



## Vladislav Pavlát

University of Finance and Administration, Prague, Czech Republic  
Institute of Finance  
vladislav.pavlat@vsfs.cz

# ON FINANCIAL MARKETS INFRASTRUCTURES<sup>1</sup>

**Summary:** The main aim of this paper is to present a characteristic and an analysis of the important role of financial markets infrastructures (FMIs) in the world economy. Actually, the word “infrastructure” is frequently used, however the existing definitions differ. In the first part of the paper, a brief survey of literature on this subject is given. As a result, two characteristics of the FMI are presented and analyzed. In the second part of the paper, an outline of actual theory of FMIs – with a description of its recent history – is highlighted. The third part gives a survey of FMIs regulation. In the fourth part, the role of FMIs in the world economy is dealt with.

**Keywords:** financial market, financial market infrastructure.

## Introduction

The aim of this paper is to characterize the financial markets infrastructures (FMIs), the elements of FMIs theory, FMIs regulation, and FMIs role in the world economy. These problems are very topical: they are discussed and researched by many researchers and institutions (Joint Forum, FSB, IOSCO, BSBS etc.). According to our working hypothesis, first, the IOSCO actual definition of the phenomenon “FMIs” has to be preferred for practical use in regulatory practice; second, second, FMIs regulation have to correspond to financial markets regulations; and third, FMIs are systemically important for financial

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markets smooth working. The first three parts of paper are mainly based on description of the FMIs elements; part four brings a brief synthetic view on selected research results about the FMIs role in the world economy.

### **1. The meaning of the words “infrastructure” and “financial market infrastructures”**

From the semantic point of view, the meaning of the word “infrastructure” is very clear: an infrastructure is “something” (= a structure) which is *below* (= *infra*) “something else (= below another structure). However, this explanation is too general, and rather “empty:” it fits to anything – and nothing.

If we consult different dictionaries and/or encyclopaedias, we are surprised by the manifold meanings of this word, and unexpectedly the word is no more “empty”, but “full” of almost endless different meanings. According to different dictionaries (quoted by Wikipedia), the word “infrastructure” stems from England: since (at least) 1927, the original meaning of this word was “The installations that form a basis for any operation or system [www1].” *Id est*: the installations are “below” something else.. According to the Oxford English Dictionary [www2], the word “infrastructure” was applied in the military sense. In this sense, the word was used by NATO (after 1940). Later on, the word was adopted by urban planners (since 1970). In the 1980s, the word was used in connection with the discussion of the nation’s “infrastructure crisis”. A different approach to the use of the word “infrastructure” is the so called “branch approach” in an economic sense. The actual definition of the word “infrastructure” which can be found in one of the Czech dictionaries is the following: the infrastructure is “A set of branches performing economic and social systemic functions [www3]”.

Most FIMs definitions (derived from the above general meaning of the word “infrastructure”) are branch definitions. For research uses we proposed a “broad” FMIs definition. Financial markets do not function in a vacuum – they operate within a specific time and place. Therefore, they require certain conditions to operate, referred to as the “financial market infrastructures”. In this regard, the financial market infrastructures can be defined as follows: 1) As a set of *material-technical conditions*, required for the functioning of financial markets; 2) As a *set of activities*, which must be performed to allow trading of financial assets on the financial markets; and 3) *As a group of institutions and organizations* necessary for smooth operation of financial markets [Pavlát, 2013]. Our definition represents an application of FM theory and belongs to the “*academic*” definitions.

In the actual regulatory practice, a “narrow” FMIs definition is used. *The IOSCO Technical Committee* defines the financial markets infrastructures as “a multilateral system among participating financial institutions, including the operator of the system, used for the purposes of recording, clearing, or settling payments, securities, derivatives, or other financial transactions [CPSS – IOSCO, 2011].”

According to the IOSCO definition, 5 basic types of the financial market infrastructures are distinguished: 1) Payment systems (PS); 2) Central securities depositories (CSD); 3) Securities settlement systems (SSS); 4) Central counterparties (CCP); 5) Central electronic databases of electronic transactions (Trade Repositories -TR) [CPSS-IOSCO, 2012].

*Payment systems* (PS) are the first component in the classification of the financial market infrastructures. A payment system may be viewed as a network of relationship between/among institutions, instruments, rules, work procedures, standards, and technical measures that allows financial payments in economy. Parties to transactions may settle their mutual payment obligation via a payment system. A *central securities depository* (CSD) is a financial institution, which retains securities (e.g. shares, bonds, etc.) in materialized (paper) or dematerialized (electronic) form in a manner that allows their owners to dispose of such securities (i.e. transfer them to other owners, use them as collateral in securities trading, etc.). Today, most depositories also provide services in the area of the securities transaction settlement, clearing, etc. In many countries, national securities depositories tend to be traditionally linked to stock exchanges. In addition to national central securities depositories, there are also international central securities depositories. In the IOSCO classification, such depositories are referred to as the *securities settlement systems* (SSS). The term *central counterparty* (CCP) tends to be used in a situation, where the clearing financial transactions of one party to a transaction/dealing are ensured by a single – “central” – institution. A *trade repository* (TR) keeps centralized electronic records of transactions with off-exchange (OTC) financial derivatives.

The concept of the financial market infrastructures defined by IOSCO focuses on the systems and institutions that affect the financial market *directly*; the basis for this focus is the effort aimed at limiting the financial risks of entities entering the financial market.

The above mentioned classification newly classifies individual components of the financial market infrastructures; these components had previously been viewed independently, but nowadays they are viewed as a structured system. This new approach resulted from the problems invoked by the last global financial crisis.

*To resume:* The new systemic approach to the financial market infrastructures means that individual FMIs have to be viewed as a structured system, i.e. individual components must be interconnected by consistent regulations and measures, differentiated for various groups of entities entering the financial market, for different financial products, as well as for different types of financial risk (counterparty risk, liquidity risk, newly systemic risks as well).

## 2. Selected elements of the FIMs theory

2.1. The emerging FMIs theory (which is derived from the FM theory) consists of the following main elements: firstly, FMIs definition; secondly, qualitative features of FMIs; thirdly, FMIs typology and classification. These three basic elements can be used as starting-points to the analysis of the fourth necessary element, i. e. the general patterns of development of modern FMIs. In the economic literature, the content and scope of FMIs is differently defined by representatives of different economic schools, according to the main paradigms of these schools. This – inter alia – means that by different schools the same qualitative features of the same parts of financial infrastructure are differently ranged and classified. For example, the “human factor” is excluded or included.

Since the 1960s, a long-lasting discussion on the meaning of the word “infrastructure” (which was understood as a general term applicable in all fields) was going on in continental Europe. One of the most recognized German authors in his analysis of the “infrastructure” – Prof. Reimut Jochimsen – in his functional definition of infrastructure distinguished between material, institutional and personal infrastructure<sup>2</sup>. By many authors his classification of infrastructure was considered to be useful [Buhr, 2003].

In Keynesian economics, the word *infrastructure* was exclusively used to describe *public assets* that facilitate production, but *not private assets* of the same purpose. In post-Keynesian times, however, the word “[...]” has been applied with increasing generality to suggest the internal framework discernible in any technology system or business organization [www4].

2.2. In the literature, a variety of approaches to the infrastructure classification is used. Some of the authors distinguish the so-called “hard” and “soft” in-

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<sup>2</sup> R. Jochimsen’s definition: „[...] infrastructure is defined as the sum of material, institutional and personal facilities and data which are available to the economic agents and which contribute to realizing the equalization of the remuneration of comparable inputs in the case of a suitable allocation of resources, that is complete integration and maximum level of economic activities [Jochimsen, 1966]”.

frastructures. However, many other possibilities exist. FMIs can be distinguished, for example, according to the (a) branch of financial services or securities industry, (b) the entities rendering services to different FMIs types, (c) the type of activities, (d) the geographical dimension, (e) the size of entities (f) private and public participation, (g) legal or shadow character, etc.

2.3. Generally speaking, FMIs development mainly depends on the financial markets development. However, the relation of FMIs and FMs is more complex: The changes of FMIs – on one side – are mostly caused by FMs development, but – on the other side – changes of FMIs elements frequently have an impact on further development of FMs. And even more than that: as both FMs and FMIs are complex structures, composed of different parts, some of these parts (on both sides, i.e. on the side of FMs and/or FMIs) develop more quickly than other parts. This *uneven development* of different parts (FMs and FMIs) is the cause of structural changes in different elements of both, i. e. there is a mutual relation of *FMs and FMIs – they influence each other*.

If the above reasoning is correct, it is possible – without much hesitation – to assume that with growing volume of financial markets the *FIMs services volumes are growing* as well. With a growth of division labour and specialisation, financial market will specialize: different financial market segments are created. The development of such specialised market segments leads to *creation of new parts of FIMs*. Let us remind, for example, the changing infrastructure of financial derivatives. This means that complexity both of financial markets and financial markets infrastructure will be growing. The rate of this growth will mainly depend on external factors – on material, technological or intellectual innovation.

As for the last 10 – 15 years, both financial markets and their financial infrastructures were influenced by the gigantic development of computers and information technology which were applied on the field of FMs and FIMs. This development was neither smooth, nor equal. During the last two decades, the “leaps” – caused by changes of technology – were the prevalent form of progressive development FMs and FMIs.

For this period, a *disproportional development of FIMs* was characteristic: in different market segments and in different countries, the structure of FIMs did not correspond to the existing specific needs. A striking example of how such disproportions can be surmounted is the African “big leap” on the field of information technology and media – in Africa, the 21<sup>st</sup> century co-exists with medieval and ancient primitive structures, but financial markets located in big cities are working, because they were able to apply the modern FIMs. There is a general tendency which consists in the *rapid growth of high-tech in the FIMs* which

requires the specialised personnel in all financial market segments to be employed, and, correspondently, in almost all financial markets infrastructures as well [Pavlát, 2013a].

*To resume:* there is a strong interdependence between the FM and FMIs development; therefore, the actual existing elements of FMIs theory are derived from the FM theory.

### **3. FMIs regulation**

If the world FMIs have to be able to minimize the impacts of the next potential financial and economic crises, it is quite clear that FMIs have to be appropriately monitored, overseen, and regulated. The next paragraphs are discussing some selected problems of FMIs international regulation.

At present, there are a great number of international organisations, institutions and other international bodies involved in activities connected with the international regulation of FMIs as a whole, or of their different components. As the world FM is regulated, FMIs have to be regulated as well – both at the national and the international levels.

It is obvious that international organizations have different goals and tasks; most of them are interested in FMIs problems in a partial way – so far as it has a direct or indirect (or a higher or lower) importance for achievement of their main goals and tasks.

The regulatory activities performed by international organisations are manifold – they include, for example, setting up the rules of trading (for different financial market segments), financial trades' settlement, financial technical standards, ethical standards, financial conglomerates etc. They consist of, monitoring, oversight, enforcement, technical and procedural standards setting, best practices recommendations etc. To be able to perform all these activities, the international organisations involved in FM and FMIs regulation have to mutually co-operate.

During the global financial crisis (mostly as a result of G7 and G20 Summits, etc.) many international organizations actively sought stricter regulation of financial markets and, at the same time, a better regulation of financial market infrastructures. Compared to the situation at the beginning of this millennium, now the representatives of most international economic organizations stress the need for improving co-operation and information exchange.

The extent of regulatory measures initiated by international organizations (e.g. in connection with the preparation and implementation of measures under

the Third Basel Agreement) is impressive. The period of the last 5 to 8 years may be viewed as a *qualitative change*, not only in terms of the content of adopted measures, but also in terms of the thoroughness of their preparation, with hundreds and thousands of financial experts from all over the world being involved. The international economic organizations and institutions paid special attention to regulation of financial derivatives (among others), as serious problems emerged in this area during the crisis.

At present, among the main international organisations shaping the world FIMs regulatory framework the following short list of organisations can be set up: the Financial Stability Board, the Joint Forum, the BSBS, IOSCO, the International Monetary Fund, the International Bank for Settlements, the International Accounting Standards Board, the International Federation of Accountants, and the Public Interest Oversight Board.

*To resume:* under the pressure of impacts of the global financial and economic crisis, the situation on the field of FIMs regulation has been improving.

#### **4. Remarks on the role, structure and development tendencies of FIMs in the world economy<sup>3</sup>**

The role of FIMs in the world economy can be characterized in the following way: 1. Generally speaking, the role of FIMs consists in securing general and specific conditions for working of securities industry. 2. FIMs have a „*systemic significance*“, as they are shaping the „milieu“ for securities industry. FIMs are indispensable, as they really enable the financial markets working. 3. There is a deep interconnectedness between FM and FIMs. In both systems, financial stability, risks, efficiency, structure, innovations, and growth tendencies are mutually influenced; the impulses – as the history shows – may come from both systems.

In comparison to the preceding period of some 15 years, during the period 2007-2013, under the impact of the world financial crisis, important changes both of the FM system and the FIMs system took place: 1. FIMs regulation on the international scale was substantially modified (inter alia, new Principles of FIMs regulation were issued), and applied on national scale as well; 2. After 2011, the systemic risk of FIMs (probably) became lower, as a result of strict regulatory measures; 3. The bulk of regulatory measures was oriented towards the financial derivatives and reduced the risks in this segment (both of FM and FIMs); 4. As a result of IT innovations the FIMs structure became more special-

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<sup>3</sup> In this paragraph some of the results of our actual researches are summarized. A book on FIMs with substantial analytic statistical data will be published in 2015 by our university.

ized; 5. Therefore, there is a need for a specific regulation of different FMIs activities which would correspond to the changes of the world securities industry (such as algorithmic trading, high-frequency trading, new structured products, direct electronic access to the market, alternative trading systems, etc [Pavlát, 2013a]. 6. The influence of media both on FM and FMIs was growing (social networks). 7. There is a strong tendency to an intensified co-operation of international organisations (both public and private) on the field of FMIs regulation<sup>4</sup>.

## Conclusion

In our actual research, the aim of which is to analyse activities and institutions concerned with securities industry, the IOSCO “narrow” definition was mainly used; however, this definition does not contain other important segments of FMIs in a “broad” sense (such as media, etc.). The FMIs theory elements briefly described in our paper were mainly derived from the FM theory; it would be useful to expand the scope of analysis: the relations between FMIs segments should be analysed. FMIs international and national regulations have to correspond to financial markets regulations to work in the same direction, because of both systems interconnectedness. As the FMIs are systemically important for financial markets smooth working, tendencies of FMIs further development which is influenced by many factors (not only by FM) should be analysed. Our research will be continued to cover the missing links.

## Literature

- Buhr W. (2003), *What is Infrastructure?*, University of Siegen, Paper No. 107-03.
- CPSS – IOSCO (2011), *Consultative Report on Principles for Financial Markets Infrastructures*. March 2011, <http://www.bis.org/press/p110310htm>.
- CPSS – IOSCO (2012), *Consultative Report on the Recovery and Resolution of Financial Market Infrastructures*, <http://www.iosco.org/news/pdf/IOSCONEWS246.pdf>
- Jochimsen R. (1966), *Theorie der Infrastruktur, Grundlagen der marktwirtschaftlichen Entwicklung*, JCB Mohr (Paul Siebeck), Tübingen.
- Pavlát V. (2013). *Globální finanční trhy*. (Global Financial Markets.), VŠFS – Eupress, Praha.
- Pavlát V. (2013a), *On the Changing Structure of the World Financial Markets*. Studia Ekonomiczne – Zeszyty Naukowe Wydziałowe Uniwersytetu Ekonomicznego w Katowicach, nr 170, Katowice.

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<sup>4</sup> This is a short list only, and it could be substantially extended.

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- [www 1] *Online Etymology Dictionary*, 1927. <http://dictionary.reference.com/browse/infrastructure> (accessed: 24.04.2008).
- [www 2] *Oxford English Dictionary*, <http://www.oxforddictionaries.com/definition/english/infrastructure?q=Infrastructure>, (accessed: 01.07.2014).
- [www 3] “*Infrastruktura je soubor odvětví zajišťujících ekonomické a sociální systémové funkce.*” (*Infrastructure is a set of branches performing economic and social systemic functions.*) <http://slovník-cizích-slov.info/infrastruktura> (accessed: 01.07.2014).
- [www 4] <http://en.wikipedia.org/wiki/Infrastructure> (accessed: 30.6.2014).

## O INFRASTRUKTURZE RYNKÓW FINANSOWYCH

**Streszczenie:** Głównym celem artykułu jest zaprezentowanie cech oraz przeanalizowanie roli pełnionej przez infrastrukturę rynków finansowych (IRF) w światowej gospodarce. Pomimo częstego wykorzystywania terminu „infrastruktura” brak zgodności co do jego definicji. W pierwszej części artykułu dokonano przeglądu literaturowego poświęconego temu zagadnieniu. W rezultacie zaprezentowano i przeanalizowano dwie cechy IRF. W drugiej części opracowania przedstawiono zarys teorii IRF, wraz z krótkim opisem ostatnich wydarzeń w tej dziedzinie. Część trzecia zawiera przegląd regulacji dotyczących IRF. W części czwartej opisano rolę, którą IRF pełnią w światowej gospodarce.

**Słowa kluczowe:** rynek finansowy, infrastruktura rynku finansowego.