How Does Privacy Regulation Affect Transatlantic Venture Investment? Evidence from GDPR*

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We analyze the impact of Europe's General Data Protection Regulation (GDPR) on venture investment flows between the European Union (EU) and US. Using data on investment rounds from 2014 to 2019, we find that GDPR's rollout in May 2018 led to a significant decline in US investor activity in the EU, evidenced by fewer deals and investment. The effects are pronounced for newer and data-related ventures, with investors shifting toward geographically closer ventures and increasing deal syndication. We find that investing in closer ventures is a key driver of the decline in investment inflows to Europe, while syndication mitigated some of the negative effects. The rise in syndication is primarily driven by US investors joining syndicates led by EU-based investors. Our findings highlight the critical role of digital policies in shaping investment strategies and influencing transatlantic capital flows.

Keywords: GDPR, privacy, venture capital, technology venture, local preference, syndication.

JEL Codes: G11, K20, D8.

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1. Introduction

Venture capitalists play a crucial role in driving economic growth by providing financial resources to young and innovative companies, typically in exchange for equity stakes (Kortum and Lerner 2000; Samila and Sorenson 2011). The United States has the largest and most developed venture capital (VC) market worldwide, with Europe lagging far behind. During the past decade, annual VC investments in the EU averaged 0.2% of GDP, less than one-third of the 0.7% observed in the US (Arnold, Claveres and Frie 2024). Although this lower volume of venture capital investment may, in principle, reflect a relative shortage of successful, high-growth potential ventures on the demand side, it underscores persistent supply-side issues. Specifically, the EU has fewer large-scale VC funds, and those that exist are often less equipped than their US counterparts. Since 2013, EU-based VC funds raised approximately $794 billion less than their US counterparts and there have been 137 VC funds larger than USD 1 billion in the US, compared to only 11 in the EU.[1] This gap highlights the importance of cross-border investment inflows, particularly from US investors, into economies characterized by less developed venture investment ecosystems. Moreover, foreign investors can bring valuable expertise, facilitating the internationalization of local ventures and opening opportunities for foreign exits (Mäkelä and Maula 2005; Jääskeläinen and Maula 2005; Hursti and Maula 2007), especially when foreign venture capitalists (VCs) partner with local ones (Schertler and Tykvová 2011; Humphery-Jenner and Suchard 2013). In effect, according to the 2023 European Investment Fund Venture Capital Survey,[2] over 80% of VC fund managers strongly agree that greater activity by global investors is crucial for scale-up financing in Europe.

Against this backdrop, data has become a key input in technology, attracting investments in data-driven innovations around the world. Such innovations have transformed marketplaces, and the prospects of new services and monetization surrounding data have galvanized entrepreneurs and investors across industry sectors. However, data-driven operations are also associated with concerns about exposure, privacy intrusion, and misuse without the knowledge or consent of the source. These concerns, exacerbated by recent cases 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.[3] However, adding regulatory bur-

[1] See Arnold, Claveres and Frie (2024) and Draghi (2024) for additional details.

[2] Available at https://www.eif.org/news_centre/publications/eif_working_paper_2023_93.pdf, accessed on 1/14/2025.

[3] See for example the reports published by the Federal Trade Commission in 2012 (available at:

dens to companies can hurt innovation and entrepreneurship (Djankov et al. 2002; Bleier, Goldfarb and Tucker 2020). This negative effect can be particularly large among smaller technology ventures seeking to raise venture capital, a context where shifting regulatory landscapes have been shown to contribute to raising uncertainty in returns and potentially lowering investment (Gompers and Lerner 2001). Consistently, more than half of the small and medium enterprises in Europe flag regulatory obstacles and the administrative burden as their greatest challenge.[4]

The EU's relatively underdeveloped venture investment ecosystem, together with the regulatory burdens on young and innovative European technology ventures, have been identified as key drivers of the innovation and competitiveness gaps with the US by Draghi (2024). In this paper, we examine the unintended consequences of the European General Data Protection Regulation (GDPR) in affecting investment flows between the EU and US.

The 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 and 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 because compliance itself is a function of heuristics that have yet to be fully tested in the courts.[5] Second, ventures may rely on the compliance strategies of larger platforms, but many of these platforms only announced how they intended to pursue compliance on or around GDPR's implementation date,[6] and some have, over time, revised their

https://www.ftc.gov/reports/protecting-consumer-privacy-era-rapid-change-recommendations-businesses-policymakers), 2014 (available at: https://www.ftc.gov/reports/data-brokers-call-transparency-accountability-report-federal-trade-commission-may-2014) and 2016 (available at: https://www.ftc.gov/reports/big-data-tool-inclusion-or-exclusion-understanding-issues-ftc-report), or by the European Data Protection Supervisor in 2016 (available at: https://www.edps.europa.eu/sites/default/files/publication/16-09-23_bigdata_opinion_en.pdf).

[4]See for example BusinessEurope's report, "Reducing Regulatory Burden to Restore the EU's Competitive Edge," available at: https://www.businesseurope.eu/publications/reducing-regulatory-burden-restore-eus-competitive-edge?utm_source=chatgpt.com.

[5]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.

[6]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-

policies to reach compliance adequacy.[7] The choices of the larger platforms may also be critical for smaller firms because they influence those firms' data-related liabilities under the regulation.[8] As a consequence, the actual cost of compliance may change over time. The regulation is therefore associated with uncertainty about the extent to which ventures can 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, Johnson and Shriver 2024). For investors, it follows that GDPR introduces new uncertainty, as well as information acquisition and due diligence costs related to EU venture deals, and these costs may be particularly pronounced for investors who are not based in the EU.

In this paper, we leverage the introduction of the GDPR as an exogenous variation. Using six years of investment data (2014-2019), we investigate the impact of the GDPR on investors' investment strategies and its implications for venture investment flows between the EU and US. Common strategies that venture investors may adopt to mitigate the increased investment costs following a law change include investing locally and syndicating deals (e.g., Gompers and Lerner 1999; Cumming and Dai 2010). Accordingly, we conjecture that US investors could reduce their investments in EU startups and shift their focus to other assets unaffected by the GDPR, a strategy to which we refer as "pullback." Moreover, since syndication can help mitigate investment risks and reduce screening and monitoring costs, investors may expand their co-investment efforts with other local investors, a strategy to which we refer as "syndication with locals."

Using a difference-in-difference comparison between the EU and US, we find that all investors reduced investments in the EU, but this pullback effect was significantly more pronounced for US investors. That is, the GDPR amplified the tendency of EU ventures to receive funding from closer investors. In particular, our findings suggest a 20.63% reduction in the number of monthly EU deals led by US investors and a 13.15% reduction in their amounts after the rollout of GDPR relative to US ventures. In comparison, the reductions for EU deals completed by EU investors were 12.98% in the number of deals

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).

[7] 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.

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

and 4.50% in the investment amounts, neither of which was statistically significant. These effects were more pronounced for new and data-related ventures. Furthermore, we find a significant increase in deal syndication between EU and US investors following the GDPR's rollout in the EU, with the probability of such deals rising by about 37 percent. This was primarily driven by US investors participating as non-lead partners alongside EU investors in financing EU ventures. These patterns are consistent with syndication enabling investors to share information and resources during screening and monitoring processes.

Overall, we provide compelling evidence of a shift in investment strategies and a decline of venture investment flows into the EU from US investors after the GDPR's implementation. From a policy perspective, this highlights the cost of the GDPR in terms of reduced entrepreneurial activity and possibly innovation (Campbell, Goldfarb and Tucker 2015). Beyond providing capital, foreign investors contribute to the success of local ventures by offering expert advice, access to relevant networks, and facilitating foreign exit opportunities. In the long run, promising EU startups may relocate away from the EU in search of better financing opportunities, depriving the EU of both direct economic growth and the positive spillovers from innovative firms, potentially further widening the productivity gap between the EU and US (Arnold, Claveres and Frie 2024; Draghi 2024).

Related Literature. First, our study contributes to a large body of literature that explores the impact of public policies on venture investment and entrepreneurship (Howell 2017; Bloom, Van Reenen and Williams 2019). Specifically, we focus on the effects of data policies and regulation. A burgeoning stream of research has examined the implications of such policies in other domains. 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. Johnson, Shriver and Goldberg (2022) examine the impact of the 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 study provides new and complementary insights from the perspective of investors. We show that the costs and uncertainty brought about by the 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 for investment and their syndication choices. Hence, any regulatory approach that aims to alleviate some of the costs identified in these related works has to be cognizant of the heterogeneous responses of investors.

Closest to our paper, Jia, Jin and Wagman (2021) demonstrate that the rollout of the GDPR was 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 and investment strategies. To our knowledge, this paper is the first to study the interface between the two.

Second, by examining how EU and US investors differentially respond to the increased uncertainty of investing in EU ventures, our findings contribute to the literature on investors' local preferences and cross-border investments.[9] Cumming and Dai (2010) examine local preference in the context of venture investments in the US market, suggesting that investors exhibit strong tendencies to invest locally, especially those who specialize in technology industries or invest alone rather than as a syndicate. The literature suggests that investors who are geographically closer to ventures may 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 (Kang and Kim 2008; Agarwal and Hauswald 2010). Investors in closer proximity may have a better understanding of the legal and institutional environments in which their portfolio ventures initially operate. It has indeed been demonstrated that it is less costly to screen and acquire information, and monitor and support (Lerner 1995; Sorenson and Stuart 2001; Dai, Jo and Kassicieh 2012) geographically-close portfolio firms than distant ones, and that geographical distance is thus related to investment performance.

Third, we contribute to the literature on deal syndication. The resource-based view suggests that deal syndication facilitates the sharing of information and resources among investors. Lerner (1994) highlights how syndication can improve screening by mitigating adverse selection (Bygrave 1987), while also improving venture monitoring. This effect arises when investors possess complementary skills that enhance value creation (Brander, Amit and Antweiler 2002; Tian 2011). In contrast, the diversification theory posits that

[9] For recent surveys on investors' local preference and incentives for cross-border investments, see Coeurdacier and Rey (2013) and Devigne, Manigart and Wright (2018).

syndicating a deal reduces the capital commitment required from each investor, enabling them to make a greater number of investments. We document an increase in deal syndication following the rise in screening and monitoring costs introduced by the GDPR. To explore the role of diversification incentives in driving this outcome, we compare EU and US investors before and after the GDPR. Our findings indicate that EU investors, who are more likely to lead investments in partnership with US investors after the GDPR, do not increase the number of deals they undertake.[10]

The remainder of the paper is organized as follows. Section 2 describes the data. Section 3 presents our empirical strategy and Section 4 discusses the main effect of the GDPR on investment flows between the EU and US. Section 5 explores the role of syndication as a mechanism that can mitigate these negative effects of the GDPR. Section 6 concludes.

2. Data

The primary sources of data are Thomson Reuters' VentureXpert (VX) and CrunchBase (CB) datasets. VX is a comprehensive dataset of venture capital investments and one that has been used extensively in venture investment research, both domestic as well as cross-border (Aizenman and Kendall 2012). CB tracks similar information about emerging businesses, particularly in the technology space, and broadens the coverage of non-VC (e.g., angel) investors.[11] We collect VX and CB data on all investment deals involving EU or US ventures and at least one investor headquartered in EU or the US., 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 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 zip code) 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.,

[10] This result is consistent with the results in Hopp and Rieder (2011), who document that concentration of VC portfolios increases with syndication.

[11] For recent activity in the academic literature that pertains to this data source, see Lerner et al. (2018), Chatterji et al. (2019), and Jia, Jin and Wagman (2021).

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 whose stakes are typically the highest amount in a venture's financing round and who 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.

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.[12] 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 as 'Startup/Seed', 'Early Stage', 'Expansion', or 'Later Stage', which excludes 23,102 deals at the 'Buyout/Acquisition', 'Real Estate', or 'Other' stages.[13] We remove deals that have undisclosed dollar amounts. Overall, there are 74,269 CB and 38,915 VX financing deals; of those, 15,467 (approximately 15.95%) overlap.[14] 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

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

[13] 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.

[14] 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.

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.[15]

Finally, we gather local macroeconomic indicators, including the unemployment rate, consumer price index (CPI), interest rate, median income, and GDP per capita, for each member state where a venture operates.

2.1. Variable definition and descriptive statistics

We treat each funding round observed as a 'deal' event, tallying deals per month in each US or EU member state. Our sample comprises ventures in 24 EU member states and 51 US states including the District of Columbia (henceforth, states).[16] We refer to a deal as "cross-union-led" or more briefly as "cross-union" if the venture and the lead investor are from a different 'union' (i.e., one in the EU and one in the US). Cross-union deals include both cases in which a cross-union investor invests alone or syndicates the deal with other investors. Similarly, "same-union" deals are defined as those where the venture and the lead investor are both from the EU or are both from the US. For example, a deal between a French venture and a German lead investor, or one between a venture headquartered in New York and a lead investor from California would be both classified as same-union. In some specifications, we will also consider deals with at least one cross-union investor regardless of whether the investor is a lead investor or not.

We also examine deal syndication, which we define at the deal level as a case when two or more investors partner in funding a venture. Since we are interested in understanding investment flows between EU and US, we will often focus on "cross-union

[15]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.

[16]Table A.1 reports the EU states included. 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 because it is still bound by the 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.

syndication," which we define as the scenario in which at least one EU and one US investor partner in a venture funding round. Within these deals, we will further distinguish cases wherein the same-union investor is the lead ("same-union led") from those where the opposite happens ("cross-union led").

To examine drivers and additional implications of the shift in investment flows between EU and US after the GDPR, we construct several additional variables. First, we distinguish "data-related" deals from all the others by leveraging the keywords associated with a venture by VX and CB. Specifically, we define "data-related" ventures tagged with keywords such as 'data,' 'statistics,' 'evidence,' 'apps,' 'location-based services,' 'AI,' 'social media,' and 'e-commerce.'[17] We construct a similar "data-related" variable for each investor, but since we do not observe keywords associated with them, we label an investor as data-related if at least 50% of the ventures they invested in before the enactment of the GDPR are data-related. Next, we tag as "new" those deals involving ventures that had never raised capital before the enactment of the GDPR, and as "follow-on" those deals involving an investor (either as lead or non-lead) that had previously led a round in the focal venture.

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

$$(1) \quad d_{ij} = 3963 \times ar_cos\lfloor sin(lat_i)sin(lat_j) + cos(lat_i)cos(lat_j)cos(\mid long_i - long_j \mid)\rfloor,$$

where lat (latitude) and $long$ (longitude) are measured in radians and 3963 is a constant representing the radius of the Earth in statute miles.[18] Following a similar approach, we compute the average distance between the venture and all non-lead investors or all investors (lead and non-lead) involved in the deal.

Table 1 presents summary statistics at the state-month level for ventures in the EU and US. The number of cross-union deals is lower for EU ventures compared to their US counterparts. However, the total amount of capital invested by lead US investors in EU ventures exceeds that invested by EU investors in US ventures by 7.25%. This

[17] 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.

[18] 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.

TABLE 1. Summary Statistics

	EU ventures					US ventures				
	Mean	Median	75-percentile	95-percentile	N	Mean	Median	75-percentile	95-percentile	N
Panel A: State-month level										
# of deals	6.52	2	6	27	1,728	8.12	2	7	29	3,672
# of cross-union deals	1.49	1	3	12	1,728	1.82	1	4	15	3,672
# of same-union deals	5.03	2	4	18	1,728	6.30	2	5	19	3,672
$MM in cross-union deals	54.97	15.17	69.59	196.75	1,728	51.25	13.04	62.47	174.69	3,672
$MM in same-union deals	56.43	17.66	72.14	194.55	1,728	143.32	19.57	99.54	304.71	3,672
# of deals with a cross-union investor	1.91	1	3	15	1,728	2.01	1	4	15	3,672
$MM in deals with a cross-union investor	58.92	13.27	71.69	192.77	1,728	76.23	25.01	95.26	201.77	3,672
# of deals with EU-only Investors	3.04	1	5	12	1,728	2.45	1	5	11	3,672
# of deals with US-only Investors	1.73	1	4	8	1,728	3.29	1	4	8	3,672
$MM in deals with EU-only Investors	47.48	10.39	55.37	148.55	1,728	28.67	6.55	31.07	79.44	3,672
$MM in deals with US-only Investors	53.14	10.77	59.07	128.66	1,728	117.05	15.77	76.07	211.51	3,672
# of syndicated deals	5.85	2	5	22	1,728	7.22	3	7	30	3,672
# of cross-union syndicated deals	2.14	1	4	12	1,728	1.87	1	3	11	3,672
Unemployment rate	8.63%	7.11%	10.15%	20.67%	1,728	4.68%	4.64%	5.60%	6.93%	3,672
GDP per capita (in thousand US$)	32.77	9.38	19.58	65.23	1,728	57.19	25.66	77.15	138.55	3,672
Consumer Price Index (CPI)	108.45	108.22	110.35	113.85	1,728	111.15	110.18	113.48	115.84	3,672
Interest rate (macro)	-0.15%	-0.29%	0	0.29	1,728	0.73%	0.32%	1.24%	2.37%	3,672
Panel B: Deal Level										
$\mathbb{1}$\{Syndication\}	89.84%	1	1	1	23,373	89.23%	1	1	1	37,776
$\mathbb{1}$\{Cross-union syndication\}	36.13%	0	1	1	8,414	28.36%	0	1	1	10,578
$\mathbb{1}$\{Data-related deal\}	33.67%	0	1	1	15,227	49.04%	1	1	1	18,310
$MM amount per deal	8.72	0.95	12.59	67.75	23,373	17.78	2.03	19.75	116.77	37,776
$MM per deal if $\mathbb{1}$\{Syndication\}	9.47	0.98	10.57	61.86	20,945	18.93	1.98	16.93	109.73	33,740
$MM per deal if $\mathbb{1}$\{cross-union syndication\}	9.41	1.67	8.45	43.11	8,414	16.94	1.21	13.66	80.52	10,578
# of investors	5.4	3	6	15	23,373	4.3	3	7	12	37,776
# of cross-union investors	1.6	1	3	7	23,373	1.9	1	4	6	37,776
# of same-union investors	3.8	2	3	9	23,373	2.4	2	4	8	37,776
Lead investor-venture distance (miles)	575	273	347	795	23,373	715	469	504	981	37,776

Notes: Panel A reports summary statistics from our entire final sample at the state-month level, distinguishing the 24 EU states considered (EU ventures) from the US ones (US ventures). Panel B reports summary statistics from our entire final sample at the deal level, distinguishing the 24 EU states considered (EU ventures) from the US ones (US ventures).

disparity becomes even more pronounced when examining solo or syndicated deals completed exclusively by EU or US investors. On average, a US investor acting alone, or a syndicate comprised solely of US investors, completes 1.73 deals per month in each EU state, with a total investment of $53.14 million. In contrast, an EU investor alone, or a syndicate of only EU investors, completes 2.45 deals per month in each US state, but with a lower total investment of $28.67 million. These statistics suggest an even larger gap on a per-deal basis, highlighting not only the greater availability of capital among US investors but also a larger and more dynamic investment ecosystem characterized by higher demand or greater opportunities. Additionally, they underscore the significant role of US investment flows in fostering European entrepreneurship.

Furthermore, Table 1 indicates that the total amount invested per EU state-month by syndicates involving at least one US investor is 24.09% higher than the amount invested by EU-only investors. Conversely, for US ventures, deals involving only US investors are, on average, 53.54% larger than those involving at least one EU investor. This underscores

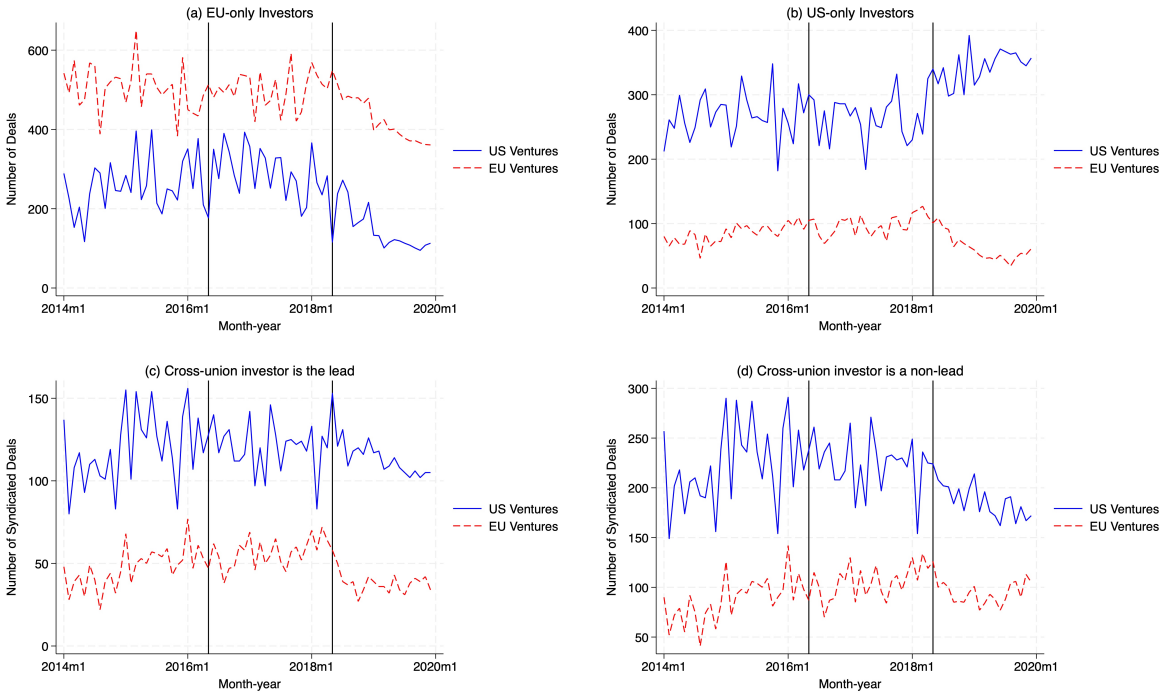


FIGURE 1. Trends in Cross-union investment and syndication

Notes: Figures (a) and (b) summarize the monthly number of deals per EU or US state for deals involving only EU investors or only US investors, respectively. Figures (c) and (d) focus on the number of cross-union syndicated deals in each state-month. The former illustrates the pattern for deals led by a cross-union investor, whereas the latter focuses on deals where a cross-union investor participated in the syndication as a non-lead investor. The two vertical black lines indicate the GDPR's enactment and rollout, respectively.

the pivotal role of US investors partnering with EU investors in driving investment activity within the EU. Panel B of Table 1 delves deeper into these dynamics, specifically analyzing syndication and cross-union syndication at the deal level. Panel B shows that syndication is very common (about 89% of the deals) for both EU and US ventures. However, the likelihood of an EU deal (i.e., an investment round into an EU venture) being cross-union syndicated is 36.13%, compared to 28.36% for US deals. In terms of syndicate size, the data shows that EU deals tend to involve larger syndicates, driven primarily by a higher number of same-union investors, on average.

The table also highlights that the probability of a funding round supporting a data-related EU venture is about 16 percentage points lower than that of a data-related US venture. This gap may partly reflect a relative shortage of data-related ventures in the EU—those particularly affected by the GDPR—a concern recently emphasized by policymakers (Draghi 2024).

Figure 1 examines trends in cross-union VC investment around the enactment and

rollout of the GDPR. As shown in Figure (a), the number of deals involving EU-only investors, either investing alone or syndicating with other EU investors, decreased in both the EU and the US—albeit at a slower pace in the US. In contrast, Figure (b) reveals a significant divergence between US and EU ventures in the number of investment deals involving US-only investors. Specifically, the figure highlights an increase in the number of deals completed for US ventures by US-only investors, either investing alone or in syndication with other US investors and a decrease in the number of deals completed for EU ventures by US investors. Figures (c) and (d) delve into syndication dynamics. Figure (c) shows a decline in the number of cross-union syndicated rounds led by a US investor in EU ventures following the GDPR's rollout. In contrast, the same figure does not indicate a sharp change for cross-union syndicated rounds led by an EU investor in US ventures. Meanwhile, Figure (d) suggests that although EU investors reduced their participation as non-lead investors in cross-union syndicated rounds into US ventures after the GDPR's rollout, US investors maintained a similar level of participation as non-lead investors in cross-union syndicated rounds into EU ventures.

From the perspective of US investors, Figure 1 highlights their increased preference for investing within the US following the rise in costs associated with the GDPR's rollout. This shift has the potential of harming the tech venture ecosystem in the EU. However, the figure also suggests that partnering with EU investors, particularly as non-lead investors, may help mitigate these concerns.

3. Empirical Framework

To examine the effects of the GDPR on investment flows, our identification strategy exploits two sources of variation in a difference-in-differences (DiD) framework. First, time variation originates from the enactment and rollout of the regulation. While the 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. Second, we leverage cross-sectional variation in the geographical location of the headquarters of ventures and investors.

We expect that when the GDPR became enforceable, entrepreneurs and investors began to recognize the costs associated with compliance, uncertainty, and implementation, as well as the broader implications of the regulation. This was particularly evident in the days and weeks leading up to the GDPR's effective date, when major platforms—relied upon by numerous technology ventures—started unveiling tighter rules for developer-

side services, including new policies on data sharing, data portability, and data liability. Furthermore, these costs are likely to vary among investors across EU and US, which allows us to assess the differential effects of the GDPR based on where investors and ventures are headquartered.

We carry out the main empirical analysis at two levels. At the aggregate level, each observation is defined at the state-month level and the dependent variable is the number of deals reached or the total amount of dollars invested in each month-state. A state is one of the 24 EU member states in our sample or one of the 51 US states. The number of deals provides a metric for the extensive margin and could be zero if no ventures in the state received venture capital in a given month. As a measure of the geographic zones to which investors and ventures belong, we categorize deals into five different types: (i) at least one cross-union investor participates ('cross-union-participated'); (ii) the lead investor is from a different union ('cross-union-led' or simply 'cross-union'); (iii) the lead investor is from the same union ("same-union-led" or simply 'same-union'); (iv) only EU investors participate ('EU-only'); (v) only US investors participate ('US-only'). These categories are not mutually exclusive, meaning a single deal may fall into multiple groups. For example, a deal involving a lead investor from a different union would be both cross-union-led and cross-union-participated.

Several reasons motivated our choice to aggregate the deals at the state level. First, the implementation of the GDPR, while aiming for a uniform law, is local (i.e., country-level enforcement in the EU). Second, there is no US federal privacy legislation except for selected age groups or sectors such as children, healthcare, and finance. Third, each EU member state is not comparable with the US at the macro level, and some macro variables such as the unemployment rate are local.

At the deal level, we consider several dependent variables. First, we set a dummy equal to one if the deal is syndicated. Second, we set another dummy equal to one if the deal is "cross-union syndicated," meaning that at least one US and one EU investor co-invest in the deal. Third, we construct several measures of syndicate size based on the geographical location of investors, including the total number of investors in the syndicate, the number of cross-union investors, and the number of same-union investors. Additionally, we consider the geographical distance between the venture and its investors as an outcome.

Across different specifications, the treatment group comprises deals that involve EU ventures and the control group comprises deals that involve US ventures. While the treatment group does tend to have lower levels of venture activity than the control

group, there does not appear to be a differential pretreatment trend that would violate the common trend assumption in our DID analysis. For example, at the aggregate level, Figure A.1 depicts trend lines of the number of cross-union- and same-union-led deals from January 2014 to December 2019. All figures suggest that no divergence took place between EU and US after the enactment of the GDPR, but some sustained divergence took place around the time of the GDPR's rollout. Both EU and US trends also track each other closely otherwise, and particularly so up until the GDPR was rolled out in May 2018).

For the aggregate-level analysis, we use the following Poisson regression:

$$y_{st} = \exp\Big(\alpha_s + \alpha_t + \delta X_{st} + \beta_1 (EU_s \times GDPR_Enact_t) + \\ + \beta_2 (EU_s \times GDPR_Rollout_t) + \varepsilon_{st}\Big), \tag{2}$$

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 equal to 1 if t is on or after April 2016 but before May 2018 and 0 otherwise, and $GDPR_Rollout_t$ is a dummy variable equal to 1 if t is after May 2018 and 0 otherwise. The dependent variable y_{st} is the number or the total value of the financing deals in each state-month. 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. In all cases, we obtain similar results when using Ordinary Least Squares (OLS).

The coefficients β_1 and β_2 capture the effects of the GDPR's enactment and rollout across all categories, respectively. Standard errors are clustered at the state level because the GDPR mandates state-specific enforcement and the heterogeneity is confirmed in market perception. Specifically, while the 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 of 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.[19] Goldberg, Johnson and Shriver (2024) additionally demonstrate that the GDPR suffers from implementation heterogeneity across EU coun-

[19]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."

tries, heterogeneity that lines up with traditional member state enforcement behaviors.

Similarly, at the deal level, we use specifications of the following form:

$$y_{jst} = \alpha_s + \alpha_t + \delta X_{jst} + \beta_1 \left(EU_{js} \times GDPR_Enact_t \right) + \\ + \beta_2 \left(EU_{js} \times GDPR_Rollout_t \right) + \varepsilon_{jst}, \tag{3}$$

where j identifies deals according to their assigned unique identifier, the dependent variable y_{jst} is one of the dummies identifying a certain type of deal (syndicated or cross-border syndicated), one of our measures of syndicate size, or the log of the geographic venture-investor distance in deal j, and α_t and α_s are year-month and state fixed effects. Deal-level control variables in X_{jst} 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_{jst}, and all other dummy variables are the same as previously. Standard errors are clustered at the state level. The choice of the regression model (linear, Probit, Poisson) depends on the nature of the dependent variable being analyzed.

4. The Effect of the GDPR on Investment Flows between the EU and US

We begin by examining how the GDPR affects cross-union venture investment by estimating Equation 2. The results are summarized in Table 2.

We find that while the enactment of the GDPR did not significantly affect investment flows between the EU and US, its rollout had large and significant effects. Panel A examines the impact on deal counts. Column 1 reveals a 15.55% reduction in the number of EU deals involving any US investors, compared to US deals involving any EU investors. Column 2 indicates that this reduction was particularly pronounced (20.63%) for rounds led by US investors for EU ventures. Column 3 also shows a decline in rounds led by EU investors within the EU; however, this estimate is only significant at the 10% level and is both economically and statistically smaller than the reduction observed for cross-union-led rounds. A similar pattern emerges, with an even wider gap, when comparing Columns 4 and 5. Column 4 documents an 8.79% decrease in the number of investment deals completed for EU ventures by a single EU investor or syndicates of only EU investors. In contrast, Column 5 shows that the same reduction is over 10

percentage points larger for investment deals completed for EU ventures by single US investors or syndicates of only US investors.[20]

Panel B highlights similar trends when analyzing the total amount of dollars invested per state-month. Specifically, the cost for the EU of the GDPR in terms of a reduced inflow of investment from the GDPR amounts to more than $1.71 billion per year.[21] Overall, our findings indicate that, after the GDPR's rollout, all investors reduced their investments in the EU. However, this pullback was significantly more pronounced for US investors, leading to a marked reduction in investment inflows from the US to the EU.[22]

The last row of Table 2 reports that the p-value of the F-test for pre-treatment trends is always above 5% (and indeed, never below 10%). This result indicates the absence of any pre-existing differential trends between EU and US in the number and value of the various types of deals analyzed prior to April 2016. Figure A.2 in the Appendix depicts coefficient plots of the monthly pre-treatment tests for the counts of cross-union-led and same-union-led deals using the Poisson specification. To perform these tests, we run the same specifications for the pre-GDPR enactment data, including a full set of interactions between the EU dummy and a month-specific dummy. The coefficients of these interactions are depicted along with their confidence intervals and confirm that there is no pre-existing differential trend between EU and US before April 2016.[23]

Home Bias. A natural explanation for the greater drop in foreign investment into EU ventures relative to US ones is provided by home bias, i.e., investors' tendency to invest locally.

Proximity to the venture can mitigate an investor's screening and monitoring costs. 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. Cumming and Dai (2010) document the incidence of home bias in the context of venture investments in the US market, suggesting that investors who specialize in technology

[20] Besides comparing estimated magnitudes, we also use seemingly unrelated regressions (SUR) to formally verify that the coefficients on (EU venture * GDPR_Rollout) are indeed statistically different across the different specifications compared.

[21] Column 1 indicates a 10% reduction (exp(–0.106) – 1) in investment in the EU post-GDPR. Using the summary statistics in Table 1, this corresponds to a monthly decline of $5.93 million per state. Aggregating this over a year across the 24 EU states in our sample yields the reported figure.

[22] Consistently, as shown in Table A.3, we find a significant reduction in US investor's activity in the EU when we measure it by computing their share of total number or value of deals in a given state-month.

[23] 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.

TABLE 2. The effect of the GDPR on cross-union investment

Dimension:	(1) Cross-union participated	(2) Cross-union led	(3) Same-Union led	(4) EU-only investors	(5) US-only investors
Panel A: Number of deals (Poisson Regression)					
GDPR_Enact	-0.104	-0.245*	-0.327***	-0.043	-0.316**
	(0.109)	(0.141)	(0.118)	(0.202)	(0.254)
EU venture * GDPR_Enact	0.138	0.087	0.075	0.063	0.102
	(0.112)	(0.083)	(0.065)	(0.074)	(0.094)
GDPR_Rollout	-0.151	-0.827***	-0.712***	-0.284	-0.561
	(0.295)	(0.184)	(0.147)	(0.261)	(0.279)
EU venture * GDPR_Rollout	-0.169***	-0.231***	-0.139*	-0.092**	-0.214***
	(0.046)	(0.059)	(0.071)	(0.042)	(0.079)
F-test on Pre-treatment (p-value)	0.216	0.198	0.161	0.186	0.138
Panel B: $ Amount (Poisson Regression)					
GDPR_Enact	-0.114	-0.149	-0.071	-0.227	-0.106
	(0.234)	(0.113)	(0.104)	(0.174)	(0.175)
EU venture * GDPR_Enact	0.028	0.086	0.083	0.075	0.065
	(0.205)	(0.059)	(0.066)	(0.087)	(0.110)
GDPR_Rollout	-0.312	-0.222	-0.143	-0.207	-0.123
	(0.224)	(0.298)	(0.175)	(0.166)	(0.365)
EU venture * GDPR_Rollout	-0.106*	-0.141**	-0.046*	-0.059**	-0.165***
	(0.056)	(0.067)	(0.024)	(0.027)	(0.062)
F-test on Pre-treatment (p-value)	0.201	0.168	0.206	0.194	0.125
Observations	5,400	5,400	5,400	5,400	5,400
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes

Notes: Panel A reports the results when using the # of deals per state per month of different types as the dependent variable. The dependent variable in Panel B is the total $ amount (in MM) per state per month of different types. Each column aggregates the dependent variable across a different dimension: whether at least one cross-union investor participated in the deal, whether a cross-union investor was the lead investor, whether a same-union investor was the lead investor, whether only EU investors participated in the deal, or whether only US investors participated in the deal. All results refer to the Poisson specification. GDP is scaled by 10 trillion US$. 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.

industries exhibit even stronger tendencies to invest locally. 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, for example, lower costs of information acquisition. It thus follows that the average distance

between investors and EU ventures should shrink after the GDPR due to its interaction with home bias.

TABLE 3. The effects of the GDPR on investor-venture distance

	Dependent Variable: ln (Geographic Distance)		
	(1)	(2)	(3)
Dimension	Lead to Venture	Non-lead to Venture	All to Venture
GDPR_Enact	-0.145	-0.105	-0.117
	(0.375)	(0.512)	(0.507)
EU venture * GDPR_Enact	0.051	0.070	0.062
	(0.221)	(0.214)	(0.337)
GDPR_Rollout	-0.207	0.027	-0.055
	(0.233)	(0.103)	(0.079)
EU venture * GDPR_Rollout	-0.151**	-0.087***	-0.112***
	(0.061)	(0.026)	(0.047)
SUR Test on GDPR Rollout (p-value)		0.0007	
Model	OLS	OLS	OLS
Macroeconomic Controls	Yes	Yes	Yes
Investor/Deal Characteristics	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Month FE	Yes	Yes	Yes
Observations	61,149	54,685	61,149
F-test on Pre-treatment (p-value)	0.174	0.194	0.148

Notes: Each observation is a deal. The dependent variables in Columns 1 to 3 are the log(distance between the lead investor and ventures), log(distance between all other investors and ventures), and log(distance between all investors and ventures), respectively. The distance is the average miles among all investors to ventures in Columns 7 and 8. Standard errors are clustered by state (member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

We test this hypothesis by running a deal-level regression, estimated by OLS, where the main dependent variable is the distance (in logs) between the lead investor and the venture as computed in Equation 1. Column 1 of Table 3 shows that after the GDPR rollout, the distance between the venture and investor leading the round decreased by 14%. Columns 3 and 4 use the average distance between non-lead or all investors as the dependent variable, providing consistent evidence. This finding supports the notion that the GDPR amplified the tendency of EU ventures to attract funding from geographically closer investors, thereby further reducing the inflow of investment from the US.

Data-related ventures and investors. The GDPR mandates a higher degree of privacy, data management, and control, and requires legitimate interest or informed opt-in consent for data collection—assigning substantial liability risks and penalties for data flow and data processing violations. It thus follows that firms that process and rely on larger amounts of data are likely to be more susceptible to compliance and adjustment

costs due to the regulation, further aggravating the uncertainties surrounding (i) what constitutes adequate compliance, and (ii) how the larger platforms on which ventures often rely will pursue compliance.[24]

Thus we test if, after the GDPR, the pullback effect is more pronounced for more data-related ventures. Columns 1 to 4 of Table 4 demonstrate that the reduction in investments by both EU and US investors in EU ventures was more pronounced for data-related ventures compared to others. However, the differential effect was more significant for cross-union investors: the negative impact of the GDPR on the number of investment deals by cross-union investors was over 10 percentage points greater for data-related ventures relative to others. In contrast, for same-union investors, this difference was approximately 5 percentage points. This suggests an interaction between home bias and the heightened costs imposed by the GDPR on data-related ventures.

TABLE 4. Heterogeneous effects on cross-union investing

	Data-related ventures		Other Ventures		New ventures		Follow-on deals	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dimension	Cross-union led	Same-union led	Cross-union led	Same-union led	Cross-union led	Same-union led	Cross-union led	Same-union led
GDPR_Enact	-0.512***	-0.490***	-0.198**	-0.234*	0.040	0.030	0.034	0.029
	(0.124)	(0.122)	(0.101)	(0.129)	(0.138)	(0.138)	(0.143)	(0.126)
EU venture * GDPR_Enact	0.060	0.109	0.070	0.094	0.033	0.034	0.039	0.035
	(0.068)	(0.085)	(0.077)	(0.080)	(0.114)	(0.085)	(0.128)	(0.088)
GDPR_Rollout	-1.058***	-1.030***	-0.736***	-0.114***	0.030	0.040	0.033	0.026
	(0.169)	(0.164)	(0.187)	(0.039)	(0.096)	(0.131)	(0.143)	(0.107)
EU venture * GDPR_Rollout	-0.285***	-0.151**	-0.157***	-0.098*	-0.267***	-0.152***	-0.175***	-0.098***
	(0.118)	(0.068)	(0.051)	(0.048)	(0.073)	(0.039)	(0.034)	(0.028)
Model	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,400	5,400	5,400	5,400	5,400	5,400	5,400	5,400
F-test on Pre-treatment (p-value)	0.111	0.128	0.117	0.135	0.108	0.134	0.129	0.117

Notes: The dependent variable in Columns 1 to 4 is the number of investments into data-related and non-data-related ventures, sub-grouped further into cross- and same-union-led. The dependent variable in Columns 5 and 6 is the # of funding rounds raised by new ventures subgrouped into cross- and same-union-led. The dependent variable in Columns 7 and 8 is the # of follow-on deals subgrouped into cross- and same-union-led. We do not report the coefficients of macroeconomic 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.

A similar pattern emerges when focusing on data-related investors rather than data-related ventures, as shown in Table A.4. The reduction in investments was more pronounced among data-oriented investors with a history of focusing on data-related ven-

[24]For instance, in light of the GDPR, Google defined itself as a 'data controller' instead of a 'data processor,' which expanded its data access while shifting the liability for legitimate interest and/or obtaining informed consent to publishers. See, e.g., https://digiday.com/media/google-publishers-gdpr-standards/.

tures. Once again, this pullback was particularly significant for cross-union investors. These findings raise policy concerns regarding the long-term implications for the growth, scalability, and internationalization of EU data-related ventures. This is especially critical because the investors withdrawing capital are those with the most experience in the sector. Consequently, the costs extend beyond reduced capital availability, as EU ventures also lose access to valuable expertise of US investors.

New ventures and follow-on deals. We explore two additional dimensions of heterogeneity. First, we examine whether the negative effects are stronger for new ventures that had never raised venture capital. Intuitively, if the pullback in cross-union investing is driven by the increased uncertainty brought about by the regulation, this effect is likely to be more pronounced for newer ventures. These ventures typically face greater uncertainties due to an incomplete resource base, a lack of organizational routines, limited networks, lower legitimacy in the marketplace, and less managerial experience (Vohora, Wright and Lockett 2004). Second, we examine the heterogeneous effects on follow-on deals, which we define as instances where a prior lead investor reinvests in the same venture. Since information asymmetry between the investor and the venture should be lower thanks to prior investment, we expect the negative effect to be weaker compared to that for new deals.

Our findings, which are summarized in Columns 5–8 of Table 4, reveal that the impact of the GDPR on venture capital investment varies significantly across deal types. While the enactment of the regulation had no significant effect on investment in new ventures or follow-on deals, the full rollout led to a pronounced decline in cross-union investment activity, particularly in new ventures. The significant negative coefficient on (EU venture * GDPR_Rollout) in Columns 5 and 6 suggests that European investors became more reluctant to back new firms following the heightened regulatory uncertainty and increased compliance costs. Additionally, and consistent with our previous findings, such an effect was significantly stronger for rounds led by a cross-union investor. In contrast, the decline in follow-on deals (Columns 7 and 8) was smaller in magnitude, consistent with the notion that information asymmetry is lower in repeat investments, mitigating the impact of regulatory uncertainty.

These results underscore the disproportionate burden of the GDPR on younger, less-established EU ventures, which may face greater challenges in securing funding from US investors post-GDPR. This is particularly relevant from a policy perspective, as new ventures are key drivers of innovation, often introducing novel technologies and business models. By reducing US investment in these firms, the GDPR may inadvertently affect

the early-stage innovation pipeline.

Dynamic effects of the GDPR. Understanding the dynamic effects of the GDPR is essential for assessing its short- and long-term implications for investment flows and innovation ecosystems. The immediate effects of such a sweeping regulatory change likely reflect the initial uncertainty and adjustment costs faced by investors, while the longer-term effects indicate whether markets adapt to mitigate these challenges over time. To examine these dynamics, we employ an event study design thereby we interact a dummy variable for EU-based ventures with month-year dummies. Figure 2 illustrates these dynamic effects for rounds involving any cross-union investor, rounds led by a cross-union investor, and rounds involving only US investors.

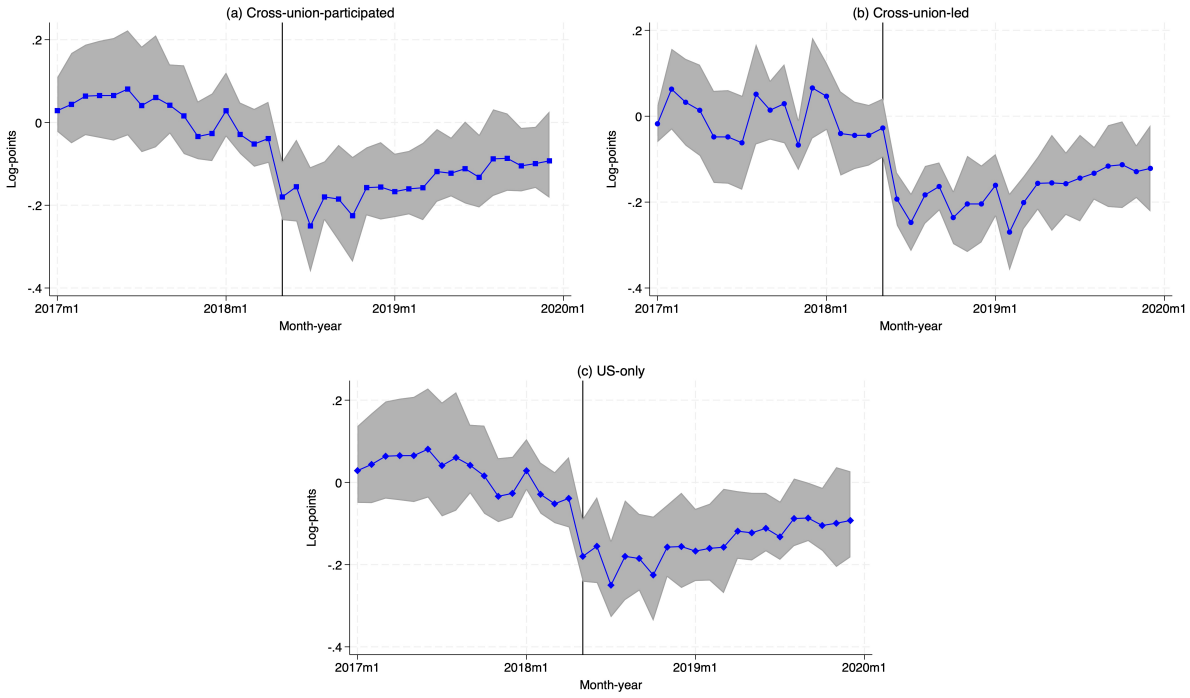


FIGURE 2. Dynamic effects of GDPR

Notes: Each figure plots the estimated coefficients for the interaction between the dummy variable for EU-based ventures and month-year dummies. In Figure (a), the dependent variable is the number of deals in which at least a cross-union investor participated. In Figure (b), the dependent variable is the number of deals led by a cross-union investor. In Figure (c), the dependent variable is the number of deals in which only US investors participated. The shaded areas illustrate the 95% confidence intervals. The vertical black line indicates the GDPR's rollout.

All three figures exhibit similar patterns: the GDPR had a particularly strong negative impact on investment inflows into the EU from US-based investors during the first 10 months following its implementation, with reductions in the number of these types of

deals involving US investors in the EU reaching up to 26%. Although the effect remained negative in the longer term, its magnitude diminished to approximately -15% by the end of 2019. These findings suggest that while the initial disruptions caused by the GDPR persisted, investors partially adapted to the regulatory environment over time. The next section investigates syndication as one possible mechanism that may explain this pattern.

5. The GDPR and Deal Syndication

To better understand how the GDPR reshaped cross-border investment flows between EU and US, we examine changes in syndication behavior. Syndication plays a crucial role in mitigating investment risks and reducing screening and monitoring costs (Lerner 1994). We hypothesize that the regulatory uncertainty introduced by the GDPR increased the overall tendency of investors to syndicate deals as a risk management strategy. Moreover, given that the uncertainties associated with the GDPR are likely more pronounced for non-European investors, we further conjecture that US investors increasingly relied on partnering with European investors. Local partners bring essential expertise in navigating complex regulatory environments and managing GDPR compliance, making them invaluable collaborators for foreign investors aiming to sustain their investment activities in the European market.

To test the effect of the GDPR on overall syndication, we estimate a deal-level probit regression in the form of Equation 3 where the dependent variable is a dummy equal to one if the deal has two or more investors. Columns 1 and 2 of Table 5 show that the GDPR led to a 6 percentage point increase in the probability that a deal is syndicated, although this effect is only significant at the 10% level. Next, we follow a similar strategy to test if the GDPR increased US investors' tendency to syndicate deals with European investors. In Columns 3 and 4, we use as an outcome $\mathbb{1}\{\text{Cross-union syndication}\}$, a binary variable which is one when the focal deal involves at least one EU and one US investor. We find that the probability of US and EU investors syndicating a deal together was 37 percentage points higher in Europe than in the US after the GDPR's rollout.[25]

The last three columns of Table 5 focus on the extensive margin, specifically examining whether the GDPR led to an increase in syndicate size—the number of investors co-investing in a single deal. Column 6 shows that, for EU ventures, the average size of a syndicate deal increased by 10% after the GDPR's rollout. This aligns with the idea that

[25]The percentage point changes mentioned in the text refer to the change in the probability of the binary outcome (predicted by the Probit model) due to a one-unit change in an independent variable, where we use the delta method to estimate the standard errors of these marginal effects.

TABLE 5. The effects of the GDPR on deal syndication

Dep. Var.	(1) 𝟙{Syndication}	(2) 𝟙{Syndication}	(3) 𝟙{Cross-union syndication}	(4) 𝟙{Cross-union syndication}	(5) # of investors	(6) # of cross-union investors	(7) # of same-union investors
GDPR_Enact	0.139	0.118	0.129	0.091	0.104	0.076	0.120
	(0.129)	(0.092)	(0.123)	(0.086)	(0.089)	(0.084)	(0.118)
EU venture * GDPR_Enact	0.098	0.112	0.126	0.113	0.101	0.126	0.081
	(0.121)	(0.111)	(0.077)	(0.113)	(0.099)	(0.124)	(0.091)
GDPR_Rollout	0.112	0.079	0.105	0.081	0.109	0.134	0.092
	(0.122)	(0.124)	(0.128)	(0.138)	(0.089)	(0.101)	(0.142)
EU venture * GDPR_Rollout	0.013*	0.015*	0.187*	0.206**	0.096**	-0.028	0.141**
	(0.007)	(0.008)	(0.096)	(0.091)	(0.045)	(0.026)	(0.061)
Model	Probit	Probit	Probit	Probit	Poisson	Poisson	Poisson
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investor/Deal Characteristics	No	Yes	No	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	91,693	61,149	91,693	61,149	61,149	61,149	61,149
F-test on Pre-treatment (p-value)	0.174	0.129	0.173	0.157	0.174	0.194	0.148

Notes: The first 4 columns show Probit deal-level regressions with and without controlling for investor characteristics (number of years of investing experience, number of investments, a dummy for whether they have a history of data-related investments, total amount of money invested up to the focal quarter, number of seeds or angel ventures invested) and venture characteristics (industry sector, stage, age, total $ amount received up to the focal deal) where the dependent variable is either a dummy that equals 1 if two or more investors co-invest in the deal (𝟙{Syndication}) or if at least one US and one EU investor co-invest in the deal (𝟙{Cross-union syndication}). The estimates reported are the coefficients and not the marginal effects. The last three columns display the results of deal-level Poisson regression where the dependent variable is the total # of investors involved in the deal, the # of cross-union investors involved in the deal, or the # of cross-union investors involved in the deal. Standard errors are clustered by state (member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

involving more investors can help mitigate risks and reduce screening and monitoring costs by pooling resources and expertise. Columns 6 and 7 reveal that for EU ventures, the growth in syndicate size was primarily driven by an increase in the number of EU-based investors participating in a single deal, rather than by an increase in US-based investors. This suggests that investment risk also increased for EU investors, as evidenced by the greater number reliance of EU investors co-investing in EU ventures, but the increase in perceived risk was even more pronounced for US investors.

The lead investor plays a pivotal role in syndication, typically being responsible for conducting due diligence, negotiating deal terms, and providing strategic guidance to the portfolio company post-investment. This role becomes even more critical in contexts requiring navigation through complex regulatory environments, such as those shaped by the GDPR. Table 6 presents the results of an aggregate-level Poisson regression, examining the number and size of cross-union syndicated rounds led by either cross- or same-union investors.

TABLE 6. Syndication patterns between EU and US investors

Dep. Var.	# of syndicated deals			Size of syndicated deals ($MM)		
	(1) Cross-union-led	(2) Other cross-union	(3) Other	(4) Cross-union-led	(5) Other cross-union	(6) Other
GDPR_Enact	-0.043	-0.036	0.178	-0.316	-0.319	-0.169
	(0.202)	(0.195)	(0.157)	(0.254)	(0.250)	(0.244)
EU venture * GDPR_Enact	0.063	0.104	0.073	0.102	0.218	0.087
	(0.074)	(0.098)	(0.058)	(0.094)	(0.211)	(0.083)
GDPR_Rollout	-0.284	0.101	-0.151	-0.570	-0.590	-0.211
	(0.261)	(0.348)	(0.295)	(0.884)	(0.472)	(0.165)
EU venture * GDPR_Rollout	-0.052**	0.095***	-0.152	-0.196***	0.045	0.054*
	(0.024)	(0.035)	(0.129)	(0.059)	(0.028)	(0.028)
Model	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,400	5,400	5,400	5,400	5,400	5,400
F-test on Pre-treatment (p-value)	0.183	0.121	0.203	0.188	0.146	0.156

Notes: The table shows state-month level Poisson regressions. The dependent variable in the first three columns is the # of syndicate deals that are: cross-union-led (i.e., with a lead investor not from the same union as the venture), other cross-union (i.e., with an investor different from the lead and not from the same union as the venture), other (i.e., with only investors from the same union as the venture involved). The last three variables refer to the total $ amount (in $M) raised in syndicated rounds of the same three types as above. 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.

Column 1 reveals that, for EU ventures, the number of syndicated rounds led by US investors significantly decreased by 4.88%. This decline translated into a 17.80% reduction in investment inflows, as shown in Column 4. By contrast, Column 2 highlights that the observed increase in cross-union syndication within the EU was primarily driven by US investors participating in rounds led by EU investors. However, as indicated in Column 5, there was no significant change in the total amount invested in these types of deals. Our findings suggest that the increase in syndication in the EU was primarily driven by US investors partnering as non-lead investors with EU investors. This behavior is consistent with US investors seeking to reduce uncertainty and transaction costs by relying on local partners with superior expertise in navigating the GDPR regulatory framework.

Finally, Column 3 shows that there was no significant increase in the number of syndicated deals within the EU that did not involve US investors, suggesting that regulatory complexities impose higher costs for cross-union investors. Moreover, the observed increase in syndicate size might explain the results in Column 6, which shows a rise in the total amount invested in these deals. However, this increase was only statistically significant at the 10% level and did not offset the decline observed for the number of

syndicated rounds led by US investors.[26]

Drivers of and heterogeneity in syndication patterns. The literature has traditionally identified two main motives behind syndication: reducing uncertainties and costs by pooling resources with investment partners (resource-based view) and reducing the capital commitment required from each investor (diversification view). We leverage the shock of the GDPR on syndication incentives to analyze the role of these forces in driving the observed effects. To this end, we run a series of Poisson regressions at the investor-quarter level to examine patterns in cross-union syndicated investments. Specifically, we exploit cross-sectional variation in investor location and time variation in the enactment and rollout of the GDPR.

Our analysis reveals that the increase in both the amount invested and the number of syndicated deals was smaller for US investors compared to EU investors.[27] Additionally, we find that deal concentration—measured by the Herfindahl-Hirschman Index (HHI) of deals, calculated using the amount invested in each deal involving a given investor relative to the total amount invested in deals involving that investor throughout the focal quarter—was greater for US investors after the GDPR, particularly for deals involving EU ventures.

Hence, US investors did not respond to the heightened regulatory uncertainty by spreading their investments across more ventures. Instead, deals became more concentrated. This suggests that the primary driver behind the increase in syndication was not diversification, but rather the pooling of resources to mitigate risks. The heightened regulatory uncertainty introduced by the GDPR likely pushed investors—especially those unfamiliar with the EU regulatory landscape—to prioritize collaboration with partners who could share the burden of compliance and reduce information asymmetries.

Finally, in the appendix, we present additional heterogeneous analyses examining the effects of the GDPR on cross-union syndication. These results shed light on how different types of ventures and investors were affected. Consistent with the notion that data-related ventures face heightened risks under the GDPR, we find that the increase in cross-union syndication was primarily driven by new and data-related ventures. Moreover, this shift was significantly influenced by changes in the behavior of investors with a

[26] In all the analyses presented, the F-test performed fails to reject the null hypothesis that the parallel trends assumption in the pre-treatment period holds (p-value > 0.05).

[27] Our results are summarized in Tables B.1 and B.2 in the appendix. Table B.1 presents results from a balanced panel, which includes all quarters, even those in which a given investor made no investments. In contrast, Table B.2 excludes these non-investment quarters, focusing only on periods where investors were actively engaged.

historical preference for data-related ventures (Table A.5). This further highlights that the GDPR's impact, along with the subsequent adjustments in the venture investment ecosystem, were not uniform across sectors or investor types, but had more negative effects for investors and ventures more exposed to the regulatory uncertainties and compliance costs.

6. Conclusion

This paper examines the impact of the GDPR on venture investment flows between the EU and US. Our findings highlight the significant, unintended consequences of the GDPR on transatlantic (cross-union) investments, particularly by US-based investors. Using data on venture investments from 2014 to 2019, we document a significant decline in US investor activity in the EU following the GDPR's rollout in May 2018. This decline was especially pronounced for new and data-driven ventures, which are both more exposed to regulatory uncertainty and highly reliant on venture investment to scale.

The introduction of the GDPR imposed additional regulatory burdens on technology ventures, raising uncertainty about investment returns. In response, we find that investors adjusted their strategies by prioritizing geographically closer ventures and increasing deal syndication. While the shift toward closer ventures exacerbated the decline in US investment inflows to the EU, syndication between US and EU investors partially mitigated the adverse effects. Notably, the rise in syndication was driven by US investors joining deals led by EU-based investors, underscoring the importance of local expertise in navigating regulatory complexity.

While the onset of the COVID-19 pandemic prevents us from analyzing the exit outcomes (e.g., IPOs, acquisitions) of ventures affected by the GDPR—and hence impacted by the pullback from US investors—prior research highlights the substantial costs associated with reductions in foreign investor activity. Specifically, the loss of US investor capital and expertise, which could have facilitated growth, scaling, and internationalization, represents a missed opportunity for EU ventures and likely diminishes their probability of success. Over time, these challenges may encourage entrepreneurs to relocate outside the EU or establish their companies in regions with less stringent regulatory burdens. As such, the GDPR's unintended consequences not only hinder individual ventures but also pose long-term risks to the EU's global competitiveness and ability to foster a thriving innovation ecosystem.

Overall, our findings emphasize the broader implications of regulatory policy on in-

novation ecosystems. While the GDPR aims to enhance consumer privacy and data protection, its implementation inadvertently introduced significant barriers to venture investment inflows, exacerbating the funding gap between the EU and US. This regulatory-driven divergence highlights the vulnerability of underdeveloped venture investment ecosystems like the EU's, and underscores the critical need for a more balanced approach to regulation—one that achieves privacy and other digital policy goals without stifling entrepreneurial activity and innovation.

References

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

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

Arnold, Nathaniel, Guillaume Claveres, and Jan-Martin Frie. 2024. "Stepping up venture capital to finance innovation in Europe."

Bleier, Alexander, Avi Goldfarb, and Catherine Tucker. 2020. "Consumer privacy and the future of data-based innovation and marketing." *International Journal of Research in Marketing*, 37(3): 466–480.

Bloom, Nicholas, John Van Reenen, and Heidi Williams. 2019. "A Toolkit of Policies to Promote Innovation." *Journal of Economic Perspectives*, 33(3): 163âĂŞ84.

Brander, James A., Raphael Amit, and Werner Antweiler. 2002. "Venture-Capital Syndication: Improved Venture Selection vs. The Value-Added Hypothesis." *Journal of Economics & Management Strategy*, 11(3): 423–452.

Bygrave, William D. 1987. "Syndicated investments by venture capital firms: A networking perspective." *Journal of Business Venturing*, 2(2): 139–154.

Campbell, James, Avi Goldfarb, and Catherine Tucker. 2015. "Privacy Regulation and Market Structure." *Journal of Economics & Management Strategy*, 24(1): 47–73.

Chatterji, Aaron, SolÃĺne Delecourt, Sharique Hasan, and Rembrand Koning. 2019. "When does advice impact startup performance?" *Strategic Management Journal*, 40(3): 331–356.

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

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.

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.

Cumming, Douglas, and Na Dai. 2010. "Local bias in venture capital investments." *Journal of empirical finance*, 17(3): 362–380.

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.

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

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de Silanes, and Andrei Shleifer. 2002. "The regulation of entry." *The quarterly Journal of economics*, 117(1): 1–37.

Draghi, Mario. 2024. "The future of European competitivenes."

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.

Goldberg, Samuel G., Garrett A. Johnson, and Scott K. Shriver. 2024. "Regulating Privacy Online: An Economic Evaluation of the GDPR." *American Economic Journal: Economic Policy*, 16(1): 325âĂŞ58.

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

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

Gompers, Paul, and Josh Lerner. 1999. "What drives venture capital fundraising?"

Gompers, Paul, and Josh Lerner. 2001. "The Venture Capital Revolution." *Journal of Economic Perspectives*, 15(2): 145–168.

Hopp, Christian, and Finn Rieder. 2011. "What drives venture capital syndication?" *Applied Economics*, 43(23): 3089–3102.

Howell, Sabrina T. 2017. "Financing innovation: Evidence from R&D grants." *American economic review*, 107(4): 1136–1164.

Huberman, Gur. 2001. "Familiarity breeds investment." *The Review of Financial Studies*, 14(3): 659–680.

Humphery-Jenner, Mark, and Jo-Ann Suchard. 2013. "Foreign VCs and venture success: Evidence from China." *Journal of Corporate Finance*, 21: 16–35.

Hursti, Jani, and Markku VJ Maula. 2007. "Acquiring financial resources from foreign equity capital markets: An examination of factors influencing foreign initial public offerings." *Journal of Business Venturing*, 22(6): 833–851.

Jääskeläinen, Mikko, and Markku Maula. 2005. "The effects of direct and indirect foreign venture capital ties on exit market selection and exit modes." *Helsinki University of Technology working paper*.

Jia, Jian, Ginger Zhe Jin, and Liad Wagman. 2021. "The Short-Run Effects of the General Data Protection Regulation on Technology Venture Investment." *Marketing Science*, 40(4): 661–684.

Johnson, Garrett, S Shriver, and S Goldberg. 2022. "Privacy & market concentration: intended & unintended consequences of the GDPR." *Available at SSRN 3477686*.

Kang, Jun-Koo, and Jin-Mo Kim. 2008. "The Geography of Block Acquisitions." *The Journal of Finance*, 63(6): 2817–2858.

Kortum, Samuel, and Josh Lerner. 2000. "Assessing the Contribution of Venture Capital to Innovation." *The RAND Journal of Economics*, 31(4): 674–692.

Lerner, Josh. 1995. "Venture Capitalists and the Oversight of Private Firms." *The Journal of Finance*, 50(1): 301–318.

Lerner, Josh, Antoinette Schoar, Stanislav Sokolinski, and Karen Wilson. 2018. "The globalization of angel investments: Evidence across countries." *Journal of Financial Economics*, 127(1): 1–20.

Lerner, Joshua. 1994. "The Syndication of Venture Capital Investments." *Financial Management*, 23(3): 16–27.

Mäkelä, Markus M, and Markku VJ Maula. 2005. "Cross-border venture capital and new venture internationalization: An isomorphism perspective." *Venture Capital*, 7(3): 227–257.

Samila, Sampsa, and Olav Sorenson. 2011. "Venture capital, entrepreneurship, and economic growth." *The Review of Economics and Statistics*, 93(1): 338–349.

Schertler, Andrea, and Tereza Tykvová. 2011. "Venture capital and internationalization." *International Business Review*, 20(4): 423–439.

Sorenson, Olav, and TobyÂăE. Stuart. 2001. "Syndication Networks and the Spatial Distribution of Venture Capital Investments." *American Journal of Sociology*, 106(6): 1546–1588.

Tian, Xuan. 2011. "The Role of Venture Capital Syndication in Value Creation for Entrepreneurial Firms*." *Review of Finance*, 16(1): 245–283.

Vohora, Ajay, Mike Wright, and Andy Lockett. 2004. "Critical junctures in the development of university high-tech spinout companies." *Research policy*, 33(1): 147–175.

Appendix A. Other Figures and Tables

TABLE A.1. List of EU states included in the sample

Austria	Belgium	Croatia	Czech Republic
Denmark	Estonia	Finland	France
Germany	Greece	Hungary	Republic of Ireland
Italy	Latvia	Luxembourg	Netherlands
Poland	Portugal	Romania	Slovakia
Slovenia	Spain	Sweden	United Kingdom

TABLE A.2. Summary Statistics: Investor-quarter level

	EU Investors					US Investors				
	Mean	Median	75-percentile	95-percentile	N	Mean	Median	75-percentile	95-percentile	N
Panel A: Unconditional on active investor (Balanced Sample)										
# of deals in EU ventures	0.03	0.02	0.04	0.07	446,304	0.01	0.01	0.02	0.04	711,072
$MM in deals in EU ventures	0.1	0.08	0.11	0.22	446,304	0.04	0.05	0.08	0.13	711,072
# of deals in US ventures	0.02	0.01	0.03	0.04	446,304	0.04	0.04	0.07	0.12	711,072
$MM in deals in US ventures	0.05	0.05	0.09	0.14	446304	0.14	0.11	0.24	0.40	711,072
# of syndicated deals in EU ventures	0.03	0.02	0.03	0.06	446,304	0.01	0.01	0.02	0.04	711,072
$MM in syndicated deals in EU ventures	0.09	0.07	0.09	0.19	446,304	0.04	0.04	0.07	0.12	711,072
# of syndicated deals in US ventures	0.02	0.01	0.03	0.04	446,304	0.04	0.03	0.06	0.11	711,072
$MM in syndicated deals in US ventures	0.05	0.04	0.08	0.13	446,304	0.12	0.10	0.21	0.35	711,072
# of cross-border syndicated deals in EU ventures	0.01	0.01	0.01	0.02	446,304	0.01	0.01	0.01	0.02	711,072
$MM in cross-border syndicated deals in EU ventures	0.03	0.03	0.04	0.07	446,304	0.02	0.02	0.03	0.05	711,072
# of cross-border syndicated deals in US ventures	0.01	0.01	0.01	0.02	446.304	0.01	0.01	0.01	0.02	711,072
$MM in cross-border syndicated deals in US ventures	0.02	0.02	0.03	0.05	446,304	0.03	0.03	0.04	0.07	711,072
Panel B: Conditional on active investor (Unbalanced Sample)										
# of deals in EU ventures	0.78	0.59	0.84	1.69	18,596	0.31	0.34	0.56	0.96	29,628
$MM in deals in EU ventures	5.38	0.65	8.67	75.68	18,596	6.81	1.02	14.52	86.59	29,628
# of deals in US ventures	0.39	0.34	0.66	1.02	18,596	1.02	0.84	1.77	2.98	29,628
$MM in deals in US ventures	3.34	0.31	4.05	46.85	18,596	10.97	2.54	21.33	132.75	29,628
# of syndicated deals in EU ventures	0.65	0.49	0.70	1.40	18,596	0.28	0.31	0.51	0.87	29,628
$MM in syndicated deals in EU ventures	5.65	0.68	9.10	79.46	18,596	6.95	1.04	14.81	88.32	29,628
# of syndicated deals in US ventures	0.36	0.32	0.62	0.95	18,596	0.88	0.72	1.52	2.56	29,628
$MM in syndicated deals in US ventures	3.74	0.35	4.54	52.47	18,596	11.63	2.69	22.61	140.72	29,628
# of cross-border syndicated deals in EU ventures	0.21	0.19	0.27	0.53	18,596	0.13	0.14	0.23	0.39	29,628
$MM in cross-border syndicated deals in EU ventures	5.60	0.68	9.02	78.71	18,596	6.88	1.03	14.67	87.46	29,628
# of cross-border syndicated deals in US ventures	0.15	0.13	0.25	0.39	18,596	0.19	0.16	0.33	0.56	29,628
$MM in cross-border syndicated deals in US ventures	3.64	0.34	4.41	51.07	18,596	10.09	2.34	19.62	122.13	29,628

Notes: The table presents summary statistics from our entire final sample at the investor-quarter level, distinguishing investors based in one of the 24 EU states considered (EU investors) from those based in a US state (US investors). Panel A includes investor-quarter observations with zero investment (balanced sample, unconditional on investor activity), whereas the same does not apply to Panel B (unbalanced sample, conditional on investor activity).

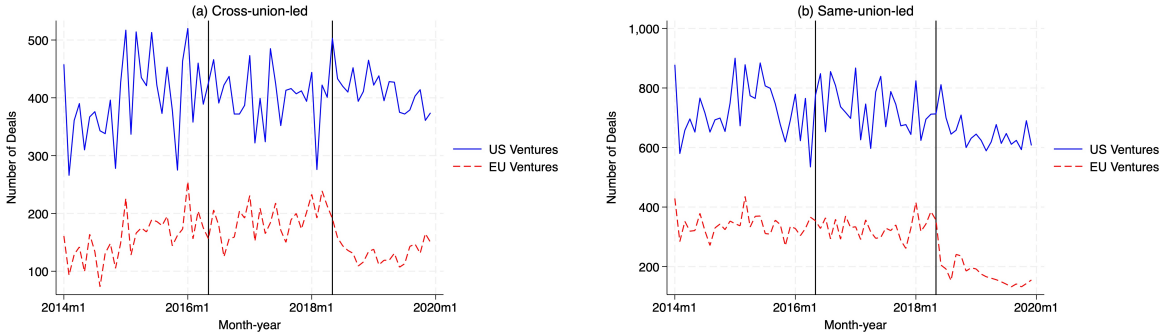


FIGURE A.1. Trends in Cross-union investment and syndication

Notes: Figures (a) and (b) summarize the monthly number of deals per EU or US state for deals led by a cross- or same-union investor, respectively. The two vertical black lines indicate the GDPR enactment and rollout, respectively.

TABLE A.3. GDPR and the Share of US Investor Activity in the EU

	Share Deals by US Investors		Share $ Investment by US Investors	
	(1) US led	(2) Any US	(3) EU led	(4) Any EU
GDPR_Enact	0.036	0.032	0.039	0.031
	(0.106)	(0.104)	(0.098)	(0.095)
EU venture * GDPR_Enact	0.040	0.036	0.034	0.026
	(0.106)	(0.096)	(0.126)	(0.135)
GDPR_Rollout	0.040	0.034	0.040	0.041
	(0.077)	(0.113)	(0.078)	(0.089)
EU venture * GDPR_Rollout	-0.086***	-0.034***	-0.063**	-0.019*
	(0.029)	(0.012)	(0.031)	(0.011)
Model	OLS	OLS	OLS	OLS
Macroeconomic Controls	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Observations	5,400	5,400	5,400	5,400
F-test on Pre-treatment (p-value)	0.151	0.120	0.143	0.135

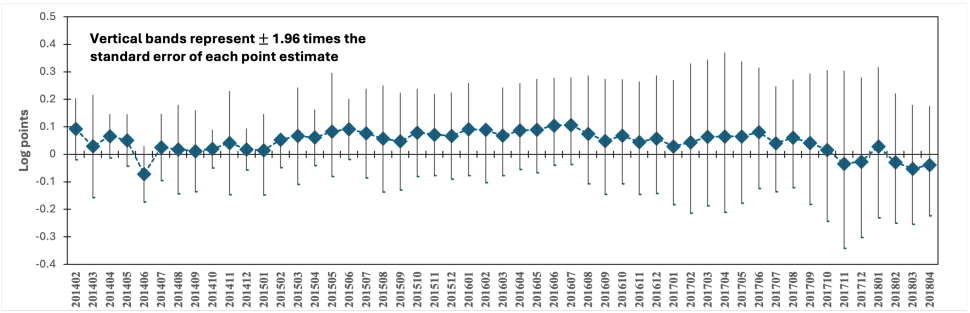
Notes: The table shows the results of a linear regression version of Equation 2, estimated via OLS, where each observation is a state-month. The dependent variable in Column 1 (2) is the share of the total number of deals led by (involving) a US-based investor. The dependent variable in Column 3 (4) is the share of the total venture capital invested in deals led by (involving) a US-based investor. Standard errors are clustered by state (member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

Table A.4. Heterogeneous effects on cross-union venture investing

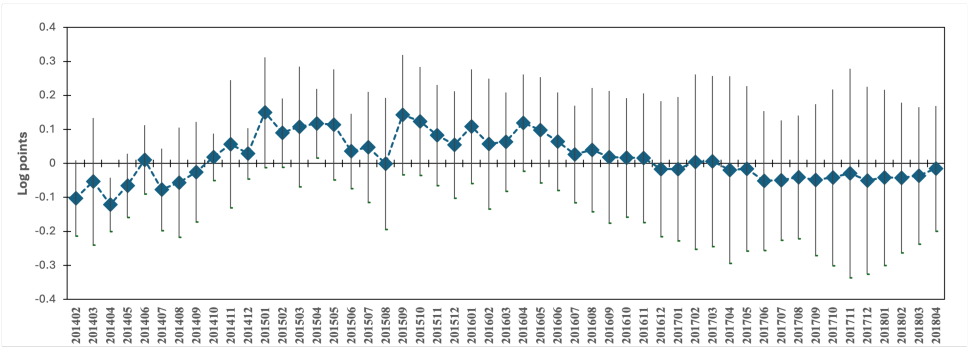
	Data-related Investors		Other Investors	
Dimension	(1) Cross-union led	(2) Same-union led	(3) Cross-union led	(4) Same-union led
GDPR_Enact	0.281	0.289**	0.373*	0.185*
	(0.201)	(0.131)	(0.202)	(0.111)
EU venture * GDPR_Enact	-0.093**	0.050	-0.031	0.026
	(0.038)	(0.076)	(0.024)	(0.021)
GDPR_Rollout	0.953**	0.496*	-0.147	-0.197
	(0.400)	(0.273)	(0.287)	(0.154)
EU venture * GDPR_Rollout	-0.292***	-0.141**	-0.113***	-0.059**
	(0.126)	(0.068)	(0.030)	(0.027)
SUR Test on Difference of GDPR Rollout (p-value)		0.000		0.000
Model	Poisson	Poisson	Poisson	Poisson
Macroeconomic Controls	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes
Observations	5,400	5,400	5,400	5,400
F-test on Pre-treatment (p-value)	0.202	0.178	0.133	0.192

Notes: The dependent variable in Columns 1 to 4 is the number of investments into data-related and non-data-related ventures, sub-grouped further into cross- and same-union-led. The dependent variable is the # of investments by data-related and non-data-related investors, subgrouped further into cross- and same-union-led. We do not report the coefficients of macroeconomic 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.

Figure A.2. Pre-treatment tests



(a) Foreign-led deals



(b) Same-union-led deals

Table A.5. Heterogeneous effects on cross-union syndication

Dep. Var.	(1) # of data-related deals	(2) # of deals by data-related investors	(3) # of other deals	(4) # of deals by other investors	(5) # of new deals	(6) # of follow-on deals
GDPR_Enact	0.358	0.346	0.451	0.251	0.040	0.064
	(0.216)	(0.166)	(0.246)	(0.145)	(0.058)	(0.069)
EU venture * GDPR_Enact	-0.077	0.062	0.009	0.059	0.014	0.020
	(0.052)	(0.092)	(0.068)	(0.036)	(0.105)	(0.102)
GDPR_Rollout	0.994	0.534	-0.126	-0.189	0.010	0.022
	(0.739)	(0.605)	(0.333)	(0.434)	(0.167)	(0.543)
EU venture * GDPR_Rollout	0.047***	0.061***	-0.015	0.031***	0.022**	0.007
	(0.013)	(0.022)	(0.028)	(0.004)	(0.009)	(0.047)
Model	Poisson	Poisson	Poisson	Poisson	Poisson	Poisson
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,400	5,400	5,400	5,400	5,400	5,400
F-test on Pre-treatment (p-value)	0.156	0.142	0.116	0.207	0.159	0.162

Notes: The table shows the results of Poisson regressions where data is organized at the state-month level and only cross-union syndicated deals (i.e., deals involving at least a US and an EU investor) are retained in the sample. The dependent variable in Column 1 (3) is the # of deals in data-related (non-data-related) ventures. The dependent variable in Column 2 (4) is the # of deals by data-related (non-data-related) investors. The dependent variable in Column 5 is the # of deals in new ventures, namely those that have never raised a funding round before. The dependent variable in Column 6 is the # of repeated deals, i.e. those where a lead investor from a previous round invests again in the venture (either as lead or non-led). We do not report the coefficients of macroeconomic 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.

Appendix B. Investor-level Analyses

This appendix provides a detailed summary of the additional analyses conducted to explore the effects of GDPR on syndication patterns in the venture capital industry. Our analysis leveraged Poisson regressions at the investor-quarter level to investigate how GDPR influenced cross-union syndicated investments.

We run Poisson regressions of the following form:

$$y_{it} = \exp\Big(\alpha_i + \alpha_t + \delta X_{it} + \beta_1 (EU_i \times GDPR_Enact_t) + \\ + \beta_2 (EU_i \times GDPR_Rollout_t) + \varepsilon_{st}\Big), \tag{A1}$$

where i denotes an investor, t indexes quarters, EU_i is a dummy that equals 1 for EU-based investors, $GDPR_Enact_t$ is a dummy variable which equals 1 if the time t is on or after the first quarter of 2016 but before the second quarter of 2018 and 0 otherwise, and $GDPR_Rollout_t$ is a dummy variable that equals 1 if the time t is after the second quarter of 2018 and 0 otherwise. Year-quarter and investor fixed effects are denoted by α_t and α_i, respectively, whereas X_{it} are investor-specific control variables (number of years of investing experience, number of investments, a dummy for whether they have a history of data-related investments, total amount of money invested up to the focal quarter, number of seeds or angel ventures invested), and ε_{it} is an error term. Standard errors are clustered at the state level (based on investor location) because GDPR mandates state-specific enforcement and the heterogeneity is confirmed in market perception.

The dependent variable y_{st} is the number or the value of cross-union syndicated deals considering deals in any venture, EU ventures only, or US ventures only (Columns 1-6). Additionally, we also consider deal concentration, measured using the Herfindahl-Hirschman Index (HHI), as a dependent variable. Specifically for any investor i in a quarter t, we compute HHI as:

$$HHI_{it} = \sum_j \left(\frac{v_{j\,it}}{\sum_j v_{j\,it}} \right)^2$$

where $v_{j\,it}$ is the dollar value of a given deal completed by investor i in quarter t.

We perform these analyses using both balanced and unbalanced panels. The balanced panel includes all quarters, even those in which a given investor made no investments, while the unbalanced panel focuses solely on quarters where investors were actively

TABLE B.1. GDPR, Investors and Cross-border Syndication (Balanced Panel)

Dep. Var.	$MM cross-union syndicated deals			# of cross-union syndicated deals			Deal amount HHI		
	(1) All	(2) EU Ventures	(3) US Ventures	(4) All	(5) EU Ventures	(6) US Ventures	(7) All	(8) EU Ventures	(9) US Ventures
GDPR_Enact	0.008	0.011	0.009	0.109	0.102	0.116	0.018	0.021	0.014
	(0.028)	(0.025)	(0.029)	(0.123)	(0.114)	(0.134)	(0.053)	(0.045)	(0.039)
EU venture * GDPR_Enact	0.008	0.009	0.006	0.098	0.076	0.110	0.018	0.016	0.018
	(0.033)	(0.025)	(0.030)	(0.122)	(0.120)	(0.118)	(0.046)	(0.065)	(0.052)
GDPR_Rollout	0.009	0.011	0.006	0.123	0.143	0.109	0.014	0.018	0.015
	(0.025)	(0.028)	(0.026)	(0.095)	(0.133)	(0.132)	(0.041)	(0.071)	(0.067)
EU venture * GDPR_Rollout	0.025*	0.018**	0.007	0.052***	0.077***	0.009**	-0.014**	-0.021***	0.007
	(0.014)	(0.008)	(0.023)	(0.009)	(0.017)	(0.004)	(0.007)	(0.004)	(0.029)
Observations	1,157,376	1,157,376	1,157,376	1,157,376	1,157,376	1,157,376	1,157,376	1,157,376	1,157,376
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All specifications are run at the investor month level, and # of deals categorized by either EU or US ventures, EU ventures, and US ventures. The dependent variables are # of lead deals, # of new deals, # of repeat deals (i.e., new round of investment after the last round), and # of syndicated deals, respectively. We do not report the coefficients of macroeconomics variables controls. Standard errors are clustered by investor location (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

TABLE B.2. GDPR, Investors and Cross-border Syndication

Dep. Var.	$MM cross-union syndicated deals			# of cross-union syndicated deals			Deal amount HHI		
	(1) All	(2) EU Ventures	(3) US Ventures	(4) All	(5) EU Ventures	(6) US Ventures	(7) All	(8) EU Ventures	(9) US Ventures
GDPR_Enact	0.035	0.026	0.041	0.072	0.062	0.083	0.031	0.035	0.027
	(0.110)	(0.139)	(0.104)	(0.071)	(0.094)	(0.043)	(0.097)	(0.130)	(0.086)
EU venture * GDPR_Enact	0.026	0.021	0.033	0.028	0.011	0.015	0.032	0.036	0.026
	(0.116)	(0.092)	(0.104)	(0.242)	(0.082)	(0.030)	(0.080)	(0.086)	(0.116)
GDPR_Rollout	0.033	0.027	0.036	0.009	0.007	0.019	0.035	0.041	0.031
	(0.096)	(0.136)	(0.137)	(0.096)	(0.382)	(0.161)	(0.105)	(0.090)	(0.104)
EU venture * GDPR_Rollout	0.031*	0.037**	0.012	0.047***	0.068***	-0.017*	-0.011*	-0.016**	0.002
	(0.017)	(0.016)	(0.009)	(0.012)	(0.021)	(0.009)	(0.006)	(0.008)	(0.021)
Observations	48,224	48,224	48,224	48,224	48,224	48,224	48,224	48,224	48,224
Macroeconomic Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Investor FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All specifications are run at the investor month level, and # of deals are categorized by either EU or US ventures, EU ventures, and US ventures. The dependent variables are # of lead deals, # of new deals, # of repeat deals (i.e., new round of investment after the last round), and # of syndicated deals, respectively. We do not report the coefficients of macroeconomic variables controls. Standard errors are clustered by investor location (i.e., member state in EU and state in US). ***, **, and * indicate significance at the 1%, 5%, and 10% levels.

engaged in investment activity. Table B.1 summarizes the results obtained using the balanced panel, whereas B.2 summarizes the results obtained using the unbalanced panel.

We find significant differences in the response of US and EU investors. The number of syndicated deals and the total amount invested increased for EU investors compared

to their US counterparts. Additionally, deal concentration, measured using the deal HHI, was relatively greater for US investors after GDPR, particularly for deals involving EU ventures. This suggests that US investors responded to the regulatory uncertainty introduced by GDPR by concentrating their investments rather than diversifying across ventures. Results are robust to using the balanced or the balanced dataset.

Overall, the findings indicate that GDPR-induced regulatory uncertainty reshaped syndication incentives within the venture capital industry. Rather than diversifying their portfolios, US investors prioritized pooling resources with co-investors to mitigate risks and share the burden of compliance.