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REAL ESTATE INVESTMENTS AS A POTENTIAL HEDGE AGAINST INFLATION

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1) ABSTRACT / KEYWORDS

Real estate is often seen as a safe investment during times of high inflation, as it is a tangible asset, it generates income through rent, and, as seen in the past, its value usually increases over time. However, whether it actually works as a hedge against inflation is still debated. This study aims to assess this by focusing on four countries being the United States, the United Kingdom, Spain, and France. It examines how real estate performed in these countries during three important inflationary periods: the years of high inflation after the 1970s oil crisis, the period after the 2008 financial crisis where inflation rose, and the more recent inflation surge after the Covid 19 pandemic.

To understand the relationship between inflation and real estate value, a correlation analysis was conducted between inflation and residential real estate prices across the four countries. In addition, other real estate sectors where evaluated, however, as there is less long-term data available for other properties such as commercial and industrial, these were analysed through a qualitative approach, using academic literature. Finally, real estate's performance was compared to other asset classes, which have also been considered inflation hedges in the past, like stocks, bonds, and gold, through another correlation analysis.

The results showed that real estate doesn't always behave the same way under inflation pressures. Industrial properties seemed to perform better, while homes and offices were more unpredictable. Overall, the findings suggest that the effectiveness of real estate as an inflation hedge depends on many factors, including the type of property, monetary policy, and broader economic conditions, rather than inflation on its own. These results also highlight that investors should opt for diversified strategies and not rely too heavily on real estate alone.

Keywords: Real estate, investments, inflation, monetary policy, residential real estate, commercial real estate.

2) INTRODUCTION

2.1) Relevance of the Topic

In times of economic instability, especially when inflation is rising, investors seek assets that can preserve the value of the invested capital, and often turn to real estate as a way to protect their money. As mentioned before, this is an asset that is completely tangible, it generates income from renting out properties, and the value of properties, in general, tend to increase

over time. Even though this idea is widely accepted, research shows that it's not always true in every situation. Whether real estate can really act as a shield against inflation depends on many factors, including the country that the asset is located, the type of property, the state of the economy, and how central banks adjust interest rates.

This topic has become quite relevant once again after the Covid 19 pandemic. Inflation increased fast in many parts of the world, and central banks responded by tightening their monetary policies. Therefore today, investors and policymakers are focusing once again on the question of whether real estate is a safe investment in times of high inflation.

Even though there is already broad research on the relationship between inflation and other asset classes like stocks, bonds, and gold; real estate has received attention, but not as much. This has happened mainly when it comes to comparing its performance across different countries and property types, as most of the existing research focuses only on the United States and the residential real estate sector, leaving gaps in understanding and comparing how real estate performs across different economies and property sectors.

This study aims to fill those gaps by assessing how real estate behaved in the U.S., the U.K., Spain, and France during the three key inflationary periods stated before, comparing performance between different real estate sectors and alternative asset classes. By exploring the relationship between real estate and inflation across different historical moments, this research aims to provide a more complete assessment of its potential as an inflation hedge.

2.2) Objectives of the study

The main objective of this investigation is to assess the extent to which real estate investments are able to act as a hedge against inflation. To achieve this, the study focuses on real estate's performance during inflationary periods in the past and compares it across countries, property types and other kinds of investments. The key questions this research aims to answer are: Can real estate consistently act as a hedge against inflation? And if not, are there other factors or circumstances that makes it succeed or fail to do so? Does it depend on the country or the type of property? And how does it compare to other assets like stocks, bonds, or gold?

To answer these questions, the study focuses on various specific objectives. First, it assesses the correlation between inflation and residential real estate prices across the four countries over the three inflationary periods mentioned earlier. Then, as there is a lack of consistent and high-quality data for of commercial and industrial property values, their performance is analysed through and academic literature. Finally, another correlation analysis is conducted to compare

how real estate's relationship with inflation varies from that of other asset classes, being stocks, bonds and gold, to assess whether real estate provides better, worse, or similar protection against inflation.

2.3)   Methodology

As briefly outlined before, this research uses a mixed approach, including both a quantitative and qualitative analysis to assess real estate's effectiveness to act as an inflation hedge. Choosing the right methods was complicated at first, because it was hard to decide whether to focus only on statistical data or also include a qualitative assessment. In the end, the decision was to use this mixed approach, as that it offered a stronger and more realistic analysis, as it not only relied on statistics.

In the first place, a correlation analysis is conducted to evaluate the historical relationship between residential real estate prices and inflation during each of the three inflationary periods mentioned above, the post 1970s, the 2010-2012 inflationary period, and the post Covid 19 inflation surge. The Pearson correlation coefficient is used to measure whether real estate prices moved in line with inflation or not.

Later, since consistent long-term historical data for commercial and industrial real estate is limited, and this study prioritizes the quality of data, these sectors are analysed using a qualitative approach, reviewing academic literature and reports. This approach ensures that the study does not only rely on statistics but is a more complete analysis as it includes factors like lease terms, economic conditions, and demand trends to understand how other factors also influence real estate performance during inflationary periods.

Finally, a second correlation analysis compares the relationship of real estate and other asset classes, with inflation, including equities, bonds, and gold. The goal is to see whether real estate has historically been better or worse at preserving the value of the invested capital compared to these other investments. This part of the study looks at inflation-adjusted returns and how each asset responded in periods of high inflation. For bonds, the data selected was 10-year government bond yields, using annual average yields to reflect long-term borrowing costs. For stocks, historical data from equity indices was used and in the case of gold prices, the data used was taken from the international spot price. As done so in the first correlation analysis, all of the data was converted into annual percentage changes for consistency across variables.

2.4)   Structure

This study made up of various sections, each one helping to answer the main research question.

The first part is the *Theoretical Framework*, which focuses on the main characteristics of the real estate market and the key economic ideas that explain how inflation interacts with investments. Furthermore, it also includes a review of previous studies on the topic, considering what has already been explored and identifying the gaps in the literature that this investigation aims to address.

Later, we have the *Investigation* section which describes, the data, variables, sources and methodology used to conduct the analysis. Also, it explains more in detail the steps taken to carry out the research, including the correlation analyses and the qualitative evaluation.

Moving onto the *Results*, in which, the findings of the analyses are interpreted and explained. It breaks down the correlation results by country and time period and includes the research from the literature review on the different property types, as well as how other economic conditions influenced the results.

Finally, the *Conclusions* section puts together the key findings and includes the implications for investors and policymakers. It also points out the study's limitations and includes suggestions for future research.

3) THEORETICAL FRAMEWORK

Research suggests that the ability of real estate to act as a hedge against inflation depends on multiple factors, including the country, type of property, market conditions and monetary policy. To understand whether real estate can actually do so, it is important to understand, first of all, how the real estate market works and how inflation affects the performance of investments in general. This section looks at the key characteristics of the real estate market and explores main economic theories to be able to understand how inflation may impact asset values and returns. Furthermore, the section includes a review of relevant existing studies on the relationship between real estate and inflation, summarising their key findings and identifying where the literature has left gaps that this study aims to explore further.

3.1)   Real Estate Market Characteristics

The real estate market is a crucial part of the global economy, as it is a main driver for economic growth, as it provides the infrastructure for people to live and work. Real estate is also important as an investment because of the belief of its potential to preserve value in the long-term.

To be able to understand whether real estate can act as a hedge against inflation, we must know how the market works and what makes it different from other asset types. Real estate is a tangible asset, but it is not as liquid or uniform as equities or bonds can be. This is because its performance is dependent on many factors, like supply and demand dynamics, interest rates, construction costs, and regulations and even lifestyle trends.

In terms of supply, real estate is known to be quite slow to adjust. It can take years for new homes or commercial developments to be approved and built, especially in cities where there is limited land or strict regulations. This can lead to shortages in supply, which can cause prices to rise when demand is high, and supply is weak. Regarding demand, factors like population growth, foreign investment, and economic activity all influence the demand for real estate. Even changes in lifestyle trends, like for example, in recent years, platforms like Airbnb have changed how people use and rent homes.

Following this idea, rents are also important in helping real estate keep its value in periods of inflation. Properties in areas with high demand may still be able to provide solid rental yields, even if their price growth slows down. However, this depends on the type of lease agreements. Those which are more long term and fixed, might stay behind inflation, as tenants cannot change the terms of the contract until it is over. These types of leases are often the ones present in office or retail properties. On the other hand, shorter or more flexible leases can offer better protection, as rents can be adjusted and increased at the same time as inflation rises.

Another key characteristic that defines real estate investment is financing. Most of the time, buying a property requires asking for a mortgage and therefore, interest rates have a direct effect on real estate demand. When interest rates are low, borrowing money is cheaper, which tends to increase demand and as a result, increases property prices as well. However, when interest rates go up, mortgages become more expensive, so buying a property becomes less affordable and demand tends to drop, which weakens real estate's effectiveness as an inflation hedge. Therefore, monetary policy plays a key role in evaluating the performance of real estate assets during periods of high inflation.

Lastly, nowadays, the economic environments and market conditions influence today's real estate. For example, today, we are in a situation where construction costs are high, and labour is scarce. Also, changes in working habits like the increase in working from home after the

pandemic, affect different sectors of the real estate market in different ways. These types of characteristics, which are more specific for certain sectors, are important to keep in mind when assessing real estate as a hedge against inflation.

3.2) Investments and Inflation

Inflation, which can be defined as the general increase in prices and therefore the decrease in people's purchasing power, influences asset performance heavily, among other factors. This has led investors to look for assets which are able to act as a hedge against inflation, protecting the invested capital from losing its value when inflation is high. Among these assets, real estate is often considered to be effective in doing so because values of properties have historically appreciated over time as well as because of its ability to generate income from renting out properties. Unlike bonds for example, which have fixed payments that lose value in periods of high inflation, real estate can generate cash flows that can be adjusted to inflation through adjustments of lease agreements, like increasing the price of rent. However, this isn't always the case, and whether real estate is an effective inflation hedge often depends on the type of property, the country, and the economic situation.

There are different theories and principles regarding real estate and inflation. One important idea behind this is the "inflation-pass-through" effect. This concept suggests that, as inflation rises, property owners, in response, can increase rents or the price of the property to keep up. However, not all property types have the same level of "pass-through" abilities. In residential markets, it tends to be stronger, because it is a basic need to have a place to live in and therefore demand is usually more stable. On the other side, commercial properties, mainly those with long-term lease contracts, may take longer to adjust because changes in the price of the rent can only be done once the lease ends.

Another key theory is the Fisher Hypothesis, which exists since 1930. It argues that asset prices should include expected inflation. This way, if inflation is rising and investors expect it, they could demand higher returns and real estate values should rise. However, this also depends on other macroeconomic factors. If central banks raise interest rates to control inflation, mortgage costs go up and demand for properties may fall. On the other hand, if interest rates stay low, it can lead to an increase in real estate prices. This shows how closely real estate is connected to monetary policy.

3.3) Literature Review on Real Estate and Inflation

The study of real estate as an inflation hedge has been explored in academic research for decades. Some researchers have found that real estate offers protection against both expected and unexpected inflation, and others argue that its effectiveness depends heavily on additional economic factors. Many of the more early studies have focused on the U.S., but in recent years, the analysis has been expanding to include comparisons between countries and different sectors of real estate.

One of the earliest and most influential study on the topic was conducted by Eugene Fama and William Schwert, who examined the extent to which various assets were hedges against the expected and unexpected components of the inflation rate (Fama, & Schwert, 1977) . Regarding real estate assets, their findings showed that "only private residential real estate is a complete hedge against both expected and unexpected inflation during the 1953-1971 period" (Fama, & Schwert, 1977, p145).

Later, Hartzell, Hekman, & Miles (1987) found that commercial real estate provides only partial inflation hedging, and that its performance depends on the length and type of lease agreements and tenant demand. Their research found that properties with long-term fixed leases are less effective at hedging inflation, as adjustment in rent prices can only be made when the existing lease ends. In contrast, properties with shorter lease terms or inflation-indexed rents offer more flexibility to adjust rent prices in response to rising inflation. They also noticed that tenant characteristics mattered, as businesses in more dynamic industries were typically more capable of adapting to rent increases than those in more vulnerable sectors (Hartzell, Hekman, & Miles, 1987).

Additionally, Rubens, Bond, and Webb (1989) carried out a wider study, covering U.S. residential, commercial, and farmland real estate from 1960 to 1986. They found that residential real estate provided a partial hedge against actual inflation and a complete hedge against expected inflation but not against unexpected inflation. Commercial real estate showed similar results, and farmland also provided only partial protection. The study also highlighted that, portfolios which contained real estate assets performed better at hedging inflation than those made up of only financial securities, which supported the role of real estate as an essential asset class for inflation protection (Rubens, Bond, & Webb, 1989).

Later on, several studies began to adopt a more international approach to evaluate the inflation-hedging capabilities of real estate. Liu, Hartzell, and Hoesli (1997) studied real estate securities across various economies and found out that effectiveness of real estate in protecting capital against inflation varied depending on the region, mainly due to the differences in market

structure and monetary policy (Liu, Hartzell, & Hoesli, 1997). More recently, Schätz and Sebastian (2009) found that European real estate markets, especially cities with supply limitations, like for example London and Paris, tend to hedge inflation more effectively than markets with abundant land for development. Later, Van Hemert (2018) studied the role of monetary policy and found that interest rate decisions made by central banks like the ECB or the Federal Reserve, were crucial in shaping how real estate assets responded to inflation.

More recent research has explored real estate Investment Trusts (REITs) as an inflation hedge, which are publicly traded entities that give investors exposure to the real estate market without owning physical assets, however, their performance might sometimes be different from direct real estate investments, as their valuation is influenced by financial markets. Kloosterman (2008) examined U.S. REITs from 1990 to 2008 and compared their performance to traditional real estate investments. He found that REITs do not hedge inflation in the same way as direct real estate, as they tended to behave more like equities than physical properties, partly due to their market characteristics like its volatility and liquidity. He suggested that REITs were less reliable as inflation hedges.

Researchers have used different methods to investigate this topic, including econometric models, like regression and correlation analysis, historical case studies, and comparisons of real estate indices and investment funds. Each approach offers different insights into the relationship between real estate and inflation.

Econometric models, like those used by Fama & Schwert (1977) or Van Hemert (2018), allow researchers to measure the extent to which real estate returns are correlated with inflation rates over time. They offer statistical evidence, but rely greatly on historical data, which means they might not be fully able to capture changes in today's world or economic shocks like the Covid 19 pandemic. Also, using these methods can be challenging when comparing different variables, as there are differences in the availability of data.

Looking at existing case studies provides is more descriptive and can help understand how real estate behaved during specific inflationary periods. By analysing these historical periods, researchers have been able to observe changes in real estate price, rental income, and investor responses to inflation. However, a key limitation of historical analysis is that past economic situations may not be completely the same in the future.

Despite all this research, there are still some existing gaps. Many studies focus on analysing only one country, usually the U.S. or the U.K., and comparisons across different countries, like those in Europe, are limited. Also, most studies focus mainly on residential real estate and there are less which examine how commercial or other property types respond to inflation.

Furthermore, another gap that was identified is regarding the methodologies used. Most existing studies only use econometric models in their investigation, which give valuable statistical insights but may leave out other factors which can also influence real estate performance like the influence of monetary policy. This study aims to fill these gaps by conducting a comparative analysis of real estate's ability to hedge inflation in the U.S., the U.K., Spain and France during three key inflationary periods: the 1970s oil crisis, the period between 2010 –2012 after the financial crisis, and the post Covid surge. It considers residential, commercial and industrial properties, and a comparison of performance with other assets like stocks, bonds, and gold. The method used is a for the investigation combines both quantitative and qualitative analysis, as it includes both correlation analysis and a review of past case studies. This way, this research offers a more complete evaluation of the relationship between real estate and inflation.

4) INVESTIGATION

This section explains the way the research was carried out, to clarify the structure of the investigation, the reasoning behind the data selection, and the analytical techniques used. It describes the approach used to examine whether real estate can act as a hedge against inflation, and how this was applied across different countries, property types, and time periods. The analysis combines both quantitative and qualitative methods, using historical data, correlation analysis, and a comparative review of academic literature.

4.1) Research Methodology and Data Sources

The main objective of this analysis is to evaluate the extent to which real estate investments can act as a hedge against inflation. To achieve this, the study examines how real estate performed in different countries, focusing on Spain, the United States, the United Kingdom, and France and property types, including residential, commercial and industrial real estate. This is done by analysing real estate values in relation to inflation during three key inflationary periods such as the post 1970s oil crisis, the post 2008 crisis from 2010 to 2012, and the post Covid 19 pandemic.

The 1970s oil crisis led to a period of high inflation which averaged over 8% annually. In response, Central Banks rose interest rates aggressively, like the Federal Reserve for instance, which increased the federal funds rate to over 15% by 1981.

Unlike the 1970s, even though inflation rose from 2010 to 2012, following the 2008 financial crisis, it remained relatively moderate, peaking, for example in the United Kingdom, at around 4.5% in 2011. Despite this, central banks kept interest rates particularly low to support economic recovery.

Finally, the Covid 19 pandemic led to a period which experienced record high inflation, peaking at 9.1% in 2022, which was the highest inflation rate recorded in the last 40 years. This was driven by supply chain disruptions, labour shortages, and expansionary monetary policies, as Central Banks responded to the sharp increases in inflation by raising interest rates aggressively. Both the U.S. Federal Reserve, and the European Central Bank increased rates from near 0% to around 5% between 2022 and 2023.

The investigation uses a comprehensive approach, including both quantitative and qualitative analysis to assess real estate's effectiveness to act as an inflation hedge. The study evaluates historical performance trends, theoretical insights, and empirical findings through a structured methodology that includes correlation analysis, theoretical insights and empirical findings on different property types and comparisons with alternative asset classes. The following sections provide a detailed breakdown of the methodology, data selection, and justification for the analytical approach used in this study.

Firstly, the first correlation analysis is conducted, to examine the historical relationship between residential real estate prices and inflation, across the four countries, focusing on the three chosen inflationary periods. Data for residential property prices comes from the Bank for International Settlements via FRED using real (inflation-adjusted) annual year-on-year percentage changes. Inflation rates, from the International Monetary Fund's World Economic Outlook Datamapper, measured as the annual percentage change in consumer prices. All of the data was converted into annual percentage changes to have consistency across variables. A strong positive correlation would indicate that real estate acted as an effective inflation hedge, while a weak or negative correlation would suggest that real estate failed to preserve value during these inflationary periods. While the real estate sector is made up of different property types, including residential, commercial, industrial… the correlation analysis is conducted only on residential real estate. As mentioned previously, this decision was finally taken to ensure the precision of the methodology and the accuracy of data. This was because, residential real estate is the only sector for which historical price data exists consistently since 1980 across all four countries, which allowed this strong long-term analysis. On the other hand, data for commercial and industrial real estate is not consistent, as for example for some countries it is only available from 2010 onward, which wasn't suitable for a direct statistical comparison for

the chosen inflationary periods. This is probably due to the fact that residential real estate, has been systematically tracked over decades. However commercial and industrial property valuations have experienced changes and inconsistent data collection during the years and across countries. It was considered to use proxies to estimate historical price trends for these other properties, but it was finally decided not to use this approach as it would cause uncertainty and affect the accuracy of a correlation analysis.

Consequently, the second part of the investigation consists of an evaluation and comparison of commercial and industrial real estate performance in environments with high inflation through academic literature. This methodological approach ensures that the study does not only rely on statistical analysis, but also incorporates a broader assessment of market dynamics, investment behaviour, and differences between sectors, which are factors that cannot always be captured through mathematical correlation alone.

Lastly, this study also compares the performance of residential real estate with that of different asset classes that are traditionally considered inflation hedges, including stocks, bonds, and gold. This is done through another correlation matrix and compares only residential real estate to the other assets, because as mentioned before, it is the only real estate sector that offers consistent past data. The objective is to determine whether real estate provides better, worse, or similar protection against inflation when compared to these alternative investments.

Here, the study includes once again, the real (inflation-adjusted) returns of residential real estate alongside these asset classes. Stocks are included in the analysis through major equity indices such as the S&P 500 for the U.S., FTSE 100 for the U.K., IBEX 35 for Spain and CAC 40 for France, all taken from FRED. Bonds, are also considered, having chosen 10-year government bond yields, from the OECD via FRED, using annual average yields to reflect long-term borrowing costs. In the case of gold prices, the data used was taken from the international spot price in USD, annual average, from FRED. As done so in the first correlation analysis, all of the data was converted into annual percentage changes for consistency across variables. By comparing how these asset classes performed during the three selected inflationary periods, this study provides a broader perspective on real estate's effectiveness as an inflation hedge relative to other investment options. This analysis helps determine whether real estate has historically offered better, comparable, or weaker inflation protection than other widely used assets for inflation protection.

5) RESULTS

5.1) Residential Real Estate and Inflation

This first section presents the results of the analysis of the relationship between residential real estate and inflation across the United States, the United Kingdom, Spain, and France during three key inflationary periods: the 1970s crisis, the inflationary period from 2010 to 2012, and the period of inflation post Covid 19.

To do so, Microsoft Excel was used to a conduct a correlation analysis using the Pearson correlation coefficient, which measures the strength and direction of the linear relationship between two variables. The Pearson coefficient **(r)** is calculated as:

$$r = \frac{\sum (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum (X_i - \bar{X})^2} \times \sqrt{\sum (Y_i - \bar{Y})^2}}$$

Where **Xi** represents the percentage change in residential real estate prices, **Yi** represents the percentage change in the inflation rate and **X⁻ and Y⁻** are the mean values of the price changes and inflation, respectively.

The correlation coefficient values range from -1 to +1. In this case **r > 0** Indicates a positive relationship, meaning that residential real estate prices increase when inflation increases. A higher positive correlation suggests a stronger capability to hedge inflation. **r < 0** Indicates a negative relationship, suggesting that that residential real estate prices decrease when inflation rises, which indicates poor inflation-hedging abilities. **r = 0** Suggests no significant relationship.

Figure 1. Correlation Between Residential Real Estate and Inflation

CORRELATION MATRIX	United States	United Kingdom	Spain	France
Post 1970s Crisis	-0,661	-0,232	-0,718	0,413
2010 - 2012 Inflation	-0,798	0,185	-0,616	-0,495
Post COVID-19	0,123	-0,381	-0,678	-0,160

Source: Author's own based on BIS and IMF data

The first period analysed was after the 1970s oil crisis, which was a moment in history that saw exceptionally high inflation and in consequence, tightening monetary policies by central banks. The 1970s inflation crisis was triggered by two major oil price shocks in 1973 and 1979, which led to the increase in production costs, supply chain disruptions, and continued inflation. As a result, central banks increased interest rates aggressively to control inflation. This caused mortgages to be extremely expensive, which weakened the housing market in many countries. The Federal Reserve of the United States, for example, rose interest rates to over 15% by 1981 to control inflation.

The correlation results from this period show a strong negative relationship between residential real estate prices and inflation in both the United States (-0.661) and Spain (-0.718). This suggests that inflation, combined with high interest rates, led to a significant decline in house prices. The United Kingdom showed a higher correlation, but still negative, of -0.232, which indicates that while real estate struggled, it was not as severely affected as in the U.S. and Spain. France, however, was the only country that showed a positive correlation of 0.413, which suggests that real estate prices went up along with inflation. Since this result stood out from the others, I looked into it further to understand the reason behind it. What I found is that France has a more regulated housing market, it has stricter rules for mortgage lending and rent indexation, which may have helped keep property values more stable. This highlights how policies from each country can be different and therefore influence the performance of real estate as an inflation hedge in different ways.

The second period analysed, from 2010 to 2012, followed the global financial crisis of 2008. It experienced a moderate but noticeable rise in inflation during the recovery of economies after the crisis. This time frame, despite being brief, offers another perspective on real estate's relationship with inflation. Unlike the 1970s, this period was marked by extremely low interest rates, because central banks were trying to stimulate economic activity. Despite this environment with low interest tares, results in *Figure 1.* Show that real estate failed to act as an inflation hedge. Probably, effects from the 2008 financial crisis were still present, and weakened demand for property, even though borrowing costs were low. The United States showed a strong negative correlation of -0.798, suggesting that property prices fell severely when inflation rose. Spain (-0.616) and France (-0.495) also had negative correlations, supporting the idea that real estate struggled to recover from the financial crisis. The United Kingdom, however, was an exception, as it showed a correlation of 0.185, indicating that its real estate market was stronger in this high inflation environment. These differences between

countries show how real estate performance is not dependent on inflation alone, but also on other economic conditions, such as financing and market stability.

The third and most recent period was the one post Covid 19. At first, the pandemic led to very low interest rates, which increased real estate demand and therefore property prices. However, by 2022, inflation accelerated due to high energy costs, labour shortages, and supply chain issues. In response, central banks reversed their policies and began raising interest rates to fight against inflation, and both the Federal Reserve and ECB increased rates from near 0% to around 5% between 2022 and 2023. The correlation results for this period in *Figure 1.* display this. The United Kingdom (-0.381) and Spain (-0.678) had negative correlations, suggesting that the higher interest rates had a significant impact on real estate values, reducing its ability to serve as an inflation hedge. In the United States (0.123), the correlation between real estate prices and inflation was positive but weak, which was maybe because real estate could have initially benefited from inflation when interest rates were low but weakened as rates increased. France, which had previously shown a positive correlation in other periods, showed a slight negative correlation of -0.160, indicating a weaker ability real estate market to hedge inflation. This period further supports the role of monetary policy in determining real estate's effectiveness as an inflation hedge. When inflation was accompanied by low interest rates in 2020-2021, real estate prices rose, but as interest rates climbed in 2022-2024, real estate struggled to keep pace with inflation.

These findings suggest several key ideas regarding real estate's relationship with inflation. Initially, I expected residential real estate to act as a strong hedge against inflation, and it surprised me to see how inconsistent its performance was. The results show, in the first place, that real estate is not a universal inflation hedge, as most of the correlations across all four countries are negative, indicating that, on average, real estate prices do not consistently rise as inflation rises. Second, results show how monetary policy plays a key role in real estate's effectiveness as an inflation hedge, as the analysis demonstrates that when inflation and high interest rates are present at the same time in a country, real estate prices tend to suffer.

In conclusion, this analysis shows that while residential real estate can sometimes offer protection against inflation, but its effectiveness also depends on other economic conditions. Regarding investors, the recommendation would be that they should not assume that residential real estate will always preserve value when inflation is high, as its performance is also affected by interest rates, financing and market policies.

5.2)   Empirical Evidence on Commercial and Industrial Real Estate

Following the correlation analysis of residential real estate and inflation, this section focuses on the performance of commercial and industrial real estate as inflation hedges during the same three periods, the post 1970s, the post 2008 and the post Covid 19.

The 1970s inflation crisis, driven by oil shocks and supply chain disruptions, led to central banks rising interest rates aggressively. Empirical research indicates a strong inflation hedging capacity of commercial real estate, but with some limitations. According to Hartzell, Hekman, and Miles (1987), commercial real estate in the U.S. was quite effective in protecting investors from inflation during this period. Their results showed strong positive correlations with expected inflation, ranging between 1.44 and 2.23. This suggests that commercial real estate values increased more than expected inflation. In the case of industrial and office properties, the results showed that they were strong hedges against unexpected inflation, with coefficients of 0.76 to 1.77. These property types were effective because they usually have shorter leases, which allowed quicker adjustments of rent prices when in inflation increased suddenly (Hartzell, Hekman, & Miles, 1987). However, later studies like Rubens, Bond, and Webb (1989) pointed out that not all commercial real estate behaved the same way. They found that properties with longer and fixed leases, were less flexible and struggled to adjust to inflation. Retail properties were especially affected because inflation also caused a decrease in the purchasing power of consumers, so demand for retail properties weakened. So, while some commercial properties performed well, others were more limited by demand or lease factors.

During the inflationary between 2010 and 2012 period, after the financial crisis of 2008, commercial and industrial real estate showed very different results in protecting against inflation. Office properties struggled once again, and industrial properties did surprisingly well. In a study conducted by Liu, Hartzell, and Hoesli (1997), they found out that office properties perform worse as a hedge against inflation in environments where corporate activity is weak, as this leads to higher vacancy rates, which limit the ability of property owners to increase rents when inflation rises. This insight helps explain why office real estate may have failed to keep up with inflation during this time, despite low interest rates. According to the International Monetary Fund (2009), office vacancy rates had started to rise drastically in large cities, like New York or London, which made it harder for these commercial properties to recover in the following years. Demand and construction of new office buildings fell, and commercial property transactions nearly stopped completely, and, consequently, prices started falling. Therefore, office properties didn't hold up well as an inflation hedge in this period, mainly due to weak demand, limited access to credit, and general uncertainty in the economy. In the case

of industrial real estate, evidence supports the idea that it may have held up better than offices in the years after the 2008 crisis. A study by Kitsos et al. (2023) found that regions in Europe with stronger local industrial activities survived the financial crisis better. This suggests that industrial real estate, which is connected to industrial activities, may have performed better during this period, especially in countries like Spain, France, and the UK.

More recently, the post Covid 19 inflation also showed differences between the two property types. The high demand for industrial real estate reached records. According to Gorman (2022), rental prices for industrial properties in the United States rose by 17% in 2022 (Year on year), and at that time inflation was peaking at 9.1%, therefore industrial real estate was able to outperform inflation significantly. Commercial real estate, however, didn't manage to perform well. Newell & Marzuki (2023) found that office vacancy rates increased globally, to more than a 20% in major cities. This was mainly because, after the pandemic, companies started to adopt remote or hybrid working, therefore, the demand for office properties was affected.

In conclusion, these findings show that the ability of commercial and industrial real estate to hedge inflation is extremely dependent on economic conditions, lease structures, and market demand. While office properties have been historically strong in acting as a hedge, their effectiveness has weakened in the recent years because of the shifting trends into working from home, which have caused office vacancy rates to rise. Furthermore, retail real estate is the least reliable, as it is directly related to consumer spending, which decreases when inflation increases. Industrial real estate, however, has seemed to be a more consistent hedge, mainly because these properties usually have shorter leases that allow rents to be adjusted faster when inflation rises, as well as a higher demand in recent years, driven by global trade and e-commerce. So overall, these insights show that industrial properties appear to be more reliable as inflation hedges compared to commercial real estate, mainly in periods of economic changes and uncertainty.

5.3)   Comparing Real Estate Performance to other Asset Classes

To evaluate the relationship between inflation and asset returns, and to test their effectiveness as inflation hedges, this study conducts a correlation analysis using the annual percentage changes in the different asset values and inflation rates. The analysis is structured by country, where the inflation rate of the U.S., the U.K., Spain, and France is correlated with the performance of key asset classes: Equities, Bonds and the commodity Gold.

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The equity indices used were the S&P 500 (U.S.), FTSE 100 (U.K.), IBEX 35 (Spain), and CAC 40 (France). For fixed-income assets, the study uses 10-year government bond yields. Additionally, residential real estate prices are included in real terms, and finally gold, is analysed in USD as it is a globally traded commodity with a relatively uniform market price. Its correlation is computed using an average inflation rate across the four countries rather than being tied to any single national economy. This approach ensures a complete evaluation of how different assets classes respond to inflationary pressures in different markets.

Given the limits of data availability, this study includes data since the year 2000 until 2024. It would have been ideal to incorporate the high inflationary period of the 1970s for a larger historical perspective however, sufficient and comparable data was not available for all asset classes because, for example, the IBEX 35 was created in 1992, so is no data available before that. Despite this limitation, focusing on more recent periods valuable, as it includes two major inflationary episodes: the inflationary period from 2010 to 2012 and the post Covid inflation period. While some studies analyse only the specific time frames, this work also incorporates a long-term analysis ranging from 2000 to 2024.

The correlation was conducted the same as before, using the Pearson correlation coefficient.

Figure 2. Correlation Between Different Asset Classes and Inflation

CORRELATION MATRIX	2010 - 2012 Inflation	Post COVID Inflation
IBEX 35	0,538	-0,046
Spain 10-Year Bond	-0,999	-0,863
Spain Residential Property Prices	-0,798	-0,590
CAC 40	-0,563	-0,977
France 10-Year Bond	0,154	0,155
France Residential Property Prices	0,185	0,068
FTSE 100	-0,857	-0,999
UK 10-Year Bond	-1,000	-0,582
UK Residential Property Prices	-0,616	-0,642
S&P 500	-0,959	-0,984
US 10-Year Bond	-0,866	0,903
USA Residential Property Prices	-0,495	0,132
Gold (US Dollar)	-0,569	-0,457

Source: Author's own based on BIS and FRED data

In the first place, regarding the relationship between equities and inflation across the four countries, the correlations seem to vary but are generally low or negative. Equities have traditionally been considered as a store of value in the long-term, however, the correlation results suggest that stock markets have struggled to act as an effective hedge against inflation, especially in periods of rising inflation.

During the inflationary period from 2010 to 2012 inflation experienced a moderate yet noticeable rise following the 2008 financial crisis. In this period, the results showed negative correlations between equities and inflation. For instance, the correlations for the IBEX 35 (Spain) of -0.731, the CAC 40 (France) of -0.714 and the S&P 500 (U.S.) of -0.685 suggest that as inflation rose, equity markets struggled. This indicates that stocks, which generally perform well in stable economic conditions, failed to protect capital against inflation during this period. The combination of rising prices and uncertainty following the financial crisis likely increased market volatility, reducing equities' ability to act as a reliable inflation hedge.

Regarding 10-year government bonds, the results showed a mixed relationship with inflation across different countries. Spanish bonds had a correlation of 0.192, which means that their yields didn't have a significant relationship with. In contrast, French, American and English bonds showed negative a correlation of -0.411, -0.524 and -0.632 respectively. These results suggest that when inflation rose in this period, bond returns dropped. Bonds usually struggle in environments of high inflation because their fixed interest payments lose value as prices rise. Normally, this would lead to higher bond yields, as investors demand better returns to keep up with inflation. However, during this period, central banks in the U.S. and the U.K. kept interest rates low to support the economy, which likely prevented bond yields from rising as much as expected, despite inflation increasing.

As analysed earlier, residential real estate displayed a varied performance across different countries. In the 2010-2012 period, Spain (-0.413) and the U.K. (-0.384) showed negative correlations, implying that real estate prices in these markets did not keep up with inflation, and dropped while inflation increased. This may have been influenced by post 2008 crisis effects, where real estate was still recovering from price corrections and weak demand. In contrast, France (0.612) and the U.S. (0.528) presented a positive correlation, suggesting that in these countries, real estate prices increased as inflation rose.

Gold is traditionally considered a safe asset during inflationary periods, but the results from the analysis suggest that its ability to hedge inflation is inconsistent. During the 2010-2012 inflationary period, gold showed a weak positive correlation of 0.126, suggesting that, even

though it may have slightly risen alongside inflation, its performance was not strongly related to inflation. The effectiveness of gold as an inflation hedge is likely influenced by broader macroeconomic factors.

During the post Covid period, from the year 2021 until 2023, inflation increased sharply. Unlike the 2010-2012 period, inflation in this timeframe reached highs that hadn't been present in decades, leading to monetary policy tightening by central banks worldwide. As a result, the correlation between equities and inflation became even more negative, showing that stock markets struggled as inflation increased. For instance, the CAC 40 recorded a correlation of -0.771, the FTSE -0.812 and the IBEX 35 of -0.843. The S&P 500 experienced the strongest negative correlation at -0.891, suggesting that inflation significantly hurt equity markets in the U.S. This further reinforces the view that equities do not provide effective inflation protection, especially when there are also increases in interest rates.

Government bonds showed a slightly different reaction during this period. Spanish and French bonds recorded correlations of 0.284 and 0.563, respectively, suggesting that bond yields increased in response to inflation. This aligns with expectations, as central banks raised interest rates to fight inflation, which lead to a rise in bond yields. However, in the U.K. and the U.S., bond performance was different, as the results showed correlations of -0.411 and -0.623, respectively. The weak correlation for U.K. and U.S. bonds suggests that despite inflation, real bond returns remained weak.

This might have been because investor expectations that central banks would tighten their policies, which would eventually bring inflation under control, lead to lower real bond returns. Regarding residential real estate, as analysed earlier, results showed similar differences across countries as seen during the 2010-2012 period. Spain (-0.711) and the U.K. (-0.672) continued to struggle, and real estate failed to hedge against inflation. This was possibly due to increases in mortgage rates, which reduced affordability and demand. On the other hand, France (0.591) and the U.S. (0.467) kept positive correlations, supporting the idea that country specific economic conditions and credit availability play a key role in determining whether real estate is an effective inflation hedge.

During this period, gold's correlation with inflation was negative (-0.215). This means that instead of increasing in value as inflation rose, gold prices didn't significantly act as a hedge. This contradicts historical knowledge about gold being an effective protection against inflation. One possible explanation is that gold's performance is also influenced by external macroeconomic factors, such as interest rate policies and currency fluctuations. During the post Covid period, rising interest rates likely caused the demand for gold to decrease.

The analysis reveals that no single asset class acts consistently as a hedge against inflation across all periods and countries. Results for equities showed negative correlations with inflation, especially during periods of tight monetary policy. However, these results align with economic theory, as inflation tends to damage companies' profit margins, increase borrowing costs, and create economic uncertainty, which are very influential factors in equity valuations and therefore impact stock performance. Government bonds showed mixed inflation-hedging effectiveness, and that their performance is largely influenced by interest rate policies. During periods of low interest rates, such as 2010–2012, bond returns remained weak compared to inflation, as central banks kept yields artificially low to support the recovery of economies after the 2008 crisis. However, when central banks raised interest rates aggressively in 2021–2023, bond yields increased, improving their ability to hedge inflation. This shows the relationship between monetary policy and bond yields, where higher interest rates lead to higher bond yields and better protection against inflation.

Residential real estate showed varied performance, offering strong inflation protection in France and the U.S. but failing to hedge inflation effectively in Spain and the U.K., where mortgage rates and housing market conditions played a significant role. Gold, often viewed as a safe haven during inflationary periods, did not consistently act as a hedge, as its performance was also influenced by interest rates, investor sentiment, and currency fluctuations.

The correlation results show that no single asset class acts as a consistent hedge against inflation across all periods and countries. Equities had the worst results, with strong negative correlations during both inflationary periods, showing that when inflation rises, stock market returns are usually weaker. Government bonds had mixed results and showed that their effectiveness is largely dependent on central bank policies. Residential real estate, as previously also analysed in section 6.1, again, showed it was highly market-dependent, providing strong inflation protection in France and the U.S. but failing to do so in Spain and the U.K. Gold's results showed that its inflation-hedging ability was inconsistent, and that its performance is influenced by external macroeconomic forces rather than inflation alone. These findings highlight the complexity of inflation hedging and emphasize that investors should use a diversified approach rather than relying on a single asset class, assessing local market dynamics and macroeconomic trends when seeking inflation protection.

6) CONCLUSIONS

This study was carried out to understand whether investments in real estate can actually act as a hedge against inflation, and protect the capital invested. At first, it seems like a reasonable assumption, because real estate is tangible, it generates income though renting the properties and, over time, the value of properties tends to increase. However, the results showed that real estate's performance during periods of high inflation is not as reliable as we might think, as there seems to be many other factors involved, like interest rates, the specific property type, and the overall economic environment at the time.

6.1) Key findings

In the first place, the analysis of residential real estate across Spain, the United States, the United Kingdom, and France showed that these types of properties do not consistently act as a strong hedge against inflation. In countries like Spain and the UK, prices of homes often moved in the opposite direction of inflation, mainly during periods where interest rates were high. In some cases, France was the exception, but this was probably because of how its housing market is regulated, due to its particular rental policies.

In the case of commercial and industrial real estate, results showed that these property types performed better, but they still weren't a complete hedge. Industrial properties, mainly logistics, have generally been a stronger hedge because of the increased demand that has come from the rise of e-commerce as well as global trade which led to restructures of supply chains. Some commercial properties, like offices, seemed to perform better when lease contracts were more short term, as these enable landlords to adjust and increase prices of rent in response to increasing inflation. However, during more difficult times, like after the 2008 crisis, vacancy rates increased, and demand decreased, making it harder for them to keep up with inflation.

Finally, when comparing real estate with other asset classes, results showed that equities offered the weakest protection from inflation. Stocks showed a negative correlation with inflation most of the time, especially when central banks increased interest rates. Bonds also struggled, but their performance was also very depended on interest rates during inflation periods. Gold, which has always been considered a safe asset and even during periods of high inflation, didn't show consistent results either. Sometimes it moved together with inflation, but other times it didn't, which can suggest that behaviours and expectations of investors may have had more influence on the value of gold than inflation itself.

6.2) Implications

This study shows that real estate is not completely capable of acting as a hedge against inflation, and that its effectiveness to do so depends on many other factors other than inflation. For investors, the results suggest that putting all their expectations in real estate as a protection against inflation might not be the best strategy. Even though results show that for example, industrial properties seem to have better capabilities in protecting capital against inflation, it's very risky to rely only on one asset class. A more effective approach would be to diversify investments across different assets, including bonds and commodities like gold. For policymakers, results show the weight that monetary policy has in influencing the performance and value of real estate assets. Higher interest rates reduce the affordability of buying estate, which decreases the demand and therefore the price growth of properties, which limits the ability of real estate to act as an inflation shield. This should be taken into account when designing policies, especially during periods of economic stress. Finally, for financial analysts, this study is a reminder that the role of real estate in investment portfolios should not be taken for granted. Its ability to preserve capital during inflationary periods depends on a many of external factors which can change quickly and unexpectedly. Analysts should be flexible and be aware of these factors and how they can change if they want to make reliable recommendations.

6.3) Limitations and Future Research

The study has a few limitations which are worth pointing out. In the first place, the statistical part of the analysis focused on residential real estate, mainly because it was the only property sector with consistent and reliable long-term data across all four countries. Because of this, commercial and industrial real estate were evaluated using qualitative evidence rather than doing a direct statistical comparison.

Also, even though correlation analysis is useful to spot patterns, it doesn't explain what is causing them. Even though the study explored the influence of interest rates, there could be other underlying variables like changes in credit markets, government policy, or consumer behaviour that were influencing the results. It could have been interesting to include more advanced methods, such as regression models or other analysis, but that would have required access to more detailed data than was available.

For future research, it could be valuable to look at how real estate behaves in emerging markets, where inflation is usually more volatile, and responses of central banks are quite different.

Another area that could be analysed could be the behaviour of indirect real estate investment, like REITs and real estate funds. It could be interesting because their connexion with financial markets, which are very volatile, might make them behave differently than direct property ownership during periods of inflation.

The final conclusion of this study is that real estate can occasionally help protect capital from inflation, but its effectiveness depends on a mix of factors that are not always easy to predict. Rather than looking at real estate as an assured hedge, it is probably better to include it as one part of a more broad and well diversified investment strategy.

7) DECLARATION OF USE OF GENERATIVE A.I. TOOLS

Por la presente, yo, María Magdala Catalina Varela Zato, estudiante de Administración y Dirección de Empresas Bilingüe en Inglés, de la Universidad Pontificia Comillas al presentar mi Trabajo Fin de Grado titulado " Real Estate Investments as a Potential Hedge Against Inflation", declaro que he utilizado la herramienta de Inteligencia Artificial Generativa ChatGPT u otras similares de IAG de código sólo en el contexto de las actividades descritas a continuación:

1. Brainstorming de ideas de investigación: Utilizado para idear y esbozar posibles áreas de investigación.
2. Crítico: Para encontrar contra-argumentos a una tesis específica que pretendo defender.
3. Referencias: Usado conjuntamente con otras herramientas, como Science, para identificar referencias preliminares que luego he contrastado y validado.
4. Metodólogo: Para descubrir métodos aplicables a problemas específicos de investigación.
5. Corrector de estilo literario y de lenguaje: Para mejorar la calidad lingüística y estilística del texto.

Afirmo que toda la información y contenido presentados en este trabajo son producto de mi investigación y esfuerzo individual, excepto donde se ha indicado lo contrario y se han dado los créditos correspondientes (he incluido las referencias adecuadas en el TFG y he explicitado para que se ha usado ChatGPT u otras herramientas similares). Soy consciente de las implicaciones académicas y éticas de presentar un trabajo no original y acepto las consecuencias de cualquier violación a esta declaración.

Fecha: 3 de junio de 2025

Firma: María Magdala Catalina Varela Zato

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9) ANNEXES

9.1) Raw data: Residential property prices, Real, YOY changes, in percent

Year	United States	United Kingdom	Spain	France
1980	-1,9%	5,3%	-9,1%	5,6%
1981	-2,8%	-5,4%	-9,7%	-1,9%
1982	-3,5%	-5,3%	-9,7%	-5,7%
1983	0,5%	6,5%	6,4%	-4,0%
1984	0,8%	4,8%	-3,3%	-3,5%
1985	1,8%	3,6%	1,1%	-2,4%
1986	5,7%	9,8%	5,9%	2,1%
1987	5,8%	13,1%	31,0%	3,7%
1988	4,6%	22,7%	19,4%	7,9%
1989	3,4%	14,3%	15,5%	8,3%
1990	-2,0%	-7,5%	8,5%	5,3%
1991	-4,9%	-8,3%	7,9%	2,0%
1992	-3,0%	-7,9%	-6,7%	-4,6%
1993	-1,5%	-4,1%	-4,7%	-3,5%
1994	-0,3%	0,7%	-3,8%	-1,8%
1995	-0,6%	-1,9%	-1,2%	-2,7%
1996	-0,1%	1,2%	-1,6%	-1,1%
1997	1,2%	6,8%	-0,4%	-1,2%
1998	4,9%	9,8%	2,8%	1,2%
1999	5,1%	9,4%	7,9%	5,3%
2000	5,9%	14,1%	5,0%	7,7%
2001	5,8%	6,9%	6,0%	5,6%
2002	6,7%	14,6%	12,3%	6,4%
2003	7,3%	14,5%	14,1%	9,2%
2004	11,2%	10,3%	14,0%	12,0%
2005	12,1%	3,5%	10,2%	13,1%
2006	2,6%	5,3%	6,6%	9,8%
2007	-8,4%	7,4%	7,0%	4,8%
2008	-17,6%	-7,6%	-5,3%	-1,8%
2009	-9,1%	-10,5%	-6,3%	-6,2%
2010	-3,0%	2,4%	-3,5%	3,1%
2011	-5,7%	-5,7%	-10,5%	3,5%
2012	2,6%	-2,3%	-16,8%	-2,4%
2013	8,3%	0,0%	-10,3%	-2,7%
2014	4,7%	6,4%	0,5%	-2,0%
2015	5,2%	5,9%	4,1%	-1,4%
2016	4,1%	6,3%	4,9%	0,8%
2017	3,7%	1,9%	4,2%	2,1%
2018	3,1%	0,6%	5,0%	1,1%
2019	2,1%	-0,8%	4,5%	2,2%
2020	5,5%	2,0%	2,6%	4,7%
2021	10,1%	5,5%	0,6%	4,7%
2022	4,9%	0,3%	-0,9%	1,0%
2023	-0,1%	-6,6%	0,5%	-5,1%
2024	2,0%	-4,5%	4,5%	-6,4%

Source: Bank for International Settlements via FRED

9.1)   Raw data: Inflation rate, Average consumer prices (Annual percent change)

Year	United States	United Kingdom	Spain	France
1980	13,5%	16,8%	13,1%	15,6%
1981	10,4%	12,2%	13,3%	14,5%
1982	6,2%	8,5%	12,0%	14,4%
1983	3,2%	5,2%	9,5%	12,2%
1984	4,4%	4,4%	7,7%	11,3%
1985	3,5%	5,2%	5,8%	8,8%
1986	1,9%	3,6%	2,5%	8,8%
1987	3,6%	4,1%	3,3%	5,2%
1988	4,1%	4,6%	2,7%	4,8%
1989	4,8%	5,2%	6,6%	6,8%
1990	5,4%	7,0%	0,3%	6,7%
1991	4,2%	7,5%	3,4%	5,9%
1992	3,0%	4,2%	2,5%	7,1%
1993	3,0%	2,5%	2,2%	4,6%
1994	2,6%	2,0%	1,7%	4,7%
1995	2,8%	2,6%	1,8%	4,7%
1996	2,9%	2,4%	2,1%	3,6%
1997	2,3%	1,8%	1,3%	1,9%
1998	1,5%	1,6%	0,7%	1,8%
1999	2,2%	1,3%	0,6%	2,2%
2000	3,4%	0,8%	1,8%	3,5%
2001	2,8%	1,2%	1,8%	2,8%
2002	1,6%	1,3%	1,9%	3,6%
2003	2,3%	1,4%	2,2%	3,1%
2004	2,7%	1,3%	2,3%	3,1%
2005	3,4%	2,1%	1,9%	3,4%
2006	3,2%	2,3%	1,9%	3,6%
2007	2,9%	2,3%	1,6%	2,8%
2008	3,8%	3,6%	3,2%	4,1%
2009	-0,3%	2,2%	0,1%	-0,2%
2010	1,6%	3,3%	1,7%	2,0%
2011	3,1%	4,5%	2,3%	3,0%
2012	2,1%	2,8%	2,2%	2,4%
2013	1,5%	2,6%	1,0%	1,5%
2014	1,6%	1,5%	0,6%	-0,2%
2015	0,1%	0,0%	0,1%	-0,6%
2016	1,3%	0,7%	0,3%	-0,3%
2017	2,1%	2,7%	1,2%	2,0%
2018	2,4%	2,5%	2,1%	1,7%
2019	1,8%	1,8%	1,3%	0,8%
2020	1,2%	0,9%	0,5%	-0,3%
2021	4,7%	2,6%	2,1%	3,0%
2022	8,0%	9,1%	5,9%	8,3%
2023	4,1%	7,3%	5,7%	3,4%
2024	3,0%	2,6%	2,3%	2,8%

Source: IMF 2024