TALLINN UNIVERSITY OF TECHNOLOGY

School of Information Technology

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E-Governance Technologies and Services

How the establishment of the new e-Residency issue points affecting the number of e-Residents from these countries and area around with CausalImpact method.

Master's thesis

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Author’s declaration

I confirm that I have constructed this Master’s thesis individually and that the current paper has not been presented by anyone before. All resources, viewpoints, citations, and other materials from other authors that have been used in this thesis have been referred to.

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Abstract

The purpose of this Master's thesis is to introduce the e-Residency program and how opening new issue points might significantly contribute to gaining new e-residents and opening new companies. As of March 2023, more than 100,053 e-residents from around the world have been digitized with the e-Residency program, and 25,017 Estonian companies have been created remotely by e-residents, bringing new businesses and investment opportunities to the Country.

The importance of this study lies in understanding the success factor of the e-Residency program and how it can help to attract international businesses and new e-residents to Estonia around the world. The current Master's thesis will go through four new issuance points: Singapore, South Africa, Brazil, and Thailand. The present study aims to investigate the impact of these issuance points on the number of e-residents and the subsequent establishment of companies from the respective countries. The study utilizes the CausalImpact package developed by Google to achieve this objective, a statistical framework used to analyze causal effects in time series data.

This thesis is written in English and is 58 pages long, including 8 chapters, 4 figures, and 1 table.

Key words: e-Estonia, E-Residency, e-resident, e-services, e-Government, pickup location, ICT, ID, X-road, PBGB.

Annotatsioon

Selle magistritöö eesmärk on tutvustada e-Residency programmi ning seda, kuidas uute väljastuspunktide avamine võib oluliselt kaasa aidata uute e-residentide ja ettevõtete loomisele. Alates 2023. aasta märtsist on e-Residency programmi raames digitaliseeritud rohkem kui 100 053 e-residenti üle maailma ning 25 017 Eesti ettevõtet on loodud e-residentide poolt kaugjuhtimise käigus, tuues uusi ärisid ja investeerimisvõimalusi riiki.
Uurimistöö tähtsus seisneb e-Residency programmi edufaktorite mõistmises ja selle rakendamises rahvusvaheliste ettevõtete ning uute e-residentide meelitamiseks Eestisse.

Käesolev magistritöö vaatleb nelja uut väljastuspunkti: Singapur, Lõuna-Aafrika, Brasiilia ja Tai. Uuringu eesmärk on välja selgitada nende väljastuspunktide mõju e-residentide arvule ja vastavate riikide ettevõtete asutamisele. Selleks kasutab uuring Google'i arendatud CausalImpact paketti. See on statistiline raamistik, mida kasutatakse aegridade andmete põhjuslike mõjude analüüsimiseks.

Magistritöö on kirjutatud inglise keeles ning sisaldab 58 lehekülge koos 8 lisade ja 1 joonistega 4 lehekülgedel.

Võtmesõnad: e-Eesti, e-Residency, e-resident, e-teenused, e-Valitsus, väljastuspunkt, ICT, ID, X-road, PBGB.

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Abbrevations and concepts

e-governance	e-governance is the application of information and communication technology for delivering government services, the exchange of information communication transactions, integration of various standalone systems and services between government-to-customer, government-to-business, government-to-government as well as backoffice processes and interactions within the entire government framework.
e-Government	Refers to the simplification and the transaction of business processes by the use of information and communication technology in the context of governance and public administration.
e-Estonia	Name for Estonia which has developed with many years and refers to Estonian success and reputation as a strong e-state, with high level eGovernment solutions.
Pickup location	This is place where e-Residency cards are collected by **e-Residency applicants.**
e-Residency	e-Residency is a status by which non-residents can gain a secure digital identity issued by Estonia, similar to those that are provided to permanent residents and citizens of Estonia by their ID card. This enables them to use services provided by Estonian state agencies and private sector connected usually to the ID card.
e-resident	E-resident is a physical person who has received the e-resident's digital identity (smart ID-card) from the Republic of Estonia.
ICT	Information and Communication Technology
ID	Identity Document
X-road	A secure data exchange layer between different organizations information systems in Estonia.
PGBG	Police and Border Guard Board

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1 Introduction

In modern times the rise of technology has revolutionized how humans interact with the world around them. Estonia successfully leveraged this transformation and developed an efficient e-governance and public e-services infrastructure, which is currently working in Estonia for citizens and making their lives easier and more convenient (Kotka, 2014).

Estonia became the first country in the world, which come up with the idea of e-Residency, where anyone can establish and manage a trusted location-independent company online from anywhere in the world. Estonia launched the e-Residency program, the first of its kind, back in 2014, and it has since grown to be the program to beat, with more than 100 000 e-Residents worldwide. Over the past seven years, becoming an e-resident and collecting digital ID card has become increasingly convenient, with more than 50 pick-up locations now available worldwide.

The study examines whether establishing new pick-up locations helps Estonia attract foreign entrepreneurs and investments and acquire new e-Residents. Enterprise Estonia (EAS) data will be collected and analyzed in RStudio to understand the impact of new pick-up points in Singapore, South Africa, Brazil, and Thailand.

To better understand the role pick-up locations play in the growth of the e-Residency program, we will explore the following research questions: "How do E-Residency pick-up locations affect e-citizenship in these countries and neighboring regions?"

The sub-questions include: "Is the opening of new pick-up locations critical enough to impact the program's growth?" and "Is it necessary to open new pick-up locations to maximize the program's growth?"

This thesis has eight chapters: the first summarizes e-Estonia's historical background. An overview of the e-Residency project is presented in chapter two. A theoretical approach will be incorporated in chapter three to explore the importance of pick-up locations. Chapter Four explains a synthetic control methodology, while Chapter Five presents a

working technical solution. Chapter Six analyzes the results of opening the pick-up locations with a discussion on providing future recommendations. The author will evaluate the results in Chapter Seven and answer all the research questions by bringing some further recommendations. Chapter Eight is the conclusion of gathering and analyzing information.

The study offers valuable insights into developing the E-Residency program. These findings will help policymakers and entrepreneurs take advantage of Estonia's digital infrastructure.

2 Historic backround

The Estonian government has integrated national branding and national reputation management into its ICT policy from the beginning of its independence after the soviet union collapsed. The Estonian government has made continuous efforts to build Estonia's reputation as an advanced digital society connecting government information systems and provide public and private e-services, and "e-Estonia" has been a central theme in the country's national branding campaigns (Alari. 2023). The Estonian government launched several ICT initiatives, such as the Tiger Leap program in the 1990s, X-Road in 2001, the national mapping system ID in 2002, and online voting in 2005 where Estonia become a pioneer for the first time in history (CPI 2019). These efforts created an advantageous environment for the implementation of the e-Residency project, which aimed to attract foreign entrepreneurs and investors by giving them access to the country's electronic environment and services, which were built in those years, including the ability to register their businesses in Estonia and manage them remotely online (Kotka, T. 2014). The e-Residency project aimed to increase Estonia's attractiveness both as a business environment and as a friendly place to live or temporarily reside, and to strengthen Estonia's image as an e-state.

Another important aspect of the e-Residency project is its potential to generate revenue for the Estonian government. E-Residents pay a fee to obtain a digital ID card and to use services such as registering a business in Estonia. In addition, e-Residents can also use other Estonian services, such as banking and accounting services, which generate revenue for the service providers. Thus, the e-Residency project was seen not only as a way to attract foreign entrepreneurs and investors but also as a means to generate revenue for the Estonian economy in Taxes (E-Residency 2.0 White Paper. 2023).

Overall, the e-Residency project represents a unique case where national branding and reputation management were integrated into a national policy tool. The project was designed as a solution to multiple government agendas, including digitization, economic growth, national reputation management, and migration (Tammpuu & Masso, 2018). E-

Residency program created a branding mechanism for the country and reinforced a sense of e-patriotism.

As a result of these factors, Estonia not only attracts international business, but also provides its citizens with the opportunity to take advantage of its effective digital services every day. Nowadays, Estonia is one of the most technologically advanced countries on earth and is often called “e-Estonia ” (Draheim et al., 2016)

2.1 Estonian business environment

Estonia is one of the few countries where you can open a business without needing a visa, local agents, or technical assistance. Estonia has successfully attracted foreign investment and fostered innovation in the digital industry. As a result of Estonia's highly developed cybersecurity solutions and 5G infrastructure, it has created a safe and secure environment for start-ups and foreign investments (MKM., 2019).

To date, Estonia has 10 unicorn companies: Skype in 2005, Playtech in 2007, Wise in 2015, Bolt in 2018, Pipedrive in 2020, Zego, ID.me and Gelato in 2021, Veriff and Glia in 2022. To put it another way, there are 7.7 unicorns per million per capita. There are several factors that contribute to Estonia having so many unicorn companies. These factors include the small size, low population of the country, and low launch barrier. Creating and maintaining a legal entity is relatively simple with less bureaucracy involved. Moreover, the small local market and high internet usage allow Estonian start-ups to develop simplified and agile solutions to problem domains where traditional approaches are rather complex, with a value proposition that appeals to micro and small businesses. (Kütt, 2023)

Besides its digital ecosystem, Estonia's tax system provides a favorable environment for foreign and domestic entrepreneurs. The taxation system in Estonia is simple. There is a 20% corporate income tax rate in Estonia and a 20% individual income tax rate. Even so, profits are tax-free if the company reinvests, encouraging companies to reinvest in their business, which in turn promotes economic growth. In the 2022 International Tax

Competitiveness Index Rankings, Estonia ranked first worldwide (ITCI) (Bunn & Hogreve, 2022).

Furthermore, Estonia's tax system is complemented by its efficient and transparent regulatory environment. The government has implemented a streamlined regulatory framework to simplify starting and running a business in Estonia. This framework includes the electronic filing of tax returns and other documents with online access to government services such as the e-Business Register and the Estonian Tax and Customs Board. In terms of e-country and the benefits it offers, Estonia is the country that has successfully introduced it (Taxes in Estonia 2022).

The combination of a digital society, highly developed cybersecurity solutions, 5G infrastructure, and a transparent and fair tax system has made Estonia an outstanding location for start-ups and foreign investment.

3 E-Residency

The Estonian e-Residency Program was launched in 2014 to attract international business and investment to the country, supported by the public sector. The program allows individuals to start and operate an Estonia-based business online without having to be physically present in the country. An individual with e-Residency can open a business account, sign and notarize documents, and access a range of online services offered by Estonian government agencies (Tammpuu & Masso, 2019). Most people who apply for this program are entrepreneurs, freelancers and digital nomads looking for flexibility and a friendly tax regime that Estonia offers them. By 2023, more than 100,000 people are e-Residents worldwide. The program has also helped to raise Estonia's profile as a leader in digital innovation and attract more investment in the Estonian economy (Sapiton, 2023).

The program has also significantly boosted the Estonian economy. The e-Residency program has brought to Estonia more than 150 million euros in taxes and state fees for Estonia, and this revenue stream is growing year by year. The success of Estonia's e-Residency program has gained worldwide recognition and made Estonia a pioneer in e-Governance. More than 99% of Estonian public services can be accessed online, reducing bureaucracy for founders (Kütt, 2022). It has helped promote Estonia's image as a technologically advanced and digitally connected country, creating a sense of national pride and identity (Jaffe, 2016).

With Estonian success, many countries have introduced their e-Residency programs to the global market and recognized the importance of digital identity. Overall, the Estonian e-Residency program has fundamentally changed the world of digital innovation. As the world becomes more digitized, programs like this are becoming more popular and Estonia has entered first (Sikkut, 2015).

The Estonian government has taken several steps to ensure the security and integrity of the program, including regular audits and background checks on applicants. One of them is the physical encounter to obtain a ID e-Residency card. As the world continues to move towards digitalization, programs like this are becoming more and more interesting for

people who want to work remotely, make their businesses more reliable and optimize their companies' tax systems and get into the European market (Andero, 2021).

3.1 e-Residency Programs Around the World

The Estonian e-Residency program is the most established and successful, with the highest number of e-Residents and a well-developed online business services infrastructure (Sallam et al., 2022). Entrepreneurs worldwide have found it attractive because it provides access to the European Union market and strong government support with minimum bureaucracy. The e-Residency program introduced by Estonia has inspired many other countries to implement their own programs. Despite the limited academic literature, the author is dedicated to research in this field.

The Estonian government welcomes the idea that other countries could develop e-Residency programs. The e-Residency program is one proven method of serving people outside a country's borders. By developing their own programs, more countries can collaborate and share best practices. For now many countries offering e-Residency programs: Estonia, Azerbaijan, Liberland, Portugal, Lithuania, Ukraine, South Africa, Georgia, and Brazil. Moreover, there may be opportunities for interoperability between different programs, allowing users to access services from multiple programs with a single digital ID. This is a real possibility to be a game-changer for e-Residency programs, and Estonia is well-positioned to lead the way (Xolo, 2023). As the e-Residency program continues to grow, Estonia may explore opportunities for collaboration with other programs to enhance its services further.

The Azerbaijani government launched its m-Residency program in 2018, making Azerbaijan one of the first countries in the industry. The program was developed with the assistance of Estonia's e-Residency program(Adhele, 2020). Azerbaijan's Digital Trade Hub runs the program and allows entrepreneurs to set up and run their companies remotely. Both residencies offer digital ID cards, which enable e-Residents to access government services and sign digital documents.

At the beginning of 2021, Lithuania launched an e-Residency program (Lithuania launches own national e-Residency scheme, 2021). In comparison, the Lithuanian e-Residency program is still in its early stages of development, with some limitations, such as the need for physical touchpoints during the application process and lower indexes on paying taxes and digital government services. However, it has some strengths, including lower state fees and a more advanced business environment than some of the other programs.

E-Residency in Ukraine was established in October 2022, allowing foreign entrepreneurs to apply for residency permits electronically. In addition to registration and termination of business operations in Ukraine, the program grants the right to work in the country, but not the right to live there or visit. The Ukrainian e-Residency program provides access to the Ukrainian market for small IT specialists and freelancers. The Ukrainian economy is suffering a devastating impact due to the conflict with Russia (Ukraine will create e-Residency 2023). The number of foreign investments in Ukraine has decreased significantly, as few foreigners are ready to come and open a business under Russian bombs. The Ukrainian e-Residency program can potentially be an effective economic recovery tool after the war.

The Palau Digital Residency program is relatively new and still developing its infrastructure. However, it can potentially attract entrepreneurs looking to establish businesses in the Pacific region (Erika, 2023).

3.2 Future of e-Residency

A country's ability to provide quality e-services and a conducive business environment will likely determine whether it becomes a successful provider of e-Residence in the future or not. Following Estonia's example, similar programs have been implemented in a number of other countries. Estonian program aimed to provide a world-class business environment and e-services to 10 million e-Residents by 2025. In terms of its first strategic goals, the e-Residency program was ambitious. Soon it was clear that the initial plan needed revision. There was a new vision document e-Residency 2.0 white paper produced in 2018 which focused on the quality aspects of the program, which was followed by a government of Estonia approved action plan (Korjus, 2018). The mission of e-Residency is to enable "business without borders" by providing the community with the financial tools they require in order to run a successful business worldwide. As a member of the e-Residency program, you have access to a marketplace of corporate service providers from which you may choose the best service provider for your business needs. It is expected that this market will grow rapidly in the near future.

It is possible to attribute Estonia's success to a combination of dedicated work since 2014 and uncontrollable factors. COVID-19 had a positive impact on this field because people needed the option of registering their companies at home (Sallam et al., 2022). Two thousand two hundred fourteen companies have been founded by e-Residence in Estonia in the first half of 2021, an increase of 26% from the first half of 2020.

Public relations is one of the reasons e-Residency is growing. As part of the e-Residency program, meetups and webinars are being held and participants are participating in events around the world related to the program. E-Residency offers a two-part monthly introductory webinar for anyone interested in learning more about this opportunity or becoming more professional through its use. Business owners and investors are able to meet with program representatives in different markets in English, Russian, and Estonian, which makes an e-Residency more practical and accessible. Those consulting potential e-Residents are representatives with a high level of knowledge in this industry. The same representatives can see at events like sTARTUp Day, the most significant business

festival in the Baltics, or Freedom Business Summit in Portugal, which takes place in September in Lisbon 2023 (*Freedom business summit 2023)*.

Estonia strives to open up its advanced e-services and trusted business environment to additional digital access through a well-developed e-Governance system. By doing so, it contributes to Estonia's economic growth and innovation potential. There are many countries in which developing a business is more difficult or even impossible due to bureaucracy or other financial factors (Frick, 2020).

Following a discussion with the active e-Residency business developer, the author discovered that one issue might be the speed of obtaining an e-Residency, since 3-8 weeks is still quite a long time. There were, however, numerous improvements and fixes made to many services. One day, every entrepreneur from any country may be aware of the possibility of opening a business in Estonia. This is just by throwing an app on their phone with a couple of clicks, which will speed up economic growth.

Not many people heard that Bill Gates is one of the few to have received an e-Residency. Furthermore, he shares the stage with world leaders such as German Chancellor Angela Merkel, Japanese Prime Minister Shinzo Abe, and Pope Francis, the head of the Roman Catholic Church who also got e-Residency. The reason was to help them learn more about our digital nation (Chronicle, 2018). The most significant part is how the Estonian government works and uses every opportunity to promote innovation in technologies and ways of thinking. There were a few individuals who received it as a gift from the Republic of Estonia. The author states that in the future, those ways of marketing will be much more widely used. We will see influencers promoting opening companies with a new Estonian e-Residency. Additionally, we may hear advertisements for e-Residency on airplanes flying to Estonia within the next 10 years.

4 Theoretical approach

The e-Residency program allows individuals to set up a company and digitally sign it as soon as their new card is activated. The card can usually be collected at Estonian embassies, but if there is no embassy in the applicant's country, they can choose from a partner pick-up location. Once the card is activated, the e-Resident can access various services, including setting up and managing a company, signing contracts and legal documents, and accessing Estonian e-services. E-Residents can also use their digital ID to encrypt and sign emails and access secure online banking services. If the ID card is not collected within six months from the pick-up point, it will be returned to Estonia and canceled. Neither physical residency nor citizenship is the same as electronic residency. (Republic of Estonia, 2023).

Despite Estonia's success and innovation in e-Residency, there are risks associated with it. For the e-Residency program to succeed, it must overcome several obstacles. These include high costs and lengthy processes for obtaining an e-Residency identity, language barriers to different services, and the possibility of unethical businesses occurring in the system. Additionally, technical threats, such as cyber-attacks, browser incompatibility, or fake digital identities, are risky. There is also a potential risk of legal disputes that Estonian courts may be unprepared for. If the relations between e-Residency and Estonian banks are affected, it could significantly impact the program. Estonian banks are essential for the program's users as they provide financial services such as opening bank accounts, managing payments, and paying taxes. If banks refuse to collaborate with e-Residency, users could have difficulties managing their businesses remotely (Kotka & Korjus).

The National Audit Office identified several areas of concern that threaten the program's reputation and effectiveness (Riigikontroll, 2020). The PBGB has issued digital IDs to foreigners with valid criminal offenses and business bans in other countries without revoking their documents or verifying their activities in Estonia.

Additionally, banks in Estonia have difficulty opening accounts for e-Residents since there is no certainty that their companies will operate in Estonia. This limits banking services, which are essential for business. While the e-Residency program provides

entrepreneurs access to public and private services, the inability to open a bank account may deter potential applicants. However, some e-Residents companies may be eligible for a business account with an Estonian bank if they have a connection to the Estonian market. To apply for an Estonian bank account, e-Residents must travel to Estonia to complete the account opening process. LHV, an Estonian bank, offers the opportunity for e-Residents to apply online and receive pre-approval before traveling to Estonia to complete the account opening process.

Fortunately, e-Resident entrepreneurs have a wide range of payment institutions and fintech companies, depending on their physical location, business needs, and prior experience using payment institution services. These payment institutions can offer accounts with many of the same features as traditional banking, including an International Bank Account Number (IBAN). E-Residents could also use a traditional bank from other countries in the EU for business banking needs. (Business banking options for e-residents 2022).

4.1 Profitability of e-Residency program

Comparing the five-year costs and direct revenues of the e-Residency program revealed that investments were 15.7 million euros and the state received 25.2 million euros in direct revenues. This means that the program's direct revenues exceed the costs by 9.5 million euros. Along with the increase in revenues, the program's costs also increase. For example, together with the costs planned for 2020, the program's total costs will increase to 22.4 million euros. Despite this, 95% of revenue in those five years came from just 6% of companies. Apart from being innovative, this project has paid its way on a direct cost-revenue basis. At the end of 2019, e-Residents created more than 1,300 jobs in Estonia, whose average salary was in line with the average Estonian salary. The National Audit Office's report for 2020 noted that the program's revenues exceeded its expenses at the end of its first five years (Riigikontroll, 2020, July 19).

Based on the results of the Report, which the National Audit Office presented to the Parliament on 23 July 2020. It showed us the results based on the data analyzed from 2014 to 2019. By 2023, the number of companies registered in Estonia by e-Residents

got from 11584 on 1 January 2020 to 25953 companies on 1 April 2023. Estonia's e-Residency program has demonstrated its success by registering an impressive number of companies by April 2023.

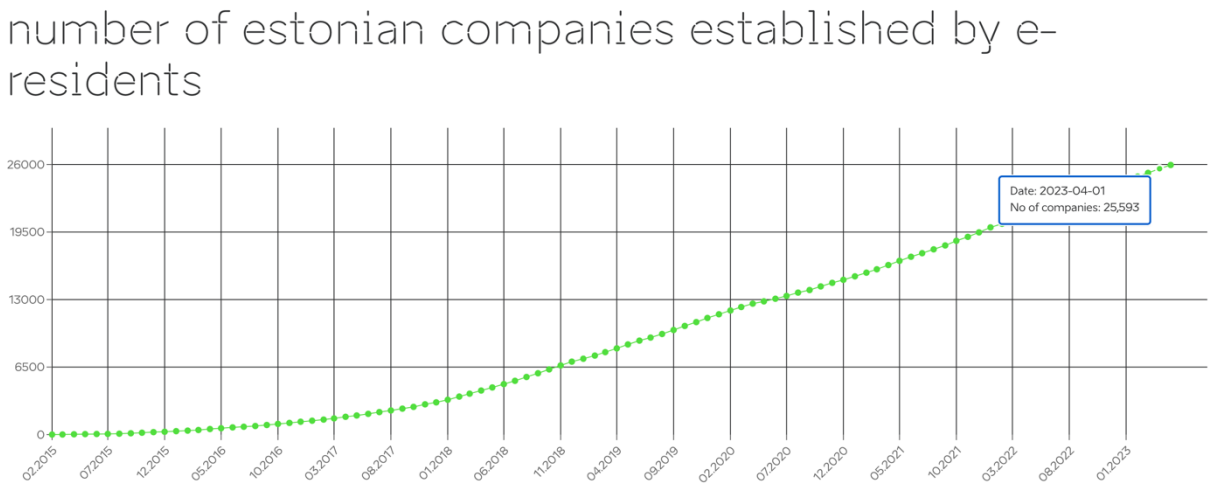

Figure 1 Number of e-residents over time (e-Residency Dashboard, 2023)

Recently, the program has continued to generate significant economic benefits for Estonia. In the first half of 2022, the program brought in a combined €24 million in tax revenue from e-Residents, exceeding the first five years in direct revenues by one year. Altogether 3,262 Estonian residents were employed by companies run by e-Residents, which is 1,194 more than a year ago (ERR, 2022)The e-Residency program has also helped improve the Estonian business market's competitiveness, with nearly one-third of startups in Estonia being established by e-Residents (Tambur, 2020).

4.2 Process for obtaining the e-Resident's Digital ID Card

The author ensured a deep understanding of the process of obtaining the e-Residents digital ID card to have a more comprehensive overview and understanding of the process from the applicant's side. The section also highlights the importance of fingerprinting and explains why applicants must visit an Estonian embassy or partner collection point in person to collect the card. This information is relevant to the thesis as it can help identify potential challenges and opportunities for e-Residency program implementation.

Applying for an e-Residency begins with submitting an online application via the official website (e-resident.gov.ee). State fees for e-Residency are 120 euros, payable during the application process, and non-refundable. The application includes the applicant's name, physical address, profile picture, contact information, and a copy of the passport or ID card. Applicants should also submit a motivation statement - a paragraph outlining their reasons for applying, which the Police and Border Guard Board uses to evaluate their application. The e-Residency team encourages the applicant to mention anything notable about the relationship with Estonia, business history, and future business plans (Xolo, 2023). When an application is submitted, the Estonian Police and Border Guard Board verifies the applicant's identity in 30 days. After the background check, a notice will be sent to the applicant, and the e-Resident's digital ID card will be ready to reach a pick-up location, which was chosen in the process of submission. After that, the applicant must visit e-Residency pickup point: Police and Border Guard Board offices in Estonia, e-Residency Collection Points delegated to BLS International, Estonian Embassies or Mobile pickup point to collect the ID card. Mobile pickup point is the Estonian Ministry of Foreign Affairs, who issues e-Residency cards periodically once every two months on certain dates and in specified locations. The card cannot be sent by mail or collected from an honorary consul outside Estonia because honorary consuls lack fingerprinting technology. In contrast, fingerprinting is compulsory for e-resident to obtain an e-Residency ID card (Engineering Today, 2021). This is why e-Residency has more than 50 pick-up locations around the world. Card activation takes about 15 minutes at one of those pick-up locations. Two requirements for the application are signing a declaration of intent and fingerprinting. A candidate receives a physical e-Residency kit at the end of the process, which includes a digital ID card, a card reader, and two PIN codes. (Webmedia.2023).

Figure 2 Timeline for e-residents (Engineering Today, 2021)

Figure 3 e-Residency Kit (Havam, 2022)

4.3 Partner pick-up locations

To better understand the decision behind opening pick-up points in these specific locations, the author interviewed the e-Residency program policy maker. (APPENDIX 1)

The lack of pick-up points in South Africa, Thailand, Brazil, Singapore, and nearby areas was a significant factor in opening new locations and partnering with BLS International.

The e-Residency program partnered with BLS International, a trusted firm with technology-enabled specialty services for government and diplomatic missions worldwide, with over 16 years of global experience. The main goal of this partnership, which started in 2020 through the public procurement register (Brown, 2021), is to help to issue E-Residency cards in 5 locations. Today BLS International manages the e-Resident's Digital ID Card service in Japan, South Africa, Brazil, Thailand, and Singapore. It is important to make an e-Residency program that provides accessible and efficient services to potential e-Residents worldwide.

The partnership with BLS International and the opening of new issue points could help to address some of the challenges faced in the past, such as the long distance to the nearest pick-up point. By expanding the program's reach and improving the application process, the partnership with BLS International was a significant step towards achieving the goals of the e-Residency program. However, the PBGB helps to issue residents' digital ID cards, but the BLS has no role in the application process. The BLS can help with the application process by providing technical capacity for fingerprinting or other biometric data collection, which PBGB requires.

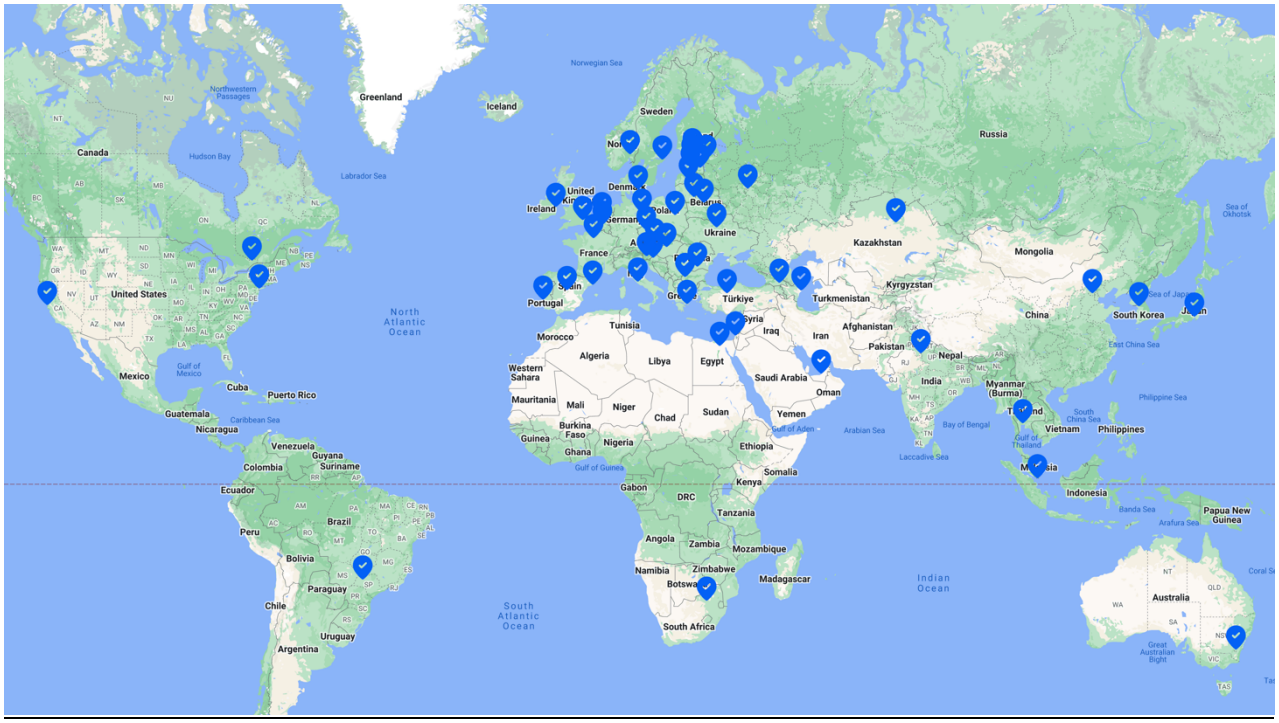

Figure 4 Pickup Locations (e-Residency, 2023)

4.4 Honorary consul

In Estonia, issuing the e-Resident's Digital ID Card is the responsibility of the Police and Border Guard Board (PBGB). The PBGB has established a network of service points where applicants can complete the necessary steps for obtaining a card. This includes providing biometric data such as fingerprints. These service points are typically located at Estonian embassies or other designated locations (Xolo, 2023). This process might be performed by an approved person with specific training. One of the options is honorary consuls.

Honorary consuls are individuals appointed to represent a nation in a foreign city or region. Their appointment is established by the country they represent and recognized by the country to which they are assigned. Honorary consuls perform diplomatic duties part-time in addition to their regular professions. There are several responsibilities and functions associated with honorary consuls. Their mission is to strengthen Estonia's international profile and provide consular services and assistance to Estonian citizens

abroad (ERR, 2022). Occasionally, they are permitted to issue passports and identification cards to Estonian citizens (Ministry of Foreign Affairs, n.a.).

The author found out that none of the honorary consuls from Estonia have the technical capacity for fingerprinting or other biometric data collection. Therefore, they do not have the authority to issue the e-Resident's Digital ID Card. From a non-formal interview with one of the employees in E-Residency, the author found that PBGB has established specific procedures for issuing the card, and these procedures must be followed to ensure the security and integrity of the process (APPENDIX 1). A consul or E-Residency representative, however, who has been specifically trained in these procedures and biometric data collection devices, may be permitted to issue an electronic ID card to an e-Resident, according to the regulations of the government. (Webmedia. 2023).

4.5 Evaluating Alternatives for ID Card Issuance

It is essential that the e-Residency program evaluate alternative solutions for the issuance of ID cards to e-Residents.

BLS can choose not to continue its partnership as a private company. As part of the five-year contract, BLS will charge an average service fee of € 18 per application and provide value-added services like assistance with application e-Residency digital IDs, for which it would charge an average service fee of € 38 per application (BLS International 2020). A business gets paid based on the number of newly enrolled e-Residents. There is a possibility that BLS does not wish to renew its contract with e-Residency and may even cancel it before the end of the active contract. This contract was signed in 2020 for 5 years. This decision may be due to a lack of people visiting their locations to pick up e-Residency ID cards.

Moreover, the contract with BLS is a kind of first collaboration for the program. BLS may not meet expectations, which might impact the view of the program. Talking with one of the stakeholders (APPENDIX 1), the author found that one potential solution could be to train business developers to handle the ID card issuance process. This would provide additional control over the process, necessary training, and expansion potential. However,

the program must consider the potential challenges associated with this approach carefully. To address these concerns, the program could explore a combination of strategies, such as:

- Appointing individuals to manage pick-up locations in areas where e-Residency demand is high.
- Close those points where BLS's presence is not financially viable.
- Developing partnerships with other organizations that provide similar services to BLS, with competitive pricing.

As a result of following those combinations, the program can maintain its quality and consistency while adapting and expanding to meet e-Residents evolving needs.

5 Synthetic Control Methodology

The main research question asked in this thesis is: How does establishing new e-Residency pick-up locations affect the number of e-citizens from these countries and neighbouring regions?

Sub-questions asked are the following:
1. Is opening new pick-up locations critical enough to impact the program's growth?
2. Should the E-Residency program open new pick-up locations to maximize the program's growth?

The methodology of this paper consists of the synthetic control method. This method was introduced by Abadie and Gardeazabal (2003) and has been widely used in industry due to its interpretability and simplicity. The author gained most of the knowledge on this method from a lecture by Alberto Abadie (Abadie, A. 2021). Synthetic control method is a widely used to estimate the impact of an event intervention on an outcome variable of interest. In this case, our research question is: how opening new e-Residency pick-up locations affects sign up percentage of the number of e-citizens from specific countries and neighboring regions of this specific location. The synthetic control method could provide a counterfactual estimate of what would have happened to the outcome variable if the policy intervention (opening new pick-up locations) had not occurred.

Based on pre-treatment data, the synthetic control method generates a synthetic control unit via combining control units (i.e., nations that did not get the policy intervention). The synthetic control unit aims to approach the treated unit (i.e., the nation that received the policy intervention) on important pre-treatment attributes. The discrepancy between the actual outcome variable in the treated unit and the expected outcome variable in the synthetic control unit following the policy intervention determines the causal effect of the policy intervention. Using our study's synthetic control method, we can estimate the causal effect of opening new e-Residency pick-up locations on the number of e-citizens from specific countries and neighboring regions. This will help us answer our research questions and provide insights for policymakers on whether opening new pick-up locations can maximize the e-Residency program's growth.

The mixed-methods approach allows for a more comprehensive understanding of the research questions. Data collection consists of workshops, discussions with subject matter experts, and analysis of growth data from the E-Residency program. Seminars and meetings are conducted in person in nonformal communication with policymakers to gain insight into the program's operation (APPENDIX 1), identify key factors influencing its growth, and explore the potential impact of new pick-up locations. The data on program growth is collected from policymakers and includes the number of e-Residents from different countries, dates when ID card of e-Residency was issued, and the overall growth rate of the program.

5.1 CausalImpact method

The Statistical Analysis course was offered by the E-Governance Technologies and Services MSc program at TalTech. The author attended this class at TalTech Mob-ÕIS (2023, January). This course covered various statistical techniques to analyze complex data, including the CasualImpact method of multivariate statistics. As a result of the course, the author has gained a deeper understanding of the underlying principles of synthetic control.

Through this course, the author met Indrek Seppo, who is a resident analyst at e-Residency as well as a teacher of statistical analysis courses. Using the data obtained from the e-Residency program, the author selected the tool that would be most appropriate for analysis with the assistance of Indrek. It has been decided that the author will analyze the data using the CausalImpact method in order to assess the causal effect of the new pickup points on the e-Residency program's growth, specifically the number of new e-Residents from the country and neighboring countries where the new pickup location has been established.

5.2 Rlanguage and Rstudio

The master thesis paper uses the CausalImpact package Brodersen et al. (2015) developed for the Analysis in Rstudio using R language. The CausalImpact package is an open-

source software tool that implements the Bayesian structural time series model to estimate causal effects in time series data.

Using R and Rstudio in this master thesis paper provides several benefits. Firstly, the R language is a powerful statistical analysis tool capable of performing various statistical tests, model estimations, and data visualization (R Core Team, 2021). Secondly, the Rstudio IDE is an intuitive and user-friendly environment that simplifies the process of data analysis and code writing. Lastly, the CausalImpact package is specifically designed for causal inference in time series data, making it a suitable tool for analyzing new pickup locations' impact on the E-Residency program's growth. Overall, using R and Rstudio with the CausalImpact package provides a robust and effective methodology for analyzing the causal effect of new pickup locations on program growth in this master thesis paper.

5.3 Bayesian structural time series model

The purpose of this thesis is to determine the causal influence of pick-up locations on the growth of e-Residents within specific countries using Bayesian modeling and the CausalImpact package. It is a powerful tool for understanding how prior knowledge is revised when new information is introduced (Kruschke, J. K., 2015). This thesis specifically applies Bayesian modeling to assess the impact and likelihood of significant effects arising from the establishment of pick-up locations in Brazil, South Africa, Thailand, and Singapore.

This model is particularly apt for this study as it offers a probability of achieving the same result without the input of the pick-up location. Thus, it provides an estimate of the causal impact of pick-up locations on e-Resident growth.

Unlike a single-point estimate or a confidence interval, the Bayesian approach offers a probability distribution over possible effect.

6 Analysis of data from 4 pickup locations in RStudio

As we discussed in previous chapters, e-Residency programs offer individuals the opportunity to establish and manage businesses remotely. Estonia e-Residency program, for instance, has experienced significant growth over the years. It is unclear how pickup points in different countries influence the uptake of the Estonian e-Residency program.

Our research investigates this topic, particularly focusing on the newly established issuance points launched in Singapore, South Africa, Brazil, and Thailand in March 2021. To answer the research questions asked, data from e-Residency program was gathered and should be analyzed before making any statements. We collected data from the Estonian e-Residency Application System (EAS), with the latest data available until November 2022. The dataset comprises essential information, such as the names of countries in both Estonian and English, and the month for which the data applies. It also comprises the number of citizens and residents of each country who have joined e-Residency, and the date in a format that is standardized for all countries.

In this study, the data analysis was carried out in RStudio using Google's CausalImpact package. This was done to estimate the growth in the number of e-Residents from these countries after opening new pick-up locations. Specifically, we seek to understand the impact of establishing new issuance points on e-Residency uptake, focusing on the number of e-Residents registered at these locations.

These findings may serve as a useful guide for future development of the program and targeted promotional campaigns. In addition, it lays the groundwork for future studies examining the potential contribution of e-Residency programs to digital innovation and entrepreneurship.

6.1 Analysis of impact on Brazil

In this study, the author analyzed the impact of opening a pickup location on e-Residency uptake in Brazil. The analysis was performed with the CausalImpact package in R. The data was first loaded with the read_excel() function and then filtered to select the relevant columns for analysis. To restructure the data, pivot_wider() was used, followed by

excluding columns for countries without interventions. Brazil data was moved to the first column using the relocate() function, and missing values were replaced with 0 by the replace() function.

To conduct the causal impact analysis, pre- and post-intervention periods were defined with the CausalImpact() function. The results were summarized using the summary() function, and a report was generated to communicate the estimated effect size and statistical significance. A plot was also generated using the plot() function and customized with the theme_minimal() and labs() functions to add a title.

Each step in the analysis process was critical in guaranteeing that the data was correctly prepared and analyzed using the appropriate statistical methods. Loading the data ensured that it was available for analysis while filtering it helped select the relevant columns. By pivoting the data, it was easier to analyze the data for each country, and further filtering eliminated irrelevant data. Moving the Brazil data to the first column confirmed that the CausalImpact() function processed the data correctly. Replacing missing data with 0 ensured the function could handle the data. Each step of the analysis process needed to be completed accurately to estimate the causal impact of the intervention on the uptake of E-Residency in Brazil.

In Appendix 2, a detailed description of the associated code is provided.

During the post-intervention period, the number of e-Residents signing up from Brazil had an average value of approximately 13.81. Without the Brazil pick-up location, the expected average sign-ups would have been 4.44. This counterfactual prediction's 95% confidence interval is [-1.24, 9.68]. By subtracting this prediction from the observed response, the author estimates the Brazil pick-up location's causal effect on e-resident sign-ups: an increase of 9.37 with a 95% confidence interval of [4.12, 15.05].

Cumulatively, 290 e-Residents signed up after the intervention. Without the Brazil pick-up location, the expected number of sign-ups would have been 93.29, with a 95% confidence interval of [-25.98, 203.38].

Expressing these results in relative terms, the number of e-Residents signing up from Brazil increased by approximately 197% due to establishing the pick-up location. This relative increase's 95% confidence interval is [-161%, 390%].

Based on Bayesian one-sided tail-area probability (p) is 0.018, the Brazil pick-up location is statistically significant in affecting e-Residency sign-ups. The probability of this being a coincidence is very small (Nss, 2023). Therefore, the results suggest that the Brazil pick-up location positively and significantly impacted the number of e-Residents signing up from Brazil and neighboring regions.

6.2 Analysis of impact on Thailand

The author is doing the same process but analyzing the impact of opening up a pickup location in Thailand. The process analyzes data from an Excel file about the impact of opening a pickup location in Thailand. The data is filtered and organized into a new table. Then the data is further processed, replacing missing values and selecting a specific country. The data was analyzed using a causal impact model, and the results were summarized and visualized.

In Appendix 3, a detailed description of the associated code is provided.

During the post-intervention period, the number of e-Residents signing up from Thailand had an average value of approximately 8.81. Without the Thailand pick-up location, the expected average sign-ups would have been 3.45. This counterfactual prediction's 95% confidence interval is [-0.14, 7.39]. According to the author's analysis, an increase of 5.36 will occur in e-resident sign-ups when the Thailand pick-up location is added to the observation: [1.41, 8.95] within the 95% confidence interval.

Using cumulative values, the total number of e-Residents signing up during the post-intervention period was 185. The expected total sign-ups would have been 72.53 without the Thailand pick-up location.

Since the pick-up location was established, the number of e-Residents signing up from Thailand increased by approximately 156%. Its 95% confidence interval is [-139%, 437%].

The Bayesian one-sided tail-area probability (p) is 0.021, which indicates that the causal effect of the Thailand pick-up location on e-Residency sign-ups is statistically significant. The probability of this happening by accident is very small (Nss, 2023). Therefore, the results suggest that the Thailand pick-up location positively and significantly impacted the number of e-Residents signing up from Thailand and neighboring regions.

6.3 Analysis of impact on Singapore

There is a third pickup point in Singapore, which is probably the biggest competitor to the Estonian e-Residency program.

The process analyzes data from an Excel file about the impact of opening a pickup location in Singapore. Then the data is further processed, replacing missing values and selecting a specific country. In a report, the data is analyzed and summarized using a causal impact model.

In Appendix 4, a detailed description of the associated code is provided.

During the post-intervention period, the number of e-Residents signing up from Singapore had an average value of approximately 5.38. Without the Singapore pick-up location, the expected average sign-ups would have been 3.52. This counterfactual prediction's 95% confidence interval is [-3.09, 11.74]. By subtracting this prediction from the observed response, we estimate the causal effect of the Singapore pick-up location on the number of e-resident sign-ups: an increase of 1.86 with a 95% confidence interval of [-6.36, 8.47].

Based on cumulative values, the total number of e-Residents signing up during the post-intervention period was 113. If the Singapore pick-up location had not been established, the expected total number of sign-ups would have been 73.95, with a 95% confidence

interval of [-64.85, 246.58]. By establishing the pick-up location, the number of e-Residents signing up from Singapore increased by approximately 81%.

The Bayesian one-sided tail-area probability (p) is 0.065, which indicates that the causal effect of the Singapore pick-up location on e-Residency sign-ups is not statistically significant. It seems that the Singapore pick-up location did not significantly impact the number of e-Residents signing up from Singapore and neighboring regions (Nss, 2023).

In summary, the intervention in Singapore resulted in a small effect size and was not statistically significant, as indicated by the analysis performed. This observation requires further analysis, which will be discussed in a conclusion chapter.

6.4 Analysis of impact on South Africa

The last pickup point for this research was South Africa.

The data was obtained from an Excel file and analyzed with the CausalImpact package in R. The data was filtered and organized in a table to extract the relevant columns for analysis. The missing values were replaced, and the data were further processed to include only South African residents. The causal impact was estimated using the CausalImpact() function pre and post-intervention. A summary() and plot() function were used to visualize the results.

In Appendix 5, a detailed description of the associated code is provided.

The average number of South African e-Residents signed up after the intervention was approximately 5.19. It is expected that the average sign-ups would have been 2.47 without the South Africa pick-up location, and the expected average sign-ups would have been 2.47. This counterfactual prediction's 95% confidence interval is [-0.40, 4.94]. By subtracting this prediction from the observed response, we estimate the causal effect of the South Africa pick-up location on the number of e-resident sign-ups: an increase of 2.72 with a 95% confidence interval of [0.25, 5.59].

According to cumulative values, the total number of e-Residents signing up during the post-intervention period was 109. If the South Africa pick-up location had not been

established, the expected total number of sign-ups would have been 51.89, with a 95% confidence interval of [-8.48, 103.84].

Expressing these results in relative terms, the number of e-Residents signing up from South Africa increased by approximately 104% due to the new pick-up location. A 95% confidence interval is [-144%, 250%] for this relative increase.

The Bayesian one-sided tail-area probability (p) is 0.024, which indicates that the causal effect of the South Africa pick-up location on e-Residency sign-ups is statistically significant. The probability of this effect by chance is very small (Nss, 2023). Therefore, the results suggest that the South Africa pick-up location has significantly impacted the number of e-Residents signing up from South Africa and neighboring regions.

7 Discussion of Results and Recommendations

The analysis conducted in this study showde impact of establishing e-Residency pick-up locations in Brazil, Thailand, Singapore, and South Africa on the number of recently registered e-Residents from these countries.

In Brazil, establishing a pick-up location led to an increase in the average number of e-resident sign-ups from an expected 4.44 to approximately 13.81, representing a relative increase of about 197%. This effect was statistically significant according to a one-sided tail-area probability of 0.018.

Similar positive effects were observed in Thailand, where average sign-ups increased from an expected 3.45 to approximately 8.81, translating to a relative increase of 156%. The statistical significance of this effect was also confirmed with a one-sided tail-area probability of 0.021.

In Singapore, however, the impact was less pronounced. The average sign-ups increased from an expected 3.52 to approximately 5.38, marking a relative increase of roughly 81%. Using a one-sided tail-area probability of 0.065 to estimate this effect, the Singapore pick-up location did not significantly impact the number of e-Residents from Singapore and nearby areas who signed up.

South Africa showed an average sign-up increase from 2.47 to 5.19, representing a relative increase of 104%. Based on the one-sided tail-area probability of 0.024, it can be concluded that the South Africa pick-up location has a substantial impact on the number of e-Residents signing up from South Africa and neighboring regions.

In conclusion, establishing new pick-up locations had varied effects on e-Residency uptake in different countries. Brazil and Thailand experienced significant positive results, while Singapore was not statistically relevant. Although showing a smaller effect size, South Africa demonstrated a statistically significant impact. These findings suggest that country-specific factors may influence the effect of pick-up locations on e-Residency uptake. There were different results for all pick-up locations, and further exploration is necessary. The author believes that factors such as the local economy, the technology

industry, and the existing e-Residency program might influence the impact of new pick-up locations.

7.1 Key priorities

The author asked business developer from e-Residency program: “What are the key priorities for investors and freelancers when selecting a country for their business registration and tax management?” It appears that factors such as corruption level, digitalization, and taxation significantly influence investors and freelancers’ preferences when selecting a country to establish a business.

Upon receiving the response from the e-Residency program business developer, the author was motivated to investigate the relationship between the factors of corruption, digitalization, and taxation, and the preferences of investors and freelancers when selecting the Estonian e-Residency program in those countries, where pick-up locations were opened.

The author began by collecting data on from different sources, for corruption rankings author went through Corruption Perceptions Index (Transparency.org. 2023). For digital infrastructure was used World Digital Competitiveness (WDC) ranking analyzes which countries adopt and explore digital technologies better (WCC. 2022). For comparing tax system was used The International Tax Competitiveness Index, where Estonia is number one worldwide (ITCI) (Bunn & Hogreve, 2022). This data was then compiled into a comprehensive table, comparing Estonia, South Africa, Thailand, Singapore, and Brazil.(Trading Economics. 2023).

Table 1 Data table comparing Estonia, South Africa, Thailand, Singapore and Brazil

Country	**Corruption Rank (2022)**	**Digital Infrastructure Rank (2022)**	**The International Tax Competitiveness Index (ITCI)**
Estonia	14 (Score: 74)	20	1
South Africa	72 (Score: 43)	58	No info
Thailand	101 (Score: 36)	40	No info
Brazil	94 (Score: 38)	52	No info
Singapore	5 (Score: 83)	4	No info

The comparative table highlights the key metrics of corruption rankings, digital infrastructure and the international tax competitiveness Index.

By examining the correlations between these key factors and the performance of the e-Residency program in the target countries, the author gained valuable insights into the program's potential for growth in each location. For example, Estonia achieves better results in the number of new e-Residents in countries where it outperforms local systems in these metrics. In a country like Singapore, where the local system is a strong competitor to the Estonian program, there haven't been any significant changes in the number of newly e-Residents.

It leads to a higher adoption rate and greater overall success for the program in countries where Estonia's competitive advantages are more evident. These insights can be used by policymakers and e-Residency program developers to refine their strategies and better cater to the needs and priorities of their target audience.

Further research should be conducted to identify the specific factors that influence the success of new pick-up locations. As part of this process, it may be necessary to examine local economies, technology industries, and existing e-Residency programs' role in driving demand for e-Residency.

Based on the results, the author made the following recommendations:

Identify the needs and preferences of potential e-Residents from different countries before opening new pick-up locations.

In countries where establishing new pick-up locations will not significantly impact adoption, a targeted marketing campaign or collaboration with local partners may be more effective in promoting and educating about e-Residency.

Consider the impact of e-Residency adoption and the associated costs of establishing new pick-up locations in different countries.

Monitoring and evaluating new pick-up locations should be implemented to track their performance over time, allowing for ongoing assessment and adjustments as needed.

7.2 Leveraging Local Partnerships

Getting a competitive edge in attracting new clients begins with acting and assisting active partners who are already customers. Establishing local partnerships can significantly contribute to e-Residency success by enhancing trust and credibility among potential e-Residents. For the e-Residency program to succeed, it must collaborate with well-respected public and private sector organizations to establish trust among local entrepreneurs and freelancers. In the country where the e-Residency pick-up point is located, the state should adopt a more systematic approach to the different available communication channels.

According to interviews with e-Residents (Sallam et al., 2022), the program needs more support for companies working overseas regarding networking and marketing solutions. The program's performance will improve if the e-Residency team builds strong relationships with local partners in each country. Local partners may use their networks and channels to promote the e-Residency program or relevant events where e-Residency representatives are expected to participate. In addition, they can answer common questions and concerns of potential e-Residents, which would benefit the network locally and the program in general. It is beneficial to form partnerships with e-Residents as they can provide insight into the country's unique characteristics. E-Residents are familiar with the business culture, regulatory environment, and possible challenges e-Residents might encounter in a specific country. By leveraging local partners' expertise and knowledge, the e-Residency program can tailor its offerings and services to meet the needs of potential e-Residents in each target market.

Estonian e-Residency programs may be promoted differently in different countries. Some may require attendance at a specified number of events, others require online meetings, and others require specific marketing activities. At those events or online meetings, e-Residency can do workshops covering new features or application processes for different partner companies, the range of available e-services, and the inspiring success stories of existing e-Residents. The goal is to provide valuable insights and practical advice encouraging more entrepreneurs to discuss it with others. In addition, it is to encourage them to apply for e-Residency.

7.3 Customizing the E-Residency Program for Target Markets

Setting up a foundation for the e-Residency program requires identifying areas for improvement and growth opportunities. As a result, leadership should conduct regular surveys, interview partners and e-Residents, and monitor online forums and social media to achieve this goal. Addressing these barriers will enable e-Residency representatives to demonstrate a deeper understanding of the local business environment, thus increasing its appeal to potential residents. The author learned from talking to an e-Residency business developer that business barriers in target countries are rarely structured.

Based on the author's belief, e-Residency could significantly improve its appeal and increase the number of entrepreneurs establishing companies by adapting its approach to each target market and offering assistance in the local language, particularly in regions where English is not a common language. (Kalzati, 2021). By providing language-specific website content, customer service, and educational resources, the program will likely be more accessible and appealing to a broader range of entrepreneurs (Kalzati, 2021). E-Residency should strive to provide a high level of responsiveness to user feedback.

In addition, the program should identify and address potential barriers in target markets. This requires understanding the unique challenges entrepreneurs face in each region. Marketing campaigns, educational workshops, and networking events are essential for cultivating this awareness. Using traditional and digital marketing channels in

combination can effectively communicate the value proposition of e-Residency to potential e-Residents. Existing and new services developed by external partners must be successfully integrated with the e-Residency platform and based on e-Resident needs (Lember, 2018).

8 Conclusion

This thesis aimed to investigate the impact of establishing new pick-up locations for Estonia's e-Residency program on the number of new e-Residents from these countries and surrounding areas. As part of this study, the assumption was made that the e-Residency program, a new initiative in the domain of digital governance, could gain significant traction and growth by enhancing its physical infrastructure to accommodate potential e-Residents across the globe.

It was first discussed how the e-Residency process works, emphasizing the importance of physical pick-up locations for fingerprinting and ID card distribution. The partnership with BLS International was examined as part of the study, which contributed to establishing new pick-up locations in countries such as Japan, South Africa, Brazil, Thailand, and Singapore.

According to our findings, establishing new pick-up locations positively impacts the number of new e-Residents from these countries. In Brazil, for instance, there was a relative increase of about 197% in e-Resident sign-ups, while Thailand saw a relative increase of 156%. South Africa also experienced a statistically significant increase, with sign-ups more than doubled. In Singapore, the effect was less pronounced and did not reach statistical significance. This indicates that establishing new pick-up locations may only occasionally increase the number of e-Residents.

There is a need to explore further factors contributing to the impact of new pickup locations, including the local economy, the technology industry, and public awareness of the e-Residency program. Understanding the patterns between countries and factors might enable more strategic deployment of resources in expanding the e-Residency program.

Future research could explore expanding the role of honorary consuls and exploring alternatives for issuing ID cards. In addition to demonstrating the potential benefits of expanding pick-up locations, the study also revealed the need for contingency planning. For instance, the partnership with BLS International might end, or certain locations might not be profitable. Therefore, the e-Residency program should consider various strategies,

including appointing individuals to manage pick-up locations or partnering with organizations that provide similar services.

Establishing new pick-up locations for e-Residency can contribute to the program's growth by attracting new e-Residents. However, this strategy's effectiveness depends on several contextual factors. The e-Residency program would benefit from a holistic and adaptive approach that considers the unique circumstances of each potential pick-up location and explores a diverse range of options for ID card issuance.

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APPENDIX 1: Non-formal interview questions for the members of e-Residency program

Number	Question
1	What kind of feedback have you received from e-residents in these countries regarding the new pick-up locations? What suggestions do you have for improvement or issues that need to be resolved?
2	Are there any plans to establish additional pick-up locations or change the whole process?
3	Is there any feedback from the BLS partnership regarding their satisfaction?
4	How do you plan to monitor and evaluate the long-term impact of these new pick-up locations on the e-Residency program and the creation of companies from these regions?
5	What lessons can be learned from the implementation of new pick-up locations in these countries that can be applied to future expansions of the e-Residency program?
6	Have any best practices or successful examples been identified in other countries that could serve as a model for implementing alternative pick-up locations or methods?
7	What are the key priorities for investors and freelancers when selecting a country for their business registration and tax management?

APPENDIX 2: Analysis of impact on Brazil

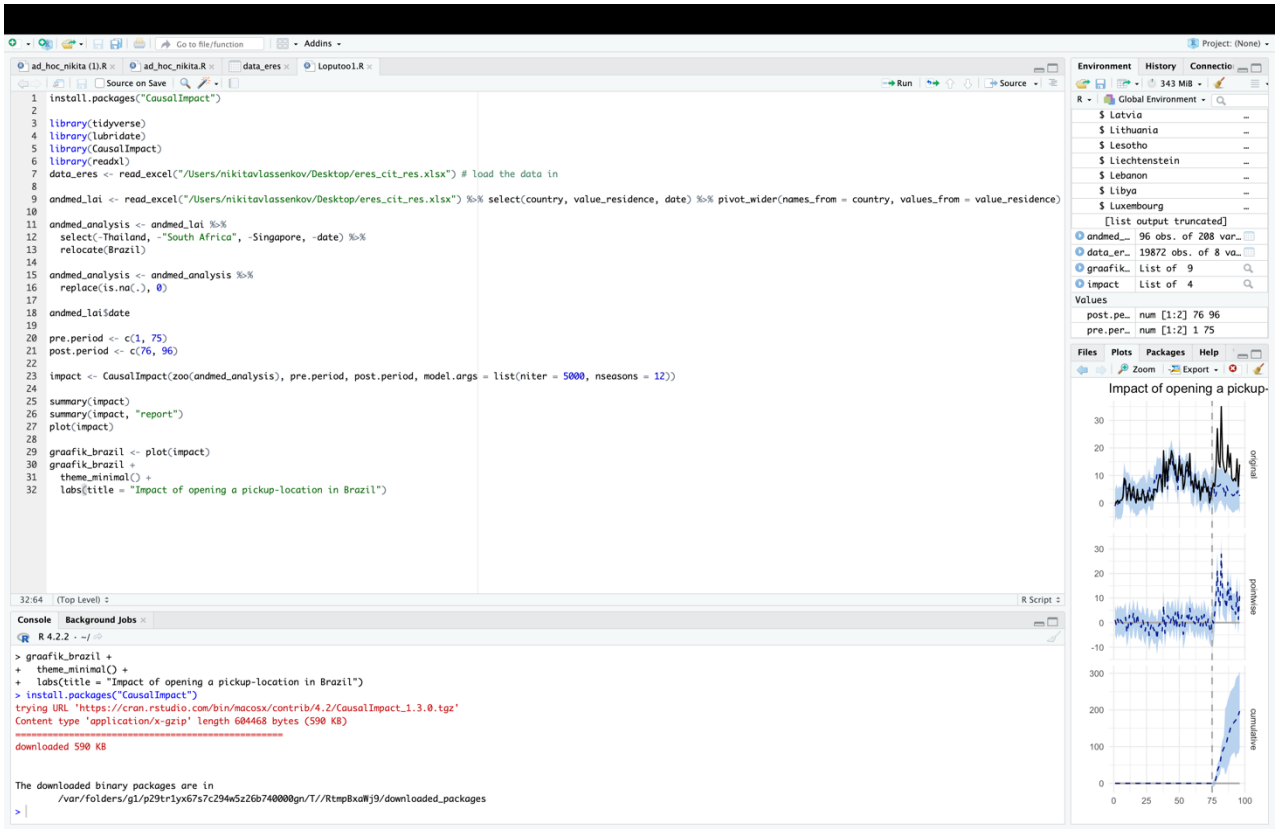


Figure 5 (Rlanguage Model of Brazil example)

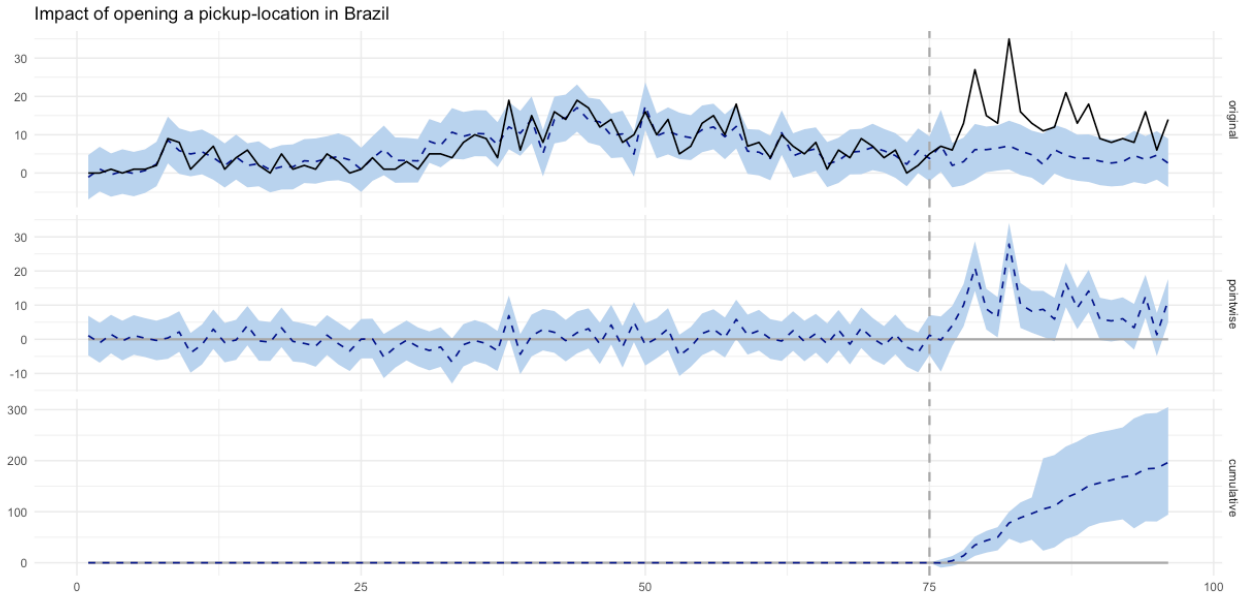


Figure 6 Impact of opening a pickup-location (Rlanguage model results of Brazil).

APPENDIX 3: Analysis of impact on Thailand

```
#Thailand

andmed_lai_Thailand <- read_excel("/Users/nikitavlassenkov/Desktop/eres_cit_res.xlsx") %>% select(country, value_residence, date) %>% pivot_wider(names_from = country, values_from = value_residence)
andmed_analysis_Thailand <- andmed_lai_Thailand %>%
  select(-Brazil, -"South Africa", -Singapore, -date) %>%
  relocate(Thailand)

andmed_analysis_Thailand <- andmed_analysis_Thailand %>%
  replace(is.na(.), 0)

andmed_lai_Thailand$date

pre.period <- c(1, 75)
post.period <- c(76, 96)

impact_Thailand <- CausalImpact(zoo(andmed_analysis_Thailand), pre.period, post.period, model.args = list(niter = 5000, nseasons = 12))
summary(impact_Thailand)
summary(impact_Thailand, "report")
plot(impact_Thailand)

graafik_Thailand <- plot(impact)
graafik_Thailand +
  theme_minimal() +
  labs(title = "Impact of opening a pickup-location in Thailand")
```

```
> graafik_Thailand <- plot(impact)
> graafik_Thailand +
+   theme_minimal() +
+   labs(title = "Impact of opening a pickup-location in Thailand")
>
```

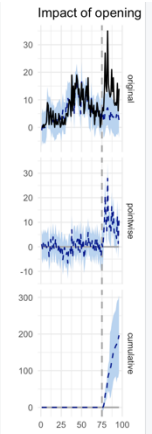


Figure 7 (Rlanguage Model of Thailand example).

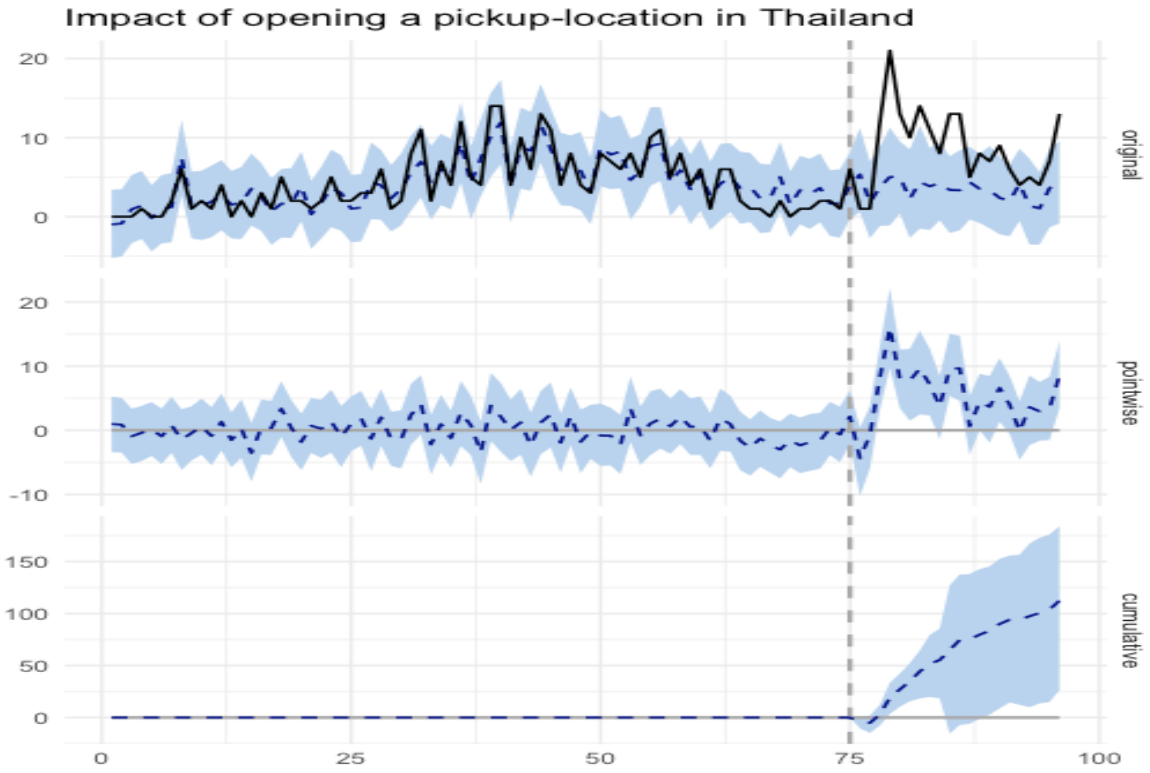


Figure 8 Impact of opening a pickup-location (Rlanguage model results of Thailand)

APPENDIX 4: Analysis of impact on Singapore

```r
#Singapore

andmed_lai_Singapore <- read_excel("/Users/nikitavlassenkov/Desktop/eres_cit_res.xlsx") %>% select(country, value_residence, date) %>% pivot_wider(names_
andmed_analysis_Singapore <- andmed_lai_Singapore %>%
  select(-Brazil, -"South Africa", -Thailand, -date) %>%
  relocate(Singapore)

andmed_analysis_Singapore <- andmed_analysis_Singapore %>%
  replace(is.na(.), 0)

andmed_lai_Singapore$date

pre.period <- c(1, 75)
post.period <- c(76, 96)

impact_Singapore <- CausalImpact(zoo(andmed_analysis_Singapore), pre.period, post.period, model.args = list(niter = 5000, nseasons = 12))
summary(impact_Singapore)
summary(impact_Singapore, "report")
plot(impact_Singapore)

graafik_Singapore <- plot(impact_Singapore)
graafik_Singapore +
  theme_minimal() +
  labs(title = "Impact of opening a pickup-location in Singapore")
```

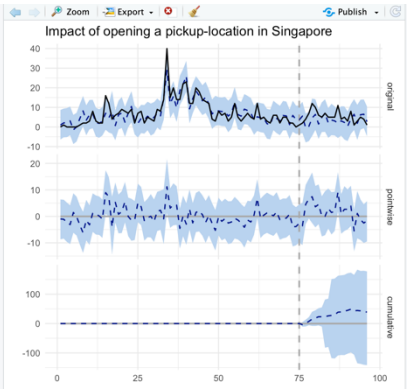


Figure 9 (Rlanguage Model of Singapore example)

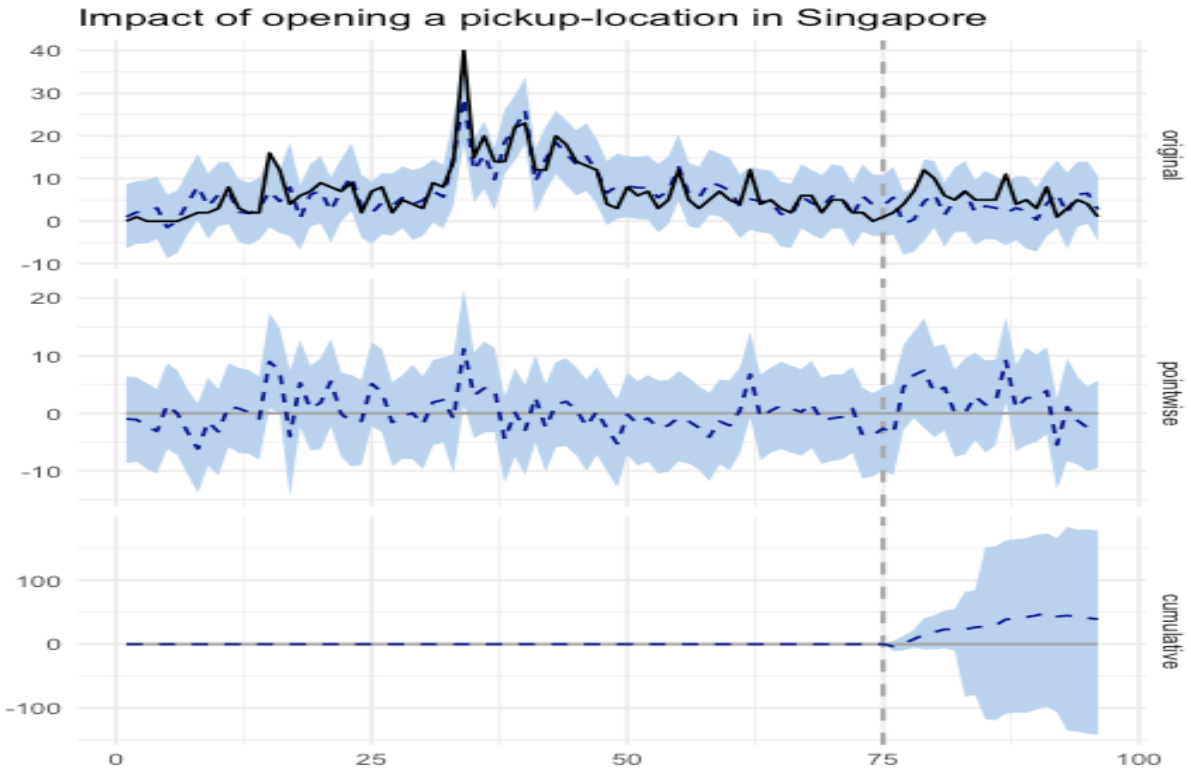
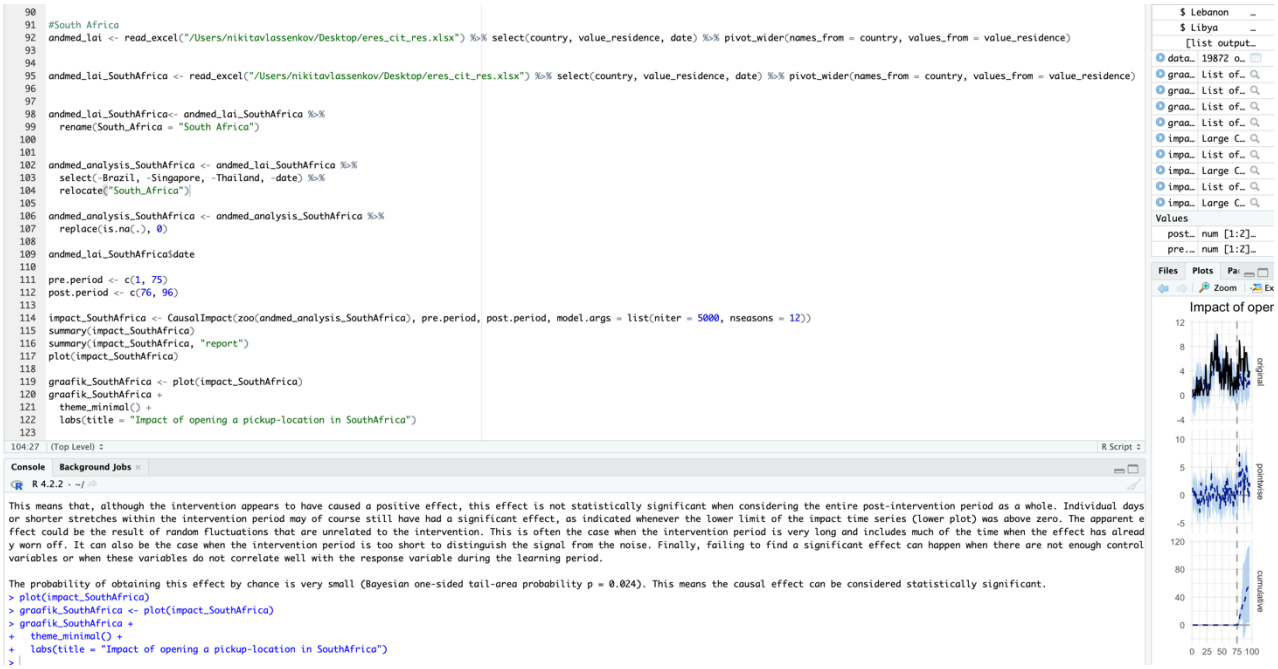


Figure 10 Impact of opening a pickup-location (Rlanguage model results of Singapore)

APPENDIX 5: Analysis of impact on South-Africa



```
#South Africa
andmed_lai <- read_excel("/Users/nikitavlassenkov/Desktop/eres_cit_res.xlsx") %>% select(country, value_residence, date) %>% pivot_wider(names_from = country, values_from = value_residence)


andmed_lai_SouthAfrica <- read_excel("/Users/nikitavlassenkov/Desktop/eres_cit_res.xlsx") %>% select(country, value_residence, date) %>% pivot_wider(names_from = country, values_from = value_residence)


andmed_lai_SouthAfrica<- andmed_lai_SouthAfrica %>%
  rename(South_Africa = "South Africa")


andmed_analysis_SouthAfrica <- andmed_lai_SouthAfrica %>%
  select(-Brazil, -Singapore, -Thailand, -date) %>%
  relocate("South_Africa")

andmed_analysis_SouthAfrica <- andmed_analysis_SouthAfrica %>%
  replace(is.na(.), 0)

andmed_lai_SouthAfrica$date

pre.period <- c(1, 75)
post.period <- c(76, 96)

impact_SouthAfrica <- CausalImpact(zoo(andmed_analysis_SouthAfrica), pre.period, post.period, model.args = list(niter = 5000, nseasons = 12))
summary(impact_SouthAfrica)
summary(impact_SouthAfrica, "report")
plot(impact_SouthAfrica)

graafik_SouthAfrica <- plot(impact_SouthAfrica)
graafik_SouthAfrica +
  theme_minimal() +
  labs(title = "Impact of opening a pickup-location in SouthAfrica")
```

```
This means that, although the intervention appears to have caused a positive effect, this effect is not statistically significant when considering the entire post-intervention period as a whole. Individual days
or shorter stretches within the intervention period may of course still have had a significant effect, as indicated whenever the lower limit of the impact time series (lower plot) was above zero. The apparent e
ffect could be the result of random fluctuations that are unrelated to the intervention. This is often the case when the intervention period is very long and includes much of the time when the effect has alread
y worn off. It can also be the case when the intervention period is too short to distinguish the signal from the noise. Finally, failing to find a significant effect can happen when there are not enough control
variables or when these variables do not correlate well with the response variable during the learning period.

The probability of obtaining this effect by chance is very small (Bayesian one-sided tail-area probability p = 0.024). This means the causal effect can be considered statistically significant.
> plot(impact_SouthAfrica)
> graafik_SouthAfrica <- plot(impact_SouthAfrica)
> graafik_SouthAfrica +
+   theme_minimal() +
+   labs(title = "Impact of opening a pickup-location in SouthAfrica")
>
```

Figure 11 (Rlanguage Model of South Africa)

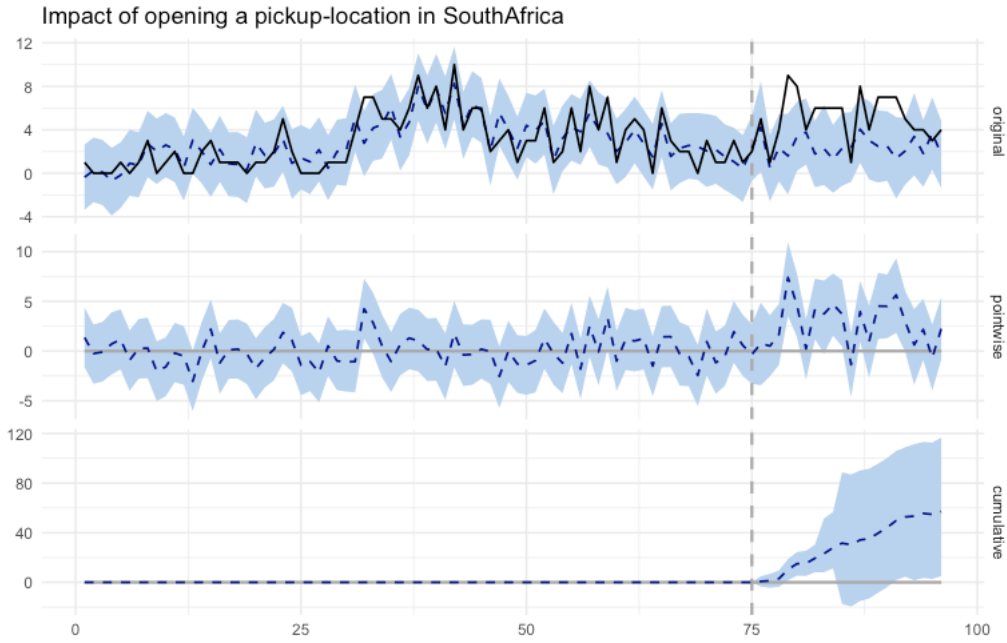


Figure 12 Impact of opening a pickup-location (Rlanguage model results of South Africa)

APPENDIX 6: GitHub Repository

A repository contains the author projects files:
https://github.com/gers144/e-Residency/tree/main