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# **New Speeds of Competition: Transaction Speed Risk in the Financial Sector**

## **Introduction**

Following the recent deep global recession that originated in the United States subprime market,<sup>1</sup> studies to identify its root causes are still going on today. Kashyap, Rajan, and Stein (2008) believe that the main cause was insufficient regulation of the financial sector, and they refer specifically to capital regulations. Benmelech and Dlugosz (2008), Keys et al. (2008a, 2008b), as well as, for instance, Mian and Sufi (2008) point to imperfections in the securitization process, i.e. the transfer of risk from the banking sector to investors and consequently many abuses by the financial sector. Diamond and Rajan (2008) believe that what played a very major role was the mistaken policy of the central bank, including specifically too much trust in the ability to control the liquidity of the financial sector. Czarnecki (2011) notes that many factors that brought about the instability of the system were rooted in hard-to-quantify, soft factors, such as the ill-conceived system of corporate governance, specifically the executive compensation system. Acharya and Richardson (2009) and Brunnermeier (2009) undertake comprehensive analyses of the causes of the problems the world economy has been experiencing over the past few years. In general, we agree with the observations of these authors, and the aim of our paper is to provide an additional argument in the debate on the possible sources of the present instability of the financial system and, ultimately, of the volatility of the

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<sup>1</sup> The recession in the U.S. began in December 2007 and lasted until September 2009 (according to the National Bureau of Economic Research, <http://www.nber.org/cycles.html>). In other countries, the beginning and end points were shifted, but the starting date of the U.S. recession very often serves as a reference and the term “recession of 2007–2009” is used for the global economy.

financial markets and the world economy. We present the reasons that led to an increase in the speed of decision making and the consequences this increase may have for the financial markets and the real economy.<sup>2</sup>

## **1. Technological revolution, deregulation, globalization: changing nature of businesses and faster decisions**

### **1.1. Technological revolution, or perhaps Total Factor Productivity**

The era of computerization, also referred to as the technological revolution, has changed the way global businesses operate and consequently brought about many changes in the global economy, both positive and negative. The use of computers has accelerated internal corporate communications, the process of collecting information, and transaction accounting and processing. In the classical Cobb-Douglas production function, the role of total factor productivity (TFP)<sup>3</sup> has increased, which is of course very useful and even desirable for continued sustainable economy growth. According to the conventional macroeconomic wisdom<sup>4</sup>, the world (and especially the developed economies), despite a high *per capita* GDP, can enjoy rapid development mainly due to TFP growth. If the world's economies want to maintain a certain rate of GDP growth, they must lay ever greater emphasis on the speed of implementing new technologies.

Research by Prescott (1999) indicates that the amount of capital (whether tangible or intangible), and wide access to technical solutions are not the factors that ensure sustained faster growth. The decisive factor determining whether a country will see higher growth is TFP, but also the ability to put it to beneficial use and, above all, the speed of its implementation. It is precisely the ability to implement new solutions and the speed of their implementation that Prescott invokes to explain the faster growth of certain countries (he compares countries with the same labor input and the same level of capital saturation of labor). If people in countries with access to similar knowledge, with similar technical solutions, and

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<sup>2</sup> Like Acharya and Richardson (2009) and Rajan (2006), this study does not provide an analytical model; it is an analysis of facts, developments, and consequences of changes stemming from globalization, deregulation, and technological progress. The impact of those changes boosted competition and accelerated decision-making processes. This paper aims to demonstrate these changes and their consequences for the economy. It should thus be a basis for further analysis of solutions that will help to better regulate financial markets and consequently increase the stability of the financial system in the future.

<sup>3</sup> According to Comin (2006), total factor productivity (TFP) is the portion of output not explained by the amount of inputs (labor, capital) used in production. In this regard, TFP can show approximately how efficiently and intensively labor, machinery, and capital are used in the production process. For more details, see Miles and Scott (2005).

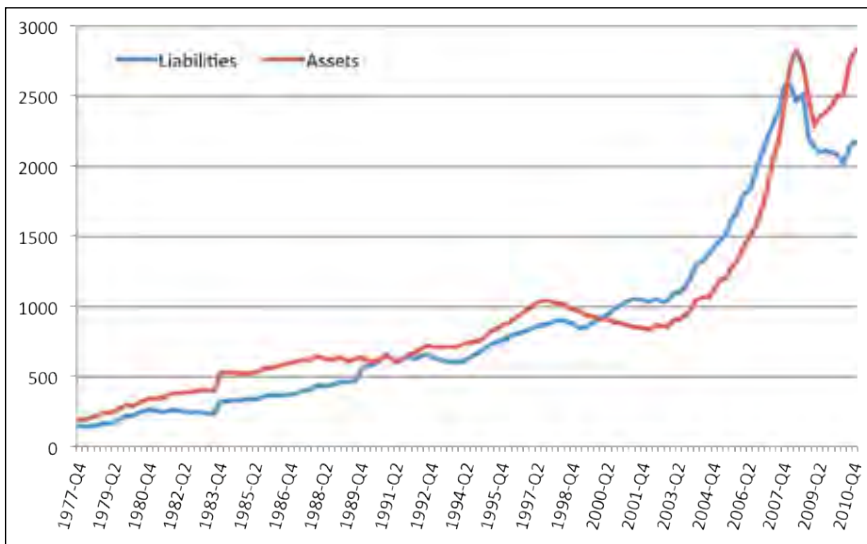
<sup>4</sup> Miles and Scott (2005).

with similar technologies vary in productivity, then possible explanation of this differences can be acceleration of decision-making processes.

## 1.2. Globalization

In the last 30 years globalization has had a profound impact on every sector of the economy, including the financial industry. The financial sector is particularly important for the economy because it moves capital from places where it is in surplus to places that require capital for further growth. Therefore, the speed with which capital is moved has a major effect on the dynamics of GDP growth, but also on the risk of tensions in the global economy. As noted by Rajan (2006), in the last 30 years local transactions (local GDP growth) have not depended on liquidity in the local market but on global liquidity. Lane and Milesi-Ferretti (2005, 2006) claim that international capital flows have led to a situation where the dependence of local markets on foreign investors has increased over the last 30 years; globally, there has been a sevenfold increase in foreign assets relative to GDP. According to Rajan (2006), interdependencies between economies have on average become seven times stronger worldwide and local liquidity has become global liquidity, with many positive consequences but also with growth in liquidity risk. Figure 1 shows the increase in the involvement of financial institutions in international markets, especially in developing countries.

Figure 1  
Assets and liabilities of international banks in developing countries  
(1978–2010; billions of US dollars)



Source: Bank of International Settlements.

Global liquidity determined changes in the way financial sector institutions operated, as globalization in combination with new technologies fueled competition and necessitated quicker decision making. Decisions made at the headquarters were implemented throughout the global organization. Transactions could be processed faster and could be conducted throughout the world in real time, which made it possible to achieve higher returns on capital and, as pointed out by Elton and Gruber (1995), to diversify risks.<sup>5</sup>

Global operations reduced the specific risk relating to operations in a particular country. Political risk, currency risk, and the risk of competition on a single market were diversified, and the exposure to new markets created opportunities of higher returns on capital. We concur with Rajan (2006) that globalization has brought many benefits, but the consequences of global competition must not be overlooked. International competition increased the pressure on earnings in the financial sector, while the conviction of positive effects of globalization led both local regulators and banks themselves to believe that financial sector institutions could grow indefinitely because they were widely diversified. The institutions themselves believed that they were safe and therefore could increase the levels of debt.

Large-scale reliance on financial engineering must also be mentioned in this connection. The introduction of completely new instruments, such as Asset Backed Commercial Paper (ABCP), Mortgage Backed Security (MBS), or Collateralized Debt Obligation (CDO) supported by ratings assigned by well-known agencies (S&P, Moody's, Fitch) made it possible to sell credit risk to institutions around the world but also distorted the scale of the actual risk.<sup>6</sup> Additionally, global operations of institutions had a negative impact on the process of managing organizations. Fragmentation of ownership led to a situation where smaller blocks of shares provided control over organizations. Add to this that some of the board members are elected by the employees (the executive management or specifically the CEO), and it can be said that, with a fragmented shareholder structure resulting from global operations, senior executives had ever wider decision-making authority, with some powers to supervise and approve their own actions. Czarnecki (2011) notes that in consequence of those changes attractive executive compensation schemes were created, which naturally accelerated decision-making processes at the expense of increased risk, which was deferred.

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<sup>5</sup> Elton and Gruber (1995) note that, assuming a proper correlation with the domestic market, international diversification makes it possible to reduce risk and ultimately to achieve a lower risk on a portfolio for a given required rate of return. Such observations (a lower risk at the same rate of return) can be invoked to support the development of global business operations. An institution operating globally should be less risky despite achieving the same rate of return.

<sup>6</sup> Benmelech and Dlugosz (2008) describe this problem in more detail and also point out that the true risk is concealed through the use of financial engineering. One of their more interesting observations is that banks issued AAA-rated CDOs backed by securities linked to mortgages with a rating of B+.

Thus, globalization increased competition, accelerated decision-making processes, and intensified both growth in the size of the institution and the spread of risk. The relationships between risk in the banking sector around the world are described in Acharya and Richardson (2009). The authors point to very strong interdependencies between institutions on a global scale, a little like a structure built from domino tiles. In such a system, problems spread between markets with lightning speed. Rajan (2009) and Staniszewski (2011) argue in a similar vein, pointing out that the financial sector slips out of local regulators' control. Staniszewski (2011) on an example of Lehman Brother failure, concludes that quantifying institutions as too big to fail<sup>7</sup> is virtually impossible given the present international interconnections, because in a situation of lack of liquidity even the average size institution, with a sufficiently large scale of international links, is a threat not only to the national financial system, because the potential scale of damage transcends national borders.

### **1.3. Deregulation, increased innovativeness, greater transaction speed**

One reason for the acceleration of financial transactions was, in addition to globalization, the deregulation of the financial sector. The greatest and most conspicuous changes in this respect can be seen in the U.S. market. As noted by Philippon and Reshef (2009), over-regulation tends to constrain creativity, in consequence of which highly-educated, talented personnel move away from an over-regulated sector (the quality of human capital decreases). The U.S. financial sector illustrates this very clearly. Following the Great Recession of 1929–1933, the rules governing the financial market were tightened, while the last 30 years has been a period during which the restrictions introduced in the 1930s have been gradually relaxed. The following were the key restrictions introduced in the wake of the Great Recession:

- Restrictions on opening new branches (Repealed by state legislatures to allow local institutions to compete).
- The Glass-Steagall Act of 1933, or the separation of commercial banking from investment banking<sup>8</sup> (From 1987 onwards the law was gradually softened until it was repealed in 1999).
- An interest rate ceiling introduced 1933 (Abolished between 1980 and 1984).

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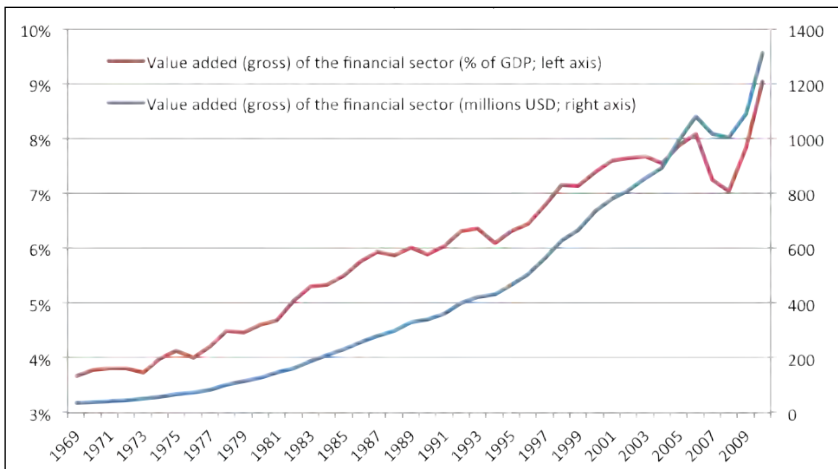
<sup>7</sup> “Too big to fail” or “too systemic to fail” are phrases defining a financial institution whose size, scale of operations, and scale of business linkages are such that the financial market regulator cannot allow it to collapse because of the risk of a domino effect causing mass bankruptcies of other institutions.

<sup>8</sup> After dramatic stock market declines in 1929, 20% of commercial banks went bankrupt because of speculative investments in stocks. The Glass-Steagall Act was to prevent such situations. The underlying idea was that commercial banks that take deposits from customers should not engage in risky transactions because ultimately they risk their customers' money.

- Separation of banks from insurance companies. The law was introduced in 1956 and repealed in 1999.

Analyzing the changes in the financial market before the tightening of the law in the 1930s and since 1980, one may notice a certain pattern. As noted by Philippon (2008), the contribution of the financial sector to GDP (expressed as value added in GDP) was very significant before 1930, fell to 2.5% of GDP in 1947, and began to grow rapidly after 1980. In 2010 the profits of the financial sector accounted for more than 8% of U.S. GDP. This is also borne out by the share of GDP accounted for by the financial sector's value added.

Figure 2  
Value added (gross) of the U.S. financial sector in dollar amount  
and as a percentage of GDP (1969–2010)



Source: Bureau of Economic Analysis, authors' calculations.

Remunerations in the financial sector changed in a similar manner, i.e., they were higher relative to compensations in other private sectors during periods of deregulation and showed no differences relative to other private sectors between 1930 and 1980. According to Philippon and Reshef (2009), deregulation of the financial sector led to increased competition on the labor market. As a consequence, the financial industry employed ever better personnel. The increase in human capital in the financial sector enabled efficiency growth in this industry, which was accompanied with number of financial innovations. Thus, the deregulation of the financial sector leads to innovations, as we have seen during the last 30 years. It also improves the quality of human capital, which increases the efficiency of the industry. Innovation and better-educated and better-paid staff work faster and more productively. However, it should be noted that this does not have only positive consequences; with a flawed incentive scheme, well-educated workers

may abuse the system in ways that are hard to identify in the short term and very costly for the economy in the longer term.<sup>9</sup>

### 1.4. The role of the media

The last 20 years has been the era of computerization; the last 10 years, the age of the Internet. The Internet has brought about a revolution in access to information: information become available to the entire world in real time. Financial institutions have adapted to these changes, too; advertising in electronic media has become the norm and reviewing online forum posts has become a routine part of public relations. Eventually, most institutions migrate with their products to this communication platform to attract new customers. The Internet has indeed become the main channel of communications with customers, and some institutions only offer online banking. Customers' growing awareness and unlimited access to information and opinions are some of the consequences of these changes. Have they also increased the speed of decision making? We believe they have; if customers may react faster, then the decisions of the managers of financial institutions must also be faster. Access to information and an increased role of the media in transmitting it have far-reaching implications for the risk of bankruptcy of the financial system. The financial sector is a sector relying on public trust, and trust is a behavioral factor. The regulations of the Basel Committee on Banking Supervision are important part of the protection of the financial sector against turbulence, but even doubling the capital requirements for banks will not protect them against bankruptcy if, for example, 20% of their customers show up at their teller stations within a short period of time as a result of some very unfavorable information. Meanwhile, the media will optimize their objective function by maximizing profit (which depends on viewing figures, number of visitors or buyers), so they will always be interested in making their reporting startling or at least very interesting. We believe that the media have accelerated the decision making of both corporate and individual market players. In addition, the media have accelerated the transfer of shocks, or unfavorable information. Combined with the growing interdependencies of the financial markets because of liquidity, this has the effect of accelerating and reinforcing the consequences of possible shocks, which destabilizes the financial system. For the purposes of our study, it is sufficient to note the role of the media in increasing the speed of decision making, but we believe that this observation should provide an inspiration for studying the impact of the media on the stability of the financial system. Moreover, when devising new solutions, market regulators should take into account the speed of market players' access to information and its consequences.

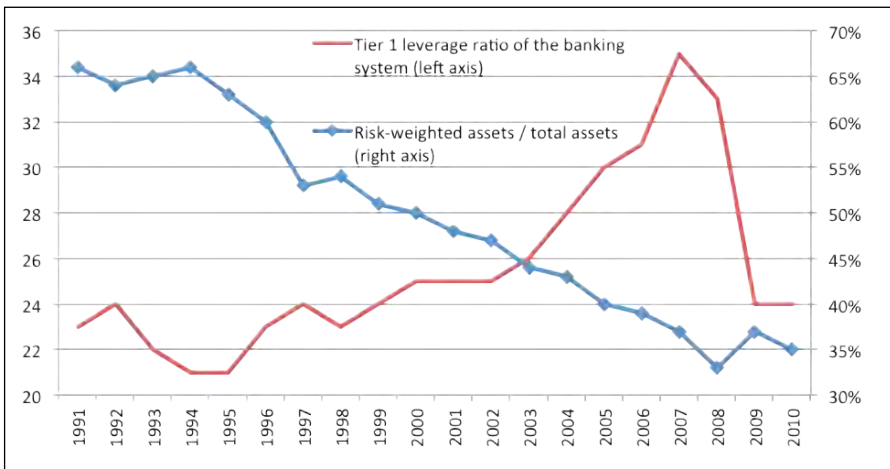
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<sup>9</sup> As noted by Slovik (2011), a mix of these phenomena gave rise to financial "innovations" that made it possible to transfer risk off the balance sheets of banks. The author observes that that served not so much to reduce risk as to hide it.

## 2. Changes at the microeconomic level: technological revolution, new instruments and a change of the philosophy of the financial industry

New technologies, globalization, and deregulation have also brought many changes at the level of individual companies, especially those in the financial industry. In the first part of this paper, we pointed out that the growth of the financial industry has been the result of technological progress, deregulation, and competition, which led to changes in the way the enterprises operate. We agree with Rajan (2006), who notes that the formula of the banking business has changed. While in the classical banking model, risk was retained on the bank's balance sheet and, consequently, banks were more conservative, in the new environment of fast information processing and competition, they had to create a system in which risk can be taken off the balance sheet or hidden from the regulator so that capital requirements can be lower.<sup>10</sup> Then, it is possible to focus exclusively on rapidly increasing business. Figure 3 clearly shows the direction of changes in the banking sector: an escape into assets that are outside the Basel regulations or are poorly recognized. This allowed a continuous increase in financial leverage.

Figure 3  
Change in risk-weighted assets (as a percentage of total assets)  
and change in bank leverage (1991–2010)



Source: Slovik (2011).

<sup>10</sup> These changes are also noted by Slovik (2011), who points to the banking sector's flight from classical banking after the introduction of the first Basel regulations in 1992.



## 2.1. Risk control and risk diversification?

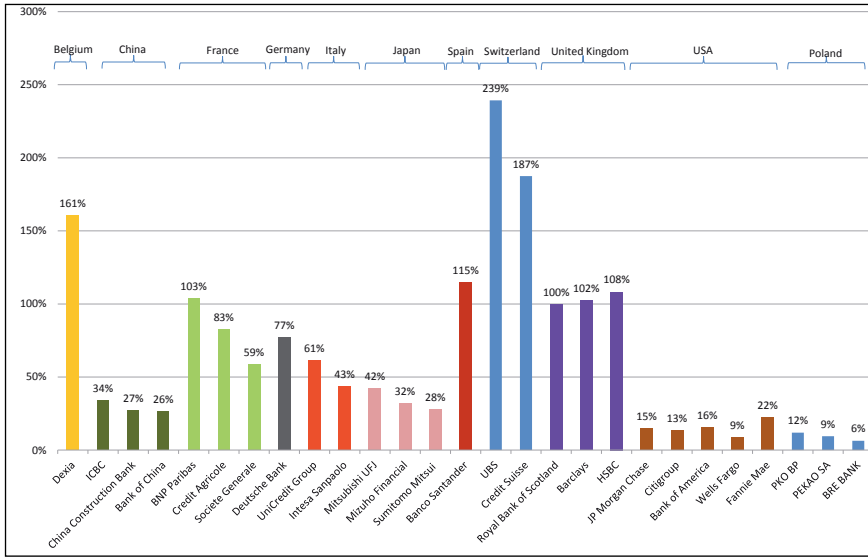
During the last 20–30 years, financial institutions have been growing ever more confident that they have better risk assessment capabilities. The speed of sorting and storing data led to a situation where customers' credit histories alone were basically treated as credit security (Rajan 2005). Also, the replacement of the classical model, where the bank assesses the borrower and then bears the risk of the borrower's solvency, with a model where the bank, upon disbursing a loan, sells off the receivables, at least in part, had a substantial impact on accelerating transactions and on risk assessment. In the new model, the financial sector gradually moved into a position where the credit institution used financial engineering to create some kind of "up-front revenue finance": first a loan was sold to the borrower, and then it was structured and sold to investors in the form of bonds. This way of doing business, with no calculation of the potential effects, led to a situation where, in terms of conventional systems of business efficiency analysis, revenues increased much faster than risks.<sup>11</sup> Consequently, the priority was to conduct as many transactions as possible. The speed with which such transactions were conducted was bound to increase because revenues and profits grew, resulting in growing bonuses for executives, without officially generating additional risk provision. Even if risk provisions were generated, their growth was incommensurately low. This does not mean that the risk of default by the borrower disappeared; it was simply shifted, often to private investors and not just within one country. International diversification also contributed to a greater degree of certainty financial institutions could have that the risk of their operations was dispersed. As a consequence of the above-described changes in the operation of financial institutions, their balance sheets swelled because of their persisting belief that the risk of the financial system was under control. This is best illustrated by Figure 4, which shows the role of the banking sector relative to GDP in the home country. The large scale in relation to GDP also points to a high level of systemic risk in case of market turbulence and possible losses of financial institutions.

Increase in banks' balance sheets was related to the conviction that risk was efficiently controlled. Of course, customer credit assessment became simpler and faster with the use of new technologies; also, the financial sector was able to diversify its risks better and more widely, as a result of which risk was willingly retained on banks' balance sheets. If financial leverage (Figure 5) is analysed, it immediately becomes evident that the apparent diversification of the financial sector was only an illusion.

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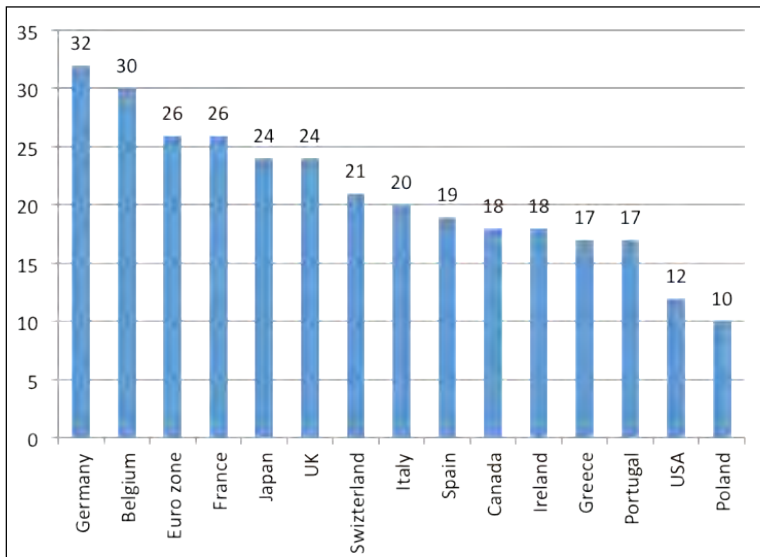
<sup>11</sup> It should be pointed out, however, that risk was analyzed only in relation to the banking sector and in accordance with the classical models of risk quantification. In our opinion, that was misleading because credit risk assessment models rely on assumptions about certain parameters of the system surrounding the banking sector; if the entire system became more indebted because risk was transferred there from the banking sector, that also increased the level of risk in the banking sector itself.

**Figure 4**  
**Comparison of the assets of the world's and Poland's largest banks relative to GDP in the home country (as of the end of 2010)**



Source: Calculated based on Bloomberg and International Monetary Fund data.

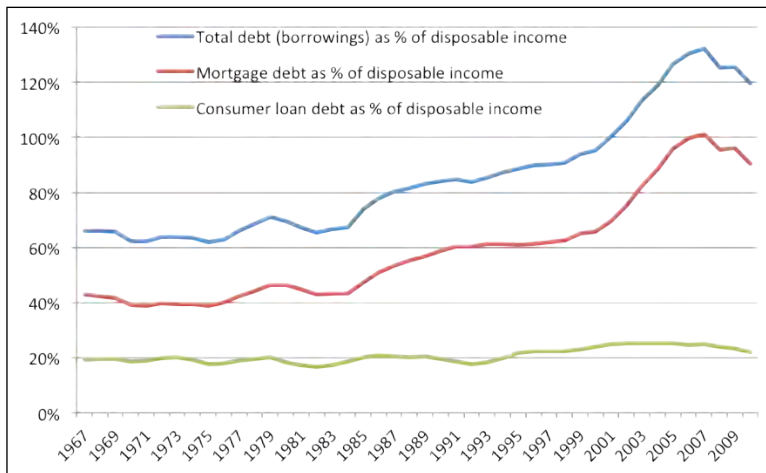
**Figure 5**  
**Financial leverage of the banking sector (ratio of tangible assets to equity) in various countries**



Source: International Monetary Fund, *Global Financial Stability Report*; Polish Financial Supervision Authority (KNF); Bloomberg.

From the perspective of an individual business entity, diversification lowers the level of risk, but it should be realized that rather than eliminating risk diversification only shifts risk elsewhere. In our view, new diversification methods increased the level of risk in the system, because by transferring the risk that should be confined to the banking sector they allowed the level of risk to increase in the economy as a whole.<sup>12</sup> Of course, in times of prosperity, the result is a faster growth of the economy, with growing household and institutional debt (Figure 6). However, in times of crises, under conditions of illiquidity, more complications result which market regulators were not prepared for.

Figure 6  
U.S. household debt as a percentage of disposable income, broken down into mortgage and consumer loans (1967–2010)



Source: Federal Reserve, Bureau of Economic Analysis, authors' calculations.

## 2.2. Up-front revenue finance

Risk diversification during the last 20–30 years was a simple transfer of risk to other entities outside the financial sector, to other countries, and, within the financial sector, temporal deferment of risk. We will call this kind of diversification “up-front revenue banking” or “up-front revenue finance.”

In our opinion, up-front revenue finance is associated with a flawed incentive system for managers in the financial sector. The incentive system that has been and still is widespread in the global financial system consists of two components

<sup>12</sup> It should also be noted that international diversification leads to an increase in the scale of operations, which makes managing an organization more difficult and thus increases operational risk.

of remuneration.<sup>13</sup> One component is a fixed salary; the other, a performance bonus. What is an inherent feature of most banking products is that they generate fee income up front; then they generate further revenue, and risk begins to come into the picture, which of course lowers the gross profitability of the product as provisions have to be made. This description best fits the traditional bank loan. However, the past 20 years has seen the emergence of structured products, in which revenue is realized at the time of sale, up front, while risk is substantially deferred. Classic examples of such products are provided by securitization instruments (ABS/MBS/CDO) or structured investment products. The emergence of such products can be explained by the better quality of managers and specialists working in the financial sector during the last 30 years, as described by Phillipon and Reshef (2009). It is very easy to see that such products are perfect from the point of view of managerial staff: the manager's performance is visible up front, while risk is deferred to a distant future, three, five, or ten years away. After all, if a manager works no longer than three–five years at a given institution, then his/her bonus is not based on profit or discounted profit but on discounted revenues, while risk will be absorbed at a later time by the owner, i.e. the shareholders.<sup>14</sup> It can be assumed that managers are not fully aware of the risk when creating new products; they are not able to predict it so they do not abuse the up-front system. The situation is, however, best explained by the words of Charles Prince, CEO of Citigroup from 2003 to 2007, who ran what was at the time the largest financial group in the world. Aware of how the up-front revenue finance system works, he explained why he had continued to sell *MBSs* and *CDOs*: “*When the music stops, in terms of liquidity, things will be complicated. But as long as music is playing, you have got to get up and dance. We’re still dancing.*”<sup>15</sup> Interestingly, Charles Prince said those words in July 2007, and in November 2007, after the Citigroup posted disastrous results eventually necessitating a huge bailout by the government, he resigned as CEO and walked away with a severance package worth USD 37 million. The situation at Citigroup was the rule rather than the exception in the banking sector, as shown in Table 1 (Czarnecki 2011).

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<sup>13</sup> The system operated from the lowest ranks in the hierarchy. More about remuneration systems in the financial industry in Czarnecki (2011).

<sup>14</sup> One situation where a shareholder may knowingly agree to this kind of arrangement is when there is concern that the business may lose liquidity. In that case, the fee income from up-front-type business pays for risk relating to earlier products. It should be noted, however, that this kind of situation should not be maintained in the long term because a model in which one product's revenue is discounted in order to conceal a deficit of revenue from other products makes the bank's risk analysis more difficult, as a result of which the bank operates suboptimally.

<sup>15</sup> *Financial Times*, 9 July 2007, quoted after Kashyap, Rajan, and Stein (2008).

Table 1  
**Amounts and structures of remunerations of the CEOs of the largest  
 Wall Street investment banks**

CEO name Bank	Year	Basic Salary (USD)	Cash Bonus (USD)	Other Components (stocks, options, other) (USD)	Total (USD)
Lloyd C. Blankfein Goldman Sachs	2007 2006	600,000 600,000	26,985,474 27,243,500	42,738,878 16,233,652	70,324,352 44,077,152
James E. Cayne Bear Stearns	2006 2005	250,000 200,000	17,070,746 12,721,154	21,028,932 15,533,246	38,349,678 28,454,400
Richard S. Fuld Jr Lehman Brothers	2007 2006	750,000 750,000	4,250,000 6,250,000	29,382,036 11,172,645	34,382,036 18,172,645
John J. Mack JP Morgan	2007 2006	800,000 800,000	0 0	802,458 36,729,106	1,602,458 37,529,106,
Stanley E. O'Neal Merrill Lynch	2006	700,000	18,500,000	72,175,383	91,375,384
John A. Thain Merrill Lynch	2007	57,962	15,000,000	2,249,918	17,307,610

Source: Czarnecki (2011).

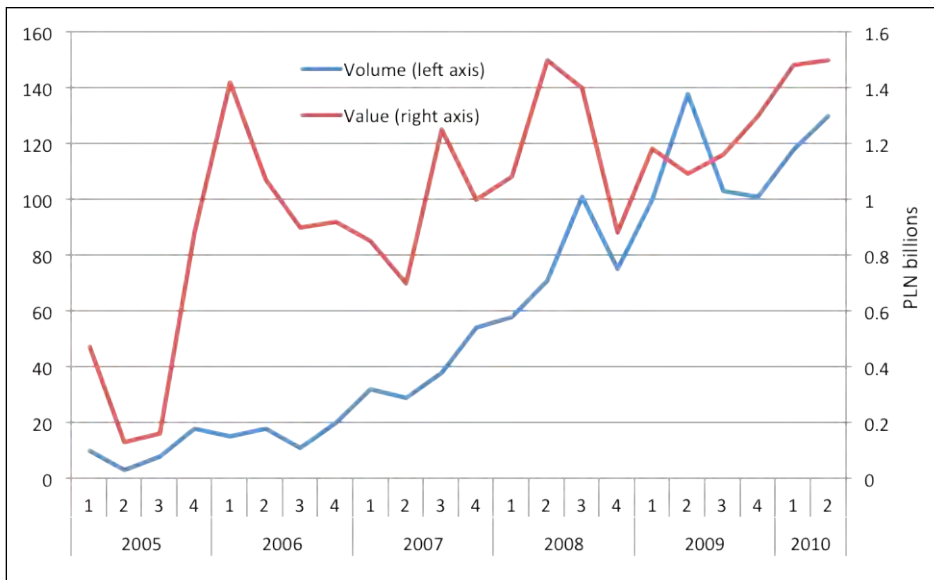
There are several areas where up-front revenue banking could be seen. One of them is the process of bank loan securitization. The role of banks in the securitization process consisted of making loans and then converting those loans into so-called mortgage-backed securities (MBSs). In the next step, MBSs were sold, whereby the bank's balance sheet risk was "diversified." Interestingly, the bank earned revenue not only from loans but also from the sale of MBSs. The portion of loans that was securitized and sold decreased the carrying amount of loan outstandings on the asset side (thus reducing risk) and increased the cash position, which could be used to fund further loans, subsequently to be securitized and sold. Clearly, this was perfect for boosting the current earnings of banks. Sales income came from two sources, fees for the granting of credit and fees for the sale of MBSs, while the risk was transferred to buyers.<sup>16</sup> Securitization itself is very useful where funding for long-term assets is scarce because it makes it possible to increase the availability of mortgage loans. Problems arise in two cases, though: where the bank keeps on its balance sheet poor-quality MBSs or in the kind of situation we saw during the 2007–2009 crisis. What happened was that MBSs

<sup>16</sup> Of course, banks also believed in the quality of the CDOs they sold as they retained some of them on their balance sheets and sold some of them to affiliates (e.g. hedge funds).

remaining on the bank's balance sheet served as the basis for new derivatives, so-called collateralized debt obligations (CDOs), which were sold with a rating they did not deserve. This is discussed in more detail by Keys et al. (2008a, 2008b), Mian and Sufi (2008), and Staniszewski and Staniszewska (2009).

Another area of up-front revenue banking, very conspicuous in Poland, is the sale of investment instruments with a guaranteed rate of return, i.e. structured products incorporating derivatives of varying sophistication, mostly options. They started to be offered by Polish banks around the year 2000 and their sales have been on the increase since then. At the end of 2010, the market value of outstanding structured products stood at about PLN 20 billion.<sup>17</sup>

Figure 7  
Volume and value of structured products sold in Poland (2005 – Q2 2010)



Source: StructuredRetailProducts.com, authors' calculations.

Structured products usually consist of two components: options linked to a particular index, currency, or other assets and a deposit or bond that should provide a minimum redemption value at maturity, if such a minimum value is guaranteed.<sup>18</sup> At the date of sale, i.e. after the subscription period, the distributor, usually a bank, receives a sales commission discounted for a period of 2–10 years<sup>19</sup>. Another aspect is that funds from the structured product mostly go to the

<sup>17</sup> Estimates of the Polish Financial Supervision Authority (KNF), [www.knf.gov.pl](http://www.knf.gov.pl).

<sup>18</sup> In Poland, most structured product come with a principal guarantee, which of course reduces potential returns as it offers a lower participation in the index.

<sup>19</sup> Depending on product maturity.

bank as a deposit agreed with the institution that created the product. This may seem a perfect situation for the bank: fee income plus a deposit of most of the funds. We agree that such products offer many benefits, but note should also be taken of the risks, including, for instance, the risk of bankruptcy of the option issuer or of the risk of customer dissatisfaction. If the bank sells the product to its customers, it assumes that the issuer of the option embedded in the product will not have problems delivering on its promises. Another risk is that customers will be dissatisfied and will go away after the expiry of the guarantee period.<sup>20</sup> If the customers after, say, five years even get 100% of the principal, which was guaranteed, there is a very serious risk that they will go away dissatisfied with the institution that offered them the product. Thus, what the bank does when selling a structured product is that it earns revenue up front while deferring the risk until the maturity of the product.

By looking at just the two forms of up-front revenue finance mentioned above, we can see great advantages offered by structured products if used skillfully. Securitization can be used to expand lending without increasing risk on the balance sheet of the bank. Sales of structured investment products allow the banking sector to generate fee income and secure funding in difficult times. It should be noted, however, that these products have increased the speed of decision making, the speed of transactions.<sup>21</sup>

### 2.3. Shadow banking

The speed with which securitization developed, competition, and the pursuit of profits, of course partly resulting from the high quality of people employed in the financial sector in the last 30 years (Philippon and Reshef 2009), and a flawed executive incentive system (Czarnecki 2011) resulted in yet another risk-generating change by causing the emergence of the so-called shadow banking system. Many banks formed special purpose vehicles (SPV or conduits) that remained off their balance sheets and thus did not give rise to additional capital requirements. The activities of such vehicles consisted in issuing short-term securities backed by

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<sup>20</sup> Mokrogulski and Sapielak (2010) note that the average annual rate of return offered by such products in Poland between 2000 and 2009 was about 3%, or one percentage point below a bank deposit, while 45% of the outstanding structured products yielded the guaranteed level, which was usually equal to 100% of the principal or less.

<sup>21</sup> In the case of securitization (CDOs, MBSs), the bank sells the credit risk and increases its cash position. As a result, it increases its revenues and strengthens its ability to grant additional credit. A situation where sales of a product reduce risk and increase revenue is desirable, and consequently the speed of such transactions rises. The same is true of structured investments: they give customers a principal guarantee, so they are very simple to sell. The bank receives discounted revenue from the sale, and additionally most of the funds return to the same institution in the form of a deposit. In such a situation, the sale is simple and fast. We believe that such transactions increase the speed of decision making because in the short term they offer the perception of being risk-free; however, they increase the system's vulnerability to shocks.

medium- and long-term credit receivables portfolios purchased from the parent (asset backed commercial paper (ABCP), which include MBSs and CDOs). If one takes a close look at this structure, one can say that in many respects it is classical banking, except that it bypasses the capital requirements by operating in the “shadow” of the banking sector proper. According to a study by Adrian et al. (2010), the assets of the shadow banking sector increased from zero in 1980 to nearly USD 20 trillion in 2008. The same authors also note that in 2007 a quarter of the assets of the banking sector proper was transferred to shadow banking conduits. Acharya, Schnabl, and Suarez (2011) observe that ABCP issued by conduits in 2007 in the U.S. alone had a face value of USD 1.3 trillion and were the largest money market instrument, larger than the treasury bills market, whose size they estimate to be USD 940 billion. They note, however, that while the purpose of securitization itself, or up-front revenue banking, was to transfer risk outside the banking sector, shadow banking, which was kept risk within the banking sector, was motivated by banks’ intention to circumvent regulatory capital requirements. Analysis of the 30 largest banks sponsors of ABCP (Table 2) clearly reveals capital deficiencies in the largest financial institutions. Those institutions that overused this manner of sidestepping banking regulations have met an unfortunate fate.

Table 2 “Missing capital”

**The 30 largest banks sponsors of ABCP as of 1/1/2007. For each bank, the capital that should be required for its off-balance-sheet ABCP is computed assuming that the adequate level of own capital required for such instruments should be 8% ( $ABCP * 0.08 = Total$ ; expressed in USD billions). “Missing capital” is also computed as a share of the bank’s equity. Equity as measured in the table is Tier 1 capital.**

Name	Tier 1	ABCP	Missing capital	
			Total	%
Sachsen Landesbank	1.3	12.5	1	79.9
Hypo Real Estate	4.5	18.9	1.5	33.4
Westdeutsche Landesbank	9.5	29.9	2.4	25.1
Lloyds Banking Group	6.1	18.8	1.5	24.6
Crédit Agricole	6.5	19.5	1.6	24.1
ABN Amro	31.2	68.6	5.5	17.6
Bayerische Hypo-und Vereinsbank	14.1	22.3	1.8	12.6
Bayerische Landesbank	15.8	22.4	1.8	11.3
Fortis	16.4	22.6	1.8	11,0
Société Générale	29.4	38.6	3.1	10.5



Name	Tier 1	ABCP	Missing capital	
			Total	%
Deutsche Bank	31	38.7	3.1	10,0
Dresdner Bank	18.7	23.2	1.9	9.9
GMAC	15.4	17.5	1.4	9.1
Citigroup	90.9	92.7	7.4	8.2
HBOS	44	43.9	3.5	8,0
State Street Corporation	24.1	21.9	1.7	7.2
Rabobank	34.8	30.8	2.5	7.1
Barclays	45.2	33.1	2.6	5.9
Countrywide Financial Corporation	25.2	18.3	1.5	5.8
Bear Stearns Companies	19.1	13.8	1.1	5.8
KBC Group	22.9	12.6	1	4.4
JP Morgan Chase	81.1	42.7	3.4	4.2
Bank of America	91.1	45.7	3.7	4,0
ING Groep	54.3	26.4	2.1	3.9
Mitsubishi UFJ Financial Group	68.5	32.0	2.6	3.7
HSBC Holdings	87.8	39.4	3.2	3.6
Royal Bank of Canada	52.3	15.6	1.2	2.4
Bank of Montreal	45.3	11.5	0.9	2,0
Royal Bank of Scotland	75.2	15.8	1.3	1.7
BNP Paribas	62.3	11.6	0.9	1.5
Total	1,124.0	861.5	68.9	6.1

Source: Acharya, Schnabl, and Suarez (2011).

- *ABN AMRO: Nationalized in 2008 after the Dutch part of the bank was separated from The Royal Bank of Scotland Group. (BBC)*
- *Sachsen Landesbank: Taken over by Germany's Landesbank Baden-Württemberg in 2008. (FT)*
- *Hypo Real Estate: A rescue plan was announced in 2008. The bank received a €20 billion loan from the Bundesbank and €30 billion from private banks and insurance companies. Additionally, the German government, banks, and insurers provided financial guarantees totaling €35 billion, of which €26.5 billion was guaranteed by the government.*

- *Westdeutsche Landesbank: In 2009, Erste Abwicklungsanstalt (an agency set up to stabilize Germany's financial market) was forced to take over the bank's toxic assets with a nominal value of about €85 billion.*

The effects of the development of the shadow banking sector could be seen during the recession of 2007–2009, when the lack of liquidity in the ABCP market revealed the instability of the financial industry and was spreading to ever wider circles of investors, naturally with heavy losses in the banking sector itself. The consequences of the shadow banking activities are discussed in more detail among others in Kacperczyk and Schnabl (2010a and 2010b), Acharya and Richardson (2009), and Gennaioli, Schleifer, and Vishny (2011); our aim was to build on these authors' observations and try to identify the causes that led to this situation. It can certainly be concluded, however, that the off-balance-sheet banking system on the one hand accelerated decision making concerning transactions, while on the other hand it did not diversify risk in the banking sector; it in fact even increased the level of that risk.

## Conclusions

In this paper we show how the technological revolution, increased global competitiveness, and deregulation in the financial sector result in changes in the functioning of the financial sector. The financial sector has picked up pace dramatically in the last 30 years, and of course faster decisions and new methods of limiting risk have been positive changes that have increased the wealth of individual citizens and promoted economic growth. It should be borne in mind, however, that the increase in speed, combined with innovation, which, unfortunately, was often the result of efforts to circumvent regulatory constraints on banking, introduced additional risk factors and revealed the inadequacy of the early-risk-detection models.

We do not think it can be assumed that the markets will step back in technological development, globalization, or access to new electronic media, which, after all, make their operations easier and faster. In and of themselves, changes and development in the financial sector are not a result of ill will of people employed in this sector, and, besides, most of the innovations are very positive. Therefore, we should focus on what can be improved by searching for the weak link in the developments of the past 30 years. In our opinion, the problem that caused most of the distortion lay in the static nature of risk assessment models, which did not match the rate of change and the speed of transactions in the market. As long as decisions were made slowly, the development of the financial sector was slower, and the static models of risk assessment worked sufficiently well. However, the rate of development in the last 30 years has brought to light many problems. As the models used in the banking sector to assess credit risk were based on historical data, with each new loan risk assessed based on those models slipped further away from reality. Note that the last 30 years has been a period of rising household debt (Figure 6). As consumers' debt was rising, it was only

natural that the proportion of loans to stop being repaid in times of an economic downturn increased as well. To put it differently, the banking sector should adjust its risk assessment, or create new risk provision, with every new loan granted. When analyzing the entire course of developments during the recent recession of 2007–2009, many aspects can be attributed precisely to the above. Now, as risk measures for any credit portfolio are calculated for the historical portfolio, two things happen when a new loan is granted. First, historical measures of risk are applied to the new loan, which is incorrect but does not cause major distortions as long as the scale of the phenomenon remains small. Second, every loan worsens the situation of all previous borrowers (the value of collateral changes or an increase in collateral prices causes a speculative bubble), so the entire existing portfolio changes, because the risk of the system has increased with the grant of the new loan. During the past 30 years, this became especially important in a situation where the property market served as security for lending and for loan securitization. Financial institutions, but also market regulators and rating agencies, lived in a world of static models, which were at odds with reality. The real estate market grew because loan sales grew. Banks that accepted real estate as collateral securing the loans that financed it did not think they needed to adjust their models; they were also convinced that the risk of the system did not affect their balance sheets because they sold the securities to others. Loans were made ever faster because they were not associated with an increase in risk and some of them were securitized (up-front revenue banking, shadow banking), at least partially transferring risks outside the financial sector. The risk of the system kept growing, however, because with the increase in speed with which such transactions were carried out, the gap between actual risk and historical risk was bound to grow. Consequently, the risk that the financial system functioning in this way would collapse was bound to increase (systemic risk). In this regard, the observations of Sufi, Rajan, and Vig (2010) and Gennaioli, Schleifer, and Vishny (2011) point in a similar direction. Both the former and the latter note the increasing risk of the system resulting from historical loan repayment observations and the distortion of these measures under securitization conditions. In general terms, we agree with the observations of these authors; building on their work we believe that the phenomenon of securitization is useful for the growth of the economy, that deregulation and new technologies increase competition, and that the rate of growth of the financial sector grows, which is also desirable. The problem with such changes, especially given their great speed, lies in the inadequacy of risk assessment models. To put it simply, the risk of worst-case events (so-called tail risk) under such conditions is much greater than would appear based on historical observations. In our study, we show that the recession of 2007–2009 was a consequence of the inadequacy of risk assessment models resulting from the accelerated development of the financial industry and rapid changes in the risk of the entire system. We also believe that the issues of the speed of changes in the

financial sector and the impact of the speed of transactions on the stability and the risk of the financial system should be further investigated; hence, our work should serve as an inspiration for further research on this subject.

## References

- Abreu, Dilip, and Markus K. Brunnermeier. Bubbles and crashes. *Econometrica* 71: 173–204, 2003.
- Acharya, Viral, and Matthew Richardson, eds., *Restoring Financial Stability: How to Repair a Failed System*. New York University Stern School of Business, Wiley Finance, 2009.
- Acharya, Viral, Philipp Schnabl, and Gustavo Suarez. Securitization without risk transfer. Working paper, 2011.
- Adrian, Tobias, Adam Ashcraft, Hayley Boesky, and Zoltan Pozsar. Shadow banking. Working paper, Federal Reserve Bank of New York, 2010.
- Allen, Franklin, and Gale Douglas. From cash-in-the-market pricing to financial fragility. *Journal of the European Economic Association* 3: 533–546, 2005.
- Allen, Franklin, and Elena Carletti. Mark-to-market accounting and cash-in-the-market pricing. *Journal of Accounting and Economics* 45(2–3): 358–378, 2008.
- Benmelech, Efraim, and Jennifer Dlugosz. The alchemy of CDO ratings. Harvard University working paper, 2008.
- Brunnermeier, Markus K. Deciphering the liquidity and credit crunch 2007–2008. *Journal of Economic Perspectives* 23: 77–100, 2009.
- Comin, Diego. 2006. Total factor productivity. New York University working paper.
- Czarnecki, Leszek. *Risk in Banking: A Post-Crisis Perspective*. Warsaw: Studio EMKA, 2011.
- Das, Sanjiv R., Darrell Duffie, Nikunj Kapadia, and Leandro Saita. Common failings: how corporate defaults are correlated. *Journal of Finance* 62(1): 93–117, 2007.
- Dell’Ariccia, Giovanni, Deniz Igan, and Luc Leaven. Credit booms and lending standards: evidence from the subprime mortgage market. International Monetary Fund Working Paper, 2008.
- Demyanyk, Yuliya, and Otto Van Hemert. Understanding the subprime mortgage crisis. Working paper, 2008.
- Diamond, Douglas W., and Raghuram G. Rajan. Banks, short term debt and financial crisis: theory, policy, implications and applications. University of Chicago and NBER working paper, 2000.
- Diamond, Douglas W., and Raghuram G. Rajan. Illiquidity and interest rate policy. University of Chicago and NBER working paper, 2008.
- Diamond, Douglas W., and Raghuram G. Rajan. The credit crisis: conjectures about causes and remedies. University of Chicago Booth School of Business working paper, 2009.
- Dodd, Randall. Subprime: tentacles of a crisis. *Finance and Development* 44(4): 15–19, 2007.
- Greenspan, Alan. Opening remarks. Jackson Hole Symposium organized by the Kansas City Federal Reserve Bank, 2002.

- International Monetary Fund. *World Economic Outlook (WEO): Crisis and Recovery. April 2009*. Washington, DC: International Monetary Fund, 2009.
- Kacperczyk, Marcin, and Philipp Schnabl. When safe proved risky: commercial paper during the financial crisis of 2007–2009. *Journal of Economic Perspectives* 24: 29–50, 2010a.
- Kacperczyk, Marcin, and Philipp Schnabl. Implicit guarantees and risk taking: evidence from money market funds. New York University working paper, 2010b.
- Kashyap, Anil K., Raghuram G. Rajan, and Jeremy C. Stein. Rethinking capital regulation. University of Chicago working paper, 2008.
- Keys, Benjamin J., Tanmoy Mukherjee, Amit Seru, and Vikrant Vig. Securitization and screening: Evidence from subprime mortgage backed securities. Working paper, 2008a.
- Keys, Benjamin J., Tanmoy Mukherjee, Amit Seru, and Vikrant Vig. Did securitization lead to lax screening? Evidence from subprime loans. Working paper, 2008b.
- Kroszner, Randall S., and Philip E. Strahan. What drives deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions. *Quarterly Journal of Economics* 114: 1437–1467, 1999.
- Lane, P. Only human. Special report on central banks and the world economy. *The Economist*, 20 October, 2007.
- Lane, Philip R., and Gian Maria Milesi-Ferretti. Financial globalization and exchange rates. IMF Working Paper WP/05/03, 2005.
- Lane, Philip R., and Gian Maria Milesi-Ferretti. The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004. IMF Working Paper WP/06/69, 2006.
- Leventis, Andrew. Real estate futures prices as predictors of price trends. *OFHEO Working Papers*, Working Paper 08-01, 2008.
- Lucas, Douglas J., Laurie S. Goodman, and Frank J. Fabozzi. *Collateralized Debt Obligations: Structures and Analysis*. Hoboken, NJ: John Wiley & Sons, Inc., 2006.
- Mian, Atif, and Amir Sufi. The consequence of mortgage credit expansion: evidence from the 2007 mortgage default crisis. University of Chicago GSB working paper, 2008.
- Miles, David, and Andrew Scott. *Macroeconomics: Understanding the Wealth of Nations*. Chichester, England: John Wiley & Sons Ltd., 2005.
- Mokrogulski, Mateusz, and Przemysław Sapielak. Produkty strukturyzowane w Polsce w latach 2000–2010. Materiały i opracowania Urzędu Komisji Nadzoru Finansowego, 2010.
- Nier, Walter Erlend. Financial stability frameworks and the role of central banks: lesson from the crisis. IMF Working Paper WP/09/70, 2009.
- Philippon, Thomas. The evolution of the US financial industry from 1860 to 2007: theory and evidence. New York University working paper, 2008.
- Philippon, Thomas, and Ariell Reshef. Wages and human capital in the U.S. financial industry: 1909–2006. NBER Working Paper 14644, 2009.
- Prescott, Edward C. Needed: a theory of total factor productivity. *International Economic Review* 39: 525–552, 1999.

- Rajan, Raghuram G. Has financial development made the world riskier? *European Financial Management* 12(4): 499–533, 2006.
- Rajan, Raghuram G. A view of the liquidity crisis. Speech at the University of Chicago GSB, February 2008.
- Rajan, Raghuram. Too systemic to fail: consequences, causes, and potential remedies. Written statement by Raghuram G. Rajan, Eric Gleacher Distinguished Service Professor of Finance at the University of Chicago's Booth School of Business, to the Senate Banking Committee Hearings on 6 May 2009.
- Seru, Amit, Uday Rajan, and Vikrant Vig. Statistical Default Models and Incentives. *American Economic Review* 100(2): 506–10, 2010.
- Slovik, Patrick. Systematically important banks and capital regulation challenges. OECD Economics Department Working Papers No. 916, 2011.
- Staniszewski, Mariusz H. Ryzyko upadłości systemu finansowego – przykład instytucji „too big to fail” w sektorze bankowości inwestycyjnej. Accepted for publication by the Polish Economic Society, 2011.
- Staniszewski, Mariusz, and Aleksandra Staniszewska. Subprime mortgage crisis: causes and consequences. *Finanse* 1(2): 7–22, 2009.
- Stiglitz, Joseph. House of cards. *The Guardian*, 9 October, 2007.
- Strauss-Kahn, Dominique. Lessons from the financial market crisis: priorities for the world and for the IMF. Speech to the Indian Council for Research on International Economic Research, New Delhi, India, 13 February, 2008.
- Strauss-Kahn, Dominique. The global financial crisis: Preliminary lessons, International Monetary Fund, March 2009.
- Swagel, Phillip. The financial crisis: an inside view. In *Brookings Papers on Economic Activity: Spring 2009*, David Romer and Justin Wolfers, eds. Washington, DC: Brookings Institution Press, 2009.
- Zingales, Luigi. Causes and effects of the Lehman Brothers bankruptcy. University of Chicago GSB and NBER paper, 2008.

## Summary

The past 30 years has seen a genuine technological revolution that has ushered in numerous changes in the financial markets and in the real economy. Increased data processing capabilities, real-time access to information for an ever larger group of investors have brought many benefits to the global economy. While they have boosted competition and made operations swifter, they have also introduced new categories of risk. With the growth in competition and information processing speed, the size of financial institutions and, especially, the speed at which decisions are made has increased as well. As a result of the growing scale of operations of financial undertakings and competition that goes beyond local markets, decision making has had to become faster. This paper shows what processes have been driving the increase in decision-making speed and demonstrates the effect of that speed on the level of risk in the financial system and the consequences for the economy as a whole.

**Keywords:** financial market stability, risk management, intermediation, globalisation