Bison Bank

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The Socioeconomic Impact of the Golden Visa Program in Portugal

THE IMPACT ON THE HOUSING MARKET – THIAGO RIQUE UCHÔA DE MEDEIROS

Work project carried out under the supervision of:

Melissa Prado

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Abstract

In 2012, the Portuguese government implemented the Golden Visa program, which had many socioeconomic ramifications. This paper analyses those impacts, showing that the Golden Visa positively impacted the country's short-term economic growth. Also, participating investors pose no strain on social welfare services or induce any negative externalities. The shift to the venture capital funds investment option, anticipated to be the future of the program, could potentially expand an already flourishing industry. Furthermore, implementing the Golden Visa has a significant positive impact on housing prices and has spillover effects on prices after its termination.

Keywords: Golden Visa, Residence-by-investment, Macroeconomic Growth, Social Impact, Real Estate, Portugal, Housing

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1. Introduction

Immigrant investor programs (IIPs) are "policies developed by countries seeking to attract wealthy investors to become their residents or citizens" (Džankić 2018). Commonly referred to as golden visas, these schemes offer third country nationals an expedited method for receiving temporary or permanent residence or citizenship in exchange for a financial contribution to a country (COMPAS 2022). The roots of such programs date to the 1980s, when countries such as the United States, the UK, and Australia first offered residency in exchange for an investment (Džankić 2018). Over 70 countries embrace a 'golden visa' program (COMPAS 2022), with over half of the Member States of the European Union participating in these agendas (European Commission 2019). The primary objective for countries implementing these programs is to boost foreign direct investment (FDI) inflows to stimulate economic activity and growth (OECD 2002). However, several questions need to be answered regarding if this is the case. Hence, the present work seeks to comprehend whether the Golden Visa Program, precisely the Portuguese ARI program, has significantly added value to the social and economic status of the country.

This project is conducted with Bison Bank, a European bank based in Lisbon with over 20 years of track record, which provides investment banking, depositary and custody, and wealth management services to High-Net-Worth Individuals and Institutional Clients worldwide. As one of Bison Bank's major business areas works closely with prospective investors who wish to invest in the ARI Program, the company brought valuable data and insights that supported the development of the study. We have also spoken with another stakeholder, the prestigious Lisbon law firm, Telles Abreu Advogados, who shared their insights. Despite the wide adoption of these programs worldwide and the apparent success of the Portuguese ARI program, few

comprehensive studies have been conducted to evaluate their actual impact and the potential spillover effects they may have on a country's economy and society. The analysis aims to fill that void and potentially spur future research. Section 2 introduces the concepts of Immigrant Investor Programs, their presence around the globe, and the intricacies of the Portuguese program, from the several modalities through which an investor could get a Golden Visa, both in the past and present, to the effectiveness of the program in accumulating funds since its year of inception up until the end of 2022. Furthermore, in sections 3 and 4, we performed a thorough macroeconomic analysis in which we assessed the influence of the Golden Visa program on the country's economic growth, using the GDP per capita growth rate as a proxy. Given its relatively small size to the Portuguese economy, we included Golden Visas as a dummy variable while controlling for macroeconomic factors such as Inflation, Trade Openness, Government Consumption, Expenditure on Education, Foreign Direct Investment, Unemployment and Gross Capital Formation. Two different models were used to prevent the shortcomings of each from causing the robustness and accuracy of our results to decay. First, we employed an OLS regression model that yielded significance for Trade Openness, Gross Capital Formation and Government Consumption at a 5% significance level. However, the Golden Visa program displayed no statistically significant results. To complement the conclusions of this first model, we developed a more comprehensive VAR model that could help find different or more accurate takeaways. Considering lagged results and stationary data for the econometric model, the analysis and results of the VAR provides a better forecast to measure Portugal's economic growth. The model yielded statistically significant results for the lagged variables of Unemployment, Gross Capital Formation and, more importantly, the Golden Visa. In section 5, we describe the social implications programs of this kind have on societies that adopt them, both the benefits and potential pitfalls that could have an impact on the Portuguese population. Moreover, in section 6, considering that Subparagraph 7, the venture

capital funds investment option, will be the program's future, we describe the status of the Venture Capital ecosystem in Portugal and, more importantly for our scope, how banks can adapt to it.

Due to several allegations with respect to the effect of the Golden Visas on income distribution, we have run an OLS regression to comprehend what might, in fact, impact income distribution in Portugal. The model yielded that the program is indeed a good predictor for the Gini Index, but the coefficient has a different signal from what we were expecting. The Schooling rate was also found to be a determinant of income distribution.

The report also considers and analyses the program's impact on the Housing Market separately. The result obtained from a panel regression GLS estimator indicates the significant positive relationship the Golden Visa has on municipality housing prices and suggests spillover effects on prices after the program has been terminated.

Finally, as the recent modifications to the program not only change the way an applicant can be eligible for a Golden Visa in Portugal, but also the type of investors who are willing to pursue it, we felt it necessary to draw the picture of the future of the program, the opportunities and risks that stand in the new format and the competitive position of Portugal in the European Union's Golden Visa landscape.

2. Literature Review

2.1. The Portuguese Golden Visa

The Portuguese Golden Visa program, or the ARI – Authorisation of Residence for Investment Activity, introduced in October 2012, is a residence-by-investment initiative that enables non-EU citizens to obtain a Residence Permit for Investment (SEF - Serviço de Estrangeiros e Fronteiras 2023). Third-country nationals who engage in investment activities, can seek a

Residence Permit for Investment (ARI) and benefit from visa-free travel in Europe's Schengen Area, with the potential of obtaining a Portuguese passport after 5 years of maintaining the investment (Henley & Partners Portugal 2023). The Portuguese program offers passive investment options, as it will be described later. Further, a lenient physical presence requirement of only seven days a year (SEF - Serviço de Estrangeiros e Fronteiras 2023) has made the Portuguese residence-by-investment program one of the most sought-after globally. Since its inception in 2012 until September 2023, the ARI program has generated an estimated €7 billion in Foreign Direct Investment for the country from over 12,000 participating investors with a diverse range of nationalities (SEF - Serviço de Estrangeiros e Fronteiras 2023).

Initially, the visa was obtainable through eight distinct investment routes determined in the legislation (SEF - Serviço de Estrangeiros e Fronteiras 2023). These routes required applicants to meet specific criteria, later amended on January 1st, 2022, and September 30th, 2023[1]. The following subparagraphs detail the several types of investment routes and how they changed throughout the analysed period.

1. Capital transfer with a value equal to or above €1,000,000.
    a. Changed on January 1st, 2022, to €1,500,000 (Pearls of Portugal 2023).
    b. Removed from the Golden Visa document on September 30th, 2023.
2. The creation of at least ten job positions (8 new positions in low population density areas).

[1] Mais Habitação Programme – On September 30th, 2023, a national initiative aimed at providing affordable housing for the Portuguese population and addressing the rising real estate prices in Portugal and Europe was promulgated by the Portuguese president Marcelo Rebelo de Sousa (Mais Habitação, 2023). One of the leading legal measures of this program was the removal of capital transfer of funds and real estate investment routes from the Golden Visa scheme, effective from the date of the program's promulgation (Imóvel, 2023).

3. The purchase of real estate property with a value equal to or above €500,000 (€400,000 in low population density areas), considering that residential property is limited to designated interior regions.
    a. Changed on January 1st, 2022, to interior regions in Portugal (Pearls of Portugal, 2023).
    b. Removed from the Golden Visa document on September 30th, 2023.
4. The purchase of real estate property, with construction concluded for more than 30 years or located in urban regeneration areas, carrying out rehabilitation works for a total value equal to or above €350,000. (€280,000 in a low population density area).
    a. Changed on January 1st, 2022, to interior regions in Portugal (Pearls of Portugal 2023).
    b. Removed from the Golden Visa document on September 30th, 2023.
5. Capital transfer with a value equal to or above €500,000 for investing in research activities conducted by accredited public or private scientific research institutions in Portugal involved in the national scientific or technological system.
6. Capital transfer for investing in artistic output or supporting the arts with a value equal to or above €250,000 (€200,000 in low population density areas). Options include the "Artistic Support", which on some projects can offer a possible ROI on investment, and the 'Cultural Heritage Preservation" option, which comes as a non-refundable donation.
7. Capital transfer with a value equal to or above €350,000 for the acquisition of units of investment funds or venture capital funds dedicated to the capitalisation of companies incorporated under the Portuguese legislation, whose maturity, now of the investment, is, at least, of five years and, at least, 60% of the investments is realised in commercial companies with head office in national territory.
    a. Changed on January 1st, 2022, to €500,000.

2.2. Immigrant Investor Programs

As mentioned earlier, countries establish Immigrant Investor Programs (IIPs) to draw affluent investors to become citizens or residents. First, it is essential to clarify that due to the obscure nature of each country's policies concerning these programs, making a solid distinction between them can prove challenging (Surak 2021; Surak and Tsuzuki 2021). In terms of the level of investor engagement, IIPs are usually divided into "active" and "passive" alternatives (Scherrer and Thirion 2018; Sumption and Hooper 2014; Surak and Tsuzuki 2021). The "active" options are classified as business or entrepreneurial visas and require the applicant to present proof of previous business experience, submit an already prepared business proposal, and engage in day-to-day operations (Surak 2021; Scherrer and Thirion 2018). On the other hand, the "passive" options require merely the injection of economic capital (Sumption and Harper 2014; Surak 2020) in one of several investment options, including real estate, government bonds, an operating company based in the country where the investment is made, investment funds, bank deposits, or philanthropic donations (Scherrer and Thirion 2018; Surak 2020). Additionally, the benefits extended to investors in exchange for the financial commitment can vary. The investor may attain temporary or permanent residence with a potential pathway to citizenship, or they may directly receive citizenship. While there is significant overlap among these "passive" options, when focusing on the path to citizenship only, they can be divided into residence-by-investment (RBI) and citizenship-by-investment (CBI) programs (Scherrer and Thirion 2018; Surak 2021). In this context, the Portuguese ARI Program is a “passive” RBI program.

2.3. Immigrant Investor Programs around the Globe

In modern times, the first programs of this kind can be found since the early 1980s, with the launch of the Business Migration Program in Australia in 1982 (Džankić 2018). In the subsequent years, similar RBI programs were initiated in the United States of America, the

United Kingdom, New Zealand, and others (Džankić 2018), with the first CBI emerging in St. Kitts and Nevis in 1984 (Transparency International 2018; Surak 2021). Presently, over 70 countries worldwide offer some form of a "golden visa" (Surak, 2021), with over half of the Member States of the European Union adopting such programs (Scherrer and Thirion 2018). Additionally, two Member States, Malta, and Bulgaria, offer CBI programs after Cyprus suspended its program in 2020 (Henley & Partners 2023).

2.4. Who are the Investors and What are Their Motivations?

Investors participating in IIPs are mainly “third-country nationals (TCNs) from emerging economies or countries experiencing political or economic instability” (Sumption and Harper, 2014; Scherrer and Thirion 2018). Several non-mutually exclusive alternatives motivate investors, including the conventional immigration, visa-free travel, and lower taxes (Sumption and Harper 2014). Scherrer and Thirion (2018) share similar descriptions for the motivations of investors. Participants may be driven by the benefits of obtaining residence rights or a second passport through expedited channels, freedom of movement in countries with an excellent quality of life and a culture of emphasizing education, an "insurance policy" against potential instabilities in the investor's country of origin, visa-free travel, and preferential tax regimes. However, the last point may only sometimes hold, as the tax regimes in the investor's country of origin could already be more favourable. As to the origins of the participants, only some countries provide the public with these comprehensive statistics on their programs (Džankić 2018). From the analysis of only six out of the thirteen RBI programs in the European Union (Greece, Hungary, Ireland, Latvia, Portugal, and Spain), which collectively represented 95% of participants in the EU in the period 2013-2019, investors predominantly originate from China, Russia, other former Soviet States, as well as the Middle East and Africa (Surak 2021). These findings are consistent with the research conducted by Transparency International (2018) on all

13 countries. Their results show that participants originate from countries like China, Russia, Brazil, Turkey, Ukraine, Iran, South Africa, and the United States.

2.5. Social Impact of the Programs

Surak and Tsuzuki (2021), Surak (2021), Džankić (2018), and many others have supported the argument that IIPs are developed by governments as a strategic attempt to address specific economic needs of a country, particularly during economic downturns. While the potential economic benefits of IIPs are more straightforward to quantify, the potential social implications are more difficult to measure. Moreover, governments often fail to provide relevant information about their programs to the public (Transparency International 2018), with Portugal and Latvia seeming to deviate from this trend (Surak and Tsuzuki 2021). The European Parliamentary Research Service (2018, 2021) and the European Commission (2019), assessing the potential social impacts associated with the existence of these programs within the EU framework, have outlined several areas of concern. Inquiries have been made into the adequacy of due diligence procedures and background checks conducted on applicants' submitted documentation, such as criminal records and the origins of their funds (Scherrer and Thirion 2018; Surak 2021). The European Parliamentary Research Service (EPRS) studies highlight that "passive" CBI and RBI schemes are particularly prone to these risks since this immigration form is based solely on a financial transaction. They argue that "the higher the investment, the more pressure will be placed on immigration officials to be more lenient on the applicant, thereby contributing to greater impunity for crime and favouring provision of safe havens to conduct criminal activities" (Scherrer and Thirion 2018, 44). The European Commission outlines that the current governance framework design may pose vulnerabilities and create conditions for potential corruption, money laundering, and tax evasion. Transparency International (2018) points to a lack of harmonisation of standards and practices at the EU level, which could increase the risk tolerance of governments issuing golden visas. They argue that the lack of cohesion could

incentivise governments to undermine due diligence and transparency procedures to improve the program's appeal to potential investors. In the context of the Portuguese ARI program, however, the primary source of controversy stems from the possible increase in inequality. Specifically, the Portuguese population's erosion of access to housing due to the rise in rentals and real estate prices (Scherrer and Thirion 2018). This has been a cause of concern for several IIP programs in the EU that offer real estate investment options, including Cyprus, Greece, Latvia, and Malta. However, several analyses make the case that any adverse effects on the real estate market caused by IIPs are minuscule, as they represent a tiny percentage of total real estate investments, especially in larger economies (COMPAS 2022). The exception would be Greece, where, at one point, their RBI program represented a large share of the country's total real estate transactions (Surak and Tsuzuki 2021).

3. Methodology

Section 3 and Section 4 represent the primary focus of this paper, analysing the macroeconomic impact of the ARI program. To examine the program's influence, it is imperative to control for other significant factors that may have an influence on the Portuguese economy. Extracting their effects is essential for understanding and extracting the specific effect of the golden visa program. The research question will be analysed with the utilization of two methods, although, the variables stay the same for both. The first method entails incorporating the more common OLS model, but due to its limitations with time-series data, a more comprehensive VAR model will also be developed.

3.1. Dataset

The time-series statistical models used to analyse the relationship between the impact of the Golden Visa and economic growth are the OLS Model and the VAR Model. The OLS Model was produced in Python, while the VAR model was produced in Stata. The OLS Model is a

common technique used to evaluate relationships between one or more independent variables and a dependent variable through a linear regression equation. The Vector Autoregression (VAR) Model is a complex economic and financial time series model used to forecast data with multiple variables and analyse the causal impacts of impulse response functions. It incorporates the OLS model in an intricate form, capturing dynamic relationships between all variables. For each time-series t, there are k endogenous variables in the model being regressed between themselves according to the lag order p. A simple equation for the model can be viewed as:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \ldots + A_p Y_{t-p} + u_t$$

Where:

- Yt. = vector of endogenous variable k at time t
- A1, A2…, Ap = the coefficient matrices for the lagged endogenous variables
- Yt-1, Yt-2,, Yt-p = vectors of the lagged endogenous variables
- ut = vector of error term at time t

In its expanded form, the VAR model analyses in vector the relationship between all variables:

$$\begin{bmatrix} Y_{1,t} \\ Y_{2,t} \\ \vdots \\ Y_{k,t} \end{bmatrix} = \begin{bmatrix} a_{11,1} & a_{11,2} & \cdots & a_{11,k\cdot p} \\ a_{21,1} & a_{21,2} & \cdots & a_{21,k\cdot p} \\ \vdots & \vdots & \ddots & \vdots \\ a_{k,1} & a_{k,2} & \cdots & a_{k,k\cdot p} \end{bmatrix} \begin{bmatrix} Y_{1,t-1} \\ Y_{2,t-1} \\ \vdots \\ Y_{k,t-1} \end{bmatrix} + \begin{bmatrix} a_{12,1} & a_{12,2} & \cdots & a_{12,k\cdot p} \\ a_{22,1} & a_{22,2} & \cdots & a_{22,k\cdot p} \\ \vdots & \vdots & \ddots & \vdots \\ a_{k,1} & a_{k,2} & \cdots & a_{k,k\cdot p} \end{bmatrix} \begin{bmatrix} Y_{1,t-2} \\ Y_{2,t-2} \\ \vdots \\ Y_{k,t-2} \end{bmatrix} + \cdots + \begin{bmatrix} a_{1p,1} & a_{1p,2} & \cdots & a_{1p,k\cdot p} \\ a_{2p,1} & a_{2p,2} & \cdots & a_{2p,k\cdot p} \\ \vdots & \vdots & \ddots & \vdots \\ a_{kp,1} & a_{kp,2} & \cdots & a_{kp,k\cdot p} \end{bmatrix} \begin{bmatrix} Y_{1,t-p} \\ Y_{2,t-p} \\ \vdots \\ Y_{k,t-p} \end{bmatrix} + \begin{bmatrix} u_{1,t} \\ u_{2,t} \\ \vdots \\ u_{k,t} \end{bmatrix}$$

- ai, j, m = are the coefficients at the i-th row and j-th column of the m-th coefficient matrix

The dataset considered data from 1985 to 2022. The 37-year period provides us with substantial observations for both models. The data was collected from The World Bank, an international financial institution that annually publishes figures for various macroeconomic indicators. We

considered the variable GDP per Capita Growth rate in nominal prices at current US$ to measure economic growth.

3.2. The Dependent variable – GDP per capita growth rate

The Gross Domestic Product per capita is a figure that represents the value of all goods and services per citizen produced by a country in a year (Bolt et al. 2014). It is calculated as the division of a country's GDP over the course of a year with its population, i.e., how much of the total economic contribution can be attributed to each citizen (Glossary | DataBank 2023). Economists frequently use it as an indicator to measure a country's financial performance and growth (Elistia 2018) and to represent people's economic well-being (Baten and Blum 2014). However, opposing views point out certain limitations regarding such indicators. The Commission on the Measurement of Economic Performance and Social Progress (2009) highlight that present measurements of economic performance and social progress fail to capture crucial aspects of the well-being of the population, including income inequality, quality of life and environmental considerations (Stiglitz, Sen, and Fitoussi 2009). R. Brinkman and J. Brinkman (2011) argue that using single economic gauges such as GDP or GDP per capita to evaluate socio-economic progress inherently limits considerations about other factors, namely those of social and cultural nature, which have an essential role in the well-being and progress of humankind. Despite this, most available literature uses GDP per capita as the dependent variable when assessing a country's economic growth and analysing its determinants. Notably, Barro (1991, 1996), a distinguished macroeconomist and professor of economics at Harvard University, consistently employed GDP per-capita growth when evaluating the factors of economic growth across 100 countries in 1960-1985 and 98 countries in 1960-1990. Given its versatility across periods and geographical regions, we will incorporate GDP per capita growth rate as the dependent variable in the models in our study.

The GDP per capita growth rate in Portugal has seen a lot of developments over the 37-year period used in the analysis *(see Figure 5.1 in the appendix)*. The key highlights include the spike at the end of the 1980s decade (7.6%) that followed the 1983 economic crisis, much due to the FMI intervention 1983. In 1992-1993, a combination of external factors, such as the First Gulf War and subsequent oil shocks, or the German Reunification, alongside a restrictive internal monetary policy that led to high-interest rates, originated an economic recession (-2.2%). The next few years that anticipated Portugal's adherence to the EU were of continuous and extraordinary growth (3.6% average growth between 1995-2000 and above the European average) until 2003, when a new internal recession took over. The GDP per capita would grow slowly but steadily until the 2008 crisis hit. The most impactful consequences of the economic downturn in Portugal appeared in the 2011-2013 period, which was marked by recession, unemployment, and a new IMF intervention. During 2014-2022, the GDP per capita grew yearly except for 2020 due to the COVID-19 crisis, with an average of 3,1% from 2017 to 2022, excluding 2020. However, it is essential to acknowledge the impact the 2022 inflation might have had on the 6.1% GDP per capita growth rate.

3.3. Independent Variables

Further discussed in the methodologies section are the independent variables selected for our statistical analysis and their relationship with the dependent variable, GDP per capita growth rate. We will provide previous scholars' work that has determined the relative importance of these inputs for an economy. Additionally, a brief overview of the observed trends for each variable in Portugal throughout the analysis period (1985-2022) is provided. Finally, when relevant, the chosen proxy to represent them is highlighted.

Trade Openness

The concept of Trade Openness and its impact on economic growth has been a continuous topic of discussion, especially in the context of globalisation. The most common measure of Trade Openness incorporated in measuring its relationship with economic growth is the ratio of the sum of exports and imports, to the GDP. However, opposing scholars' work questions whether trade volume represents the appropriate metric for "openness" or if trade policy would be more appropriate (Ann Harrison 1996). Dowrick and Golley (2004) categorise them as "Revealed Openness" and "Policy Openness". The latter can refer to a country's access to foreign markets, the set trade barriers, and tariffs, among others. Incorporating "Revealed Openness", or trade volume, they examined a positive relationship between Trade Openness and economic growth. Trade Openness was recognised to significantly impact GDP per capita growth, especially within richer countries post-1980 (Dowrick and Golley 2004). However, they remained uncertain whether this was due to a direct effect on economic growth or an indirect impact, as Trade Openness has been hypothesised to have contributions to the development of technological advancements. Ann Harrison (1996) shared a similar theory, stating that the impact on economic growth stemming from Trade Openness could be attributed more to the continuous sharing of technological inputs, which could in turn spur technological innovations.

In this study, as a proxy for Trade Openness, we will incorporate the total annual trade volume of imports and exports to the annual GDP, as it is inherently difficult to quantify an "openness" proxy in terms of policy, and results are rarely statistically significant (Ann Harrison 1996). In Portugal, the progression of the variable has been of constant growth since the beginning of our scope *(see Figure 5.2 in the appendix)*. The only noteworthy change in Trade Openness is exhibited in periods of crisis, like the mid-eighties and 2008, caused by efforts to decrease the deficit and, of course, in 2020 due to the global economic slowdown and distribution of supply chains. It is also important to note that the period of highest growth of trade relative to GDP

coincides with the year when the Golden Visa program was in force (2012-2022), inclusively surpassing 100% of GDP in 2022.

Unemployment

In 1962, the American economist Arthur Okun published his findings on the relationship between Unemployment and GDP growth rate, thus creating Okun's Law. The economic model states that a 1% decrease in Unemployment leads to around a 2% increase in the GDP growth rate, resembling the effects of the Phillips Curve on inflation (Prachowny 1993). Since its creation, the model has been tested across countries, and many empirical studies have tested its significance. In 1984, the Brookings Institution Press published an economic study on Unemployment and Potential Output (Gordon and Clark 1984). The work tested Okun's Law and suggested that the model only works for short-run, stable economies and is disrupted during expansionary and contractionary periods (Gordon and Clark 1984). The economists tested the model in the American Economy over 30 years and concluded that Unemployment is much more closely linked with cyclical economic movements. Additionally, the work stated that as time horizons increased, Okun's model held less significance on economic output (Gordon and Clark 1984). However, in 2007, the International Journal of Economics and Management published a similar study on the topic (Noor, Nor, and Ghani 2007). The study assessed Okun's Law on the Malaysian Economy over 30 years, and evidence suggested its overall significance (Noor, Nor, and Ghani 2007). The study also challenged policymakers to provide better incentives for job seekers and job-seeking parties to increase economic output (Noor, Nor, and Ghani 2007). The Journal of Economics and Sustainable Development recently reported its findings on Unemployment and economic growth in the Nigerian Economy (Akeju and Olanipekun 2014). The research tested the model in Nigeria from 1980 to 2010, and empirical findings suggest a short-run and long-run relationship between Unemployment and economic growth (Akeju and Olanipekun 2014). The study further stated that the fiscal measure of

increasing Foreign Direct Investment (FDI) is optional to reduce Unemployment in the country (Akeju and Olanipekun 2014).

In the analysis, we incorporate the common definition of the percentage of unemployed individuals relative to the total labour force, meaning the active population. In the period of the analysis, three periods of high Unemployment are worth mentioning in the context of the Portuguese economy *(see Figure 5.3 in the appendix)*. In 1986, the unemployment rate reached 8.7%, the highest figure up until then. Due to the 1992-1993 recession, Unemployment was also registered (7.3%). Finally, Unemployment started to increase around 2009, the year after which it continued to increase until reaching its peak of 16.2% in 2013, following the 2011 crisis in Portugal (amid the 2008 world crisis). Besides this, the unemployment rate has been steady, varying between 4% (earlier) and 6% (more recently).

Inflation Rate

Inflation represents an "increase in the prices of goods and services in an economy" (European Central Bank 2023). Alternatively, it is the reduction of purchasing power for an individual. Whereas a low level of inflation is considered positive for an economy as it encourages producers to generate more goods and services and incentivises consumers to make purchases sooner, a high and unpredictable level of inflation can lead to a substantial decrease in the nominal income of households and deteriorate the standard of living (International Monetary Fund 2023). To prevent the latter, central banks deploy monetary policy tools to control the money available in an economy and the channel by which new money is supplied. The European Central Bank (ECB) encompasses this role within the framework of the Eurozone. Consequently, since inflation and the corresponding policy tools set to control it significantly affect the level of borrowing, spending, and investing in an economy, controlling for these factors is essential for measuring the actual economic impact of the Golden Visa investments

in Portugal. R.J. Barro's study on inflation and economic growth for 1960-1990 evaluated that an increase in inflation corresponds to a decline in real GDP (Barro 1995). The International Monetary Fund (1963) hypothesises that inflation diminishes the volume of resources available for domestic spending, reduces community savings, and encourages investments to flow to foreign markets, while capital flows from abroad are discouraged. The same IMF study also emphasises that inflation-induced distortions generate profitability of investments in the short run, which could make an economy less adaptable to future changes.

In Portugal, the "Consumer Price Index (CPI) measures the change in prices of a particular basket of goods and services purchased by a "typical" consumer" (Instituto Nacional de Estatistica 2023). In the study, we will incorporate the annual average rate of change of the CPI from 1985 to 2022. In the period covered by our study, inflation peaked in 1985 (19.46%) and revolved between 10-13% until 1990 due to the crises above *(see Figure 5.4 in the appendix)*. Following this period of turbulence, Portugal had registered a successive decrease in inflation for the next seven years, achieving a 2.34% inflation in 1997. For the next 20 years, the inflation rate in Portugal was stable, with an average rate of 1.84% and very punctual episodes of deflation, like the years 2009 and 2014. However, the annual inflation rate for 2022 drastically increased to 7.83% due to several factors, including the global energy crisis sparked by the conflict in Ukraine, the supply chain disruptions caused by the COVID-19 pandemic, and the substantial increase in demand primarily due to accommodative monetary and fiscal policy.

Foreign Direct Investment (FDI)

Foreign Direct Investment is a category of cross-border investment in which a resident in one Economy establishes a lasting interest and a significant degree of influence over an enterprise resident in another economy. (OECD iLibrary). Most literature agrees that FDI is significantly and positively related to economic growth. Findlay (1978) concluded that FDI increases the

rate of technical progress in the recipient country, bringing modern technologies and management practices used by foreign firms into the domestic ones. Borensztein et al. (1995) add that FDI by multinational corporations (MNCs) was the best way to channel these technological improvements. Furthermore, Wilmore (1986) and De Gregorio (1992) argued that foreign firms have a higher value-added-to-output ratio than domestic firms. Zhang (2001) performed a country-by-country study on a time series of data from 11 countries and found a strong causality between FDI and GDP growth, even though it could depend on the host country's conditions. On the contrary, Naveed and Shabbir (2006) stated that FDI does not play a significant role in the economic growth of developed countries. Moreover, the European Investment Bank released a report in 2020 that assessed the relationship between FDI and economic growth. To better understand the study, it is essential to mention that countries are clustered into four different income categories (Low, Low-Middle, High-Middle, and High). The EIB paper indicated that although FDI has a strong impact in the Low-Middle and High-Middle country categories, it has a negligible impact on economic growth for Low- and High-income countries, which includes Portugal, according to the World Bank.

The evolution of FDI in Portugal has progressed very volatilely, with several downturns and upswings over the whole 38 years contemplated in the study *(see Figure 5.5 in the appendix)*. First, FDI in the percentage of GDP went from 1% in 1985 to 3.3% in 1990, the year after which it constantly decreased until reaching one of the lowest values of the time series (0.58%). That would mark the beginning of the most eventful period regarding FDI weight on GDP, alternating between the all-time highs in 2000 (6.1%), 2003 (6.3%) and 2006 (6.4%) and two of the lowest figures in 1999 (0.58%), 2002 (0.44%) and 2004 (1.13%). The following years were quite stable, and a growing tendency kicked off in 2009 that would register its maximum in 2012 (9.9%). However, after the economic recession and subsequent downgrading of the Portuguese credit rating, the FDI relative to GDP levels decreased for three years straight.

Finally, in more recent years, the variable behaviour was steady, around 3%, except in 2020, due to the well-known COVID-19 pandemic and respective economic stagnation.

Human Capital

"Human capital consists of the knowledge, skills, and health that people accumulate throughout their lives" (World Bank 2019). Since technological advancements and scientific expertise are contingent on the abilities of individuals, Human Capital is a prerequisite for economic growth (Becker, Murphy, and Tamura 1990). Barro's (1996) cross-sectional study on determinants of economic growth for 100 countries found human capital, in terms of years of schooling and life expectancy, to be one of the main contributors to GDP per capita growth in the period 1960-1990. Su and Liu (2016) found comparable results in the context of the Chinese Economy for 1991-2010. They also outlined both direct and indirect positive contributions to economic growth, as an increase in Human Capital can contribute to the growth of technology intensive FDI. In a competitive economy, the link between the level of Education and productivity, and a more skilled workforce, not only benefits an economy in terms of output but also alleviates the government from additional strains on social welfare (Moutinho, Santos de Oliveira, Espinosa de Oliveira, and Guillen 2023). This is in part because a more educated population is better equipped to integrating technology. Mclelland (1966) also argues that education represents a productive investment rather than a consumption item. Across the available literature, there is robust evidence of the positive link between Human Capital and economic growth. In our study, we employ Government Expenditure on Education as a percentage of GDP as our proxy for the independent variable Human Capital. In the context for Portugal, this variable can be subdivided into two different periods *(see Figure 5.6 in the appendix)*. The first, from 1985 to 2000, when the Government spending on Education grew relative to GDP most years. The low levels of Education could explain this during the decades that anticipated our

time series and governmental efforts to tackle illiteracy during the period covered by this study. However, in the second period, 2009-2022, the figures dropped from 5.4% to 4.5%.

General Government Final Consumption Expenditure (Government Size)

In 1876, the German political economist Adolf Wagner published his findings on public expenditure and economic growth, creating the concept of Wagner's Law. The study suggested that as public expenditure increased, national income eventually increased, thus resulting in the inevitable outcome of economic growth (Menyah & Wolde-Rufael 2013). Since the 19th century, academics have been testing this theory, concluding as they publish their empirical work. In 1983, the Southern Economic Association published a cross-country paper on government expenditure and Economic growth between 1961 and 1976 (Landau 1983). The 15-year study concluded that there is a negative relationship between government expenditure and GDP per capita growth rate, contradicting Wagner's Law (Landau 1983). It is stated that results support a pro-free market view; as governments grow, the country's economic growth shrinks (Landau 1983). However, in 2006, the European Journal of Political Economy published a paper on government spending and public output, testing 51 developing countries from 1970 to 2002 (Akitoby et al. 2006). Evidence suggests that government spending and output are co-integrated and that both variables have a long-term relationship (Akitoby et al. 2006). Three main conclusions were drawn from the study: Governments tend to spend more on long-term projects during expansions and cut back during recessions; Fiscal policies on limiting spending should be placed during procyclical periods to mitigate risks of overspending in expansionary periods; Government Spending/GDP ratio returns to long term average even though short-term shocks on government expenditure (Akitoby et al. 2006). To control the intervention of the State in the Economy and its effects, we must measure the Government Consumption relative to the GDP.

In Portugal, it is possible to divide the evolution of this variable intro three distinct periods *(see Figure 5.7 in the appendix).* The first was between 1985 and 2005, when government spending increased consecutively, reaching the second-highest sample value in 2005. This exponential growth can be attributed to efforts to stimulate the Economy after recession periods but, above that, the deployment of the first EU funds in Portugal to promote the development of public infrastructures and a brief period of 2 years of growth where public spending reached 21% of the GDP followed. Nevertheless, when the 2008 crisis hit Portugal and the IMF intervened, the Portuguese Government was obliged to reduce the public deficit, which was 17% in 2017. However, shy signs of increment were registered in the last three years of the sample.

Gross Capital Formation (GCF)

According to the World Bank (2023), gross capital formation is the yearly addition of fixed assets to an economy and the net changes in its inventory. The relationship between gross capital formation and economic growth has sparked economists' interest over the years (Gill 1976), thus analysed in this report. The Harrod-Domar theory suggests that Capital Formation is the first step to economic growth (Pasara and Garidzirai 2020). One of the world's most notable economists on economic growth, Robert Solow, published a paper in 1962 studying the effects of capital formation on economic growth (Solow 1962). In it, he discovered that capital formation was a fundamental requirement for growth; however, it was not sufficient (Solow 1962). He argued the challenges faced during that time in obtaining the necessary data to prove his hypotheses (Solow 1962). Most recently, in 2021, the Environmental Science and Pollution Research produced an article on gross capital formation and economic growth across continents, using data from 1980 to 2018 (Aslan and Altinoz 2021). The comprehensive study drew a sizeable number of conclusions, such as capital formation negatively affects growth in European, Asian, and American countries but positively affects growth in African countries (Aslan and Altinoz 2021). Further, it detects a bidirectional causality between capital formation

and growth in Europe and Asia, meaning that both factors cause each other in a negative relationship (Aslan and Altinoz 2021).

In Portugal, there were two periods, around 1988 (27.9%) and 2000 (28%) in which this input represented all-time highs, and once again when EU funds were employed to improve the country's infrastructures, like highway constructions or stimulate the primary sector *(see Figure 5.8 in the appendix)*. Other than that, the figures revolved between 20-25% of Portugal's GDP before declining after the 2008 world crisis and registering their lowest result at 14.8%. Since then, the variable has increased and reached 20% in the last years of the covered period.

Golden Visa Investments

The primary focus of this study revolves around the ARI program, depicted as the Golden Visa Investments variable. Existing literature adopts a negative stance in discussing whether such programs significantly affect a country's economy. According to Kristin Surak (2021), any macroeconomic impacts are negligible, mainly due to the small size of RBI programs relative to the GDP in larger countries. She also states that some of the potential direct economic benefits from these programs may be diminished due to factors such as market costs, costs of competition, and the dynamics of service providers. Scherrer and Thirion (2018) argue that while RBIs do directly increase foreign portfolio investments and property investments, it is still undetermined whether the investments would have materialised regardless of the existence of the programs. On the other hand, Surak (2021), Scherrer and Thirion (2018) highlight potential spillovers from such programs, including secondary spending from investors, tax revenue, job creation, and, in the case of countries offering real-estate investments, increased construction activity. The Irish Government Economic & Evaluation Service's (2018) analysis of the Irish IIP program finds positive economic benefits from both the initial investment and ongoing investor activity within the country. However, they acknowledge complications in

estimating the net benefits while mentioning that entrepreneurial-based programs might show better results. The timeline of the ARI program's contributions has already been thoroughly explained in previous sections of this study *(see Figure 3 in the appendix)*. Notably, this variable has been included as a dummy variable in our study given its relative low proportion to the GDP of Portugal. Therefore, from 1985 to 2012, when the program was not active, the golden visa will be attributed a value of 0, and the period of 2013-2022, it will be given a value of 1. Here, it is essential to note that the Golden Visa program was launched in the last months of 2012 with only two approvals guaranteed in that year, so we have decided to start considering the presence of Golden Visas in the Portuguese Economy in 2013, as it was the first year that had palpable figures.

Independent Variable	Expected Effect
TRADE	+
GCF	+
UNEMPLOY	-
FDI	+
GOVCONSUM	+
INFLATION	-
EXENDED	+
GVI	+ *(not significant)*

Table 1: Summary of expected effect of the independent variables on GDP per capita growth

3.4. Econometric Methodology

From this point on, the variables in the models, both the dependent and independent variables, will be referred to according to the abbreviations provided in *Table 2*.

GDP per capita Growth Rate = **GDPPCGR**	Inflation Rate = **INFLATION**
Trade Openness = **TRADE**	Foreign Direct Investment = **FDI**
Unemployment Rate = **UNEMPLOY**	Human Capital = **EXPENED**
Government Size = **GOVCONSUM**	Gross Capital Formation = **GCF**
Golden Visa Investment = **GVI**	

Table 2: The Categorization of Variable Names in the Models

3.5. OLS Model

Setting up an Ordinary Least Squares (OLS) method with time-series data requires making many solid assumptions (Wooldridge 2015). Those assumptions include linearity in the model, weak dependency between the independent variables, no multi collinearity, zero expected value of the error term, homoskedasticity, and no auto collinearity between the independent variables. The last assumption is the most tedious, since the OLS model assumes observations are independent of each other, a difficult assumption to make using time-series data. In time-series analysis, the desirable statistical properties of the OLS include consistency and asymptotic efficiency. To ensure the latter, we increased the sample size from 10 observations (2013-2022) to 38 (1985-2022) to ensure the OLS estimate converges to their actual population parameters. Incorporating the GVI variable as a dummy variable enables us to do so. Additionally, extending the data for an additional 28 years ensures the validity of the Central Limit Theorem (CLT), as a larger sample size diminishes the correlation between the observations over time (Wooldridge, 2015). Asymptotic efficiency implies that the OLS estimates have the most minor variance, which increases the validity of the statistical inference, such as hypothesis testing and confidence interval decisions (Wooldridge, 2015). To obtain a reduction in the variance of the

data, achieve numerical stability, and make sure no single variable directs the analysis, we standardised the data. Standardising refers to transforming a random variable by subtracting each observation with the mean of all observations and dividing it by the standard deviation. The initial OLS regression formula is the following:

$$\mathbf{GDPPCGR_{i,t}} = \beta_0 + \beta_1 * \mathbf{Trade_{i,t}} + \beta_2 * \mathbf{GCF_{i,t}} - \beta_3 * \mathbf{Unemploy_{i,t}} + \beta_4 * \mathbf{FDI_{i,t}} + \beta_5 * \mathbf{GovConsum_{i,t}} - \beta_6 * \mathbf{Inflation_{i,t}} + \beta_7 * \mathbf{ExpendEd_{i,t}} + \beta_8 * \mathbf{GVI_{i,t}} + \boldsymbol{u_{i,t}}$$

While the model was set up to create the best possible fit with the time-series data, the assumptions of no autocorrelation and multicollinearity required a hands-on approach. To test for auto correlation, we set up a Durbin-Watson test, which test for autocorrelation in the regression errors (Durbin and Watson 1951). The test for auto correlation is particularly important when using time-series data, since OLS assumes observations are independent of each other (Wooldridge, 2015). The Durbin-Watson statistic, which ranges from 0 to 4 and a statistic of 2 indicates no autocorrelation in the sample when utilizing all eight independent variables was 2.045. Since the data set consists of only economic factors, we tested for multicollinearity using the Variance Inflation Factor (VIF) and a correlation matrix *(see Figure 6 in the appendix).* The VIF is used to identify multicollinearity between the independent variables (Mansfield and Helms 1982). A VIF between one and five indicate the variables are moderately correlated, whereas a VIF over five indicates that variables are highly correlated. Due to statistically insignificant coefficients and high VIF scores, the independent variables INFLATION and EXPENDED were excluded from the regression. The final model showed no significant correlation between the independent variables *(see Figure 7 in the appendix),* and the Durbin-Watson statistic remained stable at 2.052.

The final OLS regression formula is the following:

$$\mathbf{GDPPCGR_{i,t}} = \beta_0 + \beta_1 * \mathbf{Trade_{i,t}} + \beta_2 * \mathbf{GCF_{i,t}} - \beta_3 * \mathbf{Unemploy_{i,t}} + \beta_4 * \mathbf{FDI_{i,t}} + \beta_5 * \mathbf{GovConsum_{i,t}} + \beta_6 * \mathbf{GVI_{i,t}} + \boldsymbol{u_{i,t}}$$

However, a few caveats exist for the OLS model. First, the VIF for the variable Gross Capital Formation remained too high, with a value of 9.884. Secondly, the tremendous global turmoil and significant economic downturn in 2020, the first pandemic year, violates the assumption of normality of the residuals *(see Figures 8 and 9 in the appendix).* Considering that 2020 is the only outlier in our study, we retain it as an observation, so we do not deviate from our primary objective of determining the effect of the GVI variable and preventing overfitting the model.

3.6. VAR Model

In a VAR model, variables must be tested for stationarity. The Augmented Dickey-Fuller (ADF) and the Phillips Perron (PP) null hypothesis assess whether a unit root is present in a univariate time series dataset. Stationarity is essential in time series as it eliminates trends, cycles, or random walks happening in the data. It is useful when using analytical techniques on the data and forecasting results. It is unnecessary to check the stationarity of the dummy variable.

Testing the raw data resulted in the variables Trade, Unemployment, Expenditure on Education, Government Consumption and Gross Capital Formation with high P-values in both stationarity tests. There is weak evidence to reject the null hypothesis as these variables are non-stationary. The Differencing method stabilises the mean and variance, eliminating these trends and seasonality. While representing a variable of the time series at time t as Yt, the first difference can be written as (Yt - Yt-1), being able to extend to higher orders. After using the first-order differencing to obtain stationarity in results, all variable's test-statistic values become a large

negative number, rejected in the null hypothesis at 5% significance. Thus, variables are stationary, and the VAR Model can be produced.

4. Results and Discussion

Independent Variable	Expected Effect	Observed Effect (OLS)	Observed Effect (VAR)	Statistical Significance (OLS)	Statistical Significance (VAR)
TRADE	+	+	-	YES	NO
GCF	+	+	+	YES	YES
UNEMPLOY	-	+	+	NO	YES
FDI	+	-	+	NO	NO
GOVCONSUM	+	-	+	YES	NO
INFLATION	-	n/a	-	NS	NO
EXENDED	+	n/a	-	NS	NO
GVI	NS	+	+	NS	YES

Table 3: Summary of expected and observed results for the OLS and VAR (lagged) models

4.1. OLS Model

The OLS regression results indicate a good fit for the model. First, the Omnibus Test indicates a low probability of 0.000 and favourable Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Log Likelihood figures. However, as mentioned before, the shape of the distribution of the residuals indicates a violation of the normality assumption, with a Kurtosis value of 11.018 and a Skewness of -2.262.

This is because we left 2020 as an observation in the model. The R2, which measures what proportion of the variance in GDPPCGR is explained by the independent variables (TRADE, GCF, UNEMPLOY, FDI, GOVCONSUM, GVI), is approximately 0.581. This means that our independent variables can explain 58.1% of the variability in GDP per capita growth over the 38 years of time-series data.

Independent Variable	Coefficient	t	P > |t|
TRADE	0.0209	2.730	0.010
GCF	0.0293	2.589	0.015
UNEMPLOY	0.0098	1.236	0.226
FDI	-0.0046	-1.024	0.314
GOVCONSUM	-0.0141	-3.375	0.002
GVI	0.0007	0.071	0.944

Table 4: Summary of regression results for the OLS model

We adopt a 95% confidence interval to interpret the coefficients' significance. With p-values of 0.010, 0.015, and 0.002, Trade Openness, Gross Capital Formation, and Government Consumption emerge as the only statistically significant variables *(see Figure 10 in the appendix)*. While trade openness and gross capital formation show positive effects on GDP per capita growth, government consumption, which represents the total national income allocated to government spending on goods and services, negatively affects GDP per capita growth for Portugal. With a coefficient of 0.0007, the Golden Visa Investments variable demonstrates no significant effect on GDP per capita growth. It is important to note that the interpretation of this coefficient is redundant, as the results for this variable were not statistically significant. Next, we examine the results from the more comprehensive VAR model.

4.2. VAR Model

4.2.1. Pre-valuation

The lag order selection criteria must be incorporated into the variables in a VAR model. Using the minimisation criteria of the Schwarz Bayesian Information Criterion (SBIC), the optimal lag used for the model is 1 *(see Figure 11 in the appendix).* Also, as the dataset presents annual

data frequency, using lag one as a predictor for current results is a reasonable assumption. The VAR model can now be constructed and thoroughly analysed in the section below.

4.2.2. Summary of Regression Results

The VAR model provides detailed information on how it performed with all nine variables and 36 observations *(see Figure 12 in the appendix)*. In a VAR model, many criteria for goodness of fit are being measured, all trying to indicate if the model has a good or bad fit. The model's log-likelihood is 1006.255, a high value, indicating a good fit. The Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and Schwarz Bayesian Information Criterion (SBIC) are (50.90304), (49.52131) and (46.94424), respectively. Besides measuring the goodness of fit, these criteria analyse the model's complexity and favour low values. The Final Prediction Error (FPE) also measures the goodness of fit, and the small value of 7.23e-34 indicates an excellent fit for the model.

The Determinant of the Omega Maximum Likelihood Estimate (Det (Omega_mle)) provides data on the covariance matrix of the data, as it measures the spread, volume, and correlation of the whole structure of the model. Low values indicate multicollinearity between variables, and the meagre value of 4.26e-36 reflects this problem. Multicollinearity occurs when two or more variables are highly correlated in a model, leading to unstable coefficients and tampering with the interpretation of the results.

4.2.3. Vector Autoregressive Model

Using the expanded VAR model for each variable in the model below, the equation becomes the following:

$$\begin{bmatrix} Y_{1,t} \\ Y_{2,t} \\ \vdots \\ Y_{k,t} \end{bmatrix} = \begin{bmatrix} a_{11,1} & a_{11,2} & \cdots & a_{11,k\cdot p} \\ a_{21,1} & a_{21,2} & \cdots & a_{21,k\cdot p} \\ \vdots & \vdots & \ddots & \vdots \\ a_{k,1} & a_{k,2} & \cdots & a_{k,k\cdot p} \end{bmatrix} \begin{bmatrix} Y_{1,t-1} \\ Y_{2,t-1} \\ \vdots \\ Y_{k,t-1} \end{bmatrix} + \begin{bmatrix} a_{12,1} & a_{12,2} & \cdots & a_{12,k\cdot p} \\ a_{22,1} & a_{22,2} & \cdots & a_{22,k\cdot p} \\ \vdots & \vdots & \ddots & \vdots \\ a_{k,1} & a_{k,2} & \cdots & a_{k,k\cdot p} \end{bmatrix} \begin{bmatrix} Y_{1,t-2} \\ Y_{2,t-2} \\ \vdots \\ Y_{k,t-2} \end{bmatrix} + \cdots + \begin{bmatrix} a_{1p,1} & a_{1p,2} & \cdots & a_{1p,k\cdot p} \\ a_{2p,1} & a_{2p,2} & \cdots & a_{2p,k\cdot p} \\ \vdots & \vdots & \ddots & \vdots \\ a_{kp,1} & a_{kp,2} & \cdots & a_{kp,k\cdot p} \end{bmatrix} \begin{bmatrix} Y_{1,t-p} \\ Y_{2,t-p} \\ \vdots \\ Y_{k,t-p} \end{bmatrix} + \begin{bmatrix} u_{1,t} \\ u_{2,t} \\ \vdots \\ u_{k,t} \end{bmatrix}$$

Where:

$$Y_t = \begin{bmatrix} GDPPCGR_t \\ GVI_t \\ Inflation_t \\ Trade_t \\ GovConsum_t \\ ExpenEd_t \\ FDI_t \\ Unemploy_t \\ GCF_t \end{bmatrix}; \qquad k = 9; \qquad p = 1; \qquad t = 36; \qquad u = constant;$$

The VAR model in Stata provides us with a summary of all measured variables *(see Figure 12 in the appendix)* and how it performed in the model with all its parameters using the test with a 5% significance. Results interpret a statistically significant p-value for the variables: GDP per capita growth rate, Inflation, Trade, FDI, Unemployment, Gross Capital Formation and Golden Visa Investment. The test suggests that these variables are jointly significant in supporting the model's explanation for economic growth. The variables that were not statistically significant for the model were the Government's expenditure on Education and the Government's total final expenditure. The section below will dive into the GDP per Capita growth rate as a dependent variable. Although the other variables are also considered dependent variables in a VAR model, they will not be analysed in this study as they are not part of our analysis proposal.

4.2.4. GDP Per Capita Growth Rate

Three explanatory variables from the VAR Model had positive coefficients and were statistically significant when tested with the dependent variable, GDP per Capita Growth Rate *(see Figure 13 in the appendix).* Those lagged variables were Unemployment, Gross Capital Formation, and Golden Visa Investment, and their respective p-value results were 0.001, 0.026, and 0.020. However, our initial hypothesis for the three variables was proven wrong as we predicted Unemployment and GCF would hurt GDPPCGR, and the Golden Visa Investment would not have a statistically significant effect on economic growth. The constant variable that

explains the exogenous shocks in the model had a coefficient of 0.0002074 and a p-value of 0.941. It is not statistically significant to imply that the exogenous variable in the model is a good predictor to explain economic growth. The lagged variables of GDP per Capita Growth Rate, Inflation, Trade and Government expenditure on Education all had negative coefficients and p-values of 0.254, 0.646, 0.764 and 0.864, respectively. Like the constant variable, these results are not statistically significant to explain the dependent variable. Besides, the lagged variables for FDI and Government Final Consumption expenditure were also not statistically significant, having positive coefficients and p-values of 0.510 and 0.319, respectively.

4.2.6. Impulse Response Function

Impulse response functions (IRF) are used to explain the reaction of variables in a system while they are shocked against a specific external change. The intensity of the shock corresponds to standard deviation of the chosen variable for the shock, and the results are measured at a 95% standard error confidence interval. Graphs of IRFs were plotted as they tried to analyse the shock of having a golden visa programme (impulse variable) present in an economy against all other variables (response variables) *(see Figure 18 in the appendix)*. It is worth mentioning that due to the "difference" method applied to the variables before constructing the VAR model, the percentage magnitude is scaled down for all results. The most significant impact of the golden visa program is seen in the IRF test against the TRADE variable. The program's implementation positively shocks the variable for the sum of net exports and imports as a percentage of GDP, with levels increasing by +0.04 and confidence intervals ranging from +0.07 to 0.00 in one year. The percentage change stabilises in the fourth year and maintains steady levels throughout the twenty years. However, the confidence interval increases as time passes, ranging between +0.07 and (0.04) in the twentieth year, suggesting a variability in results in the long run. In their first two years, the GDP per capita growth rate and inflation variables predict a short-run increase in percentage levels as the golden visa program is implemented. The shock is more

visible in the short run in GDPPCGR levels as it increases to +0.03, with confidence intervals between +0.05 and 0.00. However, a nation's economic growth enjoys the program's presence in its Economy only in the short run. The variable INFLATION has a less significant increase of +0.02 and a confidence interval ranging from +0.03 to 0.00. However, the long-run response of inflation suggests more variability as the confidence interval bands range from +0.05 to (0.02). Results can be interpreted that the presence of the golden visa can create volatility in prices in the long run, forcing governments to stabilise their Economy with monetary policies. The IRF test of GVI with the variables FDI and UNEMPLOY have small negative responses to implementing the programme while maintaining variability in the long run. The impact on FDI happens as GVI shocks the variable, and the confidence interval remains steady over the 20-year measured period. By implementing the golden visa program in Portugal to attract foreign investment, the focus on investing abroad is slightly diminished in the short run. While Unemployment does decrease eventually with the implementation of the Golden Visa program, the shock is only apparent after two years, and the confidence interval widens in the 20 years, between 0.01 (and 0.04). As foreign capital enters the Portuguese Economy, new jobs are created, decreasing the unemployment curve. The IRF test of GVI with the variables EXPENED, GOVCONSUM and GCF shows almost no impact whatsoever in the results, with the confidence interval variation changing a tiny fraction for the GOVCONSUM and GCF variables overall. The EXPENED variable has no variation in the confidence interval, implying that governments do not change their policies towards expenditures on Education whether a golden visa program is present. The same can also be predicted for its total expenditure for the public and the gross capital formation.

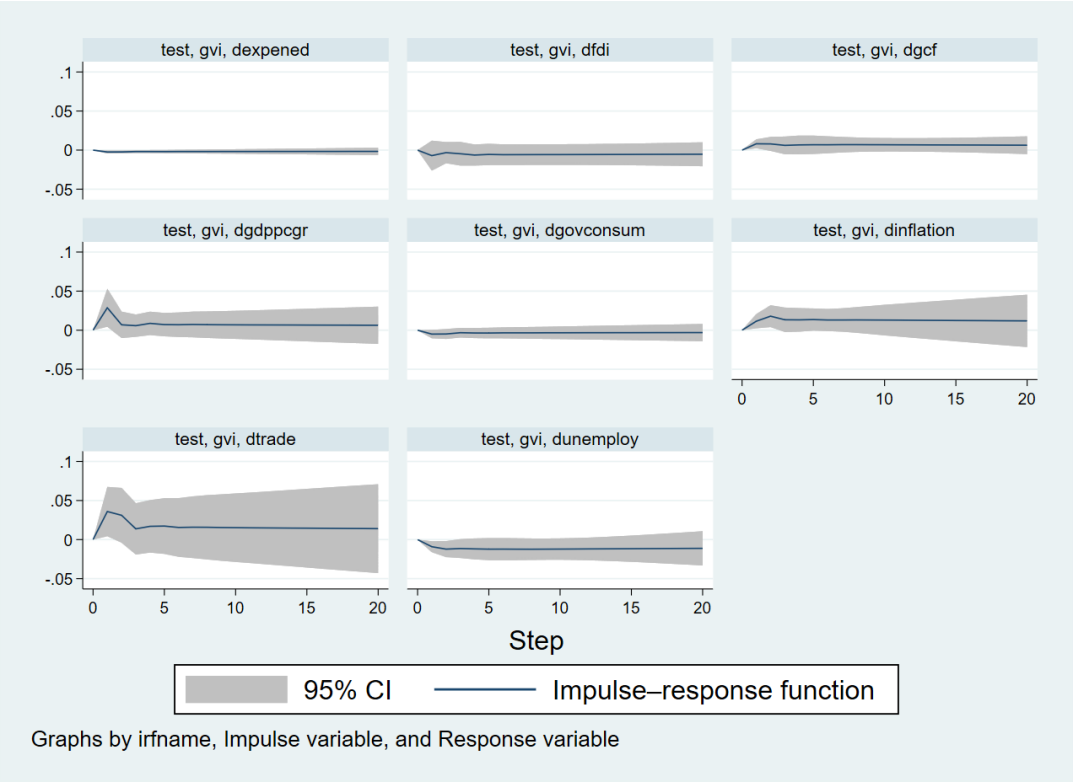


Figure 18: Impulse Reaction Functions (IRFs)

5. Implications for the Portuguese Population

As we have analysed the impact of the ARI Program on the Portuguese Economy, we now focus on the potential implications the program could have on Portuguese society. Guided by the concerns of the European Commission, the European Parliamentary Research Service, and other independent institutions, in this section, we outline the application process for the ARI program and highlight the existing concerns on the practical aspects of the background checks and due diligence procedures designed to safeguard the integrity of the program and mitigate any negative externalities. Additionally, we examine whether the presence of the investors and their families strains the social welfare systems in Portugal.

5.1. The ARI Program Application Process

During the application process, the applicant must make two trips to Portugal (Henley & Partners Portugal, 2023). The first visit is made when the investor chooses the investment option, formally starts the legal process, and opens a Portuguese bank account. The second visit involves providing biometric data and the original documentation *(see the full ARI program application process in Table 5 in the appendix).* The required documentation that the applicant must submit includes proof of investment, proof of health insurance, a criminal record certificate, and other relevant documents. Upon submission, the application undergoes formal processing and investigation by SEF (SEF, - Serviço de Estrangeiros e Fronteiras 2017). This step involves verifying the authenticity of the documents, as well as conducting background checks. In a paper published in 2018, Transparency International Portugal (TI-PT), an independent non-profit utility organisation whose mission is to combat corruption, promote transparency, and good governance, among other objectives, displayed several doubts about the framework's design and highlighted potential vulnerabilities. Some of the raised concerns included inconsistent rules, meaning that the border and services officials sometimes applied different criteria when reviewing the applications and supporting documentation. TI-PT also pointed to poor audit trials, inadequate filing of necessary documentation, and poor communication between public officials and the applicant (Transparency International, 2018). Additionally, applicants were only required to provide a police certificate from the country of origin, meaning any ongoing investigation or criminal complaint outside of Portugal or the investor's home country could have been missed. In 2019, TI-PT secured a legal victory against the Portuguese Ministry of Internal Affairs, compelling the disclosure of relevant statistical information regarding the ARI Program. The requested information included the number of visas issued, the nationalities of the participants, the number of investments per option, job creation, rejections, cancellations, contacts with authorities, and impact assessments of the

program (Transparency International Portugal 2020). At the time, the Government openly acknowledged the absence of some of this information. However, as mentioned earlier, Portugal still distinguishes itself from most European Union counterparts in disclosing significant statistical information on their RBI program to the public.

Lessons can be drawn from the case of the Hungarian RBI, in which residency bonds were granted to individuals who were potential security risks, notably Atiya Khoury, who had been linked to Syria's regime and sanctioned by the United States of America (Blanka 2018). The Hungarian program faced criticism for a lack of due diligence, obscure governance, and probable corruption, resulting in substantial financial losses for the country. Although the precise reasons for the program's closure in late 2017 are not formally known (Wiedemann 2018), these circumstances had a negative effect.

Portugal should persist in emphasising transparency, conducting rigorous background checks, and upholding due diligence procedures to mitigate any security threats and financial discrepancies while ensuring the credibility and integrity of its own RBI program within the EU framework. The new Portuguese immigration authority, the Agency for Integration, Migration and Asylum (AIMA), which replaces the former Immigration and Borders Service (SEF) and will undertake these responsibilities from now on, presents an opportunity for a significant new beginning.

5.2. Social Welfare

A common issue raised regarding immigration within the EU revolves around the perception that immigrants may pose a strain on public finances and exploit social welfare systems like healthcare and education (European Commission 2020). Nevertheless, third-country nationals participating in this scheme are wealthy and usually have private health insurance. Moreover, the initial application and renewal process requires investors to present proof that the National

Health Service covers them/or demonstrate that they hold internationally recognised health insurance for the permit period (SEF- Serviço de Estrangeiros e Fronteiras 2017). Additionally, as of September 2023, the ARI Program has issued 20,424 residence permits, including those for family members (SEF- Serviço de Estrangeiros e Fronteiras 2023). Meanwhile, the total number of first-time residence permits granted in Portugal for the same period is over 600,000 (Data Browser | Eurostat 2023). Also, Surak and Tsuzuki (2021) interpret that investors often select RBIs like tourists or businesspeople rather than conventional immigrants (Surak and Tsuzuki 2021). The applicants' preference for programs with minimal physical presence requirements (Scherrer and Thirion 2018) further backs up this claim.

6. Investment Funds – The Future of the Program?

As we previously mentioned, on September 30th 2023, the Portuguese Government decided to eliminate some of the modalities of the Golden Visa program, more precisely subparagraph 1 (Capital transfer with a value equal to or above €1,500,000), subparagraph 3 (Purchase of real estate property with a value equal to or above €500,000) and subparagraph 4 (The purchase of real estate property, with construction concluded for more than 30 years or located in urban regeneration areas, carrying out rehabilitation works, for a total value equal to or above 350,000 euros). (Lei n.º56/2023 de 6/10, Capítulo V - artigos 42º a 44º).

Therefore, the remaining possibilities to subscribe to Golden Visas will get more visibility and traction. As we stated at the beginning of this study, the Investment Funds alternative has been gaining some reputation among investors. After years of non-existent to irrelevant stakes in the Golden Visa panorama, these funds represented 0.42%, 2.68%, and 6.20% of the total investment during 2019, 2020 and 2021, respectively *(see Figure 4 in the appendix)*. Furthermore, in 2023, subparagraph 7 accounted for 22.24% of total approvals to the program *(see Figure 2 in the appendix*). The rumours around the future of the program and the "Mais Habitação" were some of the factors that might have led the new Golden Visa investors to use

alternative modalities to Real Estate. Venture Capital funds were the ones that most benefitted from these changes, with the SEF Authority indicating a significant increase in the number of requests for this form of RBI (Atlanticorp 2022). Therefore, it is paramount to develop a thorough analysis of the Portuguese Venture Capital ecosystem to acknowledge the impact this could have on it and understand how the Golden Visa program could leverage this opportunity to remain relevant and survive. However, it is also fundamental to understand the competitive environment regarding RBI/CBI programs where Portugal is concerned. The most direct competitors of the Portuguese Golden Visas are the rest of the European countries and their respective programs. With Real Estate out of the picture, the program will likely lose investors keen on acquiring their Visas through the Real Estate modality. To better assess the relevance of Real Estate in this Golden Visa framework, we need to look at the characteristics of these assets and the profile of those Golden Visa applicants who prefer this alternative. Firstly, investing in Real Estate is much simpler as it requires less expertise and awareness of a country's idiosyncrasies, automatically reducing risk. Additionally, in terms of valuation, the asset is far less risky due to its nature than participation units in investment funds. Hence, despite Portugal's VC industry's growth and ability to accommodate new Golden Visa investors, these investors will look for opportunities abroad because there needs to be more real estate for a specific subset of them. One remarkable finding from discussions on this topic with Bison Bank is the impact of culture on the kind of investment a person is most likely to select. Anglo-Saxon investors, for instance, tend to subparagraph 7, as they are more comfortable with investment funds and entrepreneurial endeavours. South American and Asian investors, on the other hand, usually choose the real estate modality. This program change may represent a turning point in the typical investor profile, an important realisation. Considering everything already discussed, it is crucial to consider all the pertinent information regarding how this novel approach may affect

the program's future. This exercise will enable us to advise Bison Bank on how to successfully adjust to and thrive within the new Golden Visa framework.

6.1. The Venture Capital Way

Venture Capital is "a form of equity financing that funds startups and early-stage emerging companies with little to no operating history but significant potential for growth." These companies sell ownership stakes to venture capital funds in return for financing, technical support, and managerial expertise. (Forbes 2023). The goal of a VC firm is to buy a minority share in a relatively early stage in the life of a startup, finance and help it grow, increase its value and profitably exit at a later stage, either by selling its participation to a third party or via an Initial Public Offering (IPO). Like other private equity funds, Venture capital earns its revenues by charging management and performance fees to its investors, the so-called Limited Partners. There are several stages where a VC firm can invest and add a company to its portfolio: Pre-Seed and Seed Rounds (smaller amounts of capital to help startups achieve Minimum Variable Product and kick-start their Business Plan), Early Stage Funding (Series A, B and C; more significant amounts of capital to help companies in their first stage of growth) and Late Stage Funding (Series D and E; even more significant amount of capital to prepare companies for IPOs or consolidate their position). On a global scale, Venture Capital has been living its worst year in 2023, with venture funding reaching $73 billion worldwide in the third quarter of 2023. Even though this is a slight increment from the second quarter of 2023, it represented a 15% decrease from the $86 billion raised from VC companies in the same period in 2022. (Crunchbase 2023). However, Artificial Intelligence (AI), Semiconductors and Sustainability sectors have been able to grant substantial amounts of funding, which have contributed to easing the slide above in VC. AI startups alone have achieved $10 billion in funding, whereas Semiconductor companies have raised $4.5 billion (Crunchbase 2023). These numbers help us understand another unique feature of Venture Capital – its fundamental impact

on promoting technology and innovation (Kortum & Lerner 2000). For this very reason, and admitting that, henceforth, the Golden Visa will mostly rely on VC, it is not dull to affirm that the Portuguese RBI program can help foster economic growth through investments in innovative businesses.

In fact, Samila and Sorenson (2011) studied the impact of Venture Capital and Entrepreneurship on economic growth and found a positive and significant effect. The findings were that an increase in the venture capital availability positively influenced the number of new businesses, employment, and aggregate income. The authors state that this may be so because venture capital allows entrepreneurs to pursue less developed and more uncertain ideas that they would not have taken forward otherwise.

6.2. The Portuguese VC Ecosystem

Portugal has seen a rise in venture capital funding over the past ten years. Portuguese venture capital was underdeveloped in 2012, making it unappealing to investors and entrepreneurs from other countries and those from Portugal. Portugal's share of venture capital transactions in Europe was only 0.1% of the total transacted. However, between 2012 and 2022, the former grew by 13% and the latter by 54%. These increases were crucial in the 85% growth in the number of startups that were incubated, as well as the emergence of seven unicorns with Portuguese ancestry (Portugal Ventures 2022). By the end of 2022, 113 funds were managed in Portugal, and 71 were active venture capital firms, according to the same publication. Moreover, the total funding amounted to $1 212M. (CMVM 2022). According to the same report, the year where the invested capital in VC most grew was 2015, representing a 53.5% increase relative to 2014 and achieving $720M. However, the following years were stable, even decreasing -3.3% in 2016 and -13.8% from 2017 to 2018. On the contrary, the last three years have been hectic in this aspect, with a continuous growth in funding since 2020 that peaked at

$1 212M in 2022 (ibidem). Nevertheless, there is an important data point in this analysis: the invested amount in Portuguese Startups decreased by 41% in 2022 (from $1 417M to $839M), according to an Armilar Venture Partners report, which also attributes this to the general rise in interest rates and subsequent reduction of the market valuation of tech companies. It would not make sense to describe the Portuguese VC ecosystem without referring to their most successful stories: the unicorns - firms whose valuation is above $1 billion (The Economic Times 2022) - they have nurtured. In this regard, by the end of 2022, Portugal ranked at the top on the list of "Most number of unicorns per billion invested" relative to the period 2020-2023, with 7.2 unicorns per billion dollars invested. Curiously enough, Portugal has six unicorns and one former unicorn. The first Portugwuese startup to reach unicorn status was Farfetch (a luxury marketplace), which was listed on the New York Stock Exchange in 2018 and currently has $462.6M market capitalisation, meaning it is no longer considered a unicorn. The second one was OutSystems (a low-code B2B platform) in 2018, currently valued at $9.5 billion. In 2021, Talkdesk (a cloud-based platform for contact centres) was valued at $10 billion, becoming the third unicorn with Portuguese DNA. The year 2021 will be viral in this sense. Feedzai (financial fraud detection software) raised a $200 million Series D round, which granted them a $1.5 billion valuation and respective unicorn status, and the same happened with Remote (Global HR solutions), whose valuation was $1 billion. SwordHealth (digital solution for treating musculoskeletal pathologies) and Anchorage (crypto assets fintech) achieved unicorn status, closing a perfect year for the Portuguese VC and startup environment (Eco Sapo 2021). Other initiatives from the Portuguese Executive and local councils were key to aiding new businesses like these and many others to grow and expand to international dimensions. Web Summit Lisbon is one of them. The biggest technological event in Europe brings together big corporate tech companies (like Google, Amazon, Apple, and IBM), startups, investors, and founders, ranging from serial entrepreneurs to new ones, promoting innovation and business and

networking opportunities. Likewise, at the end of 2022, Lisbon City Council introduced the Unicorn Factory Lisboa, which offers financial support, mentorship, and physical infrastructure in the form of "innovation hubs" to assist newly established Portuguese businesses with their scaleups foreign startups looking to expand into Portugal as well as foreign startups looking to expand into Portugal. Similar projects like Startup Porto or Startup Braga are underway in other significant cities. To contextualise the situation and derive insights from Portugal's venture capital success story, consider that the value of the first six unicorns at the end of 2021 was €34.2 million, 16% of the country's GDP or 44% of the PSI-20 index. Even without real estate options, this background may persuade investors under the Golden Visa program to select Portugal over other European nations. As mentioned, Portugal has several formidable venture capital firms, including Armilar, Indico, Shilling, Faber Ventures, and Kibo (Medium 2019). To persuade international investors to apply for Golden Visas in Portugal under Subparagraph 7, they must position themselves as solid investment opportunities. The management expertise, outstanding track record and previous fund performance must be "sold" as valuable for the investor's capital. Since venture capital is a risky activity—much riskier than real estate for several previously discussed reasons—knowledge and experience are essential to earning investors' trust when they invest in these kinds of assets.

6.3. How are Banks surfing the VC wave?

6.3.1. Literature review on the Banking Sector VC approach

There are some literature hypotheses for why the banking sector may be interested in investing in Venture Capital. Hellman, Lindsey, and Puri (2008) examined the role of banks in the Venture Capital sector. Their findings suggest that banks start investing in Venture Capital to build trustful relationships that could be advantageous in the loan market rather than striving in the early-stage investments market. According to the authors, some of the reasons for this may be banking regulation and risk avoidance, as most US regulatory environments prohibit or

constrain lending to high-risk sectors. That is why they use VC deals to foster future lending opportunities to companies with which they are already familiar. That also justifies the lack of value-added support Bottazzi, Da Rin and Hellman (2007) found in Venture Capital deals made by banks. Banks are focused on building on these investments to convert them into lending relationships, so having an infrastructure that allows mentorship and value-added support is outside their list of priorities. However, Hellman (1997) interviewed banking sector executives. Besides the shared strategic goals (entering the equity market, diversifying financial instruments, and increasing expected returns), the motives for entering Venture Capital included leveraging the brand names, their network branches, the investment skills of their teams and their knowledge of traditional businesses' financial needs. Moreover, VC is presented as an opportunity to manage and liquidate problematic loans since it allows banks to participate in the borrowers' equity.

6.3.2 International banks operating in the Venture Capital Sectors

Some of the most distinguished international investment banks have their own Venture Capital arm. At a global level, Goldman Sachs has invested in growth equity through GS Growth. Their main verticals are Enterprise Technology, where they invested $6.1 billion in more than 130 companies; Fintech, in which they financed +40 businesses in a total amount of $2.8 billion; and Healthtech, with $1.5 billion invested among +35 startups (GS Growth 2023) Likewise, Citibank also has Citi Ventures as its VC arm which has made over 200 investments since 2010 and has 154 companies in its portfolio. Their preferred fields include Fintech, Data Analytics and Machine Learning, Proptech, DLT, and digital Assets (Citi Ventures 2023). There are also some examples worth highlighting at the European scale. Barclays opened Barclays Ventures in 2018 to pursue Venture Capital opportunities in the fintech and software fields (Unicorn Nest 2023). Still in the UK, HSBC founded HSBC Ventures, aiming to leverage the VC's success, focusing on financial crime detection, cloud data and analytics, Sustainability and digital

banking while partnering with Accel, a prominent American VC firm. In France, BNP Paribas Asset Management created Opera Tech Ventures to address their investor needs for VC alternatives, partnering with the famous VC fund Plug & Play Ventures (Opera Tech Ventures 2022). Although they have only closed five deals, their focus is on fintech, open-banking and digital payment solutions. For its part, UBS launched UBS Next in 2020, a $200 million fund that targets fintech and other technological companies in coding, microservices architecture and AI (UBS, 2020). Finally, and already in the Iberian context, Santander spanned out Mouro Capital, its fintech $400 million Venture Capital branch, after the previous success of Santander Innoventures, which yielded a 1.75x cash-on-cash multiple around their 36 investments (Santander 2020) and Caixa Bank (Portuguese Bank BPI's acquirer) counts over 100 companies in its Caixa Capital Risk portfolio.

6.3.3. Portuguese Banks Venture Capital Initiatives

Regarding the Portuguese framework, some prominent banks are starting to surf the Venture Capital wave by opening specific units to start investing in this asset category.

Caixa Capital is one of them, and it has €230 AUM between Private Equity and Venture Capital. Caixa Capital has made over 30 investments in the VC arm, including some very well-known names in the Portuguese startup ecosystem, such as Unbabel, Uniplaces and MyCareforce. Additionally, Caixa Capital is a Limited Partner in some famous VC funds from Portugal (Shilling, Faber, and Oxy Capital) and abroad (Seedcamp, Endeavour and Headline) (Caixa Capital 2020). In 2016, Banco BIG started its venture capital endeavour by raising BIG Start Ventures, a B2B early-stage fund focused on financial services. Having had four successful exits since, the fund counts 15 companies within its portfolio, with a highlight for Coverflex, an employee benefits company with a valuation rounding €100 million. Start Ventures' portfolio companies have raised +$365 million among global investors (Start Ventures 2023).

Additionally, Crédito Agrícola invests in disruptive businesses in Fintech, Insurtech Regtech, and Agrotech and Sustainability through its wholly owned CA Capital risk fund. (Credito Agricola 2023)

6.4. How should Bison Bank adapt to the new Golden Visa framework?

Since we have drawn the picture of Venture Capital dynamics, its paradigm in Portugal and the way banks are approaching it internally and around the world, we are now in a better position to advise Bison Bank on what measures they could implement when aiming to thrive in the new Golden Visa reality.

6.4.1. Recommendations

1. **Become a Limited Partner in existing Venture Capital funds**

Based on the previous description of the positive evolution of the Venture Capital industry in Portugal and the new framework of the Golden Visas that does not allow for Real Estate investments or Real Estate funds, we advise Bison Bank to start offering their clients the possibility of applying to Golden Visas through Venture Capital. As we have mentioned in the Golden Visa's Investor Profiling section, a report by the European Parliamentary Research Service (2018) enumerated the main reasons for a foreign investor to apply to an RBI program and none of those included risks or returns of the investments. Nonetheless, there may be investors who are very keen on applying through investment funds and those who are more reluctant. Bison's efforts should concentrate on the latter. To address the investors who might need more confidence about investing in Venture Capital, Bison must convince them that the VC firms they will invest in are reliable. There are two essential aspects in this matter: track record and alignment of interests. Regarding the former, Bison must thoroughly study the several VC funds based in Portugal and understand which fit their investment thesis with the subparagraph seven regulation that obliges them to deploy 60% of their fund in Portuguese-

based startups. The ideal partners for Bison Bank will be those who combine this aspect with an outstanding track record that shows that the investor's money will not only be safe but, more than that, it will probably be multiplied, even though none of these have been empirically displayed as a priority. Furthermore, Bison Bank could open a so-called "Fund of Funds" where the Golden Visa investors could buy participation units. However, compliance with the program could be easier if done this way. Secondly, to demonstrate the genuineness of these beliefs on the success of the Venture Capital modality, it would be highly advisable for Bison to open positions and gain exposure in the same funds that promote, signalling a fundamental alignment of interests to the investors.

2. Open their own VC branch

Joining the Venture Capital industry by creating its own VC team and investing directly into the firms, offering investors the possibility to apply to Golden through a Bison Bank fund.

Hellman, Lindsey, and Puri (2008) found that Venture Capital could be a channel for banks to build trustful relationships with institutional entities so that they could become secure and trustworthy loanees. As an investment bank, their approach differs from those who operate in retail banking. However, Bison also have their own Depositary and Custody Services, and Venture Capital could also work to favour that business unit, promoting it to Bison's potential portfolio companies. Furthermore, besides offering a straightforward solution to their Golden Visa clients, this new Bison fund would give investors who already trust them an instrument in which they would feel comfortable putting their money. From Bison's perspective, which would also solve fundraising problems that may arise when launching a new fund. Another important data point to remember while analysing this scenario is the synergies this new unit could have with the existing services Bison offers that would not only serve as a particularly good starting point regarding reputation and capacity to execute but also limit the necessary initial investment levels. For example, depending on the stage of the deals, existing M&A and valuation teams

could provide expertise on which investments Bison should pursue and suggest adequate terms for the deals. Finally, the most important "unfair advantage" Bison can leverage compared to other banks considering entering this space is Bison Digital, their own crypto assets subsidiary, which has been live since the beginning of the year. Digital assets are all about technology and innovation, two of the dearest concepts to the Venture Capital ecosystem. Bison could use their expertise in crypto markets and fintech to surf the new wave of innovative financial solutions, focusing on investing in the most innovative startups who would need their funding and guidance to strive in tomorrow's world. Being in contact with the most recent and disruptive solutions would also enhance the solutions they could offer their Wealth Management clients, for example, and mitigate the risk that these High-Net-Worth Individuals migrate to competitors, offering a complete range of opportunities.

7. Conclusion

In this study, we employed two different approaches to estimate the macroeconomic impact of the ARI Program on the Portuguese Economy, revealing conflicting outcomes. While the OLS model indicates a statistically insignificant positive effect, the VAR results implies otherwise. The lagged variable for Golden Visa Investment in the VAR model proved to have statistically significant results in its impact on GDP per Capita Growth rate. The variable had a positive coefficient of 0.0287336 and a p-value of 0.020, highlighting the program's overall importance for Portugal's economy. Inserting the Golden Visa Investments variable as a dummy may have influenced both models, potentially overlooking the program's scale relative to the size of the Portuguese economy. Moreover, the absence of comprehensive data disabled the inclusion of indirect positive contributions, such as secondary spending by the investors, increased construction activity, additional tax revenue, and job creation within Portugal's network of service providers. These indirect factors could establish the ARI Program having a greater impact on the Portuguese economy than our results indicate. Despite concerns from the

European Unions' governing bodies and other independent institutions, Portugal's ARI Program has remained free of any major controversy and the government has showcased adequate transparency and implementation of procedures. However, emphasis is placed for the Portuguese government to persist in the effort of mitigating any future uncertainties. Furthermore, the inclusion of investors and their families in the Portuguese society does not appear to present a strain on social welfare service. With the new legislation firmly established as of October 2023, the question of the program's existence is resolved. Looking ahead, the significance of Subparagraph 7, the VC and investment funds option, is widely acknowledged as the primary source of generated funds for the program in the coming future. The shift from real estate and capital transfer investments to VC and investment fund alternatives will potentially offer more direct and positive effects on the Portuguese economy. Further developments and research are necessary to estimate the implications of this transition. The remarkable growth of the Portuguese VC market over the past decade, along with the anticipated accumulation of new funds from the ARI program provide optimism for the future of the program.

8. Thiago Medeiros – The Impact on the Housing Market

The following section analyses the Golden Visa's macroeconomic impact on the Portuguese Housing Market.

Introduction

Since the 2008 subprime mortgage crisis in the US, there have been many empirical studies on real estate markets. (Bouchouicha and Ftiti 2012). The establishment of the Golden Visa program came into effect as a response to the economic and financial crisis 2008 and the 2011 debt ceiling crisis (Amante and Rodrigues 2021). As an immigration policy to attract foreign investments, European Union countries have widely explored the Golden Visa over the past years. It has often been accused of destabilising real estate markets (Surak 2021).

This research aims to analyse further the impact of the Golden Visa on Portugal's housing market. It measures the Golden Visa Programme's effect on the median value of residences in Portugal. The research also includes the changes made to the program and how these policies impacted the housing industry.

In the literature review, I will introduce 'Government policies' as one of the main drivers for real estate growth in a country. Also, I will contextualize the history surrounding the real estate branch in the golden visa document. Next, I will produce an econometric model considering the implementation and policy changes done to the Golden Visa on municipality-level property prices. The model uses data from the *'Instituto Nacional de Estatistica'*, the Portuguese Government office for national statistics. Results from the Model indicate that implementing the Golden Visa and its changes had positive and statistically significant effects on the housing market. However, undesired significant changes were also observed in the Model, further developed in the conclusion.

Although there are a few studies on the impact of Golden Visas in Portugal (Gaspar 2020; Surak and Tsuzuki 2021; Sumi and Alam 2023), they have yet to measure its economic impact solely in the housing industry. The uniqueness of this report relies on the thorough analysis of the Golden Visa for every municipality in Portugal.

Literature Review

Government Policies

Real estate markets play a significant role in a country's GDP growth and are critical to national economies (Godwin 2006). Its price fluctuations severely impact entire economic systems and are highly relevant as many firms and families own a type of real estate asset (Mahalik 2010). Many factors influence real estate prices, and generally, two 'hands' control the industry: the invisible hand of the market and the visible hand of governments (Samuels 2011). Governments influence these markets by implementing policies to address housing problems, promote sustainable development and economic growth, and improve investment decisions (Zhao and Liu 2023).

In 2023, CellPress published a study on the 'Impact of housing policies in real estate market', analysing forty-five economic papers on the topic and drawing their conclusion from them (Zhao and Liu 2023). Results stated that expansionary monetary policies accelerated the rise in housing prices, and restrictive monetary policies decreased housing prices (Zhao and Liu 2023). Besides, the authors also conclude that monetary policies have a highly significant and lasting impact on real estate prices (Zhao and Liu 2023).

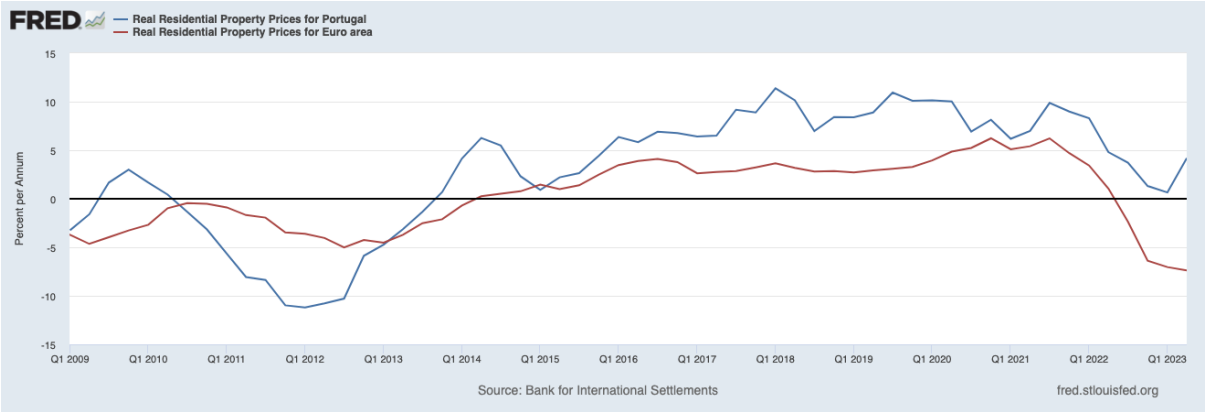
The Golden Visa

The Portuguese government implemented the Golden Visa in 2012 to mitigate the disruptive effects of the 2011 Portuguese economic crisis (Amante and Rodrigues 2021), meaning that the

immigration policy featured monetary economic incentives. The program's initial contribution was to provide capital investment to solve the decaying real estate sector, solve the rise in unemployment, and stimulate Portuguese financial markets (Amante and Rodrigues 2021). The Golden Visa was a successful program that was able to 'revive' the real estate industry in Portugal during the crisis (Silva 2015).

The Portuguese real estate market started expanding rapidly compared to other EU countries, and Portuguese citizens regarded the Golden Visa scheme as one of its leading causes. Figure 26 illustrates residential property prices for Portugal (blue line) and the Euro area (red line) from 2009 to 2023. Since 2013, Portugal has had higher annual property prices than the EU average.

Figure 19 – Real Residential Property Prices, Portugal, and Euro Area



However, this rapid growth in prices and investment was notably visible in the country's developed regions, sparking discontent in public opinion. Many critics argued that the program created wealth inequality and favoured wealthy foreign investors over the public (Harris 2023). Citizens opposing the program pressured Governments to change the Golden Visa's original policy (Harris 2023). They amended the document in January 2022 to allow real estate investments for specified municipalities in the country's interior regions (Get Golden Visa

2023). The change tried to shift assets from the Golden Visa program to low-density areas and further develop those regions (Get Golden Visa 2023).

Although changes were made to the program to try to control the increase in housing prices in coastal regions, prices continued to rise, and public opinion reigned in favour of the ban on the golden visa program (Harris 2023). Once again, authorities decided to make another change to the program and wholly removed real estate investments from the official document in October 2023 through the "Mais Habitação" scheme (Programa Mais Habitação 2023).

Methodology

The panel data model chosen to analyse the impact of the Golden Visa on Property Prices was the Generalized Least Squares (GLS) estimator. I used Stata to produce the Model.

The GLS model is optimal for the panel data analysis as it controls cross-sectional heteroskedastic variables.

Regression Model:

$$y_{i,j} = \beta_0 + \beta_1 x1_{i,j} + \beta_2 x2_{i,j} + \cdots + \beta_k xk_{i,j} + u_i + e_{i,j}$$

Where:

$y_{i,j}$ = Dependent Variable	$xk_{i,j}$ = Independent Variable
β_0 = Intercept Coefficient	β_k = Regression Coefficient
u_i = Unobserved Term	$e_{i,t}$ = Idiosyncratic Error Term

The GLS estimator must incorporate the Hausman test into the dataset, considering the Unobserved Term as a Fixed Effect and a Random Effect.

The dataset was collected from the Instituto Nacional de Estatística (INE), Portugal. It considered monthly data from January 2012 to September 2023 for all 308 Portuguese municipalities. However, as the dataset contains missing values for many months, the Model works with unbalanced data. In the end, the Model had 12808 observations for 153 municipalities.

Dependent Variable – Median Value of Property Prices AGR

The Annual Growth Rate of the Median Value of Property prices is considered the dependent variable for the Model. The variable, including apartments and houses, is measured in euros/square meters. The data originates as 'Surveys on bank evaluations on housing' and is collected monthly for all municipalities in Portugal (Statistics Portugal 2023).

***Figure 20** - AGR of Property prices, Portugal*

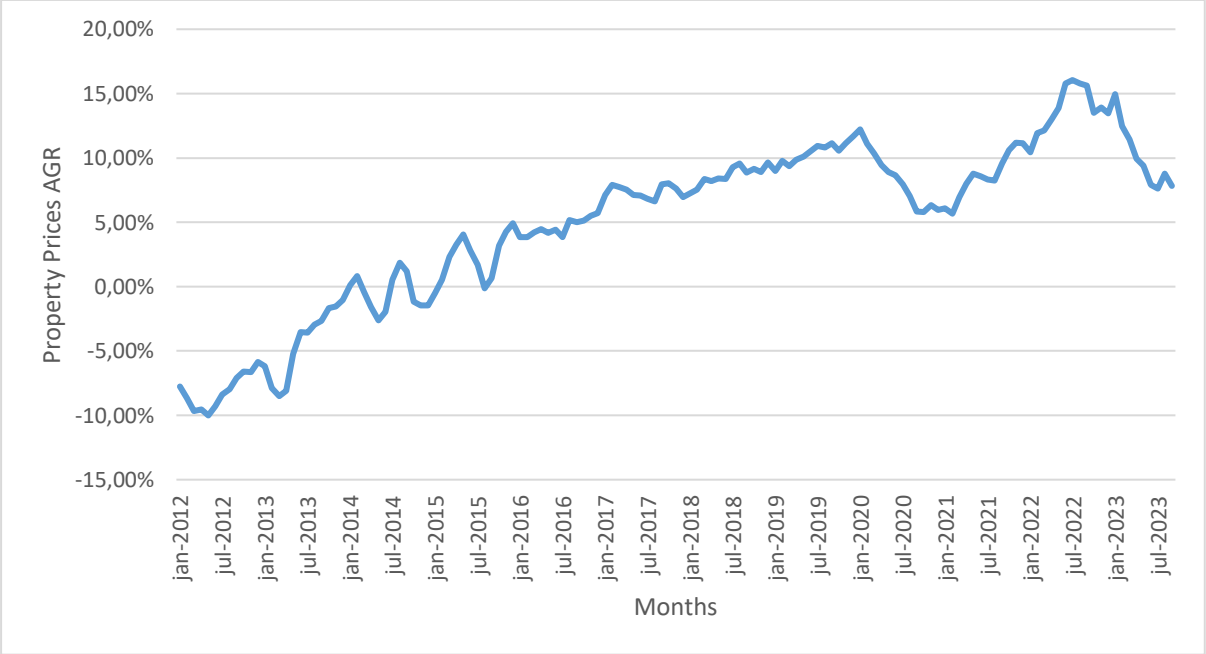


Figure 27 displays the average monthly property prices for the whole country. There was a significant contraction in average prices from the beginning due to the Portuguese financial crisis, with the trough point at -10.01% in May 2012. After that, prices began recovering and

finally stabilising in January 2014. Next, average property prices expanded drastically until the beginning of 2020, when the COVID-19 pandemic shocked the world. Although prices were significantly affected by the pandemic, annual growth rates were still above 5% and rapidly increased again in the first quarter of 2021. Property prices yearly growth rates peaked in July 2022, reaching record levels of +16.05%. Since then, average prices have decreased, reaching an annual growth rate of +7.84% in September 2023.

Figure 21 - *AGR of Property prices, Portugal – NUTS 2*

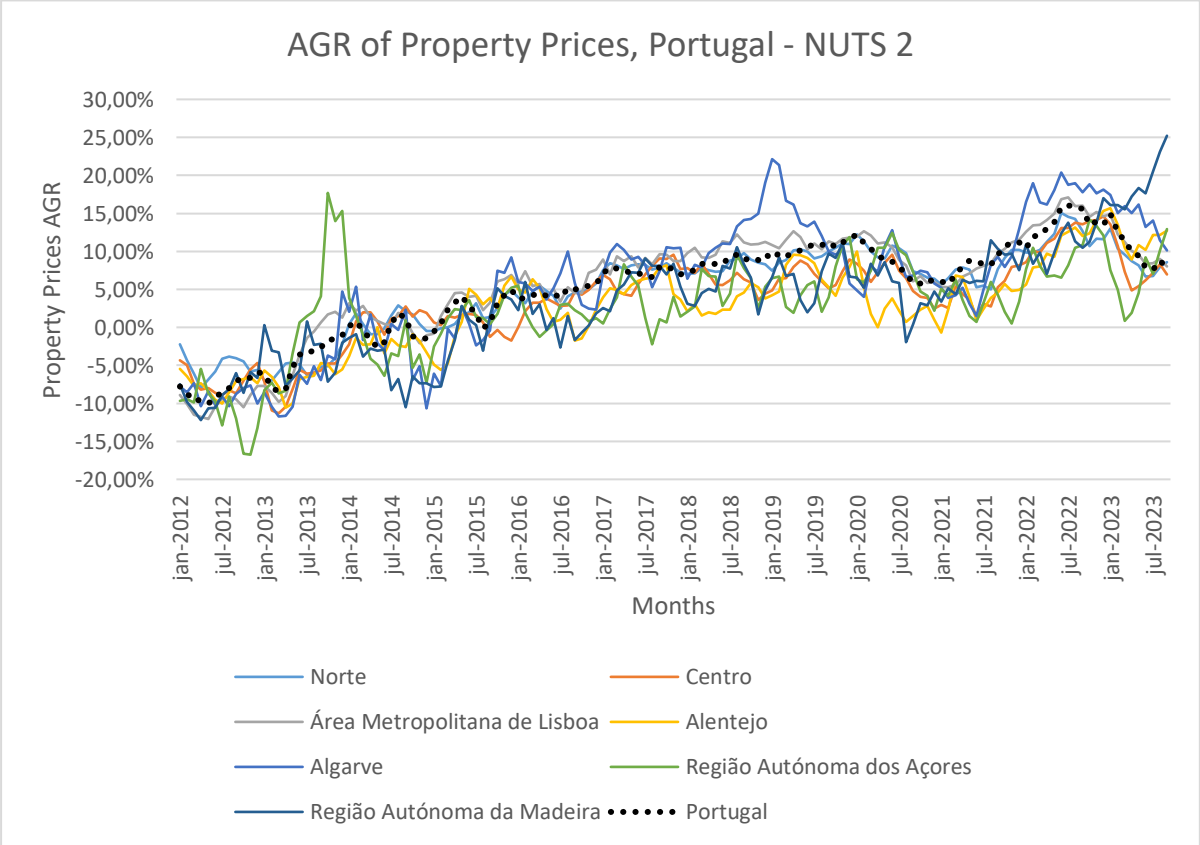


Figure 28 presents the yearly average growth rates of property prices and considers each Portuguese region according to their regions. As the Área Metropolitana de Lisboa, Norte, and Centro are the most populated regions, prices follow the same trend as the average national level. However, the areas of Algarve, Região Autónoma dos Açores and Região Autónoma da Madeira significantly vary over the years.

For the Model, the Annual growth rate of median Property prices will be measured at municipal levels.

Independent Variables:

The model has three independent variables, all dummy variables related to the Golden Visa. The variables assess whether implementing the golden visa significantly impacted overall property prices and if the policy changes made to them were significant to its objective.

Golden Visa

Like the OLS and VAR models, the Golden Visa as a dummy variable will be analysed in the panel data. It will have a value of 1 for the months the Golden Visa was active and zero for the months it was inactive.

Interior Region and Coastal Region

The variable Interior Region and Coastal Region will be highlighted for each specific municipality changed by the first amendment occurring in the Golden Visa at the year of its inception. The value of 1 will signal an interior region and a coastal region, respectively.

Hypotheses

Table 8: *Summary of expected results for the GLS random effects estimator*

Independent Variable	Expected Effect
Golden Visa	+
Interior Region	+
Coastal Region	NS

The literature review explored the golden visa's main goals and the impact of government policies on influencing property prices. Thus, the Golden Visa will have a significantly positive effect on property prices.

The amendments done to the program will also increase investments towards interior regions, positively impacting the dependent variable of annual growth rate median property prices. In coastal regions, those areas will not significantly impact property prices due to the lack of government policies affecting those regions.

Econometric Methodology

While considering the unobserved term in the dataset as a fixed effect and a random effect, the Hausman test was used to evaluate the best option between both models. The test resulted in a p-value of 0.1072, favouring using the unobserved term as random effects in the Model.

The final GLS estimator equation is the following:

$$PPAGR_{i,t} = \beta_0 + \beta_{GV} * GV_{i,t} + \beta_{IR} * IR_{i,t} + \beta_{CR} * CR_{i,t} + u_i + e_{i,j}$$

Where:

PPAGR = Property Prices Annual Growth Rate	GV = Golden Visa
IR = Interior Region	CR = Coastal Region

The Breusch Pagan Lagrangian Multiplier test (Figure 29) also supports the use of the random effects model as the p-value resulted in 0.0000.

Results and Discussion

Table 7: *Summary of expected and observed results for the GLS random effects estimator.*

Independent Variable	Expected Effect	Observed Effect (GLS)	Statistical Significance
Golden Visa	+	+	YES
Interior Region	+	+	YES
Coastal Region	NS	+	YES

The mean results for property prices' annual growth rate were 6.23%, with a standard deviation of 9.15%. The maximum and minimum values were 77.98% and -34.10%, respectively.

GLS Model

Briefly analysing the GLS estimator results, it is measured that the F-statistic of the Model indicates 0.0000 at 5% significance, meaning that the Model is normally distributed and can be used for the study. The R2 has a result of 17.60%, meaning that the independent variables fit a small proportion of the regression model.

The GLS regression indicates a positive coefficient for the Golden Visa Interior Region and Coastal Region variables, 0.1271031, 0.0474666 and 0.071454, respectively. The p-value for all independent variables is 0.000, meaning that the dummy variables are statistically significant in impacting Property Prices.

The impact of the Golden Visa suggests that the program's implementation increased overall property prices in Portugal, confirming claims that it influenced the residential industry in Portugal. These results supported the justification of the Portuguese government removing the subparagraphs on real estate from the Golden Visa document.

After the amendment to the Golden Visa in January 2022, residential properties in both interior and coastal regions increased property prices. This price increase contradicts the government's

objective of controlling saturated property prices in coastal regions and transferring investments to interior regions. It reflects the inefficiency of the amendment in providing affordable property prices to the public.

Conclusion

The impact of government policies in influencing real estate prices proved to have conflicting results when using the golden visa program as an explanatory variable. The prediction that the dummy variable 'Coastal Regions' does not have a statistically significant impact on property prices was supported by empirical evidence and was proven otherwise. It can be concluded that there are spillover effects after the end period of these policies. With the real estate program ending in October 2023, the same spillover effects will be evidenced in the Portuguese housing market, and average property prices will continue expanding. The evidence suggests that removing the real estate branch from the golden visa document will not have short-run impacts on property prices.

The short-run and long-run spillover effects from the 'Mais Habitação' program in the housing market should be analysed for future research.

Limitations

There were many missing values between periods of the dataset, as the dataset considered monthly property prices for each municipality in Portugal. Also, many municipalities were not included in the GLS model as they needed more results, 153 municipalities out of the 308. This limitation may have provoked some inconsistencies in results.

Also, other factors influencing property prices could not be implemented into the Model as they needed monthly municipal data for Portugal. Those include demographic levels, interest rates and Real GDP levels.

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Appendix

Figure 1: Nationality of approved applicants for the ARI Program from October 2012 to September 2023

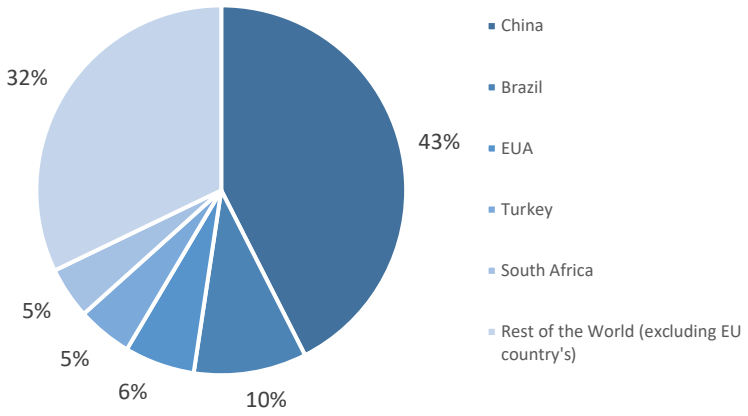

Figure 2: Number of approved applicants per investment option

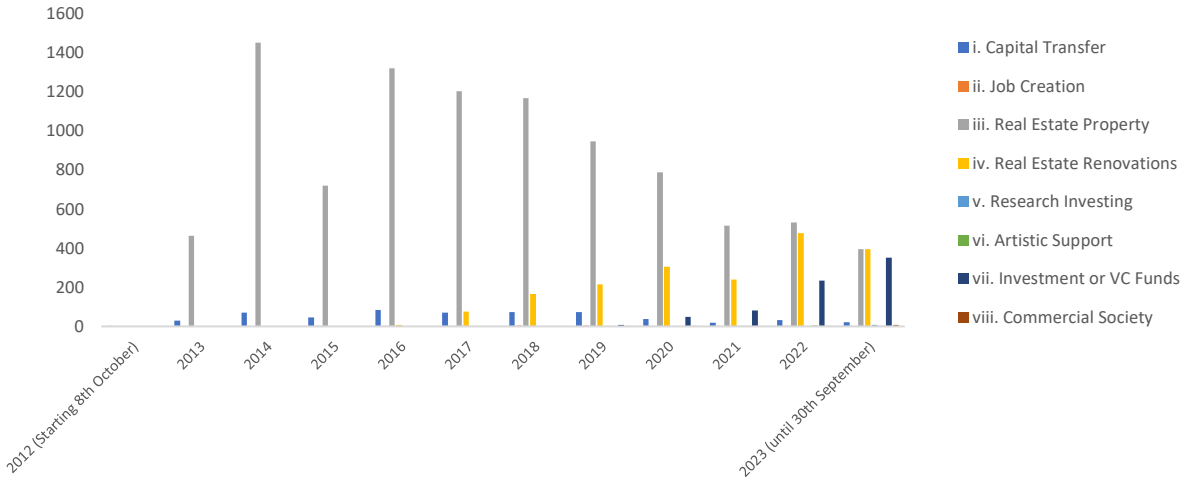

Figure 3: Timeline of Golden Visa Total Investment by year from October 2012 to September 2023

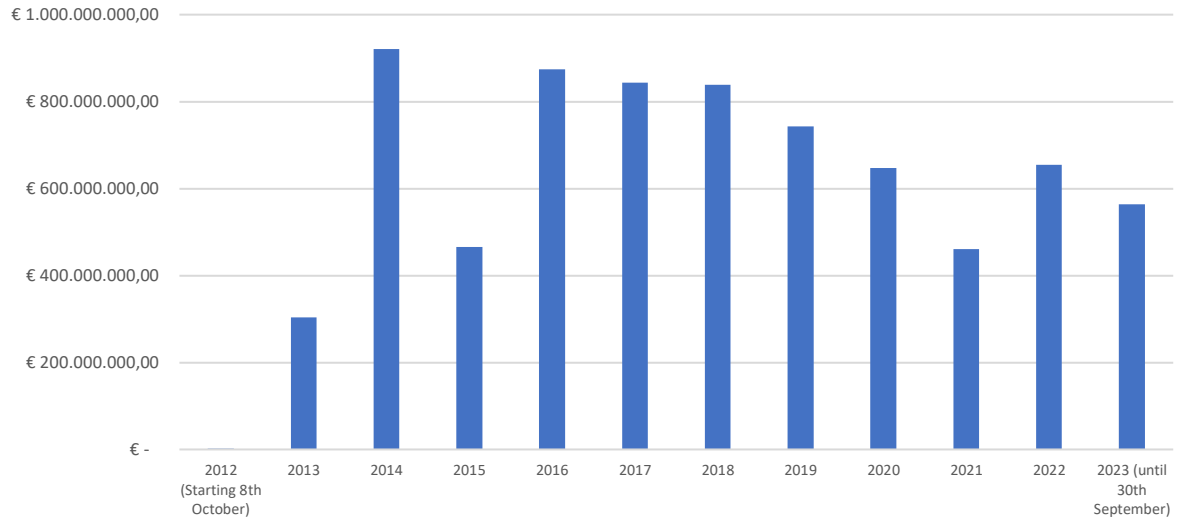

Figure 4: Percentage of total investment generated by investment option

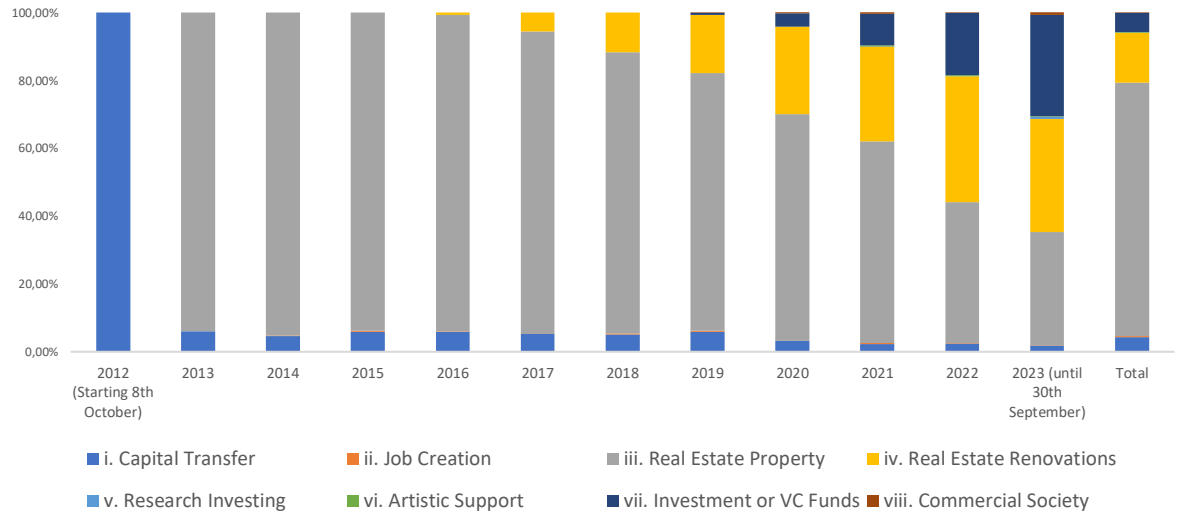

Figure 5.1: Evolution of GDP per capita growth

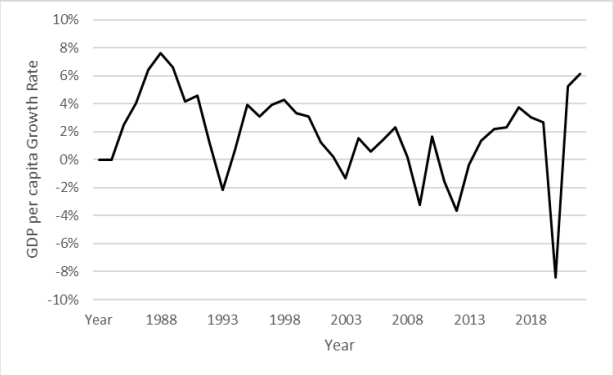

Figure 5.2: Evolution of Trade Openness

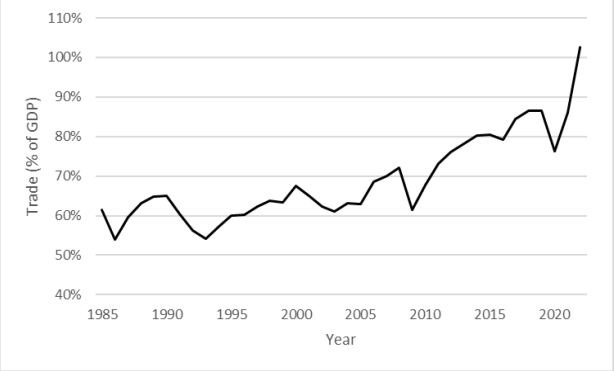

Figure 5.3: Evolution of Unemployment

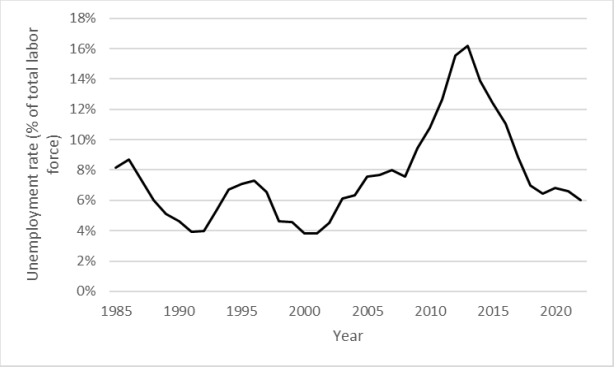

Figure 5.4: Evolution of Inflation Rate

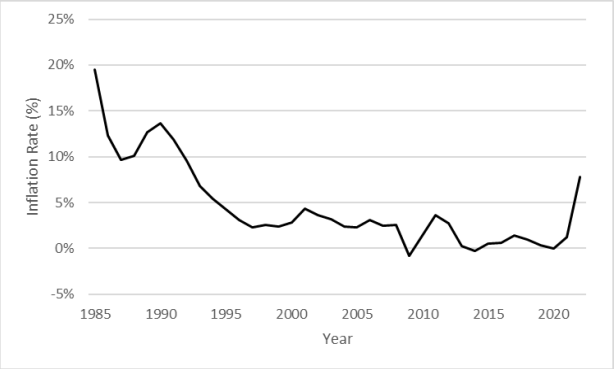

Figure 5.5: Evolution of Foreign Direct Investment

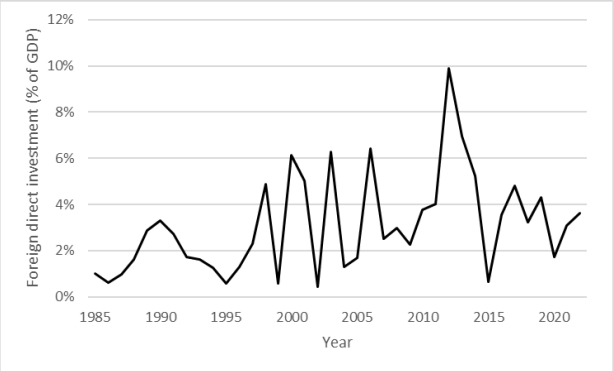

Figure 5.6: Evolution of Government Expenditure on Education (Human Capital)

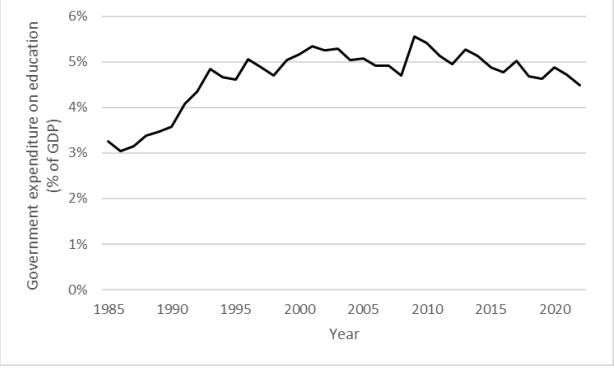

Figure 5.7: Evolution of Government final consumption expenditure

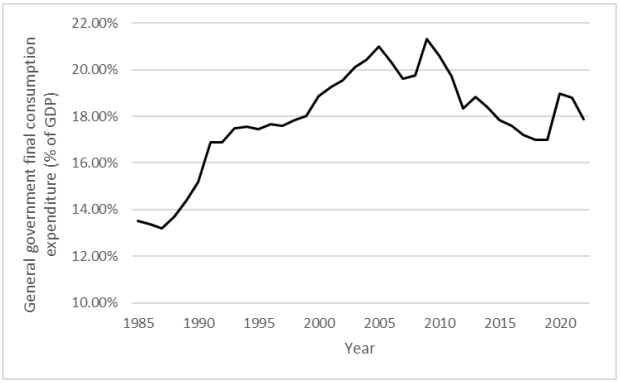

Figure 5.8: Evolution of Gross Capital Formation

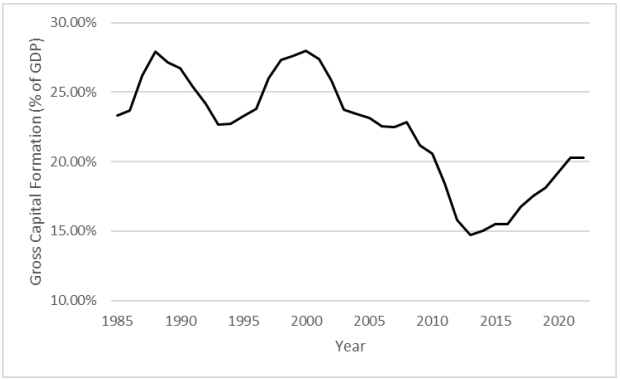

Figure 6: Correlation matrix for OLS model with all independent variables

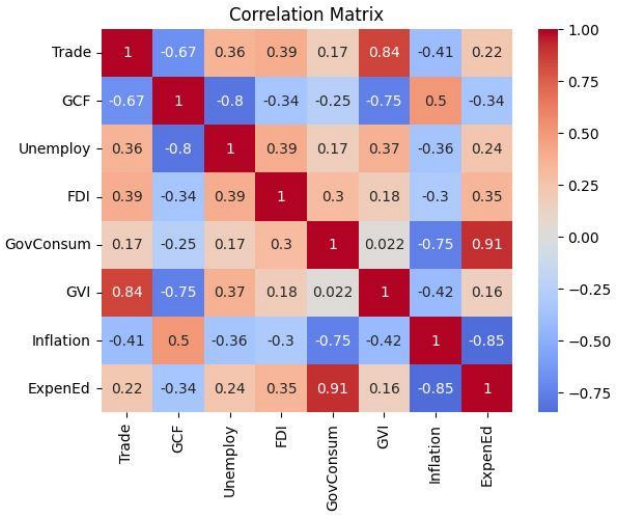

Figure 7.1: Correlation matrix for the final OLS model

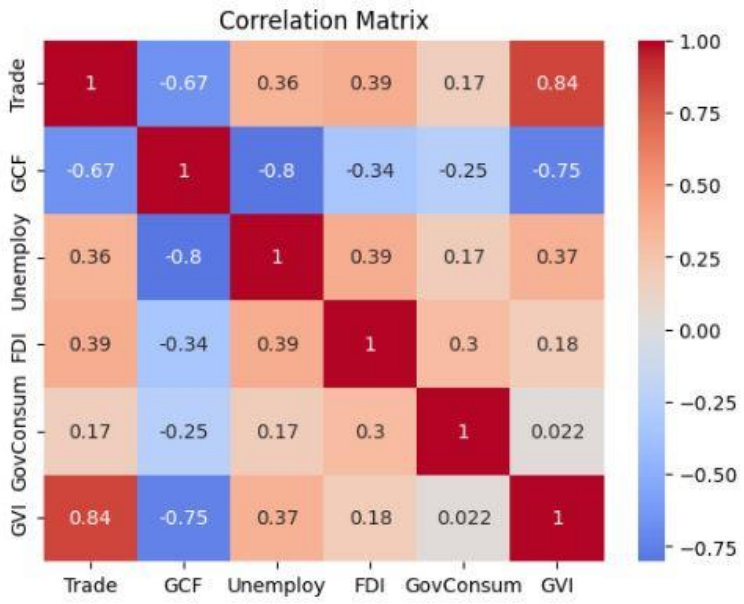

Figure 7.2: Variance Inflation Factor for the final OLS model

Variable	VIF
Const	1.000000
Trade	4.540936
GCF	9.883905
Umemploy	4.829319
FDI	1.544461
GovConsum	1.345228
GVI	7.056421

Figure 8.1: Residual Properties (with the 2020 observation)

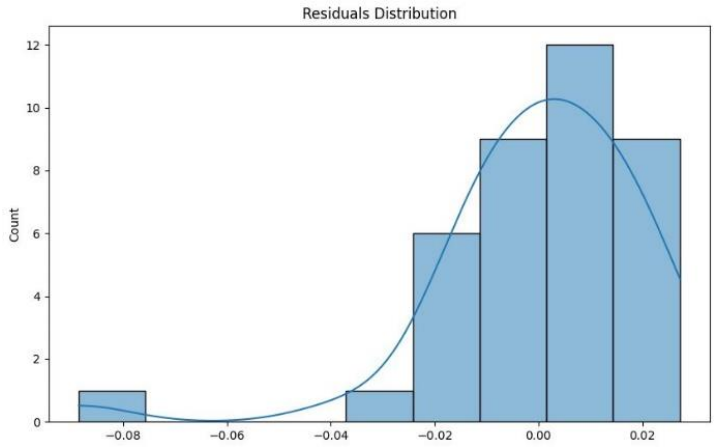

Figure 8.2: Residual vs Fitted Values (with the 2020 observation)

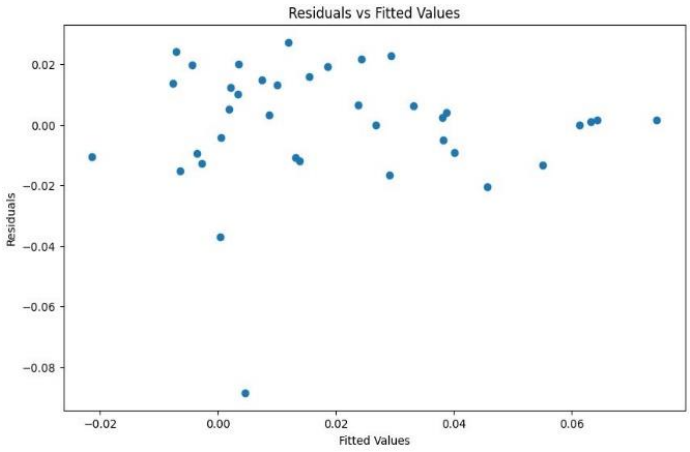

Figure 8.3: Q-Q plot (with the 2020 observation)

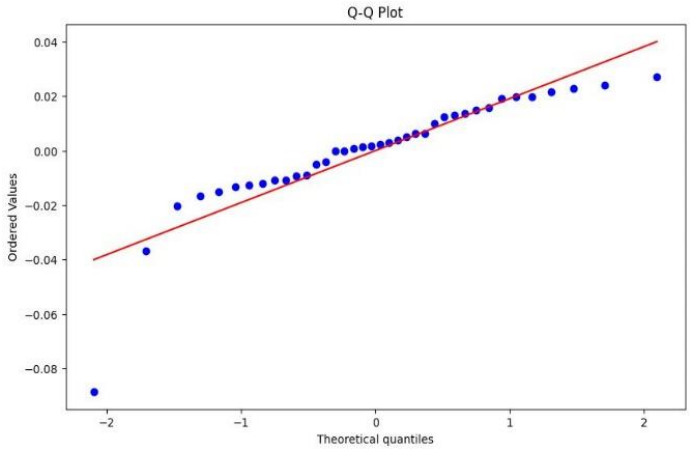

Figure 9.1: Residual Properties (without the 2020 observation)

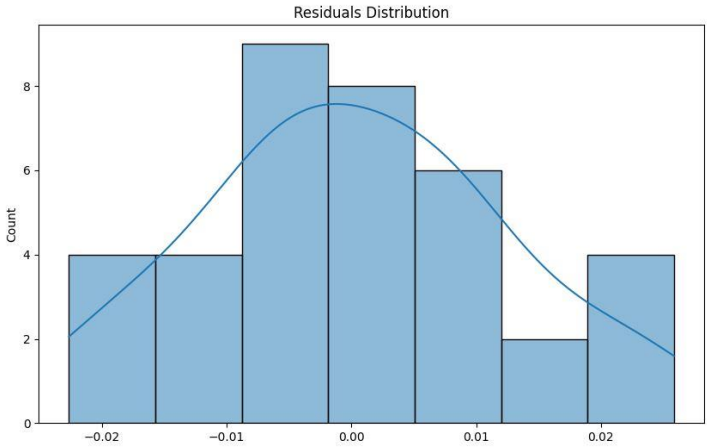

Figure 9.2: Residual vs Fitted Values (without the 2020 observation)

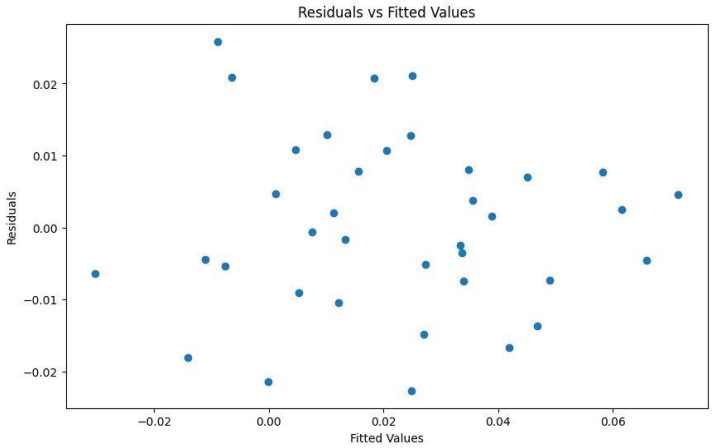

Figure 9.3: Q-Q plot (without the 2020 observation)

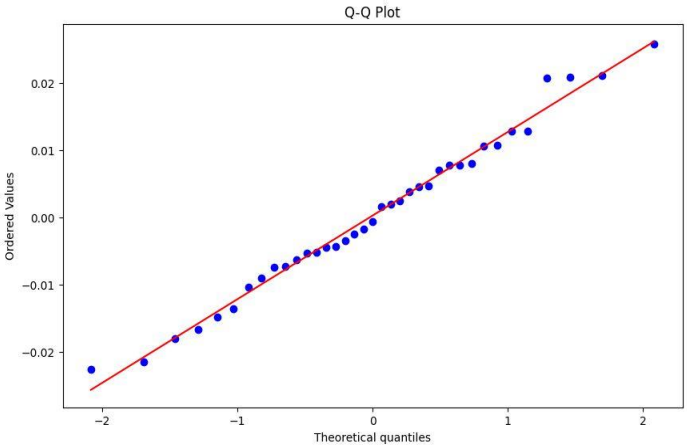

Figure 10: OLS Regression Results

OLS Regression Results

Dep. Variable		GDPPCGR		R-Squared		0.581
Model		OLS		Adj. R-squared		0.499
Method		Least Squares		F-statistics		7.153
No. Observations		38		Prob (F-statistics)		7.51e-05
Df Residuals		31		Log-Likelihood		94.688
Df Model		6		AIC		-175.4
Covariance type		nonrobust		BIC		-163.9
	coef	**std err**	**t**	**P > |t|**	**[0.025**	**0.975]**
const	0.0197	0.004	5.465	0.000	0.012	0.027
Trade	0.0209	0.008	2.730	0.010	0.005	0.037
GCF	0.0293	0.011	2.589	0.015	0.006	0.052
Unemploy	0.0098	0.008	1.236	0.226	-0.006	0.026
FDI	-0.0046	0.004	-1.024	0.314	-0.014	0.005
GovConsum	-0.0141	0.004	-3.375	0.002	-0.023	-0.006
GVI	0.0007	0.010	0.071	0.944	-0.019	0.020
Omnibus		37.811		**Durbin-Watson**		2.052
Prob (Omnibus)		0		**Jarque-Bera (JB)**		134.184
Skew		-2.262		**Prob (JB)**		7.28E-30
Kurtosis		11.018		**Cond. No.**		7.5

Figure 11: Lag-Order Selection Criteria

Lag-order selection criteria

Sample: 1988 thru 2022 Number of obs = 35

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	833.956				2.7e-32	-47.1403	-47.0023	-46.7404
1	978.021	288.13	81	0.000	8.6e-34	-50.744	-49.3634	-46.7446*
2	1102.28	248.53*	81	0.000	2.0e-34*	-53.2163*	-50.5931*	-45.6173

* optimal lag
Endogenous: dgdppcgr dinflation dtrade dfdi dunemploy dexpened dgovconsum dgcf gvi
Exogenous: _cons

Figure 12: Summary of the Regression Results (VAR model)

Vector autoregression

Sample: 1987 thru 2022		Number of obs	= 36
Log likelihood = 1006.255		AIC	= -50.90304
FPE = 7.23e-34		HQIC	= -49.52131
Det(Sigma_ml) = 4.26e-36		SBIC	= -46.94424

Equation	Parms	RMSE	R-sq	chi2	P>chi2
dgdppcgr	10	.03256	0.3953	23.53151	0.0051
dinflation	10	.012224	0.6674	72.24866	0.0000
dtrade	10	.042316	0.4381	28.06695	0.0009
dfdi	10	.02571	0.3710	21.2333	0.0117
dunemploy	10	.00938	0.5815	50.02882	0.0000
dexpened	10	.002618	0.3152	16.57262	0.0558
dgovconsum	10	.007249	0.2470	11.80615	0.2245
dgcf	10	.007674	0.7025	85.02744	0.0000
gvi	10	.145843	0.9234	434.1409	0.0000

Figure 13: GDP per Capita Growth Rate as a Dependent Variable

	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
dgdppcgr						
dgdppcgr						
L1.	-.2346328	.2057178	-1.14	0.254	-.6378322	.1685667
dinflation						
L1.	-.1792153	.3898491	-0.46	0.646	-.9433056	.584875
dtrade						
L1.	-.0778059	.2589078	-0.30	0.764	-.5852558	.429644
dfdi						
L1.	.1222149	.185326	0.66	0.510	-.2410173	.4854472
dunemploy						
L1.	1.861707	.580064	3.21	0.001	.7248024	2.998611
dexpened						
L1.	-.4079377	2.378283	-0.17	0.864	-5.069286	4.253411
dgovconsum						
L1.	1.105527	1.110038	1.00	0.319	-1.070107	3.281161
dgcf						
L1.	1.317826	.5929764	2.22	0.026	.1556132	2.480038
gvi						
L1.	.0287336	.0123864	2.32	0.020	.0044567	.0530104
_cons	-.0063957	.0074278	-0.86	0.389	-.0209539	.0081624

Figure 14: LM Test

Lagrange-multiplier test

lag	chi2	df	Prob > chi2
1	**111.4607**	**81**	**0.01403**

H0: no autocorrelation at lag order

Figure 15: Jarque-Bera, Skewness and Kurtosis Tests

Jarque-Bera test

Equation	chi2	df	Prob > chi2
dgdppcgr	300.006	2	0.00000
dinflation	1.568	2	0.45663
dtrade	1.299	2	0.52221
dfdi	0.549	2	0.76004
dunemploy	0.768	2	0.68123
dexpened	1.768	2	0.41305
dgovconsum	1.405	2	0.49537
dgcf	1.411	2	0.49390
gvi	22.657	2	0.00001
ALL	331.430	18	0.00000

Skewness test

Equation	Skewness	chi2	df	Prob > chi2
dgdppcgr	-3.0155	54.559	1	0.00000
dinflation	-.26096	0.409	1	0.52267
dtrade	.07613	0.035	1	0.85207
dfdi	-.14783	0.131	1	0.71727
dunemploy	-.29007	0.505	1	0.47738
dexpened	.17182	0.177	1	0.67385
dgovconsum	.01685	0.002	1	0.96708
dgcf	.48409	1.406	1	0.23571
gvi	1.1671	8.173	1	0.00425
ALL		65.396	9	0.00000

Kurtosis test

Equation	Kurtosis	chi2	df	Prob > chi2
dgdppcgr	15.792	245.446	1	0.00000
dinflation	2.1209	1.159	1	0.28165
dtrade	2.0818	1.265	1	0.26078
dfdi	2.4723	0.418	1	0.51812
dunemploy	2.5814	0.263	1	0.60816
dexpened	1.97	1.591	1	0.20715
dgovconsum	2.0328	1.403	1	0.23619
dgcf	2.9434	0.005	1	0.94474
gvi	6.1074	14.484	1	0.00014
ALL		266.034	9	0.00000

Figure 16: Eigenvalue Stability Condition

Eigenvalue stability condition

Eigenvalue	Modulus
.9919165	.991916
.4785694 + .4338805i	.645973
.4785694 - .4338805i	.645973
-.530435	.530435
.5134711	.513471
-.2174588 + .4195363i	.472545
-.2174588 - .4195363i	.472545
-.1884793	.188479
.02623161	.026232

All the eigenvalues lie inside the unit circle.
VAR satisfies stability condition.

Figure 17: Wald-Lag Exclusion Statistics

Equation: dgdppcgr

lag	chi2	df	Prob > chi2
1	23.53151	9	0.005

Equation: dgcf

lag	chi2	df	Prob > chi2
1	85.02744	9	0.000

Equation: dinflation

lag	chi2	df	Prob > chi2
1	72.24866	9	0.000

Equation: gvi

lag	chi2	df	Prob > chi2
1	434.1409	9	0.000

Equation: dtrade

lag	chi2	df	Prob > chi2
1	28.06695	9	0.001

Equation: All

lag	chi2	df	Prob > chi2
1	1204.998	81	0.000

Equation: dfdi

lag	chi2	df	Prob > chi2
1	21.2333	9	0.012

Equation: dunemploy

lag	chi2	df	Prob > chi2
1	50.02882	9	0.000

Equation: dexpened

lag	chi2	df	Prob > chi2
1	16.57262	9	0.056

Equation: dgovconsum

lag	chi2	df	Prob > chi2
1	11.80615	9	0.224

Figure 18: Impulse Response Functions (IRF)

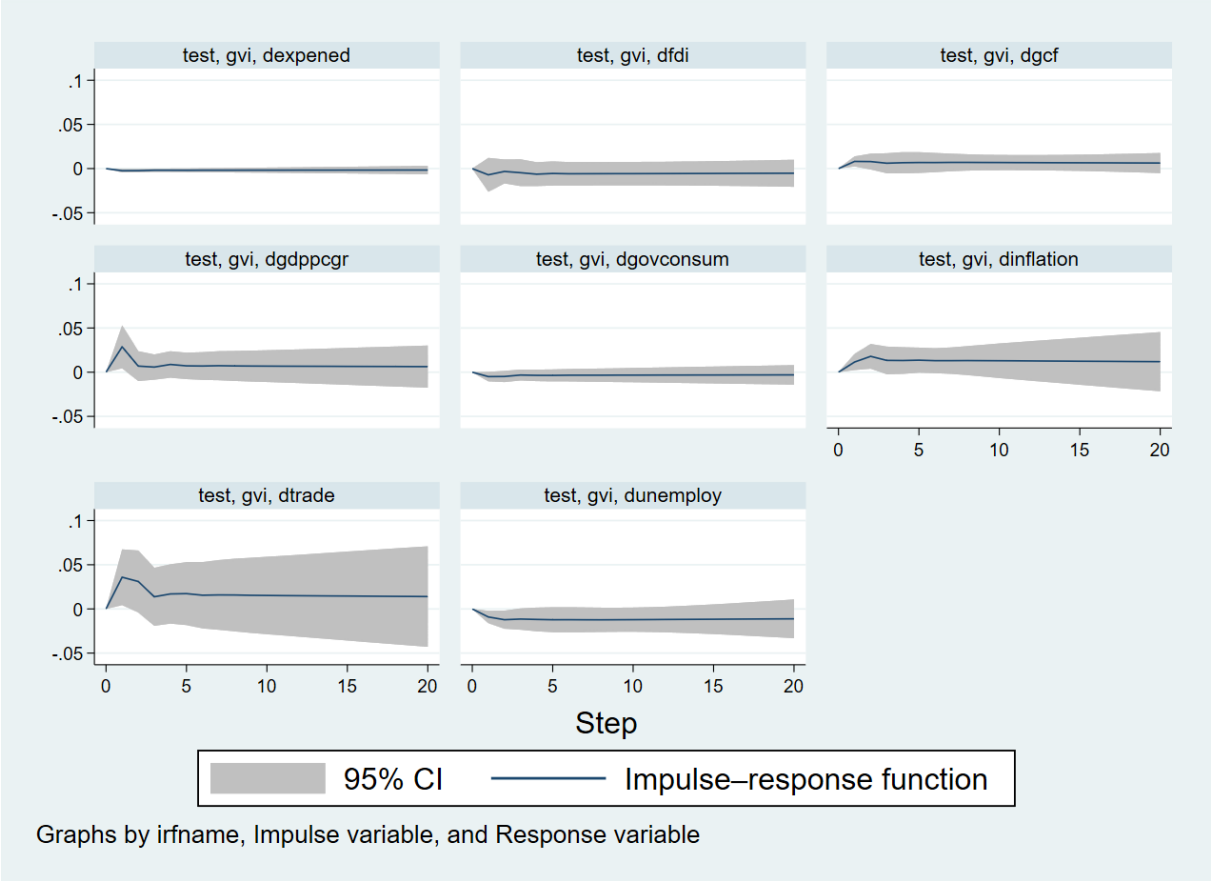

Figure 19 – Real Residential Property Prices, Portugal, and Euro Area

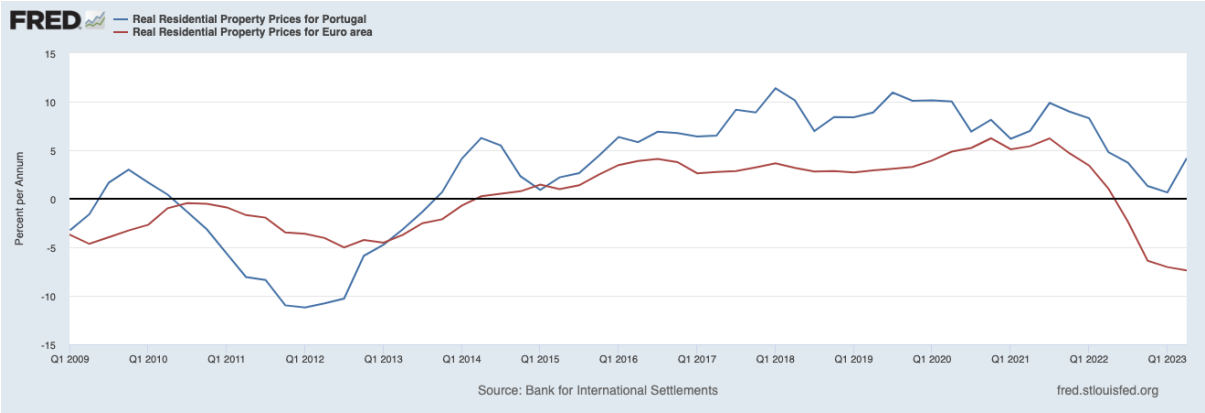

Figure 20 - AGR of Property prices, Portugal

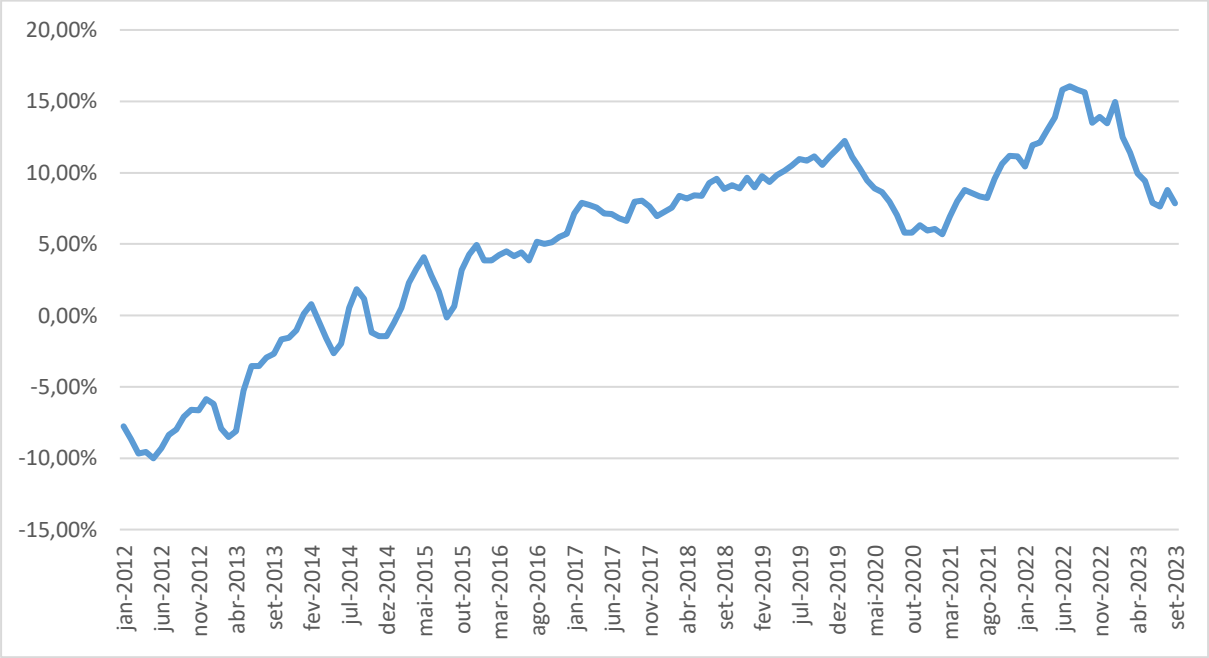

Figure 21 - AGR of Property prices, Portugal – NUTS 1

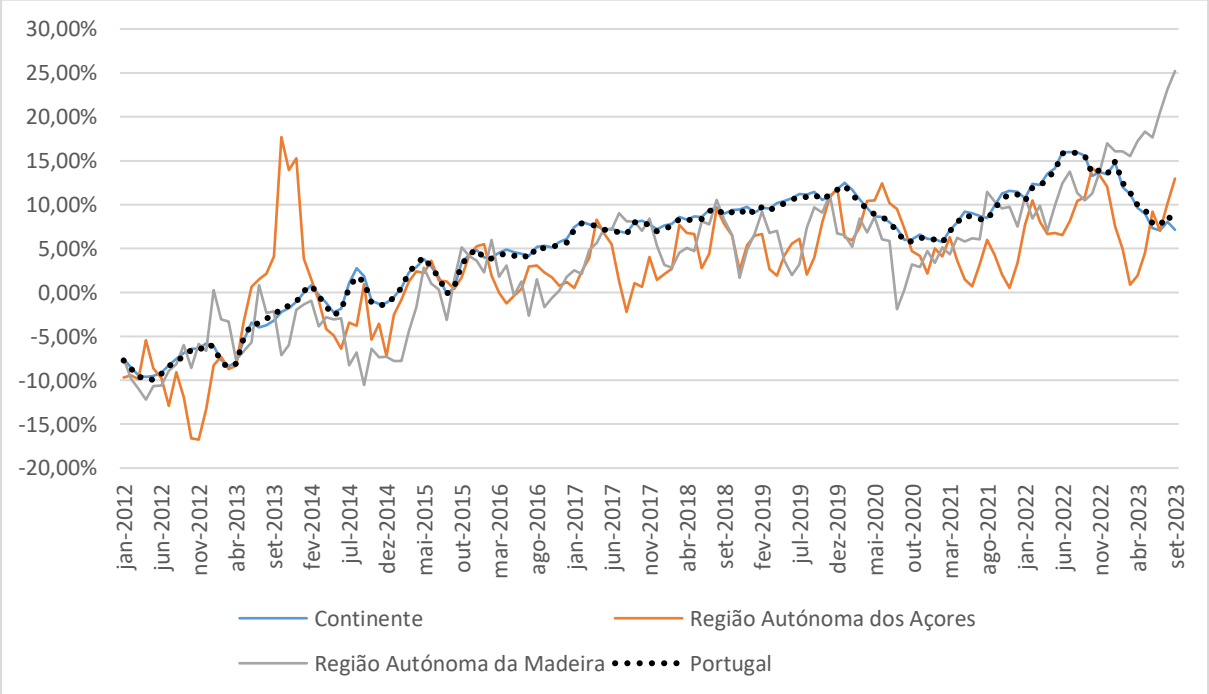

Figure 22 - AGR of Property prices, Portugal – NUTS 2

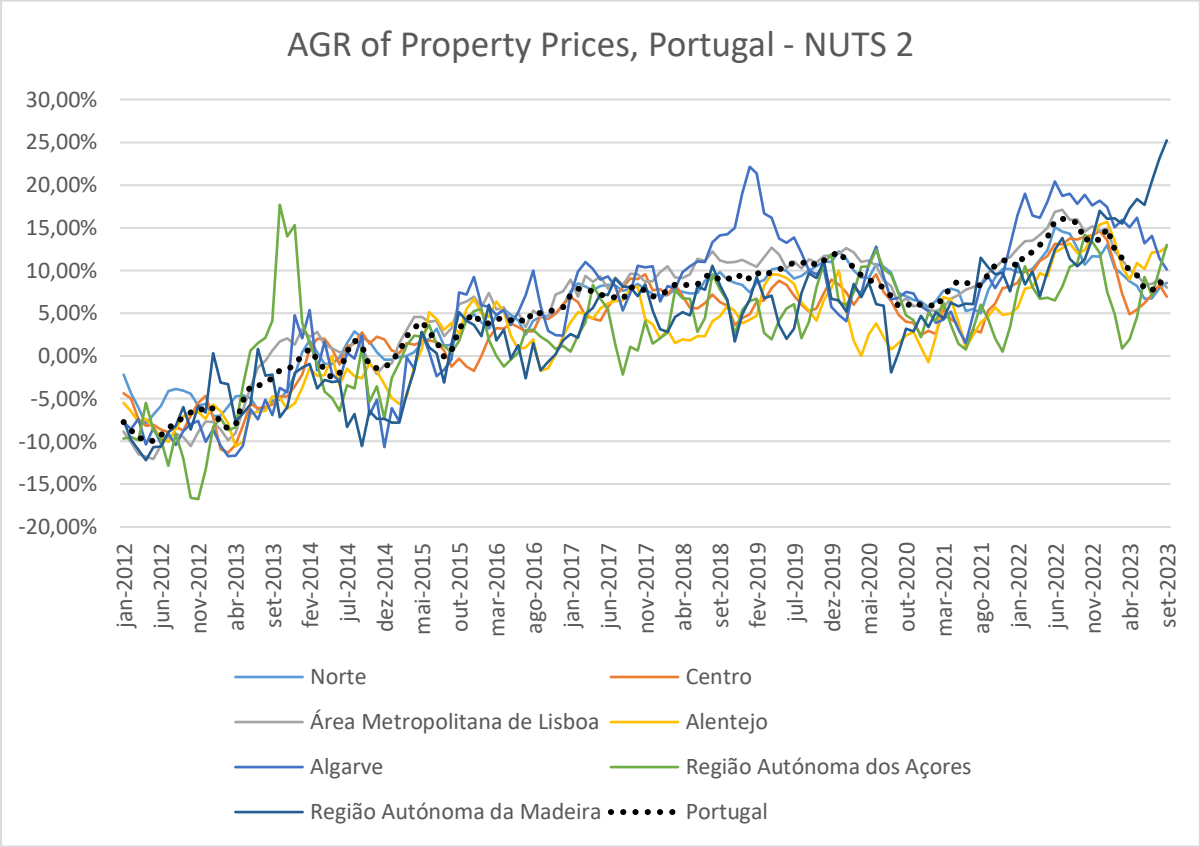

Figure 23 – Summary of Results

Variable		Mean	Std. dev.	Min	Max	Observations
PPAGR	overall	.0622628	.091538	-.340981	.7797927	N = 12808
	between		.0472971	-.0409277	.298965	n = 153
	within		.0888274	-.3972892	.7718069	T-bar = 83.7124
GV	overall	.9503546	.2172137	0	1	N = 43428
	between		1.11e-16	.9503546	.9503546	n = 308
	within		.2172137	0	1	T = 141
IR	overall	.0797872	.2709666	0	1	N = 43428
	between		.0743987	0	.1489362	n = 308
	within		.260587	-.0691489	.9308511	T = 141
CR	overall	.0691489	.2537102	0	1	N = 43428
	between		.0743987	0	.1489362	n = 308
	within		.2425933	-.0797872	.9202128	T = 141

Figure 24 – Fixed Effects (within) Regression

```
Fixed-effects (within) regression               Number of obs      =       12,808
Group variable: ID                              Number of groups   =          153

R-squared:                                      Obs per group:
     Within  = 0.1679                                         min =            1
     Between = 0.2758                                         avg =         83.7
     Overall = 0.1759                                         max =          141

                                                F(3,12652)         =       851.26
corr(u_i, Xb) = 0.0533                          Prob > F           =       0.0000
```

PPAGR	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
GV	.1269711	.0040148	31.63	0.000	.1191016	.1348406
IR	.049183	.0049209	9.99	0.000	.0395373	.0588288
CR	.0707908	.0019977	35.44	0.000	.0668751	.0747066
_cons	-.0741701	.0039341	-18.85	0.000	-.0818816	-.0664586
sigma_u	.04078112					
sigma_e	.08152038					
rho	.20016428	(fraction of variance due to u_i)				

F test that all u_i=0: F(152, 12652) = 4.29 Prob > F = 0.0000

Figure 25 – Random effects GLS Regression

```
Random-effects GLS regression                   Number of obs      =       12,808
Group variable: ID                              Number of groups   =          153

R-squared:                                      Obs per group:
     Within  = 0.1679                                         min =            1
     Between = 0.2831                                         avg =         83.7
     Overall = 0.1760                                         max =          141

                                                Wald chi2(3)       =      2607.22
corr(u_i, X) = 0 (assumed)                      Prob > chi2        =      0.0000
```

PPAGR	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
GV	.1271031	.0040077	31.71	0.000	.1192481	.1349581
IR	.0474666	.004648	10.21	0.000	.0383566	.0565766
CR	.071454	.0019787	36.11	0.000	.0675758	.0753322
_cons	-.0723646	.0047535	-15.22	0.000	-.0816812	-.063048
sigma_u	.03037074					
sigma_e	.08152038					
rho	.12187991	(fraction of variance due to u_i)				

Figure 26 – Hausman Test

	Coefficients (b) FE	(B) RE	(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
GV	.1269711	.1271031	-.000132	.0002376
IR	.049183	.0474666	.0017165	.0016158
CR	.0707908	.071454	-.0006632	.0002748

b = Consistent under H0 and Ha; obtained from **xtreg**.
B = Inconsistent under Ha, efficient under H0; obtained from **xtreg**.

Test of H0: Difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= **6.09**
Prob > chi2 = **0.1072**

Figure 27 – Breusch and Pagan Lagrangian multiplier test for Random effects

Breusch and Pagan Lagrangian multiplier test for random effects

PPAGR[ID,t] = Xb + u[ID] + e[ID,t]

Estimated results:

	Var	SD = sqrt(Var)
PPAGR	.0083792	.091538
e	.0066456	.0815204
u	.0009224	.0303707

Test: Var(u) = 0
chibar2(01) = **396.38**
Prob > chibar2 = **0.0000**

Figure 28 – Property Prices Annual Growth Rate Plot

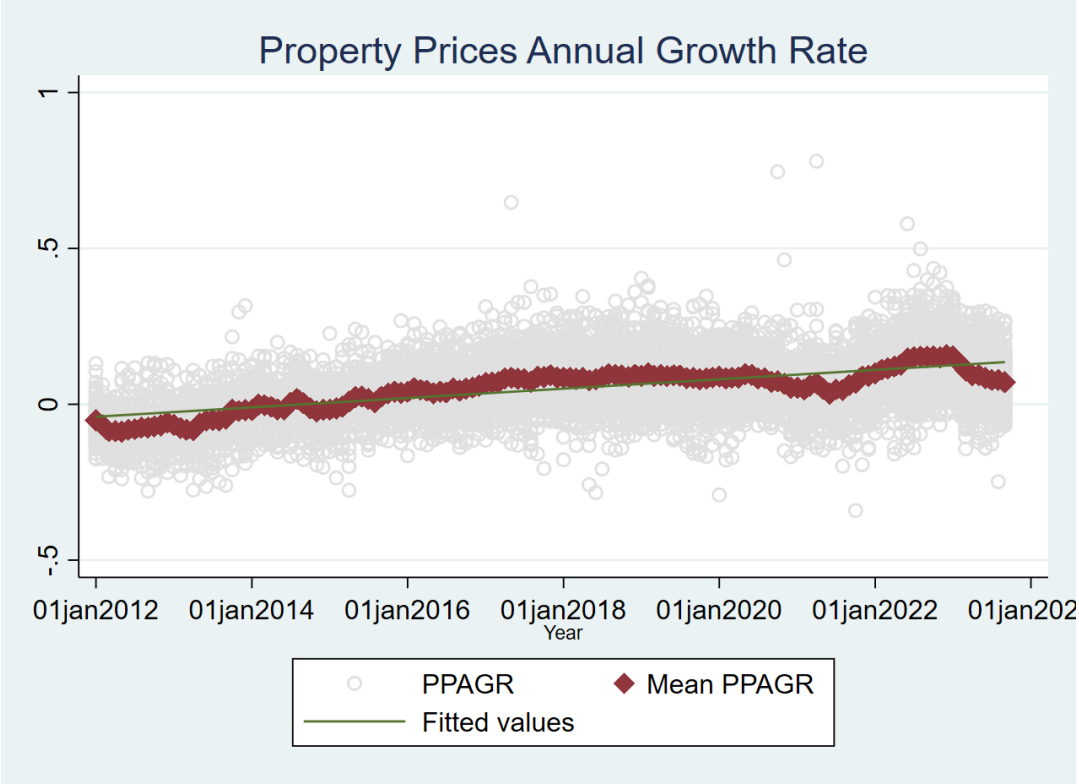

Figure 29 – Property Prices Annual Growth Rate Histogram

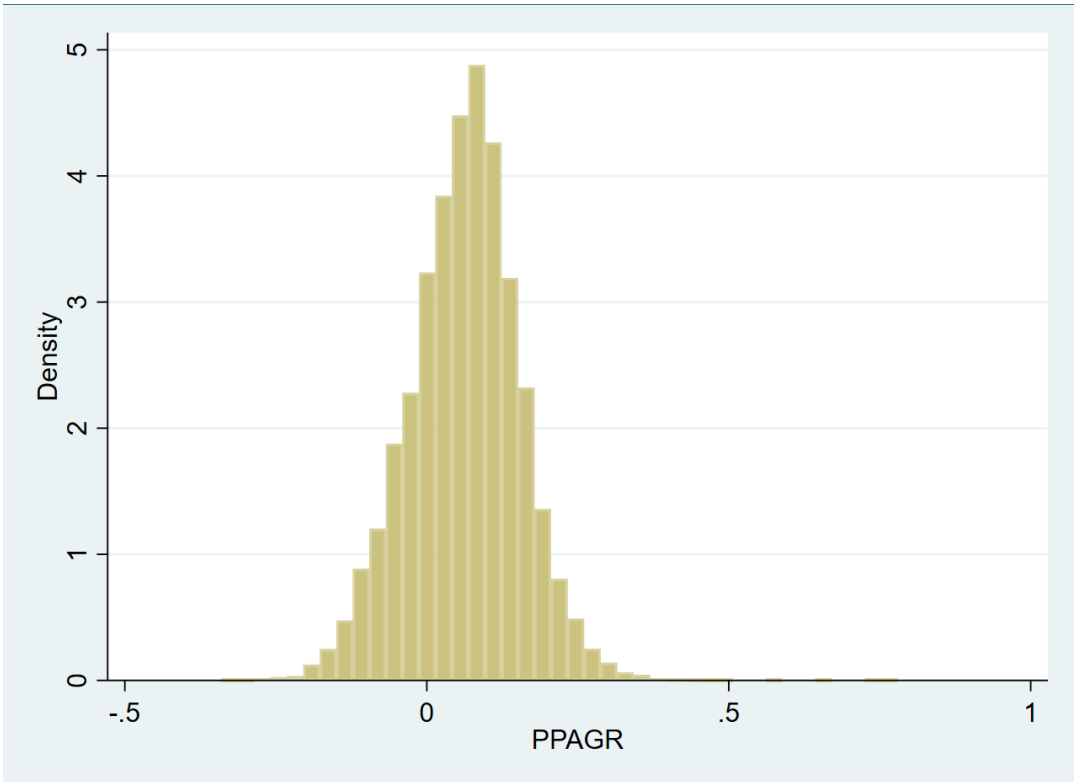

Table 5: The ARI program application process

Online Registration	**The interested party (ARI applicant) registers online or through an authorized legal representative. The applicant provides contact information and an address for notifications during the registration.**
Confirmation of Registration	The Regional Delegate where the application was submitted confirms the registration and grants access to the ARI portal for designated officials. Different profiles are assigned for tasks such as registration of payments, analysis and registration of decisions, and issuance of residence permits.
Delivery of Application	The applicant schedules the delivery of the ARI application at the Immigration and Borders Service (SEF) service location while also paying the analysis fees.
Submission of Documentation	The applicant provides the required documentation and pays the analysis fee at the SEF service location. The documentation includes proof of investment, criminal record certificates, proof of health insurance, and other relevant documents.
Processing and Investigation	Once the application is submitted, it undergoes formal processing and investigation by SEF. This step includes verifying the authenticity of the documents and conducting background checks.
Decision and Notification	The SEF registers the decision and informs the applicant whether she/he has been approved or rejected.
Issuance of the Residence Permit	If the application is approved, SEF proceeds with the issuance of the residence permit and the information is transferred to the Resident System (SIRES).

Validations

VAR Model

4.2.5. Lagrange-Multiplier Test

The Lagrange-multiplier (LM) test checks if the variables are autocorrelated to lag 1 in the model. The null hypothesis states H0: No autocorrelation at lag order 1, meaning that there is evidence of autocorrelation if the p-value is smaller than the 5% significance. The test performance indicates a probability of 0.01403, reflecting multicollinearity in the results implying patterns in the residuals that are not explained in the model *Figure 14.*

Test for Normally distributed disturbances

The Jarque-Bera, Skewness, and Kurtosis test assesses the residuals' normality for each equation in the model. The interpretation of the results indicates that the lower the p-value, the less the equations follow a normal distribution. *Figure* 15 presents the results for each test, and it is clear for all three tests that both GDPPCGR and GVI both have extremely low p-values, having compelling evidence against normality. The three tests on all equations also indicate convincing evidence against normality.

Eigenvalue Stability Condition

The Eigenvalue stability condition checks the VAR estimates' stability condition by examining the coefficient matrix's eigenvalues. For the model to be stable, the modulus of all eigenvalues must lie inside the unit circle; all modulus results must be smaller than 1. *Figure* 16 presents the modulus results as they are all contained between 0 and 1. The VAR model is expected to provide stable and reliable forecasts over time, as shocks in the system will not lead to explosive results.

Wald Lag-Exclusion Statistics

The Wald lag exclusion statistics test whether the lagged variables of all explanatory variables have a significant impact on their current value in the VAR Model. When considering all variables in the model in *Figure* 17 with the max number of degrees of freedom of 81, the p-value is 0.000, meaning that the lagged variables are essential to explain the current variables of the model.