respectively.

	DMtoEM	EMtoEM
<b>GP Characteristics</b>	<b>YES</b>	<b>YES</b>
<b>Country Characteristics</b>	<b>YES</b>	<b>YES</b>
<b>Cross-level interactions</b>		
<i>GP geographical concentration vs. investment country geographical distance</i>		
Nearby x HH GP Geo Concentration Low	<b>-0.68*</b> (-1.99)	<b>-1.02*</b> (-2.20)
Nearby x HH GP Geo Concentration High	<b>1.59**</b> (2.53)	<b>1.03**</b> (2.82)
Distant x HH GP Geo Concentration Low	0.84 (0.21)	0.74 (0.08)
Distant x HH GP Geo Concentration High	<b>-0.52*</b> (-2.37)	-0.41 (-0.89)
<i>GP cultural proximity vs. investment country geographical distance</i>		
Nearby x Lang. Speakers Dummy	<b>1.56***</b> (4.86)	<b>1.20**</b> (2.79)
Distant x Lang. Speakers Dummy	1.183 (1.13)	<b>0.43**</b> (2.52)
Nearby x Lang. Speakers	<b>1.06***</b> (5.21)	<b>1.08**</b> (2.67)
Distant x Lang. Speakers	<b>0.98***</b> (4.03)	<b>1.02**</b> (2.68)
Nearby x HH Lang. Speakers	<b>1.86***</b> (7.40)	<b>2.65***</b> (4.16)
Distant x HH Lang. Speakers	<b>1.41***</b> (6.66)	<b>1.35***</b> (3.06)
<b>Company Characteristics</b>	<b>YES</b>	<b>YES</b>
<b>Intercept</b>	<b>Yes</b>	<b>Yes</b>
<b>Investment year FE</b>	<b>Yes</b>	<b>Yes</b>
<b>Industry FE</b>	<b>Yes</b>	<b>Yes</b>
<b>Number of Countries</b>	<b>22</b>	<b>20</b>
<b>Number of Companies</b>	<b>448</b>	<b>687</b>
<b>Number of observations</b>	<b>1 055</b>	<b>1 353</b>

**Table 2.7 : Multilevel Linear Model Estimates for GP, Country and Portfolio Company effects on Deal-level PME, considering change in investment style of DM-based GPs when investing in EM.** Variable definitions are given in Appendix 2.1. T-statistics are given between brackets. One, two and three asterisks denote a 10%, 5% and 1% significance level respectively.

	<b>Deal PME</b>
<b>Style Shift</b>	-0.905 (-1.23)
<b>GP Characteristics</b>	
Size	-0.0227 (-0.65)
Local Affiliation	<b>-0.0795**</b> (-2.74)
GP Direct Investment	0.256 (1.12)
Co-investment	-0.139 (-0.65)
Pre-EM Experience	<b>1.260***</b> (13.03)
Time to Exit	-0.261 (-1.66)
Time to Invest	0.0822 (1.68)
<b>Country Characteristics</b>	
Capital Inflow	0.145* (2.51)
Nearby	0.102 (0.35)
Distant	<b>-2.319***</b> (-8.97)
Embeddedness distance	0.834 (0.80)
Hierarchy Distance	-0.211 (-0.64)
Mastery Distance	0.124 (0.13)
Intellectual Autonomy Distance	-0.594 (-1.44)
<b>Company Characteristics</b>	
First Time Investment	<b>-2.460***</b> (-4.90)
VC Dummy	-0.0317 (-0.25)
Age	<b>0.00110*</b> (2.17)
Invested Capital	0.000505 (1.44)
Deal Sequence	<b>-1.978***</b> (-4.31)
Club Deal Dummy	-0.0348 (-0.42)
<b>Intercept</b>	<b>Yes</b>
<b>Investment year FE</b>	<b>Yes</b>
<b>Industry FE</b>	<b>Yes</b>
<b>Number of Countries</b>	<b>22</b>
<b>Number of Companies</b>	<b>448</b>
<b>Number of observations</b>	<b>3 967</b>

**Table 2.8 : Effect of previous deal performance on follow-on deals performance.** Variable definitions are given in Appendix 1. T-statistics are given between brackets. One, two and three asterisks denote a 10%, 5% and 1% significance level respectively.

	<b>DMtoEM</b>	<b>EMtoEM</b>
<b>Lagged Deal-level PME</b>	<b>0.249***</b> (13.27)	<b>0.755***</b> (7.64)
<b>GP Characteristics</b>		
Size	0.114 (0.54)	-0.0169 (-0.51)
Local Affiliation	-0.245 (-0.29)	<b>-0.341***</b> (-3.36)
GP Direct Investment	1.054 (0.72)	-0.00504 (-0.02)
Co-investment	0.676 (0.45)	0.0184 (0.09)
Pre-EM Experience	1.574 (0.86)	
Time to Exit	-0.103 (-0.78)	-0.0219 (-1.50)
Time to Invest	0.00299 (0.07)	-0.00496 (-0.82)
<b>Country Characteristics</b>		
Capital Inflow	<b>0.848**</b> (2.68)	0.0311 (0.60)
Nearby	2.271 (0.71)	-0.324 (-0.58)
Distant	0.110 (0.11)	-0.0334 (-0.08)
Embeddedness distance	-1.005 (-0.48)	-0.0901 (-0.16)
Hierarchy Distance	2.502 (0.85)	0.399 (1.72)
Mastery Distance	-1.956 (-0.34)	-0.838 (-1.46)
Intellectual Autonomy Distance	-2.061 (-0.89)	0.757 (1.33)
<b>Company Characteristics</b>		
First Time Investment	0.174 (0.20)	0.173 (1.69)
VC Dummy	0.540 (0.69)	0.0269 (0.21)
Age	0.00961 (0.25)	0.00224 (0.53)
Invested Capital	<b>-1.151**</b> (-2.99)	-0.0197 (-0.40)
Deal Sequence	<b>0.00284***</b> (3.94)	<b>0.00117*</b> (2.26)
Club Deal Dummy	1.553 (1.10)	0.117 (0.89)
<b>Intercept</b>	<b>Yes</b>	<b>Yes</b>
<b>Investment year FE</b>	<b>Yes</b>	<b>Yes</b>
<b>Industry FE</b>	<b>Yes</b>	<b>Yes</b>
<b>Number of Countries</b>	<b>22</b>	<b>20</b>
<b>Number of Companies</b>	<b>422</b>	<b>601</b>

**Figure 2.4.: Re-arranged deal sequences sorted on first investments and vintage years of each fund within DMtoDM&EM subgroup of GPs.** This figure shows the methodology for establishing new deal sequences to control for possible sequence gaps within reported deals. A fund is considered DM or EM based on the most observed frequency for either EM or DM within its portfolio companies' locations. Deals are sorted within each fund based on their investment dates. Funds are sorted for each GP in the DMtoDM&EM subgroup by vintage year.

New Sequence For Lagged Deal-level PMEs	1	1 <sup>st</sup> Deal = EM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	EM Fund 1
	2	1 <sup>st</sup> Deal = DM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	EM Fund 2
	3	1 <sup>st</sup> Deal = DM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	EM Fund 3
	4	1 <sup>st</sup> Deal = EM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	DM Fund 1
	5	1 <sup>st</sup> Deal = EM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	DM Fund 2
	6	1 <sup>st</sup> Deal = DM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	EM Fund 4
	i	1 <sup>st</sup> Deal = DM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	EM Fund n
	j	1 <sup>st</sup> Deal = DM Deal	2 <sup>nd</sup> Deal = EM Deal	3 <sup>rd</sup> Deal = DM Deal	.....	DM Fund m

**Table 2.9. : effect of previous deal performance on follow-on EM deal performance correcting for deal sequences.** This table shows the regression results for deal-level PME on lagged deal-level PMEs with the new deal sequence numbers (See figure 2.4.). Variable definitions are given in Appendix 1. T-statistics are given between brackets. One, two and three asterisks denote a 10%, 5% and 1% significance level respectively.

	DMtoDM&EM		
	Given any DM/EM Deal Order	Given the first DM deal Followed by a DM deal After the last EM deal (EM-DM-DM sequence)	Given the first DM deal Followed by an EM deal After the last EM deal (EM-DM-EM sequence)
<b>Lead DM Deal PME</b>	<b>0.547***</b> (202.91)	<b>0.545***</b> (200.48)	<b>0.583***</b> (25.53)
<b>GP Characteristics</b>			
Size	-0.0864 (-1.60)	-0.0931 (-1.70)	-0.0786 (-0.50)
Local Affiliation	<b>-1.027***</b> (-5.12)	<b>-1.032***</b> (-5.06)	-0.971 (-1.52)
GP Direct Investment	-0.390 (-0.70)	-0.413 (-0.72)	0.936 (0.83)
Co-investment	-0.359 (-0.63)	-0.359 (-0.62)	0.506 (0.43)
Pre-EM Experience	0.0000381 (0.21)	0.000119 (0.63)	0.218 (0.16)
Time to Exit	<b>-0.154***</b> (-3.68)	<b>-0.155***</b> (-3.56)	-0.0112 (-0.12)
Time to Invest	<b>0.0840***</b> (7.00)	<b>0.0862***</b> (7.06)	-0.0256 (-0.76)
<b>Country Characteristics</b>			
Capital Inflow	<b>-0.405***</b> (-4.62)	<b>-0.422***</b> (-4.72)	0.299 (1.23)
Nearby	<b>1.573*</b> (2.20)	<b>1.685*</b> (2.30)	0.347 (0.15)
Distant	0.454 (0.94)	0.604 (1.18)	-0.0594 (-0.08)
Embeddedness distance	1.532 (0.82)	2.249 (0.73)	0.277 (0.19)
Hierarchy Distance	<b>-1.076*</b> (-2.10)	-1.286 (-1.63)	-0.0782 (-0.04)
Mastery Distance	0.691 (0.39)	0.408 (0.14)	1.628 (0.41)
Intellectual Autonomy Distance	-0.884 (-1.06)	-0.990 (-0.98)	-2.432 (-1.52)
<b>Company Characteristics</b>			
First Time Investment	<b>-0.643**</b> (-3.10)	<b>-0.636**</b> (-3.03)	-0.815 (-1.22)
VC Dummy	0.0783 (0.30)	0.0878 (0.33)	-0.338 (-0.56)
Age	<b>0.0604***</b> (4.98)	<b>0.0631***</b> (5.04)	0.0138 (0.51)
Invested Capital	<b>-0.359**</b> (-2.59)	<b>-0.383**</b> (-2.66)	-0.462 (-1.67)
Club Deal Dummy	0.544 (0.77)	0.745 (0.99)	-0.469 (-0.48)
<b>Intercept</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Investment year FE</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Industry FE</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<b>Number of Countries</b>	<b>47</b>	<b>25</b>	<b>22</b>
<b>Number of Companies</b>	<b>9 663</b>	<b>9 234</b>	<b>429</b>
<b>Number of observations</b>	<b>52 184</b>	<b>51 190</b>	<b>994</b>

## Chapter 3

# What does the Individual Mobility of Private Equity Professionals Tell Us About Performance? <sup>\*</sup>

### Abstract

This paper investigates whether the mobility of individual private equity professionals impacts performance. I construct a novel professional-firm-fund-deal matched dataset which allows to track private equity professionals (top, middle and lower management) across firms over time. Using a difference-in-difference design, I find that individual mobility significantly induces a 14 cents loss for every dollar invested using the MOIC (multiple of invested capital) as a performance measure, controlling for individual, firm, fund and deal characteristics. Individual mobility hurts performance most when the turnover event occurs during the investment period, when the investment is VC and when the mover is a keyperson. The results are relatively consistent across different performance measures and are robust to possible matching between firms and individuals.

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I thank Serge Darolles, Edith Ginglinger and Tamara Nefedova for helpful comments and suggestions.

Picking private equity managers isn't like picking stocks, it's like picking mutual funds.

*Jim Strang, Managing Director at Hamilton Lane,*

*In "Time for private equity chiefs to prepare next generations", The Financial Times, June 12<sup>th</sup>, 2015*

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### 3.1. Introduction

In asset management, particularly private equity, finding and retaining talent is a valuable attribute in an industry where human capital is highly intensive and important (Agrawal and Ljungqvist, 2014) and where investors cannot easily identify high performing and skillful managers (Korteweg and Sorensen, 2017). While many studies have examined the relationship between skill and performance at the institutional level (Baks et al. (2001); Fama and French (2010); Barras et al. (2010); Berk and Van Binsbergen (2015); Ferson and Chen (2015) among others), I aim in this paper to provide complementary and new insights into what drives performance at the individual managerial level (Bertrand and Schoar (2003), Ewens and Rhodes-Kopf (2015), Cornelli et al. (2017)). I construct a new multi-sourced matched database on private equity's investment performance and individual professionals; and examine how deal and fund performances are affected in the event of individual mobility. A mover is defined as either (i) a person with an employment history in a private equity firm with a termination date that coincides with a current fund managed by the same firm and their underlying deals, or (ii) a person who sits in the board of a portfolio company while being an employee of the private equity firm, and who has a record of leaving that firm. Private equity firms often lock-in their teams with non-compete provisions and entitlement to carry to incentivize them. Retaining key and skillful managers is important for fundraising as the emphasis on past team performance is a key argument in fund prospectuses, especially that LPs (the limited partners) often enforce keymen clauses in LPAs (limited partnership agreements), which entitle them to prohibit investment or even dissolve the partnership in the event of a key individual leaving the management firm or failing to devote sufficient amounts of time to the partnership. In a context of consistently declining PE returns (Harris et al., 2014, 2015), and increased managers departures within PE



firms over the last years<sup>60</sup>, I shed light on mobility as an additional driver of underperformance. I find that individual mobility significantly induces a 14 cents loss for every dollar invested using the MOIC (multiple of invested capital) as a performance measure. Individual mobility hurts performance most when the turnover event occurs during the investment period, when the investment is VC and when the mover is a keyperson. The results are consistent across different performance measures and are robust to possible matching between firms and individuals, controlling for individual, firm, fund and deal controls.

Examining individual mobility effects on private equity performance is at the crossroads of three research areas: the literature on the determinants of private equity performance, the one on the importance of human capital, and the general literature on performance and turnover.

First, the literature on the determinants of private equity performance can be grouped into five drivers: (1) persistence and skill; (2) cyclical, market maturity and competition; (3) choice of metrics and benchmarks; (4) size effects and (5) networking effects. This paper considers individual mobility as a sixth additional determinant of performance.

Second, human capital has become a significant pillar of today's organization (Zingales, 2000) and an important vector of investment decisions (Agrawal & Ljungqvist, 2014), as firms need to consider managerial ability alongside project financials to assess investment outcomes. I contribute to this literature by complementing the relatively recent empirical work on individual impact on managerial decisions and investment outcomes (Bertrand and Schoar (2003), Cornelli et al. (2017)).

Third and last, managerial turnover has shown to affect follow-on performance at different levels. For example, in young high-tech firms where disruptive effects of change are observed, Baron et al. (2001) show that turnover is highly associated with organizational change, and that it pertains more to senior positions, suggesting failure of senior management to catch up. Shaw et al. (2005) show that the level of voluntary turnover negatively impacts performance but is attenuated with

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<sup>60</sup> See for example: "Apax, a private equity firm with a revolving door", Reuters, June 12<sup>th</sup>, 2016

time, while Viral et al. (2011) show that the self-serving behaviors of senior managers impact the organizational efficiency of the firm. I contribute to this literature by examining the effect of turnover in a less complex organizational setting that allows for relative disentangling of individual tasks, and by looking at turnover in lower rank positions alongside the heavily studied senior positions. Indeed, while it is difficult to isolate an individual's personal contribution in a company in general, private equity offers a good setting to analyze the direct effect of individual mobility on performance, as it is an industry where it is relatively possible to pinpoint individual tasks and link them to individual outcomes<sup>61</sup>.

The rest of the paper is organized as follows. Section 2 details the data collection process and provides some summary statistics. Section 3 provides and discusses the main findings and section 4 concludes.

## 3.2. Data and descriptive statistics

### 3.2.1. Sample description and variable definition

In this study, I combine two individually constructed datasets to identify private equity employer-employee data: a *performance* dataset and a *professionals* dataset.

For the performance dataset, I build on the datasets in Ain Tommar and Darolles (2017) and in Ain Tommar, Darolles and Jurczenko (2018), which contain unique deal-level data that are combined from multiple sources. These data are obtained by primarily screening the Securities Data Company (SDC), Thomson Reuters and Orbis-BvD private company databases to identify private equity firms, along the names of their funds and relevant investee companies. Most of the data collected at this stage is descriptive with few information on deal and fund performance, such as location, founding dates, investment styles, deal structures, exit types, etc. The performance metrics are primarily sourced from Pitchbook and Preqin databases and are

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<sup>61</sup> Private equity investments are often managed by appointed team members, making it relatively clear which individuals were involved in which deals/funds.

completed by additional information from Zephyr-BvD, Capital IQ's Transactions database, and the Securities Data Company's M&A and PE-backed IPOs datasets. I match the screened database by name to the universe of private equity investments in those databases, controlling for name and organizational changes (e.g. mergers between private equity firms, corporate restructurings<sup>62</sup>). The resulting sample consists of 11,807 private equity firms, 25,514 funds and 84,036 deals, spanning 1957-2008 fund vintages and fully realized exits up to 2016.

The professionals' data is sourced from Capital IQ's People Intelligence database<sup>63</sup>. I collect records of more than 9,000 individual professionals in key positions (Partners, Managing Directors, Chief Investment Officers, Senior Managers, VPs, etc.) but also middle to low management levels (Senior Associates, Associates, Analysts, etc.) in 88,654 companies, of which 11,807 private equity firms. The data are not restricted geographically and span the period from 1980 onwards. I name-match the private equity firms and funds<sup>64</sup> in the performance data to the companies in Capital IQ's Professionals database, then identify the individual professionals working for the matched sample. Next, I track the work history of these professionals to establish their mobility paths. The unique person identifiers in Capital IQ ensure I control for people sharing the same names and facilitate tracking them across firms.

I am interested in investigating the link between the observed performances of private equity firms and the mobility of individual professionals. I link the deals and funds to the individual professionals using two strategies. First, I rely on the employment *start date* and *end date* provided by Capital IQ and compare them to the investment and exit dates in the performance database to identify the deals that were carried out by the private equity firms with the professional being an employee of the firm at that time. The regulatory constraint by which fund managers are not allowed to raise a follow-on private equity fund unless the previous fund is at least 70% invested, works against having same fund vintages within the same private equity firm.

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<sup>62</sup> Orbis-BvD provides the dates and comments on such events.

<sup>63</sup> Through WRDS: Wharton Research Data Services. "Capital IQ" wrds.wharton.upenn.edu

<sup>64</sup> Several instances of work experience in Capital IQ's Professionals database report fund names instead of the private equity firms' names. Since I have the complete backing channel in the performance dataset (i.e. which firm manages which funds and their respective deals), I am able to connect the professionals both to the funds and the firms.

Also, private equity and venture capital firms usually require a seat in the board of directors of the investee companies. I further validate this approach by verifying a large pool of board seats in the portfolio companies which were taken public by the private equity firms, sourced from Thomson Financials, to establish a link between the subsample of highly-ranked identified professionals (minimum title being *managing director* or *partner*) and the board seats of the portfolio companies. Second, there is a subset of individual managers I clearly identify at the fund level using the Pitchbook data (253 funds), hence cleanly connecting them to the underlying individual deals<sup>65</sup>. Inversely, I link the deals to individual managers using the fund level or board of directors' samples for observations lacking the employment *start* and *end* dates in the initial Capital IQ Professionals Database.

I identify *orphaned funds* (or *event funds* – those which witnessed a mobility event) by framing the join and departure years of the private equity professional with regards to the fund's timeline. A typical fund lifecycle has milestone periods: the *fundraising* period, during which the fund managers market the fund, gauge investor interest and collect fund commitments. The fund is *closed* once it reaches its target size<sup>66</sup>; the *investment* period, following which capital is called from investors and deployed across investment opportunities; the *harvesting* period, where investments are operated, monitored and value is maximized; and *divestment*, where investments are exited and value is realized. The fund is then liquidated, or the extension period follows. Unless one has access to proprietary data, there is little to no information on how these periods are exactly tailored for each fund. However, the general sense is that the fundraising period lasts for about 2 years, the investment period for 3 to 5 years, and the harvesting period for the following 3 to 5 years. These periods vary greatly across funds following the investment style, fund objectives, exit styles and market conditions. Divesting periods vary depending on the exit strategy (IPO, trade sale, secondary buyout, etc.). Also, divesting the first investments may overlap with the harvesting periods of the following investments, as shown in figure 3.1. I calculate the fundraising period by subtracting the fund inception date from its close date. For

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<sup>65</sup> Pitchbook collect these data from private equity fund's fundraising prospectuses and private placement memoranda.

<sup>66</sup> A fund may have multiple interim closings. Depending on whether there is interest from the investors, funds may be undersubscribed (below their target size) or oversubscribed (demand from investors is over their target size).

the subset of funds for which I have cashflow data, I calculate the time-lapse in years between the fund inception date and the last capital call to have a measure of the investment period. For the set of funds lacking cashflow data, I use the PIC indicator to proxy for the investment period. The PIC (Paid-In to Committed), is a measure of whether the fund is fully invested. It is calculated as the total amount of capital drawn down relative to the fund's total commitments. The higher this ratio, the more capital is deployed and the closer the fund is to be fully invested. I consider a fund as fully invested at the date in which the PIC is equal to 70% or higher (i.e. a fund has to have deployed at least 70% of its capital<sup>67</sup>). For funds lacking both cashflow data and PIC, I use the underlying deals investment and exit dates to average each fund's investment and harvesting periods. In those cases, the investment period is the time in years between the fund's first and last observed underlying deal investment dates; and the harvesting period is the average holding period across all observed fund investments.

The *mobility event*, which is the time where a departure is observed, may coincide with one of the fund's milestone periods. For example, an individual manager may have participated to fundraising but left during the investment period, and in that case, I assess the impact that this departure might have on the realized performance, relative to the performance of same vintage funds in firms which did not have any movers. Funds are matched primarily on vintage, but also on size, investment style and the managing firm age at the time of the first observed mobility event. Performance is measured at the fund level in two ways: on the Exit Rate of the fund, measured as the number of successfully exited investments divided by the total number of fund investments (normalized across funds and firms by the average number of exits), and on the fund investment multiple, which is the ratio of the total proceeds from exiting all fund investments to the size of the fund. Additionally, I calculate a performance measure at the firm level, by averaging exit rates across funds.

As there might be deals within the funds which may not be affected by the mobility event (a professional may join and leave between deals being newly invested and others being exited), I further refine the analysis by identifying *orphaned deals* (or *event deals*). With data on deals being

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<sup>67</sup> The 70% threshold is regulatory. Results are robust using 80%, 90% and 100% levels.

much more granular, it is easier to place the mobility event relative to when it occurred in the lifecycle of the deal: prior to the investment date, during the deal or after the exit date. The impact on deal performance is then assessed with regards to the Exit Value (i.e. proceeds from exiting the investment, in million dollars), the Exit Success (likelihood that a deal will be exited by way of IPO or M&A), and the MOIC (multiple of invested capital, which is the Exit Value divided by the amount of initial equity invested at the deal level).

Figure 3.1 illustrates the possible mobility events across fund and deal timelines.

[ Figure 3.1 about here ]

The information on professionals' attributes that I control for include their biographies, professional ranks<sup>68</sup>, nationalities and gender<sup>69</sup>, whether or not they are current employees of the firm at the end of the sample period, whether they are board members in other companies, their education, function titles, and also whether they are the only person in charge of their role at the firm and if they are a *dealmaker*<sup>70</sup>. All variable definitions are further detailed in Appendix S3.1.

All in all, the end sample of firm-professional-fund/deal matched dataset with full performance data and complete information on their employees comprises 8,433 professionals, of which 6,128

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<sup>68</sup> Capital IQ assigns a number for the importance of the individual within the organization.

<sup>69</sup> Inferred based on textual analysis of names, using a language and a gender identification APIs. The language identification API gives an average weighted probability that a name has the linguistic connotation and resonance of a given nationality, and the gender identification API processes the first names of each professional to establish whether they are male or female, accounting for mixed-gender first names (e.g. Where *Andrea* can be a female name, it is also a male name in Italy).

<sup>70</sup> The private equity industry has two reputational titles for their star managers: *rainmakers* and *dealmakers*. A *rainmaker* is known for being successful with raising funds from investors. A *dealmaker* is someone who has skill with closing deals (byside or sellside alike).

movers, with work history in 30,492 companies, of which 1,423 PE/VC firms, invested between 1980 and 2008 in 23,094 portfolio companies (through 6,849 funds – 29 vintages).

### 3.2.2. Descriptive statistics

Table 3.1 provides an excerpt of the sample's descriptive statistics. Panel A shows the distribution and the performances of firms with and without movers, and Panel B highlights some of the mobility patterns in the sample.

*[Table 3.1 about here]*

The firms with movers are overrepresented compared to firms without movers in the sample, which is unusual in studies that use mobility as an identification strategy, where the subsample of firms without movers is bigger. This ensures enough variation in the sample to examine whether mobility affects performance and the uniqueness of private equity as a setting to study individual contribution to investment outcomes.

Firms with one to five movers represent about 75% of the sample of firms with movers and concentrate approximately one third of movers. These firms have an average deal portfolio of 35 companies per fund, of which four are event deals on average. Although those firms exhibit higher exit rates at the fund level and higher numbers of successful exits, their average investment multiples and exit values are lower compared to firms without movers. Interestingly, the firms with the least number of event deals (13% of mover firms) are the ones exhibiting higher deal investment multiples and relatively similar exit values than non-mover firms. The average

number of successful exits of these firms is comparable and their exit rates at the fund level are also higher.

Looking at the mobility patterns in Panel B highlights the importance of looking at movers from different ranks. Most variation (about two thirds) is relevant to the lower ranks, while most of the remaining third consists of top executive movers. According to the data, the majority of movers completed graduate degrees, switch companies only once and move mostly to other private equity firms. Very few professionals would leave within the first year of employment (10% of movers), while one third moves in the following three years, and 50% would either switch companies after 3 to 5 years of experience, or between 6 to 10 years of experience.

### **3.3. Empirical results**

#### **3.3.1. The effect of mobility on performance**

Table 3.2. shows the difference-in-difference estimation for the effect of individual mobility on deal, fund, and firm performance measures. The group of control firms are firms without movers, and the treated group is the group of firms with at least one mover. Deals and funds from the treatment and control firms are matched on fund vintage, size, investment style and the managing firm age at the time of the first observed mobility event. Only fully exited investments are considered. Specifications 1 to 3 use deal performance measures, specifications 4 and 5 use fund performance measures, and specification 6 uses a Firm-level performance measure. Estimation accounts for the individual professional controls and the deal, fund and firm characteristics described in Appendix 3.1. and errors are clustered at the portfolio company industry.

[ *Table 3.2. about here* ]



Starting by the deal performance measures, table 3.2. shows that relative to firms without movers, firms with movers have significantly higher deal exit values, but experience significantly lower investment multiples once corrected for the initial equity invested in the deal. In economic terms, a mobility event has an impact of 14 cents loss for every dollar invested in the company, *ceteris paribus*. Also, orphaned deals have lower probability of being successfully exited, and orphaned funds experience lower exit rates as well.

The investment multiple at the fund level is however insignificant, suggesting that either the impact of mobility has low memory and does not show on the overall performance of the fund, or that managers react to hemorrhaging deal performance following mobility by consolidating teams on the subsequent deals to restore investor confidence. Consistent with this story, the exit rates across all funds are significantly higher for firms with movers compared to firms without movers.

### **3.3.2. Does mobility affect performance differently across professional ranks?**

Looking at the ranks of individuals, I do not find lower rank movers to be significantly related to significantly different performances, even after correcting the assigned ranks in Capital IQ by the information content of the titles and the task descriptions of these individuals. In contrast, key individuals' departures are associated with significantly lower performances as shown in table 3.3.

[ Table 3.3. about here ]

Consistent with the story that key individuals entertain a reputational capital, and that same reputational capital is a communication vector for private equity firms in their fundraising prospectuses, evidence suggests that key individuals' mobility negatively affects all performance measures, *ceteris paribus*. Compared to non-orphaned deals, orphaned deals experience significantly lower exit values, 12% lower chance of being exited by way of IPO or trade sale, and a 28 cents loss for every dollar initially invested. Similarly, event funds have 16% lower exit rates than non-event funds and experience similar loss levels than their underlying deals on the investment multiples. Finally, across all funds, firms' overall exit rates are significantly 10.3% lower than firms without movers.

### 3.3.3. Mobility and deal - fund lifecycles

As highlighted earlier, mobility events can occur at any of the fund milestone periods and may be relevant to a subset of deals within the fund. In this section, I look at the relative importance of individual mobility conditional on when it occurs relative to the fund and deal's lifecycles. In that regard, I assign dummy variables to pinpoint the mobility event relative to when it occurred in the fund and deal lifecycles. I redefine a new treatment dummy by multiplying each group's treatment variable by the timeline dummies, then redo the DID estimates on the new treatment variable. Panel A in table 3.4. shows the estimation results for the deal-level performance measures, and Panel B for the fund-level performance measures.

[ Table 3.4. about here ]

Mobility events with regards to the deal lifecycle can occur either before a deal is invested, during the deal, or after the deal is exited. Results are consistent with the initial findings that exit values

are significantly higher but reverse trends once corrected for the initial equity investment: deal multiples suffer a 17 cents loss for every dollar invested following mobility. There is no evidence of mobility affecting deal performance in other periods.

Evidence on individual mobility effects at the fund level is consistent with that at the deal level, as performance is significantly and negatively affected if the mobility event occurs during the harvesting period. The same conclusion can be drawn for the investment and liquidation periods, suggesting that individual private equity managers matter for concluding deals and maximizing value. One reason why mobility has no significant impact during the divestment period is that private equity firms might still succeed in exiting the investments through their networks in other ways than via IPO or successful trade sale (Hochberg *et al.* 2007). This hypothesis is supported by looking at the negative coefficient during the extension and liquidation periods, where fund managers experience higher stress in successfully exiting their investments at the end of the fund's life (Arcot *et al.*, 2015), translating in lower money multiples.

### **3.3.4. Does mobility affect performance differently across investment styles?**

In this section, I investigate whether varying investment styles react differently to mobility events. In that regards, I sort the private equity firms by their historical style and assign them to either being VC firms or Buyout firms following the most frequently observed deal structure in their track-records. Next, I sort firms within each group based on whether they are mover or non-mover firms and redo the estimations. Panel A in table 3.5. provides the DID estimation results for the VC firms, while Panel B show the same estimation results for the Buyout firms.

[ Table 3.5. about here ]

The mobility impact pattern for VC firms is consistent with the mainstream results with the exception that it is more consistent for negatively impacting the deal exit value, which reflects in the fund investment multiple and the firm and fund respective exit rates. There is no evidence of the deal being directly affected by the professional's departure in terms of probability of successful exit nor in terms of deal multiples.

Mixed conclusions can be drawn for Buyout firms, with lower significant effect on deal exit values which is consolidated in the deal investment multiple once corrected for the initial equity investment. There is no evidence of a negative impact on the fund-level multiple but both the fund and firm exit rates are significantly stressed downwards.

All in all, mobility consistently affects the absolute deal exit value negatively across investment styles, alongside overall fund and firm exit rates. These results partially support Ewens and Rhodes-Kropf (2015) findings that human capital is 2 to 5 times more important in explaining the returns of VC firms<sup>71</sup>.

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<sup>71</sup> I replicate Ewens and Rhodes-Kopf (2015) approach and find similar results for VC firms (human capital is twice as important than organizational capital in explaining returns). I complement their analysis by estimating the key managers' fixed effects for buyout firms and find that unlike VC firms, human capital in buyout firms has the same explanatory power than organizational capital in explaining the variation in returns.

### 3.4. Conclusion

In this paper, I investigate the impact of individual mobility on the performance of private equity funds and deals. The emphasis on team stability and qualifications has always been an important marketing vector in fundraising prospectuses and 'keymen clauses' in LPAs are a way for investors to ensure that the professionals that they entrusted with the fund management remain. The question of mobility has become an increasingly notorious investor concern with the increasing numbers of turnover in private equity firms and this paper provides insights into what mobility means for performance. Using a large matched firm-professional-fund-deal dataset, I find that mobility significantly induces a 14 cents loss for every dollar invested using the MOIC (multiple of invested capital) as a performance measure, controlling for individual, firm, fund and deal characteristics. Individual mobility hurts performance most when the turnover event occurs during the investment period, when the investment is VC and when the mover is a keyperson.

There are concerns that the results might be driven by unobserved reasons for which managers move across firms, or by matching between firms and individuals, and individuals and deals (Sorensen, 2007), which induces endogeneity and selection concerns. Most studies in labor economics which use mobility as an identification strategy account for such biases by studying subsamples and using instrumental variables approaches. Nevertheless, as highlighted in those studies, it is not possible to completely rule out any remaining bias from endogeneity and selection. Following these approaches, future versions of the paper will assess the robustness of the results by examining subsamples where matching between individual professionals and private equity firms is homogenous (individuals would move across firms that are historically from the same performance quartile); and in extreme cases where individuals move across firms following a pattern by which they would leave less reputed firms to work for better firms (mobility across firms from lower to higher performance quartiles).

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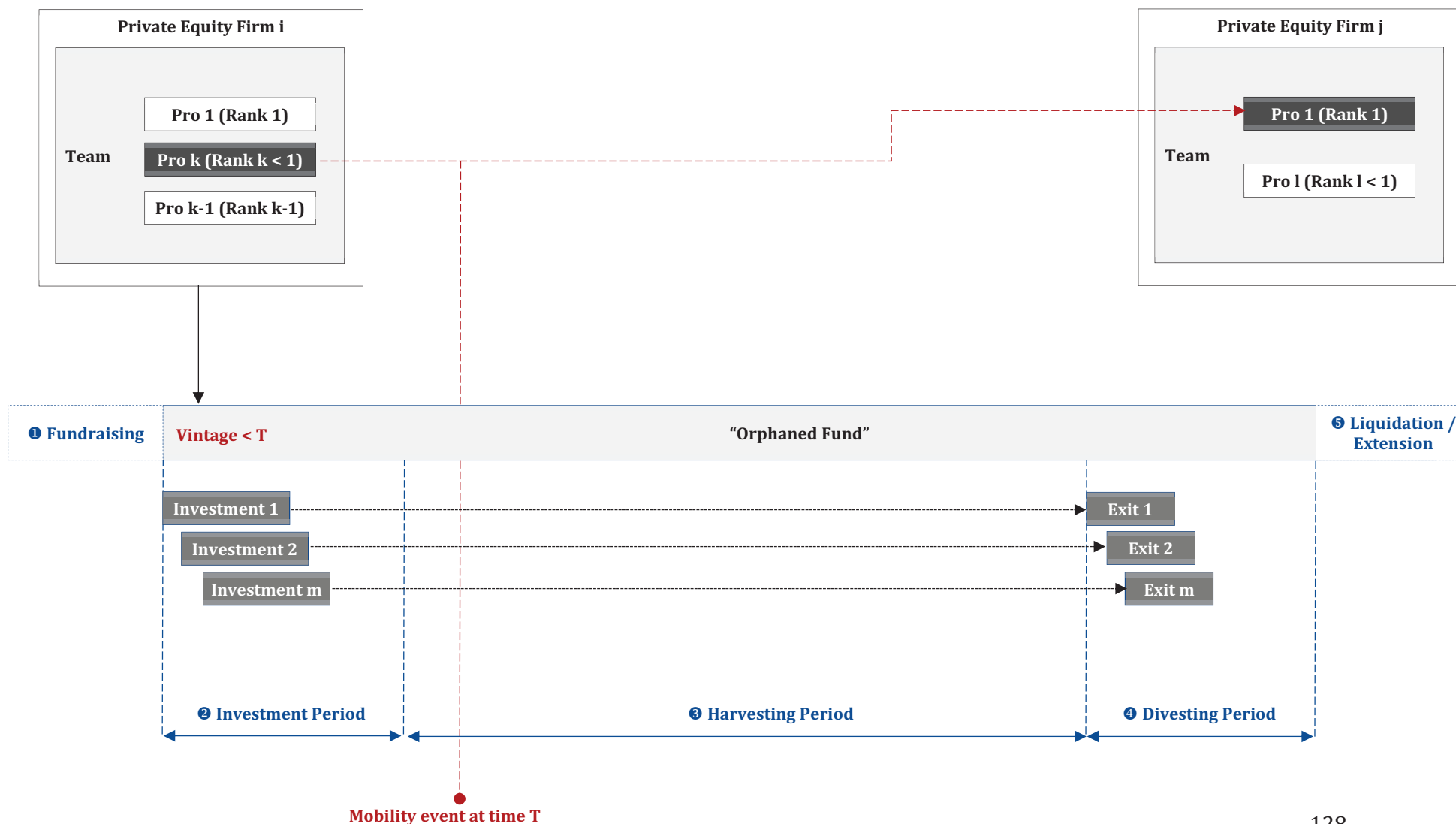
### 3.6. Tables and figures

#### Appendix 3.1: Variable Definition

Variables	Definition	Sources
<b>Performance Measures</b>		
Exit Value (log)	The natural logarithm of one plus the total proceeds from exiting the company, in million dollars.	SDC, Zephyr BvD, Pitchbook and Preqin.
Exit Success	Binary that takes the value of 1 if the investment is exited by way of IPO or a trade sale and 0 otherwise.	SDC, Zephyr BvD, Pitchbook and Preqin, Thomson Reuters.
MOIC (log)	The natural logarithm of one plus the total proceeds from exited investments to total invested capital (at the deal and fund levels)	SDC, Zephyr BvD, Pitchbook and Preqin.
Exit Rate Fund	The number of successfully exited investments to the total number of invested companies by the fund.	SDC, Thomson Reuters.
Exit Rate Firm	The number of successfully exited investments to the total number of invested companies by the firm across all funds.	SDC, Thomson Reuters.
<b>Individual Professional Controls</b>		
Rank at Entry (log)	The natural logarithm of the first observed rank at an employer company after year of degree completion. Ranks are given numbers to individual importance within the company in Capital IQ's Professional database.	Capital IQ Professionals database through WRDS
Tenure (log)	The natural logarithm of one plus the difference in years between the end year of the professional's employment and the deal investment year (or fund vintage if fund or firm performance measure is used).	Capital IQ Professionals database through WRDS, Pitchbook, Preqin, Thomson Reuters.
Professional's age (log)	The natural logarithm of the age in years of the professional one year prior to the deal investment date (or fund vintage if fund or firm performance measure is used)	Capital IQ Professionals database through WRDS, Pitchbook, Preqin, Thomson Reuters.
Graduate	Dummy for whether the professional holds a graduate degree.	Capital IQ Professionals database through WRDS
Dealmaker	Dummy for whether the professional is a key person in deal making.	Capital IQ Professionals database through WRDS
<b>Deal, fund and firm Controls</b>		
Invested Amount (log)	The natural logarithm of the invested amount in portfolio company in million dollars (when fund performance measures are the dependent variable, the invested amount is the total deployed capital by the fund up to the mobility event).	Zephyr BvD, Pitchbook and Preqin
Deal Sequence (log)	The natural logarithm of the sequence of the deal of interest within the firm (ordered by sorting the fund vintages then the deals within the funds by investment date)	Pitchbook and Preqin
Age at Financing (log)	The natural logarithm of one plus the difference between the investment date and the portfolio company's founding date, in years.	Thomson Reuters, Pitchbook and Preqin.
Has been PE-backed	Indicator variable for whether the company has been historically invested by a PE firm prior to the mobility event.	Zephyr BvD, SDC
Round number (log)	The natural logarithm of the last investing round prior to the mobility event	Thomson Reuters



**Figure 3.1.: Mobility Events.** This figure illustrates the possible mobility events across fund and deal timelines when professional k leaves firm i for firm j. The mobility time T is compared to the timelines of the funds and deals managed by firm i to identify the event deals and the event funds which were “orphaned” by professional k leaving. Fund Events include: mobility during the (1) fundraising period, (2) the investment period, (3) the harvesting period, (4) the divesting period or the liquidation or fund extension period. Similarly, at the deal level, Deal Events include mobility prior to the deal investment date, during the deal harvesting or after the deal is exited.



**Table 3.1 : Summary Statistics – Mobility patterns and performance.** Panel A describes the distribution and the performances of firms with and without movers. Panel B shows the mobility patterns in the sample. The number of invested deals is the firm’s number of portfolio company investments per fund while the professional is an employee of the PE firm. The number of event deals is the number of invested deals that were “orphaned” by the professional following their mobility. Event deals are identified by crossing each deal’s investment and exit dates with the professional’s start and end employment dates (See Figure 1 for a visual and a description of mobility events). The exit rate is the firm’s total exited investments (by way of IPO or trade sale) to the total number of investments. The MOIC (multiple of invested capital) is the deal money multiple, defined as the proceeds from exiting the investment to the amount invested. The exit value corresponds to the total proceeds from divesting a deal in million dollars, and the success exits are the number of deals exited by way of IPO or trade sale. Performance measures are calculated across the sample period. See appendix 1 for more on variable definitions.

**Panel A: Distribution of movers across firms and average performances**

	Number of Firms	% of Movers	Number of Movers	Average number of invested deals	Average number of event deals	Average Exit Rate	Average MOIC	Average Exit Value (\$M)	Average number of Success Exits
<b>Without movers</b>	<b>215</b>	-	-	<b>11</b>	-	<b>21%</b>	<b>1.5x</b>	<b>250</b>	<b>4</b>
<b>With movers</b>	<b>1 208</b>	-	<b>6 128</b>	<b>27</b>	<b>4</b>	<b>33%</b>	<b>1.1x</b>	<b>134</b>	<b>16</b>
1 to 5 movers	901	29%	1 764	35	4	33%	1.3x	134	16
6 to 10 movers	154	19%	1 156	16	2	25%	1.8x	236	4
11 to 20 movers	104	25%	1 539	61	4	22%	1.2x	77	33
21+ movers	49	27%	1 669	51	7	15%	1.4x	107	13
<b>Sample Total</b>	<b>1 423</b>	<b>100%</b>	<b>6 128</b>	<b>32</b>	<b>6</b>	<b>27%</b>	<b>1.4x</b>	<b>141</b>	<b>17</b>

*Table continued on next page*

**Panel B: Movers' characteristics**

<b>Movers...</b>	<b>Number</b>	<b>% of Total Movers</b>
Within year	628	10%
Between 1 and 3 years	1 805	29%
Between 3 and 5 years	1 319	22%
Between 6 and 10 years	1 417	23%
After 10 years+	959	16%
<b>Total</b>	<b>6 128</b>	<b>100%</b>
Who moved Once	5 441	89%
Who moved twice	487	8%
Who moved 3+ times	200	3%
<b>Total</b>	<b>6 128</b>	<b>100%</b>
In Lower Ranks (31 and below)	3 633	59%
In Middle Ranks (16 to 30)	455	7%
In Top Ranks (1 to 15)	2 040	33%
<b>Total</b>	<b>6 128</b>	<b>100%</b>
Who move to another PE firm	5325	87%
Who move to other financial institutions	279	5%
Who move to non-financial Institutions	524	9%
<b>Total</b>	<b>6 128</b>	<b>100%</b>
With an Undergraduate Degree	1880	31%
With a Graduate Degree	2737	45%
With a Post-Graduate and Other Degrees (excl. honorary degrees)	1 511	25%
<b>Total</b>	<b>6 128</b>	<b>100%</b>

**Table 3.2.: The effect of professional's mobility on performance.** This table shows the difference-in-difference estimation for the effect of individual mobility on deal, fund, and firm performance measures. The group of control firms are firms without movers, and the treated group is the group of firms with at least one mover. Deals and funds from the treatment and control firms are matched on fund vintage, size, investment style and the managing firm age at the time of the first observed mobility event. Only fully exited investments are considered. Specifications 1 to 3 use deal performance measures, specifications 4 and 5 use fund performance measures, and specification 6 uses a Firm-level performance measure. Estimation control variables include the individual controls and the deal, fund and firm controls described in appendix 1. See appendix 1 for more on variable definitions and figure 1 for a visual and a description of mobility events. Standard errors are clustered at the industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

VARIABLES	(1) Exit Value (log)	(2) Exit Success	(3) Deal MOIC (log)	(4) Exit Rate – Fund	(5) Fund MOIC (log)	(6) Exit Rate – Firm
Diff-in-diff	0.164*** (0.0374)	-0.0327* (0.0181)	-0.145*** (0.0134)	-0.0218*** (0.00674)	0.00255 (0.0192)	0.0695*** (0.00765)
Observations	23,572	26,508	23,572	35,570	30,810	26,508
R-squared	0.863	0.011	0.101	0.369	0.127	0.415
Mean control t(0)	-1.010	0.328	-0.308	0.115	-0.461	0.420
Mean treated t(0)	-1.053	0.359	-0.223	0.128	-0.496	0.385
Diff t(0)	-0.043	0.031	0.085	0.014	-0.035	-0.035
Mean control t(1)	-1.226	0.413	-0.153	0.102	-0.551	0.349
Mean treated t(1)	-1.105	0.411	-0.213	0.094	-0.583	0.383
Diff t(1)	0.121	-0.002	-0.059	-0.008	-0.032	0.035
Professional Controls	YES	YES	YES	YES	YES	YES
Deal, fund and firm Controls	YES	YES	YES	YES	YES	YES

**Table 3.3.: The effect of professional's mobility on performance when the mover is a key person.** This table shows the difference-in-difference estimation for the effect of individual mobility on deal, fund, and firm performance measures when the mover is a key person. A key person is defined as a professional with the Deal Maker flag in Capital IQ's Professional's database, which assigns a value of 1 if the person is important for deal making and 0 otherwise. The group of control firms are firms without movers, and the treated group is the group of firms with at least one key mover. Deals and funds from the treatment and control firms are matched on fund vintage, size, investment style and the managing firm age at the time of the first observed mobility event. Only fully exited investments are considered. Specifications 1 to 3 use deal performance measures, specifications 4 and 5 use fund performance measures, and specification 6 uses a Firm-level performance measure. Estimation control variables include the individual controls and the deal, fund and firm controls described in appendix 3.1. See appendix 1 for variable definitions and figure 1 for a visual and a description of mobility events. Standard errors are clustered at the industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

VARIABLES	(1) Exit Value (log)	(2) Exit Success	(3) Deal MOIC (log)	(4) Exit Rate – Fund	(5) Fund MOIC (log)	(6) Exit Rate – Firm
Diff-in-diff	-0.414*** (0.0652)	-0.119*** (0.0319)	-0.276*** (0.0234)	-0.158*** (0.0163)	-0.292*** (0.0449)	-0.103*** (0.0138)
Observations	30,809	35,571	30,809	35,570	30,810	35,571
R-squared	0.849	0.008	0.107	0.371	0.122	0.431
Mean control t(0)	-1.385	0.436	-0.468	0.123	-0.466	0.362
Mean treated t(0)	-1.312	0.473	-0.378	0.107	-0.407	0.357
Diff t(0)	0.0734	0.0364	0.0901	-0.0161	0.0591	-0.00567
Mean control t(1)	-1.369	0.537	-0.285	0.138	-0.465	0.364
Mean treated t(1)	-1.709	0.455	-0.471	0.232	-0.698	0.255
Diff t(1)	-0.340	-0.0823	-0.186	-0.174	-0.233	-0.108
Professional Controls	YES	YES	YES	YES	YES	YES
Deal, fund and firm Controls	YES	YES	YES	YES	YES	YES

**Table 3.4.: The effect of professional's mobility on performance with regards to deal and fund timelines.** This table shows the difference-in-difference (DID) estimation for the effect of individual mobility on deal, fund, and firm performance measures with regards to when the mobility event occurs in the life of the fund and the deal. Panel A shows the DID results with the unit of observation being the group of firms with orphaned deals and the control group being the firms with deals which did not suffer a mover. Panel B shows the DID results with the unit of observation being the group of firms with orphaned funds and the control group consisting of firms with funds which did not suffer a mover. Only fully exited investments are considered. Estimation control variables include the individual controls and the deal, fund and firm controls described in appendix 1. See appendix 1 for variable definitions and Figure 1 for a description of mobility events. Standard errors are clustered at the industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Panel A: Diff-in-diff estimation for orphaned deals**

VARIABLES	Exit Value (log)		Exit Success		Deal MOIC (log)	
	(1)	(2)	(3)	(4)	(5)	(6)
	Pro left during deal	Other Periods	Pro left during deal	Other Periods	Pro left during deal	Other Periods
Diff-in-diff	0.427*** (0.0668)	0.436 (0.654)	-0.0470 (0.0317)	0.0196 (0.111)	-0.169*** (0.0243)	0.435 (0.237)
Observations	23,572	23,572	26,508	26,508	23,572	23,572
R-squared	0.863	0.862	0.010	0.008	0.081	0.081
Mean control t(0)	-1.086	-0.999	0.336	0.279	-0.375	-0.448
Mean treated t(0)	-1.318	-0.950	0.423	0.329	-0.306	-0.376
Diff t(0)	-0.232	0.0492	0.0879	0.0502	0.0683	0.0719
Mean control t(1)	-1.293	-1.137	0.411	0.364	-0.240	-0.340
Mean treated t(1)	-1.098	-0.652	0.452	0.434	-0.341	-0.166
Diff t(1)	0.195	0.485	0.0408	0.0698	-0.101	0.507
Professional Controls	YES	YES	YES	YES	YES	YES
Deal, fund and firm Controls	YES	YES	YES	YES	YES	YES

*Table continued on next page*

<b>Panel B: Diff-in-diff estimation for orphaned funds</b>								
VARIABLES	Exit Rate – Fund				Fund MOIC (log)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Investment	Harvesting	Divestment	Extension or Liquidation	Investment	Harvesting	Divestment	Extension or Liquidation
Diff-in-diff	-0.169*** (0.0615)	-0.0305*** (0.00894)	0.0248 (0.0235)	-0.0452* (0.0266)	-0.694*** (0.172)	-0.0906*** (0.0261)	0.111* (0.0665)	-0.387*** (0.0822)
Observations	35,570	35,570	35,570	35,570	30,810	30,810	30,810	30,810
R-squared	0.370	0.369	0.369	0.369	0.127	0.127	0.128	0.129
Mean control t(0)	0.115	0.111	0.115	0.117	-0.438	-0.446	-0.423	-0.475
Mean treated t(0)	0.00236	0.125	0.131	0.149	-0.232	-0.481	-0.334	-0.619
Diff t(0)	-0.113	0.0144	0.0154	0.0324	0.670	-0.0348	0.0894	-0.144
Mean control t(1)	0.0977	0.0985	0.102	0.103	-0.529	-0.543	-0.515	-0.566
Mean treated t(1)	0.154	0.0823	0.142	0.0905	-0.553	-0.488	-0.314	-1.097
Diff t(1)	0.0564	-0.0162	0.0402	-0.0128	-0.0241	0.0558	0.201	-0.531
Professional Controls	YES	YES	YES	YES	YES	YES	YES	YES
Deal, fund and firm Controls	YES	YES	YES	YES	YES	YES	YES	YES

**Table 3.5.: The effect of professional's mobility on performance with regards to investment styles.** This table shows the difference-in-difference (DID) estimation for the effect of individual mobility on deal, fund, and firm performance measures with regards to the type of investment the firm is historically known for. Investment styles include mainly venture capital (VC) and buyouts (BO). For example, a Firm is deemed to be a VC if its most frequently observed fund styles prior to the first mobility event is VC, and so on. Panel A shows the DID results with the unit of observation being the group of VC firms with movers, and the control group being the VC firms without movers. Panel B shows the DID results with the unit of observation being the group of BO firms with movers, and the control group being the BO firms without movers. Panel C shows the DID estimation results with the unit of observation being the group of "Other" firms with movers, and the control group being the "Other" firms without movers. Only fully exited investments are considered. Estimation control variables include the individual controls and the deal, fund and firm controls described in appendix 1. See appendix 1 for variable definitions and Figure 1 for a description of mobility events. Standard errors are clustered at the industry. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

<b>Panel A: Diff-in-diff estimation for VC firms</b>						
VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Exit Value (log)	Exit Success	Deal MOIC (log)	Exit Rate – Fund	Fund MOIC (log)	Exit Rate – Firm
Diff-in-diff	-0.182*** (0.0595)	0.00524 (0.0283)	-0.0297 (0.0223)	-0.0449*** (0.0148)	-0.151*** (0.0411)	-0.0359*** (0.0127)
Observations	24,268	28,229	24,268	28,229	24,268	28,229
R-squared	0.855	0.012	0.121	0.364	0.156	0.412
Mean control t(0)	-0.392	0.687	-0.359	0.0444	0.277	0.378
Mean treated t(0)	-0.461	0.702	-0.296	0.0646	0.213	0.390
Diff t(0)	-0.0690	0.0149	0.0637	0.0202	-0.0639	0.0126
Mean control t(1)	-0.593	0.763	-0.247	0.0523	0.113	0.333
Mean treated t(1)	-0.480	0.783	-0.213	0.0277	0.200	0.381
Diff t(1)	0.113	0.0201	0.0340	-0.0247	0.0875	0.0485
Professional Controls	YES	YES	YES	YES	YES	YES
Deal, fund and firm Controls	YES	YES	YES	YES	YES	YES

*Table continued on next page*



<b>Panel B: Diff-in-diff estimation for BO firms</b>						
VARIABLES	(1) Exit Value (log)	(2) Exit Success	(3) Deal MOIC (log)	(4) Exit Rate – Fund	(5) Fund MOIC (log)	(6) Exit Rate – Firm
Diff-in-diff	-0.261* (0.155)	-0.0263 (0.0841)	-0.299*** (0.0693)	-0.251*** (0.0339)	-0.112 (0.0955)	-0.151*** (0.0240)
Observations	2,570	2,845	2,570	2,845	2,570	2,845
R-squared	0.918	0.012	0.122	0.276	0.231	0.428
Mean control t(0)	-0.666	0.558	-0.821	0.192	0.465	-0.266
Mean treated t(0)	-0.787	0.609	-0.707	0.241	0.344	-0.257
Diff t(0)	-0.122	0.0513	0.114	0.0496	-0.121	0.00925
Mean control t(1)	-0.857	0.667	-0.577	0.228	0.320	-0.182
Mean treated t(1)	-1.239	0.692	-0.762	0.0272	0.0869	-0.324
Diff t(1)	-0.382	0.0250	-0.185	-0.201	-0.233	-0.142
Professional Controls	YES	YES	YES	YES	YES	YES
Deal, fund and firm Controls	YES	YES	YES	YES	YES	YES

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## Résumé

Les années récentes ont témoigné un manque de dynamisme des marchés boursiers qui a poussé un nombre croissant d'investisseurs à se tourner vers les marchés privés, notamment le private equity.

Ce manuscrit aborde des thématiques qui caractérisent les mutations que connaît le private equity aujourd'hui: une recherche de liquidité relative, une quête de rendements supérieurs dans de nouveaux marchés et une stabilité des ressources humaines qui restent un vecteur de communication important lors des levées de fonds auprès des investisseurs.

Le premier essai de cette thèse examine l'impact de l'introduction en bourse des véhicules de private equity sur leurs performances et montre que cette recherche de liquidité induit une diminution significative des performances réalisées.

Le deuxième essai traite de la performance du private equity dans les marchés émergents et montre que la réussite de ces investissements est liée à la distance géographique et à la proximité culturelle entre les firmes de private equity et les entreprises financées.

Enfin, le dernier essai de cette thèse examine l'importance du capital humain pour les firmes de private equity et montre que la mobilité des managers détériore les performances réalisées.

## Mots Clés

Private equity, Performance, Introductions en bourse et Liquidité, Marchés émergents, Mobilité des managers

## Abstract

Recent years have witnessed a lack of momentum in equity markets that has driven a growing number of investors to turn to private markets, including private equity.

This manuscript addresses research questions that characterize the changes that private equity is experiencing today: a search for relative liquidity, a quest for superior returns in new markets, and a stability in human capital, which remains an important vector of communication during fundraising.

The first dissertation of this thesis examines the impact of the public listing of private equity vehicles on their performance and shows that exposure to liquidity induces significantly lower realized performances.

The second dissertation examines the performance of private equity in emerging markets and shows that the success of these investments is related to the geographic distance and the cultural proximity between private equity firms and the investee companies.

Finally, the last dissertation of this thesis examines the importance of human capital for private equity firms and shows that manager mobility deteriorates performance.

## Keywords

Private Equity, Performance, IPO & Liquidity, Emerging markets, Manager mobility