Equity Premium:
Historical, Expected, Required and Implied

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ABSTRACT

The equity premium designates four different concepts: Historical Equity Premium (**HEP**); Expected Equity Premium (**EEP**); Required Equity Premium (**REP**); and Implied Equity Premium (**IEP**). We highlight the confusing message in the literature regarding the equity premium and its evolution. The confusion arises from not distinguishing among the four concepts and from not recognizing that although the **HEP** is equal for all investors, the **REP,** the **EEP** **and** the **IEP** differ for different investors.

A unique **IEP** requires assuming homogeneous expectations for the expected growth (g), but we show that there are several pairs (IEP, g) that satisfy current prices. We claim that different investors have different REPs and that it is impossible to determine the REP for the market as a whole, because it does not exist.

We also investigate the relationship between (IEP – g) and the risk free rate.

There is a kind of schizophrenic approach to valuation: while all authors admit different expectations of equity cash flows, most authors look for a unique discount rate. It seems as if the expectations of equity cash flows are formed in a democratic regime, while the discount rate is determined in a dictatorship.

JEL Classification: G12, G31, M21

Keywords: equity premium; equity premium puzzle; required market risk premium; historical market risk premium; expected market risk premium; risk premium; market risk premium; market premium.

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1. Introduction

The equity premium (also called *market risk premium, equity risk premium, market premium* and *risk premium*) is one of the most important, but elusive parameters in finance. Some confusion arises from the fact that the term equity premium is used to designate four different concepts:

1. **Historical** Equity Premium (HEP): historical differential return of the stock market over treasuries.
2. **Expected** Equity Premium (EEP): expected differential return of the stock market over treasuries.
3. **Required** Equity Premium (REP): incremental return of the market portfolio over the risk-free rate required by an investor in order to hold the market portfolio[1]. It is needed for calculating the required return to equity (cost of equity). The CAPM assumes that REP and EEP are unique and that **REP = EEP.**
4. **Implied** Equity Premium (IEP): the required equity premium that arises from a pricing model and from assuming that the market price is correct.

The four concepts are different[2]. The **HEP** is easy to calculate and is equal for all investors[3], but the **REP,** the **EEP and** the **IEP** are different for different investors and are not observable magnitudes. We also claim that there is not an **IEP** for the market as a whole: different investors have different **IEPs** and use different **REPs**. A unique IEP requires assuming homogeneous expectations for the expected growth (g), but there are several pairs (IEP, g) that satisfy current prices.

An anecdote from Merton Miller (2000, page 3) about the expected market return in the Nobel context: *"I still remember the teasing we financial economists, Harry Markowitz, William Sharpe, and I, had to put up with from the physicists and chemists in Stockholm when we conceded that the basic unit of our research, the expected rate of return, was not actually observable. I tried to tease back by reminding them of their neutrino –a particle with no mass whose presence was inferred only as a missing residual from the interactions of other particles. But that was eight years ago. In the meantime, the neutrino has been detected".*

Different authors claim different relations among the four equity premiums defined above. These relationships vary widely:

- **HEP = EEP = REP** according to Brealey and Myers (1996); Copeland *et al* (1995); Ross, Westerfield and Jaffe (2005); Stowe *et al* (2002); Pratt (2002); Bruner (2004); Bodie, Kane and Marcus (2003); Damodaran (2006); Goyal and Welch (2006); Ibbotson Ass. (2006).
- **EEP is smaller than HEP** according to Copeland *et al* (2000, HEP-1.5 to 2%); Goedhart *et al* (2005, HEP-1 to 2%); Bodie, Kane and Marcus (1996, HEP-1%); Mayfield (2004, HEP-2.4%); Booth (1999,

[1] Or the extra return that the overall stock market must provide over the Government Bonds to compensate for the extra risk.
[2] We agree with Bostock (2004) when he says that *"understanding the equity premium is largely a matter of using clear terms"*.
[3] Provided they use the same time frame, the same market index, the same risk-free instrument and the same average (arithmetic or geometric).

HEP-2%); Bostock (2004, 0.6 to 1.8%); Dimson, Mars and Stauton (2006c, 3 to 3.5%); Siegel (2005b, 2 to 3%); Ibbotson (2002, < 4%); Campbell (2002, 1.5 to 2%).

- **EEP is near zero** according to McGrattan and Prescott (2001); Arnott and Ryan (2001); Arnott and Bernstein (2002).
- Authors that try to find the **EEP doing surveys,** as Welch (2000, 7%); Welch (2001, 5.5%); Graham and Harvey (2000, 4.65%); Graham and Harvey (2005, 2.93%); O'Neill *et al* (2002, 3.9%).
- There is **a unique IEP and REP = IEP,** according to Damodaran (2001a); Arzac (2005); Jagannathan *et al* (2000); Harris and Marston (2001); Claus and Thomas (2001); Fama and French (2002); Goedhart *et al* (2002); Harris *et al* (2003); Vivian (2005).
- Authors that ***"have no official position"***, as Brealey and Myers (2000, 2003, 2005).
- Authors that claim ***"that no one knows what the REP is"***, as Penman (2003).
- Authors that claim that ***"it is impossible to determine the REP for the market as a whole, because it does not exist"***, as Fernandez (2002).
- Authors that claim that ***"different investors have different REPs"***, as Fernandez (2004).

The rest of this paper is organized as follows. In section 2 we revise different estimates of the Historical Equity Premium (HEP), note that not all the authors get the same result for the HEP, and analyze the data. We highlight the change in the market around 1960. Before that date, the dividend yield was higher than the risk-free rate, but after that date has been always smaller. In section 3 we revise the equity premium puzzle. In sections 4 and 5 we discuss different estimates of the Expected Equity Premium (EEP) and of the Required Equity Premium (REP). Section 6 is a revision of the prescriptions of the main finance textbooks about the risk premium. We highlight the confusing message of the textbooks regarding the equity premium and its evolution. In section 7, we show that there are several pairs (IEP, g) that explain current market prices and we argue that there is no a REP for the market as a whole, but rather different investors use different REPs. We also show a positive relationship between (IEP – g) and the risk free rate after 1960. Section 8 explains which REP uses the author. Finally, section 9 concludes.

2. Historical Equity Premium (HEP)

The HEP is the historical average differential return of the market portfolio over the risk-free debt[4]. The most widely cited source is Ibbotson Associates whose U.S. database starts in 1926. Another frequently used source is the Center for Research in Security Prices (CRSP) at the University of Chicago.

2.1. First studies of the historical equity return

[4] This average differential return may be arithmetic or geometric. Different stock market indexes are used as the market portfolio, and Government bonds of different maturities are used as risk-free debt. A good discussion of the geometric and arithmetic average is Jacquier, Kane, and Marcus (2003).

Smith (1926) made the first empirical estimate of the long run return on stocks (only price changes) for the most actively traded stocks from 1901 to 1922, and showed that an equity investor (even without market timing or stock selection ability) outperformed a bond investor over this period[5].

Cowles (1939) published the first empirical study carefully done on the performance of the stock market. Cowles calculated the total return to equity from 1872 to 1937 for the NYSE, documenting a positive long term equity performance.

Fisher and Lorie (1964), using for the first time the database of stock prices completed at the University of Chicago's Center for Research in Security Prices (CRSP), showed that the average return from a random investment in NYSE stocks from 1926 to 1964 was 9.1% a year[6].

2.2. Estimates of the historical equity premium of the US

Table 1 contains the 1926-2005 average returns and HEP for the US according to Ibbotson Associates (2006). The HEP in table 1 is the difference between the average return on the S&P 500 and the return of Gov. Bonds or T-Bills. However, Ibbotson Associates (2006, page 73), use the income return (the portion of the total return that results from a periodic bond coupon payment) of the Gov. Bonds (5.2%) and consider that the relevant HEP during the period 1926-2005 is 7.1% (12.3-5.2).

Schwert (1990) and Siegel (1994, 1999, 2002, 2005a) studied the relationship between U.S. equity and bonds before 1926. The data on which they base their studies is less reliable than recent data, but the results are interesting, nevertheless. Table 2 shows their conclusions: the HEP and the inflation in the period 1802-1925 were substantially smaller than in subsequent years[7]. Note that table 1 provides a higher HEP than table 2 for the period after 1926.

Wilson and Jones (2002) provide a monthly stock price index from 1871 through 1999. They note that the S&P Index returns have often been misrepresented[8] and reconstruct the weekly S&P Composite for the period 1926-56 containing more than 400 stocks (instead of 90 as the daily S&P Composite). They get some differences versus other used indexes that are summarized on table 3.

Ibbotson and Chen (2003) use 1926-2000 historical equity returns and conclude that the expected long-term equity premium (relative to the long-term government bond yield) is 5.9% arithmetically, and 3.97% geometrically.

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[5] Three years after publication, the market crash happened. Benjamin Graham blamed Smith's book for inspiring an *"orgy of uncontrolled speculation"*.

[6] For a more detailed history see Goetzmann and Ibbotson (2006).

[7] Siegel (1999) argues that this is because bond returns were exceptionally low after 1926, while total equity returns were relatively stable over the whole time period.

[8] Standard & Poor's first developed stock price indices in 1923 and in 1927 created the Composite Index (90 stocks). On 1 March 1957, the Composite was expanded to 500 stocks and renamed S&P 500 Index (its market value was $173 billion, 85% of the value of all NYSE listed stocks). From 1926 to 1957 there were 2 different S&P Composite indexes: one was weekly and the other was daily. The S&P Composite daily covered 90 stocks until 1957; The S&P Composite weekly covered more than 400.

Goetzmann and Ibbotson (2006) employ a new NYSE database for 1815–1925[9] to estimate the U.S. equity returns and the HEP since 1792 (but they mention that dividend data is absent pre-1825, and is incomplete in the period 1825–71). Their main results are in table 4.

Table 1. Returns and HEP according to Ibbotson Associates (2006). 1926-2005

Nominal Returns 1926-2005	Average return Arithmetic	Average return Geometric	Standard deviation	Serial correlation
S&P 500	12,3%	10,4%	20,2%	3%
Income	*4,2%*	*4,2%*	*1,6%*	*89%*
Capital appreciation	*7,8%*	*5,9%*	*19,5%*	*3%*
Long-Term Gov. Bonds	5,8%	5,5%	9,2%	-8%
Income	*5,2%*	*5,2%*	*2,7%*	*96%*
Capital appreciation	*0,5%*	*0,4%*	*4,4%*	*-19%*
T-Bills	3,8%	3,7%	3,1%	91%
Inflation	3,1%	3,0%	4,3%	65%

HEP over Gov. Bonds	**6,5%**	**4,9%**
HEP over T-Bills	**8,5%**	**6,7%**

Table 2 - Nominal returns and HEP from Siegel (2005a)

arith. = arithmetic average. geom. = geometric average

	Average returns (%)						
	Stocks		Bonds		**HEP (%)**		
	arith.	geom.	arith.	geom.	**arith.**	**geom.**	Inflation (%)
1802-1870	8.28	7.02	5.11	4.78	**3.17**	**2.24**	0.1
1871-1925	7.92	6.62	3.93	3.73	**3.99**	**2.89**	0.6
1926-2004	8.78	6.78	2.77	2.25	**6.01**	**4.53**	3.1
1802-2004	8.38	6.82	3.88	3.51	**4.50**	**3.31**	1.4

Table 3. Geometric average of the returns of different indexes in selected periods

(%)	**Cowles**	**S&P**	**Wilson and Jones**	**Ibbotson**	**CRSP NYSE**
1871-1925	7,24	7,28	7,28		
1926-1940	**3,27**	**4,20**	**3,23**	**4,04**	**3,01**
1941-1956		15,60	15,20	16,11	15,36
1957-1999		12,10	12,28	12,24	11,79
1926-1999		11.08	11.00	11.35	10.70
1871-1999		9,51	9,40		

Table 4. Average return of the US according to Goetzmann and Ibbotson (2006)

1792-1925	Arithmetic return	Geometric return	Standard deviation
Stocks	7.93%	6.99%	14.64%
Bonds	4.17%	4.16%	4.17%
Comm. Paper	7.62%	7.57%	3.22%
Inflation	0.85%	0.61%	7.11%
HEP (Bonds)	**3.76%**	**2.83%**	

1926-2004	Arithmetic return	Geometric return	Standard deviation
Stocks	12.39%	10.43%	20.32%
Gov. Bonds	5.82%	5.44%	9.30%
T-Bills	3.76%	3.72%	3.14%
Inflation	3.12%	3.04%	4.32%
HEP (Bonds)	**6.57%**	**4.99%**	
HEP (Bills)	**8.63%**	**6.71%**	

Total returns from 1871 to 1925 are constructed from the Price-Weighted NYSE and the Cowles Income Return Series.

In a very interesting article, Siegel and Schwartz (2006) calculate the return of the original S&P 500 companies since 1957 until 2003 and find that their return has been higher than the return of the S&P

[9] See Goetzmann, Ibbotson, and Peng (2001), who collected U.S. stock market data by hand from 1815.

500[10]. The average geometric return of the S&P 500 was 10.85% (standard deviation of 17%), while the return of the original 500 companies was 11.31% (standard deviation of 15.7%).

Table 5. Different Historical Equity Premiums (HEP) in the US according to different authors

			Ibbotson	Shiller	WJ	Damodaran	Siegel	Max-min
HEP vs. LT Gov. Bonds	Geometric	1926-2005	**4,9%**	**5,5%**	**4,4%**	**5,1%**	**4,6%**	1,0%
		1926-1957	**6,0%**	**7,3%**	**5,1%**	**5,8%**		2,2%
		1958-2005	**4,1%**	**4,2%**	**4,0%**	**4,5%**		0,6%
	Arithmetic	1926-2005	**6,5%**	**7,0%**	**5,8%**	**6,7%**	**6,1%**	1,2%
		1926-1957	**8,8%**	**10,1%**	**7,6%**	**8,7%**		2,5%
		1958-2005	**4,9%**	**5,0%**	**4,7%**	**5,4%**		0,7%
HEP vs. T-Bills	Geometric	1926-2005	**6,7%**	**6,0%**	**6,2%**	**6,3%**	**6,2%**	0,7%
		1926-1957	**8,2%**	**8,4%**	**7,3%**	**7,6%**		1,1%
		1958-2005	**5,6%**	**4,3%**	**5,4%**	**5,4%**		1,3%
	Arithmetic	1926-2005	**8,5%**	**7,7%**	**7,9%**	**8,2%**	**8,2%**	0,8%
		1926-1957	**11,1%**	**11,2%**	**9,9%**	**10,5%**		1,4%
		1958-2005	**6,8%**	**5,4%**	**6,6%**	**6,6%**		1,5%

Ibbotson figures come from Ibbotson Associates (2006). Shiller figures come from *http://aida.econ.yale.edu/~shiller/data.htm*. WJ figures have been updated from Wilson and Jones (2002). Damodaran figures come from http://pages.stern.nyu.edu/~adamodar/. Siegel figures have been updated from Siegel (2005a).

Note that not all the authors get the same result, even for the HEP. Table 5 is a comparison of the HEP in the US according to different authors. The differences are substantial, especially for the period 1926-1957. The differences are mainly due to the stock indexes chosen. It is also important to keep in mind that the data from the 19th century and from the first part of the 20th century is quite poor and questionable. Table 6 shows the differences among the different indexes commonly used.

Table 6. Number of securities in the US indexes commonly used

	S&P composite weekly	Ibbotson	CRSP NYSE
1926-1957	228 stocks in 1927, 410 in 1928, 480 in 1956	S&P Composite daily: 90 stocks	Growing number of stocks: 592 in 1927; 1059 in 1957
1957-2006	abandoned	S&P Composite daily: 500 stocks	Growing number of stocks: 1500 in 1975; 2813 in 1999

2.3. A closer look at the historical data

Figure 1 shows that interest rates were lower than dividend yields until 1958 and than the earnings to price ratio until the 1980s. It suggests that many things have changed in the capital markets and that the last 40 years have been different than the previous ones. It is quite sensible to assume that the portfolio theory, the CAPM, the APT, the VAR analysis, the futures and options markets, the appearance of many mutual and hedge funds, the increase of investors, the legislation to protect investors, financial innovation, electronic trading, portfolio insurance, market participation,… have changed the behaviour and the risk attitudes of today's investors vs. past investors. In fact, financial markets are so different that the relative magnitude of dividend yields to interest rates has been reversed.

[10] The market value of the S&P 500 companies that have survived from the original 1957 list was only 31% of the 2003 year-end S&P 500's market value. Since the S&P 500 was formulated, more than 900 new companies have been added to the index (and an equal number deleted from).

It is interesting to look at historical data to know what happened to our grandparents (or to our great grandparents), but it is not sensible to assume that their markets and their investment behaviour were similar to ours[11].

Figure 2 shows the evolution of the 20-year rolling correlation of (dividend yield – R_F) versus R_F (the yield on Government long-term bonds). Again, we may see that something has changed in the markets because that correlation after 1960 has been lower than ever before. Figure 3 shows the raw data used to calculate the correlations of Figure 2 and permits to contrast the different behavior of the markets in the periods 1871-1959 and 1960-2005. In section 7 we analyze this data and derive implications.

Figure 4 shows the evolution of the 20-year rolling HEP (arithmetic and geometric) relative to the T-Bills. It may be seen that the periods with equity returns much higher than the T-Bill rates were the 50s and the 90s.

Figure 5 compares the 20-year rolling HEP with the current T-Bond yield. From 1960 to 2000 the HEP increased when the yield decreased and vice versa. It did not happen so clearly in previous years.

Figure 1. 10-year T-Bond yields, Earnings to Price ratio (E/P) and Dividend yield of the US
Source: Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm

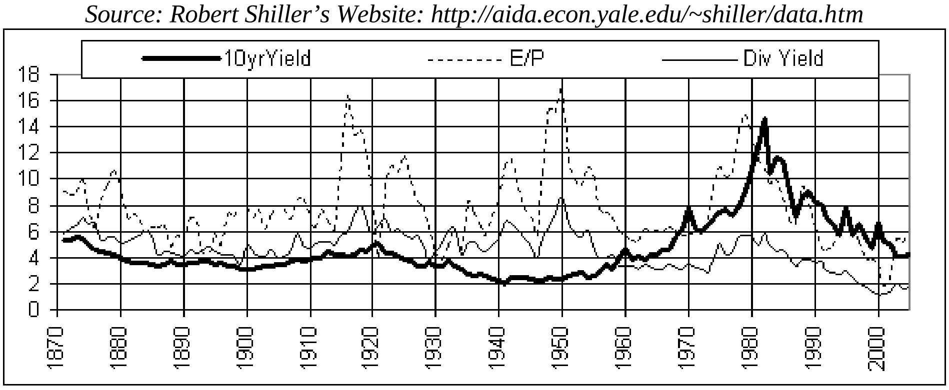
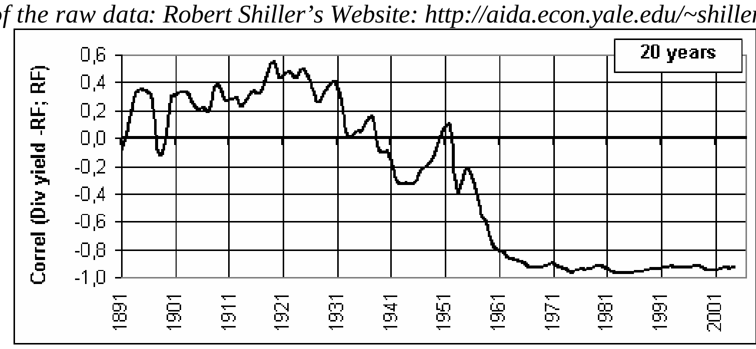


Figure 2. 20-year rolling correlation of (dividend yield – R_F) versus R_F (yield on T-Bonds). Monthly data.
Source of the raw data: Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm



[11] Neither the exam of Ec1010 in 1932 is very useful for a student today.

Figure 3. (Dividend yield – R_F) versus R_F (yield on Government long-term bonds)
Source of the raw data: Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm

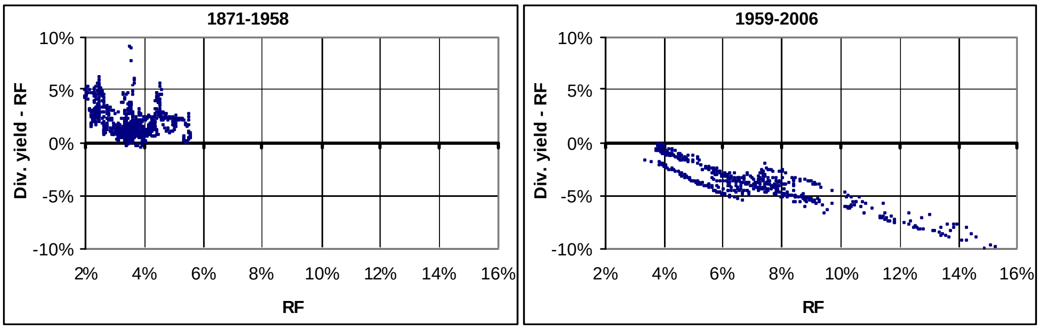


Figure 4. 20-year rolling HEP versus the T-Bills.
Source of the raw data: Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm

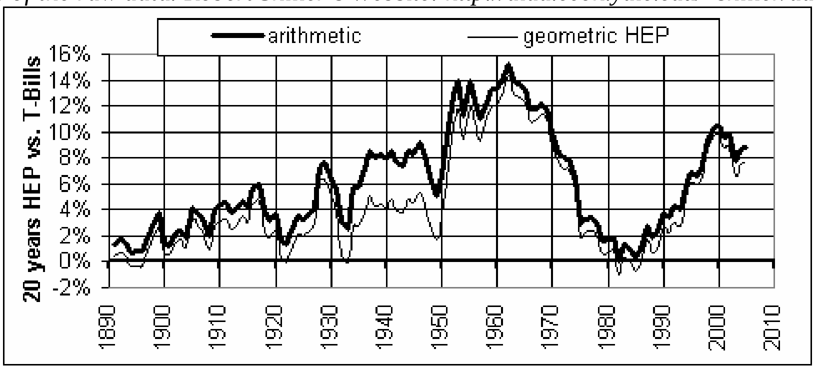
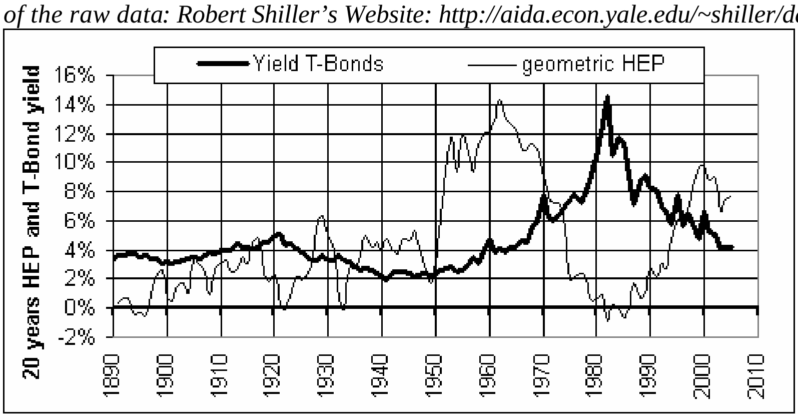


Figure 5. 20-year rolling geometric HEP versus the T-Bills, and T-Bond yield
Source of the raw data: Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm



2.4. Estimates of the Historical Equity Premium (HEP) in other countries

Blanchard (1993) examined the evolution of stock and bonds rates over the period 1978 to 1992 for the US, Japan, Germany, France, Italy and the UK. He constructed 'world' rates of return (using relative GDP weights for the countries) and documented a postwar decline in the dividend yield and in various measures of the HEP.

Jorion and Goetzmann (1999) constructed a database of capital gain indexes for 39 markets, with 11 of them starting in 1921(see table 7). However, they obtained pre-1970 dividend information only for 6 markets. They concluded that *"for 1921 to 1996, US equities had the highest real return for all countries, at 4.3%, versus a median of 0.8% for other countries. The high equity premium obtained for U.S. equities appears to be the exception rather than the rule"*. According to the authors, *"there are reasons to suspect that [the US] estimates are subject to survivorship"*.

However, Dimson and Marsh (2001) do not find survivorship bias for the US. They calculate the geometric HEP for 1955-1999 of US, UK, Germany and Japan and get 6.2%, 6.2%, 6.3% and 7.0%.

Table 7. Equity return of selected countries, according to Jorion and Goetzmann (1999)

Country	Period	Nominal Return	Real Return	Dollar Return	Inflation
U.S.	21-96	6.95%	4.32%	6.95%	2.52%
Sweden	21-96	7.42%	4.29%	7.00%	3.00%
Germany	21-96	4.43%	1.91%	5.81%	2.47%
Canada	21-96	5.78%	3.19%	5.35%	2.51%
U.K.	21-96	6.30%	2.35%	5.20%	3.86%
France	21-96	9.09%	0.75%	4.29%	8.28%
Belgium	21-96	4.45%	-0.26%	3.51%	4.73%
Italy	28-96	10.10%	0.15%	3.22%	9.94%
Japan	21-96	7.33%	-0.81%	1.80%	8.21%
Spain	21-96	4.66%	-1.82%	1.53%	6.61%
Median 39 countries			**0.75%**	**4.68%**	
11 countries with continuous histories into the 1920s:		Mean	1.88%	5.09%	
		Median	2.35%	5.20%	

Table 8. HEP vs. short (30 days) and long term (10 or 30 years) fixed income in 17 countries. 1900-2005. Annualized returns. *Source: Table 3 of Dimson, Marsh and Staunton (2006c)*

% p.a.	**HEP relative to**					
	Bills			**Bonds**		
Country	Geometric Mean	Arithmetic Mean	Standard Error	**Geometric Mean**	Arithmetic Mean	Standard Error
Australia	7,08	8,49	1,65	**6,22**	7,81	1,83
Japan	6,67	9,84	2,70	**5,91**	9,98	3,21
South Africa	6,20	8,25	2,15	**5,35**	7,03	1,88
Germany	3,83	9,07	3,28	**5,28**	8,35	2,69
Sweden	5,73	7,98	2,15	**5,21**	7,51	2,17
U.S.	**5,51**	**7,41**	**1,91**	**4,52**	**6,49**	**1,96**
U.K.	4,43	6,14	1,93	**4,06**	5,29	1,61
Italy	6,55	10,46	3,12	**4,30**	7,68	2,89
Canada	4,54	5,88	1,62	**4,15**	5,67	1,74
France	6,79	9,27	2,35	**3,86**	6,03	2,16
Netherlands	4,55	6,61	2,17	**3,86**	5,95	2,10
Ireland	4,09	5,98	1,97	**3,62**	5,18	1,78
Belgium	2,80	4,99	2,24	**2,57**	4,37	1,95
Norway	3,07	5,70	2,52	**2,55**	5,26	2,66
Spain	3,40	5,46	2,08	**2,32**	4,21	1,96
Denmark	2,87	4,51	1,93	**2,07**	3,27	1,57
Switzerland	3,63	5,29	1,82	**1,80**	3,28	1,70
Average	**4,81**	**7,14**	**2,21**	**3,98**	**6,08**	**2,11**
World-ex U.S.	**4,23**	**5,93**	**1,88**	**4,10**	**5,18**	**1,48**

Dimson *et al* (2006c) use a unique database to calculate the historical equity premium for 17 countries over 106 years (1900-2005). Their estimates (see Table 8) are lower than frequently quoted

HEPs mainly due to the incorporation of the earlier part of the 20th century as well as the opening years of the 21st century[12].

But, apart from the historical interest, how useful and accurate is that data? As Dimson *et al* (2006c) point out, *"virtually all of the 16 countries experienced trading breaks … often in wartime. The U.K. and European exchanges, and even the NYSE, closed at the start of World War I…Similarly, the Danish, Norwegian, Belgian, Dutch and French markets …when Germany invaded in 1940, and even the Swiss market closed from May to July 1940 for mobilization. … Japan after the Great Tokyo Earthquake of 1923. …Germany and Japan from towards the end of World War II, and Spain during the Civil War"*. They claim that *"we were able to bridge these gaps"*, but this assertion is questionable. They admit that *"the end-year index levels recorded for Germany for 1943–47, Japan for 1945, and Spain for 1936–38 cannot be regarded as market-determined values"*. Dimson *et al* (2006c) explain in their footnote 7 that *"In Spain, trading was suspended during the Civil War from July 1936 to April 1939, and the Madrid exchange remained closed through February 1940; over the closure we assume a zero change in nominal stock prices and zero dividends"*. It is not clear why this assumption is a reasonable one. They also mention one *"unbridgeable discontinuity, namely, bond and bill (but not equity) returns in Germany during the hyperinflation of 1922–23, when German bond and bill investors suffered a total loss of –100%. …bonds and bills can become riskier than equities. When reporting equity premiums for Germany … we thus have no alternative but to exclude the years 1922–23"*.

In a previous work Dimson, Marsh and Staunton (2002) show that the HEP was generally higher for the second half century: the World had 4.7% in the first half, compared to 6.2% in the second half.

Table 9 contains some of the HEPs reported by different authors for the US.

Table 9. Historical Equity Premium (HEP) for the US according to different authors

Author(s)	Reference/average	Period for HEP	Value
Siegel (2002)	T-Bonds, geo.	1926-2001	4.9%
Ibbotson and Chen (2003)	T-Bonds, geo.	1926-2000	3.97%
Siegel (2005a)	T-Bonds, geo.	1926-2004	4.53%
Ibbotson Associates (2006)	T-Bonds arith. capital aprec. only	1926-2005	7.1%
Goetzmann and Ibbotson (2006)	T-Bonds, geo.	1792-1925	2.83%
Goetzmann and Ibbotson (2006)	T-Bonds, geo.	1926-2004	4.99%
Goyal and Welch (2006)		1872-2004	4.77%
Goyal and Welch (2006)		1927-2004	6.35%
Dimson & al.(2006c)	T-Bonds, geo. US	1900-2005	4.52%
Dimson & al.(2006c)	T-Bonds, geo. World	1900-2005	4.04%

[12] Their database contains annual returns on stocks, bonds, bills, inflation, and currencies for 17 countries from 1900–2005, and is described in Dimson *et al* (2006a and 2006b). They construct a World equity index (U.S. dollars index of 17 countries weighted by its starting-year market capitalization or by its GDP, before capitalizations were available) and a World bond index, constructed with each country weighted by its GDP. The series were compiled to avoid the survivorship bias that can arise from backfilling. Their choice of international markets was limited by their requirement to have data for the whole century.

3. Expected Equity Premium (EEP)

The **Expected** Equity Premium (EEP) is the answer to a question we would all (especially analysts and fund managers) like to answer accurately in the short term, namely: what incremental return do I expect from the market portfolio over the risk-free rate over the next years?

Estimates of the EEP based on historical analysis presume that the historical record provides an adequate guide for future expected long-term behaviour. However, the HEP changes over time, and it is not clear why capital market data from the 19th century or from the first half of the 20th century may be useful in estimating expected returns in the 21st century.

Numerous papers assert that there must be **an** EEP common to all investors (to the representative investor). But it is obvious that investors do not share "homogeneous expectations"[13] and, also, that many investors do not hold the market portfolio but, rather, a subgroup of stocks and bonds[14]. Heterogeneous investors do not hold the same portfolio of risky assets; in fact, no investor must hold the market portfolio to clear the market.

We claim in section 7 that without "homogeneous expectations" there is **not one** EEP (but several), and there is **not one** REP (but several).

3.1. The Historical Equity Premium (HEP) is not a good estimator of the EEP

Although many authors consider that the equity premium is a stationary process, and then the HEP is an unbiased estimate of the EEP (*unconditional* mean equity premium), we do not agree with that statement: the HEP is not a good estimator of the EEP. For example, Mehra and Prescott (2003) state that *"…over the long horizon the equity premium is likely to be similar to what it has been in the past"*.

The magnitude of the error associated with using the HEP as an estimate of the EEP is substantial. Shiller (2000) points out that *"the future will not necessarily be like the past"*. Booth (1999) concludes that the HEP is not a good estimator of the EEP and estimates the later in 200 basis points smaller than the HEP[15]. Mayfield (2004) suggest that a structural shift in the process governing the volatility of market returns after the 1930s resulted in a decrease in the expected level of market risk, and concluded that EEP = HEP – 2.4% = 5.9% over the yield on T-bills (4.1% over yields on T-bonds).

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[13] Brennan (2004) also admits that "*different classes of investor may have different expectations about the prospective returns on equities which imply different assessments of the risk premium*".

[14] But, even with "homogeneous expectations" (all investors have equal EEP), the REP would not be equal for all investors. In that situation, the investors with lower REP would clear the market.

[15] He also points out that the nominal equity return did not follow a random walk and that the volatility of the bonds increased significantly over the last 20 years.

Survivorship bias[16] was identified by Brown, Goetzmann and Ross (1995) as one of the main reasons why the results based on historical analyses can be too optimistic. They pointed out that the observed return, *conditioned on survival* (HEP), can overstate the unconditional expected return (EEP). However, Li and Xu (2002) show that the survival bias fails to explain the equity premium puzzle: *"To have high survival bias, the probability of market survival over the long run has to be extremely small, which seems to be inconsistent with existing historical evidence"*. Siegel (1999, p. 13) mentions that *"Although stock returns may be lower in foreign countries than in the U.S., the real returns on foreign bonds are substantially lower"*.

Pastor and Stambaugh (2001) present a framework allowing for structural breaks in the risk premium over time and estimate that the EEP fluctuated between 4% and 6% over the period from 1834 to 1999, declined steadily since the 1930s (except for a brief period in the mid-1970s) and had the sharpest drop in the last decade of the 20th century.

Constantinides (2002) addresses different ways in which we may account for biases in the sample mean premium in order to estimate the expected premium and draws a sharp distinction between conditional, short-term forecasts of the mean equity premium and estimates of the unconditional mean. He says that the conditional EEPs at the end of the 20th century and the beginning of the 21st are substantially lower than the estimates of the unconditional EEP (7%) *"by at least three measures"*. But he concludes that *"the currently low conditional, short-term forecasts of the equity premium do not necessarily imply that the unconditional estimate of the mean premium is lower than the sample average. Therefore, the low conditional forecasts do not necessarily lessen the burden on economic theory to explain the large sample average of the equity return and premium over the past 130 years"*.

Dimson *et al* (2003) highlight the survivorship bias relative to the market, *"even if we have been successful in avoiding survivor bias within each index, we still focus on markets that survived"* and concluded that the geometric EEP for the world's major markets should be 3% (5% arithmetic). Dimson *et al* (2006c) admit that *"we cannot know today's consensus expectation for the equity premium"*, but they conclude that *"investors expect an equity premium (relative to bills) of around 3–3½% on a geometric mean basis"*, substantially lower than the HEP found in their own study.

3.2. Surveys

A direct way to obtain an expectation of the equity premium is to carry out a survey of analysts or investors although Ilmanen (2003) argues that surveys tend to be optimistic: *"because of behavioural biases, survey-based expected returns may tell us more about hoped-for returns than about required returns"*.

[16] "Survivorship" or "survival" bias applies not only to the stocks within the market (the fact that databases contain data on companies listed today, but they tend not to have data on companies that went bankrupt or filed for bankruptcy protection in the past), but also for the markets themselves ("US market's remarkable success over the last century is typical neither of other countries nor of the future for US stocks" (Dimson *et al* 2004)).

Welch (2000) performed two surveys with finance professors in 1997 and 1998, asking them what they thought the EEP was over the next 30 years. He obtained 226 replies, ranging from 1% to 15%, with an average arithmetic EEP of 7% above T-Bonds.[17] Welch (2001) presented the results of a survey of 510 finance and economics professors performed in August 2001 and the consensus for the 30-year arithmetic EEP was 5.5%, much lower just 3 years earlier.

Graham and Harvey (2005) indicate that U.S. CFOs reduced their average EEP from 4.65% in September 2000 to 2.93% by September 2005. Over this period, the HEP had fallen only 0.4%.

Goldman Sachs (O'Neill, Wilson and Masih, 2002) conducted a survey of its global clients in July 2002 and the average long-run EEP was 3.9%, with most responses between 3.5% and 4.5%. The magazine *Pensions and Investments* (12/1/1998) carried out a survey among professionals working for institutional investors and the average EEP was 3%.

3.3. Regressions

Attempts to predict the equity premium typically look for some independent lagged predictors (X) on the equity premium: $\text{Equity Premium}_t = a + b \cdot X_{t-1} + e_t$

Many predictors have been explored in the literature. Some examples are:

- Dividend yield: Ball (1978), Rozeff (1984), Campbell (1987), Campbell and Shiller (1988), Fama and French (1988), Hodrick (1992), Campbell and Viceira (2002), Campbell and Yogo (2003), Lewellen (2004), and Menzly, Santos, and Veronesi (2004). Cochrane (1997) has a good survey of the dividend yield prediction literature.
- The short term interest rate: Hodrick (1992).
- Earnings price and payout ratio: Campbell and Shiller (1988), Lamont (1998) and Ritter (2005).
- The term spread and the default spread: Avramov (2002), Campbell (1987), Fama and French (1989), and Keim and Stambaugh (1986).
- The inflation rate (money illusion): Fama and Schwert (1977), Fama (1981), and Campbell and Vuolteenaho (2004a,b), and Cohen, Polk and Vuolteenaho (2005).
- Interest rate and dividend related variables: Ang and Bekaert (2003).
- Book-to-market ratio: Kothari and Shanken (1997).
- Value of high and low-beta stocks: Polk, Thompson and Vuolteenaho (2004).
- Consumption and wealth: Lettau and Ludvigson (2001).
- Aggregate financing activity: Baker and Wurgler (2000) and Boudoukh *et al* (2006).

Goyal and Welch (2006) used most of the mentioned predictors and could not identify one that would have been robust for forecasting the equity premium and, after all their analysis, they recommended *"assuming that the equity premium is 'like it always has been'"*. They also show that most of these

[17] The interest rate paid by long-term T-bonds in April 1998 was approximately 6%. At that time, the most recent Ibbotson Associates Yearbook was the 1998 edition, with an arithmetic HEP versus T-bills of 8.9% (1926–1997).

models have not performed well for the last thirty years, that are not stable, and that are not useful for market-timing purposes.

However, Campbell and Thompson (2005) claim that some variables (ratios, patterns, levels of sort and long term interest rates) are correlated with subsequent market returns and that *"forecasting variables with significant forecasting power insample generally have a better out-of-sample performance than a forecast based on the historical average return"*.

3.4. Other estimates of the expected equity premium

Siegel (2002, page 124) concluded that "the future equity premium is likely to be in the range of 2 to 3%, about one-half the level that has prevailed over the past 20 years" [18]. Siegel (2005a, page 172) affirms that *"over the past 200 years, the equity risk premium has averaged about 3%"*. Siegel (2005b) maintains that *"although the future equity risk premium is apt to be lower than it has been historically, U.S. equity returns of 2-3% over bonds will still amply reward those who will tolerate the short-term risk of stocks"*. However, in a presentation at the SIA annual meeting (November 10, 2005) Siegel maintained that *"equity premium is 4% to 5% now"*.

In the *TIAA-CREF Investment Forum* of June 2002, Ibbotson forecasted *"less than 4% in excess of long-term bond yields"*, and Campbell *"1.5% to 2%"*.

McGrattan and Prescott (2001) did not find corporate equity overvalued in 2000 and forecasted that the real returns on debt and equity should both be near 4%: *"Therefore, barring any institutional changes, we predict a small equity premium in the future"*.

Arnott and Ryan (2001) claim that the expected equity premium is near zero. They base their conclusion on the low dividend yield and their low expectation of dividend growth. Arnott and Bernstein (2002) also conclude that *"the current risk premium is approximately zero"*.

Bostock (2004) concludes that according to historical average data, equities should offer a risk premium over government bonds between 0.6% and 1.8%.

Grabowski (2006) concludes that *"after considering the evidence, any reasonable long-term estimate of the normal EEP as of 2006 should be in the range of 3.5% to 6%"*.

Maheu and McCurdy (2006) claim that the US Market had *"three major structural breaks (1929, 1940 and 1969), and possibly a more recent structural break in the late 1990s"*, and suggest an EEP in 2004 between 4.02% and 5.1%.

Table 10. Estimates of the EEP (Expected Equity Premium) according to different authors

Authors	Conclusion about EEP	Note
Surveys		
Pensions and Investments (1998)	3%	Institutional investors
Graham and Harvey (2000)	4.65%	CFOs
Welch (2000)	7% arithmetically, 5.2% geometrically	Finance professors

[18] Siegel also affirms that: "Although it may seem that stocks are riskier than long-term government bonds, this is not true. The safest investment in the long run (from the point of view of preserving the investor's purchasing power) has been stocks, not Treasury bonds".

Welch (2001)	5.5% arithmetically, 4.7% geometrically	Finance professors
O'Neill, Wilson and Masih (2002)	3.9%	Global clients Goldman
Graham and Harvey (2005)	2.93%	CFOs
Other publications		
Booth (1999)	EEP = HEP - 2%	
Pastor and Stambaugh (2001)	4 -6%	
McGrattan and Prescott (2001)	near zero	
Arnott and Ryan (2001)	near zero	
Arnott and Bernstein (2002)	near zero	
Siegel (2002, 2005b)	2 - 3%	
Ibbotson (2002)	< 4%	
Campbel (2002)	1.5 - 2%	
Mayfield (2004)	EEP = HEP - 2.4%= 5.9% + T-Bill	
Bostock (2004)	0.6 – 1.8%	
Goyal and Welch (2006)	EEP = HEP	
Dimson, Mars and Stauton (2006c)	3 - 3.5%	
Grabowski (2006)	3.5 – 6%	
Maheu and McCurdy (2006)	4.02% and 5.1%.	
Ibbotson Associates (2006)	EEP = HEP = 7.1%	

4. Required and implied equity premium

The Required Equity Premium (REP) of an investor is the incremental return that she requires, over the risk-free rate, for investing in a diversified portfolio of shares. It is a crucial parameter in valuation and capital budgeting because the REP is the key to determining the company's required return to equity and the required return to any investment project. The HEP is misleading for predicting the REP. If there was a reduction in the REP, this fall in the discount rate led to re-pricing of stocks, thus adding to the magnitude of HEP. The HEP, then, overstates the REP.

The IEP is the implicit REP used in the valuation of a stock (or a market index) that matches the current market value with an estimate of the future cash flows to equity. Two models are widely used to calculate the IEP: the Gordon (1962) model (constant dividend growth model) and the residual income (or abnormal return) model.

According to the Gordon (1962) model, the current price per share (P_0) is the present value of expected dividends discounted at the required rate of return (k). If d_1 is the dividend per share expected to be received at time 1, and g the expected long term growth rate in dividends per share[19],

$P_0 = d_1 / (k - g)$, which implies: $k = d_1/P_0 + g$. $IEP = d_1/P_0 + g - R_F$ (1)

The abnormal return method is another version of the Gordon (1962) model when the "clean surplus" relation holds ($d_t = e_t - (BV_t - BV_{t-1})$, being d the dividends per share, e the earnings per share and bv the book value per share):

$P_0 = bv_0 + (e_1 - k\, bv_0) / (k - g)$, which implies: $k = e_1/P_0 + g\,(1 - bv_0/P_0)$[20] (2)

[19] Although we say "dividends per share", we refer to equity cash flow per share: dividends, repurchases and all expected cash for the shareholders.
[20] Comparing the two models, it is clear than in a growing perpetuity, $D_1 = E_1 - g\, BV_0$. The equivalence of the two models may be seen in Fernandez (2005)

Jagannathan, McGrattan and Scherbina (2000) use the Gordon model, assume that dividends will growth as fast as GNP, and come with an estimate of 3.04%. They mention that *"to get the estimate up to Brealey and Myer's 9.2%, we would need to assume nominal dividend growth of 13.2%. This is an unreasonable assumption"*. They also revise Welch (2000) and point out that *"apparently, finance professors do not expect the equity premium to shrink"*.

Claus and Thomas (2001) calculate the equity premium using the Gordon model and the residual income model, assuming that g is the consensus of the analysts' earnings growth forecasts for the next five years and that the dividend payout will be 50%. They also assume that the residual earnings growth after year 5 will be the current 10-year risk-free rate less 3%. With data from 1985 to 1998, they find that the IEP is smaller than the HEP, and they recommend using a REP of about 3% for the US, Canada, France, Germany, Japan and UK.

Harris and Marston (2001), using the dividend discount model and estimations of the financial analysts about long-run growth in earnings, estimate an IEP of 7.14% for the S&P 500 above T-Bonds over the period 1982-1998. They also claim that the IEP move inversely with government interest rates, which is hard to believe.

Easton, Taylor, Shroff and Sougiannis (2002) used the residual income model with IBES data for expected growth[21], and estimated an average IEP of 5.3% over the years 1981-1998.

Goedhart, Koller and Wessels (2002) used the dividend discount model (considering also share repurchases), with GDP growth as a proxy for expected earnings growth and with the average inflation rate of the last 5 years as a proxy for expected inflation. Table 11 contains their results that they report. They conclude that *"we estimate that the real cost of equity has been remarkably stable at about 7% in the US and 6% in the UK since the 1960s. Given current, real long-term bond yields of 3% in the US and 2.5% in the UK, the implied equity risk premium is around 3.5% to 4% for both markets"*.

Table 11. IEP and real cost of equity in the US and the UK according to Goedhart *et al* (2002).

	US		UK	
	1962-1979	1990-2000	1962-1979	1995-2000
Market risk premium	**5.0%**	**3.6%**	**4.3%**	**3.0%**
Real risk-free rate	2.2%	3.1%	1.4%	2.8%
Real cost of equity	7.2%	6.7%	5.7%	5.8%

Fama and French (2002), using the discounted dividend model, estimated the IEP for the period 1951-2000 between 2.55% and 4.32%, far below the HEP (7.43%). For the period 1872-1950, they estimated an IEP (4.17%) similar to the HEP (4.4%). They claimed that in the period 1951-2000 *"a*

[21] Although Chan, Karceski and Lakonishok (2001) report that *"IBES forecasts are too optimistic and have low predictive power for long-term growth"*.

decline in the expected stock return is the prime source of the unexpected capital gain", and that *"the unconditional EEP of the last 50 years is probably far below the realized premium"*[22].

Ritter and Warr (2002) claim that in 1979-1997, the IEP declined from +12% to -4%. However, Ritter estimate of the IEP in 2006 is a little over 2% on a geometric basis.

Harris, Marston, Mishra and O'Brien (2003) estimated discount rates for several companies using the dividend discount model and assuming that g was equal to the consensus of the analysts' growth of dividends per share forecasts. They found an IEP of 7.3% (if betas calculated with a domestic index) and 9.7% (when betas calculated with a world index).

Many authors use an expected growth of dividends per share (g) equal to the consensus of the analysts' forecasts, but Doukas, Kim and Pantzalis (2006) find that stock returns are positively associated with analyst's divergence of opinion, and consider the divergence of opinion as risk.

Vivian (2005) replicated Fama and French (2002) to the UK, obtained similar results (see table 12), and concluded that the discount rate (REP) declined in the later part of the 20th Century.

Table 12. REP and HEP in the US and in the UK according to Fama and French (2002) and Vivian (2005).

Table I of Fama and French (2002)

US	REP	HEP
1872-2000	3.54%	5.57%
1872-1950	4.17%	4.40%
1951-2000	2.55%	7.43%

Table 1 of Vivian (2005)

UK	REP	HEP
1901-2002	4.41%	5.68%
1901-1950	4.22%	3.49%
1951-2002	4.60%	7.79%
1966-2002	3.00%	6.79%

O'Hanlon and Steele (2000) proposed calculating the REP using accounting figures and got a variety of estimates between 4 and 6%.

Glassman and Hassett (2000) calculated in their book Dow 36,000 that the REP for the U.S. in 1999 was 3%, arguing that stocks should not carry any risk premium at all, and that stock prices will rise dramatically further once investors come to realize this fact[23].

Faugere and Erlach (2006) claimed that the equity premium tracks the value of a put option on the S&P 500. However, their conclusion is not very helpful: *"using an 8.1% premium in valuation formulas and capital budgeting problems may be appropriate, since the observed level of the long-run equity premium is fully consistent with the observed steady-state GDP growth and consistent with risk explanations as well. However, if one believes that the recent 1990's trends in dividend yields, interest rates, taxes and inflation represent permanent regime shifts, our model can be parameterized to yield a 3.5% equity premium"*.

One problem of all these estimates is that they depend on the particular assumption made for the expected growth.

Table 13. Implied Equity Premium **(IEP)** and Required Equity Premium **(REP)** according to different authors

Author(s)	Method	IEP = REP

[22] Fama and French (1992) report that in the period 1941-1990 an equally weighted index outperformed the value weighted (average monthly returns of 1.12% and 0.93%) in the whole period and in most sub sample periods.
[23] Not to be outdone, Kadlec and Acampora (1999) gave their book the title, *Dow 100,000: Fact or Fiction?*

O'Hanlon and Steele (2000)	accounting		4 to 6%
Jagannathan & al (2000)	DDM		3.04%
Glassman and Hasset (2000)			3%
Harris and Marston (2001)	DDM		7.14%
Claus and Thomas (2001)	RIM	1985-1998	3%
Fama and French (2002)	DDM	1951-2000	2.55%
Fama and French (2002)	DDM	1872-1950	4.17%
Goedhart, Koller and Wessels (2002)	DDM	1990-2000	3.5 to 4%
Ritter (2002)	DDM	2001	0.7%
Ritter and Warr (2002)	RIM	1979-1997	+12% to -4%.
Harris & al (2003)	DDM		7.3%
Vivian (2005)	DDM & RIM	1951-2002 UK	4.6%
Ibbotson Associates (2006)	REP=EEP=HEP	1926-2005	7.1%

DDM = dividend discount model. RIM = residual income model

5. The equity premium puzzle

The **equity premium puzzle**, a term coined by Mehra and Prescott (1985), is the inability of a *standard representative consumer asset pricing model*, using aggregate data, to reconcile the HEP. To reconcile the model with the HEP, individuals must have implausibly high risk aversion according to standard economics models[24]. Mehra and Prescott (1985) argued that stocks should provide at most a 0.35% premium over bills. Even by stretching the parameter estimates, Mehra and Prescott (2003) concluded that the premium should be no more than 1%. This contrasted starkly with their HEP estimate of 6.2%.

5.1. Attempts to solve the equity premium puzzle

This puzzle has lead to an extensive research effort in both macroeconomics and finance. Over the last 20 years, researchers have tried to resolve the puzzle by generalizing and adapting (weakening one or more of the assumptions) the Mehra-Prescott (1985) model, but still there is not a solution generally accepted by the economics profession. Some of the adapted assumptions include:

- alternative assumptions about preferences (state separability, leisure, precautionary savings) or generalizations to state-dependent utility functions: Abel (1990); Constantinides (1990); Epstein and Zin (1991); Benartzi and Thaler (1995); Bakshi and Chen (1996); Campbell and Cochrane (1999); and Barberis, Huang, and Santos (2001),
- narrow framing[25]: Barberis and Huang (2006),
- probability distributions that admit disastrous events such as fear of catastrophic consumption drops: Rietz (1988); Mehra and Prescott (1988), Barro (2005),
- survivorship bias: Brown, Goetzmann, and Ross (1995),

[24] Kocherlakota (1996) reduces the models to just 3 assumptions: individuals have preferences associated with the standard utility function, asset markets are complete (individuals can write insurance contracts against any contingency), and asset trading is costless.

[25] Narrow framing is the phenomenon documented in experimental settings whereby, when people are offered a new gamble, they sometimes evaluate it in isolation, separately from their other risks.

- liquidity premium: Bansal and Coleman (1996),
- taxes and regulation: McGrattan and Prescott (2005),
- the presence of uninsurable income shocks or incomplete markets: Mankiw (1986); Constantinides and Duffie (1996); Heaton and Lucas (1996) and (1997); Storesletten, Telmer, and Yaron (1999),
- relative volatility of stocks and bonds: Asness (2000)
- limited stock market participation and limited diversification: Saito (1995), Basak and Cuocco (1998), Heaton and Lucas (2000), Vissing-Jorgensen (2002), Gomes and Michaelides (2005),
- distinguishing between the cash flows to equity and aggregate consumption: Brennan and Xia (2001), who claim to be able to justify an equity premium of 6%.
- borrowing constraints: Constantinides, Donaldson, and Mehra (2002),
- other market imperfections: Aiyagari and Gertler (1991); Alvarez and Jermann (2000),
- disentangling the equity premium into its cash flow and discounting components: Bakshi and Chen (2006);
- measurement errors and poor consumption growth proxies: Breeden, Gibbons, and Litzenberger (1989), Mankiw and Zeldes (1991), Ferson and Harvey (1992), Ait-Sahalia, Parker, and Yogo (2004).

There are several excellent surveys of this work, including Kocherlakota (1996), Cochrane (1997) and Mehra and Prescott (2003 and 2006). Kocherlakota (1996) says that *"while there are several plausible explanations for the low level of Treasury returns, the large equity premium is still largely a mystery to economists"*.

Rietz (1988) and Barro (2005) suggest that low-probability disasters, such as a small a large "crash" in consumption, may justify a large equity premium. However, Mehra and Prescott (1988) challenge Rietz to identify such catastrophic events and estimate their probabilities.

McGrattan and Prescott (2005) argue that the 1960-2001 HEP is mainly due to changes in taxes and regulatory policy during this period. They also say that *"Allowing for heterogeneous individuals will also help quantify the effects of increased market participation and diversification that has occurred in the past two decades. Until very recently, mutual funds were a very expensive method of creating a diversified equity portfolio"*.

Limited stock market participation can increase the REP by concentrating stock market risk on a subset of the population. To understand why limited participation may have quantitative significance for the REP, it is useful to review basic facts about the distribution of wealth, and its dynamics over time. Mishel, Bernstein and Allegretto (2006) document that wealth and stock holdings in the U.S. remain highly concentrated in dollar terms: in 2004, the wealthiest 10% held 78.8% of the stocks (84% in 1989 and 76.9% in 2001), and the wealthiest 20% held over 90% of all stocks. Only 48.6% of U.S. households held stocks in 2004 (51.9% in 2001 and 31.7% in 1989) and only 34.9% (40.1% in 2001 and 22.6% in 1989) held stock worth more than $5,000. Of this 34.9%, only 13.5% had direct holdings. Mankiw and Zeldes (1991) reported that 72.4% of the 2998 families in their survey held no stocks at all. Among families that held more than $100,000 in other liquid assets, only 48% held stock. The covariance of stock returns and consumption of the families that hold stocks is triple than that of no stockholders ant it may explain part of the puzzle.

Brennan (2004) highlights the "*democratization of Equity Investment*": "*The increase in the number of participants in equity markets was accompanied by a massive increase in the scale of the equity mutual fund industry: the assets under management rose from $870 per capita in 1989 to over $14,000 per capita in 1999, before declining to a little over $12,000 per capita in 2001. On the other hand, holdings of bond mutual funds grew only from $966 per capita in 1989 to $2887 in 1989. In other words, while bond funds roughly tripled, equity funds went up by a factor of over 14!*" and "*the share of corporate equity held by mutual funds rose from 6.6% in 1990 to 18.3% in 2000*".

Heaton and Lucas (2000) introduced Limited Participation and Limited Diversification in an overlapping generations model and concluded that the increases in participation of the past two decades are unlikely to cause a significant reduction in the EEP, but that improved portfolio diversification might explain a fall in the EEP of several percentage points.

There is some promising research on heterogeneity. Abel (1991) hoped that "*incorporating differences among investors or more general attitudes toward risk can explain the various statistical properties of asset returns*". Levy and Levy (1996) mentioned that the introduction of a small degree of diversity in expectations changed the dynamics of their model and produced more realistic results. Constantinides and Duffie (1996) introduced heterogeneity in the form of uninsurable, persistent and heteroscedastic labor income shocks. Bonaparte (2006) used micro data on households' consumption and provides a new method on estimating asset pricing models, considering each household as living on an island and taking into account its lifetime consumption path. Due to the great deal of heterogeneity across households, he replaced the representative agent with an average agent.

Bakshi and Chen (2006) claim that "*disentangling the equity premium into its cash flow and discounting components produces an economic meaningful equity premium of 7.31%*".

Shalit and Yitzhaki (2006) show that at equilibrium, heterogeneous investors hold different risky assets in portfolios, and no one must hold the market portfolio.

It is interesting the quotation in Siegel and Thaler (1997): "*no economic theorist has been completely successful in resolving the [equity premium] puzzle*" ... but ... "*most economists we know have a very high proportion of their retirement wealth invested in equities (as we do)*".

6. The equity premium in the textbooks

This section contains the main messages about the equity premium conveyed in the finance textbooks and valuation books. Figure 6 collects the evolution of the Required Equity Premium (REP) used or recommended by the textbooks and by the academic papers mentioned on previous sections. Table 14 contains the equity premium recommended and used in different editions of several textbooks. Ritter (2002, "*The Biggest Mistakes We Teach*") focused on the use of the historical equity risk premium in textbooks as an estimate of the future. Looking at Figure 6 and at Table 14, it is quite obvious that there is not much consensus, creating a lot of confusion among students and practitioners (and finance authors, also) about the Equity Premium.

Figure 6. Evolution of the Required Equity Premium (REP) used or recommended in the most important finance textbooks and academic papers

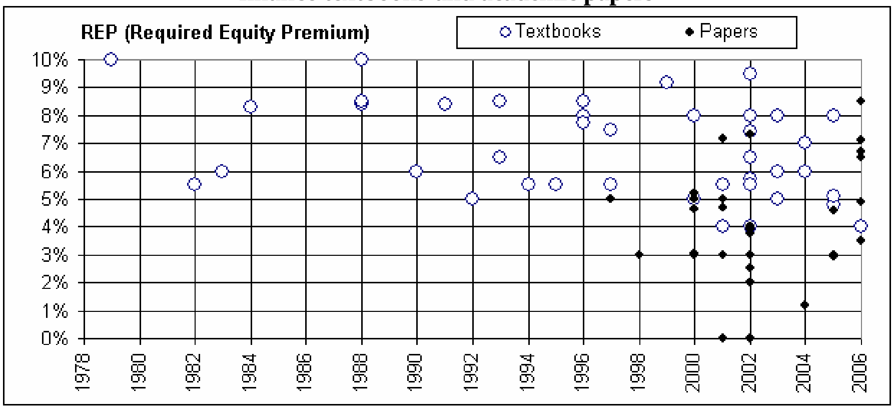

Table 14. Equity premiums recommended and used in textbooks

Author(s) of the Textbook	Assumption	Period for HEP	REP recommended	REP used
Brealey and Myers				
2nd edition. 1984	REP=EEP= arith HEP vs. T-Bills	1926-81	8.3%	8.3%
3rd edition. 1988	REP=EEP= arith HEP vs. T-Bills	1926-85	8.4%	8.4%
4th edition. 1991	REP=EEP= arith HEP vs. T-Bills	1926-88	8.4%	8.4%
5th edition. 1996	REP=EEP= arith HEP vs. T-Bills		8.2 - 8.5%	
6th and 7th edition. 2000 and 2003	No official position		6.0 - 8.5%	8.0%
8th edition. 2005 (with Allen)	No official position		5.0 - 8.5%	
Copeland, Koller and Murrin (McKinsey)				
1st edition. 1990	REP=EEP= geo HEP vs. T-Bonds	1926-88	5 - 6%	6%
2nd ed. 1995	REP=EEP= geo HEP vs. T-Bonds	1926-92	5 - 6%	5.5%
3rd ed. 2000	REP=EEP= arith HEP – 1.5-2%	1926-98	4.5 - 5%	5%
4th ed. 2005. Goedhart, Koller & Wessels	REP=EEP= arith HEP – 1-2%	1903-2002	3.5 – 4.5%	4.8%
Ross, Westerfield and Jaffe				
2nd edition. 1988	REP=EEP= arith HEP vs. T-Bills	1926-88	8.5%	8.5%
3rd edition. 1993	REP=EEP= arith HEP vs. T-Bills	1926-93	8.5%	8.5%
4th edition. 1996	REP=EEP= arith HEP vs. T-Bills	1926-94	8.5%	8.5%
5th edition. 1999	REP=EEP= arith HEP vs. T-Bills	1926-97	9.2%	9.2%
6th edition. 2002	REP=EEP= arith HEP vs. T-Bills	1926-99	9.5%	9.5%
7th edition. 2005	REP=EEP= arith HEP vs. T-Bills	1926-02	8.4%	8%
Van Horne, 6th edition. 1983				6.0%
8th edition. 1992			3 - 7%	5.0%
Copeland and Weston (1979 and 1988)				10%
Weston and Copeland (1992)				5%
Bodie, Kane and Marcus				
2nd edition. 1993	REP=EEP		6.5%	6.5%
3rd edition. 1996	REP=EEP=arith HEP vs. T-Bills - 1%		7.75%	7.75%
5th edition. 2002			6.5%	6.5%
2003	REP=EEP= arith HEP vs. T-Bills	1926-2001		5%; 8%
Damodaran 1994 Valuation. 1st ed.	REP=EEP= geo HEP vs.T-Bonds	1926-90	5.5%	5.5%
1996, 1997, 2001b, 2001c	REP=EEP= geo HEP vs.T-Bonds		5.5%	5.5%
2001a	average IEP	1970-2000	4%	4%
2002	REP=EEP= geo HEP vs.T-Bonds	1928-00	5.51%	5.51%
2006 Valuation. 2nd ed.	REP=EEP= geo HEP vs.T-Bonds	1928-2004	4.84%	4%
Weston & Brigham (1982)			5-6%	
Weston, Chung and Siu (1997)			7.5%	
Bodie and Merton (2000)				8%
Stowe *et al* (2002)	REP=EEP= geo HEP vs.T-Bonds	1926-00	5.7%	5.7%
Hawawini and Viallet (2002)	REP=EEP= geo HEP vs.T-Bonds	1926-99		6.2%
Pratt (2002)	REP=EEP=HEP			7.4%, 8%
Fernandez (2002)	"is impossible to determine the premium for the market as a whole"			
Penman (2003)	"No one knows what the REP is"			6%
Fernandez (2001, 2004)	"different investors have different REPs"			4%
Bruner (2004)	REP=EEP= geo HEP vs.T-Bonds	1926-2000	6%	6%
Palepu, Healy and Bernard (2004)	REP=EEP= arith HEP vs.T-Bonds	1926-2002	7%	7%
Weston, Mitchel & Mulherin (2004)	REP=EEP= arith HEP vs.T-Bonds	1926-2000	7.3%	7%
Arzac (2005)	REP=IEP		5.08%	5.08%

6.1. Brealey and Myers

In the 2nd edition (1984, pages 119, 132) they used REP = EEP = HEP = 8.3%, the arithmetic HEP over T-Bills in the period 1926-1981 according to Ibbotson[26]. In the 3rd edition (1988, pages 126, 139, 140, 185), they used REP = EEP = HEP = 8.4%, the arithmetic HEP over T-Bills in the period 1926-1985. In the 4th edition (1991, page 131), they focused on the arithmetic HEP over T-Bills in the period 1926-1988 (8.4%), continued considering that REP = EEP = HEP, and used 8.4% in their examples (pages 131, 194, 196). In the 5th edition (1996) they suggested 8.2-8.5%.

In the 6th edition (2000, page 160), they recognized that *"Brealey and Myers have no official position on the exact market risk premium, but we believe a range of 6 to 8.5% is reasonable for the United States. We are most comfortable with figures toward the upper end of the range"*. Further on, on page 195, they say: *"How about the market risk premium? From past evidence it appears to be 8 to 9%,[27] although many economists and financial managers would forecast a lower figure"*. They also mentioned that *"Many financial managers and economists believe that long-run historical returns are the best measure available"*.

In the 7th edition (2003, page 160), they continued without official position, and believing in the range of 6 to 8.5%. On page 195, they said: *"How about the market risk premium? As we have pointed out in the last chapter, we can't measure EEP with precision. From past evidence it appears to be about 9%,[28] although many economists and financial managers would forecast a lower figure. Let's use 8% in this example"*.

Brealey, Myers and Allen (2005), on page 154 of the 8th edition say *"Brealey, Myers and Allen have no official position on the exact market risk premium, but we believe that a range of 5 to 8.5 percent is reasonable for the risk premium in the United States"*.[29]

6.2. Copeland, Koller and Murrin (McKinsey)

In the two first editions (1990 and 1995), the McKinsey book advised to use a REP = geometric HEP versus Government T-Bonds. However, they changed criteria in the 3rd and 4th editions: they advised to use the arithmetic HEP of 2-year returns versus Government T-Bonds reduced by a survivorship bias. Although in the 2nd edition they said that (page 268) *"we use a geometric average of rates of return*

[26] They said on pages 119 of (1984), 127 of (1988) and 131 of (1991) that *"the crucial assumption here is that there is a normal, stable risk premium on the market portfolio, so that the expected future risk premium can be measured by the average past risk premium. One could quarrel with this assumption, but at least it yields estimates of the market return that seem sensible."*
[27] They reported on page 156 the arithmetic HEP versus the T-Bills in the period 1926-1997 (9.2%).
[28] They reported on page 155 the arithmetic HEP versus the T-Bills in the period 1926-2000 (9.1%).
[29] *"It seems that the expected market return over this period was 9.4%, or 5.3% above the risk-free interest rate. This is 2.3% lower than the realized risk premium in the period 1900-2003."* The average market return that they used was (page 149) 11.7% (figures from Dimson, Marsh and Staunton).

because arithmetic averages are biased by the measurement period", they used arithmetic averages in the 3rd and 4th editions.

In the 1st edition (1990), they recommended 5-6% (page 193) and used a REP of 6% (page 205) because (see page 196): *"Our opinion is that the best forecast of the risk premium is its long-run geometric average"*[30].

In the 2nd edition (1995) they recommended 5-6% (page 268)[31] and used a REP of 5.5% (page 281).

In the 3rd edition (2000, page 221), they recommended 4.5-5% (page 221) and used a REP of 5% (page 231). They justify their recommendation as follows: *"It is unlikely that the U.S. Market index will do as well over the next century as it has in the past, so we adjust downward the historical arithmetic average market risk premium. If we substract a 1.5 to 2% survivorship bias from the long-term arithmetic average of 6.5%, we conclude that the market risk premium should be in the 4.5-5%*[32] *range"*.

In the 4th edition of the McKinsey valuation book, Koller, Goedhart and Wessels (2005, page 297) state that the REP is equal to the EEP and say on page 298: *"we believe that the market risk premium as of year-end 2003 was just under 5%".* On page 539 they use in an example a REP of 4.8%. On page 303, they argue that *"Since it is unlikely that the U.S. stock market index will replicate its performance over the next century, we adjust downward the historical arithmetic average market risk premium. Using data from Jorion and Goetzmann, we find that between 1926 and 1996, the U.S. arithmetic annual return exceeded the median return on a set of 11 countries with continuous histories dating to the 1920s by 1.9% in real terms, or 1.4% in nominal terms. If we subtract a 1% to 2% survivorship bias from the long-term arithmetic average of 5.5 percent*[33]*, the difference implies the future range of the U.S. market risk premium should be 3.5% to 4.5%".*

6.3. Ross, Westerfield and Jaffe

In all editions they recommend REP = EEP = arithmetic HEP vs. T-Bills, using Ibbotson data.

In (1988, 2nd edition), they considered (pages 243-4) that REP = EEP = arithmetic HEP versus T-Bills for 1926-1988 = 8.5% (12.1% - 3.6%) and used it on page 287. In (1993, 3rd edition), they also recommended 8.5%. In (1996, 4th edition), they considered (page 241) that REP = EEP = arithmetic HEP versus T-Bills for 1926-1994 = 8.5% (12.2% - 3.7%) and used it on page 280.

[30] They report on page 194 the Ibbotson geometric HEP versus the T-Bonds in the period 1926-1988 (5.4%).

[31] Copeland, Koller and Murrin (1995, 2nd ed., page 268):*"We recommend using a 5 to 6% market risk premium for U.S. companies. This is based on the long-run geometric average risk premium for the return of the S&P 500 versus the return on long-term government bonds from 1926 to 1992"*.

[32] 6.5% is the arithmetic HEP of 2-year returns in the period 1926-1998 (see page 220). The arithmetic HEP of 1-year returns was 7.5%, and the geometric HEP was 5.9%.

[33] 5.5% is the arithmetic mean of 10-year holding periods returns from 1903 to 2002. The arithmetic mean of 1-year returns is 6.2%, according to exhibit 10.5 of Koller, Goedhart and Wessels (2005).

In (1999, 5th edition), they considered (page 259) that REP = EEP = arithmetic HEP versus T-Bills for 1926-1997 = 9.2% (13% - 3.8%), used it on page 261, and said "*It is generally argued that the best estimate for the risk premium in the future is the average risk premium in the past*".

In (2002, 6th edition), they considered (page 259) that REP = EEP = arithmetic HEP versus T-Bills for 1926-1999 = 9.5% (13.3% - 3.8%) and used it on pages 274 and 324. They mentioned (1999 in page 259; 2002 in page 273) that "*financial economists use [the HEP] as the best estimate to occur in the future. We will use it frequently in the text*".

In (2005, 7th edition), they considered (page 259) that REP = EEP = arithmetic HEP versus T-Bills for 1926-2002 = 8.4% (12.2%-3.8%) because "*financial economists find this to be a useful estimate of the difference to occur in the future*".[34] However, on page 286 they used a REP = 8%.

6.4. Bodie, Kane and Marcus

In (1993, 2nd edition, page 549), they used a REP = EEP = 6.5% (14.5%-8%) to value Hewlett-Packard. They justified it by saying "*Suppose the consensus forecast for the expected rate of return on the market portfolio in 1990 was about 14.5%*".[35]

In the 3rd edition (1996, page 535), they used a REP = EEP = HEP – 1% = 7.75% to value Motorola[36]. In the 5th edition (2002, page 575), they valued Motorola using a REP = 6.5% (12.5%-6%)[37].

In the 6th edition (2003), they used CRSP data to calculate the arithmetic HEP vs. T-bills for 1926-2001, which was 8.64% (12.49%-3.85%). They said on page 157 that "*the instability of average excess return over the 19-year subperiods calls into question the precision of the 76-year average HEP (8.64%) as an estimate of the EEP… There is an emerging consensus that the HEP is an unrealistic high estimate of the EEP*". They used in the examples different REPs: 8% (pages 426, 431) and 5% (page 415).

6.5. Damodaran

[34] But they finish with a caveat on page 284: "*of course, the future equity risk premium could be higher or lower than the historical equity risk premium. This could be true if future risk is higher or lower than past risk or if individual risk aversions are higher or lower than those of the past*".

[35] It is not clear how they got the 14.5%. They presented (pages 126 and 127) CRSP historical data for 1926-1990. The average arithmetic returns were: 12.13% for stocks, 4.9% for T-Bonds and 3.73% for T-Bills.

[36] They argue that "*the HEP has been closer to 8.5%. However, stock analysts were relatively pessimistic about market performance over the short term. Although the HEP is a guide to the EEP one might expect from the market, there is no reason that the risk premium cannot vary somewhat from period to period*". The 8.5% that they mentioned was the arithmetic HEP using T-Bills in the period 1926-1993.

[37] They argue that "*the HEP has been closer to 9.14%. However, after several banner years, stock analysts in mid-2000 were increasingly wary about future market performance over the short term. Although the HEP is one guide as to the EEP one might expect from the market, there is no reason that the risk premium cannot vary somewhat from period to period. Moreover, recent research suggests that in the last 50 years the HEP was considerably better then the market participants at the time were anticipating. Such a pattern could indicate that the economy performed better than initially anticipated during this period, or that the discount rate declined*". The 9.14% that they mentioned was the arithmetic HEP using T-Bonds in the period 1926-1999.

In 1994 and 2002 Damodaran recommended REP = EEP = geometric HEP versus T-bonds. In 1997 he used a REP = arithmetic HEP versus T-Bills. In 2001a and 2006 he recommended REP = EEP = IEP.

Damodaran *on Valuation* (1994, page 22), recommended an EEP of 5.5%, the geometric HEP using T-bonds for the period 1926-1990: *"5.5% is used through the book for calculating expected returns"*. However, on page 24, he calculated the cost of equity of Pepsico using a REP of 6.41% (geometric HEP 1926-1990 using T-Bills). For Germany (page 164) he used a REP of 3.3%.

Damodaran *on Valuation* (2006, 2nd edition) used a REP of 4% for the US. He said that the most relevant historical figure is the geometric HEP versus T-Bonds, that for the period 1928-2004, was 4.84%. He used a dividend discount model to conclude that *"the implied premium for the US and the average implied equity risk premium has been about 4% over the past 40 years"*.

Damodaran (2001a, page 63) recommended *"6.05%, which is the geometric average premium for stocks over treasury bonds from 1928 to 1999 if you use historical premiums. In using this premium, however, you are assuming that there are no trends in the risk premium and that investors today demand premiums similar to those they used to demand two, four, or six decades ago. Given the changes that have occurred in the markets and in the investor base over the last century, you should have serious concerns about using this premium, especially in the context of valuation"*. But Damodaran (2001a, page 67) concluded: *"The average implied equity-risk premium between 1970 and 2000 is approximately 4%. By using this premium, you are assuming that while markets might have been overvalued in some of these years and undervalued in others, it has been, on average, correct over this period"*. Throughout his book, Damodaran (2001a) used a REP = 4% for the U.S.

Damodaran (2001b), however, used a REP of 5.5% (see, for example, pages 237, 339, 425 and 426). In the first edition (1997), he already used a REP of 5.5% for the US in most of the examples, but on page 128 he calculated the cost of equity of Pepsico using a REP of 8.41% (arithmetic HEP 1926-1990 using T-Bills).

Damodaran (2001c) mentioned (page 192) that although the geometric HEP versus T-bonds from Ibbotson for 1926-1998 (6.38%), *"in this book we use a premium of 5.5% in most of the examples involving US companies"*. But he continued in a footnote *"we must confess that this is more for the sake of continuity with the previous version of the book and for purposes of saving a significant amount of reworking practice problems and solutions"*.

Damodaran (Investment Valuation, 2002, pages 170, 171) used a REP = HEP = 5.51% for US, which is the geometric HEP versus T-bonds in the period 1928-2000 according to the Federal Reserve Bank. On page 174 he argued that *"the market correction in 2000 pushed the IEP up to 2.87% by the end of 2000"* and suggested an equation for the IEP between 1960 and 2000:

IEP = 1.87% + 0.2903 (T-bond rate) – 0.1162 (T-bond – T-bill).[38]

In the first edition (1996), he used (page 251) a REP of 5.5% to value Boeing. On page 48, he shows that 5.5% is the geometric HEP versus T-bonds in the period 1926-1990

[38] The R-squared of the regression is 49% and the t-statistics of the coefficients are 5.94 and 1.10 respectively.

6.6. Copeland and Weston

In (1979, page 295), they used a REP = 10% (17%-7%), and on page 321 they used 9.83%. In their 3rd edition (1988) they used the same values (see pages 458 and 531).

Weston and Copeland (1992, page 407), used a REP = 5% (9%-4%), and on page 944 a REP = 5% (11%-6%).

6.7. Van Horne

In (1968, 1st ed., page 215), he still did not mention the CAPM or the market risk premium.

In (1983, 6th ed., page 215), he used a REP = 6% (13% - 7%). He justified it: "*Suppose, for easy illustration, that the expected risk-free rate is an average of the risk-free rates that prevailed over the ten-year period and that the expected market return is average of market returns over that period*".

In (1986, page 373), he mentioned that *"for the expected return of the market portfolio of stocks, one can use consensus estimates of security analysts, economists, and others who regularly predict such returns. Merrill, Lynch and other investment banks make these predictions"*.

In (1992, Fundamentals, 8th ed., page 438), he used a REP = 5% (13% - 8%). He justified it: *"Assume that a rate of return of about 13% on stocks in general is expected to prevail and that a risk-free rate of 8% is expected"*. He added: *"the 'before hand' or ex ante market risk premium has ranged from 3 to 7%"*.

6.8. Penman

In (2001, 1st ed., page 692), he said that *"the market risk premium is a big guess. Research papers and textbooks estimate it in the range of 4.5% to 9.2%. Pundits keen to rationalize the 'high' stock market at the end of the 1990s were brave enough to state that it had declined to 2%... Compound the error in beta and the error in the risk premium and you have a considerable problem… No one knows what the market risk premium is"*.

In (2003, 2nd ed., page 445), he admitted that *"we really do not have a sound method to estimate the cost of capital… Estimates [of the equity premium] range, in texts and academic research, from 3.0% to 9.2%"*, and he used 6% (page 443).

6.9. Other finance textbooks and valuation books

Weston and Brigham (1968) still did not defined equity premium, but they defined the cost of equity (page 189) as *"the minimum rate of return that must be earned to keep unchanged the value of the existing common equity"*. In (1982, 6th edition, page 393) they said that *"the market risk premium can be considered relatively stable at 5 to 6% for practical application"*.

Weston, Chung and Siu (1997) recommend 7.5%.

Bodie and Merton (2000) use 8% for USA[39].

Stowe, Robinson, Pinto and McLeavey (2002), in their book for the CFA (Chartered Financial Analysts) Program use (page 49) a REP = Geometric HEP using T-Bonds during 1926-2000, according to Ibbotson = 5.7%.[40]

Pratt (2002) affirms that *"Cost of capital is the* ***expected rate of return that the market requires*** *in order to attract funds to a particular investment".* He assumes that REP=EEP=HEP and he uses 7.4% (page 68) and 8% (page 74) and 8.10%.

Hawawini and Viallet (2002) use (page 328) a REP = 6.2% = geometric HEP over T-bonds in the period 1926-1999 according to Ibbotson.

Fernandez (2002) is the only finance textbook that claims that *"it is impossible to determine the premium for the market as a whole, because it does not exist. Even if we knew the market premiums of the different investors who operated on the market, it would be meaningless to talk of a premium for the market as a whole".* He also mentions that we *"could only talk of a market risk premium if all investors had the same cash flow expectations". "If they did, it would make sense to talk of a market risk premium because all investors would have the market portfolio. However, expectations are not homogeneous".*

Fernandez (2004, 2001) also mentioned that "*the HEP, the EEP and the REP are different concepts*" and that "*different investors have different REPs*". In the examples (see pages 608 and 623) he uses REP = 4%.

Palepu, Healy and Bernard (2004, page 8-3) mention that the HEP "*constitutes an estimate of the REP*" and use REP = 7% in the examples (page 8-5).

Weston, Mitchel and Mulherin (2004) mention that the arithmetic HEP over T-bonds in the period 1926-2000 according to Ibbotson was 7.3%, while the geometric was 5.7%. On page 260 they use REP = EEP = 7%.

Bruner (2004, pages 269 and 294) uses a required equity premium of 6% because (see page 265) *"from 1926 to 2000, the risk premium for common stocks has averaged about 6% when measured geometrically".*

Arzac (2005) uses (see exhibit 3.4) a required equity premium of 5.08% for a valuation done in December 2002 (5.08% is the expected equity premium as of that date calculated using the Gordon equation).

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39 On page 347, they say that *"in the CAPM, the equilibrium risk premium on the market portfolio is equal to the variance of the market portfolio (s^2_M) times a weighted average of the degree of risk aversion of the holders of wealth (A). Suppose that s_M = 20% and A = 2. Then the risk premium on the market portfolio is 8%."* The CAPM tells us that asset prices are a function of the risk aversion of the **representative investor** and of the variance-covariance structure of the universe of assets. If the form of the utility function and the coefficient of risk aversion are both known, then knowledge of the variance-covariance of the universe of assets (or the variance of the portfolio of risky assets) is sufficient to identify the spread between risky and riskless asset portfolios.

40 They also mention another method to calculate the cost of equity: the *"bond yield plus risk premium method".* Under this approach, the cost of equity is equal to the *"yield to maturity on the company´s long-term debt plus a typical risk premium of 3-4%, based on experience."*

REP = HEP	vs. T-Bills	vs. T-Bonds
Arithmetic	Brealey and Myers (1984, 1988, 1991, 1996) Ross, Westerfield and Jaffe (1988, 1993, 1996, 1999, 2002, 2005); Bodie, Kane and Marcus (2003); Pratt (2002)	Weston, Mitchel and Mulherin (2004), Palepu, Healy and Bernard (2004)
Arithmetic - survivor bias		McKinsey (2000, 2005); Bodie, Kane and Marcus (1996)
Geometric		McKinsey (1990, 1995); Damodaran (1994, 1996, 1997, 2001b, 2001c, 2002, 2006); Stowe *et al* (2002); Hawawini and Viallet (2002); Bruner (2004)

REP = IEP	Damodaran (2001a); Arzac (2005)
"No oficial position"	Brealey and Myers (2000, 2003, 2005)
"different investors have different REPs"	Fernandez (2001, 2002, 2004)
"No one knows what the REP is"	Penman (2003)

In the following section we claim that the confusion comes from the fact that **there is not a REP** for the market as a whole: different investors use different **REPs**. Last sentence may me rewritten as: **there is not an IEP** for the market as a whole: different investors use different **IEPs**. A unique IEP requires assuming homogeneous expectations for the expected growth (g), but there are several pairs (IEP, g) that satisfy current prices.

7. There is not an IEP, but many pairs (IEP, g) which are consistent with market prices

Even if market prices are correct for all investors, there is not a unique REP common for all investors. In a simple Gordon model, there are many pairs (Ke, g) that satisfy equation (1). As Ke is the sum of the Implied Equity Premium (IEP) plus the risk-free rate (R_F), there are many pairs (IEP, g) that satisfy equation (1). A unique IEP requires assuming homogeneous expectations for the expected growth (g). If equation (1) holds, the *expected* return for the shareholders is equal to the *required* return for the shareholders (Ke), but there are many *required* returns (as many as expected growths, g) in the market. On top of that, IEP and g change over time.

If investors' expectations were homogenous, it would make sense to calculate a unique IEP, as all investors would have the market portfolio and the same expectations regarding the portfolio[41]. However, as expectations are not homogenous[42], different investors use different **REPs**: investors who expect higher growth will have a higher REP. Heterogeneous investors do not hold the same portfolio of risky assets; in fact, no investor must hold the market portfolio to clear the market: it does not make sense to search for a common REP because it does not exists.

We can find out an investor's REP by asking him, although for many investors the REP is not an explicit parameter but, rather, an implicit one that manifests in the price they are prepared to pay for

[41] Even then, this method requires knowing the expected growth of dividends. A higher growth estimate implies a higher premium.
[42] Doukas, Kim and Pantzalis (2006) document analysts' divergence of opinion.

shares[43]. However, it is impossible to determine the REP for the market as a whole, because it does not exist. Even if we knew the market premiums of all the investors who operated on the market, it would be meaningless to talk of a premium for the market as a whole.

A rationale for this may be found in the aggregation theorems of microeconomics, which in actual fact are non-aggregation theorems. One model that works well individually for a number of people may not work for all of the people together[44]. For the CAPM, this means that although the CAPM may be a valid model for each investor, it is not valid for the market as a whole, because investors do not have the same return and risk expectations for all shares. Prices are a statement of expected cash flows discounted at a rate that includes the risk premium. Different investors have different cash flow expectations and different future risk expectations. One could only talk of an equity premium if all investors had the same cash flow expectations.

Reallocating terms in equation (1), we get:

$$IEP - g = d_1/P_0 - R_F \qquad (3)$$

There are many pairs (IEP, g) that satisfy the Gordon equation at any moment. All the papers that we revised on section 5 assume that there is an "expected growth rate for the market" and get an "IEP for the market". But without homogeneous expectations, there is not an "expected growth rate for the market".

Similarly, for having an EEP common for all investors we need to assume homogeneous expectations (or a representative investor) and, with our knowledge of financial markets, this assumption is not reasonable. A theory with a representative investor cannot explain either why the annual trading volume of most exchanges more than double the market capitalization.

We also find that the difference (IEP – g),[45] is related to the risk free rate in the period after 1960. Figure 7 shows the relationship for the period after 1980 for the US, Spain and the UK. Figure 8 shows the relationship for the periods 1981-2006 (eliminating the years 1999 and 2000) and 1959-1980 (eliminating the period June 1977-March 1978) for the US. It may be seen the high negative correlation between (IEP – g) and the risk free rate in the three markets.

[43] An example: An investor is prepared to pay 80 euros for a perpetual annual cash flow of 6 euros in year 1 and growing at an annual rate of 3%, which he expects to obtain from a diversified equity portfolio. This means that his required market return is 10.5% ([6/80] + 0.03).

[44] As Mas-Colell *et al.* (1995, page 120) say, "it is not true that whenever aggregate demand can be generated by a representative consumer, this representative consumer's preferences have normative contents. It may even be the case that a positive representative consumer exists but that there is no social welfare function that leads to a normative representative consumer."

[45] We calculate ($d_1/P_0 - R_F$) that is equal to (IEP – g)

Figure 7. Correlations (d_1/P_0 - R_F) – (R_F) for the US, Spain and the UK. Monthly data.
(d_1/P_0 - R_F) = IEP – g. *Source of the data: Datastream*

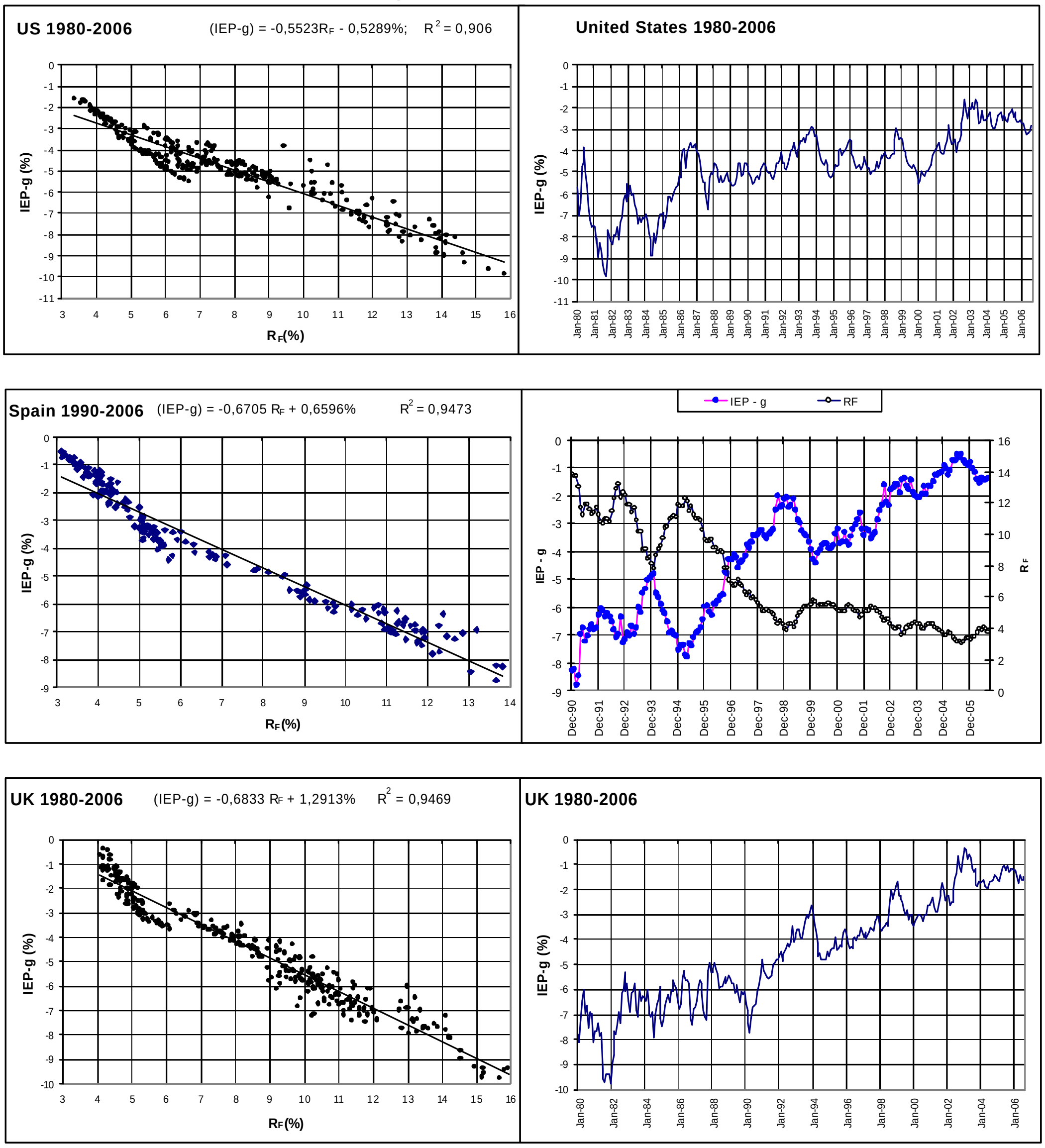

Figure 8. Correlations (d_1/P_0 - R_F) – (R_F) for the US, Spain and the UK. Monthly data.
(d_1/P_0 - R_F) = IEP - g
Source of the data: Robert Shiller's Website: http://aida.econ.yale.edu/~shiller/data.htm

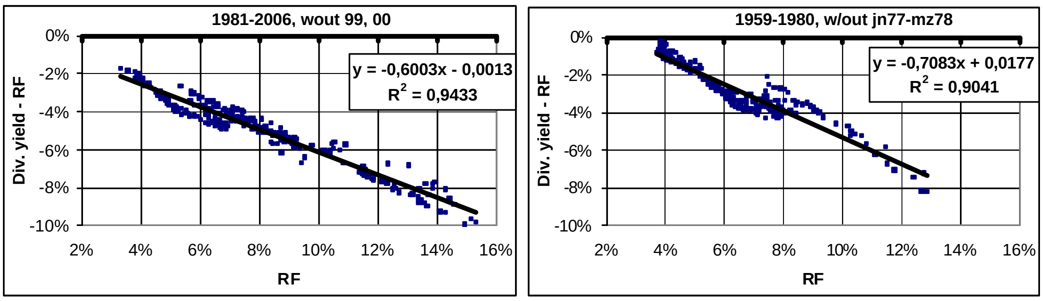

Table 15. Regressions with monthly data of Y (IEP – g) on R_F (10 year Gov. Bond Yield) Monthly data. (d_1/P_0 - R_F) = IEP – g. *Source of the data: Datastream*

	Full period	(R squared)		Without 1997-02	(R squared)
USA 1980-2006	Y = -0.5523 R_F - 0.5289%	0.9060		Y = -0.5864 R_F - 0.1278%	0.9417
Germany 1980-2006	Y = -0.7192 R_F + 0.5907%	0.8205		Y = -0.7569 R_F + 0.9362%	0.8427
UK 1980-2006	Y = -0.6833 R_F + 1.2913%	0.9469		Y = -0.7195 R_F + 1.7119%	0.9551
France 1988-2006	Y = -0.9587 R_F + 2.5862%	0.9245		Y = -1.0273 R_F + 3.2364%	0.9625
Italy 1991-2006	Y = -1.0693 R_F + 3.0398%	0.9563		Y = -1.1223 R_F + 3.7155%	0.9730
Spain 1991-2006	Y = -0.6705 R_F + 0.6596%	0.9473		Y = -0.7135 R_F + 1.1954%	0.9747

Table 16. Regressions with monthly data of Y (d_1/P_0) on R_F (10 year Gov. Bond Yield) Monthly data. (d_1/P_0) = R_F + IEP – g. *Source of the data: Datastream*

	Full period	(R squared)		Without 1997-02	(R squared)
USA 1980-2006	Y = 0.4477 R_F - 0.5289%	**0.8636**		Y =0.4136 R_F - 0.1278%	**0.8893**
Germany 1980-2006	Y =0.2808 R_F + 0.5907%	**0.4107**		Y =0.2431 R_F + 0.9362%	**0.3559**
UK 1980-2006	Y =0.3167 R_F + 1.2913%	**0.7930**		Y =0.2805 R_F + 1.7119%	**0.7637**
France 1988-2006	Y =0.0413 R_F + 2.5862%	**0.0222**		Y =-0.0273 R_F + 3.2364%	**0.0178**
Italy 1991-2006	Y =-0.0693 R_F + 3.0398%	**0.0843**		Y =-0.1223 R_F + 3.7155%	**0.2993**
Spain 1991-2006	Y =0.3295 R_F + 0.6596%	**0.8129**		Y =0.2865 R_F + 1.1954%	**0.8612**

Regressions with monthly data of Y (d_1/P_0 - R_F) on Inflation (annual)

	Full period	(R squared)	**Without 1997-02**	(R squared)
USA 1980-2006	Y= -0,3494 Inf -3,3779	0,3053	Y= -0,3423 Inf -3,4291	0,2837
Germany 1980-2006	Y= -0,4301 Inf -2,9491	0,2767	Y= -0,389 Inf -3,1588	0,2334
UK 1980-2006	Y= -0,3787 Inf -2,7106	0,4548	Y= -0,3173 Inf -3,3742	0,3900
France 1988-2006	Y= -1,3914 Inf -0,732	0,3339	Y= -1,844 Inf +0,3968	0,3513
Italy 1991-2006	Y= -2,1442 Inf +1,7486	0,7073	Y= -2,2576 Inf +2,1702	0,7074
Spain 1991-2006	Y= -1,1553 Inf +0,1225	0,4845	Y= -1,3003 Inf +0,72	0,4760

Regressions with monthly data of Y (d_1/P_0) on Inflation (annual)

	Full period	(R squared)	**Without 1997-02**	(R squared)
USA 1980-2006	Y=0,3703 Inf +1,4393	0,4977	Y=0,3258 Inf +1,8417	0,4881
Germany 1980-2006	Y=0,3058 Inf +1,6325	0,4595	Y=0,2632 Inf +1,8645	0,4374
UK 1980-2006	Y=0,2255 Inf +2,8923	0,6095	Y=0,1824 Inf +3,3621	0,6610
France 1988-2006	Y=0,2878 Inf +2,262	0,1756	Y=0,0529 Inf +2,9377	0,0071
Italy 1991-2006	Y= -0,0294 Inf +2,5748	0,0029	Y= -0,1555 Inf +3,1992	0,0868
Spain 1991-2006	Y=0,7355 Inf +0,2633	0,6554	Y=0,7007 Inf +0,6391	0,7225

Regressions with monthly data of R_F (10 year Gov. Bond Yield) on Inflation (annual)

	Full period	(R squared)	**Without 1997-02**	(R squared)
USA 1980-2006	Y=0,7196 Inf +4,8172	0,4363	Y=0,6681 Inf +5,2707	0,3947
Germany 1980-2006	Y=0,7359 Inf +4,5816	0,5107	Y=0,6521 Inf +5,0233	0,4460
UK 1980-2006	Y=0,6042 Inf +5,6029	0,5667	Y=0,4998 Inf +6,7362	0,5260
France 1988-2006	Y=1,6793 Inf +2,994	0,4823	Y=1,8968 Inf +2,5409	0,4152
Italy 1991-2006	Y=2,1148 Inf +0,8261	0,8068	Y=2,1021 Inf +1,029	0,7845
Spain 1991-2006	Y=1,8908 Inf +0,1408	0,6011	Y=2,001 Inf -0,0809	0,5829

8. How do I calculate the REP?

For calculating the cost of equity (required return to equity cash flows) of a company, a valuator has to answer the following question: which differential rate over current T-Bond yields do I think compensates the risk of holding the shares? If there is only an owner of the shares, we can directly ask him the question. But if it is a traded company, the valuator has to make a prudential judgment. As Grabowski (2006), points out, *"the entire appraisal process is based on applying reasoned judgment to the evidence derived from economic, financial and other information and arriving at a well reasoned opinion of value"*.

We need the cost of equity to discount the expected equity cash flows of the company. Note that there is a kind of schizophrenic approach to valuation: while all authors admit that different valuators and investors may have different expectations of equity cash flows, most authors look for a unique discount rate. It seems as if the expectations of equity cash flows are formed in a democratic regime, while the discount rate is determined in a dictatorship. In any market, different investors may have different expectations of equity cash flows and different evaluations of its risk (that translate into different discount rates). Then, in the case of a traded company, there are investors that think that the company is undervalued (and buy or hold shares), investors that think that the company is overvalued (and sell or not buy shares), and investors that think that the company is fairly valued (and sell or hold shares). The investors that did the last trade, or the rest of the investors that held or did not have shares do not have a common REP (nor common expectations of equity cash flows).

For calculating the REP, we must answer the same question, but thinking in a diversified portfolio of shares, instead in just the shares of a company. In the valuations that I have done in the 21st century I have used REPs between 3.8 and 4% for Europe and for the U.S. Given the yields of the T-Bonds, I think[46] that an additional 4% compensates the additional risk of a diversified portfolio.

9. Conclusion

The equity premium (also called *market risk premium, equity risk premium, market premium* and *risk premium*), is one of the most important, discussed but elusive parameters in finance. Much of the confusion arises from the fact that the term equity premium is used to designate four different concepts (although many times they are mixed): **Historical** Equity Premium (HEP), **Expected** Equity Premium (EEP); **Required** Equity Premium (REP) and **Implied** Equity Premium (IEP).

The **HEP** is equal for all investors, but the **REP,** the **EEP and** the **IEP** are different for different investors. There is no an **IEP** for the market as a whole: different investors have different **IEPs** and use different **REPs**. A unique IEP requires assuming homogeneous expectations for the expected growth (g), but there several pairs (IEP, g) that satisfy current prices.

We show that in the finance literature and in valuation textbooks, there are authors that claim different identities among the four equity premiums defined above: some claim that **HEP = EEP = REP**; others claim that **EEP is smaller than HEP;** others claim that there is **a unique IEP and that REP =**

[46] And also my clients that are able to answer to that question.

IEP; others ***"have no official position"***; others claim that **EEP is near zero;** others try to find the **EEP doing surveys;** others affirm ***"that no one knows what the REP is"***.

We claim that different investors have different REPs and that it is impossible to determine the REP for the market as a whole, because it does not exist. Heterogeneous investors do not hold the same portfolio of risky assets; in fact, no investor must hold the market portfolio to reach equilibrium.

There is a kind of schizophrenic approach to valuation: while all authors admit that different valuators and investors may have different expectations of equity cash flows, most authors look for a unique discount rate. It seems as if the expectations of equity cash flows are formed in a democratic regime, while the discount rate is determined in a dictatorship. In any market, different investors may have different expectations of equity cash flows and different evaluations of its risk (that translate into different discount rates).

It has been argued that, from an economic standpoint, we need to establish the primacy of the EEP, since it is what guides investors' decisions. However, the REP is more important for many important decisions, among others, valuations of projects and companies, acquisitions, and corporate investment decisions. On the other hand, EEP is important only for the investors that hold the market portfolio.

We also show that there is a relationship between (IEP – g) and the risk free rate.

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