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SEARCHING FOR FINANCIAL BUBBLE IN THE PRIVATE SPACE SECTOR

Modern market economy is not protected from the risks which may lead to sharp decrease in rate of growth or even to cutback of economic activity. Assessing and managing risks is required to lessen the negative impact of possible crisis. In this sense, young and developing sectors of economy are more vulnerable to economic fluctuations as far as it takes several years to work out an appropriate strategy to handle the market crunch.

Among all the possible economic problems this research concerns financial bubble and, consequently, analysis of stock exchange. In this field Benjamin Graham and David Dodd are assumed to be pioneers who distinguished market price of the stock from its intrinsic value. Since the first edition of "Security Analysis" (Graham, Dodd 1934) [1] was published, it is considered to be the bible for investors. Almost 70 years later in 2002 Robert Brenner published his "The Boom and the Bubble: The US in the World Economy" [2] analyzing the causes of local and global bubbles of the 20th century. Mark Faber and Warren Buffet accepted and modernized the approach suggested by Graham and Dodd. Warren Buffet published a revised edition of "The Intelligent Investor: The Definitive Book on Val-

ue Investing" in 2006 [3]. Mark Faber used the concept of value investing to assess the investment attractiveness of the Asian companies ("Tomorrow's Gold: Asia's age of discovery", Faber 2010) [4]. Among the homeland researchers, Elena Chirkova deserves attention as an author of a unique book about the financial bubbles [5]: not only did she present a detailed overview of the most important financial bubbles, but she also singled out the most common causes of the bubble bursts.

The aim of this work is to analyze the private space sector of the world economy and to find out if there is a financial bubble. To handle this issue, it is relevant to define, what the "financial bubble" is, which criteria points at its appearing, and then to compare these theoretical conditions with the real situation in the target sector.

According to the Space Foundation annual Space Reports [6-11], share of Private Space Sector has been steadily increasing since 2005 till the present and nowadays it covers three fourth of the Global Space Market. In addition, total Space expenditures rocketed from \$190 billion to more than \$300billion (Figure 1).

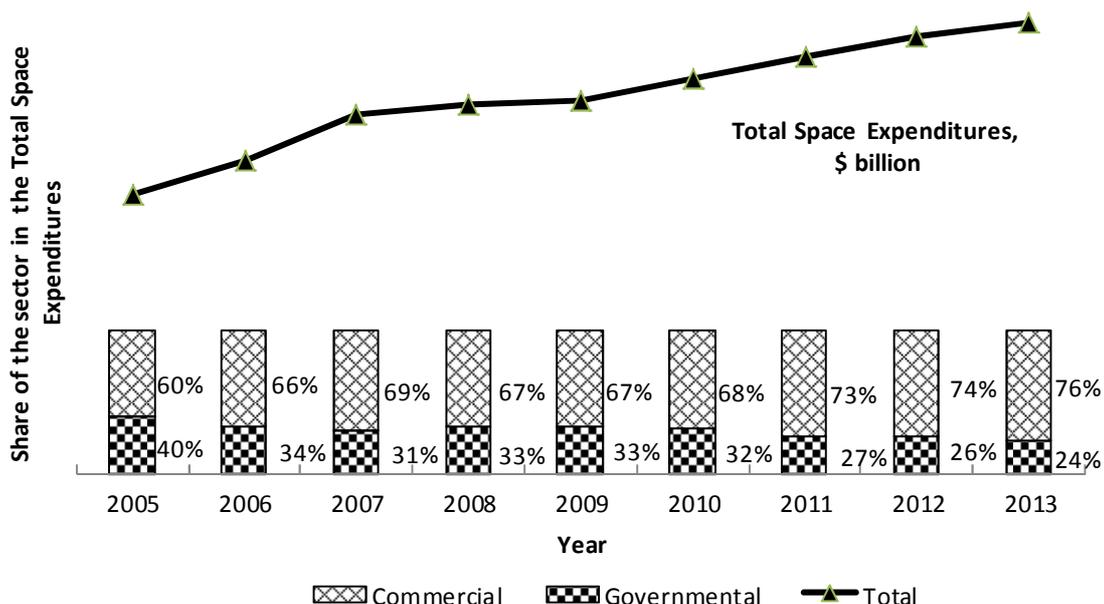


Fig. 1. Total Space Expenditures, 2005-2013 [6-11]

However, despite the increasing funding, significant step forward has not been taken yet. Space tourism is not a reality, lunar resources are not available, and asteroid mining is postponed until the next decade [8, p.17]. Such an inconsistency between expenditures and achievements may point at overvalued capacities of the industry. Costs of the projects with a low return on investment are getting higher, while most of these projects have a little value for shareholders. One can call it a venture investment, but the situation is somehow similar to the dotcom splash in the early 2000's. Almost 15 years ago overconfident investors invested in those companies that were related to online-business without even paying attention at the financial statements of the "dotcom" company. Ultimately, those companies became too overvalued and the bubble had burst as soon as investors had understood the difference between market price and intrinsic value of the dotcom shares [5, p.238-240].

In the literature there exist different approaches to the definition of the financial bubble. The challenge is that the emerging bubble is hardly distinguishable from the casual period of growth of the market. The most common definition of the bubble is "a situation in which prices for securities, especially stocks, rise far above their actual value" [12-13]. However this definition is generally thought to be of little practical use, actually the former Federal Reserve Chairman Mr. Greenspan once mentioned that "it was very difficult to identify definitively a bubble until after the fact – that is, when it is bursting we confirm its existence" [14]. Instead of quantitative, Robert Shiller suggested a qualitative definition: "the term "bubble" refers to a situation in which excessive public expectations of future price increases cause prices to be temporarily elevated" [15]. Elena Chirkova states that the bubble is growth in prices, which can not be explained by the fundamental factors and is followed by a sharp decrease after the bubble burst [5, p.244].

Despite there is no precise definition of the bubble phenomenon, economists are united concerning its causes. Financial bubble is suggested to appear as a result of extra exhilaration on the stock market, when investors all flock to a particular product or asset. In this respect, Robert Shiller argues that "the stock price increase is driven by irrational euphoria among individual investors, fed by an emphatic media" [16]. The biggest problem is that difference between developing economy and pre-bubble situation on the market is hardly distinguishable, and that has led to bubble bursts several times in the past (like the dotcom crisis in the beginning of the 21st century).

These are several "litmus papers" which can be used for a primary analysis of a market:

- Nonlinear growth of the share prices during a short time period;
- Growing number of companies that make IPO;

- Purely speculative attitude towards shares (short period of owing particular shares);
- Most companies shares are overvalued: their intrinsic price is lower than the market one [5, p.235-247].

Space Foundation, the largest non-profit space organization, provides a list of 28 private companies, which are strongly related to space exploration and commercialization. Among them there are such "blue chips" as Boeing and Lockheed Martin, Viasat and Northrop Grumman [6-11]. In the frame of our research dynamics of share prices of these companies have been investigated within the period between 2008 and 2014. According to the total rate of growth, all the companies were divided into four groups (Table 1):

- 1) Extra fast: this group consists of those companies which more than doubled their share price;
- 2) Fast: this group consists of companies which rate of growth is between 50% and 100%;
- 3) Stable: this group consists of companies with a stable rate of growth which have increased their share price no more than by 50%;
- 4) Negative: this group consists of companies which share price has decreased.

Table 1
Classification of Space Companies according to the Rate of Growth [6-11]

Rate of growth	Number of companies
Extra fast (>100%)	8
Fast (>50%)	8
Stable (>0%)	9
Negative (<0%)	3

So, almost third of companies more than doubled their share prices, while Loral Space and Communications multiplied it by 4 (from \$18,37 per share in August 2008 to \$73,56 per share in August 2014). Without any denial, that is the direct consequence of NASA insisting on satellite development programs in which Loral has taken part [17]. Not only Loral, but also Boeing and Northrop Grumman gained an advantage from cooperating with NASA (88,38% and 99,03% of growth respectively)[9, 46]. In addition, European Aeronautic Defense and Space (EADS) has also increased its share price by 285%. That is the evidence of European Union involvement in the space commercialization. There is also a possibility that later there will be more European companies among the "blue chips" of the industry.

Unfortunately, there were some companies which activity led to share price decrease, for instance Trimble Navigation, Iridium Communication, Comtech Telecommunication (-4,28%, -6,22%, -20,49% respectively). All of them operated in the same field with Loral Space and Communication, but due to inability

to provide reliable and secure satellite-delivered services they performed much worse than Loral did.

The research has also revealed that up to the middle of 2013 most of the companies had been regaining position lost due to the world financial crisis. During 2008 and 2009 governmental expenditures on space programs suffered a huge shortening and that immediately hurt traders' and investors' interest in "space shares". However, within the last year one can notice an exponential share price growth in several companies. For example, price of the DISH Network share equals to \$64,92, while a year ago it cost only \$44,8. Such level of growth is noticed also in Direct TV (from \$60,29 to \$86,98 per share).

Another part of our research concerns comparison of the market price of shares with their intrinsic, or fundamental, value. It allows us to judge, whether the target market is overvalued or undervalued.

According to methodology of Warren Buffet [18], intrinsic value of a share is calculated on the basis of estimated yield in a long-run period, usually 5 or 10 years. However, there are some subjectively pre-estimated values used in calculations, like an average growth rate, which may lead to obtaining different results of intrinsic value for the same company. It is therefore recommended to admit a 5% deviation from

the estimated intrinsic value while comparing it with the market share price of a target company.

To compare intrinsic value and market price Relative Graham Value formula (1) can be used [18].

$$RGV = \frac{IV}{MP}, \quad (1)$$

where *RGV* - Relative Graham Value;

IV – Intrinsic Value;

MP – Market Price.

If $RGV < 1$, it means that the explored share is overvalued. $RGV > 1$ points at undervalued company, which has a space for improvement and whose share price is likely to grow. To take a 5% confidence interval into account, Intrinsic Value was multiplied by 0,95(lower interval limit) and 1,05(upper interval limit). If the upper interval limit is smaller than the Market Price, it means that *RGV* will definitely be lower than 1 and vice versa. But if the Market Price lies between upper and lower interval limits, than we assume that Market Price of the company share is approximately equal to its Intrinsic Value. The results of *RGV* calculations for the 28 examined companies are presented below (Table 2).

Table 2

Relative Graham Value of Space Companies

<i>RGV</i> < 1 (1,05* <i>IV</i> < <i>MP</i>)	<i>RGV</i> ≈ 1 (0,95* <i>IV</i> < <i>MP</i> < 1,05* <i>IV</i>)	<i>RGV</i> > 1 (0,95* <i>IV</i> > <i>MP</i>)
Alliant Techsystems Inc.* The Boeing Co.* L-3 Communications Holdings, Inc.* Lockheed Martin Corp.* Northrop Grumman Corp.* Honeywell International, Inc.* Raytheon Co.** ITT Exelis Inc.** Garmin Ltd.** Harris Corp.*** Loral Space & Communications Inc.*** Orbital Sciences Corp.*** DISH Network Corp.*** Orbcomm Inc.***	Computer Sciences Corp.** DigitalGlobe, Inc.** Trimble Navigation Ltd.*** Iridium Communications Inc.***	Comtech Telecommunications Corp.*** EchoStar Corp.*** ViaSat, Inc.*** Sirius XM Radio Inc.*** Eutelsat Communications S.A.***

* - Aerospace & Defense

** - IT Services and GPS Services

*** - Satellite Manufacturing and Communications

In accordance with the *RGV* value we should admit that more than half of the companies are overvalued, which implicitly means that there is a risk of bubble appearing in the private space sector. It should also be noticed that all the companies of Aerospace and Defense sector are overvalued, so they should be investigated more thoroughly.

However, there is another possible cause for such values. Companies of Aerospace and Defense sector (Boeing, Northrop Grumman, Lockheed Martin, L-3 Communication etc.) are diversified companies, and spacecraft construction is not the only activity for them. Therefore, without a detailed research it is im-

possible to define, which particular activity has led to the gap between market price and intrinsic value.

Another symptom of bubble appearing is a large number of companies which are becoming public in order to raise funds in the shortest term [5, 238]. For

example, before the dotcom crisis annual number of IPOs in the IT sphere multiplied by 7.3. In order to check it, we can compose a timescale of all the IPOs of the private space companies and find out if there is a rush (Figure 2).

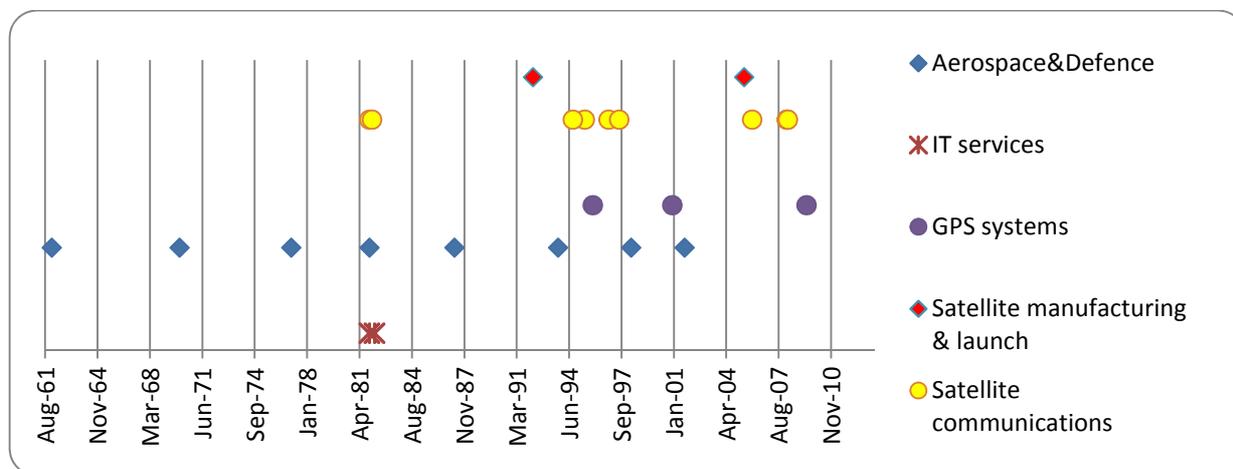


Fig. 2. Timescale of the Space companies IPO dates [19-20]

As it is seen, within the past 10 years only 4 companies appeared on the market. There was a kind of rush between the years 1994 and 2002, when 11 companies launched an issue and became public, but it is not likely to have an influence on what is happening nowadays.

One of the factors which explain small number of strong players on the market is high market entry threshold. The task of funding an average space company can be managed only by the richest tycoons or by the government. Both of them are present on the market. For example, Elon Musk (138th position in the Forbes rating) who is a CEO of SpaceX, says he invested almost all his savings in establishing SpaceX. As a representative of the government, NASA regulates the activity of private space companies by the means of state procurements. But for NASA help several satellite manufacturing companies would not have survived until nowadays.

To sum it up, we have to admit that the private space sector bears the mark of being overvalued. Almost half of the investigated companies performed a non-linear growth in share prices within the last year, while there are no visible reasons for increase in their fundamental value. However, number of companies on the market is stable within the last 10 years and is not likely to grow in the nearest future, so it is too early to make judgments about the rush in the industry. In addition, there is a strong governmental regulator, like NASA, who should prevent companies from misleading their shareholders and unconditional growth of share price. There is also a merely subjective, but important factor: CEOs of several companies, like SpaceX and BlueOrigin, also were CEOs of PayPal

and Amazon.com and have successfully survived the dotcom crisis, so they have a relevant experience and should not allow their companies to become too overvalued. Without any denial, to find out more precisely, if there is a risk of a bubble appearing, more detailed investigation is required.

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Малишко А. В., Парпаров Д. Ю. В пошуках фінансового бульбара в секторі приватної космічної індустрії

Ця стаття стосується фінансового аналізу сектору приватної космічної індустрії. Мета цієї статті полягає у визначенні наявності фінансового бульбара в приватному секторі глобальної космічної індустрії чи скасуванні можливості її існування. Розглянуті різні підходи до тлумачення дефініції «фінансовий бульбар». Залежно від цих дефініцій низка критеріїв, що свідчать про формування бульбара, була запропонована. Основна частина дослідження базується на аналізі вартості акцій компаній, чия діяльність пов'язана з освоєнням та комерціалізацією космічного простору. Застосована методологія Уоррена Баффета для калькуляції внутрішньої вартості цінних паперів для виявлення недооцінених

та переоцінених компаній у досліджуваному секторі економіки. Окрім цього, проведено аналіз періодичності утворення нових компаній на ринку аерокосмічної індустрії.

Ключові слова: фінанси, приватна космічна індустрія, освоєння, комерціалізація.

Малышко А. В., Парпаров Д. Ю. В поисках финансового пузыря в секторе частной космической индустрии

Эта статья касается финансового анализа сектора частной космической индустрии. Цель данной статьи заключается в определении наличия финансового пузыря в частном секторе мировой космической индустрии. В статье рассмотрены различные подходы к определению понятия «финансовый пузырь». В зависимости от этих дефиниций был предложен ряд критериев, свидетельствующих о формировании пузыря. Основная часть исследования базируется на анализе цены акций компаний, чья деятельность связана с освоением и комерциализацией космического пространства. Применена методология Уоррена Баффета для калькуляции внутренней стоимости ценных бумаг для определения недооцененных и переоцененных компаний в целевом секторе экономики. Кроме этого, проанализирована частота появления новых компаний на рынке аэрокосмической индустрии.

Ключевые слова: финансы, частная космическая индустрия, освоение, комерциализация.

Malyshko A. V., Parparov D. Y. Searching for Financial Bubble in the Private Space Sector

This article is related to financial analysis of the space sector of economy. The aim of this project is to find out whether there is a bubble in the private segment of the global space economy or not. Different approaches to the definition of the financial bubble are overviewed. Depending on these definitions several criteria were singled out as symptoms of the bubble appearance. The main part of the research grounds on the analysis of the dynamics of share prices of the companies which activity is related to space exploration and commercialization. Buffett's approach to calculation of the intrinsic value was used to define over or undervalued companies in the target sector. The research also concerns the analysis of frequency of new companies appearing on the market.

Keywords: finances, private space industry, mastering, commercialization.

Received by the editors: 15.10.2014
and final form 23.12.2014