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Data Governance and Digital Development: Empirical Analysis of the European Union's General Data Protection Regulation

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Abstract (Deutsch)

Diese Masterarbeit untersucht die Auswirkungen der Datenschutz-Grundverordnung (DSGVO) der Europäischen Union auf die Entwicklung des digitalen Sektors in der EU, mit Fokus auf Handel, Investitionen und Beschäftigung. Mithilfe einer Differenz-von-Differenzen-Strategie auf Basis eines Paneldatensatzes von 24 OECD-Ländern im Zeitraum 2015 bis 2019 vergleicht die Studie EU-Mitgliedstaaten, die der DSGVO unterliegen, mit einer Kontrollgruppe fortgeschrittener Volkswirtschaften, die während des Beobachtungszeitraums marktorientierte Datenschutzregime verfolgten. Die Analyse zeigt einen statistisch signifikanten Rückgang von Risikokapitalinvestitionen in den digitalen Sektor der EU nach Einführung der DSGVO, was darauf hindeutet, dass eine erhöhte regulatorische Komplexität das Vertrauen von Investoren verringert haben könnte. Im Gegensatz dazu lassen sich keine eindeutigen kurzfristigen Effekte auf den digitalen Handel oder die Beschäftigung feststellen.

Abstract (English)

This thesis investigates the impact of the European Union's General Data Protection Regulation (GDPR) on the development of the EU digital sector, focusing on trade, investment, and employment outcomes. Using a difference-in-differences strategy applied to a panel dataset of 24 OECD countries from 2015 to 2019, the study compares GDPR-affected EU member states with a control group of advanced economies operating under market-driven data regimes during the observed period. The analysis finds a statistically significant decline in venture capital investments in the EU digital sector following GDPR implementation, suggesting that heightened regulatory complexity may have led to reduced investor confidence. By contrast, no conclusive evidence is found for short-term effects on digital trade or employment outcomes.

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1 Introduction

Data is a critical asset in the modern digital age, driving both economic growth and raising complex governance issues. The ability to collect, store, and analyze vast quantities of data has unlocked groundbreaking opportunities for both private enterprises and public institutions. Data has led to substantial creation of both private value, through profit-maximizing mechanisms such as personalized marketing, dynamic pricing and predictive analytics, and social value by contributing to public health and safety, artificial intelligence, and climate change monitoring (UNCTAD, 2021) (Forum on Information and Democracy, 2024). Alongside these economic benefits, the non-economic dimensions of data such as privacy, human rights, and security have become increasingly pressing concerns amidst increasing number of high-profile data breaches such as Cambridge Analytica and Equifax and a growing demand by consumers to reassert control over this process (Aridor, Che, & Salz, 2022).

In response to these challenges, various economies have developed different approaches to data governance, reflecting their unique priorities and regulatory culture. The Digital Economy Report 2021 (UNCTAD) highlighted three prevailing data governance models that exert significant influence worldwide: the US model, which emphasizes private sector control over data to drive value creation; the Chinese model, which prioritizes government control to ensure national security; and the EU model, which focuses on individual control grounded upon rights to privacy.

The European Union's General Data Protection Regulation (GDPR), which came into effect in 2018, is one of the first and most comprehensive data protection frameworks in the world, containing stringent requirements for the processing and transfer of personal data not just within the EU but on any global entity handling EU citizens' data. This regulatory approach contrasts sharply with the more market-driven model of the United States, where, until 2020, comprehensive consumer data privacy laws existed only in two states, namely California and Virginia (Bloomberg Law, 2024).

This thesis investigates the impact of the EU's rights-based data governance approach on the development of the EU's digital sector through a comparative analysis with non-EU OECD countries that follow a free market-driven approach to data governance. The aim is to assess whether stringent data protection rules have supported or hindered the growth of the digital economy in the EU, by observing certain outcome variables.

The research question guiding this thesis explores the impact of the GDPR on the digital sector in EU countries in terms of trade, investment, and employment, relative to other OECD countries that follow a free market-driven approach to data governance. To answer this question, the thesis examines five ICT (Information and Communication Technology)-related outcome variables that serve as proxies for digital sector performance across these three dimensions. These are:

- Trade in ICT (or digital) goods, disaggregated into *imports*, *exports*, and *total trade volume*;
- *Venture capital investments in ICT firms*, capturing the flow of private capital into the digital sector; and

- *Employment of ICT Specialists*, measuring labor demand for specialists dealing with Information and Communication Technology (ICT).

The analysis is conducted as an event study using a difference-in-differences strategy for the period 2015 to 2019, treating the implementation of the GDPR in 2018 as the policy intervention. The objective is to estimate the impact of the regulation by comparing pre- and post-GDPR trends in the outcome variables between EU member states and a control group of non-EU OECD countries with market-driven data governance models. This research contributes to the growing empirical literature on the economic effects of privacy regulations, with a specific focus on how such frameworks influence behavior and outcomes in data-intensive sectors.

The structure of the thesis is as follows. Chapter 2 reviews recent economic literature on the GDPR. Chapter 3 introduces the theoretical framework that links the GDPR to the selected outcome variables and outlines the expected mechanisms of impact. Chapter 4 describes the data sources and defines the variables used in the analysis. Chapter 5 outlines the empirical strategy, including the identification approach and model specifications. Chapter 6 presents the main results. Finally, Chapter 7 discusses the broader implications, acknowledges the study's limitations, and offers concluding remarks.

2 Literature Review

This section reviews the emerging body of empirical literature examining the economic impact of the GDPR. Most studies employ quasi-experimental designs, particularly difference-in-differences or event study frameworks, exploiting the timing and territorial scope of the GDPR's implementation in 2018. While certain areas such as labor market dynamics have been paid less attention, much of the empirical literature to date has focused on firm behavior, market activity, and regulatory spillovers.

A significant body of work has examined how the GDPR has reshaped firm-level data practices and behavior. Demirer et al. (2024) used data on monthly cloud usage to show that GDPR implementation led to a 26% decline in data storage and a 15% decline in data processing by EU firms relative to their U.S. counterparts. These findings suggest a shift toward less "data-intensive" operations post-regulation. Similarly, Aridor et al. (2022) found that the GDPR's opt-in requirements reduced the number of observable consumers on online travel platforms by 12.5%, while simultaneously increasing the informational value of remaining user data. Together, these studies point to a broader trend: the GDPR may reduce the volume of data collection while enhancing its quality or informational value.

Other studies have focused on market structure and innovation. Janßen et al. (2022) analyzed app market data from the Google Play Store and showed that GDPR led to a 50% decline in new app entries within the EU and drove one-third of existing apps out of the market. This decline corresponded with reductions in consumer surplus and overall app usage, suggesting potentially adverse effects on digital innovation and product availability.

Investment dynamics in the post-GDPR environment, a strand to which the thesis contributes, have also attracted attention. Jia et al. (2019) compared venture capital flows into technology startups in the EU and the U.S., finding that, following the GDPR's implementation, EU-based firms experienced a 15% decline in deal count and a 13% decline in average deal size relative to their U.S. counterparts. These effects were especially pronounced for data-intensive firms and those reliant on foreign investment, reflecting concerns around increased regulatory complexity. Complementing these findings, Chen et al. (2022) studied firm-level data across 61 countries and revealed that GDPR exposure led to an 8% reduction in profits and a 2% decline in sales, with smaller technology firms being disproportionately affected. Together, these studies suggest that GDPR compliance burdens may dampen investor interest, especially in high-growth or high-risk digital sectors.

A parallel stream of literature, which the thesis also seeks to extend, has explored the GDPR's implications on international trade and cross-border data flows. Unlike firm-level studies, this strand often relies on theoretical models or survey-based methods to assess broader economic outcomes. For instance, Spiezia and Tscheke (2020) employed a gravity model and concluded that while GDPR-inspired data agreements can enhance trust and legal certainty, they may also function as trade barriers by raising operational compliance costs. The strength of this claim, however, remains contested. Tomiura et al. (2019), drawing on survey responses from Japanese firms, reported that although 40% of surveyed firms adopted stricter internal data practices and 5% encountered challenges with cross-border data collection, only 1% scaled back their EU operations in response to the GDPR. The thesis contributes to this area of literature by introducing empirical evidence on international trade in digital goods, a relevant area not yet explored in existing empirical research.

In contrast to the growing evidence on trade and investment, the labor market effects of the GDPR remain notably underexplored. The only forward-looking study in this area is by Christensen et al. (2013), who used a dynamic stochastic general equilibrium model to simulate the GDPR's impact prior to its implementation. Their analysis predicted a 0.3% decline in labor demand, driven by increased compliance and operational costs. However, given the study predates the regulation's enactment, it does not capture realized labor market outcomes, nor does it account for sector-specific heterogeneity. To date, no empirical research has systematically examined how the GDPR has affected employment patterns, particularly in the digital sector, representing a significant gap in the literature that the thesis addresses.

In summary, the existing research demonstrates that the GDPR has produced a wide range of economic implications, particularly by reshaping firm-level data practices, discouraging entry and innovation in digital markets, reducing venture capital investment, and constraining cross-border trade in the digital sector. These effects tend to be most pronounced among smaller, data-intensive firms, indicating that compliance costs and regulatory uncertainty may impose disproportionate burdens. On the other hand, the regulation's labor market implications remain insufficiently examined. However, the regulation's implications for labor market outcomes remain relatively

underexplored. This thesis seeks to address existing gaps and extend the literature by empirically assessing changes in employment, alongside international trade and investment patterns, in the digital sector across both GDPR and non-GDPR jurisdictions within selected OECD countries. It also seeks to prove discern determine whatever the result of Jia et al's result in the EU and US by expanding the country with additional countries in the OECD sample.

The next section formulates the theoretical framework that conceptualizes the channels through which the GDPR is expected to influence the outcome variables examined in this thesis and derives the hypotheses to inform the subsequent empirical analysis.

3 Theoretical Framework

Based on the foregoing discussion and the theoretical mechanisms outlined in this section, the introduction of the GDPR is expected to affect trade, venture capital investments, and employment in the EU's ICT sector through multiple channels. By imposing binding legal requirements for personal data processing, the regulation increases operational costs and influences how firms, investors, and trade partners make decisions. First, the GDPR shifts firm-level labor demand by introducing compliance obligations that increase the need for ICT specialists, though the overall effect on aggregate employment remains uncertain due to potential labor supply inelasticity and job losses in adversely affected sectors. Second, it creates an adverse shock for investors, lowering the expected returns on ICT ventures in the EU due to increased compliance costs, reduced scalability for firms providing data-intensive services, and additional legal non-compliance costs faced by firms under the jurisdiction. Third, by increasing the cost of international trade due to more complex cross-border data transfer and safeguard requirements, GDPR acts as a non-tariff barrier that may reduce the EU's intensity of exports and imports in ICT goods relative to trade flows between countries operating under less restrictive data protection regimes. Although these effects differ in how they play out, they all reflect the broader impact of the GDPR in introducing new barriers that shape the size, composition, and openness of the EU's digital economy when compared to other OECD countries with more flexible, market-driven data policies during the years observed.

3.1.1 GDPR and ICT Employment: Compliance Labor as a Required Input

The implementation of the GDPR introduces non-optional compliance requirements that significantly affect firm-level labor demand for firms in the ICT sector, as such firms routinely collect and processes personal data via digital channels. Firms subject to the regulation must establish necessary protocols as well as personnel requirements for data protection to ensure compliance with the regulation. These obligations introduce fixed costs in the form of required governance, documentation, and personnel dedicated to data protection, such as privacy officers and compliance engineers. From a purely demand-side perspective, this creates upward pressure on labor demand for ICT specialists with compliance-relevant skills.

Consider a representative firm that generates revenue R and employs two types of labor: standard production labor L, and compliance-related labor L_C, with corresponding wages w and w_C. The firm also faces fixed non-labor costs F, such as infrastructure and capital. The profit function is then expressed as:

$$\pi = R - wL - w_C L_C - F$$

Under pre-GDPR conditions, L_C may be negligible or absent. However, once GDPR is enforced, the firm must increase L_C to meet compliance obligations, which raises the total labor cost. It should be noted that the firm cannot opt out of compliance without incurring steep fines or legal consequences, and in most cases, exit from the market is not a viable option due to sunk costs and forgone revenue. The firm chooses to remain in operation if post-GDPR profits remain non-negative:

$$\pi^{GDPR} = R - wL - w_C L_C^{GDPR} - F \geq 0$$

Exiting would involve a one-time loss equal to $-F$. Thus, as long as $\pi^{GDPR} > -F$, the firm prefers to absorb the higher labor costs and comply with GDPR.

This reasoning implies that, in equilibrium, profit-maximizing firms are incentivized to stay in the market and increase demand for compliance-related labor L_C to satisfy regulatory requirements. However, there are reasons this demand-side adjustment may not necessarily translate into higher observed employment levels. If the supply of qualified ICT specialists is inelastic in the short run, for example due to scarce ICT specialist supply or long training lags, then the increased demand for compliance-related personnel would instead raise wages w_C for these employees rather than their employment level L_C. Furthermore, GDPR may simultaneously reduce output and investment in data-intensive segments of the ICT sector, lowering demand for production labor L.

Therefore, while GDPR likely altered the composition of ICT labor demand, particularly by increasing the need for compliance-related roles, the net employment effect is uncertain. It depends on the relative strength of demand for new roles versus the job losses in affected sectors, and whether sufficient skilled labor is available to fill new positions. As such, whether the GDPR results in a net increase or decrease in the employment share of ICT specialists is an empirical question that this thesis seeks to explore, without imposing a directional prior expectation.

3.1.2 GDPR and Venture Capital Investment: Regulatory Risk and Expected Return

Venture capital investment decisions depend on the trade-off between expected returns and associated risks. Firms in the ICT sector receiving venture funding typically operate under uncertainty, and investors evaluate them based on projected revenues, growth potential, and the surrounding risk and policy environment. The introduction of the GDPR alters this environment by adding a new layer of regulatory compliance that affects the cost structure and legal exposure of firms. From the investor's perspective, this represents a negative policy shock that lowers the expected net return of funding EU-based ventures.

Suppose an investor is evaluating a portfolio of potential ICT firms, some in the European Union and others in comparable OECD countries operating under free market-driven data regimes during the observed time period such as the United States and Canada. For each startup, the investor estimates an expected return $\mathbb{E}[r]$ and considers the associated risk, represented by the variance σ^2. Following a simple standard expected utility theory under risk aversion, the investor's utility from investing in a given firm is modeled as:

$$U = \mathbb{E}[r] - \gamma\sigma^2$$

where $\gamma > 0$ represents the investor's risk aversion. The GDPR reduces expected return $\mathbb{E}[r]$ by increasing compliance costs, reducing scalability for data-intensive services, as well as potential liabilities for cases of non-compliance. We represent this impact as a decrease of Δ in expected returns:

$$\mathbb{E}[r^{GDPR}] = \rho - \Delta$$

Here, ρ is the pre-GDPR baseline expected return, and Δ reflects the expected loss in returns from increased compliance costs, limited scalability, and legal non-compliance risks faced by ICT firms under the regulation. As a result, the investor's utility from funding EU-based ICT firms declines. Unless this is offset by lower perceived risk or higher returns potential, capital seeking exposure to the ICT sector is likely to shift towards ventures operating in jurisdictions with less restrictive data governance frameworks.

This theoretical mechanism aligns with empirical findings in the literature, such as Jia et al. [2019], whose study found a post-GDPR decline in both the number and value of venture capital deals in the EU relative to the United States. This thesis extends upon Jia et al.'s findings by considering a broader comparison group and separate measure to evaluate whether similar effects persist when the EU is compared with a wider set of market-driven data economies.

The resulting hypothesis is that the GDPR introduces an adverse shock that to investor utility, lowering the attractiveness of EU-based ICT ventures compared to those in less regulated environments.

3.1.3 GDPR and Trade in ICT Goods: Compliance Costs as Non-Tariff Barriers

Enforcement of the GDPR may also impact the flow of ICT goods across borders by introducing regulatory frictions that function similarly to non-tariff trade barriers. While GDPR does not explicitly restrict the import or export of physical products, it directly affects digital trade by imposing strict legal conditions on how data is transferred across jurisdictions. For many ICT goods, especially those connected to online services or involving data exchange, compliance with GDPR becomes a prerequisite for market access, effectively raising the cost of trade for firms operating in or with the European Union.

This mechanism can be represented using a standard gravity model of trade, in which bilateral trade flows are inversely related to trade costs. If we let the volume of ICT Goods Trade from country i to country j be denoted as $\boldsymbol{T}_{ij}$, which is determined by both countries' economic activity A_i and A_j and a trade cost term τ_{ij}, then the model is expressed as:

$$\boldsymbol{T}_{ij} = \frac{A_i A_j}{\tau_{ij}}$$

Under GDPR, the trade cost τ_{ij} increases for flows involving EU countries, not due to tariffs but due to compliance requirements outlined in the GDPR such as Data Protection Impact Assessments (DPIAs), legal mechanisms for cross-border data transfer, and other storage and safeguard requirements for data related to individuals in the European Union. These obligations are particularly burdensome for small and medium-sized ICT firms that lack the administrative capacity to handle complex legal frameworks across borders. As a result, trade costs under GDPR are higher than they would be in the absence of the regulation, which implies:

$$\tau_{ij}^{GDPR=1} > \tau_{ij}^{GDPR=0}$$

and thus:

$$\boldsymbol{T}_{ij}^{GDPR=1} > \boldsymbol{T}_{ij}^{GDPR=0}$$

In other words, the introduction of GDPR leads to a contraction in ICT Goods trade flows relative to a counterfactual scenario where no additional regulatory cost is introduced. Beyond the overall reduction in trade flows, GDPR introduces further symmetric effects on imports and exports. On the import side, GDPR limits foreign firms' ability to collect and analyze consumer data within the EU, reducing their capacity to tailor products and market effectively to EU consumers. This functions as a non-tariff barrier, leading to a decline in ICT imports that rely on data-driven customization. On the export side, GDPR restricts EU firms' ability to collect and process consumer data in foreign markets, limiting their ability to refine products and adapt offerings to external consumer preferences. This constraint reduces the competitiveness of EU-based ICT firms, resulting in lower exports.

Therefore, the resulting hypothesis is that by increasing the cost of international trade through regulatory compliance requirements, the GDPR lowers the intensity of the EU's exports and imports in ICT goods relative to countries with less restrictive data protection regimes, as well as both imports and exports of ICT goods in the EU relative to countries with less restrictive data protection regimes.

3.2 Summary of hypotheses

Based on the theoretical mechanisms discussed above, this thesis examines the following hypotheses about the impact of the GDPR on the ICT sector in the European Union:

H1. **Presence of GDPR-Induced Labor Demand Shifts:** The implementation of the GDPR alters the demand for ICT specialists in the EU, leading to changes in their employment share relative to other OECD countries. However, the direction of this change is theoretically uncertain due to offsetting effects and will be explored.

H2. **Decline in ICT Venture Capital Investments:** The GDPR introduces a negative shock to expected returns for investors in EU-based ICT ventures, resulting in a decline in venture capital investment compared to the other OECD countries with free market-oriented data protection regimes.

H3. **Reduced Trade Openness for ICT Goods:** The GDPR raises the cost of cross-border digital trade, reducing the EU's overall trade in ICT goods relative to other non-EU OECD countries.

4 Data

The thesis draws on a balanced annual panel dataset covering the period from 2015 to 2019 across 24 OECD countries, namely Australia, Austria, Belgium, Canada, Czechia, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Japan, Luxembourg, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, Norway, the United Kingdom, and the United States.

The start year of 2015 is selected to establish stronger pre-treatment trajectories for validating the parallel trends assumption, although complete data is available from 2014. Preliminary inspection on the data showed trends in 2014 slightly diverging higher, which could weaken the credibility of the identifying assumption. Therefore, 2015 is selected as a more suitable start year upon displaying stronger parallel trends between treatment and control groups. The 2014 data is still included in later robustness checks to test the sensitivity of the results to alternative pre-treatment windows. The end year is set for 2019 to avoid confounding effects from the COVID-19 pandemic, which began in 2020 and significantly disrupted global digital and economic activity.

The primary source of data is the OECD Going Digital Toolkit, which provides standardized cross-country indicators within the framework of digital development and across seven policy areas acting as subdimensions. The Toolkit covers the following seven policy areas: (1) Access to communications infrastructure, services, and data; (2) Effective use of digital technologies; (3) Data, privacy, and security; (4) Digital government; (5) Innovation and technology adoption; (6) Jobs and skills; and (7) Societal well-being and inclusion. The OECD Going Digital Toolkit includes over 40 indicators across these policy dimensions. From this set, five indicators were selected based on their relevance to the focus of the thesis on digital trade, investment, and employment, as well as the availability of complete and comparable data across countries and years. The selected outcome variables along with their units are listed below, and a full table with their descriptions, measurement units, and data sources is provided subsequently in Table 1.

1. ICT goods exports (% of total international trade of all goods)
2. ICT goods imports (% of total international trade of all goods)

3. Total trade in ICT goods (% of total international trade of all goods), manually calculated as the sum of ICT exports and ICT imports
4. ICT venture capital investments (% of GDP)
5. Employment of ICT specialists (% of total employment)

In addition to the OECD dataset, supplementary data is also obtained from the UN Conference on Trade and Development's statistical database (UNCTADstat) to address existing gaps in the OECD dataset, particularly for trade indicators with missing country-year observations. Remaining missing values were imputed using linear interpolation techniques. When a single intermediate year was missing between two observed values (e.g., 2016 missing between 2015 and 2017), the missing value was imputed as the simple average of the two surrounding years. For gaps spanning multiple consecutive years (e.g., 2015–2017 missing between 2014 and 2018), linear interpolation was applied to estimate values for each missing year. In cases where the final year of the series (e.g., 2019) was missing, the last available value was carried forward.

The final dataset is structured as a balanced panel of 24 countries observed over five years (2015–2019), yielding 120 country-year observations per outcome variable and providing the basis for the difference-in-differences analysis.

Table 1: Description of Outcome Variables, Units and Data Sources				
No.	*Variable*	*Description*	*Unit*	*Source*
1.	ICT goods exports	Measures the value of exported information and communication technology (ICT) goods as a share of total international trade of all goods. ICT goods span a broad range of products in the digital economy, including computer and peripheral equipment, communications technology, consumer electronics, and a miscellaneous category that also covers intangible goods such as recorded content, consumer and storage media (UN Trade and Development, 2017). Other types of intangible digital goods, such as cross-border data transfers or cloud-based services, are not captured in this trade classification, as the flow of such goods remains a challenge to measure consistently and are not yet included in international trade statistics.	Share of total international trade in all goods	OECD Going Digital Toolkit, UNCTADstat
2.	ICT goods imports	Measures the value of imported ICT goods as a share of total international trade of all goods.	Share of total international trade in all goods	OECD Going Digital Toolkit, UNCTADstat
3.	Total trade in ICT goods	Calculated as the sum of ICT goods exports and imports. This manually derived indicator captures the overall trade volume of ICT goods relative to total international trade of all goods for each country-year observation.	Share of total international trade in all goods	OECD Going Digital Toolkit, UNCTADstat
4.	ICT venture capital investments	Measures the flow of venture capital investments into the ICT sector as a percentage of GDP. This indicator reflects the scale of early to late-stage financial support for ICT firms s. Venture capital is defined as private equity investment provided by specialized intermediaries in firms that are not publicly listed. Data is compiled from national venture capital associations or commercial providers.	Share of Gross Domestic Product	OECD Going Digital Toolkit
5.	Employment of ICT specialists	Measures the share of total employment in occupations classified as ICT specialist roles. ICT specialists are identified using the 2008 International Standard Classification of Occupations (ISCO-08), and include job roles such as software developers, network professionals, IT support, and telecommunications technicians. The data is derived from national labor force surveys or similar household surveys.	Share of total employment	OECD Going Digital Toolkit

4.1 Descriptive analysis of the data

Table 2 presents summary statistics for the five outcome variables in the dataset. On average, ICT goods exports account for 3.37% of total international trade in all goods, while ICT goods imports make up 5.70%, resulting in a combined average of 9.08% for total ICT goods trade. The data reveals significant variation in digital goods trade intensity across countries, with total ICT goods trade, for instance, ranging from just over 1% to more than 27% of a country's total international trade in all goods.

Table 2: Summary Statistics for Outcome Variables

Variable	Mean	SD	Min	Max	N
ICT goods exports	3.3742	3.1139	0.24	13.78	144
ICT goods imports	5.7030	3.2391	0.78	15.06	144
Total trade in ICT goods	9.0773	5.9413	1.12	27.15	144
ICT venture capital investments	0.0364	0.0547	0.00	0.34	144
Employment of ICT specialists	3.5663	0.9715	1.63	6.38	144

Notes: *Exports, Imports, and Total Trade in ICT Goods are measured as shares of total international trade; Venture Capital Investments as a share of GDP; Employment of ICT specialists as a share of total employment.*

Venture capital investment in the ICT sector, measured as a share of GDP, ranges from zero to 0.34%, with a mean of 0.036%. The distribution is heavily skewed toward the lower end, suggesting that in most country-year observations, startup funding in the digital sector remains relatively small in macroeconomic terms. However, the few higher-end observations point to substantial variation in the scale of private investment across countries and time periods.

Employment of ICT specialists, expressed as a share of total employment, averages 3.57% across the dataset, with values ranging from 1.63% to 6.38%. This suggests moderate variation and a relatively balanced distribution, reflecting differing degrees of workforce demand for ICT specialists across national labor markets.

The next section presents the empirical strategy used in the thesis.

5 Empirical Strategy

Following the methodology adopted in most empirical studies on the GDPR, this thesis employs a difference-in-differences strategy to estimate the regulation's impact on the selected indicators for the digital sector. The strategy compares the evolution of outcomes before and after the GDPR's enactment in 2018 between countries subject to the regulation (treatment group) and countries that are not (control group).

5.1 Selection of Treatment and Control Groups

The treatment group includes 19 EU member states, including Austria, Belgium, Czechia, Denmark, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Portugal, Slovenia, Spain, Sweden, Norway, and the United Kingdom, all of which implemented

the GDPR in 2018. The United Kingdom is treated as part of the GDPR-affected group in the main analysis, as the time frame precedes the country's withdrawal from the EU.

In the United Kingdom, the Data Protection Act 2018 incorporated the GDPR into domestic law prior to Brexit in 2020. After Brexit, the United Kingdom introduced amendments alongside its own UK GDPR in 2021 which was also received approval for EU GDPR Adequacy the same year (European Commission). As such, the United Kingdom is included in the treatment group while also excluded from the analysis in later robustness tests to account for potential transitional effects related to Brexit. However, it is not reclassified into the control group as the country was subject to GDPR requirements during the full treatment period.

The control group consists of five non-EU OECD countries, which include the United States, Canada, Australia, Japan and Switzerland, which were not subject to the GDPR during the observation period and determined to have followed market-oriented approaches to data protection.

Prior to the European Commission's GDPR Adequacy Decisions beginning in 2019, there was no existence of a single authoritative classification of countries by data governance models. As such, selection for control group countries among the parent OECD database is informed by three criteria. First, countries were evaluated based on the existence and scope of national data protection frameworks in place during the observation period. Jurisdictions with outdated or minimal legal structures governing personal data were excluded. Second, only advanced economies within the OECD, as classified by the International Monetary Fund's World Economic Outlook (2023), were selected. Emerging economies were excluded to avoid structural differences that could compromise the internal validity of the difference-in-differences design. Additionally, countries that met the criteria but lacked sufficient data coverage for the relevant outcome variables or observation period were also excluded from the control group. Third, reference was made to the typology of prevailing data governance models outlined in the UNCTAD Digital Economy Report (2021), which classifies the United States as the paradigmatic example of a free-market, private sector-driven data regime, in contrast to the EU's rights-based model.

Countries other than the United States in the control group were assessed based on their regulatory proximity to the U.S. model, including features such as sector-specific privacy laws, decentralized enforcement mechanisms, and greater reliance on self-regulation or co-regulation by industry actors. For example, Canada's Personal Information Protection and Electronic Documents Act, published in 2000 and in effect throughout the observed period, placed emphasis on organizational accountability rather than strict ex-ante limitations on data use, and permitted broad flexibility for firms to determine data handling practices internally. Similarly, Australia's Privacy Act 1988 applied unevenly across sectors and did not impose data security and online privacy obligations until its most recent amendments in 2024. Japan's Act on the Protection of Personal Information was not GDPR-aligned until after 2019 (European Commission), and its pre-2018 version allowed for broadly defined purposes for usage of data, consistent with firm-oriented models. Switzerland, although previously recognized by the European Union as providing an adequate level of data

protection in 2000, did not bring its revised Federal Act on Data Protection into effect until 2023 and only received formal GDPR adequacy recognition in 2024 (Swiss Confederation).

5.2 Estimation Model

The thesis employs a standard two-way fixed effects difference-in-differences estimation strategy. The inclusion of both country and year fixed effects helps mitigate bias from unobserved heterogeneity and ensures that the estimated treatment effect is not confounded by time trends or fixed country characteristics. Country fixed effects account for time-invariant characteristics specific to each country, such as institutional quality, regulatory culture, or digital infrastructure, while year fixed effects capture global shocks and time-specific influences common to all countries, such as macroeconomic fluctuations, technological progress, or global trade conditions.

The baseline estimating equation is specified as the following:

$$Y_{it} = \alpha + \lambda_t + \mu_i + \beta_1 \text{Treatment}_i + \beta_2 \text{Post}_t + \beta_3 (\text{Treatment}_i \times \text{Post}_t) + \epsilon_{it}$$

Where:

- Y_{it} represents the outcome of interest for country i at time t.
- λ_t denotes year fixed effects to capture common shocks over time.
- μ_i denotes country fixed effects to control for time-invariant country characteristics.
- Treatment_i is a dummy variable equal to 1 for GDPR-affected EU countries, and 0 otherwise.
- Post_t is a dummy variable equal to 1 for post-GDPR years (2018–2019), and 0 otherwise.
- $\text{Treatment}_i \times \text{Post}_t$ is the interaction term of interest, capturing the differential impact of the GDPR on the treated EU group.
- ϵ_{it} is the error term.

The coefficient β_3 provides the difference-in-differences estimate of the GDPR's impact on each outcome variable. It isolates the average treatment effect on the treated by comparing changes in the outcome for the GDPR-affected group before and after implementation, relative to changes in the control group over the same period. The empirical results are presented in the following section.

5.3.1 Validating the Parallel Trends Assumption

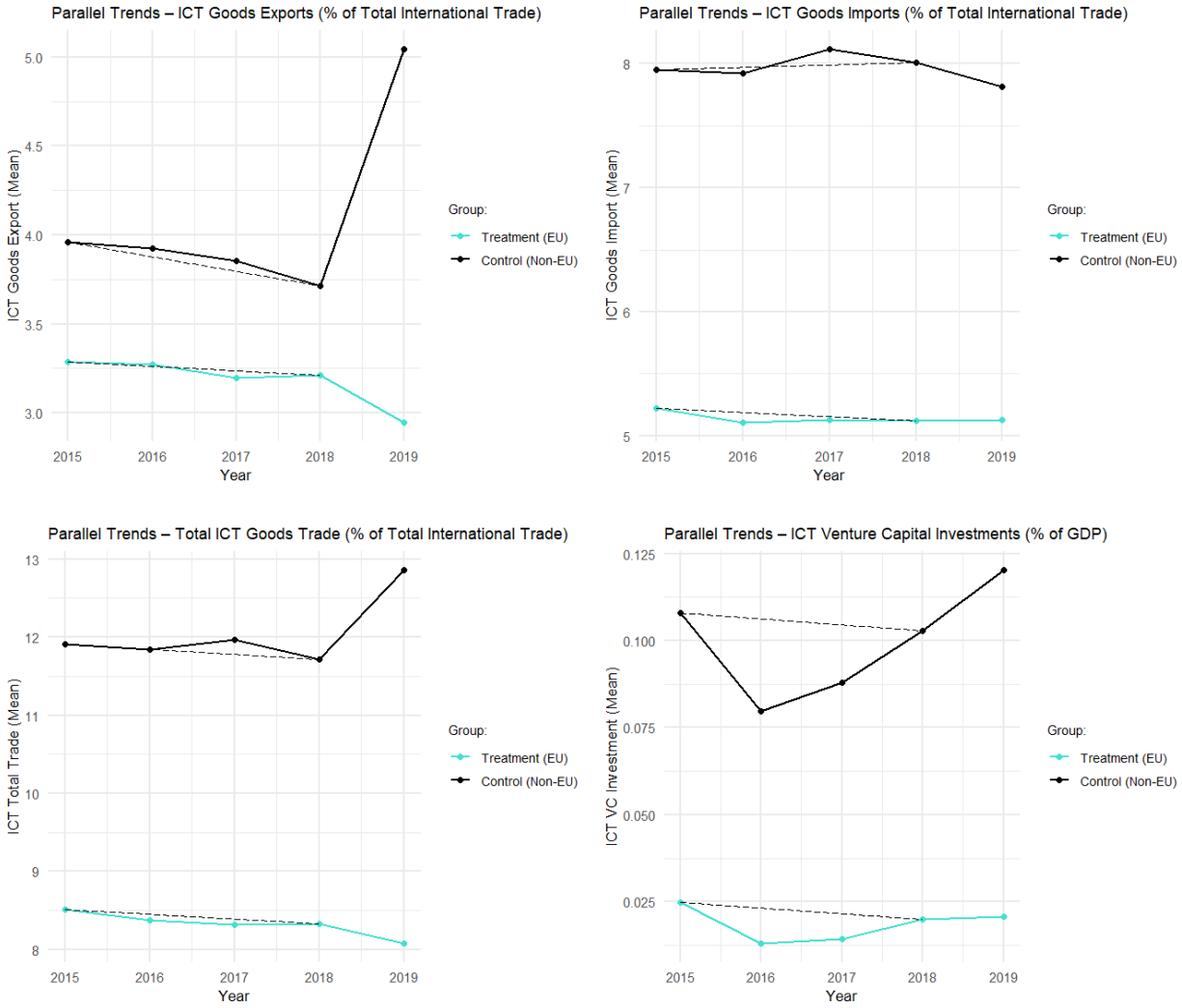
The difference-in-differences empirical approach identifies treatment effects by comparing the change in average outcomes for the treatment group with the change in outcomes for the control group. The validity of this approach rests on two key assumptions. First, the parallel trends assumption requires that, in the absence of treatment, the average outcomes of treatment and control groups would have followed similar trajectories over time. Second, the no anticipation

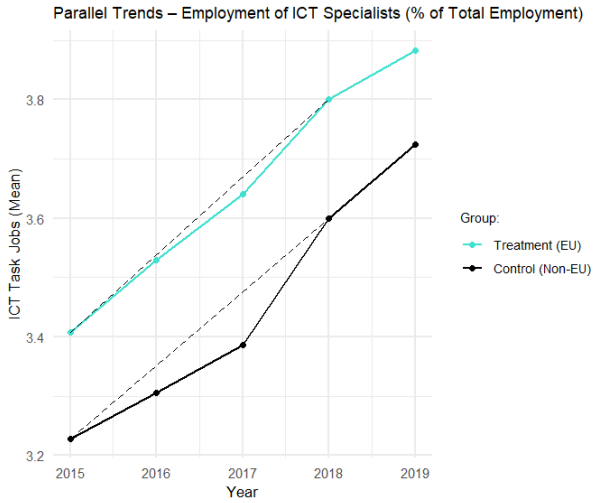
assumption requires that treatment effects do not occur prior to the implementation date, implying that agents did not adjust their behavior in expectation of the GDPR before 2018.

To support the validity of the parallel trend assumption, a visual inspection of pre-treatment trends was conducted for all outcome variables. This involved plotting the group-level means of each variable over the observation period (2015–2019), separately for the treatment group (EU countries subject to the GDPR) and the control group (non-EU OECD countries not subject to the GDPR). Parallel trends between the groups in the pre-treatment period (2015–2017) would indicate that the first identifying assumption holds.

The plots in Figure 1 below show the pre-treatment trends for each of the five outcome variables. The pre-treatment trajectories are displayed in the dashed lines, denoting whether the treatment and control groups followed similar paths prior to the GDPR's implementation in 2018.

Figure 1: Plots of Pre-Treatment Trends for Outcome Variables





In the case of ICT goods exports, both treatment and control groups exhibit a gradual downward trend between 2015 and 2017, suggesting broadly parallel movements in the pre-treatment period. However, a sharp divergence is observed in 2019, with exports increasing substantially in the control group and declining further in the treatment group. This post-2018 divergence supports the plausibility of a GDPR-related effect, though some caution may be warranted due to the slight pre-treatment slope differences.

For ICT goods imports, the treatment and control groups exhibit slightly different trajectories prior to 2018. Both groups display a decline in 2016, followed by an increase in 2017 and a subsequent decline in 2018. The fluctuations observed in 2017 and 2018 are more pronounced in the control group, resulting in greater slope variation and sharper alternations between increases and decreases. After 2018, the treatment group remains relatively stable, while the control group continues along a downward trajectory, producing a post-treatment divergence in levels. These dynamics suggest that although the groups share some common year-to-year variation, differences in the magnitude of pre-treatment changes warrant caution in interpreting the impact of the GDPR.

The combined measure of total ICT goods trade (Exports plus Imports) shows broadly parallel trends before 2018. Both groups exhibit slight year-on-year declines from 2015 to 2017. Following the introduction of the GDPR, total ICT trade increases in the control group but continues to decline in the treatment group, indicating a post-treatment divergence possibly consistent with the hypothesized regulatory effect.

Pre-treatment trends in ICT venture capital investment appear approximately parallel, with both groups showing a decline in 2016 followed by modest increases in 2017. The trajectories move in the same direction over this period, without evidence of sharp deviations between them. Although the control group shows stronger variation in investment levels, the underlying slopes remain largely comparable. These pre-treatment dynamics reinforce the plausibility of the parallel trend assumption for venture capital investments in the digital sector. The divergent post-treatment pattern, which shows a substantial increase in investment activity within the control group relative

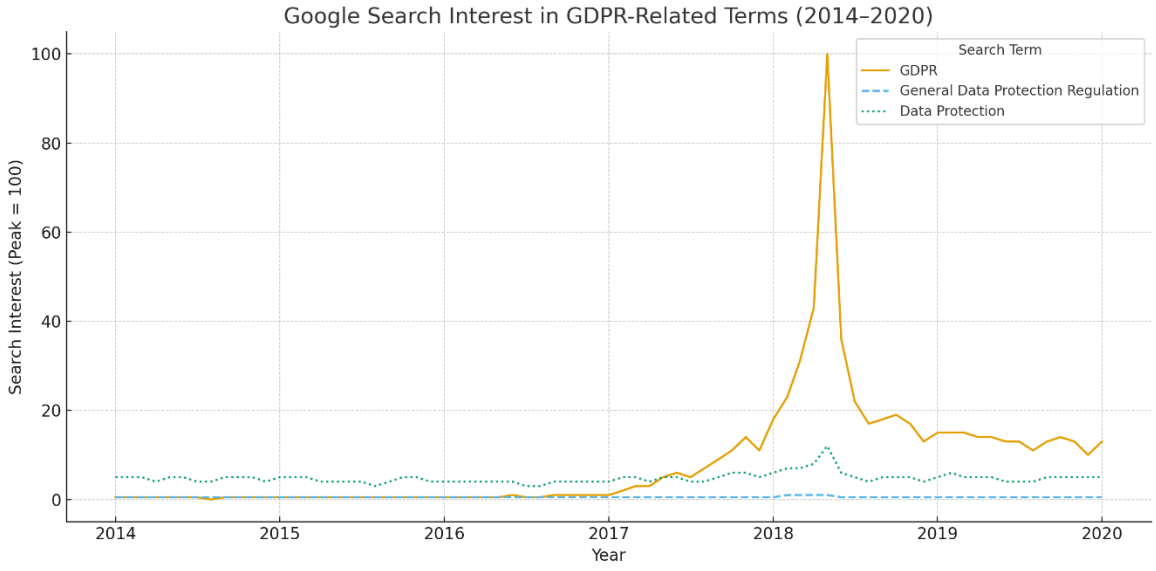
to the treatment group, is also consistent with the expected impact of GDPR-related compliance costs on investor behavior.

For employment of ICT specialists, the treatment and control groups exhibit strongly parallel trends during the pre-treatment period from 2015 to 2017. Both groups show a steady increase in the share of ICT employment, with a near-constant gap between them, and a slight deviation is observed in 2017 where the treatment group experienced a modest upward shift in growth rate. Overall, their trend lines appear strongly parallel and the graph indicates similar slopes prior to the GDPR's implementation, supporting the plausibility of the parallel trend assumption regarding labor demand for ICT specialists across both control and treatment groups.

5.3.2 Validating the No Anticipation Assumption

To assess the validity of the no anticipation assumption, data from Google Trends is used to track public attention to GDPR-related terms between 2014 and 2020, examining whether any behavioral adjustments occurred during the pre-intervention period. The search terms include "GDPR," "General Data Protection Regulation," and "Data Protection," with the resulting values representing relative search interest scaled to a peak value of 100, indicating the highest point of popularity for each term within the observed timeframe.

Figure 2: Internet Searches in Relation to Data Protection



As the figure above shows, search interest in all queried terms remained consistently low and stable until late 2017, after which the terms "GDPR" and "General Data Protection Regulation" experienced a sharp and concentrated spike that peaked in May 2018, coinciding with the regulation's enforcement. The absence of a sustained increase in attention prior to this point suggests that public awareness and behavioral responses to the GDPR were largely concentrated around the enforcement date, thereby supporting the plausibility of the no anticipation assumption.

The preceding sections have outlined the methodological framework used in the thesis for analyzing the GDPR's impact on selected outcomes in the digital sector. The plausibility of the parallel trends and no anticipation assumptions is evaluated using graphical illustrations and supplementary data, providing support to the identification strategy. With these conditions reasonably satisfied, the analysis now turns to the empirical results. The next section presents the main estimation results, followed by robustness tests to ensure the consistency of the findings under alternative model specifications.

6 Results

This section presents empirical findings from the difference-in-differences analysis to show GDPR's impact on development of EU digital sector through the five outcome variables: (1) ICT goods exports, (2) ICT goods imports, (3) total ICT goods trade, (4) venture capital investment in ICT firms, and (5) employment of ICT specialists. Analysis is conducted for the years 2015 to 2019 and all models are estimated using panel fixed-effects regressions, incorporating both country and year fixed effects.

6.1 Regression Results

Table 3 presents the regression results, with Columns (1) through (5) corresponding to each of the variables. The primary coefficient of interest is the Treatment × Post interaction term, which captures the average treatment effect of the GDPR, from its intervention date in 2018, on 19 EU member states relative to the non-EU countries in the control group (United States, Japan, Canada, Australia and Switzerland).

Table 3: Difference-in-Differences Regression Results

	Dependent variable:				
	ICT Goods Export (1)	ICT Goods Import (2)	Total ICT Goods Trade (3)	Venture Capital Investment (4)	ICT Specialists (5)
Treatment	1.138	−1.924***	−0.786	0.023*	2.486***
	(1.312)	(0.220)	(1.279)	(0.012)	(0.109)
Treatment × Post	−0.640	0.061	−0.579	−0.017**	−0.040
	(0.914)	(0.153)	(0.891)	(0.008)	(0.076)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	120	120	120	120	120
R^2	0.686	0.992	0.918	0.911	0.978
Adjusted R^2	0.589	0.990	0.893	0.883	0.971
F Statistic (df = 23; 87)	8.286***	477.192***	42.443***	38.685***	167.123***

Note: *p<0.1; **p<0.05; ***p<0.01
The 'Treatment × Post' coefficient estimates the GDPR effect.
All models include country and year fixed effects. 'Post' is omitted as it is absorbed by year fixed effects.
Outcome units: Exports, Imports, and Total Trade in ICT Goods are measured as share of total international trade; Venture Capital Investments as share of GDP; Employment of ICT Specialists as share of total employment.

The outcome variables are measured as shares of broader aggregates: ICT exports and imports are expressed as a share of total international trade in all goods; venture capital investment is measured as a share of GDP; and ICT sector employment is expressed as a share of total employment. Coefficients are therefore interpreted in percentage point terms. This means a coefficient of –0.640

on ICT goods exports directly indicates a 0.640 percentage point decrease on share of ICT goods exports within a country's total international trade of all goods.

6.1.1 Effects on ICT Trade Flows: Exports, Imports and Trade Total

ICT Goods Exports

The effect of the GDPR on digital trade is assessed by looking at exports and imports in ICT goods, and then the total amount of ICT goods trade, combining both exports and imports, represented as a share of total international merchandise trade. Across all three regressions, the results are directionally consistent with our theoretical predictions but statistically insignificant following the implementation of the GDPR.

For ICT goods exports, the coefficient is –0.640, suggesting that GDPR-affected EU member states experienced an average decline of 0.640 percentage points in their ICT export share relative to non-EU OECD countries. While this reduction in exports from GDPR is directionally aligned with the theoretical expectations that compliance obligations and cross-border data restrictions act as non-tariff barriers to digital trade in Section 3, the effect is not statistically significant. Based on the result, an example of the practical negative effect could be EU exporters facing increased difficulty in tailoring digital products or services for foreign markets due to limitations on cross-border data flows, resulting in lower competitiveness for firms reliant on data applications personalized for regions outside the EU.

When compared with descriptive statistics that show average ICT goods exports in the sample accounting for 3.37% of total merchandise trade, a drop of 0.64 percentage points from the regression would reflect a nearly 19% relative decline from baseline levels. This potential magnitude reinforces the idea that, while statistically uncertain, the estimated coefficient could represent a substantively meaningful negative policy effect. The adjusted R^2 of 0.589 indicates that about 59% of the variance in export intensity is explained by the model, including fixed effects for year and country.

ICT Goods Imports

Next, the coefficient on ICT goods imports is 0.061, which is again statistically insignificant but is positive, showcasing an opposite directional effect compared to exports. This also contrasts with the Section 3's theoretical expectation that foreign firms would face higher entry barriers in GDPR jurisdictions, which would lower the level of imports in the EU region. One explanation may lie in asymmetric market power, where smaller foreign firms may have exited due to compliance complexity, but large multinationals with superior legal and technical capabilities (e.g., Google, Microsoft) remained and expanded their footprint in the EU. This is evident from Johnson et al. (2023)'s finding, which showed increased market concentration and a relative expansion of large firms' presence in the EU digital sector after the regulation.

From a descriptive standpoint, average ICT goods imports across the dataset account for 5.70% of total international merchandise trade. A change of 0.061 percentage points, as suggested by the regression, represents just over a 1% relative increase, which is a negligible shift in practical terms. This reinforces the interpretation that, despite the theoretical expectation of a negative effect, the GDPR did not produce a discernible short-term impact on overall import volumes, at least at the aggregate level.

The near-perfect R^2 value of 0.990 suggests that almost all variation in ICT import shares across countries and over time is already explained by fixed effects and country-level time trends, which also raise concerns about an overfitting model. Therefore, the regression results for imports do not provide enough reliable evidence that the GDPR meaningfully altered ICT import levels in the short term, even if the structural implications for market composition may still be policy relevant.

Total Trade in ICT Goods

When exports and imports are combined, the total ICT goods trade indicator also shows a negative but insignificant treatment effect (coefficient: –0.579; p-value > 0.1). The aggregate result aligns with the notion that the reduction in exports dominates the marginal increase in imports, yielding a net contraction in trade intensity. Conceptually, this is consistent with GDPR acting as a non-tariff trade barrier that was conceptualized in Section 3, due to increased compliance obligations and data protection protocols outlined in the regulation.

At the aggregate level, total average trade in ICT goods accounted for 9.08% of all international merchandise trade. Therefore, a 0.58 percentage point reduction would represent a 6.4% contraction in the trade of ICT goods.

6.1.2 Effects on Venture Capital Investments

Across the five outcome variables, venture capital investment in the ICT sector shows the most robust and statistically significant GDPR effect. The coefficient for ICT venture capital investments after the GDPR is –0.017 and this is statistically significant at the 5 percent level, indicating reliable evidence of decline in ICT venture capital investment in EU member states post-2018 relative to countries from the control group.

This result directly supports the second hypothesis from the theoretical framework that the GDPR introduces an adverse regulatory shock that lowers the expected return for investors in data-driven ventures in the GDPR jurisdiction. The utility framework outlined in Section 3.1.2 showed an increase in compliance risk (Δ) reduces investor utility, which is further amplified in high-uncertainty sectors such as the digital sector. This creates a powerful disincentive to invest in EU-based ICT ventures, especially businesses whose operations heavily rely on behavioral data, digital advertising, or data monetization.

Furthermore, given that the average level of ICT venture capital investment across the dataset is 0.036% of gross domestic product, the coefficient's estimated reduction of 0.017 percentage points

represents a 47% contraction relative to the mean. The economic significance of the effect, especially in a sector where startup financing is already small in macroeconomic terms and highly sensitive to regulatory shifts, is quite substantial compared to their prior investment levels.

The significance of this result also aligns closely with evidence from Jia et al. (2019), which found a 15% decline in deal count and a 13% decline in average deal size when comparing venture capital flows into technology startups in the EU and the U.S. following the GDPR implementation. While this thesis measures investment as a share of GDP and not absolute deal counts, both results confirm that investor hesitancy is a principal outcome of regulatory tightening in the short run. Moreover, this new finding extends the empirical scope of Jia et al. (2019) by including an expanded set of non-EU OECD countries with market-oriented data regimes, reinforcing the generalizability of the GDPR's negative effects on investment beyond the EU – U.S. comparison.

6.1.3 Effects on Labor Demand for ICT Specialists

The impact of the GDPR on labor demand in the ICT sector is assessed through changes in the employment share of ICT specialists in a country's total employment. The regression estimate for employment share of ICT specialists is –0.040, indicating that labor demand for ICT specialists decreased by 0.04 percentage points in EU member states after the GDPR. However, this result is not statistically significant and does not provide ample empirical support for a clear shift in labor demand in either direction, offering no confirmation of a net effect as outlined in the theoretical discussion in Section 3.1.1.

While the GDPR likely increased the need for compliance-related ICT roles, this may have been offset by declines in labor demand within data-intensive sectors negatively affected by the regulation (e.g., targeted advertising or behavioral analytics). Additionally, firms may have absorbed compliance responsibilities into existing staff roles rather than through new hiring, resulting in no detectable net change in aggregate employment levels. Moreover, if the supply of ICT specialists is relatively inelastic due to labor shortages or training lags, then the adjustment to increased demand may manifest in higher wages rather than higher employment levels, further limiting detectability through aggregate employment shares.

Upon comparison with the descriptive analysis, the average employment share of ICT specialists across the dataset is 3.57% of total employment, with a range spanning from 1.63% to 6.38%. Against this backdrop, the estimated decline of –0.040 percentage points correspond to a relative change of just 1.1% below the mean, suggesting that the estimated effect is also minor in economic terms. Therefore, the empirical result remains insufficient to validate any directional hypothesis about GDPR's effect on labor demand, leaving the theoretical ambiguity unresolved.

Finally, the adjusted R^2 of 0.971 indicates that the fixed effects model explains nearly all variation in labor demand for ICT specialists, which highly raises the likelihood of overfitting in the model. Taken together, the findings do not provide conclusive evidence that GDPR implementation

significantly altered ICT labor demand in aggregate terms, and the question of GDPR's net employment effects remain largely an open empirical question to be explored in future research.

6.2 Robustness Tests

To assess the reliability and stability of the main regression results, a series of robustness checks were conducted by modifying the model specification using two approaches: (1) excluding the United Kingdom from the treatment group to factor out potential Brexit effects, and (2) expanding the pre-treatment window from five to six years by including additional data for the year 2014. The core significant finding for venture capital investment from the results remains largely robust with changes in significance levels from 5% to 10% by including an additional year. Estimates for all other variables remain relatively stable and statistically insignificant throughout, while the direction of ICT goods imports changes under the extended pre-treatment period.

The first robustness check excludes the United Kingdom from the treatment group due to its unique position within the EU during the GDPR implementation period and its subsequent withdrawal from the Union. The observation window remains unchanged (2015–2019). Under this specification, the pre-treatment trends remain visually consistent with the original analysis, and the estimated coefficient for venture capital investment remains nearly identical at –0.017, and statistically significant at the 5 percent level. This reinforces the robustness of the primary finding in terms of Brexit, suggesting that the core empirical finding is not driven by any changes in dynamics within the United Kingdom. As shown in the table below, for all other outcome variables, both the direction of the coefficients and their statistical insignificance also remain unchanged from the original regression.

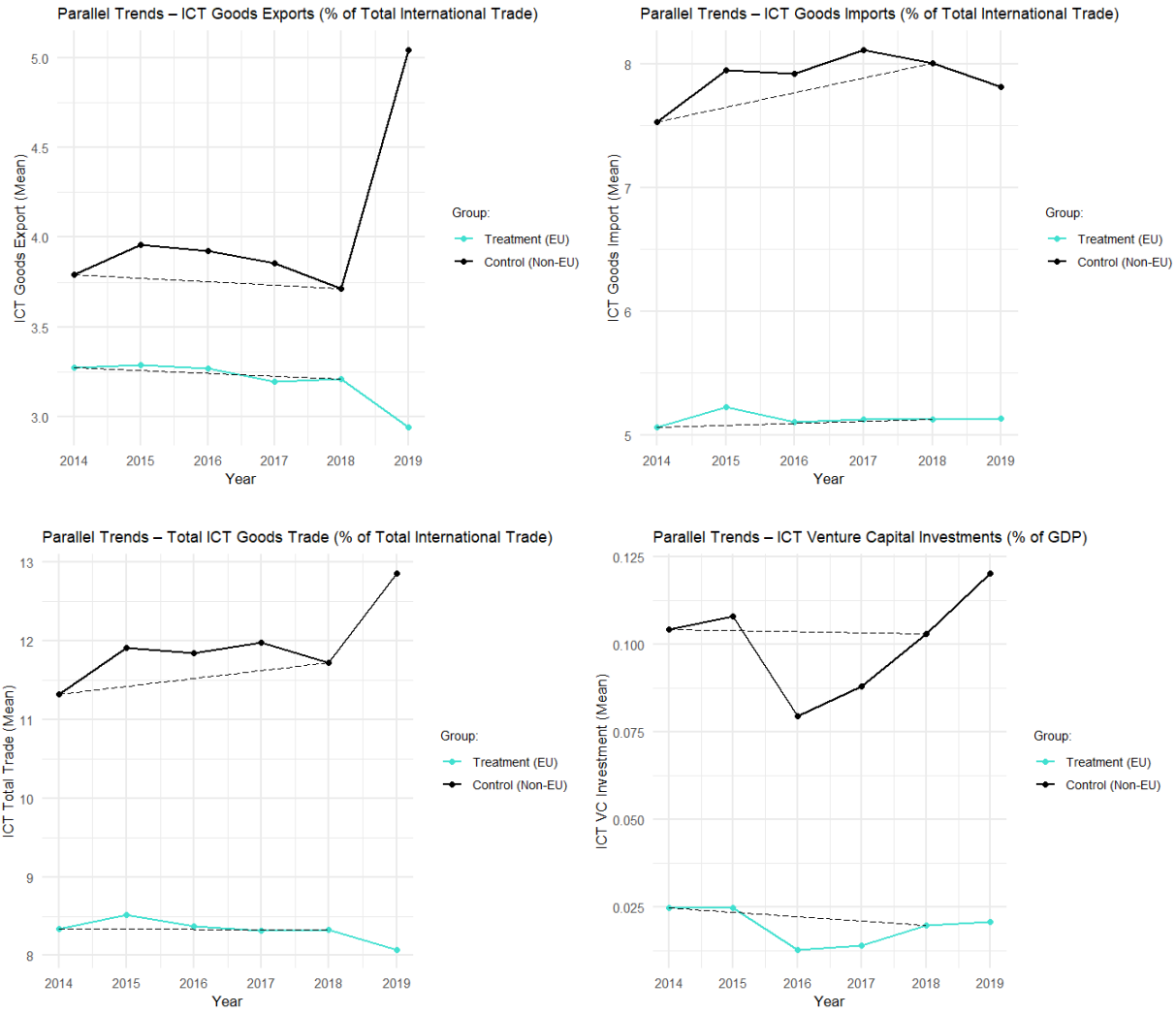
Table 4: Difference-in-Differences Regression 2 excluding the United Kingdom (2015–2019)

	Dependent variable:				
	ICT Goods Export	ICT Goods Import	Total ICT Goods Trade	Venture Capital Investment	ICT Specialists
	(1)	(2)	(3)	(4)	(5)
Treatment	2.945**	−1.169***	1.777	0.010	3.370***
	(1.337)	(0.223)	(1.301)	(0.012)	(0.110)
Treatment × Post	−0.589	0.071	−0.517	−0.017**	−0.034
	(0.937)	(0.156)	(0.911)	(0.008)	(0.077)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	115	115	115	115	115
R^2	0.684	0.992	0.919	0.912	0.976
Adjusted R^2	0.586	0.990	0.893	0.885	0.969
F Statistic (df = 23; 87)	8.190***	484.026***	42.658***	39.218***	153.696***
Note:					*p<0.1; **p<0.05; ***p<0.01

The second robustness test expands the pre-treatment period to include the year 2014, increasing the total number of observations from 120 to 144. While this offers an extended baseline, it weakens the parallel trends assumption slightly for certain variables. As displayed in the plots for parallel trends below, trajectories between 2014 and 2015 deviate more between the treatment and

control groups, particularly for venture capital investment. As a result, the pre-treatment period becomes less stable, and interpretation under this extended window warrants caution.

Figure 3: Plots of Alternative Pre-Treatment Trends beginning in the year 2014



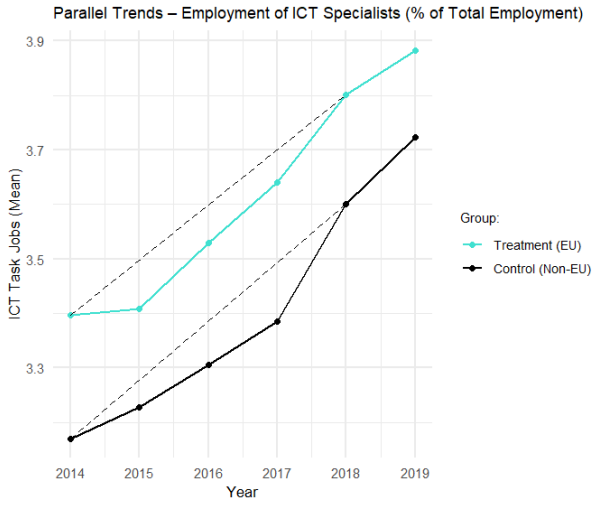


Table 5: Difference-in-Differences Regression 3 with all countries (2014–2019)

	Dependent variable:				
	ICT Goods Export (1)	ICT Goods Import (2)	Total ICT Goods Trade (3)	Venture Capital Investment (4)	ICT Specialists (5)
Treatment	1.197	−1.744***	−0.547	0.023**	2.474***
	(1.090)	(0.216)	(1.067)	(0.012)	(0.099)
Treatment × Post	−0.676	−0.033	−0.709	−0.015*	−0.041
	(0.797)	(0.158)	(0.780)	(0.009)	(0.072)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	144	144	144	144	144
R^2	0.724	0.990	0.927	0.896	0.976
Adjusted R^2	0.654	0.987	0.909	0.869	0.970
F Statistic (df = 24; 114)	12.486***	471.199***	60.681***	40.738***	192.628***
Note:					*p<0.1; **p<0.05; ***p<0.01

From the output presented following the alternative parallel trends, the estimated coefficient for venture capital investment under this specification is –0.0155, which is slightly smaller in magnitude compared to the main result, alongside a change in significance level from 5 percent to the 10 percent level. The change suggests that extending the pre-treatment period slightly reduces the statistical strength of the main empirical finding. Other outcomes remain largely unchanged in direction and magnitude, except for ICT goods imports, where the coefficient changes directionally from positive to negative, though the result remains statistically insignificant.

Lastly, a third robustness check combines both adjustments by excluding the United Kingdom and including 2014 in the sample period. In this specification, the coefficient for venture capital investment is –0.016 and statistically significant at the 5 percent level. This is nearly identical to the original specification beginning in 2015 with both all countries and without the United Kingdom, reinforcing the main finding's stability in both statistical significance and magnitude. Parallel trends remain identical to the previous 2014 specification with the United Kingdom. The coefficient for ICT goods imports also retains its directional shift to negative, while the other variables remain statistically insignificant and stable in direction and magnitude.

Table 6: Difference-in-Differences Regression 4 excluding the United Kingdom (2014–2019)

	Dependent variable:				
	ICT Goods Export (1)	ICT Goods Import (2)	Total ICT Goods Trade (3)	Venture Capital Investment (4)	ICT Specialists (5)
Treatment	3.060***	−0.945***	2.115***	0.010***	3.294***
	(0.146)	(0.305)	(0.450)	(0.003)	(0.120)
Treatment × Post	−0.624	−0.020	−0.645	−0.016**	−0.038
	(0.586)	(0.131)	(0.517)	(0.008)	(0.025)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	138	138	138	138	138
R^2	0.723	0.990	0.928	0.897	0.974
Adjusted R^2	0.652	0.988	0.909	0.870	0.967
F Statistic (df = 23; 109)	12.374***	477.447***	61.050***	41.053***	176.797***

Note: *p<0.1; **p<0.05; ***p<0.01

Across all alternative specifications, the main result for venture capital investment remains consistent in direction and relatively stable in magnitude. The inclusion of 2014 weakens the parallel trends assumption slightly and, when the United Kingdom is not excluded, the statistical significance for venture capital investments slightly weaken from 5% to 10%. For the other outcome variables, the robustness tests do not reveal any significant change in effect direction or magnitude and these estimates remain statistically insignificant in all specifications. Only the coefficient for ICT goods imports is affected directionally from an increased additional year.

Taken together, the testing affirms the core empirical finding that the GDPR had a negative short-run effect on venture capital investment in the ICT sector. For the other outcome variables, the robustness checks do not yield meaningful changes. All remain statistically insignificant in every specification, apart from the directional change in ICT goods imports when the pre-treatment window is expanded.

The following section concludes the thesis by highlighting the key findings, reflecting on policy relevance, acknowledging methodological limitations, and suggesting avenues for future research.

7 Conclusion

The thesis presented analysis on how the EU's General Data Protection Regulation influenced the development of the EU digital sector relative to other advanced OECD economies with market-oriented data regimes. The analysis focused on three core dimensions: international trade in ICT goods, venture capital investment in ICT firms, and employment of ICT specialists.

The most consistent finding is that the GDPR was associated with a measurable decline in venture capital investments in the EU digital sector. This suggests that heightened compliance obligations and regulatory complexity may have reduced the attractiveness of EU-based digital ventures for investors. The result reinforces concerns raised in prior literature and extends the insights to a broader group of comparison countries beyond the commonly studied EU – U.S. context.

By contrast, the analysis finds no clear evidence whether the GDPR significantly affected aggregate trade flows in ICT goods or altered overall employment in the ICT sector in the short

run. In particular, as employment remains an underexplored area in the current GDPR literature, the theoretical question of whether the regulation induced labor market shifts and in which direction remains open, and future research is needed to further explore this area.

Findings from the thesis also carry practical implications for policymakers. They underline the importance of aligning data protection frameworks with digital development goals, particularly by offering transitional support, legal clarity, or flexible compliance pathways for small and mid-sized firms, as well as investors, in navigating new regulatory environments. If data protection is to succeed both economically and socially, it must safeguard individual rights without deterring investment or eroding competitiveness in emerging digital sectors.

Finally, the study is subject to several limitations. The use of country-level annual data is acknowledged to limit the number of observations and prevent detailed firm-level breakdowns. Moreover, the time window ends in 2019 to avoid COVID-related disruptions, restricting the scope to short-term effects. Future research may extend this work by incorporating firm-level data, exploring long-run analyses, and examining comparative data protection models outside the EU. As global regulatory environments continue to evolve, understanding how different approaches to data protection affect innovation, trade, and employment will remain a pressing topic of inquiry.

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