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Evangelos Vasileiou, Dimitrios Apostolidis

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Dollar-Cost Average plan in EMU countries: could it be beneficial? What the data say.

Dr Evangelos Vasileiou

Assistant Professor

University of the Aegean

Department of Financial and Management Engineering

e-mail: e.vasileiou@aegean.gr

Dimitrios Apostolidis

University of the Aegean

Department of Financial and Management Engineering d.k.apostolidis@gmail.com

Abstract

This study examines a real case scenario using real data under the assumption of a long-term investment horizon. We examine the Dollar Cost Average, Cost Average Plan (CAP) in our case, and attempt to ascertain whether it could prove beneficial for an investor that does not have a significant amount of money to invest when the plan begins. We compare the outcome of the CAP with the alternative scenario of investing a monthly amount in a deposits account, which is in real terms the most comparable plan to the CAP. Using data from January, 2003 to November, 2021 from a wide range of ten (10) European Monetary Union countries, we compare the empirical evidence of these results and we reach the conclusions that CAP outperforms the seasonal bank deposits plan. Moreover, we compare these strategies with the Buy-and-Hold (BnH) strategy, as most studies do, and we conclude that CAP is more beneficial for highly volatile and less uptrend markets than a BnH strategy.

Jel Classifications: G1; G11; N2

Keywords: Dollar Cost Averaging; Investment Strategies; Investment Decisions; Investment Plans.

1. Introduction

This note examines alternative strategies for an investor who does not have a significant amount to invest, but s/he tries to gather a significant capital amount in the long term. We test an investment strategy that it is widely recommended by practitioners and in some way works as an insurance fund: the Dollar-Cost Average plan. In this study, we use the term Cost Average Plan (CAP) because the denomination currency is not always the USD. CAP implies that a fixed amount of money (equal installments) is invested on a seasonal basis in order to reduce the bad timing effect. In most studies, the performance of this strategy is compared with the Buy-and-Hold (BnH) strategy, under the assumption that an investor with a significant amount of money chooses between CAP and BnH investment options.

The CAP strategy has been examined in the financial literature from several different perspectives. A dominant suggestion is that CAP significantly reduces the risk relative to a BnH strategy because one of the drawbacks to using a BnH strategy is that the total capital may not be invested at the appropriate time (Malkiel (1975)). Moreover, CAP protects the investor from buying a large amount of overvalued stock and gives a kind of signal to buy a large number of stocks when their prices fall (Constantinides (1979)). Moreover, CAP protects investors from behavioral fears and regrets when the time seems inappropriate (Statman (1995)). However, according to other scholars, CAP is one of the many strategies that have been suggested in the financial literature, but it does not always have risk-return benefits relative to other investment plans (Samuelson (1994)). Lu, Hoang, and Wong (2020) show that CAP outperforms BnH strategies in highly volatile and less uptrend markets.

In our work, we mainly focus on the benefits of the CAP for a long-term investor who does not have a large amount of money to invest at a specific time, but s/he wants to save money for the future. For this reason, we assume that the investor invests a small amount of his/her salary in the domestic stock market, and we compare his/her returns relative to an investment plan which assumes a fixed of monthly deposits to a financial institution with a compensation rate equal to the deposit rate of the agreed maturity up to 1 year. Additionally, we present the comparison of these strategies with the BnH strategy, as most similar CAP studies do.

We test our assumptions using data from a wide range of countries that belong to the European Monetary Union (EMU). The data for the stock markets are gathered from yahoo finance and the deposit rates of these markets are collected from the European Central Bank for the period January, 2003 up to November, 2021.

The rest of this paper goes as following: Section 2 describes the data, Section 3 presents the empirical findings, and Section 4 concludes the study.

2. Data

We use data from ten EMU countries whose stock markets present different financial trends¹ and performances during the examined period: Austria, Belgium, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain. Table 1 reports the countries and the indices we used in our sample.

Table1: Description of the indices of the study per country.

| Country | Index |
|-------------|---|
| Austria | Austrian Traded Index (ATX) - The ATX tracks the price trends of the blue chips on Wiener Börse in real time. |
| Belgium | Belgium Stock Market Index (BEL20) - The BEL20 is the benchmark stock market index of Euronext Brussels. It tracks the performance of the 20 most capitalized and liquid stocks traded in Belgium. |
| France | Cotation Assistée en Continu (CAC40) - The CAC 40 is a benchmark French stock market index. The index represents a capitalization-weighted measure of the 40 most significant stocks among the 100 largest market caps on the Euronext Paris. It is a price return index. |
| Germany | Deutscher Aktien Index (DAX) - DAX represents 30 of the largest and most liquid German companies that trade on the Frankfurt Exchange. |
| Greece | Athens Stock Exchange (ASE) – ASE is a capitalization-weighted index of Greek stocks listed on the Athens Stock Exchange. |
| Ireland | Irish Stock Exchange Index (ISEQ) - The index comprises the companies with the highest trading volume and market capitalisation. |
| Italy | FTSEMIB- FTSEMIB index consists of the 40 most liquid and capitalized stocks listed on the Borsa Italiana. |
| Netherlands | Amsterdam Exchange Index (AEX) - The AEX is a free float market capitalization weighted index that reflects the performance of the 25 largest and most actively traded shares listed on Euronext Amsterdam. |
| Portugal | Portuguese Stock Index (PSI) - PSI-20 tracks the prices of the twenty listings with the largest market capitalisation and share turnover in the general stock market of the Lisbon exchange. |
| Spain | IBerian InDeX (IBEX)- IBEX is the benchmark stock market index of the Bolsa de Madrid, Spain's principal stock exchange. |

¹ Our sample includes European countries that have recovered from the European sovereign crisis (Austria, Belgium, France, Germany, and Netherlands) and the PIIGS economies (Portugal, Ireland, Italy, Greece, and Spain) that have been significantly influenced by this crisis.

Table 2 presents the descriptive statistics on the performance of the stock markets in our data sample. We estimate the daily returns (dr) using the formula

$$dr = \frac{Price_t}{Price_{t-1}} - 1 \quad (1)$$

, where $Price_t$ is the price of the stock market on the currently examined day and $Price_{t-1}$ is the price of the stock market on the previous day.

From Table 2, we can easily observe that all the time series are not normally distributed (Kurtosis>3, Skewness≠0, and Jarque-Bera tests statistically significant). Moreover, it is worth mentioning that the stock markets of our sample present differences. As it was expected, the stock markets of Portugal, Italy, Greece, and Spain present the lowest mean returns in our sample².

In the rest of this section, we analyze the deposit rates we use in our study which are the deposit rates for new time deposits with agreed maturity up to 1 year as those are given by the ECB. Table 3 reports the descriptive statistics and Figure 1 graphically presents the performance of the rates. We note the following: Portugal, Italy, Greece, and Spain, which suffered the highest losses from the sovereign risk, have the higher mean returns (Table 1), which is logical due to the higher risk. All deposit rates time series do not follow the normal distribution. Figure 1 depicts with dashed lines the deposit rates of Portugal, Italy, Greece, and Spain.

² Ireland is the market that recovered the fastest among the PIIGS markets.

Table 2: Descriptive statistics of the daily returns of the stock markets

| | ATX | BEL20 | CAC40 | DAX | ASE | ISEQ | FTSEMIB | AEX | PSI | IBEX35 |
|---------------------|------------|--------------|--------------|------------|------------|-------------|----------------|------------|------------|---------------|
| Mean | 0.036% | 0.024% | 0.027% | 0.044% | 0.003% | 0.025% | 0.014% | 0.027% | 0.006% | 0.018% |
| Median | 0.041% | 0.046% | 0.057% | 0.076% | 0.011% | 0.041% | 0.068% | 0.065% | 0.036% | 0.059% |
| Maximum | 12.773% | 9.784% | 11.176% | 11.402% | 14.375% | 10.223% | 11.488% | 10.548% | 10.734% | 14.435% |
| Minimum | -13.649% | -14.211% | -12.277% | -12.239% | -16.233% | -13.033% | -16.924% | -10.753% | -9.859% | -14.059% |
| Std. Dev. | 1.468% | 1.229% | 1.352% | 1.360% | 1.835% | 1.370% | 1.488% | 1.298% | 1.175% | 1.407% |
| Skewness | -0.320 | -0.309 | -0.056 | -0.009 | -0.249 | -0.545 | -0.436 | -0.056 | -0.247 | -0.138 |
| Kurtosis | 12.248 | 13.603 | 11.263 | 10.841 | 10.715 | 11.436 | 12.435 | 12.299 | 11.208 | 12.919 |
| Jarque-Bera | 17,453.53* | 22,910.79* | 13,868.17* | 12,486.23* | 12,137.35* | 14,695.77* | 18,233.60* | 17,564.37* | 13,730.86* | 19,994.39* |
| Observations | 4,874 | 4,874 | 4,874 | 4,874 | 4,874 | 4,874 | 4,874 | 4,874 | 4,874 | 4,874 |

Note: * indicates statistical significance at the 1% confidence level.

Table 3: Descriptive Statistics of Deposit rates with agreed maturity up to 1-year (new business)

| | AUSTRIA | BELGIUM | FRANCE | GERMANY | GREECE | IRELAND | ITALY | NETHERLANDS | PORTUGAL | SPAIN |
|---------------------|----------------|----------------|---------------|----------------|---------------|----------------|--------------|--------------------|-----------------|--------------|
| Mean | 1.260 | 1.023 | 1.322 | 1.099 | 2.272 | 1.255 | 1.634 | 1.258 | 1.622 | 1.543 |
| Median | 0.840 | 0.390 | 0.890 | 0.620 | 2.250 | 1.210 | 1.580 | 0.550 | 1.640 | 1.870 |
| Maximum | 4.750 | 4.360 | 4.710 | 4.470 | 5.210 | 4.440 | 4.370 | 4.690 | 4.700 | 4.920 |
| Minimum | -0.360 | -0.300 | -0.100 | -0.500 | 0.110 | -0.400 | 0.330 | -0.260 | 0.040 | -0.220 |
| Std. Dev. | 1.302 | 1.334 | 1.266 | 1.324 | 1.488 | 1.279 | 0.980 | 1.308 | 1.347 | 1.359 |
| Skewness | 1.035 | 1.068 | 0.936 | 1.020 | 0.197 | 0.762 | 1.015 | 1.095 | 0.547 | 0.509 |
| Kurtosis | 3.165 | 2.926 | 2.949 | 3.000 | 1.835 | 2.733 | 3.446 | 3.028 | 2.286 | 2.484 |
| Jarque-Bera | 40.784* | 43.200* | 33.168* | 39.354* | 14.322* | 22.631* | 40.877* | 45.344* | 16.133* | 12.314* |
| Observations | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 | 227 |

Note: * indicates statistical significance at the 1% confidence level.

The chart displays the deposit rates for ten European countries from 2003 to 2021. The Y-axis represents the deposit rate in percentage, ranging from -1.00 to 6.00. The X-axis represents the year, from 2003 to 2021. The legend identifies the countries by their line styles: Austria (solid blue), Belgium (solid red), France (solid green), Germany (solid purple), Greece (dotted blue), Ireland (solid orange), Italy (dashed dark blue), Netherlands (solid dark red), Portugal (dashed green), and Spain (dotted dark blue).

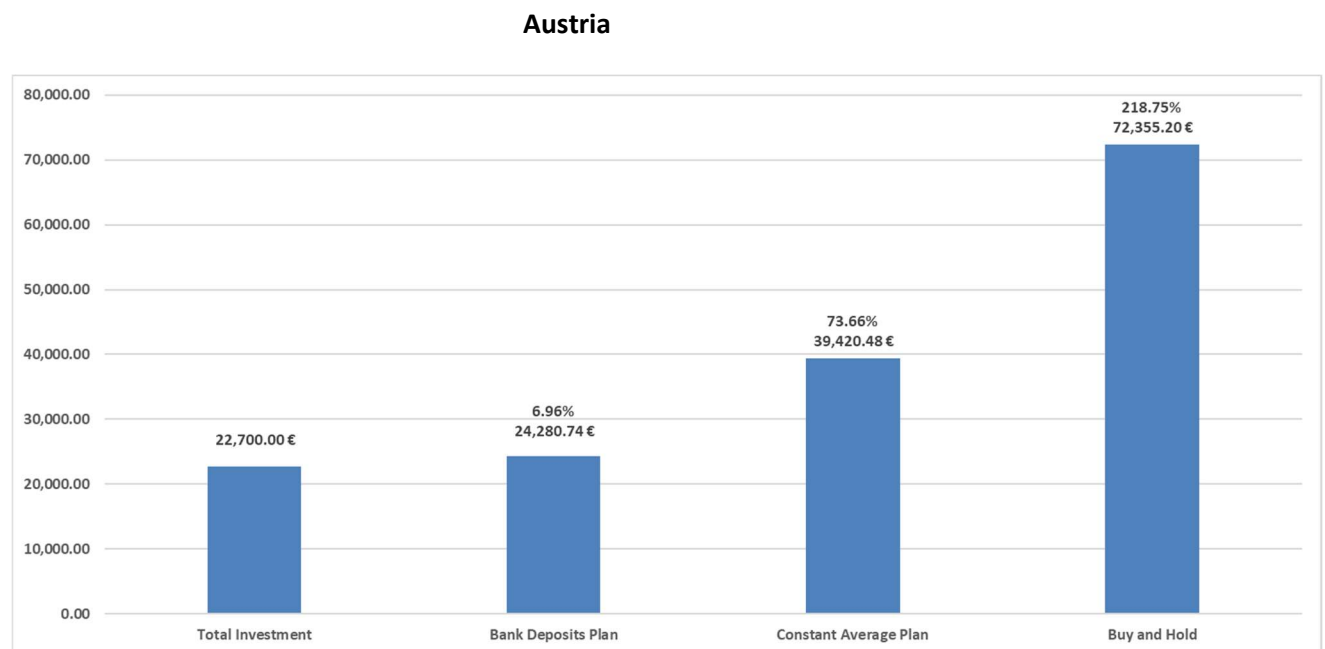
The chart shows a general upward trend in deposit rates until 2008, followed by a sharp decline and subsequent fluctuations. Greece (dotted blue line) shows the highest peak around 2008, while Italy (dashed dark blue line) shows a significant peak around 2012. Most countries converge to low rates (below 1.00%) by 2021.

3. Empirical Findings

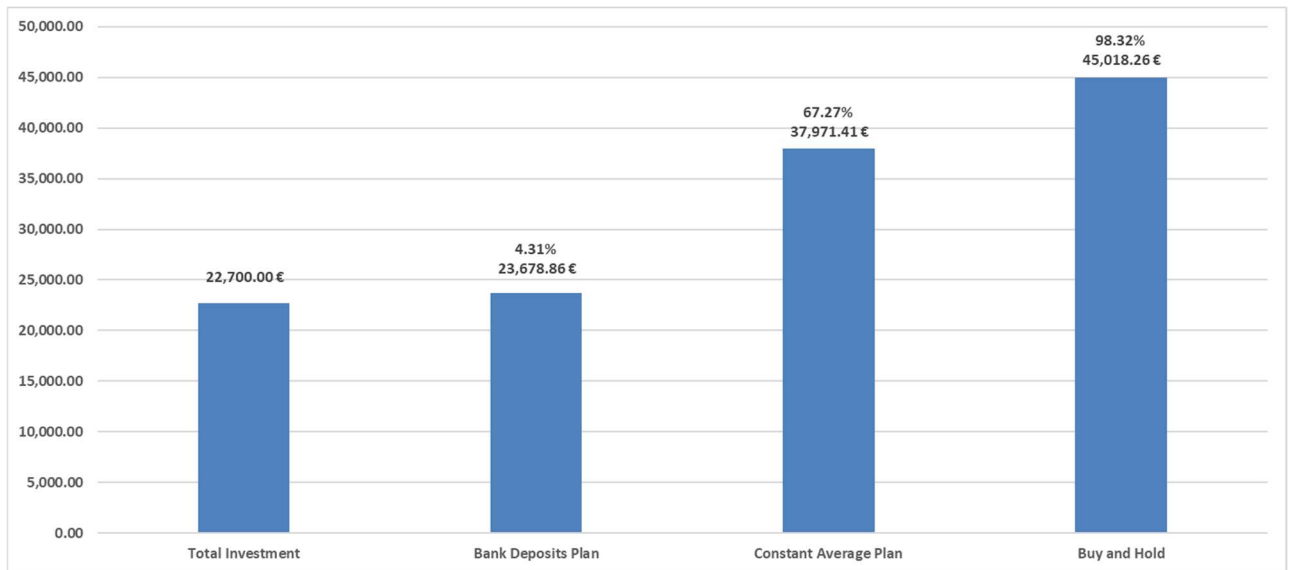
We present the case of an investor who does not have a big amount of money to invest at time t in order to compare the benefits and the drawbacks of CAP relative to the BnH after n years. Thus, we assume that our investor is a young person (or a parent of a newborn) who wants to save money for future consumption for compensation (or for his/her studies).

We assume that the investor's financial conditions enable him/her to save €100 per month. S/He starts the CAP in January, 2003 and liquidates the investment in November, 2021 (227 installments of €100,00). The alternative plan is to deposit this amount in a bank account. We assume that this bank account bears a rate equal to the domestic rate of the new time deposits with agreed maturity up to 1 year and this rate renews on a monthly basis. We also include in our empirical evidence the BnH return for a more detailed analysis. However, this strategy is not comparable to the other two strategies because when the plan begins, the investor may not have a significant amount (e.g. €22,700 which is the invested capital in our example) to invest in order to gain increased returns. Figure 2 presents the results per country.

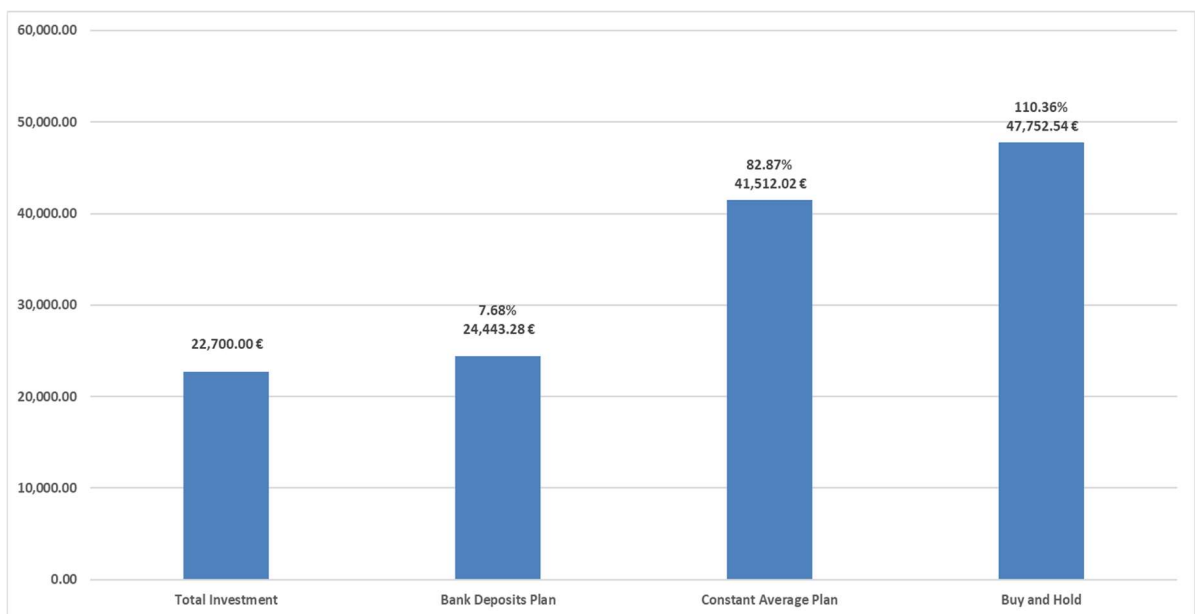
Figure 2: Comparison of CAP, Bank Deposits and BnH Strategies



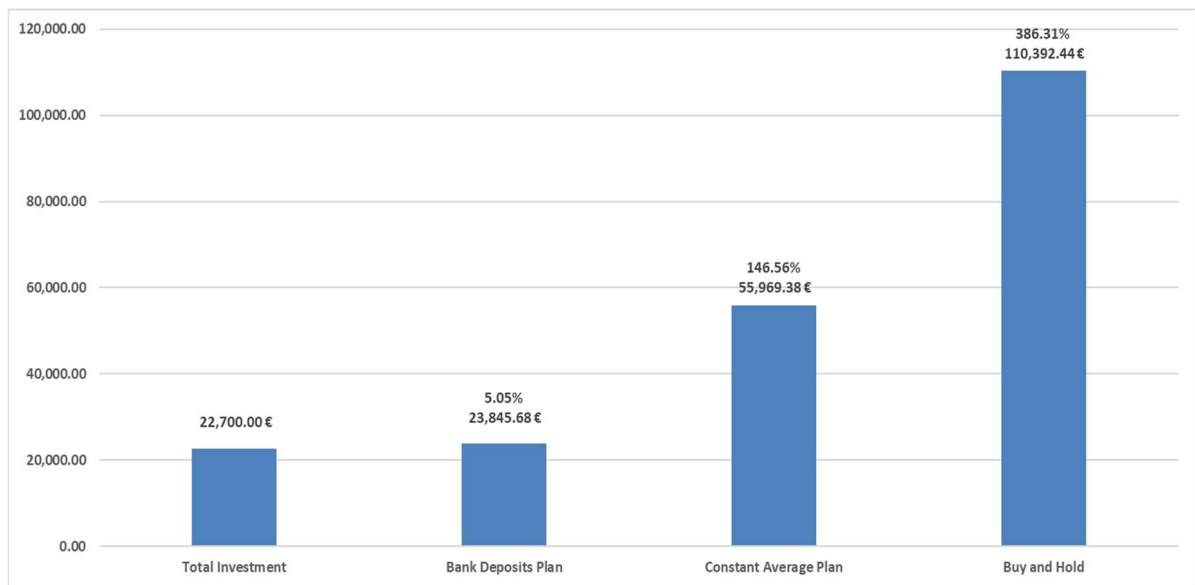
Belgium



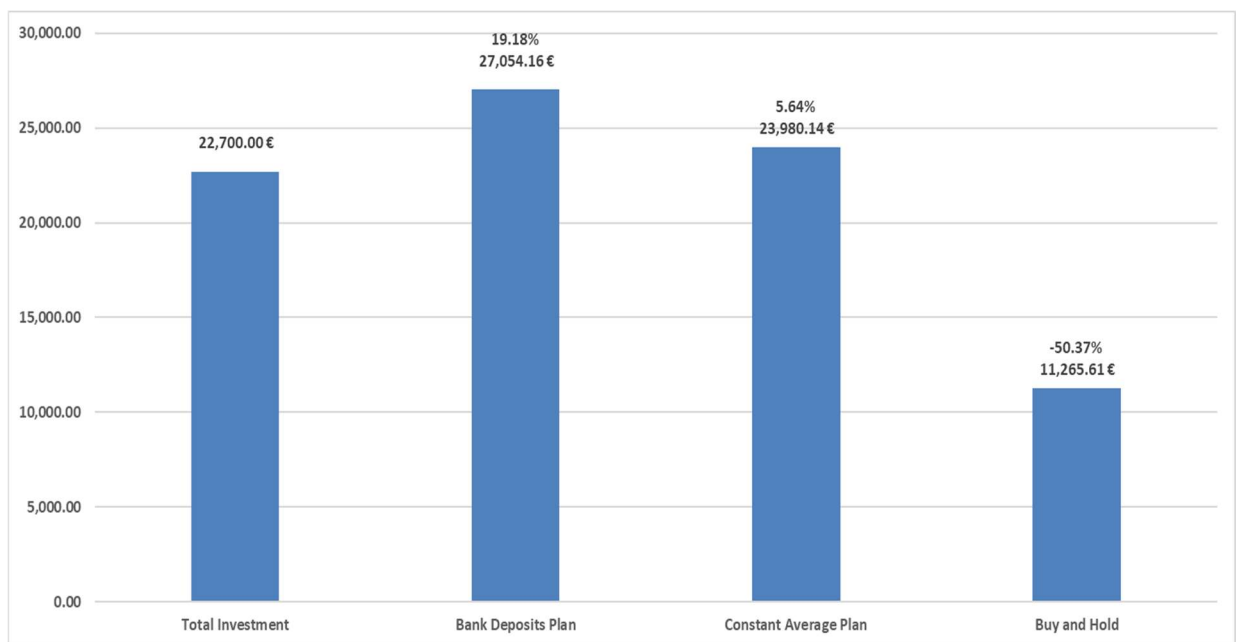
France



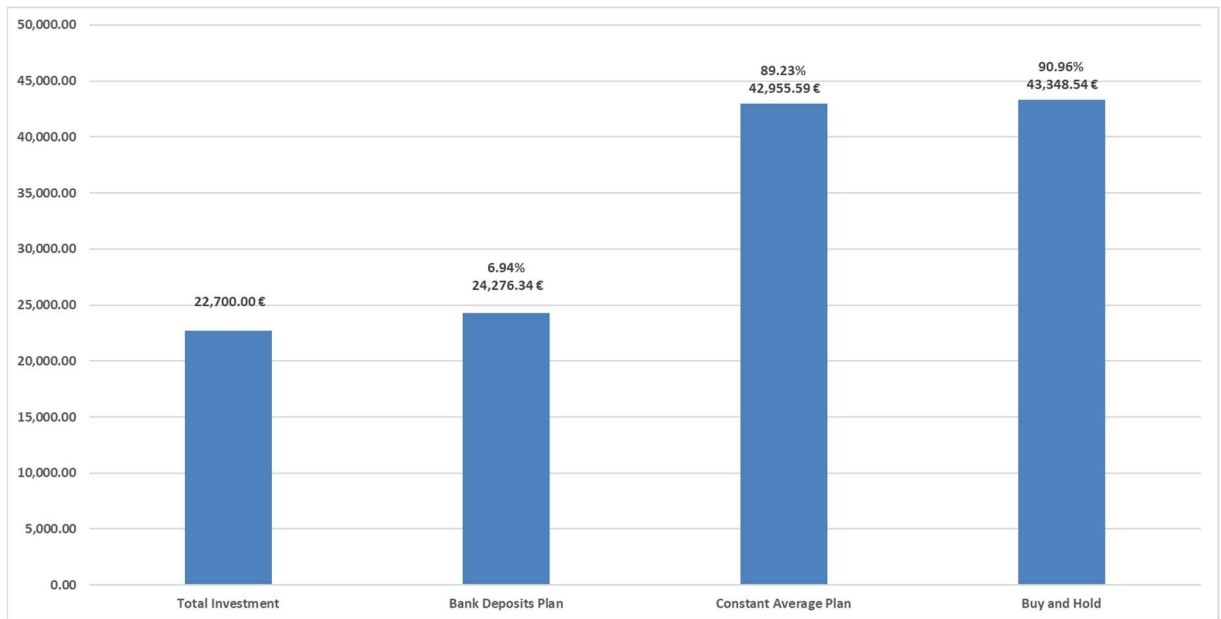
Germany



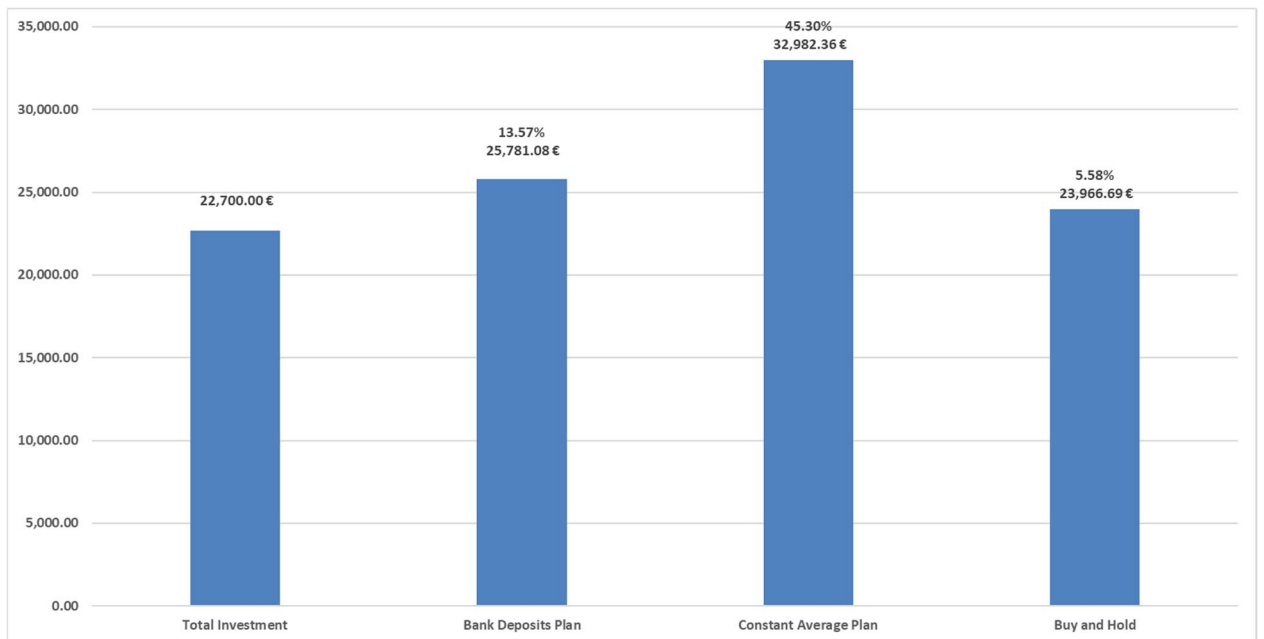
Greece



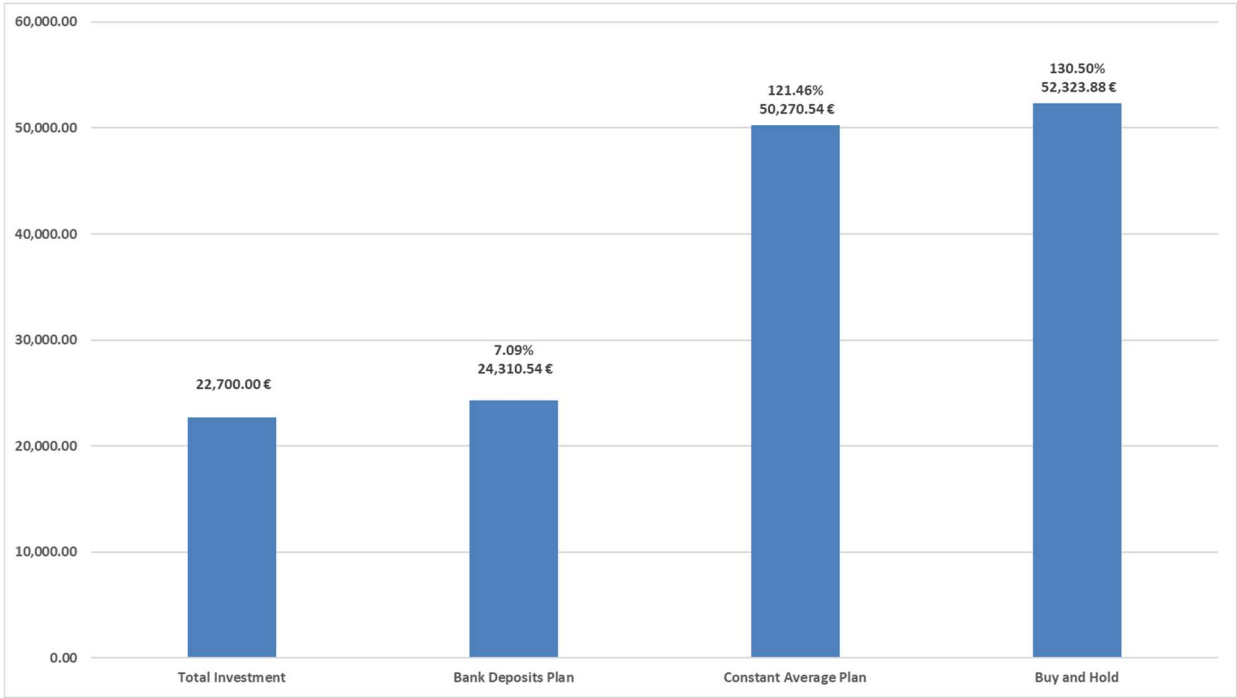
Ireland



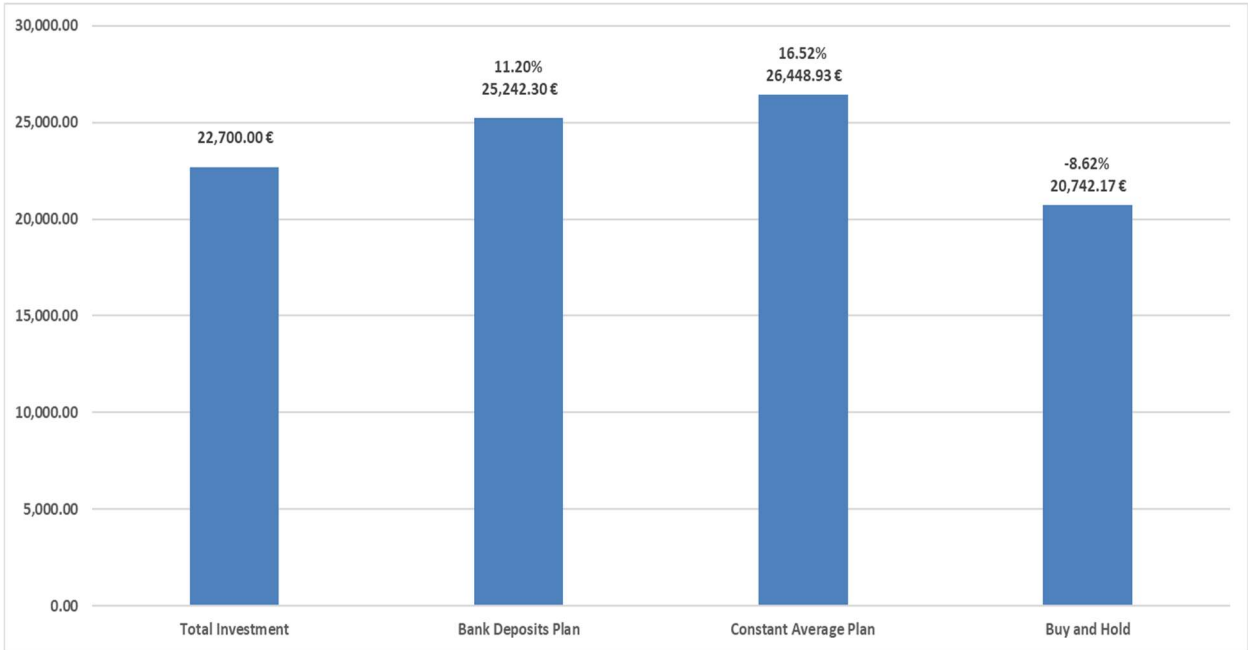
Italy



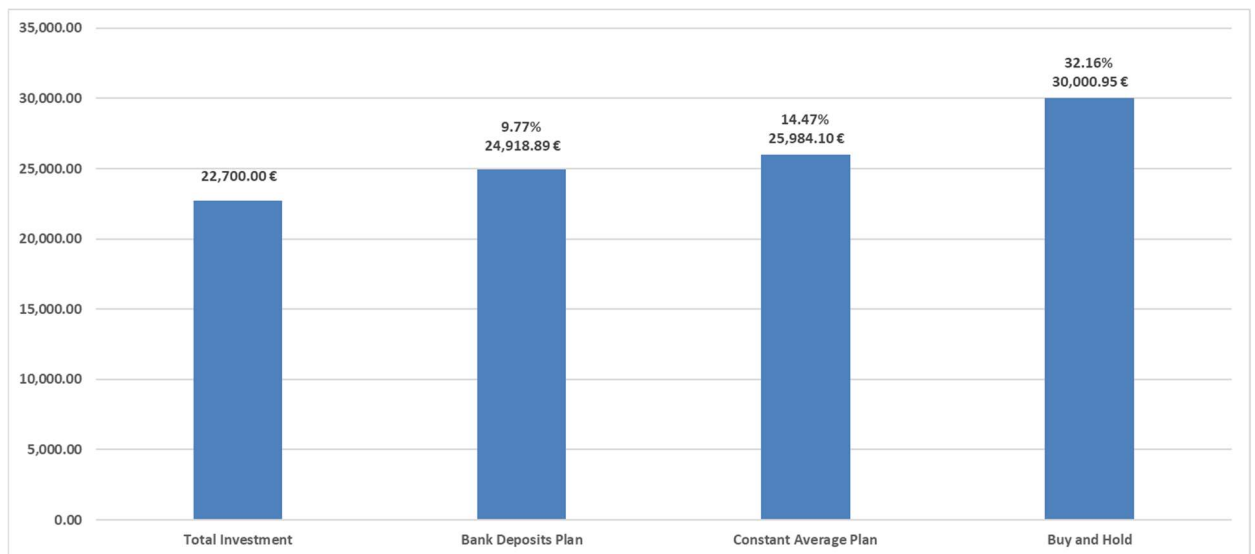
Netherlands



Portugal



Spain



The results show that CAP is significantly more profitable than the Bank Deposits Plan, thus, an investor with a long-term horizon should adopt the CAP. The only exception in our sample is the Greek case, which suffered significant losses from 2003 onwards. Moreover, the results confirm the findings by Lu, Hoang, and Wong (2020) that CAP is more beneficial for highly volatile and less uptrend markets than a BnH strategy, e.g. the Greek, Italian, and Portuguese case.

4. Conclusions

This note tries to highlight the importance of alternative investment strategies using real data for real cases. We show that in most EMU countries the CAP strategy is beneficial for most long-term investors who do not have a big amount of money to invest at the beginning of their investment period. The empirical evidence shows that the investment of a small amount per month leads to increased profits and contributes to the lump of a high capital in the future.

Several adjustments per case may be made, e.g. value-average, proportional rebalancing (Chen and Estes (2010)), TOM-based strategies (Vasileiou (2018)) etc. for benefits optimization. Moreover, several other groups of investors and cases could be examined using real data: could one of the aforementioned strategies be beneficial in cryptocurrency markets? Does proportional rebalancing fit better for compensation cases? Further investigation in this direction can yield useful results/insight.

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