GDPR and the Localness of Venture Investment*

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Abstract

We examine how investors' tendency to invest locally interacts with Europe's General Data Protection Regulation (GDPR). Using five-year investment data, we demonstrate that GDPR differentially affects investors as a function of their proximity to ventures. We show that GDPR's rollout in May 2018 has negative effects on EU venture investment, and the effects are larger when ventures and lead investors are not in the same state or union. The relationship manifests in the number of deals and the amount invested per deal, and is pronounced for newer, data-related, and consumer-facing ventures, as well as for repeat investments. GDPR's earlier enactment in April 2016 exhibits similar effects for investors that invest out of their preferred industries.

Keywords: GDPR, investment, local preference, technology, new ventures

JEL Codes: G11, K20, D8

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1 Introduction

Data has become a key input in technology, attracting investments in data-driven innovations across the glove. Such innovations have transformed marketplaces, and the prospects of new services, insights, and monetization surrounding data have galvanized entrepreneurs and investors across industry sectors. Data-driven operations, however, are also associated with concerns about exposure, privacy intrusion, and misuses without the knowledge or consent of the source. These concerns, exacerbated by recent incidences of data breaches and related scandals, have led to calls for tighter rulesets that require more transparency, control, and the imposition of some limits on the collection, storage, and processing of users' data (Federal Trade Commission, 2012, 2014, 2016; European Data Protection Supervisor, 2016).

GDPR, a landmark EU privacy law that imposes conditions on firms' data practices, was enacted on April 14, 2016, becoming enforceable two years later on May 25, 2018. The regulation aims to protect data by 'design and default,' with both specific as well as heuristic requirements that firms handle data according to a set of principles. For the youngest of those firms and their investors, GDPR introduces significant relative costs and uncertainty. First, the regulation creates uncertainty with respect to which data-driven products are compliant, and whether products or processes need to be changed, since compliance itself is a function of heuristics that have yet to be fully tested in courts.[1] Second, ventures may rely on the compliance strategies of larger platforms, but many of these platforms only announced how they intend to pursue compliance on or around GDPR's implementation date,[2] and some

[1]For instance, ventures and investors may be unclear about whether legitimate interest (versus informed consent) is an adequate path to compliance. See, e.g., https://www.cpomagazine.com/data-protection/direct-marketing-under-the-gdpr-consent-vs-legitimate-interests/ and https://www.assetfinanceinternational.com/index.php/legal/legal-general/legal-general/17331-gdpr-confusion-over-legitimate-interest-affects-motor-retail-marketing.

[2]Examples include a SafeDK report that more than half of mobile applications are not compliant (https://www.mobilemarketer.com/news/study-55-of-apps-may-not-meet-gdpr-privacy-standards/515546/), Apple reportedly removing apps that share location data (https://www.idownloadblog.com/2018/05/09/apple-removing-apps-location-data/) and updating its privacy terms (https://techcrunch.com/2018/05/23/apple-introduces-new-privacy-portal-to-comply-with-gdpr/), Facebook announcing that "Businesses may want to implement code that creates a banner and requires affirmative consent. Each company is responsible for ensuring their own compliance" (https://developers.facebook.com/ads/blog/post/2018/05/10/compliance-protections-gdpr/), Shopify updating its app permissions for merchants and developers (https://www.shopify.com/partners/blog/gdpr-compliance), and Google releasing new consent requirements to developers (https://bit.ly/2ziUgJA).

are still revising their policies to reach compliance adequacy.[3] The choices of the larger platforms may also be critical for smaller firms because they influence those firms' data-related liabilities under the regulation.[4] As a consequence, the actual cost of compliance may change over time. The regulation is thus associated with uncertainties about the extent to which ventures are able to get their products to comply, and how much it would cost them to do so, with early indications that the costs may be significant (Goldberg et al., 2019; Jia et al., 2019). For investors, it follows that GDPR introduces new uncertainty, information acquisition, and due diligence costs pertaining to EU venture deals, and these costs may be particularly pronounced for investors who are not based in the EU.

In this paper, we empirically investigate how GDPR may aggravate investors' preferences for investing locally, that is, how investors' tendencies to favor investments in their geographical vicinity interfaces with the effects of GDPR on investments in technology ventures. The literature suggests that investors have better access to information about companies located near them, resulting in more investments being made in their geographical vicinity.[5] We refer to this tendency as "local preference" rather than "home bias" because bias must be relative to a well-defined benchmark of unbiased investment. More specifically, we do not seek to confirm or challenge the existence of investors' local preference; rather, we assess how such local preference interacts with a landmark data regulation like GDPR.

To examine the impact of GDPR on local and distant investors, we divide investors into three groups. Foreign investors belong not only to different states or countries but also different unions (e.g., US and EU). Same-union investors belong to different member states within the same union, whereas domestic investors belong to the same member state. Utilizing a difference-in-difference comparison between the EU and US, we demonstrate that GDPR's implementation has a greater effect on the EU ventures financed by non-EU investors than on those financed by EU investors. That is, GDPR amplifies the tendency of EU ventures to receive funding from closer investors. In particular, our findings suggest

[3]See, e.g., `https://www.nytimes.com/2019/01/21/technology/google-europe-gdpr-fine.html` and `https://www.ft.com/content/197a6758-a148-11e9-a282-2df48f366f7d`.

[4]See, e.g., `https://digiday.com/media/google-publishers-gdpr-standards/`.

[5]See, e.g., Coval and Moskowitz (1999).

a 22.20% reduction in the number of monthly EU foreign deals and a 41.89% reduction in their per-deal amounts after the rollout of GDPR relative to US ventures. In comparison, the reductions were 15.80% and 35.77% in the number and per-deal amounts, respectively, of same-union EU deals, and 12.1% and 28.08% in the number and per-deal amounts of domestic EU deals.

To gain more insight from the interaction between investors' preference to invest locally and a landmark data regulation, we proceed to break down these effects in multiple ways. First, by sorting ventures based on whether their products are more or less related to data. Second, by sorting ventures based on whether they are consumer or business facing (i.e., business-to-consumer or businesses-to-business). Third, by sorting ventures based on their age groups. Fourth, by sorting deals based on their funding stages (early, main, and late). Fifth, by distinguishing between US-based and non-EU-non-US based foreign investors in EU ventures (we do so by sorting deals based on three geographic investor areas—EU-based investors, US-based investors, and non-EU-non-US-based investors in the rest of the world). And sixth, by examining whether investors make follow-on investments in portfolio ventures.

We find strong evidence in support of a local preference effect (often called home or local bias) moderating the impact of GDPR on domestic EU investors across all specifications. In particular, we demonstrate stronger negative effects on distant investors pertaining to deals in more data-related ventures, in younger ventures, in early funding stages, and for investments in consumer-facing ventures. We further demonstrate that relative to US ventures, investors are less likely to re-invest post-GDPR in the EU portfolio ventures in which they invested pre-GDPR, and that this negative effect rises in the distance between (previous) investors and ventures (i.e., more distant investors participate in fewer follow-on rounds). Moreover, those EU ventures that do succeed in raising additional funding post GDPR tend to do so from investors who are geographically closer to them.

Our findings contribute to the intersection of the local investment preference and data

regulation literatures.[6] The literature has argued that investors who are geographically closer to ventures face lower risks and lower information costs than more distant investors, and close proximity to the invested ventures facilitates coordination and frequent interactions between investors and entrepreneurs (Cumming and Johan, 2007; Kang and Kim, 2008, 2010; Agarwal and Hauswald, 2010). Investors in closer proximity may have better understandings of the legal and institutional environments where their portfolio ventures initially operate. It has indeed been demonstrated that it is less costly to identify (Wright et al., 2005), screen and acquire information (Cumming and Johan, 2007), and monitor and support (Lerner, 1995; Jääskeläinen et al., 2006; Mäkelä and Maula, 2006; Sorenson and Stuart, 2001) geographically-close portfolio firms than distant ones, and that geographical distance is thus related to investment performance. As geographical, cultural, legal, and institutional distances increase, so do long-distance investors' expected costs. In turn, long-distance investments require higher expected returns to justify participation, which diminishes the pool of suitable opportunities (Florida and Kenney, 1988; Sorenson and Stuart, 2001; Guiso et al., 2009; Aizenman and Kendall, 2012; Giannetti and Yafeh, 2012; Bottazzi et al., 2016).[7]

Nascent ventures often face additional uncertainties driven by an incomplete resource base and a lack of organizational routines, networks, legitimacy in the marketplace, and managerial experience (Vohora et al., 2004), which investors in close proximity are naturally better positioned to monitor and address (Dai et al., 2012). Cumming and Dai (2010) examine local preference in the context of venture capital (VC) investments in the US market, suggesting that venture capitalists (VCs) exhibit strong tendencies to invest locally, especially VCs who specialize in technology industries and/or who invest alone rather than as a syndicate. In contrast, ventures in later stages may expand beyond their initial boundaries, both in terms of product as well as geography, which, unlike younger ventures, may posi-

[6]For recent surveys on investors' local preference and incentives for cross-border investments, see Coeurdacier and Rey (2012) and Devigne et al. (2018). For a recent survey on the economics of data and privacy, see Acquisti et al. (2016).

[7]While distant investors may form a syndicate to co-invest with local investors (Nahata et al., 2014; Chemmanur et al., 2016), the largest investors in a syndicate (i.e., lead investors), who put the largest amounts at stake, tend to conduct the due diligence in syndicated investments (Wright and Lockett, 2003), whereby if those investors are farther away from ventures, the issues pertaining to distance persist. Therefore, it is expected that for lead investors, geographical proximity to portfolio ventures is important.

tion them to more readily benefit from the knowledge-base and networks of foreign investors (Sapienza et al., 2006; Mäkelä and Maula, 2006).[8] Our analysis complements this literature by examining how investors' local preference interacts with a landmark data regulation.

On the regulatory front, the literature has shown that data regulation may disproportionately impact newer ventures (Campbell et al., 2015; Adjerid and Godinho de Matos, 2019) and distort the product distribution that new ventures pursue (Krasteva et al., 2015), which can further diminish the pool of suitable long-distance investments. Closest to our paper, Jia et al. (2019) demonstrate that the rollout of GDPR is associated with significant negative and pronounced effects on the number of EU venture deals, the size of those deals, and the overall amounts invested in EU ventures. While their focus is on the broader effects of data regulation on venture investment, the analysis provides a foundation for the present study about the dynamics between GDPR—an all-encompassing data regulation—and investors' local preference. To our knowledge, this paper is the first to study the interface between the two. Also closely related, Goldfarb and Tucker (2011, 2012) and Goldberg et al. (2019) examine the effects of data regulation. Goldfarb and Tucker (2011, 2012) examine the impact of the EU Privacy Directive on online advertising, demonstrating that the rollout of the Directive was associated with a decline in advertising effectiveness, thereby potentially reducing data monetization—a key component in the valuation of new data-driven ventures. Goldberg et al. (2019) examine the impact of GDPR on online web traffic, sales, and third-party tracking, demonstrating revenue declines due to the regulation. They further show that beliefs about local regulatory strictness may influence firms' compliance activities. Our

[8]Coval and Moskowitz (2001) link local preference to mutual fund performance, finding that US mutual fund managers prefer to invest in firms that are geographically near to them. Similar results have been shown with respect to other financial intermediaries (French and Poterba 1991; Parwada, 2008), as investment in new ventures involves considerable uncertainty and is characterized by asymmetric information at the outset and agency problems during the investment process (Cumming, 2006; Engel and Keilbach, 2007; Cumming and Dai, 2010). Investors that benefit from reputation (Krishnan et al., 2011), large local investment networks (Hochberg et al., 2010), and industry specialization (Cressy et al., 2007) tend to be associated with higher portfolio returns from nearby ventures, and may thus naturally hesitate to forego these advantages with long-distance investments. Home bias can simply refer to the observation that investors' portfolios can be disproportionately balanced in favor of domestic investments, which may be driven entirely by the expectations of higher net returns. However, the literature additionally offers behavioral elements, suggesting that 'familiarity' can be a primary determinant of investment choice (Huberman, 2001; Franke et al., 2006). At the same time, such behavioral elements can be translated to, e.g., lower costs of information acquisition.

study provides new and complementary insights from the perspective of investors. First, we show that GDPR's 2016 enactment had a significant impact but only on a subset of investors. Second, we show that the costs and uncertainty that underly GDPR's 2018 implementation (e.g., with respect to the adequacy of a venture's compliance, compliance costs, necessary product modifications, potential impact on data-driven revenues, and with respect to how larger platforms will pursue compliance) interface with investors' local preference. Hence, any regulatory approach that aims to alleviate some of the costs identified in these related works has to be cognizant of the different effects on investors.

The remainder of the paper proceeds as follows. Section 2 describes the data and Section 3 presents the overall empirical approach. Section 4 provides results related to the overall effects of GDPR at the aggregate and deal levels, and Section 5 gives subsample results broken down along different dimensions. Section 6 examines two extensions that shed some light on the underlying mechanism, and Section 7 concludes.

2 Data

The primary sources of data are the Thomson Reuter's VentureXpert (VX) and CrunchBase (CB) datasets. VX is a comprehensive dataset of venture capital investments (Aizenman and Kendall, 2012), and one that has been used extensively in VC investment research, both domestic (e.g., Cumming and Dai, 2010; Hochberg et al., 2010; Petkova et al., 2014) as well as cross-border (Dai et al., 2012; Mäkelä and Maula, 2006; Nahata et al., 2014). CB tracks similar information about emerging businesses, particularly in the technology space, and broadens the coverage of non-VC (e.g., angel) investors.[9] We collect VX and CB data on all venture related funding activities in the EU and US from January 2014 to June 2019, including financing round parameters such as venture information (name, location, operating category, founding date, and financing dates) and funding information (the size of a funding round, the date a round was announced, the type of financing such as seed, Series A, Series

[9]For recent activity in the academic literature that pertains to this data source, see Hochberg (2016), Kaplan and Lerner (2017), Lerner et al. (2018), Chatterji et al. (2018), and Jia et al. (2019).

B in CB data and Seed/Startup, Early Stage in VX data, and the number of investors per funding round). Each venture in the CB dataset is also tagged with relevant product keywords (e.g., 'software', 'data analytics', 'healthcare', 'banking', etc) and each venture in the VX dataset is tagged with an industry (e.g., 'healthcare', 'finance', etc).

For each venture financing round, both VX and CB track the location (country, state, city, and zipcode) of investors, the industry in which an investor prefers to invest (e.g., 'software', 'AI', 'analytic', 'internet', 'service', 'diversified', etc), the investor's age (i.e., the difference between the financing round year and the year that the investor began investing), the investor's size (i.e., the amount of capital under management in millions of dollars), and measures of the investor's experience (the number of investments the investor had before the financing round year, and the number of investments made in a particular industry as well as across all industries before the financing round year).

Venture deals (financing rounds) are often syndicated. The CB dataset indicates who the lead investor is in a particular deal (i.e., the investor who stakes the highest amount in a venture's financing round and conducts much of the due diligence). While the VX dataset does not specify a lead investor, it does indicate the dollar amounts invested by each investor that participates in a financing round; thus, we define the lead investor for the VX data as the one who invests the most in a round. We exclude about 270 deals from CB and 30 deals from VX that either have co-lead investors or equal investment amounts in a round. Henceforth, as far as the investor side of venture deals, our focus is on lead investors; for robustness, we also collect location data on other participating investors.

The CB data has a relatively large number of angel and earlier, seed-stage investments. The VX data has a relatively large number of venture-capital deals and investments in other funding stages. Due to our focus on venture-lead investor dyads, we exclude deal observations in which a venture's nation, investor's name, and/or the investor's nation are missing.[10] We also exclude investors who are bank (14,890 deals), government (8,502 deals), or university affiliated (3,202 deals). We focus on ventures in the stages that VX classifies

[10]In the CB data, the entirety of an investor's information is missing if the investor's name is missing.

as 'Startup/Seed', 'Early Stage', 'Expansion', or 'Later Stage', which excludes 23,102 deals at the 'Buyout/Acquisition', 'Real Estate', or 'Other' stages.[11] We remove deals which have undisclosed dollar amounts. Overall, there are 74,269 CB and 38,915 VX financing deals; of those, 15,467 (approximately 15.95%) overlap.[12] We group all funding deals from the two datasets into three funding stages — early stage (comprising 43% CB of deals, 32% of VX), main stage (31% of CB, 44% of VX), and later stage (22% of CB, 21% of VX).

There are 97,717 deal observations in the overall sample without duplicates, and about two thirds of the deals pertain to US ventures. Of the overall sample, 32,894 CB observations are missing dollar amounts, 3,674 observations in CB and VX are missing a funding stage (a control at the deal level), and 6,024 CB deals are missing both dollar amounts and investor information (e.g., investor name, investor location, investor type). Some VX observations do not have investor names but they do contain all of the other investor fields. Observations with missing dollar amounts (and missing funding stages at the deal level) are omitted from dollar-amount specifications. Number-of-deals specifications only omit the 6,024 observations missing both dollar amounts and all investor information. We calculate a venture's time-varying age based on its founding date.[13] We consider two different age categories: new and young firms (0-6 years old) and mature firms (6+ years old). Firms may consequently switch between age categories in our sample.

Both the VX and CB datasets track the preferred industries of investors, with slightly differing measures. VX either tags an investor's industry preference as a specific industry or, in cases where the investor has a history of investing across industries, tags it as 'diversified.'

[11]The two datasets categorize funding stages differently. VX has 4 major funding stage groups in our setting (start-up/seed, early stage, expansion stage, and later stage) whereas CB has more specific stages (e.g., angel, seed, series A, series B, private equity, post IPO, debt financing, etc). Early stage comprises angel, seed, pre-seed, convertible note, and product crowdfunding stages from CB, and startup/seed and early stages from VX. Main stage comprises series A, B, C, bridge series A-B, initial coin offering, and equity crowdfunding from CB, and expansion and acquisition stages from VX. Later stage comprises series D and later, private equity, debt financing, and post IPO activities from CB, and later stage from VX. The precise grouping of funding types does not change the nature of the results.

[12]Some venture names need to be matched between the two datasets due to small differences. For instance, a venture named "ABC" in CB may appear as "ABC Inc." in VX. The matching process is such that the search for matching keywords is automated but any 'approved' match is done manually.

[13]There are some cases where a founding date is unavailable or when a venture's first financing round predates its founding; in those cases, we use the venture's first financing round as its founding date.

In those latter cases, we track the histories of 'diversified' investors in our data to determine their two most common investment industries. To compare an investor's industry preference with the industry of a venture in a particular investment deal in the VX dataset, we pull the relevant industry tags from each venture's business description.[14] The CB dataset tags both investors and ventures with relevant industry keywords (for investors, the tags point to industry preferences; for ventures, the tags point to the industry to which their products belong), which we use to conduct a similar comparison. The comparison is based on the extent to which the investor-side tags match with the venture-side tags. Specifically, the percentage of overlap between the two sides of a deal (lead investor and venture) is calculated to determine the extent to which they belong to the same industry (i.e., whether the investor's industry preference lines up with the venture's industry). If the overlap exceeds a specified threshold, we count the investor and venture as belonging to the same industry. Our results are not sensitive to the precise threshold used—we report results for the threshold of 50%.

We treat each funding round observed as a 'deal' event, tallying deals per month in each US or EU member state.[15] We refer to a deal as foreign if the venture and the (lead) investor are from a different 'union' (i.e., one in EU and one in the US, China or elsewhere). A deal is said to be of the same union if the venture and the investor belong to different member states within the same union (e.g., a venture in France has a German lead investor, and a venture in New York has a lead investor from California). A deal is said to be domestic if the venture and the investor are from the same member state.

For each deal, we calculate the geographic distance between the lead investor and the venture by obtaining the latitude and longitude coordinates of the center of their respective zip codes (for US investors, from the Census Bureau's Gazetteer) and cities (for EU

[14]For example, Flyreel Inc., which provides artificial-intelligence solutions for property insurance, raised a financing round with a lead investor who focuses on investing in the Artificial Intelligence sector. Flyreel's industry thus matches its lead investor's preferred industry in this round.

[15]Despite Brexit, we include Great Britain as part of the treatment group due to its adoption of a GDPR-like regulation in the same time frame as the rest of the EU, and due to the fact that it is still bound by GDPR during our sample. In addition, the few observations we have for Bulgaria, Cyprus, Malta, and Lithuania are removed because some macroeconomic variables were not available for those member states at monthly frequencies.

investors).[16] In line with Cumming and Dai (2010), we estimate the geographic distance between their respective coordinates as follows:

$$d_{ij} = 3963 \times ar\_cos\lfloor sin(lat_i)sin(lat_j) + cos(lat_i)cos(lat_j)cos(\mid long_i - long_j \mid)\rfloor,$$

where *lat* (latitude) and *long* (longitude) are measured in radians and 3963 is a constant representing the radius of the Earth in statute miles.[17]

For each deal, the VX dataset groups ventures into industry groups that we further categorize into healthcare, finance, information technology (IT), and others. We use these four categories to determine an investor's experience in a specific industry, which is later used as a control variable in our deal-level analysis. In cases where a venture's categorization is not directly available (CB does not have categories, and VX has additional category groupings), we mimic the VX categorization for healthcare, finance, and IT by utilizing each venture's keyword tags, prioritizing the healthcare category, then finance, then IT. Our results are not sensitive to the precise categories. The category distributions in both the VX and CB datasets are quite similar, with 15.28% of the deals in healthcare, 11.15% in finance, 63.21% in information technology (IT), and the remaining 10.36% in the 'other' group. Separately, we also group all ventures that are tagged with data-related keywords (such as data, statistics, evidence, apps, location-based services, AI, social media, and e-commerce) into the more-data-related group; all other ventures are in the less-data-related group.[18] We similarly identify 'B2C-focused' and 'B2B-focused' ventures based on relevant keywords (such as 'B2C,' 'consumers,' and 'individuals' for the B2C category; and 'enterprise,' 'business,' and 'software as a service' for B2B).

In line with Goldberg et al. (2019), we incorporate a measure of regulatory strictness by

[16] As a robustness check, we assessed the impact of lead investors syndicating with local investors in a round, separating foreign investors into two further subgroups, one that co-invests with local investors and one that does not, and the results were similar for both subgroups.

[17] Sorenson and Stuart (2001) use '3437' as the constant representing the radius of the Earth in nautical miles; Coval and Moskowitz (1999, 2001) use '6379' as the constant representing the radius of the Earth in kilometers. Using these different units (i.e., nautical or kilometer) does not alter the nature of the results.

[18] While this categorization is crude, it captures the essence of our intent to roughly categorize firms by how critical data is to their operations. The results are not sensitive to the precise keyword grouping we use.

making use of the European Commission's 2008 survey of 4,835 data controllers:[19] "Data Protection in the European Union: Data Controllers Perceptions." Specifically, we use question Q3B of the survey: "The data protection law in (OUR COUNTRY) is interpreted and applied more rigorously than in other Member States." Respondents either totally agreed, rather agreed, rather disagreed, totally disagreed, or abstained, and the survey results provide the percentage of respondents who selected each answer in each EU member state. The continuous and time-invariant measure on which we focus is the proportion of respondents who either 'agreed' or 'rather agreed' with the survey's statement. We further collect local macroeconomic controls such as unemployment rate, CPI, interest rate, and GDP per capita for each member state in which a venture is located.

Table 1 reports the summary statistics at the aggregate level for ventures in the EU and US. Panel A indicates that our sample comprises ventures in 24 EU member states and 51 US states including the District of Columbia (henceforth, states). On average, the number of deals per state of each deal type are similar between the EU and US. Panel B suggests that both EU and US investors tend to invest in domestic and same-union deals, though, percentage-wise, more EU investors invest in US ventures than vice versa. Panels C through E report summary statistics for each of the subgroups we track. Figure 1 depicts monthly trends for the average number of deals of each type (foreign, same-union, and domestic). There are no noticeable differential trends between the EU and US prior the announcement of GDPR. Figure 1(a) indicates a significant divergence between US and EU ventures in the number of foreign investment deals after the rollout of GDPR. Figures 1(b) and 1(c) suggest lesser effects for same-union and domestic venture deals.

From the perspective of investors, Figure 2 highlights investors' local preference, with domestic deals topping foreign deals in Figures 2(a) and 2(b), and non-EU/non-US investors splitting their investments roughly equally between the US and EU in Figure 2(c), up until the rollout of GDPR. All three figures seem to point to some divergence after GDPR's rollout, but the magnitude of such divergence seems smallest for EU investors in Figure 2(a), perhaps

[19] See: `http://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_226_en.pdf`

indicative of their local preference.

Summary statistics at the deal level are in Table 2. Panel A details deal and venture characteristics in our sample, suggesting that the average dollar amount raised per deal in the US ($17.78 million) doubles that in the EU ($8.72 million). The distribution is highly skewed in both the EU and US, with the median dollar amounts raised per deal ($2.03 million for the US and $0.95 million for EU) much lower than the respective averages. The average venture age is about 3 years in both the EU and US. The number of investors per deal is similar for both EU and US ventures. Panel B reports investor characteristics, indicating that US investors tend to be older (11 years in the US compared to 8 years in the EU, on average). US investors also have larger capital under management compared to EU investors. The average age of investors outside of the EU and US and their capital under management is similar to US investors. Panels C and D report summary statistics for the type of investments (foreign, same-union, domestic) from the perspective of ventures and investors, respectively. Panel C suggests that deals with foreign lead investors are associated with significantly larger dollar amounts, with, for instance, a $16.76 million average EU-venture foreign deal size compared to $8.49 and $5.41 million on average for same-union and domestic EU-venture deals. In the EU, 52.01% of EU venture deals in our sample are led by domestic investors, compared to 25.06% and 22.93% by same-union and foreign investors, respectively. In the US, in contrast, 39.36% of deals are domestic, compared to 34.65% and 25.99% by investors from different states and by foreign investors, respectively. The summary statistics along with Figures 1 and 2 paint a picture that is consistent with the literature, suggesting that investors tend to prefer to invest locally.

3 Empirical Approach

We aim to examine how investors' local preference interacts with the effects of GDPR on investment in technology ventures. We do so by contrasting venture activity in the EU with the US before and after both the enactment and the rollout of GDPR. We hypothesize that

GDPR intensifies ventures' tendencies to receive local funding. While GDPR was enacted in April 2016, its enforceability began to take hold in May 2018, with mandatory implementation by EU member states and mandatory compliance by firms that service EU citizens. Consistent with Jia et al. (2019), we anticipate that as GDPR's enforceability came into place, entrepreneurs and investors realized the compliance, uncertainty and implementation costs, as well as the ex-post implications of GDPR. This is particularly evident in the days and weeks immediately before GDPR's effective date, as major platforms, on which a vast number of technology ventures rely, began to reveal the ways in which they were tightening their developer-side services with new data sharing, data portability, and data liability rules.

We assess the differential effects of GDPR based on where investors and ventures are located using a difference-in-differences methodology (DID). We carry out the empirical analysis at two levels. At the aggregate, each observation is defined at the month-state level and the dependent variable is the number of deals reached in each month-state. The number of deals provides a metric for the extensive margin and could be zero if no ventures in the state had any deals in a given month. As a measure of the geographic zones to which investors and ventures belong, we sort deals into three different types—foreign, same-union, and domestic deals. At the deal level, the dependent variable is either the dollar amount raised per deal or the geographical venture-to-investor distance, both of which are always positive. The dollar amount raised per deal provides a metric for the intensive margin.

Across the different specifications, the treatment groups comprise deals that involve EU ventures and the control groups comprise deals that involve US ventures. While the treatment groups do tend to have lower levels of venture activity than the control groups, there does not appear to be a differential pre-trend that would violate the common trend assumption in our DID analysis. At the aggregate level, Figures 1(a)-(c) depict trend lines of the number of foreign, same union, and domestic deals per month-state from January 2014 to June 2019.[20] All subfigures suggest that no divergence took place between the EU and US

[20]We separate the deals at the state level since: (i) The implementation of GDPR, while aiming for a uniform law, is local (i.e., country-level enforcement in the EU). (ii) There is no US federal privacy legislation except for select age groups or sectors such as healthcare and finance. (iii) Each EU member state is not comparable with the US at the macro level, and some macro variables such as unemployment are local.

after the enactment of GDPR, but some sustained divergence took place around the time of GDPR's roll out. Both EU and US trends also track each other closely otherwise, and particularly so up until May 2018. For aggregate-level analysis, our specification is given by:

$$y_{st} = \alpha_s + \alpha_t + \delta X_{st} + \beta_1 EU_s \times GDPR\_Enact_t + \beta_2 EU_s \times GDPR\_Rollout_t + \varepsilon_{st}, \quad (1)$$

where s denotes state, t indexes month, EU_s is a dummy that equals 1 for EU states and 0 otherwise, $GDPR\_Enact_t$ is a dummy variable which equals 1 if the time t is on or after April 2016 but before May 2018 and 0 otherwise, and $GDPR\_Rollout_t$ is a dummy variable which equals 1 if the time t is after May 2018 and 0 otherwise. The dependent variable of interest is Y_{st}, which is the number of financing deals in each month-state. Year-month and state fixed effects are denoted by α_t and α_s, respectively, whereas X_{st} are state-specific macroeconomic control variables (monthly unemployment rate, CPI, interest rate, and quarterly GDP per capita), and ε_{st} is an error term. The coefficients β_1 and β_2 capture the effects of GDPR's enactment and rollout across all categories, respectively. Standard errors are clustered at the state level, because GDPR mandates state-specific enforcement and the heterogeneity is confirmed in market perception.[21] We use a Poisson specification for the number of deals regressions due to a large number of zeroes at the month-category observation level. In all cases, we obtain similar results with OLS.

Figure 2 depicts coefficient plots of the monthly pre-treatment tests for the three types of deal counts (foreign, same-union, and domestic deals) using the Poisson specification. To perform the pre-treatment tests, we run the same specifications for the pre-GDPR enactment data, including a full set of interactions between the EU dummy and each month dummy. The

[21] While GDPR applies to all EU countries, the policy change is at the state level. This follows from the definition of the 'lead supervisory authority,' which has the "primary responsibility for dealing with a cross-border data processing activity, for example when a data subject makes a complaint about the processing of his or her personal data." The location of the lead supervisory authority is based on a firm's main establishment location. Recital 127 further states that: "Each supervisory authority not acting as the lead supervisory authority should be competent to handle local cases where the controller or processor is established in more than one Member State, but the subject matter of the specific processing concerns only processing carried out in a single Member State and involves only data subjects in that single Member State." Goldberg et al. (2018) additionally demonstrate that GDPR suffers from implementation heterogeneity across EU countries, heterogeneity that lines up with traditional member state enforcement behaviors.

coefficients of these interactions are depicted along with their confidence intervals. Figure 2(a) indicates that there is no pre-existing differential trend between the EU and US in the number of foreign deal prior to April 2016, confirming the observable trends in Figure 1(a). Figures 2(b) and 2(c) similarly demonstrate that there are no pre-existing differential trends between the EU and US in the number of same-union and domestic deals prior to April 2016, also confirming the observable trends in Figures 1(b) and 1(c).[22]

To take into account the potentially different enforcement protocols and levels of regulatory strictness of the supervisory authorities in different EU member states—at the very least as ex-ante perceived by investors—we incorporate an additional measure of regulatory strictness, making use of the European Commission's 2008 survey of 4,835 data controllers.[23] The survey results suggest that a third of respondents believed the data protection laws in their country were applied more rigorously than in other member states, with a quarter saying the opposite. More developed countries such as France, Germany, and the UK tend to be correlated with perceptions of stricter enforcement. To decouple the effect of regulatory strictness from GDP per capita, we use the following specification at the aggregate level:

$$\begin{aligned} y_{st} = \alpha_s + \alpha_t + \delta X_{st} + \beta_1 EU_s \times GDPR\_Enact_t + \beta_2 EU_s \times GDPR\_Rollout_t \\ + \beta_3 RS_s \times GDPR\_Enact_t + \beta_4 RS_s \times GDPR\_Rollout_t \\ + \beta_5 GDP \times EU_s + \beta_6 GDP \times GDPR\_Enact_t + \beta_7 GDP \times GDPR\_Rollout_t \\ + \beta_8 GDP \times EU_s \times GDPR\_Enact_t + \beta_9 GDP \times EU_s \times GDPR\_Rollout_t + \varepsilon_{st} \end{aligned} \tag{2}$$

In (2), RS_s gives the proportion of survey respondents in each EU member state who believe their supervisory authority is relatively strict (we set $RS = 0$ for all US states), such that $RS_s \times GDPR\_Enact_t$ and $RS_s \times GDPR\_Rollout_t$ are the interaction terms between the measure of regulatory strictness and the $GDPR\_Enact_t$ and $GDPR\_Rollout_t$ dummies. Sim-

[22] We include the months of April 2016 in the post-enactment period and May 2018 in the pre-rollout period. The results are unchanged if we remove these months from the sample.

[23] A large body of literature examines the relationship between legal frameworks and investors' incentives. See, e.g., Lerner and Schoar (2005) and Cumming (2008).

ilarly, $GDP \times GDPR\_Enact_t$ and $GDP \times GDPR\_Rollout_t$ are the interaction terms between a state's GDP per capita and the $GDPR\_Enact_t$ and $GDPR\_Rollout_t$ dummies, whereas $GDP \times EU_s \times GDPR\_Enact_t$ and $GDP \times EU_s \times GDPR\_Rollout_t$ are the three-way interaction terms of a state's GDP, the EU dummy, and the $GDPR\_Enact_t$ and $GDPR\_Rollout_t$ dummies.[24]

We further test the effects of GDPR at the aggregate level for different subgroups of ventures or investors. Specifically, the above specifications are separately applied to (i) EU investors only, US investors only, and all non-EU and non-US investors; (ii) more-data-related and less-data-related ventures; (iii) different funding stages (early, main, late); and (iv) different venture age groups (0-6, and 6+ years old).

At the deal level, we use the specification

$$ln(y_{jsct}) = \tag{3}$$

$$\alpha_s + \alpha_c + \alpha_t + \delta X_{jsct} + \beta_1 EU_s \times GDPR\_Enact_t + \beta_2 EU_s \times GDPR\_Rollout_t + \varepsilon_{sct},$$

where j identifies deals according to their assigned unique identifier, the dependent variable $ln(y_{jsct})$ is either the log of the dollar amount raised or the log of the geographic venture-investor distance in deal j, and α_t, α_s, and α_c are month, state and category fixed effects. Deal-level control variables in X_{jsct} include funding type, firm age, investor type, investor size (capital under management), investor age, investor experience across all industries, investor experience in the venture's industry, and the investor's exit count (the number of portfolio ventures that were acquired or had gone public). The error term is given by ε_{jsct}, and all other dummy variables are the same as previously. We use the log of the amount raised per deal because while the amount is always positive, its distribution is highly skewed. In all deal-level specifications, error terms are double clustered by state and investor id.

[24]Regulatory strictness RS_s only takes non-zero values for EU states, so three-way interactions $RS_s \times EU_s \times GDPR_t$ are the same as two-way interactions $RS_s \times GDPR_t$.

4 Local Preference and Overall GDPR Effect

We begin by examining how the aggregate monthly number of deals for each state in each deal category (i.e., foreign, same union, or domestic) changes from the pre- to the post-periods of the enactment and rollout of GDPR. Column 1 of Table 3 reports the results of our baseline specification for foreign deals. The results suggest that GDPR's enactment had no significant effect on the number of foreign deals per EU state.[25] However, the number of foreign deals in each EU state experienced a 22.20% decrease after the rollout of GDPR, where the $EU \times GDPR\_Rollout$ coefficient is translated to a marginal effect that is evaluated at the mean value of the other covariates, giving the impact due to being subject to GDPR. Columns 2 and 3 test GDPR's effect on the number of same-union and domestic deals, suggesting respective decreases of 15.80% and 12.10% in each EU state after the rollout of GDPR. The results point to significant decreases in the number of EU deals after GDPR's rollout, but lesser decreases in same-union and domestic deals.[26]

Adding in the measure of regulatory strictness to the specification, we test whether the negative effects of GDPR's rollout are driven by perceptions about regulatory strictness or GDP. Column 4 demonstrates that when adding in this measure, the estimated effect is stronger, suggesting a 26.42% decrease in the aggregate number of foreign deals per EU member state after the rollout of GDPR. Similarly, Columns 5 and 6 indicate decreases of 13.48% and 9.92% for same-union and domestic deals, respectively. The coefficient on the regulatory strictness variable is significant and negative, suggesting that greater perceptions of stricter enforcement are associated with more negative effects of GDPR. The coefficient on the GDP per capita interaction term is also significant and negative, indicating that larger economies, which likely tend to be more concerned with data privacy, experience a greater relative reduction in the number of deals that go through. An OLS specification with the dependent variable of $ln(1 + \#$ of deals) in Columns 7 to 9 indicates decreases of

[25] Potential explanations for the lack of effects from GDPR's announcement include difficulty in predicting the extent and veracity of enforcement, high fixed and variable compliance costs, a general attitude of wait and see, in addition to reliance on big platforms to define the general ecosystem.

[26] Throughout, the qualitative nature of the results is unchanged if we exclude one or multiple large investors and when only observations from the third quarter of each year are included to control for seasonality.

16.22%, 10.33% and 6.85% for foreign, same-union and domestic deals, respectively, where the marginal effects on the number of deals are computed from the estimated coefficients of $EU \times GDPR\_Rollout$, accounting for the fact that the dependent variable is log of one plus the number of deals.

To provide a crude measure of 'cultural' norms and differences, we consider an investor and a venture who are from the same continent as 'broadly' culturally similar (Hofstede, 2001; Griffith et al., 2005; Chakrabarti et al., 2008; Tung and Verbeke, 2010; Shenkar, 2012). The next specification separates deals based on whether or not investors and ventures belong to the same continent, with EU (US) ventures still comprising the treatment (control) group. Columns 1 and 2 of Table 4 report the effects of GDPR on the aggregate number of deals when venture-investor continents differ and when they are the same, respectively. We focus on the marginal effects computed from the estimated coefficients of the Poisson specification. Our baseline model suggests decreases of 20.15% and 12.45% in the number of different-continent and same-continent deals after the rollout of GDPR, respectively, but no significant effect after GDPR's enactment. Columns 3 and 4 add regulatory strictness and GDP per capita interaction terms to the baseline specification and result in similar decreases.

We next assess the impact on deals based on whether investments are made inside or outside investors' preferred industries. When investing outside their preferred industries, investors may incur additional uncertainty and costs of due diligence (for instance, investors may have a superior network or experience in their preferred industries). To examine whether GDPR has a differential impact vis-à-vis investors' local preference as a function of whether the industry in which a venture operates matches its lead investor's preferred industry, we separate the number of deals into two groups—deals in which the investor-venture industries sufficiently overlap and deals where they do not. The results are not sensitive to the precise grouping (i.e., overlap threshold) and are reported for a threshold of 50%.

Columns 5 and 6 of Table 4 give the effects of GDPR on the number of deals for different and overlapping investor-venture industries, respectively. Our baseline specification indicates a 10.51% decrease in the number of deals for different investor-venture industries after the

2016 *enactment* of GDPR but no such effect for deals in which investor and venture industries overlap. These results suggest that investors who invest in EU ventures that are outside their preferred industries are more reluctant to invest after GDPR's enactment, potentially because of the additional informational disadvantage to which investors in such deals are subjected. Columns 5 and 6 further suggest decreases of 23.43% and 14.44% in the number of different and overlapping investor-venture industries deals, respectively, after the rollout of GDPR. Adding in the regulatory strictness and GDP per capita interaction terms yields similar results.

Overall, the aggregate number-of-deals analysis represents a salient extensive margin effect, suggesting a substantially greater percentage of foreign funding rounds may fail to materialize after the rollout of GDPR, though all three deal types, foreign, same-union, and domestic, decrease following GDPR's rollout. The next set of results assesses the differential impact of GDPR on the intensive margin (dollar amount raised per deal) as well as on the geographical distance between ventures and lead investors. The aim is to identify whether, for deals that go through, the different deal types are also associated with a differential impact on the dollar amount raised, and whether the distance between lead investors and EU ventures shrinks after the enactment and rollout of GDPR.

Table 5 provides the results of the deal-level log-linear specification. Column 1 suggests a 25.8% decrease in the geographical distance between investors and EU ventures after the rollout of GDPR and no significant effect its enactment. Columns 2-4 suggest reductions of 41.89%, 35.77%, and 28.02% in the dollar amount raised per deal for foreign, same-union, and domestic deals, respectively, after the rollout of GDPR, but no significant effect after its enactment. Columns 5 and 6 report decreases of 39.82% and 26.13% in the dollar amount raised per deal for different-continent and same-continent deals, respectively, after the rollout of GDPR, and no significant effect after its enactment. Columns 7 and 8 indicate decreases of 46.98% and 27.33% in the dollar amount raised per deal for different and overlapping investor-venture industry deals, respectively, after the rollout of GDPR. Column 7 also indicates a decrease of 23.34% in the dollar amount raised per deal in different investor-venture industries

rounds after the enactment of GDPR. The intensive margin analyses thus match those for the extensive margin and point to GDPR-reinforced local-preference for domestic EU investors.

5 Local Preference and Heterogeneous GDPR Effects

While the effects we have measured thus far may be negative and statistically significant, particularly for the rollout of GDPR, there may exist heterogeneity in the effects across different groupings of investors and ventures. This section applies the baseline specifications to different subsamples. Specifically, we consider the following different groupings: (i) by venture propensity to utilize data; (ii) by whether ventures are consumer (B2C) or business (B2B) facing (iii) by (early, main, late) funding stages; and (iv) by venture age group (0-6 and 6+ years old).

One example of subsample heterogeneity is depicted in Figure 3, where the monthly number of deals for the EU and US are plotted separately for more-data-related ventures and less-data-related ventures. There is no apparent differential trend between the EU and US prior to April 2016, and the rollout of GDPR appears to have had effects for both venture groups. We apply the baseline specifications to these subsamples and Table 6 reports the results for the number of foreign, same-union and domestic deals, and the number of overlapping vs different investor-venture industry deals. For more-data-related ventures, Columns 1-3 indicate margin reductions of 26.29%, 20.71% and 13.67% in the number of foreign, same-union and domestic deals, respectively, following GDPR's rollout, but no significant effects following its enactment. For the subsample comprising less-data-related ventures, Columns 4 and 5 suggest small negative effects for the number of foreign and same-union deals after GDPR's rollout; however, the effect on the number of domestic deals is insignificant in Column 6. Applying a SUR test further shows that the coefficients on $EU \times GDPR\_Rollout$ significantly differ across the two groups, such that more-data-related ventures are associated with larger negative effects following GDPR's rollout. Columns 7-10 indicate negative effects after both the enactment and rollout of GDPR on the number of deals where investors'

preferred industries differ from ventures' industries, but only for the more data-related subsample; the magnitude of the effect is still larger after the rollout of GDPR than after its enactment.

Business-to-consumer (B2C) ventures, which tend to deal with a greater number of individual users—as opposed to a smaller number of customers in the form of businesses for business-to-business (B2B) ventures—may face higher costs of compliance. If that is indeed the case, it stands to reason that investors would, in an overall sense, anticipate B2C ventures to incur greater compliance costs relative to B2B ventures after the rollout of GDPR, which is indeed reflected in a higher relative absolute drop of investment in B2C ventures, both in terms of the number of deals and amounts invested (Jia et al., 2019).

In addition to the higher compliance costs for B2C relative to B2B ventures, more distant lead investors appear to react differently to GDPR for one group (B2C) and considerably less so for the other (B2B). Columns 11 and 12 of Table 6 report the results of an OLS specification using the logarithm of lead investor-venture distance as the dependent variable for B2C and B2B ventures, respectively. The results indicate that the distance between investors and ventures of B2C deals shrinks 26.1% compared to 10.6% for B2B deals after the rollout of GDPR. These findings suggest that ventures that are more impacted by GDPR tend to also be associated with a greater extent of pullback from more distant investors.

Two other examples of subsample heterogeneity are depicted in Figures 4 and 5, where the number of deals is depicted for the 0-6 and 6+ year-old venture age groups and for the three (early, main, late) funding stages. Under the groupings of the three different (foreign, same-union, domestic) deal types, for 0-6 year old ventures, Columns 1-3 of Table 7 suggest reductions in the number of monthly deals per member state after the rollout of GDPR of 23.36%, 14.27%, and 10.68% for foreign, same-union, and domestic deals, respectively. For 6+ year-old ventures, Columns 4-6 suggest a negative effect on foreign deals (a 14.62% decrease) after GDPR's rollout, but insignificant effects for same-union and domestic deals. Neither subsample shows a significant effect after GDPR's enactment. These results suggest that while more established EU ventures incurred less of a negative effect after GDPR's

rollout, the post-GDPR intensification in the localness of venture funding appears to persist.

Table 8 reports results from the grouping based on early, main, and late funding stage deals. Columns 1 and 4 indicate that GDPR's rollout had a significant negative effect on the number of foreign deals per month in both the early and main stages, with margin reductions of 25.55% and 17.72%, respectively. Columns 2 and 5 similarly indicate decreases of 17.39% and 12.01% in the monthly number of same-union deals in the early and main stages after GDPR's rollout. Columns 3 and 6 indicate a corresponding decrease of 11.13% in the monthly number of early-stage domestic deals, but insignificant effects for main-stage domestic deals. Columns 7-9 report insignificant effects all across deal types for the late stage subsample.

Ventures in the 0-6 year-old age group in our sample are those that primarily seek seed and early series financing, as indicated in Figure 6—rounds where angel investment and venture capital begin to overlap, with venture capital replacing some of the funding previously raised from angel investors. In Figure 6, the circles depict the relative number of observations, with larger circles indicating more deals. The number of Seed, Series A, and Series A-B deals in Figure 6(a) for 0-6 year old firms are significantly larger than their corresponding numbers in Figure 6(b) for 6+ year-old firms. The combined estimates of Tables 7 and 8 thus suggest that those nascent firms that most critically depend on angel and VC financing are also the ones that on the margin benefit the most from their domestic investors' local preference. That is, the local preference of EU investors somewhat dampens the negative effects on EU ventures from GDPR's implementation.

6 Investor Location and Initial vs Repeat Investment

We next take steps towards disentangling some of the underlying drivers that may explain the observed wedge in the reaction to GDPR by investors who are closer to the EU ventures in which they invest and more distant investors. To do so, we use investor information to better understand how EU venture investment becomes more local post GDPR.

6.1 Geographic Zones

While GDPR negatively affected foreign investment in EU ventures, it has been unclear whether this pullback is driven by US investors or non-EU/non-US investors. Grouping investors by their location, we segment the sample into three subsamples of EU-based-only (EU-only) investors, US-based-only (US-only) investors, and non-EU-non-US-based only (non-EU/US) investors. Figure 7 depicts the trends of the monthly number of deals, plotted separately for EU-only investors, US-only investors, and non-EU/US investors. There are no apparent differential trends prior to April 2016, and GDPR's rollout seems to have had effects across the different groups, though especially for US-only and non-EU/US investors.

Note that it is impossible to group individual deals based on whether deals are foreign, same-union or domestic in each subsample by investor location, since it would, by construction, either set the treatment or the control group as all zeroes (e.g., for the EU-investors-only subsample, EU ventures would either be part of same-union or domestic deals, whereas only US ventures would be part of foreign deals). Hence, only the number of deals is counted in this specification. That is, for the subsample of EU-only investors, the treatment group comprises their same-union deals and domestic deals, while the control group comprises their investment in US ventures (foreign deals). Similarly, for the subsample of US-only investors, the treatment group comprises their investments in EU ventures (foreign deals) and the control group comprises their investments in same-union and domestic deals. In the subsample of non-EU/US investors, the treatment group comprises deals associated with their investment in EU ventures and the control group comprises their investments in US ventures. This latter subsample makes it possible to (i) examine the effect of US investors' local preference, and (ii) assess the shift in investment preferences of investors outside of the EU and US after the enactment and rollout of GDPR, where a negative effect would indicate a withdrawal of funding by these investors from EU ventures relative to US ventures.

Table 9 reports the results from applying the baseline specification for the number of deals and for the grouping of overlapping vs different investor-venture industries, when further dividing the sample into the three categories by investor location (EU-only, US-only, non-

EU/US). Consistent with the overall baseline results, Columns 1-3 indicate that GDPR's rollout had a negative effect on investment in EU ventures, suggesting decreases of 10.68%, 21.48% and 18.04% from EU-only, US-only and non-EU/US investors. These results lend further credence to the existence of a local preference moderating the impact of GDPR on investments by EU-based investors in EU ventures. In line with the overall effects of GDPR, Columns 4 to 9 indicate that there is a negative effect on the number of deals after *both* the enactment and the rollout of GDPR for deals in which ventures' industries do not overlap with the preferred industries of their lead investors.[27]

6.2 First Round and Repeat Investment

We next focus only on ventures that receive their initial round of financing. We test the effects of GDPR on the number of such first-round deals based on venture and investor locations. Table 10 reports the results from our baseline specification. Columns 1 to 3 suggest that relative to US ventures, foreign investors pull back more—a decrease of 15.02%—from first-round investments in EU ventures after the rollout of GDPR compared to same-union (a decrease of 8.89%) and domestic investors (a decrease of 6.17%). Columns 4 to 6 demonstrate a similar pullback by non-EU/US investors. Hence, these results reinforce the negative impact of GDPR on nascent ventures vis-à-vis foreign investment, and the intensification in nascent EU ventures being locally funded.

Our focus now shifts to assessing the effects of GDPR on repeat investments. A lead investor from a prior round may have inside information about the venture in which they invested, particularly the extent to which the venture is able and prepared to comply with GDPR. Differential changes in prior lead investors' willingness to re-invest and participate in follow-on rounds may provide further evidence of how a landmark data regulation such

[27]Braun et al. (2019) and Woodward (2019) demonstrate US investors may improve an EU venture's access to capital and expert networks. As a robustness check, we separated deals into a subgroup with a participating US investor (i.e., not necessarily as the lead investor), and a subgroup without US investors (deals with investors in the EU and/or the rest of the world except US), and then reran the analysis. GDPR's rollout has a significant negative effect on both types of deals, though the magnitude for deals with US investors is larger (i.e., more negative). This could be because those investors have access to better outside options through US venture networks.

as GDPR may aggravate any observed tendencies by investors to invest locally. In the proceeding, we count a lead investor in a previous round as a repeat investor in a subsequent round if they participate in the latter in any capacity, including not as a lead. Our focus is primarily on lead investors because they tend to have relatively larger investor shares and because they are most likely to have inside information.[28] The literature has also shown that a negative signal may be inferred by outsiders when previous investors do not participate in a subsequent round (see, e.g., Kim and Wagman, 2016).

Columns 1 and 2 of Table 11 report the effect of GDPR on the distance between lead investors and ventures in the cases with repeat and non-repeat investors. Column 1 indicates that the distance between investors and ventures in the case of repeat investments decreases 12.35% after the rollout of GDPR compared to a 27.61% decrease in the case of non-repeat investments in Column 2. The decrease in Column 1 suggests that lead investors change in subsequent rounds more for EU ventures after GDPR, and their replacements tend to be investotrs who are located closer to the ventures. The decrease in Column 2 is, at least in part, because lead investors change by default for this grouping, but also potentially because distant investors pull back more from deals without repeat investors (e.g., due to a negative signal). In order to disentangle these two effects, we use Probit specifications to assess the probabilities that (i) the prior lead investor also leads a subsequent round conditional on a venture receiving an initial investment prior to GDPR's enactment, (ii) the prior lead investor participates in a subsequent round in any capacity, and (iii) that more distant lead investors from previous rounds participate in subsequent rounds. We use the following specification:

$$y_{st} = \alpha_s + \alpha_t + \delta X_{st} + \beta_1 EU_s \times GDPR\_Enact_t + \beta_2 EU_s \times GDPR\_Rollout_t$$

[28] Conditional on ventures having at least two financing rounds with one of them prior to GDPR's enactment in April, 2016, we set a 'repeat-lead' dummy equal to 1 if the lead investor from a previous round is the lead investor in the follow-on round and 0 otherwise, and a 'repeat-investor' dummy equal to 1 if the lead investor from a previous round participates in the subsequent round in any capacity and 0 otherwise. There are 5,896 deals with repeat investors that have an initial round before the enactment of GDPR with subsequent rounds after its enactment (12,715 observations including pre and post deals) and 1,765 deals in the non-repeat group (3,567 observations including previous round deals).

$$+\beta_3 PRD_s \times EU_s + \beta_4 PRD_s \times GDPR\_Enact_t + \beta_5 PRD_s \times GDPR\_Rollout_t \qquad (4)$$

$$+\beta_6 PRD_s \times EU_s \times GDPR\_Enact_t + \beta_7 PRD_s \times EU_s \times GDPR\_Rollout_t + \varepsilon_{st},$$

where PRD_s gives the distance between the lead investor and the venture in the previous funding round, such that $PRD_s \times GDPR\_Enact_t$ and $PRD_s \times GDPR\_Rollout_t$ are the interaction terms between the previous round distance and the $GDPR\_Enact_t$ and $GDPR\_Rollout_t$ dummies, whereas $PRD_s \times EU_s \times GDPR\_Enact_t$ and $PRD_s \times EU_s \times GDPR\_Rollout_t$ are the three-way interaction terms of the previous round distance, the EU dummy, and the $GDPR\_Enact_t$ and $GDPR\_Rollout_t$ dummies. The dependent variable is either the repeat lead dummy (Column 3) or the repeat-investor dummy (Columns 4 - 5).

Column 3 indicates that the lead investors in initial rounds of EU ventures, relative to their US counterparts, are significantly less likely—a 32.43% decrease—to continue to be the lead in a subsequent round after the rollout of GDPR. Column 4 suggests that relative to US ventures, EU ventures that were funded prior to the enactment of GDPR are less likely—a 14.38% decrease—to receive additional investment after the rollout of GDPR. Column 5 suggests that the likelihood of a previous lead investor investing in an EU venture again after GDPR's rollout decreases by 22.35%, and the farther the lead investor was the last round, the greater the decrease. Combined, Columns 3-5 suggest that GDPR has a negative effect on inside investors' decisions to follow on their pre-GDPR investments, and that these effects are amplified for more distant investors.

At the same time, investors who are located closer to EU ventures, whether repeat or new investors, appear to be more optimistic. There are multiple potential reasons for this, including that (i) local investors are confident in their information about the extent of local enforcement and compliance costs; (ii) they are able to reduce or handle risk and future uncertainty due to their localness to their portfolio ventures; and/or (iii) they may have worse outside options relative to investors in the US and the rest of the world.

7 Conclusion

Using five years of investment data in EU and US technology ventures, we demonstrated evidence suggesting that investors' local investment preference interacts with the effects of GDPR. Specifically, we showed that GDPR's rollout in 2018 had a negative effect on EU venture investment and the effects are larger when ventures and lead investors are not in the same country or union. The relationship manifests in the number of deals per month and in the amount invested per deal, and is particularly pronounced for newer, data-related, and B2C ventures. GDPR's enactment in 2016 exhibits similar effects but only with respect to deals in which lead investors invest outside of the industries in which they tend to operate. While we are unable to observe the absolute degree of investors' preference towards investing locally (e.g., since we may not have investors' complete portfolios pre- and post-GDPR), our findings show that GDPR intensifies ventures' tendencies to receive local funding. In particular, we find that GDPR leads to some portfolio rebalancing, fewer repeat investments especially by more distant investors, and may aggravate investors' so-called local biases.

Our findings identify new dimensions of the effects of GDPR, and illustrate that any regulatory policy that aims to alleviate some of the costs that are associated with data regulation has to be cognizant of the effects on different investor types. That is, any assessment of the potential consequences of regulation (and specifically data regulation) for new technology ventures has to take into account the differential effects on investors. For instance, a country that relies more on foreign investment may suffer larger withdrawals of venture capital upon implementing tighter data controls. On the other hand, another nation that tends to export larger amounts of investment may benefit from the perspective of retaining more venture capital for its own domestic firms once the other country adopts more stringent data policies. Our results thus point to a Prisoner's Dilemma situation in some sense, where, under some objectives, each country may unilaterally have a dominant strategy to implement lax data policies in its home market, even if a more stringent data ruleset across the world may be welfare enhancing if all countries could commit to it.

References

[1] Acquisti, A., C. Taylor, and L. Wagman (2016): "The economics of privacy," *Journal of Economic Literature*, 54(2), 442–492.

[2] Adjerid, I., and M. Godinho de Matos (2019): "Consumer behavior and firm targeting after GDPR: The case of a telecom provider in Europe," *Working paper*.

[3] Agarwal, S., and R. Hauswald (2010): "Distance and private information in lending," *Review of Financial Studies*, 23(7), 2757–2788.

[4] Aizenman, J., and J. Kendall (2012): "The internationalization of venture capital," *Journal of Economic Studies*, 39(5), 455–511.

[5] Bertrand, M., E. Duflo, and S. Mullainathan (2004). "How much should we trust differences-in-differences estimates?" *Quarterly Journal of Economics*, 119(1), 249–275.

[6] Bottazzi, L., M. Da Rin, and T. Hellmann (2016): "The importance of trust for investment: Evidence from venture capital," *Review of Financial Studies*, 29(9), 2283–2318.

[7] Braun, R., S. Weik, and A. Achleitner (2019): "Foreign venture capital in Europe: Consequences for ventures' exit routes and entrepreneurial migration," *Working Paper*.

[8] Campbell, J., A. Goldfarb, and C. Tucker (2015): "Privacy regulation and market structure," *Journal of Economics & Management Strategy*, 24(1), 47–73.

[9] Chatterji, A., S. Delecour, S. Hasan, and R.M. Koning (2018). "When does advice impact startup performance?" *NBER Working Paper*.

[10] Chemmanur, T.J., T.J. Hull, and K. Krishnan (2016). "Do local and international venture capitalists play well together? The complementarity of local and international venture capitalists" *Journal of Business Venturing*, 31(5), 573–594.

[11] Coeurdacier, N., and H. Rey (2013). "Home Bias in Open Economy Financial Macroeconomics" *Journal of Economic Literature*, 51(1), 63–115.

[12] Coval, J.D., and T.J. Moskowitz (1999). "Home bias at home: Local equity preference in domestic portfolios," *Journal of Finance*, 54(6), 2045–2073.

[13] Coval, J.D., and T.J. Moskowitz (2001). "The geography of investment: Informed trading and asset prices," *Journal of Political Economy*, 109(4), 811–841.

[14] Cressy, R.C., F. Munari, and A. Malipiero (2007). "Playing to their strengths? Evidence that specialization in the private equity industry confers competitive advantage," *Journal of Corporate Finance*, 13(4), 647–669.

[15] Cumming, D.J. (2006): "Adverse selection and capital structure: Evidence from venture capital," *Entrepreneurship: Theory & Practice*, 30(2), 155–183.

[16] Cumming, D.J. (2008): "Contracts and exits in venture capital finance," *Review of Financial Studies*, 21(5), 1947–1982.

[17] Cumming, D.J., and N. Dai (2010): "Local bias in venture capital investments," *Journal of Empirical Finance*, 17(3), 362–380.

[18] Cumming, D.J., and S.A. Johan (2007): "Advice and monitoring in venture finance," *Financial Markets and Portfolio Management*, 21(1), 3–43.

[19] Dai, N., H. Jo, and S. Kassicieh (2012): "Cross-border venture capital investments in Asia: selection and exit performance," *Journal of Business Venturing*, 27(6), 666–684.

[20] Devigne, D., S. Manigart, and M. Wright (2018): "Venture capital internationalization: Synthesis and future research direction," *Journal of Economic Surveys*, 32(5), 1414–1445.

[21] Engel, D., and M. Keilbach (2007): "Firm-level implications of early stage venture capital investment — An empirical investigation," *Journal of Empirical Finance*, 14(2), 150–167.

[22] European Data Protection Supervisor (2016). "EDPS opinion on coherent enforcement of fundamental rights in the age of big data"

[23] Federal Trade Commission (2012): "Protecting consumer privacy in an era of rapid change: Recommendations for businesses and policy makers."

[24] Federal Trade Commission (2014): "Data brokers: A call for transparency and accountability."

[25] Federal Trade Commission (2016): "Big data: A tool for inclusion or exclusion?"

[26] Florida, R., and M. Kenney (1988): "Venture capital and high technology entrepreneurship," *Journal of Business Venturing*, 3(4), 301–319.

[27] Franke, N., M. Gruber, D. Harhoff, and J. Henkel (2006): "What you are is what you like — similar biases in venture capitalists' evaluations of start-up teams," *Journal of Business Venturing*, 21, 802–826.

[28] French, K., and J. Poterba (1991): "Investor diversification and international equity markets," *American Economic Review*, 81, 222–226.

[29] Giannetti, M., and Y. Yafeh (2012): "Do cultural differences between contracting parties matter? Evidence from syndicated bank loans," *Management Science*, 58, 365–383.

[30] Goldberg, S., G. Johnson, and S. Shriver (2019): "Regulating privacy online: The early impact of the GDPR on Eurpopean web traffic & E-commerce outcomes," *NBER Working paper*.

[31] Goldfarb, A., and C.E. Tucker (2011): "Privacy regulation and online advertising," *Management Science*, 57(1), 57–71.

[32] Goldfarb, A., and C.E. Tucker (2012): "Privacy and innovation," *Innovation Policy and the Economy*, 12(1), 65–90.

[33] Guiso, L., P., Sapienza, and L. Zingales (2009): "Cultural biases in economic exchange?," *Quarterly Journal of Economics*, 124(3), 1095–1131.

[34] Hochberg, Y.V., A. Ljungqvist, and Y. Lu (2010). "Networking as a barrier to entry and the competitive supply of venture capital," *Journal of Finance*, 65(3), 829–859.

[35] Hochberg, Y.V. (2016). "Accelerating entrepreneurs and ecosystems: The seed accelerator model," *Innovation Policy and the Economy*, 16, 25–51.

[36] Huberman, G. (2002). "Familiarity breeds investment," *Review of Financial Studies*, 13(3), 659–680.

[37] Jääskeläinen, M., M. Maula, and T. Seppa (2006). "Allocation of attention to portfolio companies and the performance of venture capital firms," *Entrepreneurship: Theory & Practice*, 30(2), 185–206.

[38] Jia, J., G.Z. Jin, and L. Wagman (2018). "The short-run effect of GDPR on technology venture investment," *NBER Working Paper*.

[39] Kang, J., and J. Kim (2008): "The geography of block acquisitions," *Journal of Finance*, 63(6), 2817–2858.

[40] Kaplan, S.N. and J. Lerner (2017): "Venture capital data: Opportunities and challenges," *Measuring Entrepreneurial Businesses: Current Knowledge and Challenge*.

[41] Kim, J.-H. and L. Wagman (2015): "Screening incentives and privacy protection in financial markets: A theoretical and empirical analysis," *RAND Journal of Economics*, 46(1), 1–22.

[42] Kim, J.-H. and L. Wagman (2016): "Early-stage entrepreneurial financing: A signaling perspective," *Journal of Banking & Finance*, 67(1), 12–22.

[43] Krasteva, S., P. Sharma, and L. Wagman (2015): "The 80/20 rule: Corporate support for innovation by employees." *International Journal of Industrial Organization*, 38: 32–43.

[44] Krishnan, C.N.V., V.I. Ivanov, R.W. Masulis, and A.K. Singh (2011): "Venture capital reputation, post-IPO performance, and corporate governance," *Journal of Financial & Quantitative Analysis*, 46(5), 1295–1333.

[45] Lerner, J. (1995). "Venture capitalists and the oversight of private firms," *Journal of Finance*, 50(1), 301–318.

[46] Lerner, J., and A. Schoar (2005). "Does legal enforcement affect financial transactions? The contractual channel in private equity," *Quarterly Journal of Economics*, 120, 223–246.

[47] Lerner, J., A. Schoar, and S. Sokolinski (2018). "The globalization of angel investments: Evidence across countries," *Journal of Financial Economics*, 127(1), 1–20.

[48] Mäkelä, M.M., and M.V.J. Maula (2006): "Interorganizational commitment in syndicated cross-border venture capital investments," *Entrepreneurship Theory & Practice*, 30(2), 273–298.

[49] Miller, A.R. and C.E. Tucker (2009): "Privacy protection and technology diffusion: The case of electronic medical records," *Management Science*, 55(7), 1077–1093.

[50] Nahata, R., S. Hazarika, and K. Tandon (2014): "Success in global venture capital investing: do institutional and cultural differences matter?" *Journal of Financial & Quantitative Analysis*, 49(4), 1039–1070.

[51] Parwada, J.T. (2008): "The genesis of home bias? The location and portfolio choices of investment company start-ups," *Journal of Financial & Quantitative Analysis*, 43(1), 245–266.

[52] Petkova, A.P., A. Wadhwa, X. Yao, and S. Jain (2014): "Reputation and Decision Making under Ambiguity: A Study of U.S. Venture Capital Firms Investments in the Emerging Clean Energy Sector," *Academy of Management Journal*, 57(2), 422–448.

[53] Sahlman, W.A. (1990): "The structure and governance of venture-capital organizations," *Journal of Financial Economics*, 27(2), 473–521.

[54] Sapienza, H.J., E. Autio, G. George, and S.A. Zahra (2006): "A capabilities perspective on the effects of early internationalization on firm survival and growth," *Academy of Management Review*, 31(4), 914–933.

[55] Schertler, A., and T. Tykvová (2012): "What lures cross-border venture capital inflows?" *Journal of International Money and Finance*, 31(6), 1777–1799.

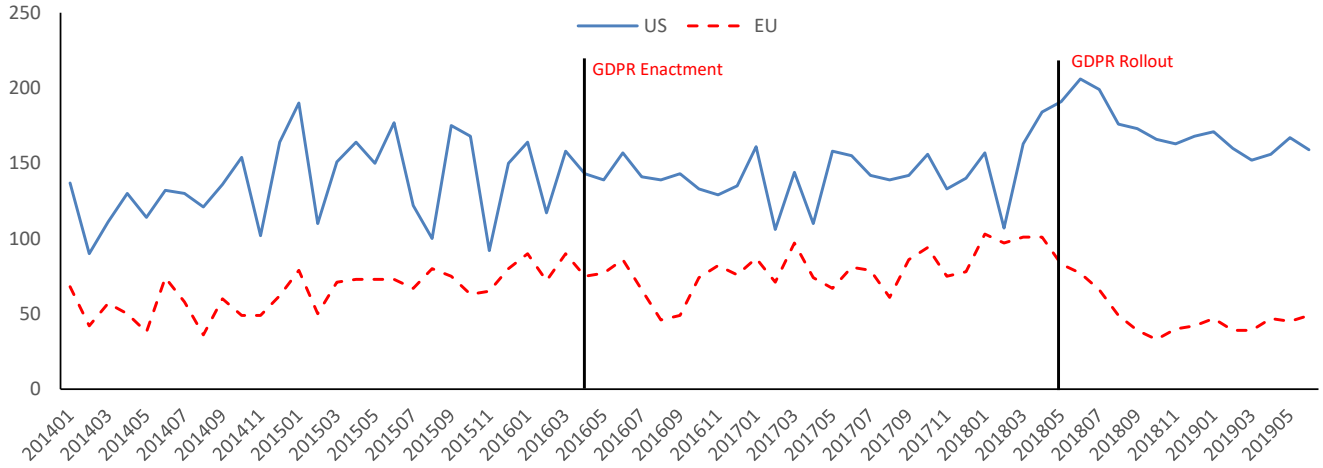
[56] Sorenson, O., and T.E. Stuart (2001): "Syndication networks and the spatial distribution of venture capital investments," *American Journal of Sociology*, 106(6), 1546–1588.

[57] Vohora, A., M. Wright, and A. Lockett (2004): "Critical junctures in the development of university high-tech spinout companies," *Research Policy*, 33(1), 147–175.

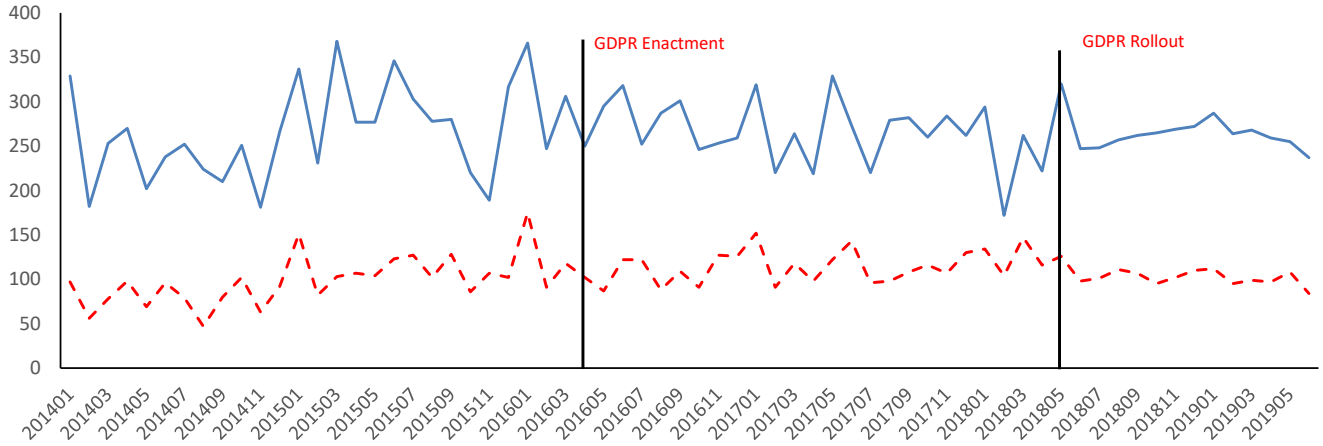
[58] Woodward, S. (2019): "The American role in European venture capital," *Working Paper*.

[59] Wright, M., and A. Lockett (2003): "The structure and management of alliances: Syndication in the venture capital industry," *Journal of Management Studies*, 40(8), 2073–2102.

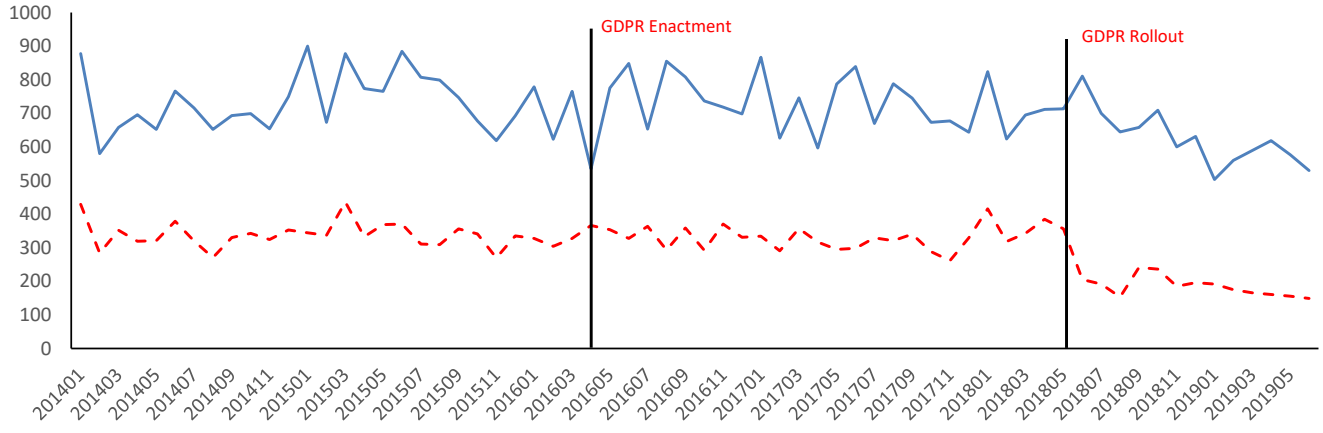
[60] Wright, M., S. Pruthi, and A. Lockett (2005): "International venture capital research: From cross-country comparisons to crossing borders," *International Journal of Management Reviews*, 7(3), 135–165.



(a) monthly # of foreign deals per member state in the EU and US

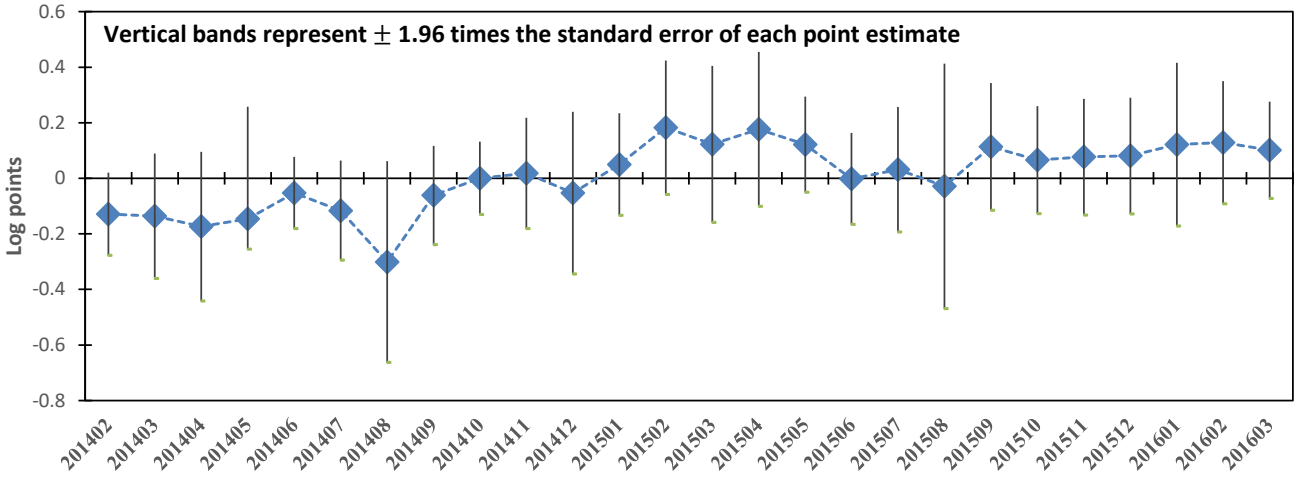


(b) monthly # of same union deals per member state in the EU and US

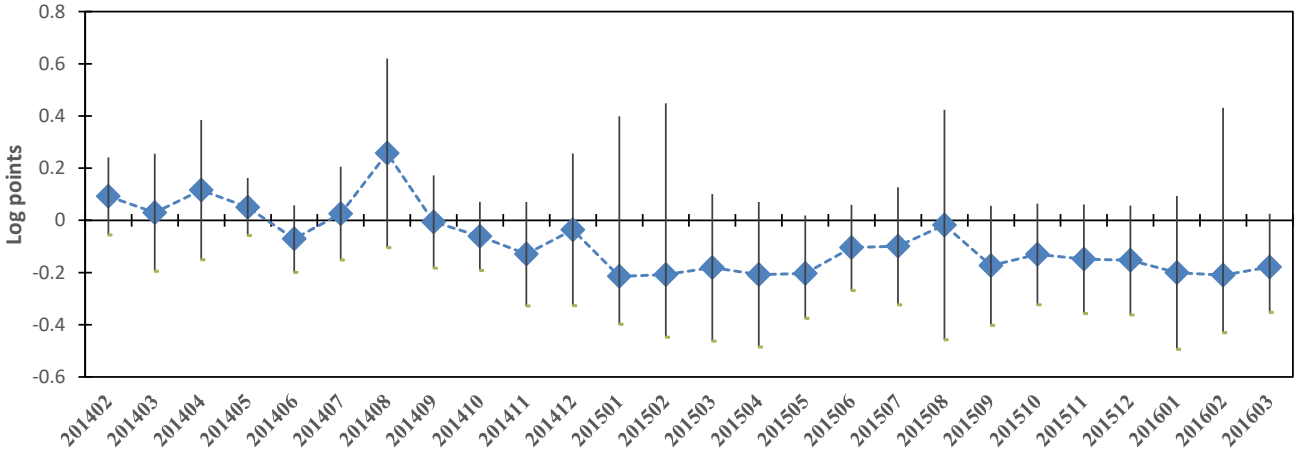


(c) monthly # of domestic deals per member state in the EU and US

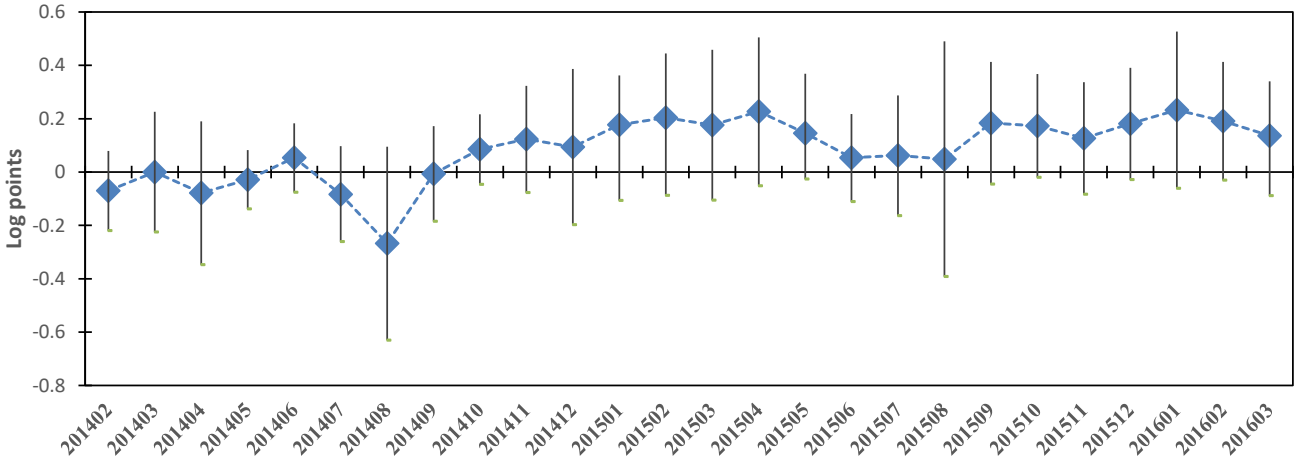
Figure 1. Aggregate level # of deals trends



(a) Pre-treatment test for aggregate level # of foreign deals – Poisson regression

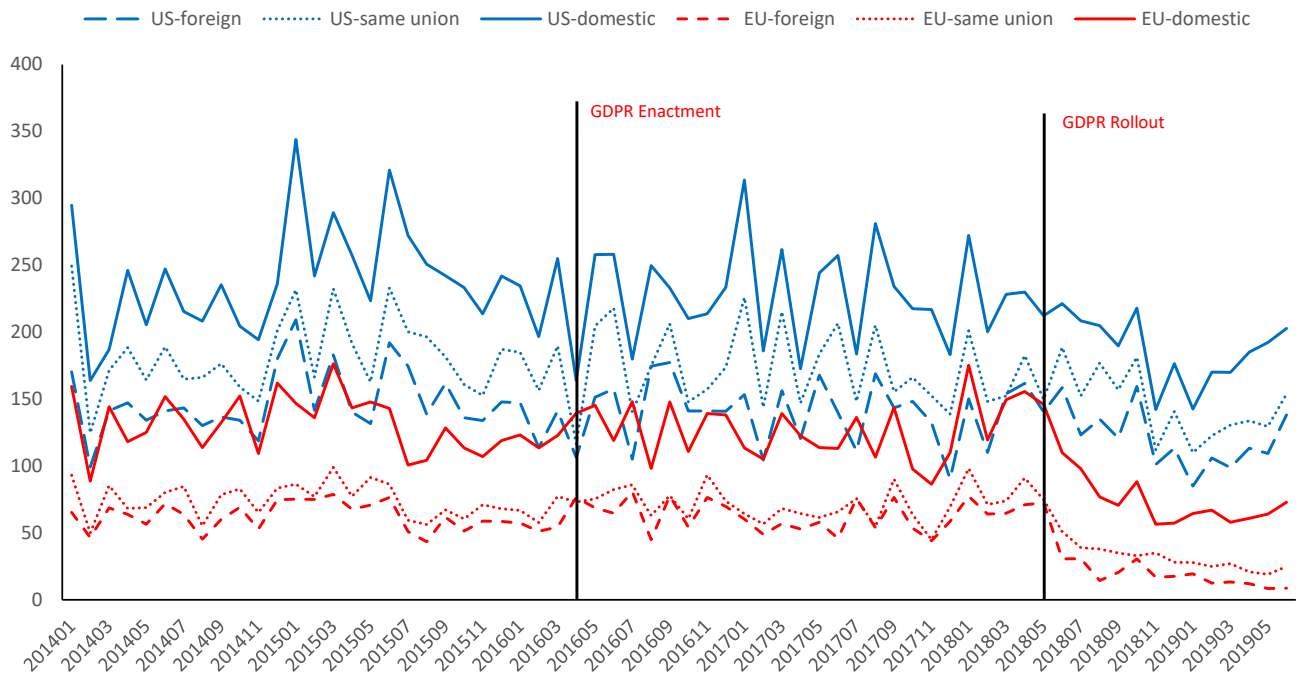


(b) Pre-treatment test for aggregate level # of same union deals – Poisson regression

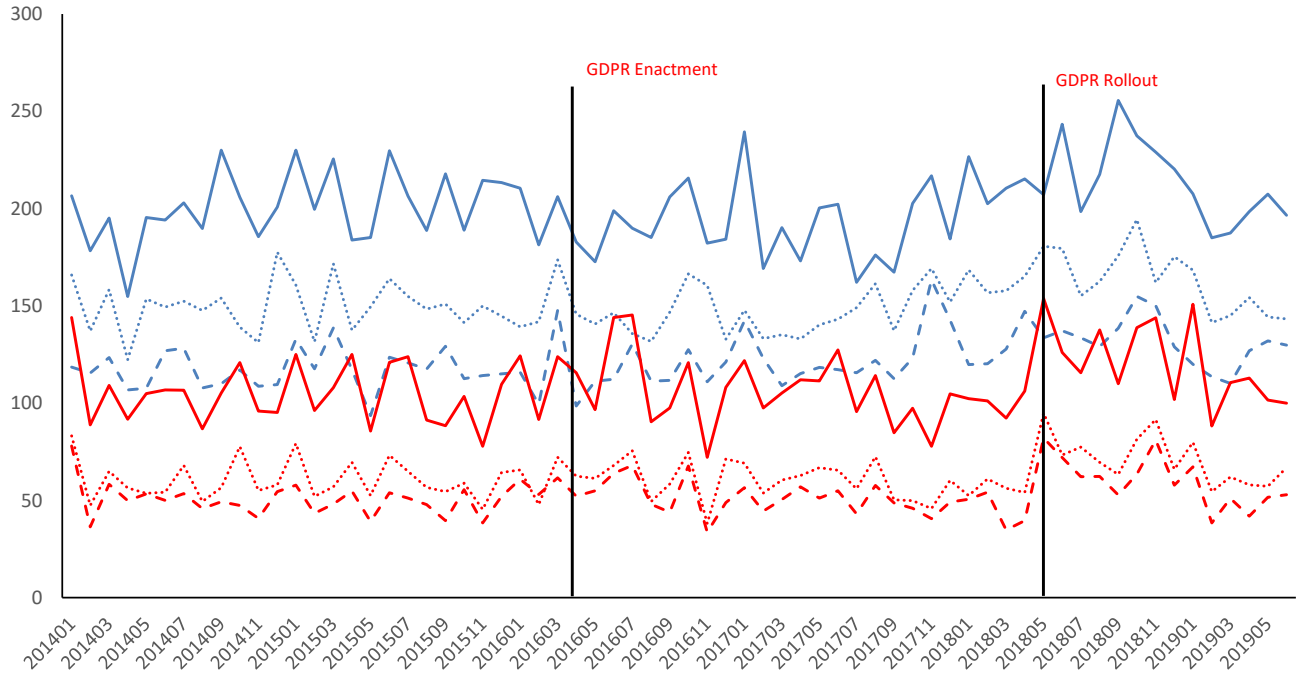


(c) Pre-treatment test for aggregate level # of domestic deals – Poisson regression

Figure 2. Pre-treatment tests for aggregate level # of deals in different dimensions

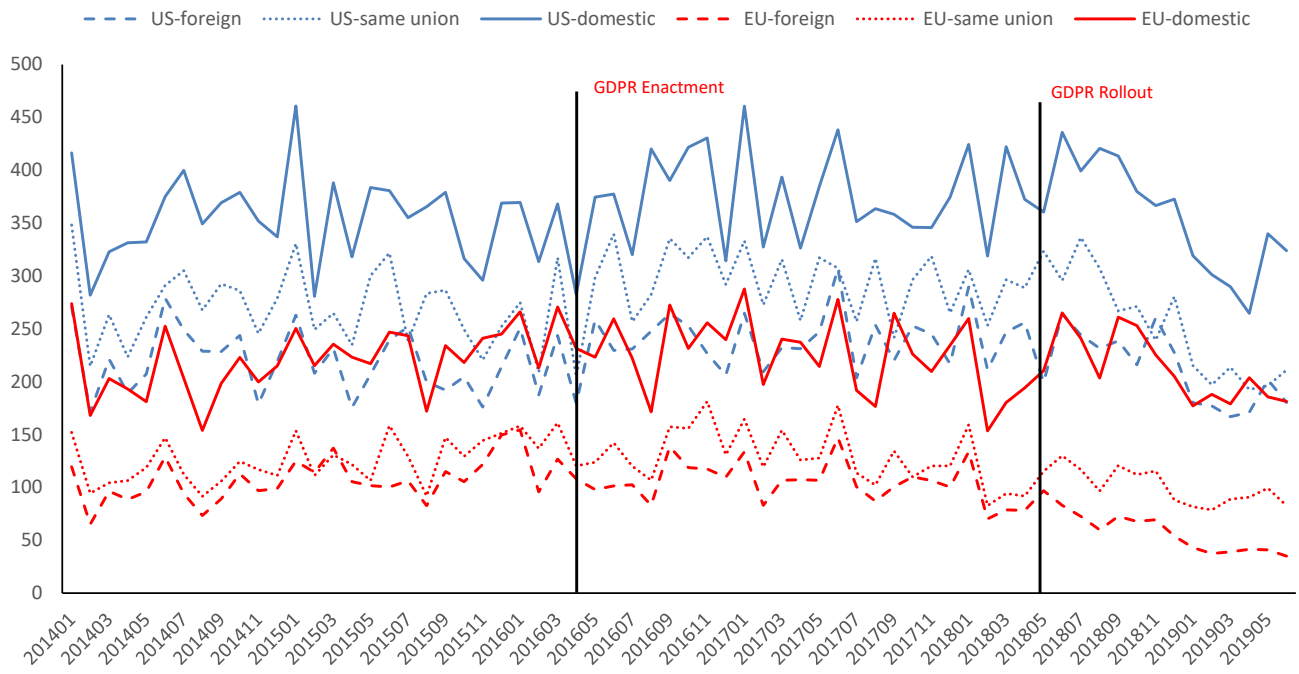


(a) More data-related group

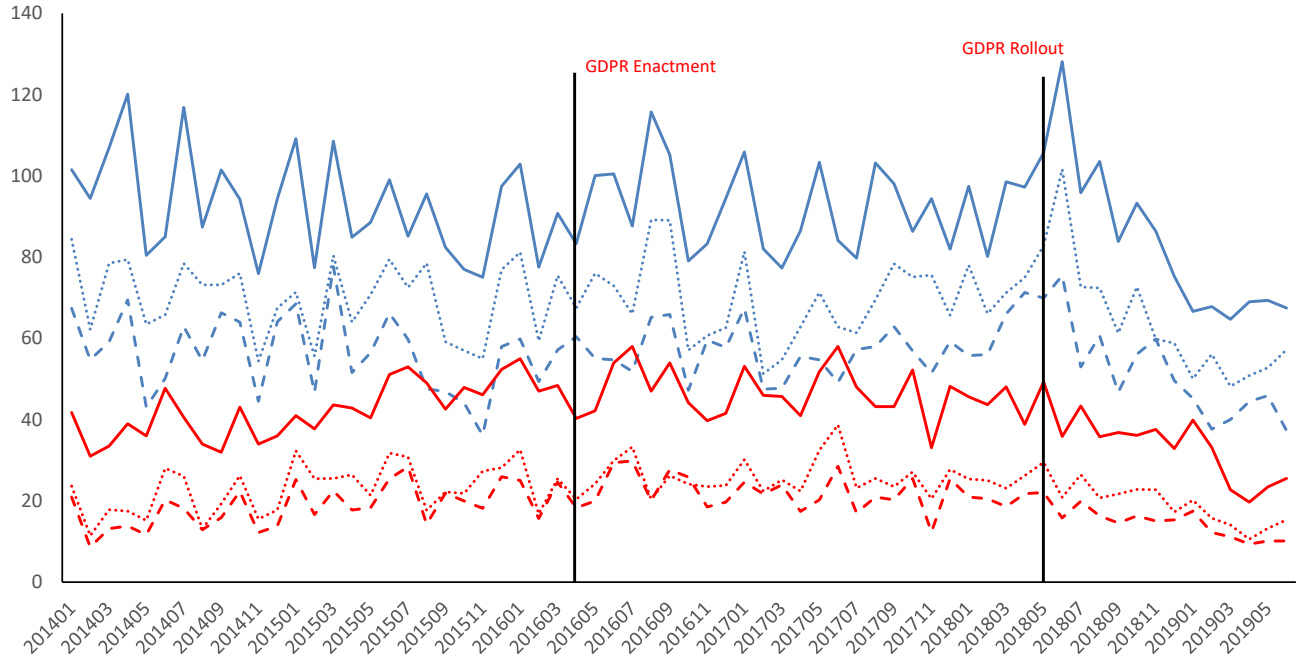


(b) Less data-related group

Figure 3. Monthly # of deals in more- and less-data-related ventures by deal types

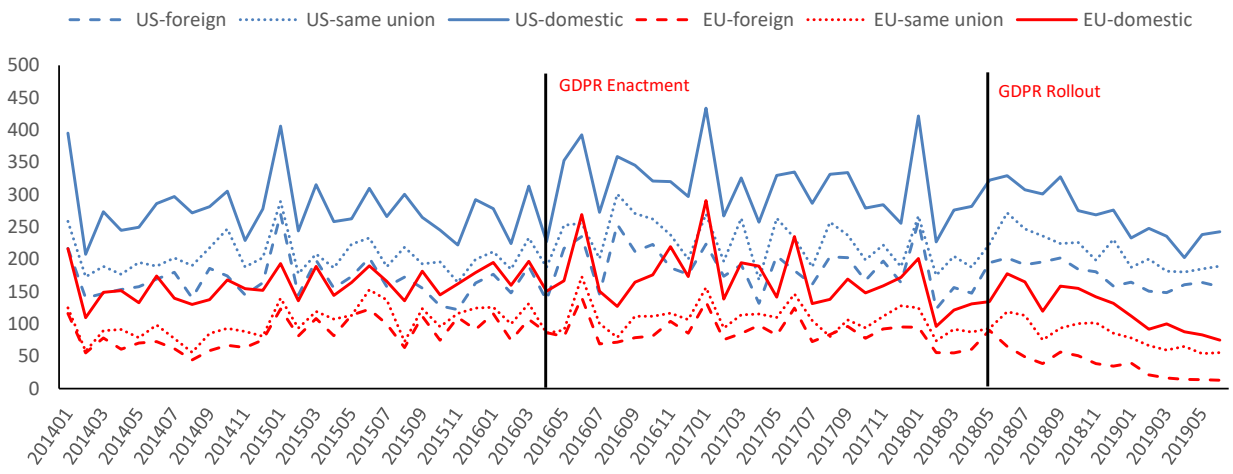


(a) 0-6 year-old ventures

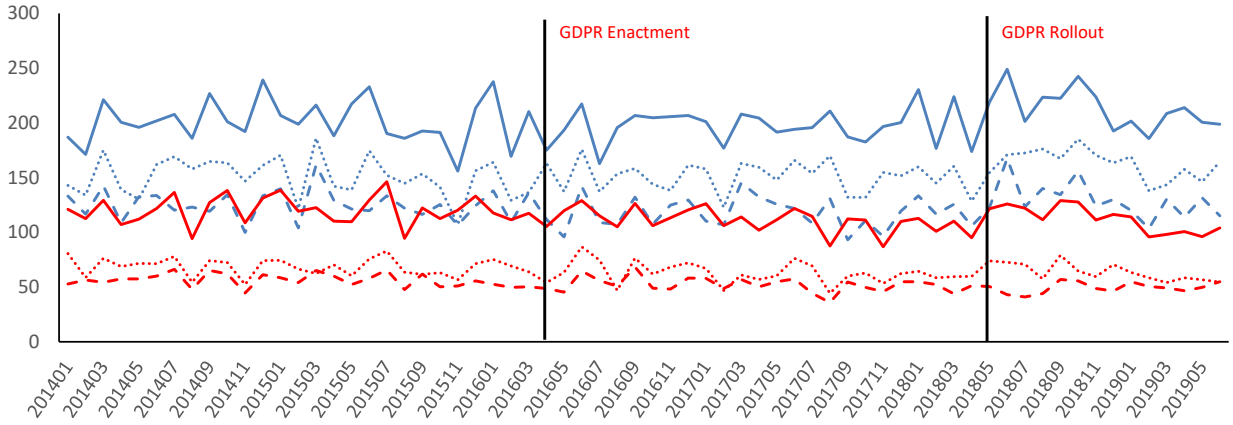


(b) 6+ year-old ventures

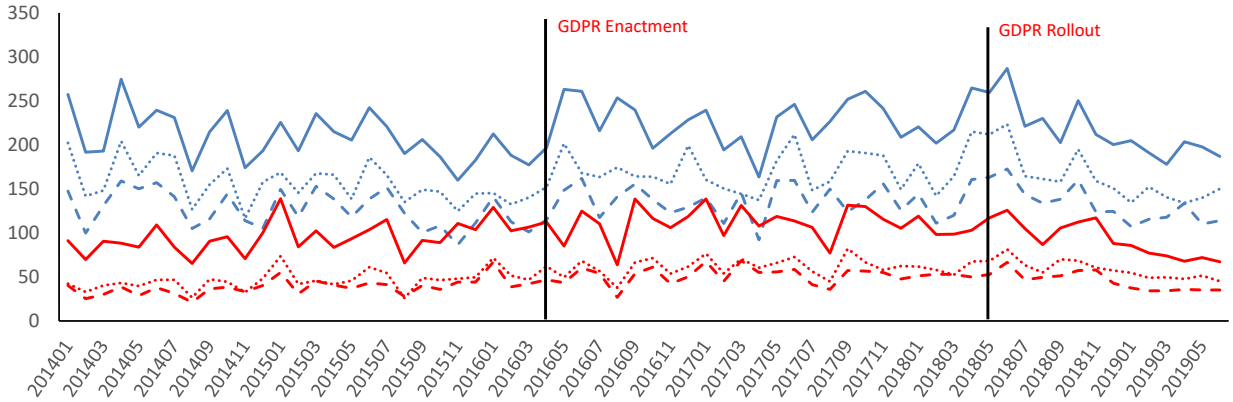
Figure 4. Monthly # of deals by venture age group and deal types



(a) Early Stage

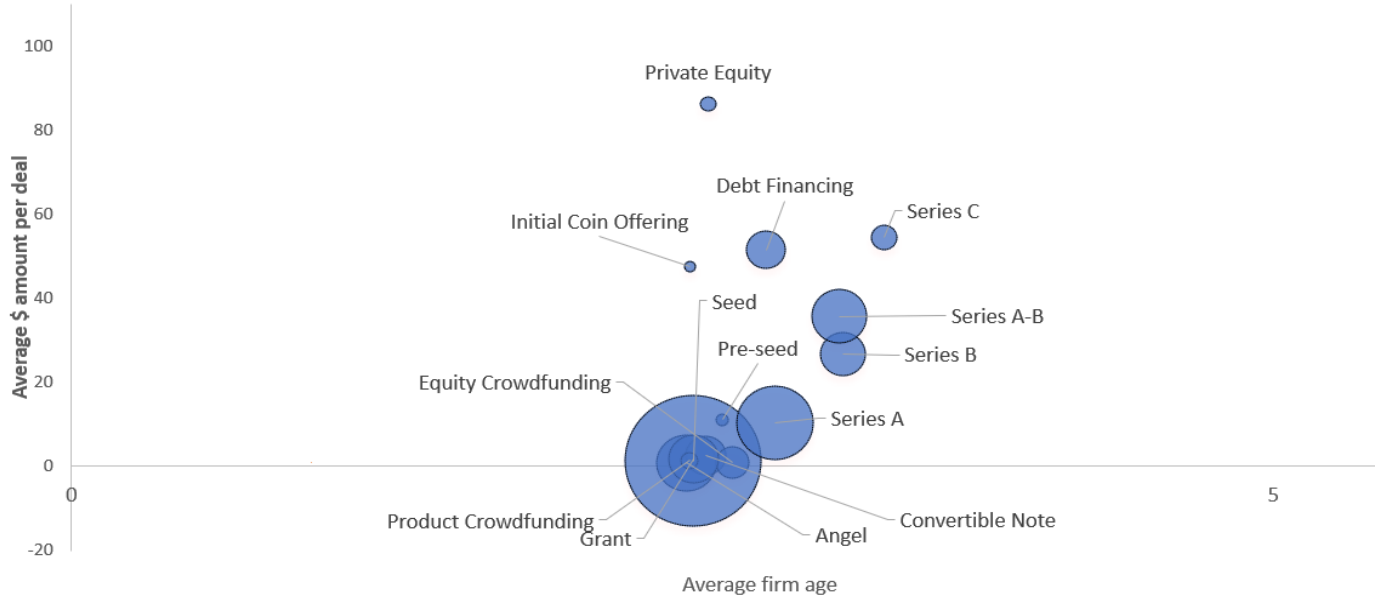


(b) Main Stage

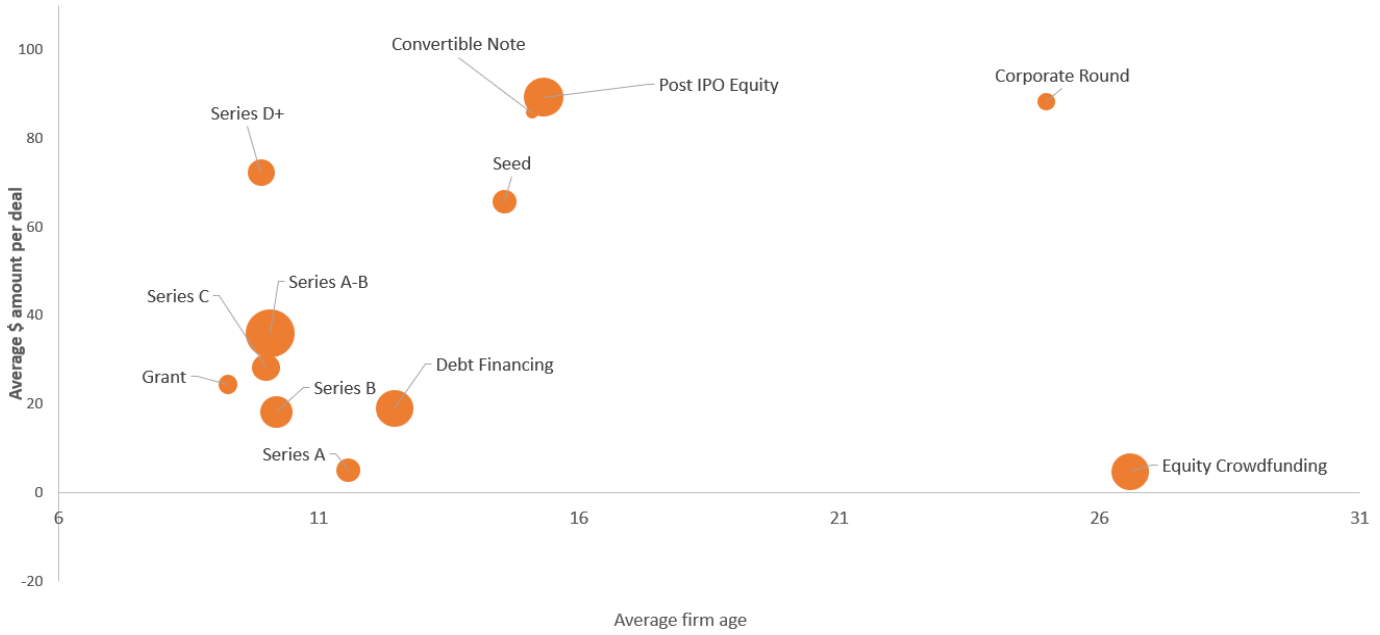


(c) Late Stage

Figure 5. Monthly # of deals by funding stages and deal types

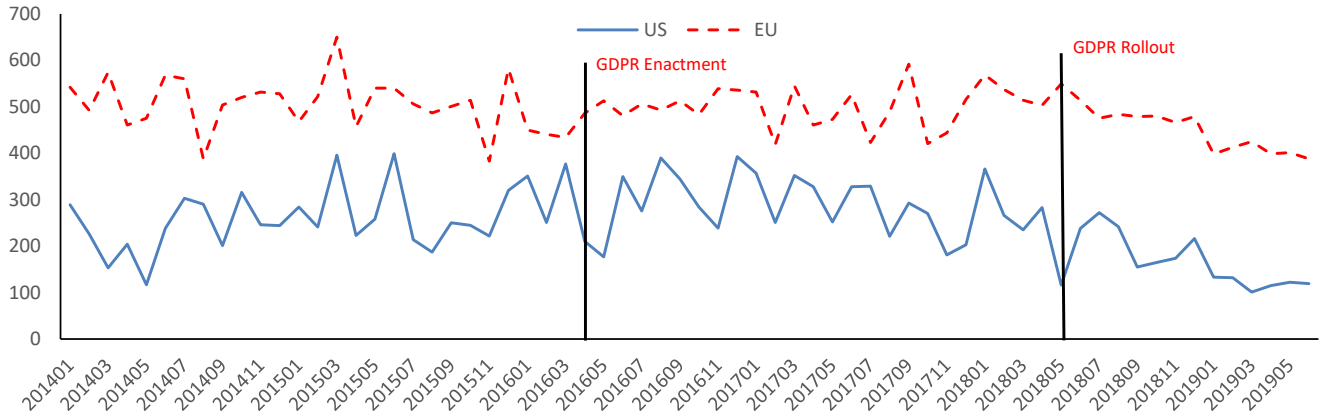


(a) 0-6 year-old ventures

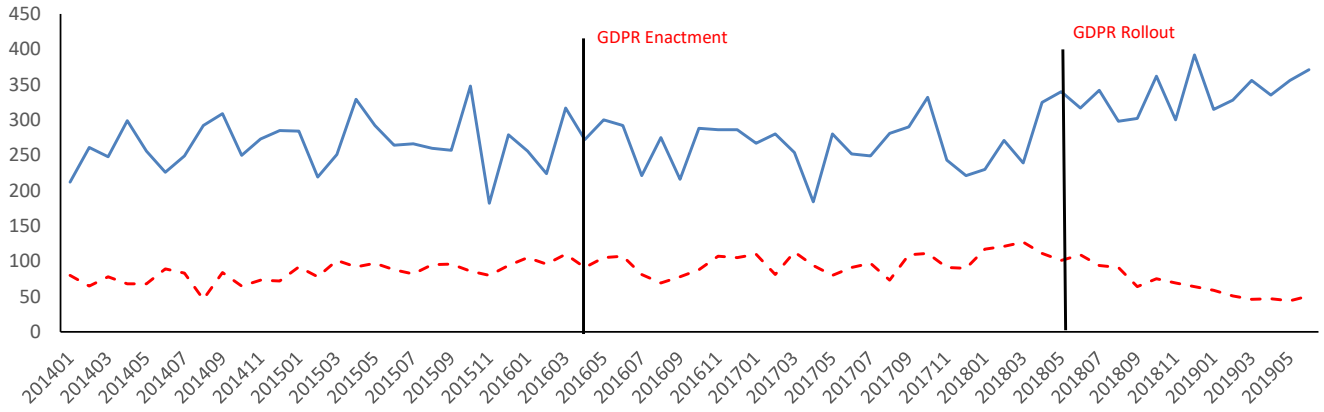


(b) 6+ year-old ventures

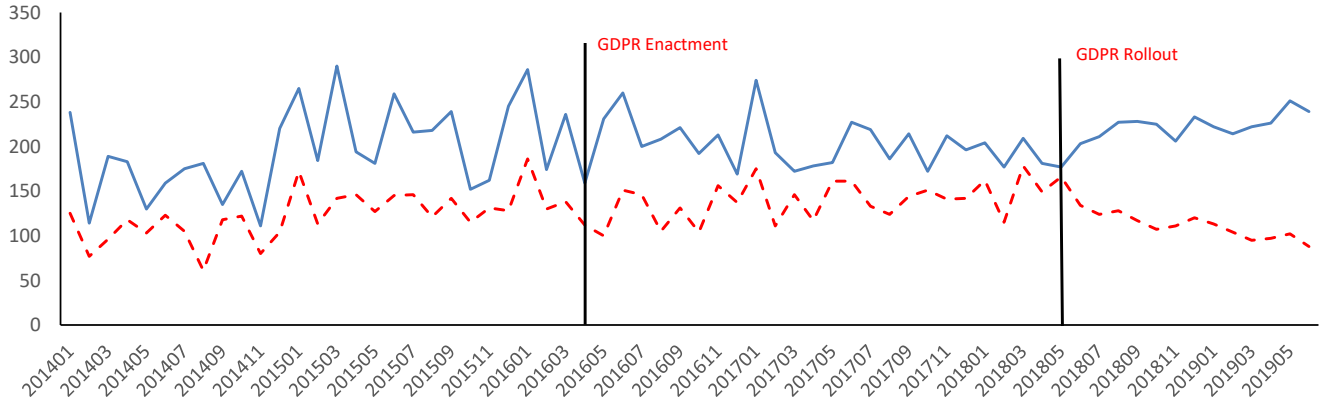
Figure 6. Funding types and amounts as a function of venture age (observations fewer than 10 are not depicted)



(a) Monthly # of deals per member state for EU-only investors in the EU and US



(b) Monthly # of deals per member state for US-only investors in the EU and US



(c) Monthly # of deals per member state for Non-EU/US investors in the EU and US

Figure 7. Monthly # of deals trends by investor location. In 2(a), the number of deals in the EU represents the # of domestic and same-union deals, and the number of deals in the US represents the # of foreign deals. In 2(b), the number of deals in the EU represents the # of foreign deals, and the number of deals in the US represent the # of domestic and same-union deals. In 2(c), the number of deals in both the EU and US are the # of foreign deals by the non-EU/US investors.

Table 1: Summary Statistics – Aggregate Level

	EU					US				
	Mean	Median	75-percentile	95-percentile	N	Mean	Median	75-percentile	95-percentile	N
Panel A: Whole Sample										
# of countries/states	-	-	-	-	24	-	-	-	-	51
# of months	-	-	-	-	64	-	-	-	-	64
# of deals	6.52	2	6	27	1,584	8.12	2	7	29	3,366
# of foreign deals	1.49	1	3	12	1,584	1.82	1	4	15	3,366
# of same union deals	1.83	1	2	10	1,584	2.91	1	3	13	3,366
# of domestic deals	3.20	2	4	18	1,584	3.39	2	5	19	3,366
# of same continent deals	5.08	3	9	21	1,584	6.43	3	11	23	3,366
# of different continent deals	1.44	1	2	8	1,584	1.69	1	2	6	3,366
# of same industry deals	2.84	1	5	11	1,584	3.65	1	4	12	3,366
# of different industry deals	3.68	1	9	15	1,584	4.47	1	7	18	3,366
Regulatory strictness	51.48%	53.55%	71.15%	81.85%	1,584	-	-	-	-	-
Unemployment	8.63%	7.11%	10.15%	20.67%	1,584	4.68%	4.64%	5.60%	6.93%	3,366
GDP per capita (in thousand)	32.77	9.38	19.58	65.23	1,584	57.19	25.66	77.15	138.55	3,366
CPI	108.45	108.22	110.35	113.85	1,584	111.15	110.18	113.48	115.84	3,366
Interest	-0.15%	-0.29%	0	0.29	1,584	0.73%	0.32%	1.24%	2.37%	3,366
Panel B: Sub-group by investor location										
EU-only investor:										
# of foreign deals	2.72	1	6	12	1,584	-	-	-	-	-
# of same union deals	2.95	1	4	7	1,584	-	-	-	-	-
# of domestic deals	3.57	1	5	12	1,584	-	-	-	-	-
US-only investor:										
# of foreign deals	-	-	-	-	-	1.73	1	4	8	3,366
# of same union deals	-	-	-	-	-	3.89	1	13	25	3,366
# of domestic deals	-	-	-	-	-	4.73	1	2	8	3,366
Non-EU/US investor:										
# of foreign deals	2.79	1	3	11	1,584	4.69	2	5	18	3,366
# of same union deals	-	-	-	-	-	-	-	-	-	-
# of domestic deals	-	-	-	-	-	-	-	-	-	-

Table 1 Continued

	EU					US				
	Mean	Median	75-percentile	95-percentile	N	Mean	Median	75-percentile	95-percentile	N
Panel C: Sub-group by data relatedness										
More data-related:										
# of foreign deals	4.71	1	4	19	1,584	8.06	3	9	38	3,366
# of same union deals	5.84	1	6	21	1,584	7.55	3	8	31	3,366
# of domestic deals	8.91	3	12	42	1,584	12.34	7	16	59	3,366
# of deals in same industry	9.72	3	15	33	1,584	13.68	9	21	63	3,366
# of deals in different industry	7.18	2	13	25	1,584	10.44	4	17	48	3,366
Less data-related:										
# of foreign deals	1.96	1	2	5	1,584	3.18	1	3	5	3,366
# of same union deals	2.36	1	3	5	1,584	3.32	1	4	7	3,366
# of domestic deals	4.11	1	3	7	1,584	5.43	2	6	11	3,366
# of deals in same industry	4.35	1	3	7	1,584	5.76	2	7	13	3,366
# of deals in different industry	3.29	1	2	6	1,584	4.91	2	5	9	3,366
Panel D: Sub-group by firm age										
New & Young firm (0-6 year):										
# of foreign deals	5.17	2	9	27	1,584	7.93	3	15	33	3,366
# of same union deals	6.58	3	14	39	1,584	7.43	3	13	27	3,366
# of domestic deals	10.69	6	21	64	1,584	12.14	8	29	72	3,366
Mature firm (6+ year):										3,366
# of foreign deals	2.18	0	1	7	1,584	3.38	1	2	9	3,366
# of same union deals	2.84	1	2	8	1,584	3.31	1	2	8	3,366
# of domestic deals	4.64	1	4	13	1,584	5.18	2	4	15	3,366
Panel E: Sub-group by funding stage										
Early Stage:										
# of foreign deals	3.30	2	11	18	1,584	4.57	3	11	21	3,366
# of same union deals	6.92	3	13	45	1,584	8.19	3	13	45	3,366
# of domestic deals	11.29	6	22	68	1,584	13.12	9	29	77	3,366
Main Stage:										
# of foreign deals	2.85	1	5	12	1,584	4.62	2	11	15	3,366
# of same union deals	3.69	1	8	16	1,584	4.26	2	9	13	3,366
# of domestic deals	5.92	2	12	21	1,584	7.11	3	15	24	3,366
Late Stage:										
# of foreign deals	3.86	2	14	22	1,584	5.22	3	15	27	3,366
# of same union deals	2.42	1	3	5	1,584	3.02	1	2	6	3,366
# of domestic deals	4.94	1	14	24	1,584	5.95	3	16	31	3,366

Table 2: Summary Statistics – Deal Level

	EU				US (or non-EU/US when specified)			
	Mean	Median	Std.dv	N	Mean	Median	Std.dv	N
Panel A: Venture Characteristics								
# of ventures	-	-	-	16,440	-	-	-	32,825
$ MM amount raised per deal	8.72	0.95	81.76	23,373	17.78	2.03	125.67	37,776
Venture age	2.85	1.83	8.78	23,373	3.29	2.09	14.87	37,776
Panel B: Investor Characteristics								
Investor age	7.8	5.1	9.78	18,862	10.8	6.4	15.77	29,362
Investor size ($M)	419.5	357.5	502.1	18,862	725.7	588.9	918.5	29,362
General experience	72.5	-	-	18,862	110.7	-	-	29,362
Healthcare industry experience	15.2	-	-	18,862	21.5	-	-	29,362
Finance industry experience	5.3	-	-	18,862	8.6	-	-	29,362
IT industry experience	52.1	-	-	18,862	79.5	-	-	29,362
Other industries experience	3.5	-	-	18,862	5.2	-	-	29,362
Distance between investor and venture (miles)	575	273	795	18,862	715	469	981	29,362
							Non-EU/US	
Investor age					9.6	6.8	14.52	7,971
Investor size ($M)					694.5	537.5	883.1	7,971
General experience					98.5	-	-	7,971
Healthcare industry experience					18.7	-	-	7,971
Finance industry experience					5.8	-	-	7,971
IT industry experience					66.7	-	-	7,971
Other industries experience					3.9	-	-	7,971
Distance between investor and venture (miles)					1218	984	2357	7,971
Panel C: Type of investments – Venture Side								
# of foreign deals	-	-	-	5,360	-	-	-	9,821
$ MM amount per foreign deal	16.76	2.05	114.55	5,360	22.67	3.18	146.19	9,821
Percentage of foreign deals				22.93%				25.99%
# of same union deals	-	-	-	5,857	-	-	-	13,088
$ MM amount per same union deal	8.49	0.21	82.26	5,857	19.66	4.85	131.28	13,088
Percentage of same union deals				25.06%				34.65%
# of domestic deals	-	-	-	12,155	-	-	-	14,867
$ MM amount per domestic deals	5.41	0.97	43.11	12,155	12.14	2.21	80.52	14,867
Percentage of domestic deals				52.01%				39.36%
Panel D: Type of investments – Investor Side								
# of foreign deals by EU investor	-	-	-	-	-	-	-	4,029
$ MM amount per foreign deals by EU investor	-	-	-	-	25.35	3.01	163.62	4,029
# of foreign deals by US investor	-	-	-	3,181	-	-	-	-
$ MM amount per foreign deals by US investor	21.02	4.12	121.28	3,181	-	-	-	-
# of foreign deals by Non-EU/US investor	-	-	-	2,179	-	-	-	5,792

Note: We do not report the summary statistics of same-union and domestic deals from investors' perspective in Panel D since these measurements duplicate the ones from ventures' perceptive in Panel C. For example, EU ventures would have same-union or domestic deals if they have EU investors, and EU investors would invest in same-union or domestic deals if they invest in EU ventures. However, foreign deals can be decomposed by EU-investors (for US ventures), US-investors (for EU ventures), and non-EU/US investors (for both EU and US ventures). In Panel D, the # of foreign deals by Non-EU/US investors is sorted into EU and US ventures. In other words, the EU columns represent the # of deals invested by Non-EU/US investor in EU ventures and similarly with the US columns for US ventures.

Table 3. GDPR impact on # of deals as a function of investor-venture geographic relationship

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	DV: # of deals in different geographic-relationship subgroups						ln (1+ # of deals in different geographic-relation subgroups)		
	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	OLS		
GDPR_Enact	-0.665*	-0.728***	-0.878**	-0.421**	-0.571**	-0.762***	-0.319	-0.319	-0.036
	(0.396)	(0.155)	(0.385)	(0.210)	(0.243)	(0.174)	(0.250)	(0.250)	(0.195)
EU * GDPR_Enact	-0.046	-0.023	0.128	-0.096	-0.020	-0.093	0.218	0.218	0.104
	(0.201)	(0.216)	(0.211)	(0.168)	(0.224)	(0.166)	(0.211)	(0.211)	(0.098)
GDPR_Rollout	-0.792***	-0.804***	-0.680***	-0.799***	-0.812***	-0.694***	-0.590**	-0.590**	-0.281
	(0.144)	(0.156)	(0.199)	(0.212)	(0.155)	(0.207)	(0.272)	(0.272)	(0.250)
EU * GDPR_Rollout	-0.251***	-0.172**	-0.129**	-0.218***	-0.145**	-0.111**	-0.124**	-0.085**	-0.038*
	(0.103)	(0.080)	(0.068)	(0.070)	(0.074)	(0.055)	(0.064)	(0.043)	(0.020)
RegStri * GDPR_Enact				-0.074	0.157	0.125	0.101	0.157	-0.046
				(0.298)	(0.248)	(0.146)	(0.179)	(0.248)	(0.091)
RegStri * GDPR_Rollout				-0.171***	-0.103*	-0.083*	-0.133**	-0.151***	-0.145***
				(0.058)	(0.054)	(0.045)	(0.064)	(0.054)	(0.061)
GDP per capita * EU				0.007***	0.002	0.017	0.012	0.012	0.004
				(0.003)	(0.012)	(0.023)	(0.023)	(0.023)	(0.021)
GDP per capita * GDPR_Enact				-0.045**	0.005	0.012	-0.035	0.012	-0.051**
				(0.019)	(0.034)	(0.033)	(0.174)	(0.033)	(0.025)
GDP per capita * GDPR_Rollout				-0.066***	-0.031	-0.042	-0.007	-0.042	-0.062***
				(0.026)	(0.073)	(0.070)	(0.243)	(0.070)	(0.020)
GDP per capita * EU * GDPR_Enact				-0.134**	0.026	0.097	-0.083	0.097	-0.105**
				(0.061)	(0.155)	(0.109)	(0.250)	(0.109)	(0.033)
GDP per capita * EU * GDPR_Rollout				-0.206**	-0.171***	-0.130**	-0.175***	-0.130**	-0.155**
				(0.105)	(0.058)	(0.056)	(0.059)	(0.056)	(0.075)
Marginal effect (rollout)	-22.20%	-15.80%	-12.10%	-26.42%	-13.48%	-9.92%			
Unemployment	0.029***	0.026	0.041	0.027**	0.029**	0.033***	0.029	0.038	0.034**
	(0.014)	(0.053)	(0.078)	(0.013)	(0.014)	(0.013)	(0.021)	(0.024)	(0.015)
GDP per capita	-0.131	0.053**	0.059	-0.295**	-0.297**	0.371**	-0.297**	0.371**	-0.295**
	(0.081)	(0.021)	(0.109)	(0.133)	(0.130)	(0.188)	(0.130)	(0.188)	(0.133)
CPI	0.046***	0.002	0.007	0.051**	0.051**	-0.002	0.062***	0.014	-0.002
	(0.017)	(0.031)	(0.069)	(0.021)	(0.022)	(0.020)	(0.023)	(0.021)	(0.020)
Interest rate	0.118***	0.028	0.044	0.123***	0.124***	-0.101**	-0.245***	-0.212*	-0.069**
	(0.034)	(0.274)	(0.204)	(0.036)	(0.038)	(0.046)	(0.059)	(0.113)	(0.034)
Dimension	Foreign	Same Union	Domestic	Foreign	Same Union	Domestic	Foreign	Same Union	Domestic
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
R-squared	-	-	-	-	-	-	0.505	0.551	0.620
F-test on pre-treatment (p-value)	0.125	0.133	0.129	0.118	0.121	0.113	0.191	0.185	0.166

*Note: The dependent variable is # of deals per state per month of different types (i.e., foreign, same union, and domestic). Columns 1 to 3 report the Poisson specification, Columns 4 to 6 add a measure of regulatory strictness, and Columns 7 to 9 report OLS under the same setting of Columns 4 to 6. GDP is scaled by 10*trillion. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 4. GDPR impact on # of deals as a function of investor-venture geographic zones and industry matchup

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	DV: # of deals in different geographic zones and investor-venture industry matchup							
	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson	Baseline Poisson
GDPR_Enact	-0.245*	-0.327***	-0.239*	-0.328***	0.013	0.044	-0.012	0.046
	(0.141)	(0.118)	(0.143)	(0.125)	(0.128)	(0.214)	(0.132)	(0.223)
EU * GDPR_Enact	0.087	0.075	0.096	0.134	-0.111**	0.071	-0.104**	0.115
	(0.083)	(0.065)	(0.075)	(0.098)	(0.056)	(0.049)	(0.052)	(0.096)
GDPR_Rollout	-0.827***	-0.712***	-0.703***	-0.742***	-0.395**	0.525	-0.366**	-0.508
	(0.184)	(0.147)	(0.213)	(0.148)	(0.180)	(0.489)	(0.179)	(0.346)
EU * GDPR_Rollout	-0.225***	-0.133**	-0.194**	-0.121**	-0.267**	-0.156*	-0.214**	-0.125*
	(0.070)	(0.064)	(0.091)	(0.059)	(0.103)	(0.087)	(0.101)	(0.077)
RegStri * GDPR_Enact			0.190	0.117			0.065	0.012
			(0.232)	(0.182)			(0.063)	(0.095)
RegStri * GDPR_Rollout			-0.154**	0.050			-0.208**	-0.125*
			(0.077)	(0.256)			(0.078)	(0.073)
GDP per capita * EU			0.045	0.005			0.024	0.015
			(0.108)	(0.034)			(0.033)	(0.012)
GDP per capita * GDPR_Enact			0.024	-0.051			0.060***	0.029
			(0.018)	(0.046)			(0.014)	(0.018)
GDP per capita * GDPR_Rollout			0.052	0.093			-0.028***	-0.002
			(0.032)	(0.069)			(0.002)	(0.029)
GDP per capita * EU * GDPR_Enact			0.003	-0.055			-0.021	-0.194*
			(0.163)	(0.128)			(0.049)	(0.110)
GDP per capita * EU * GDPR_Rollout			-0.130	-0.095			-0.119**	0.058
			(0.217)	(0.063)			(0.047)	(0.102)
Marginal effect (enactment)	-	-	-	-	-10.51%	-	-9.88%	-
Marginal effect (rollout)	-20.15%	-12.45%	-21.72%	-11.85%	-23.43%	-14.44%	-19.27%	-11.75%
Unemployment	0.004	0.015	0.001	0.007	0.015	0.009	0.022*	0.003
	(0.017)	(0.010)	(0.016)	(0.011)	(0.026)	(0.017)	(0.012)	(0.011)
GDP per capita	0.105	-0.015	0.067	0.026	0.027*	-0.088*	0.036***	-0.083*
	(0.071)	(0.155)	(0.116)	(0.173)	(0.016)	(0.046)	(0.016)	(0.049)
CPI	0.032*	-0.002	0.025	-0.002	0.018	0.069**	0.066***	-0.003
	(0.019)	(0.015)	(0.022)	(0.014)	(0.022)	(0.031)	(0.010)	(0.023)
Interest rate	-0.195***	-0.123***	-0.189***	-0.118***	-0.119**	-0.650***	0.015	-0.024
	(0.032)	(0.041)	(0.040)	(0.040)	(0.055)	(0.094)	(0.025)	(0.043)
Dimension	Different Continent	Same Continent	Different Continent	Same Continent	Different Industry	Same Industry	Different Industry	Same Industry
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
R-squared	-	-	-	-	-	-	-	-
F-test on pre-treatment (p-value)	0.201	0.234	0.191	0.155	0.147	0.161	0.120	0.115

*Note: The dependent variable for Columns 1 and 2 is the # of deals for different and same investor-venture continents per state per month, whereas it is the # of deals in different and same investor-venture industries in Columns 5 and 6. Columns 3, 4, 7, and 8 add the regulatory strictness measure to the same respective settings of Columns 1, 2, 5, and 6. All columns report Poisson specifications. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 5. GDPR impact on deal distance and $ amount raised per deal

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent Variable:	ln (Geographic distance)	ln (raised dollar amount per deal)						
		OLS						
GDPR_Enact	0.105*	0.689***	0.164	1.103***	0.692***	0.924***	0.742***	0.599***
	(0.055)	(0.146)	(0.342)	(0.276)	(0.130)	(0.154)	(0.169)	(0.225)
EU * GDPR_Enact	0.070	-0.021	-0.017	-0.082	-0.038	-0.062	-0.223***	-0.138
	(0.210)	(0.039)	(0.078)	(0.090)	(0.059)	(0.054)	(0.067)	(0.177)
GDPR_Rollout	0.360***	1.726***	0.947**	2.068***	1.666***	1.961***	1.764***	1.512***
	(0.118)	(0.192)	(0.414)	(0.447)	(0.204)	(0.211)	(0.224)	(0.291)
EU * GDPR_Rollout	-0.258***	-0.418***	-0.357**	-0.280*	-0.398***	-0.261***	-0.469***	-0.273***
	(0.092)	(0.065)	(0.166)	(0.161)	(0.122)	(0.069)	(0.118)	(0.118)
Dimension	-	Foreign Deal	Same Union	Domestic	Different Continent	Same Continent	Different Industry	Same Industry
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macroeconomic control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Venture characteristics control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investor characteristics control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	61,149	15,287	18,344	27,518	22,402	38,747	23,682	37,467
R-squared	0.518	0.664	0.705	0.615	0.477	0.518	0.478	0.571

*Note: The dependent variable is ln(geographic distance in miles) in Column 1 and ln($MM raised per deal) in all of the remaining columns. All specifications are OLS. We do not report the coefficients of venture characteristics (e.g., venture age, # of investors per deal), nor the coefficients of investor characteristics (e.g., investor age, investor size, investor's general experience, investor's specific industry experience, and the number of exits). We also do not report the coefficients of macroeconomic variable controls. The sample is composed of four different industry categories (healthcare, finance, information technology, and others). Standard errors are double-clustered by state (i.e., member state in EU and state in US) and investor ID. ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 6. GDPR impact on more data-related ventures and less data-related ventures

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	More data-related			Less data-related			More data-related		Less data-related		DV: ln (geographic distance)	
	Poisson Regression			Poisson Regression			Poisson Regression		Poisson Regression		OLS	
GDPR_Enact	-0.521***	-0.493***	-0.104	-0.207*	-0.250*	-0.049	0.281	0.274**	0.365*	0.178*	-0.114	0.028
	(0.126)	(0.123)	(0.109)	(0.105)	(0.138)	(0.108)	(0.201)	(0.124)	(0.198)	(0.107)	(0.205)	(0.234)
EU * GDPR_Enact	0.058	0.098	0.138	0.066	0.074	0.096	-0.093**	0.033	-0.035	0.022	-0.108	0.038
	(0.065)	(0.077)	(0.112)	(0.073)	(0.063)	(0.075)	(0.040)	(0.050)	(0.027)	(0.018)	(0.086)	(0.147)
GDPR_Rollout	-1.067***	-1.033***	-0.539***	-0.738***	-0.128***	-0.483***	0.941**	0.478*	-0.151	-0.211	-0.312	0.145
	(0.170)	(0.164)	(0.126)	(0.188)	(0.044)	(0.129)	(0.395)	(0.263)	(0.295)	(0.165)	(0.224)	(0.571)
EU * GDPR_Rollout	-0.305***	-0.232**	-0.147**	-0.171**	-0.155**	-0.098*	-0.320***	-0.197**	-0.143***	-0.102**	-0.261**	-0.106**
	(0.126)	(0.080)	(0.068)	(0.070)	(0.078)	(0.051)	(0.129)	(0.096)	(0.031)	(0.046)	(0.129)	(0.056)
Marginal effect (enactment)	-	-	-	-	-	-	-8.88%	-	-	-		
Marginal effect (rollout)	-26.29%	-20.71%	-13.67%	-15.72%	-14.36%	-9.34%	-27.39%	-17.88%	-13.32%	-9.70%	-26.10%	-10.6%
SUR Test on difference of GDPR rollout (p-value)				0.001	0.000	0.000			0.000	0.000		
Dimension	Foreign	Same Union	Domestic	Foreign	Same Union	Domestic	Different Industry	Same Industry	Different Industry	Same Industry	B2C	B2B
Macroeconomic Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	12,841	9,745
R-square	-	-	-	-	-	-	-	-	-	-	0.517	0.425
F-test on pre-treatment (p-value)	0.111	0.128	0.227	0.117	0.135	0.259	0.202	0.178	0.133	0.192	-	-

*Note: The dependent variable in columns 1 – 10 is the # of deals in more data-related and less data-related ventures, subgrouped further into foreign, same-union, and domestic deals, and different vs same investor-venture industries. The dependent variable in columns 11 and 12 is ln(geographic distance in miles). The specification in first 10 columns is Poisson regression but OLS in columns 11 and 12. We do not report the coefficients of macroeconomics variables controls. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 7. GDPR impact as a function of venture age

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	0-6 year-old ventures			6+ year-old ventures			0-6 year-old ventures		6+ year-old ventures	
	Poisson Regression			Poisson Regression			Poisson Regression		Poisson Regression	
GDPR_Enact	0.281	0.274**	0.479***	0.365*	0.178*	0.328**	-0.681***	-0.572***	-0.565***	-0.446***
	(0.201)	(0.124)	(0.139)	(0.198)	(0.107)	(0.133)	(0.119)	(0.110)	(0.104)	(0.113)
EU * GDPR_Enact	0.077	0.055	0.098	0.065	0.043	0.042	-0.095**	0.071	-0.026	0.103
	(0.057)	(0.055)	(0.081)	(0.063)	(0.079)	(0.372)	(0.048)	(0.049)	(0.018)	(0.088)
GDPR_Rollout	0.941**	0.478*	0.121	-0.151	-0.211	0.086	0.521	0.629**	-0.340	-0.215
	(0.395)	(0.263)	(0.361)	(0.295)	(0.165)	(0.372)	(0.335)	(0.253)	(0.239)	(0.157)
EU * GDPR_Rollout	-0.266**	-0.154**	-0.113*	-0.158*	-0.054	0.030	-0.234***	-0.132**	-0.102	-0.096
	(0.135)	(0.071)	(0.065)	(0.080)	(0.053)	(0.100)	(0.087)	(0.056)	(0.096)	(0.235)
Marginal effect (enactment)	-	-	-	-	-	-	-9.06%	-	-	-
Marginal effect (rollout)	-23.36%	-14.27%	-10.68%	-14.62%	-	-	-20.86%	-12.37%	-	-
Dimension	Foreign	Same Union	Domestic	Foreign	Same Union	Domestic	Different Industry	Same Industry	Different Industry	Same Industry
Macroeconomic Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
F-test on pre-treatment (p-value)	0.102	0.157	0.167	0.110	0.163	0.134	0.115	0.138	0.199	0.149

*Note: The dependent variable is the # of deals in 0-6 and 6+ year old ventures, subgrouped further into foreign, same-union, and domestic deals, and different vs same investor-venture industries. We do not report the coefficient of macroeconomic variable controls. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 8. GDPR impact as a function of deal funding stage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Early Stage			Main Stage			Late Stage		
	Poisson regression on # of deals			Poisson regression on # of deals			Poisson regression on # of deals		
GDPR_Enact	-0.719***	-0.727***	-0.245*	-0.244*	-0.114	-0.209**	-0.169	-0.492***	-0.204
	(0.115)	(0.121)	(0.141)	(0.135)	(0.189)	(0.103)	(0.244)	(0.123)	(0.274)
EU * GDPR_Enact	0.069	0.073	0.087	0.056	0.054	0.072	0.093	0.098	0.075
	(0.048)	(0.058)	(0.083)	(0.065)	(0.091)	(0.044)	(0.149)	(0.077)	(0.134)
GDPR_Rollout	-1.897***	-1.457***	-0.827***	-0.708***	-0.128	0.254	-0.508	0.466	0.525
	(0.186)	(0.192)	(0.184)	(0.167)	(0.381)	(0.253)	(0.346)	(0.287)	(0.489)
EU * GDPR_Rollout	-0.295***	-0.191***	-0.118**	-0.195***	-0.128**	-0.101	-0.157	-0.103	-0.068
	(0.094)	(0.059)	(0.059)	(0.077)	(0.061)	(0.079)	(0.136)	(0.085)	(0.058)
Marginal effect (rollout)	-25.55%	-17.39%	-11.13%	-17.72%	-12.01%	-	-	-	-
Category	Foreign	Same Union	Domestic	Foreign	Same Union	Domestic	Foreign	Same Union	Domestic
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
F-test on pre-treatment (p-value)	0.122	0.131	0.155	0.237	0.134	0.302	0.189	0.385	0.337

*Note: The dependent variable is the # of early, main, and late-stage deals, subgrouped further into foreign, same-union, and domestic deals, and different vs same investor-venture industries. We do not report the coefficients of macroeconomic variable controls. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 9. GDPR impact as a function of investor geographic zone

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	EU-only Investor	US-only Investor	Non-EU/US Investor	EU-only Investor		US-only Investor		Non-EU/US Investor	
	Poisson regression on # of deals			Poisson regression		Poisson regression		Poisson regression	
GDPR_Enact	-0.043	-0.316	0.281	0.077	0.095	-0.319	-0.312	-0.201***	-0.195**
	(0.202)	(0.254)	(0.201)	(0.248)	(0.238)	(0.220)	(0.219)	(0.075)	(0.081)
EU * GDPR_Enact	0.063	0.102	0.077	-0.084*	0.059	-0.135***	0.092	-0.097**	0.052
	(0.074)	(0.094)	(0.057)	(0.050)	(0.074)	(0.046)	(0.096)	(0.048)	(0.041)
GDPR_Rollout	-0.284	-0.570**	0.941**	-0.077	-0.059	-0.478	-0.474	-0.547***	-0.539***
	(0.261)	(0.284)	(0.395)	(0.310)	(0.297)	(0.335)	(0.329)	(0.095)	(0.101)
EU * GDPR_Rollout	-0.113*	-0.242***	-0.199***	-0.149**	-0.078*	-0.218**	-0.145**	-0.188**	-0.129**
	(0.061)	(0.080)	(0.061)	(0.071)	(0.048)	(0.088)	(0.072)	(0.089)	(0.060)
Marginal effect (enactment)	-	-	-	-8.06%	-	-12.63%	-	-9.24%	-
Marginal effect (rollout)	-10.68%	-21.48%	-18.04%	-13.84%	-7.50%	-19.59%	-13.50%	-17.14%	-12.10%
Dimension	-	-	-	Different Industry	Same Industry	Different Industry	Same Industry	Different Industry	Same Industry
Macroeconomic Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950	4,950
F-test on pre-treatment (p-value)	0.141	0.135	0.167	0.217	0.170	0.153	0.182	0.108	0.115

*Note: The dependent variable is the # of deals based on investor location (EU only, US only, and non-EU/US), further subgrouped into different vs same investor-venture industries. We do not report the coefficients of macroeconomic variable controls. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 10. GDPR effects on the number of first-round deals.

	(1)	(2)	(3)	(4)	(5)	(6)
	DV: # of first-round deals			# of first-round deals		
	Poisson Regression			Poisson Regression		
GDPR_Enact	-0.151	-0.083	-0.045	-0.244	-0.114	-0.209
	(0.115)	(0.121)	(0.148)	(0.187)	(0.189)	(0.203)
EU * GDPR_Enact	0.069	0.073	0.087	0.056	0.054	0.072
	(0.048)	(0.058)	(0.083)	(0.065)	(0.091)	(0.044)
GDPR_Rollout	-0.237	-0.157	-0.082	-0.208	-0.128	0.254
	(0.318)	(0.192)	(0.184)	(0.167)	(0.381)	(0.253)
EU * GDPR_Rollout	-0.163**	-0.093*	-0.064*	-0.065*	-0.195**	-0.249**
	(0.074)	(0.052)	(0.035)	(0.033)	(0.081)	(0.103)
Marginal effect (rollout)	-15.02%	-8.89%	-6.17%	-6.26%	-17.98%	-22.03%
Dimension	Foreign	Same Union	Domestic	EU-only Investor	US-only Investor	Non-EU/US Investor
Macroeconomics Control	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,950	4,950	4,950	4,950	4,950	4,950

*Note: The dependent variable in Columns 1 – 3 is the # of first-round deals per state per month of different types (i.e., foreign, same union, and domestic). The dependent variable in Columns 4 – 6 is the # of first-round deals based on investor location (i.e., EU only, US only, and non-EU/US). All specifications use Poisson regressions. We do not report the coefficients of macroeconomics controls. Standard errors are clustered by state (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*

Table 11. GDPR effects on repeat investors conditional on ventures receiving an initial investment prior to GDPR's enactment.

	(1)	(2)	(3)	(4)	(5)
Dependent Variable:	ln (geographic distance)		Repeat Lead Dummy	Repeat-Investor Dummy	Repeat-Investor Dummy
	OLS		Probit Regression		
GDPR_Enact	-0.145	0.043	-0.084	-0.037	-0.074
	(0.375)	(0.209)	(0.286)	(0.423)	(0.147)
EU * GDPR_Enact	0.051	0.011	-0.180	-0.047	-0.055
	(0.221)	(0.339)	(0.221)	(0.081)	(0.176)
GDPR_Rollout	-0.207	-0.242	-0.383	0.033	-0.132
	(0.233)	(0.178)	(0.418)	(0.174)	(0.585)
EU * GDPR_Rollout	-0.123**	-0.276***	-0.392***	-0.165***	-0.381**
	(0.056)	(0.095)	(0.139)	(0.042)	(0.179)
Prev_Round_Distance					0.008
					(0.520)
Prev_Round_Distance*EU					-0.168
					(0.378)
Prev_Round_Distance*GDPR_Enact					0.002
					(0.012)
Prev_Round_Distance*GDPR_Rollout					0.005
					(0.034)
Prev_Round_Distance*EU*GDPR_Enact					-0.031
					(0.073)
Prev_Round_Distance*EU*GDPR_Rollout					-0.269**
					(0.125)
Marginal Effect (Rollout)	-12.35%	-27.61%	-32.43%	-14.38%	-22.35%
Dimension	Repeat Investor	Non-repeat Investor	-	-	-
Macroeconomic Control	Yes	Yes	Yes	Yes	Yes
Investor and Venture Characteristics Control	Yes	Yes	-	-	-
State FE	Yes	Yes	Yes	Yes	Yes
Week FE	Yes	Yes	Yes	Yes	Yes
Observations	12,715	3,211	12,715	12,715	12,715
R-squared	0.579	0.394	-	-	-

*Note: The dependent variable in Column 1 is a dummy variable indicating that the same investor leads both the initial and subsequent rounds. The dependent variable in Columns 2-3 is a dummy variable indicating that the initial lead investor participates in any capacity in the subsequent round. The dependent variable is ln(geographic distance in miles) in Columns 4-5. We do not report coefficients of venture characteristics (e.g., venture age, # of investors per deal, amount raised in previous rounds), coefficients of investor characteristics (e.g., investor age, investor size, investor's general experience, investor's specific industry experience, and the number of exits), nor the coefficients of macroeconomic controls. Standard errors are clustered by state (member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.*