INTERNATIONAL JOURNAL OF BUSINESS, 20(2), 2015 ISSN: 1083-4346

The Risk of Holding Periods across International Stock Exchanges

A.Z. Nowak[a], T. Winkler-Drews[b], Yochanan Shachmurove[c]
[a] *Warsaw University, Poland*
Anowak@mail.wz.uw.edu.pl
[b] *Department of Banking and Insurance, Koźmiński University in Warsaw, Poland*
tadeusz@kozminski.edu.pl
[c] *Department of Economics and Business, The City College of New York, The Graduate School and University Center of The City University of New York, USA*
yshachmurove@ccny.cuny.edu

ABSTRACT

This paper examines real rates of return of the five leading stock exchanges in the world, the New York Stock Exchange (NYSE), the London Stock Exchange (LSE), Euronext, the Deutsche Börse, and the Tokyo Stock Exchange (SE) over the period 1950–2012. The paper analyzes unitized risk values of real rates of return of stock indexes and considers holding periods of one to thirty years. In conclusion, a comparative analysis of stock market dynamics across different periods pinpoints the impact of historical factors on real rates of return.

JEL Classifications: E00, E3, E4, E5, E6, F3, F4, G1, G2, N1, N2

Keywords: New York Stock Exchange; London Stock Exchange; Euronext; Deutsche Börse; Tokyo Stock Exchange; unitized risk values; holding period horizons

Acknowledgements: Shachmurove acknowledges that partial support for this project was provided by a PSC-CUNY Award, jointly funded by The Professional Staff Congress and The City University of New York, and by the Schwager Fund of the City College of The City University of New York. Shachmurove also gives special thanks to Ivana Harrington, Fatjon Kaja, Akim Mahmud, Henry Semanjarrez, and Gregg Stevens, from the City College of New York, and to University of Pennsylvania students Modibo Camara, Jamie Lee and Kevin Yang and, for their research assistance. Yochanan Shachmurove has benefitted from discussions on the topic of this paper with Emanuel, Amir and Tomer Shachmurove.

I. INTRODUCTION

Over the past three decades, financial markets have experienced unprecedented transformations, signs of which emerged in the late 1970s. In the 1980s, deregulation led to integration of financial markets, increasing competitiveness, and the gradual emergence of financial innovation. The rapid development of information and communication technologies in the 1990s contributed to the liberalization, internationalization, and growth of financial markets (Budd, 2011). Towards the end of the 1990s, cross-border investments occurred mainly between the United States (U.S.), Western Europe and, to a lesser extent, Japan (Clark, 2007). Currently, investment flows are still concentrated among the three, although the importance of other areas has been growing.

In recent years, substantial consolidation took place. The largest stock exchanges took over smaller ones, resulting in more concentrated transactions (Greasley, 2011). In 2011, 75% of the world's share trading was done at four major stock exchanges, the New York Stock Exchange (NYSE), the London Stock Exchange (LSE), Euronext, and the Tokyo Stock Exchange (Tokyo SE). Note that the holding companies of the NYSE and Euronext merged in 2007. These developments have generated changing risks, various dimensions of which have been analyzed. See de Araujo and Garcia (2013) for risk spillover among major stock exchanges, Liang and Wei (2012) on global liquidity risk, and Esqueda et al. (2012) about reduced volatility in emerging markets (Silver, 1995).

This paper presents the evolution of the level of risk for the leading five stock exchanges - NYSE, LSE, Euronext, Deutsche Börse, and Tokyo SE - from 1950 to 2012. The accepted measure of risk is the unitized risk values (variation coefficients) for the real rate of return. Risk levels are designated for holding periods of 1 to 30 years. The study uses monthly data from the Global Financial Database (www.global financialdata.com).

The remainder of the paper is organized as follows. Section II through Section VI analyzes the U.S., United Kingdom (U.K.), German, French, and Japanese markets. Section VII briefly concludes.

II. THE U.S. MARKET

With its robust economic growth during World War II, the U.S. enjoyed a post-war period of economic supremacy over other capitalist countries. The arms race arising from the outbreaks of the Cold War and the Korean War added further momentum (the Korean boom). During the period between 1950 and 1953, the U.S. industrial production increased by 41%. The end of the Korean War led to a decrease in government budget expenditures, which was accompanied by a short recession from 1953 to 1954. Inflation triggered another recession from 1957 to 1958. Expanding industrial production in the 1950s triggered a high rate of economic growth (Bordo, 2012).

Scientific and industrial research, propelled by the arms race, revitalized the economy in the 1960s. Although financing the “Great Society” programs, the space exploration missions and the Vietnam War generated budget deficits and inflation. After 1969, fighting inflation became the main goal –Keynesianism gave way to

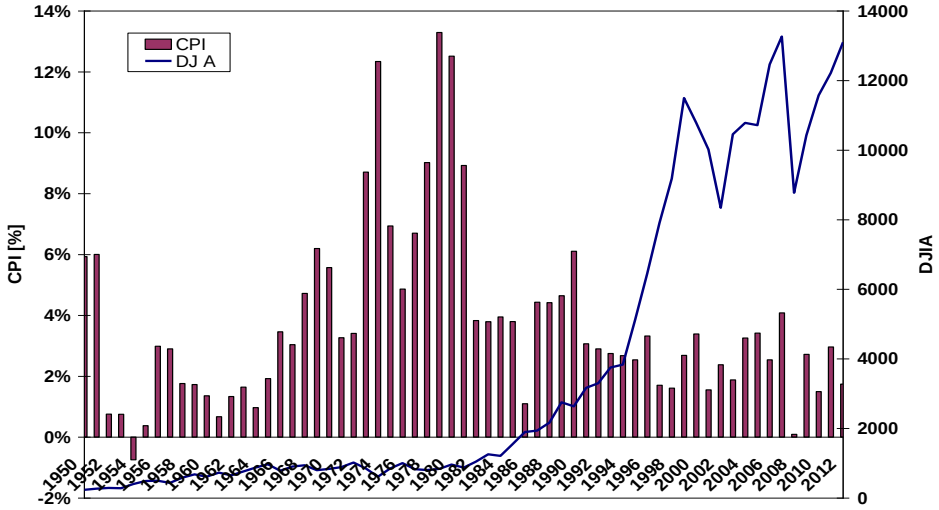
monetarism – but to no avail as stagflation, a combination of low growth and high inflation, crippled in.

During the years 1950 until 1973, the U.S. Gross Domestic Product (GDP) grew at 3.9% annually, growth in industrial production was 5.3% and inflation was at the 2.7% rate. The first oil crisis occurred in 1974 until 1975. The crisis slowed down the U.S. economy, increasing both unemployment and inflation. In 1977, under President Carter, a plethora of social programmes were initiated, which only worsened the situation. In 1980, the inflation rate was 13.5%. In 1981, when President Reagan took office, the inflation rate fell to 10.3%. President Reagan introduced deregulation and spent heavily on defence programs including the "Star Wars" missile defence system. In 1982, a decline in oil prices reduced inflation to 6.2% (World Bank Global Economic Prospects, 2010).

Economic growth rebounded to 4.6% in 1983 after the 1981-1982 recession ended, and averaged 4.1% until 1990, when another recession began. Technological innovation led to more exports, but it did not stop high trade deficits. The domestic government debt was high and reached $200 billion in 1986. Between 1974 and 1990, the American economy grew at a rate of 2.6% annually and growth in industrial production was 2.5%, with the inflation rate being 6.7% (Mishkin, 2002). Expenditures on military intervention in Kuwait in 1990 and 1992 further increased the federal deficits. In 2001, the military intervention in Afghanistan started, and from 2003 to 2005, the Iraq War costs an estimated $802 billion; both events slowed down the economy. The market interpretation of the aforementioned events is presented in Figure 1.

Figure 1

U.S. inflation and the Dow Jones Industrial Average (DJIA) Index values (1950 - 2012)



Source: Global Financial Data

Despite expenditures on the arms race, space exploration, social programs, and the Vietnam War, growth in the value of the Dow Jones Industrial Average (DJIA) continued through the early 1970s. However, the negative effects of the two energy crises did not derail the growth in the stock market from 1973 through 1984. The development of the information and technology sector gave impetus to the expansion of the American economy at the turn of the 1980s and through the 1990s (Rhode, 2006). These developments are reflected by the behavior of the stock market during the period of 1985 until 1994. A reversal of the dynamic growth occurred in 1999 as a result of the crisis due to over expansion of the Information Technology (IT) at the time. The housing boom that lasted until 2006 came to a halt, triggering the great recession of 2007. Table 1 presents summary statistics for the real U.S. stock market returns.

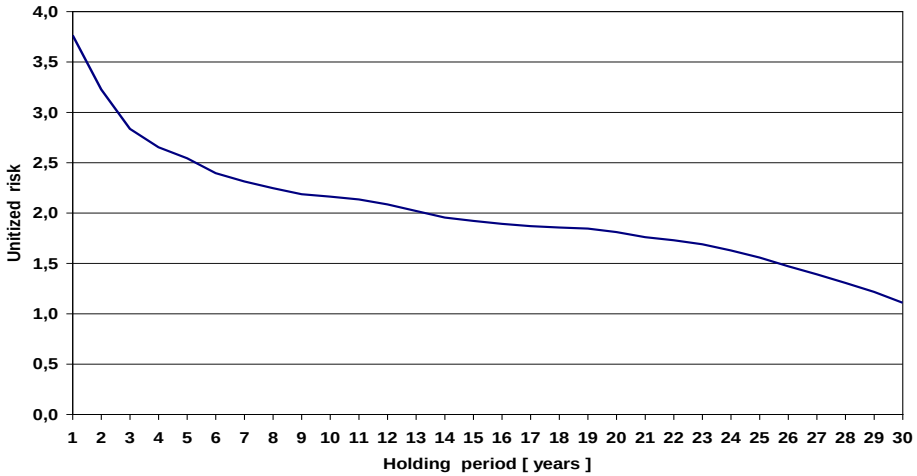
Table 1
Summary statistics for the real U.S. stock market returns

Holding Period [years]	Min	Max	Mean	Standard Deviation	Kurtosis	Skewness	Observations
1	-42.67%	46.72%	4.33%	16.30%	-0.130	0.040	745
2	-29.66%	37.28%	3.60%	11.61%	-0.013	0.131	733
3	-18.16%	28.25%	3.29%	9.34%	-0.450	0.184	721
4	-13.94%	22.91%	3.11%	8.25%	-0.768	0.216	709
5	-12.08%	22.20%	3.06%	7.79%	-0.756	0.175	697
6	-13.06%	18.20%	3.00%	7.19%	-0.856	0.005	685
7	-11.19%	16.64%	2.92%	6.75%	-1.035	-0.051	673
8	-9.97%	15.14%	2.87%	6.44%	-1.102	-0.159	661
9	-9.99%	14.89%	2.85%	6.23%	-1.051	-0.292	649
10	-9.45%	13.17%	2.77%	5.98%	-1.141	-0.304	637
11	-8.45%	12.89%	2.72%	5.81%	-1.209	-0.265	625
12	-7.74%	12.47%	2.70%	5.62%	-1.202	-0.236	613
13	-8.13%	12.79%	2.71%	5.47%	-1.076	-0.233	601
14	-7.74%	12.97%	2.71%	5.30%	-0.985	-0.188	589
15	-7.58%	12.91%	2.68%	5.14%	-0.929	-0.138	577
16	-7.39%	12.48%	2.62%	4.96%	-0.886	-0.117	565
17	-6.97%	12.92%	2.56%	4.78%	-0.914	-0.081	553
18	-6.36%	11.71%	2.48%	4.60%	-1.014	-0.043	541
19	-5.25%	10.93%	2.39%	4.42%	-1.122	-0.004	529
20	-4.84%	9.96%	2.32%	4.20%	-1.214	0.015	517
21	-4.84%	8.95%	2.28%	4.01%	-1.326	0.026	505
22	-4.23%	8.94%	2.22%	3.84%	-1.385	0.085	493
23	-4.36%	8.53%	2.16%	3.65%	-1.403	0.102	481
24	-3.03%	8.20%	2.11%	3.44%	-1.441	0.138	469
25	-3.05%	8.50%	2.09%	3.25%	-1.381	0.167	457
26	-3.12%	7.95%	2.09%	3.08%	-1.423	0.174	445
27	-2.70%	7.05%	2.06%	2.86%	-1.521	0.197	433
28	-2.01%	6.70%	2.02%	2.64%	-1.495	0.270	421
29	-1.67%	6.71%	1.99%	2.42%	-1.403	0.307	409
30	-1.15%	6.62%	1.98%	2.19%	-1.296	0.398	397

Source: Own analysis based on Global Financial Data

For the 30-year holding period, the expected value of rates of return is more than twofold smaller than the same value for 1-year. The standard deviation is respectively seven times smaller. The unitized risk values for the real rate of return for the DJIA Index are indicated on the basis of the data presented in Table 1 and Figure 2. The dynamic of unitized risk for the real rate of return of the DJIA Index is presented in Table 2.

Figure 2
Unitized risk values for the real rate of return for the DJIA Index



Source: Own analysis

Table 2
Dynamic of unitized risk for the real rate of return for the DJIA Index

Holding Period [years]	1	5	10	15	20	25	30
St. dev./ unit rate of return	3.77	2.54	2.16	1.92	1.81	1.56	1.11
Change [%]		32.45	42.58	48.98	51.90	58.65	70.5

Source: Own analysis

III. THE U.K. MARKET

At the conclusion of World War II, Great Britain was economically weak. Reconstructing its economy was only possible with the help of the United States. From 1945 until 1951, Great Britain implemented a nationalization program. The British economy focused on colonization, which made it difficult to benefit from the opportunity to export significant quantities of raw materials for the U.S. arms industry during the Korean War. The outbreak provided a renewed incentive for the British economy with intermittent perturbations in 1952. The inflation rate reached 9.6% in

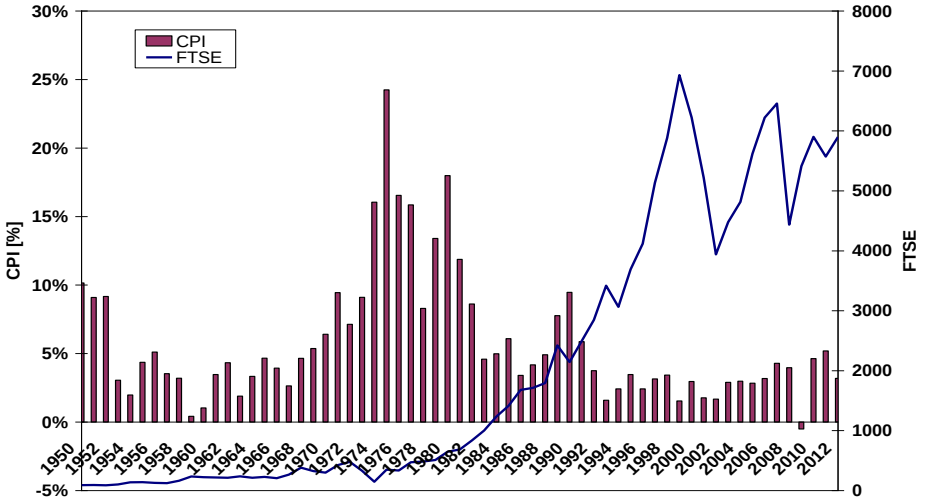
1952. In 1956, the colonial empire started disintegrating after its defeat surrounding the Suez Canal. In 1959, with a conservative economy and a lower, compared with other countries, research and development (R&D) budget, the U.K. conceded the top European GDP spot to West Germany (Arrighi, 2010; Read, 2010).

Following an attempt to construct "the opportunity to export the welfare society" and the subsequent nationalisation of certain industries in 1964, the U.K. devalued the pound sterling by about 12%. This devaluation reinvigorated exports but also reinforced inflation, which peaked at 9.4% in 1971. The British economy was managed according to Keynesian principles, which endorse state interventionism. From the mid-1960s, with a larger R&D budget, the technological gap between the U.S. and the U.K. narrowed. Inflation peaked at 24% in 1975. The exploitation of the British oil resources and the resulting oil self-sufficiency, lowered inflation to 8% in 1976, and it remained at 12% for the following three years. In 1979, the Tory won the elections and introduced monetary neoliberalism (Thatcherism) in order to reconstruct the industry, stabilize inflation, and strengthen the currency (Bernholz, 2003).

The second oil crisis thwarted the economic reforms, causing an economic depression from 1980 to 1981. In 1982, the introduction of new reforms resulted in a 3.5% increase in GDP growth rate and inflation increased by 5%. In 1983, the volume of international trade became considerably more important. In 1986, the oil price returned to its pre-crisis level. During the period of 1974-1990, the British economy grew at a rate of 1.9%. Growth remained stable through the 1990s. In the first decade of the 21st century, this development was impeded by the subprime crisis in 2008 (Kindleberger and Laffargue, 2008). Figure 3 presents the market interpretation of the aforementioned events in the U.K (see also Quennouëlle-Corre and Cassis, 2010).

Figure 3

U.K. inflation and Financial Times Stock Exchange (FTSE) Index value (1950- 2012)

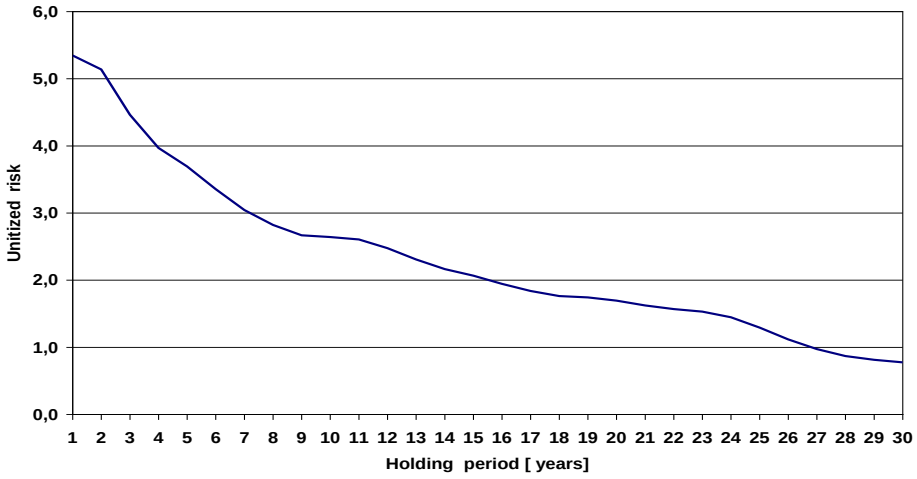


Source: Own analysis based on Global Financial Data

In the years 1950-1973 the London stock exchange (LSE) market experienced a moderate upward trend. The increasing volatility of the alternating fluctuations of the LSE benchmark shows that during the period analyzed, the growth of the British economy was achieved with difficulties. The behavior of the stock market from 1950 to 1955 was fairly steady as the average GDP growth was 3% (Littlewood, 1998). The failure of the Suez conflict in 1956 initiates the ten-year period of major deviations of the index from the trend line.

The London stock exchange reacted with more volatile performances as a result of the devaluation of the pound sterling in 1967, generating a gradual increase in inflation and then stagflation caused by the first energy crisis. The exploitation of offshore oil which mitigated the effects of the first energy crisis, and the debilitating effects of the second energy crisis caused by Thatcherism, largely contributed to the non-linear upward trend of the benchmark of the London Stock Exchange in the period 1974-1989. From 1990 until 2010, the FTSE is characterized by large amplitude fluctuations around a strong upward trend where the turning points define a global phenomenon – the Information Technology (IT) crisis in 2000 and the subprime crisis of 2006-2008 (Eichengreen, 2012). Table 3 presents summary statistics for the real U.K. stock market returns (Vickers, 2011). For the 30-year holding period, the expected rate of return is more than one and a half times smaller than the same value for 1-year. The standard deviation is respectively twelve and a half times smaller. The unitized risk values for the real rate of return for the FTSE Index are indicated on the basis of data in Figure 4 and Table 3. Table 4 presents the dynamic of unitized risk for the real rate of return for the FTSE Index.

Figure 4
Unitized risk values for the real rate of return for the FTSE Index



Source: Own analysis

Table 3
Summary statistics for the real U.K. stock market returns

Holding Period [years]	Min	Max	Mean	Standard Deviation	Kurtosis	Skewness	Observations
1	-65.32%	89.06%	3.56%	19.02%	1.260	-0.040	745
2	-52.03%	40.04%	2.57%	13.19%	1.320	-0.462	733
3	-37.52%	30.37%	2.34%	10.43%	0.948	-0.595	721
4	-25.41%	22.90%	2.14%	8.48%	0.487	-0.571	709
5	-22.87%	23.70%	2.03%	7.50%	0.400	-0.500	697
6	-22.24%	21.61%	2.01%	6.74%	0.369	-0.536	685
7	-16.45%	16.70%	2.02%	6.16%	-0.007	-0.451	673
8	-13.91%	14.20%	2.01%	5.67%	-0.221	-0.476	661
9	-11.72%	11.60%	2.00%	5.34%	-0.557	-0.527	649
10	-10.64%	11.48%	1.93%	5.09%	-0.891	-0.453	637
11	-10.68%	12.23%	1.85%	4.82%	-0.964	-0.393	625
12	-9.22%	11.55%	1.83%	4.52%	-1.030	-0.313	613
13	-8.85%	11.90%	1.86%	4.29%	-0.959	-0.297	601
14	-8.68%	9.83%	1.89%	4.08%	-0.921	-0.282	589
15	-8.55%	10.53%	1.90%	3.93%	-0.907	-0.148	577
16	-6.48%	9.50%	1.92%	3.73%	-0.906	-0.052	565
17	-5.75%	9.29%	1.92%	3.54%	-0.798	0.069	553
18	-4.28%	9.16%	1.92%	3.38%	-0.772	0.143	541
19	-4.72%	9.12%	1.88%	3.27%	-0.786	0.189	529
20	-4.65%	8.51%	1.85%	3.13%	-0.826	0.162	517
21	-3.89%	8.26%	1.82%	2.95%	-0.831	0.235	505
22	-3.44%	8.29%	1.79%	2.80%	-0.863	0.338	493
23	-2.98%	8.60%	1.73%	2.65%	-0.735	0.503	481
24	-2.92%	8.57%	1.72%	2.49%	-0.621	0.618	469
25	-2.59%	8.98%	1.77%	2.29%	-0.460	0.634	457
26	-1.80%	8.15%	1.85%	2.07%	-0.510	0.539	445
27	-1.75%	7.14%	1.91%	1.86%	-0.800	0.347	433
28	-1.07%	5.86%	1.94%	1.68%	-1.061	0.229	421
29	-1.06%	5.94%	1.95%	1.59%	-0.973	0.294	409
30	-1.01%	5.92%	1.96%	1.52%	-0.807	0.346	397

Source: Global Financial Data

Table 4
Dynamic of unitized risk for the real rate of return for the FTSE Index

Holding Period [years]	1	5	10	15	20	25	30
St. dev./ unit rate of return	5.35	3.69	2.64	2.07	1.69	1.29	0.78
Change [%]		30.91	50.58	61.36	68.31	75.82	85.49

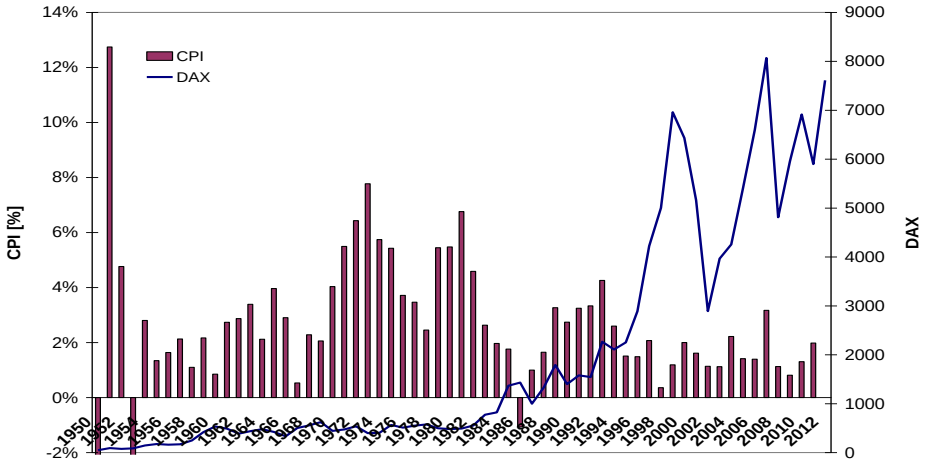
Source: Own analysis

IV. THE GERMAN MARKET

War damages and reparations for the First World War considerably weakened the German industry. The U.S. and the U.K. helped the German economy. Raw material exports from Germany helped the U.S. arms industry during the Korean boom. Additionally, increases in non-arms expenditures helped create the "German economic miracle." In 1959, Germany started leading the GDP rankings. In the 1960s, it received monetary support from the U.S., and scientific/technological progress became a driving force behind its economic expansion. From 1950 to 1973, West Germany's industrial production was five times larger, and German exports grew by 30 times (Alpert, 1951; Bairoch, 1993; Glossner, 2010).

This effect caused annual GDP to rise by 5%, with a simultaneous inflation increase. The first oil crisis increased inflation to 7% in 1974 and resulted in an economic downturn. The German economy, based mostly on coal, overcame the crisis in a short time, reaching a $14.3 billion balance of payments surplus. The second oil crisis prevented inflation from falling, reaching 6.3% in 1981. In the early 1980s, foreign investments decreased and as a result the German Mark weakened. Limited budget expenditures, coupled with increases in export and investment volumes led to a 2.3% GDP increase between 1974 and 1990. After 1990, changes in Central and Eastern Europe triggered economic development with a controlled inflation rate (Alpert, 1951). The German economy was developing steadily, despite high government expenditures as the country was going through the re-unification process (Flandreau, Holtfrerich, and James, 2003). The subprime crisis weakened the economy. Figure 5 shows the impact of German events on the market.

Figure 5
Germany inflation and Deutscher Aktienindex (DAX) Index value (1950- 2012)



Source: Global Financial Data

From 1950 to 1958 the German stock exchange enjoyed a boom as its benchmark fluctuation trends show. Despite the energy crisis, the German economy experienced modest growth, as depicted by the upward trend of the stock market for the two-decade period from 1959 to 1982. A strong upturn of the German stock market from 1983 to 1995 represents the condition of the economy during the late 1980s and 1990s (Haug and Dewald, 2004). Significant fluctuations of the DAX Index around the economic trend are adequate for the economic burden associated with the reunification of Germany. The upward trend in 1996-2012 confirms the modest growth of the German economy in the first decade of the 21st century. The impact of externalities on the German economy is manifested in other areas of the economy due to large fluctuations of the benchmark. Table 5 provides summary statistics for the real German stock market returns.

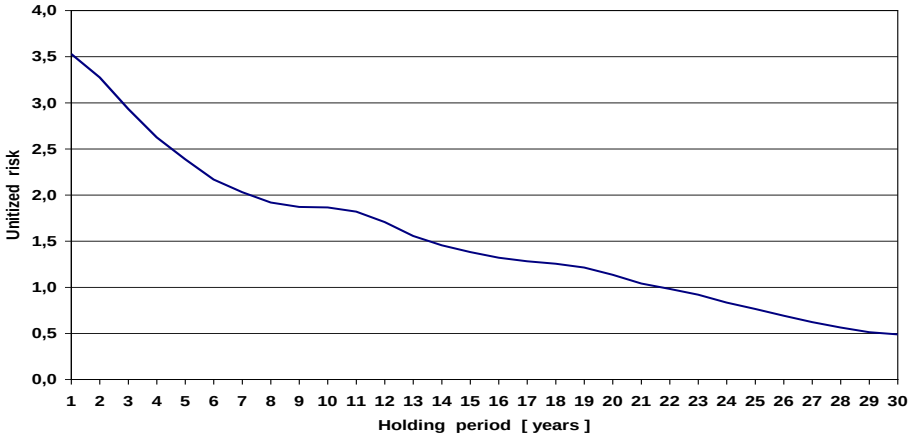
Table 5
Summary statistics for real German stock market returns

Holding Period [years]	Min	Max	Mean	Standard Deviation	Kurtosis	Skewness	Observations
1	-52.60%	98.18%	7.09%	25.03%	0.193	0.538	745
2	-36.60%	70.75%	5.67%	18.57%	0.511	0.652	733
3	-32.71%	54.24%	4.88%	14.30%	0.380	0.672	721
4	-18.34%	39.51%	4.52%	11.87%	-0.305	0.622	709
5	-16.05%	28.93%	4.34%	10.38%	-0.766	0.473	697
6	-12.87%	30.95%	4.17%	9.04%	-0.296	0.619	685
7	-10.09%	33.14%	4.04%	8.21%	0.594	0.931	673
8	-8.61%	27.93%	3.93%	7.53%	0.672	0.993	661
9	-10.66%	25.37%	3.80%	7.10%	0.580	0.869	649
10	-6.76%	26.18%	3.56%	6.64%	1.011	0.886	637
11	-6.17%	23.70%	3.33%	6.06%	0.601	0.699	625
12	-6.02%	19.59%	3.18%	5.42%	-0.287	0.348	613
13	-6.74%	15.90%	3.15%	4.90%	-0.381	0.109	601
14	-7.35%	15.87%	3.12%	4.54%	-0.276	0.057	589
15	-5.90%	13.78%	3.08%	4.26%	-0.566	0.055	577
16	-5.46%	11.94%	3.04%	4.02%	-0.596	0.036	565
17	-5.06%	10.77%	3.01%	3.85%	-0.497	0.062	553
18	-4.72%	11.36%	2.97%	3.73%	-0.273	0.138	541
19	-4.80%	11.14%	2.91%	3.53%	-0.201	0.058	529
20	-4.88%	10.54%	2.84%	3.22%	-0.032	-0.121	517
21	-5.07%	9.38%	2.79%	2.90%	0.269	-0.298	505
22	-5.02%	8.86%	2.77%	2.72%	0.014	-0.274	493
23	-3.57%	8.42%	2.77%	2.55%	-0.508	-0.205	481
24	-3.08%	6.94%	2.77%	2.31%	-0.814	-0.064	469
25	-1.57%	7.24%	2.79%	2.13%	-0.997	0.261	457
26	-1.37%	6.91%	2.81%	1.95%	-0.888	0.286	445
27	-1.81%	6.27%	2.86%	1.78%	-0.631	-0.174	433
28	-1.49%	5.88%	2.88%	1.63%	-0.487	-0.390	421
29	-0.47%	5.52%	2.88%	1.47%	-0.717	-0.441	409
30	-1.00%	5.27%	2.87%	1.41%	-0.601	-0.606	397

Source: Own analysis based on Global Financial Data

For the 30-year holding period, the expected value for the rate of return is over twofold smaller than the same value for 1-year and the standard deviation is respectively seventeen times smaller. On the basis of the data shown in Table 5, Figure 6 shows the unitized risk values for the real rate of return for the DAX Index, whose dynamic is presented in Table 6.

Figure 6
Unitized risk values for the real rate of return for the DAX Index



Source: Own analysis

Table 6
Dynamic of unitized risk for the real rate of return for the DAX Index

Holding Period [years]	1	5	10	15	20	25	30
St. dev./ unit rate of return	3.53	2.39	2.64	1.38	1.13	0.76	0.49
Change [%]		32.34	47.16	60.84	67.85	78.33	86.14

Source: Own analysis

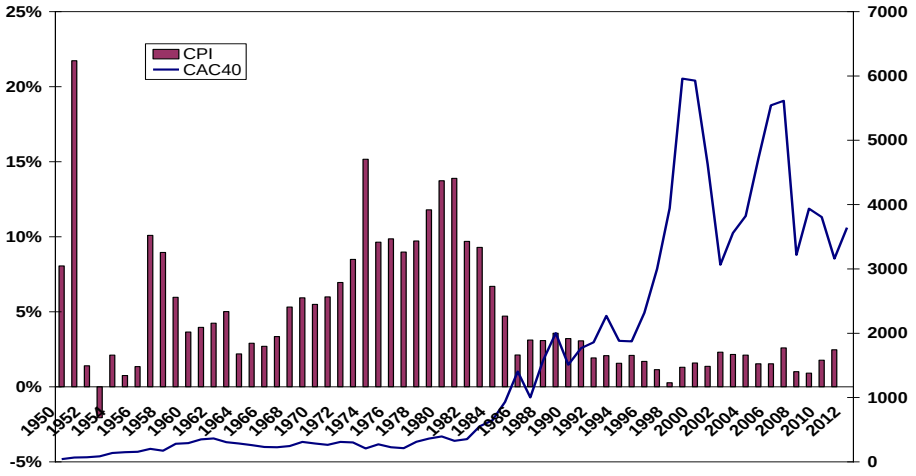
V. THE FRENCH MARKET

The American Marshall Plan was crucial for the reconstruction of the French economy. Central planning and the nationalization of energy, coal mining, aviation, and banking sectors were pillars of French economic policy (Maddison, 2000). With its military involvement in Indochina, France was not able to take full advantage of the opportunity to export significant quantities of raw materials for the U.S. arms industry during the Korean War. There was a drop in the GDP growth rate between 1952 and 1953 (Giersch, 1978). The military involvement in Indochina and Algeria resulted in France's fragility toward the worldwide economic downturn from 1958 until 1959. French exports became more competitive with the initiation of the Great France programme, which devalued the currency (Schröter, 2005).

Due to capital and technological inputs from the U.S., the French GDP increased 5.7% between 1960 and 1970. The recession caused by the first oil crisis had a lower impact on the French economy as compared with other European countries or the United States (1980). France had the second highest GDP growth rate after West Germany. The end of the second oil crisis coincided with political changes in France. In 1981, the leftist defeated the right wing political party in presidential elections. France, weakened by the oil crises and nationalization, which promoted high worker compensations, made its economy less competitive and witnessed inflation upwards of 12% (Rivoire, 1980).

During the years 1981-1983, trade difficulties prompted currency devaluations. In 1986, the rightist political party took over the government and once again privatized banks and enterprises. Throughout the years 1974 until 1990, the French economic development reached the level of Germany, and progressed much faster than that of the United Kingdom. The changes in Eastern and Central Europe did not benefit the French economy as they favoured Germany. In the first decade of the 21st century, French economic growth was stable. The subprime mortgage crisis of 2008 and 2009 impacted the French economy to a much lesser degree as compared with the U.S. and the U.K. Figure 7 presents the market interpretation of the aforementioned events in France.

Figure 7
French inflation and the CAC 40 Index value (1950- 2012)



Source: Global Financial Data

The relatively small amplitude in fluctuations of the French stock exchange index, around a moderate upward trend in the period 1950-1962, suggest that the loss of the war in Indochina (1945-1954) and in Algeria (1954-1962) did not substantially affect the behavior of the market. The large deviation of the index from the trend line in 1958 indicates low resistance of the French economy to the global economic downturn. The currency devaluation in 1960 stimulated export and technological progress, which boosted the French economy in the 70s (Allen, 2011). Both the soundness of the French economy and a better reaction to the negative effects of the two energy crises led to

favorable stock market performances. However, it was accompanied with less than the previous upward trend and with greater volatility in the stock index (Fridson, 1998).

Two devaluations of the French franc in the period 1981-1983 initiated a fifteen-year period of strong growth of the CAC40 Index. This substantial boost was a market response to shaky political and economic changes in the late twentieth-century Europe (Pomfret, 2011). The significant volatility of the Paris stock exchange benchmark around the downward trend in the period 1997-2012 is a manifestation of the growing scale of market interactions as a result of the ongoing globalization process. Table 7 presents summary statistics for real French stock market returns.

For the 30-year holding period, the expected value for the rate of return is more than twofold smaller than the 1-year and the standard deviation is respectively nine times smaller. Figure 8 derives the unitized risk values for the real rate of return for the CAC 40 Index on the basis of data in Table 7. The dynamic of unitized risk for the real rate of return for the CAC 40 Index is presented in Table 8.

Table 7
Summary statistics for the real French stock market returns

Holding Period [years]	Min	Max	Mean	Standard Deviation	Kurtosis	Skewness	Observations
1	-50.02%	81.60%	4.80%	22.67%	0.106	0.286	745
2	-34.50%	50.00%	3.79%	16.82%	-0.415	0.264	733
3	-26.77%	39.63%	3.37%	14.03%	-0.573	0.361	721
4	-24.15%	34.08%	3.11%	12.41%	-0.386	0.482	709
5	-18.74%	27.45%	2.90%	10.75%	-0.616	0.393	697
6	-15.22%	24.03%	2.75%	9.29%	-0.870	0.322	685
7	-13.82%	22.14%	2.65%	8.45%	-0.943	0.265	673
8	-13.40%	18.97%	2.52%	7.96%	-1.070	0.144	661
9	-10.90%	17.53%	2.45%	7.69%	-1.226	0.086	649
10	-9.69%	16.03%	2.32%	7.30%	-1.380	0.038	637
11	-9.78%	15.23%	2.22%	6.90%	-1.401	-0.049	625
12	-9.97%	14.27%	2.18%	6.52%	-1.294	-0.124	613
13	-9.11%	13.51%	2.16%	6.02%	-1.227	-0.241	601
14	-9.72%	12.50%	2.14%	5.70%	-1.064	-0.286	589
15	-10.35%	13.28%	2.13%	5.55%	-0.789	-0.194	577
16	-9.26%	13.86%	2.10%	5.40%	-0.602	-0.081	565
17	-8.25%	14.55%	2.05%	5.26%	-0.470	-0.014	553
18	-7.44%	14.25%	2.01%	5.10%	-0.479	0.005	541
19	-7.76%	13.65%	1.99%	4.95%	-0.637	-0.039	529
20	-7.67%	11.63%	1.96%	4.75%	-0.783	-0.121	517
21	-7.03%	10.71%	1.93%	4.56%	-0.838	-0.080	505
22	-6.17%	11.32%	1.92%	4.44%	-0.892	0.033	493
23	-5.70%	11.01%	1.91%	4.23%	-0.874	0.184	481
24	-5.45%	9.86%	1.90%	3.97%	-0.894	0.249	469
25	-5.26%	9.10%	1.91%	3.71%	-0.979	0.234	457
26	-4.34%	9.01%	1.95%	3.44%	-1.094	0.156	445
27	-3.74%	7.39%	2.00%	3.18%	-1.262	0.069	433
28	-3.38%	7.55%	2.03%	2.93%	-1.257	0.106	421
29	-2.31%	7.70%	2.03%	2.69%	-1.234	0.278	409
30	-1.73%	7.62%	2.00%	2.46%	-1.166	0.370	397

Source: Own analysis based on Global Financial Data

Figure 8
Unitized risk values for the real rate of return for the CAC 40 Index

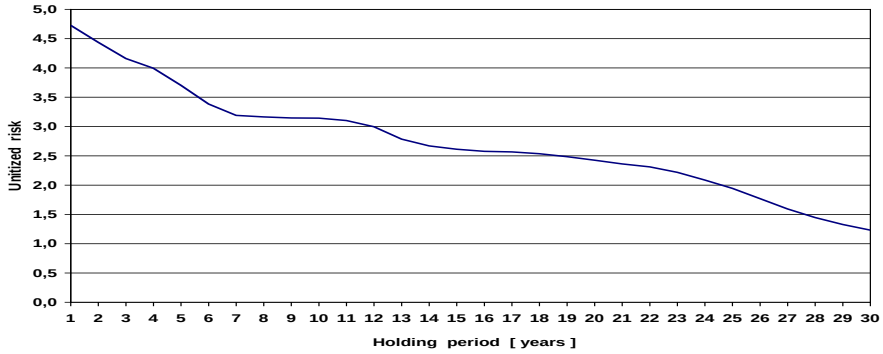


Table 8
Dynamic of unitized risk for the real rate of return for the CAC 40 Index

Holding Period [years]	1	5	10	15	20	25	30
St. dev./ unit rate of return	4.73	3.70	3.14	2.61	2.42	1.94	1.23
Change [%]		21.65	33.51	44.76	48.72	58.86	73.95

Source: Own analysis

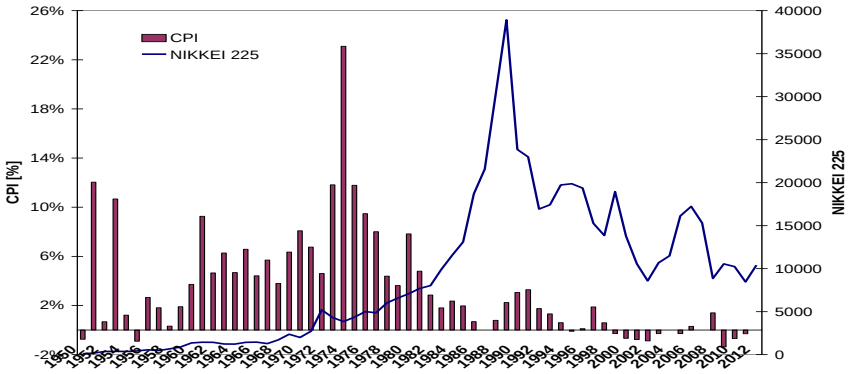
VI. THE JAPANESE MARKET

The loss of colonies and the considerable damages from World War II led Japan into an economic depression. The Communist party victory in China in 1949 forced the U.S. to change their policy toward Japan. The drastic reforms and the $2 billion invested by the U.S. in Japan did not reinstate industrial production to its pre-war level. The Korean War was a strong trigger in increasing the Japanese growth. Japan received $1.4 billion from the U.S. for military support, and exports increased. The Vietnam War (1964-1973) led to further economic development for Japan.

During the period 1950-1973, the "economic miracle" period, political stabilization and government interventions helped the Japanese economy to reach annual growth rates as follows: GDP 9.2%, industrial production 14.6%, and inflation 5.2% (Mosk, 2008). Furthermore, the economy became dependent on imports, GDP increased moderately and inflation grew (24%) as a consequence of the first oil crisis. In 1976, inflation decreased to 10% as a result of a reduction in budget expenditures. In the following year, inflation decreased even further to 4.2%, which caused the yen to appreciate. Although the second oil crisis was less severe, the Japanese economy contracted and the yen depreciated. In 1980, the Japanese capital exports grew and the country became a leader in foreign investments, hence causing the yen to re-appreciate. A dynamically increasing domestic demand and low inflation in the second part of the 1980s, helped Japan to leverage its investments, leading to a "speculative bubble" (Rockoff, 2003).

During the period 1974 until 1990, the Japanese economy was the fastest developing economy among capitalist countries. The annual average Japanese GDP grew at 3.9%, industrial production at 3.5%, and inflation by 5.2%. Since 1989, fearing the consequences of a "bubble burst," the Bank of Japan started raising interest rates, which led to a bubble burst and yen appreciation. The first post-war slowdown occurred when the Japanese GDP increased at a rate lower than other developed countries, causing the Heisei recession in the years 1991-1993. In 1995-1996, an economic revival followed an increase in investments and consumption, but rising tax rates pushed the economy once again into recession. Poor credit policy in the 1980s and the Asian financial crisis of 1997-1999 promoted the Japanese banking crisis (Cassis, 2011). Consequently, the requirements for obtaining loans became stricter, resulting in the 2000-2002 recession (Arestis, Sobreira, and Oreiro, 2011). Moreover, deflation of the 1990s affected the Japanese economic growth ("lost decade"). It started in the last decade of the 20th century, and continued throughout the first decade of the 21st. Figure 9 presents the market interpretation of the aforementioned events.

Figure 9
Japanese inflation and the Nikkei 225 Index value (1950- 2012)

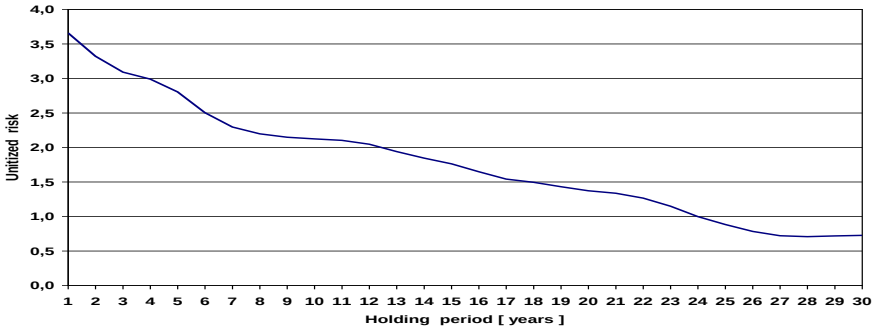


Source: Global Financial Data

The Japanese "economic miracle" can be observed on the Tokyo Stock Exchange as a sharp upward trend during the period 1950 to 1958, then weakened slightly from 1959-1968 and peaked in the final phase from 1970 to 1972. The negative economic growth caused by the energy crisis did not change the economic outlook of the Tokyo Stock Exchange during the 1969-1982 timeframe (Ferguson, 2008). The Japanese stock market explosion, mainly in exports, during the 80s and the "wake-up policy in domestic consumption" are symptoms of exponential trend in the Tokyo Stock Exchange benchmark over the period 1983-1989. A consequence of the "bubble economy" was the crisis of the early 1990s, which triggered a downward stock exchange as a result of the Asian and the subprime crises. Table 9 presents summary statistics for the Japanese real stock market returns.

For the 30-year holding period the expected value for the rate of return is more than one and a half times smaller than the same value for 1-year and the standard deviation is respectively nine times smaller. Figure 10 indicates the unitized risk values for the real rate of return for the NIKKEI 225 on the basis of data in Table 9.

Figure 10
Unitized risk values for the real rate of return for the NIKKEI 225 Index



Source: Own analysis

Table 9
Summary statistics for the real Japanese stock market returns

Holding Period [years]	Min	Max	Mean	Standard Deviation	Kurtosis	Skewness	Observations
1	-49.60%	136.81%	6.84%	25.05%	2.070	0.894	745
2	-34.72%	88.85%	5.61%	18.65%	0.840	0.658	733
3	-26.31%	63.67%	4.82%	14.91%	0.060	0.473	721
4	-20.24%	35.00%	4.22%	12.62%	-0.906	0.324	709
5	-15.82%	28.78%	4.05%	11.35%	-0.856	0.411	697
6	-14.14%	28.05%	4.00%	10.01%	-0.600	0.509	685
7	-13.82%	25.22%	3.92%	8.99%	-0.633	0.491	673
8	-12.28%	23.99%	3.80%	8.36%	-0.663	0.467	661
9	-12.01%	24.96%	3.70%	7.96%	-0.169	0.535	649
10	-9.49%	26.82%	3.52%	7.47%	0.316	0.632	637
11	-9.95%	26.47%	3.34%	7.02%	0.401	0.547	625
12	-11.07%	22.11%	3.17%	6.48%	0.068	0.218	613
13	-11.66%	19.50%	3.10%	6.02%	-0.091	-0.068	601
14	-10.59%	16.69%	3.07%	5.66%	-0.400	-0.282	589
15	-8.83%	14.47%	3.06%	5.39%	-0.565	-0.357	577
16	-7.36%	14.37%	3.09%	5.10%	-0.723	-0.368	565
17	-6.44%	13.15%	3.13%	4.83%	-0.883	-0.328	553
18	-7.00%	12.45%	3.17%	4.74%	-0.789	-0.228	541
19	-8.24%	12.95%	3.23%	4.63%	-0.562	-0.250	529
20	-7.55%	12.69%	3.27%	4.49%	-0.403	-0.320	517
21	-6.69%	12.91%	3.30%	4.41%	-0.097	-0.268	505
22	-7.06%	14.22%	3.37%	4.27%	0.269	-0.190	493
23	-6.24%	14.05%	3.41%	3.92%	0.418	-0.237	481
24	-5.25%	11.81%	3.46%	3.46%	0.163	-0.333	469
25	-4.70%	10.44%	3.54%	3.12%	-0.102	-0.326	457
26	-3.33%	10.03%	3.62%	2.83%	-0.494	-0.233	445
27	-1.97%	9.50%	3.67%	2.64%	-0.798	-0.165	433
28	-1.31%	9.23%	3.70%	2.62%	-0.938	-0.124	421
29	-1.15%	9.37%	3.73%	2.68%	-0.985	-0.047	409
30	-1.78%	9.12%	3.73%	2.71%	-0.991	0.039	397

Source: Own analysis based on Global Financial Data

Table 10 presents the dynamic of unitized risk for the real rate of return for the NIKKEI 225 Index.

Table 10
Dynamic of unitized risk for the real rate of return for the NIKKEI 225 Index

Holding Period [years]	1	5	10	15	20	25	30
St. dev./ unit rate of return	3.66	2.80	2.12	1.76	1.37	0.88	0.73
Change [%]		23.35	41.97	51.81	62.49	75.88	80.16

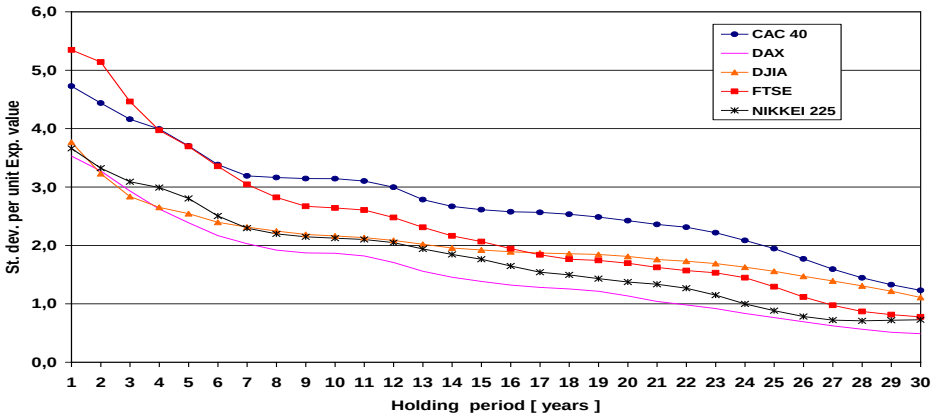
Source: Own analysis

VII. CONCLUSION

Figure 11 depicts the unitized risk values for the real rate of return for the FTSE Index, and is the highest for holding periods 1-5 years. The unitized risk values for the real rate of return for the CAC 40 Index are highest for holding periods 5-30 years. The unitized risk values for the real rate of return for the DAX Index are the lowest for all holding periods.

For the 5-year holding period, the dynamic of unitized risk is higher for the DJIA, DAX, and FTSE indices (ranging from 32.5%-30.3%), and smaller for CAC 40 and NIKKEI 225 (23.4%, 21.7%). For the 10- year holding period, it is higher for FTSE (50.6%), and the DAX has a unitized risk of 47.2%. The DJIA and NIKKEI 225 indices are at comparable levels (42.6%, 42%), and the CAC 40 is 33.5%. For the 15-year holding period, the FTSE and DAF are higher and comparable (61.4% and 60.8% respectively), while the NIKKEI 225, DJIA, and CAC40 have unitized risk values of 51.8%, 49%, and 44.8%.

Figure 11
Unitized risk values for the real rate of return for the stock indices



Source: Own analysis

For the 20-year holding period, it is comparable for the FTSE and DAX (68.3%, 67.9%), while the NIKKEI 225, DJIA, and CAC 40 respectively have unitized risk values of 62.5%, 51.9%, and 48.7%. For the 25-year holding period, the dynamic is higher for DAX (78.3%), while the NIKKEI 225 and FTSE are at comparable levels (75.9%, 75.8%) and so are the CAC 40 and DJIA indices (58.9%, 58.7%). For the 30-year holding period, the dynamic is higher and comparable for the DAX and FTSE indices (86.1%, 85.5%), while the NIKKEI 225, CAC 40 and DIJA indices respectively are 80.2%, 74% and 70.5%. For the 5-year holding period, the dynamic of unitized risk is the highest for the DJIA. For the 10-20-year holding period, it is the highest for the FTSE index. The DAX has the highest level for the 25-30-year holding period. For the 5-20-year holding period, the dynamic is the smallest for the CAC 40. For the 25-30 year period, the dynamic is smallest for the DJIA.

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