

# Credit Cycles - Theory and Application on the Czech Republic

Vilém Semerák

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## Abstract

This paper examines relationships between credit markets and overall macroeconomic development. Several traditional and modern theories of credit cycles are analysed here from the point of view of their applicability on transition economies and especially on the Czech Republic with emphasis on theories that build on interaction between asset prices and credits. The author comes to conclusion that theories with more realistic approach (Minsky's financial instability) are more relevant for transition economies than models based on the Real Business Cycle environment (Kiyotaki and Moore).

It is shown that this kind of analysis, although theoretically relevant and challenging, is difficult to materialize because suitable data on fixed asset prices are not available. Several alternative indicators of development of prices collateral are therefore proposed.

As far as Czech Republic is concerned, aggregate level of credits did not change so dramatically as original official statistics suggested and the decrease in credits had also specific structural characteristics. These changes can be attributed to problems of the Czech banking sector, but primarily to financial weakness and low profitability of Czech business firms.

## JEL Classification Numbers:

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# **1. Credit Cycles and the Czech Republic - Introduction and Questions**

Why should someone be interested in credit cycles and seemingly overly abstract theories of credit cycles? There are at least two good reasons for choosing this topic.

First - monetary phenomena and their relation to business cycle have become a widely and often discussed and disputed topic in the Czech Republic - especially after 1997. One particular phenomena attracted special and even public attention - so called credit crunch. Interest in this type of monetary disturbances culminated in 1999, when this notion was used as a simple and popular explanation of protracted recession. However, much less attention was paid to real economic background of development of credit markets and to understanding what credit crunch really is and how it is related to financial crises, domestic economic policies and other exogenous influences.

Second - modern theories and models of behaviour on credit markets are one of the most interesting fields of the present-day economic theory. These theories are trying to link specific microeconomic behaviour of different types of agents on credit markets with macroeconomic disturbances and thus complement traditional macroeconomic theories of monetary and credit cycles. Moreover, this kind of theories - as will be explained later - seems to be more than appropriate for transition economies, for which the traditional mainstream theories with their assumptions seem to be even less suitable than for developed and stable market economies.

The aim of this paper is therefore to deal with theories of credit cycles and to compare theory with Czech reality. This does mean that this work should analyse who is responsible for the recent recession. The aims are different - description and positive analysis where reliable sources of data are available.

This text originally started as an enquiry into working of Kiyotaki-Moore's model of credit-related business cycles and an application of the model on the Czech economy. In the course of work on this paper it became clear that on the one hand relationships between this highly abstract model and a transition economy is difficult to analyse directly (and often alternative indicators than original but unavailable variables of the model must be sought), and on the other hand - that if we remove elegant mathematics from the model, it is actually very similar to some other non-mainstream but non-formalized approaches, which may be even more relevant for an unstable economy with many institutional shortcomings. This work thus started expanding in two directions - first - more theoretical approaches have been taken into account,

second - an analysis of various aspects of development of Czech credit market and Czech banking has been added that should help to identify what actually took place.

However, in order to keep to the point and in order to avoid excessive width and low depth of analysis, problems analysed have been summed up to following six wider “questions” or problem areas that set limit:

1. How should we define credit crunch, how it differs from behaviour known as credit rationing and how can we recognise that economy is in this situation?
2. How does theory explain and predicts relationships between development of credit markets and business cycle?
3. What differences are there between the traditional “macroeconomic” theory and newer theories based on explicit modelling of microeconomic environment”?
4. What were the main features of development of credit market in other economies that are believed to come through something as credit crunch?
5. How can we describe behaviour of the Czech credit market - especially after monetary and exchange rate disturbances in 1997?
6. To what extent does this behaviour correspond with theoretical models and with definitions of credit crunch - was there actually something that could be described as credit crunch?

This text is being finished in the second half of 2000, that means in situation when the recent recession seems to be over and when it seems that economic revival takes place. In spite of this, there are still several reasons that cause that description and analysis offered in this text can still be interesting. Hindsight can profit from the advantage of better availability of data (although this advantage is rather doubtful in some cases) and it should therefore lead to more definite conclusions. And - we should not forget that problems related to credit market negatively afflicted development in much stronger and more developed economies than Czech Republic - and what is even more interesting, some of them were hit even several times! This is definitely a reason for a closer ex-post analysis.

To end this short introduction, I would like to thank to Mgr. Martin Èihák and to Mgr. Tomáš Holub for their help, access to official data and especially for their patience, and to Mr. Jiř Kuèera from the Ekonom weekly for information on development of asset prices. Nevertheless, all the remaining mistakes and omissions are naturally only my own fault.

## 2. Credit Crunch and Related Phenomena - Concepts and Definitions

Let us start with definitions of the terms used in description of relationships between credit markets (and money supply) and business cycle.

Generally, problems in credit markets are understood as situations in which - due to specific factors related to supply of credits - the volume of credits and simultaneously also supply of money decreases or stagnates and central bank is incapable of influencing or even reversing the trend. There are however several concepts that are related to similar situations and which can even have even similar effects to some extent. These concepts range from rather general ones that describe the overall state of economy or of a sector of an economy (e.g. financial crises and banking crises), to other rather more specific terms that characterize only selected features of economic behaviour - credit crunch, credit rationing, capital crunch, collateral squeeze, or even traditional concept of liquidity trap.

This chapter should therefore help to show problems hidden in usage of different terminology and - primarily - meanings and economic background of concepts used in the following chapters should be made clear here.

### 2.1 Financial Crises and Banking Crises

The term credit crunch is also used in connection with banking and financial crises. What are common features and differences between financial crisis and banking crisis, two phenomena that sometimes come together (in some cases even accompanied by a currency crisis)? And what is the relationship of credit market problems with these phenomena?

! **Financial crisis** is usually defined as a *sharp, brief, ultra-cyclical deterioration of all or most of a group of financial indicators - short-term interest rates, asset (stock, real estate, land) prices, commercial insolvencies and failures of financial institutions*<sup>1)</sup>. This definition of financial crises indicates that problems of financial sector may be related asset prices. Preceding boom may have a salient feature - expectation of long-term and continued growth of asset prices emerge, which will lead to a rise and gradually also to a bubble in asset prices. However, if these expectation appear to be unfounded, a period of financial distress will follow. This financial distress can lead to a financial crisis. Whether this changeover from financial distress to financial crisis occurs, depends on factors such as fragility of the system (characteristics of previous bubble and quality

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<sup>1)</sup> Kindleberger (1992)

of decision-making and credit allocation in the boom period).

! **Banking crisis** is understood as problems of banking sector caused by high share of bad loans in their portfolio that may lead to pressure on their capital - both via loss of general confidence and via necessity to maintain capital adequacy<sup>2)</sup>. If this broad definition is used, a banking crisis may but does not have to be a cause of serious macroeconomic problems.

Relation between financial and banking crises is not straightforward - financial crisis may be accompanied by banking crisis, however banking crises may appear even without financial crises and do not have to lead to onset of such a crisis. According to Jonáš (1988) there have been serious banking crises in more than 2/3 of member countries of the IMF between 1980 and 1995 only! On top of this, it seems that banking crises were in this period not only more frequent than in previous decades, but they were more serious as well.<sup>3)</sup> Still - in some cases banking crisis accompanied financial crisis, in another situations they came separately. Let us therefore start with theoretical analysis of relationships between credits and overall economic development.

## 2.2 Traditional Cases - Liquidity Trap and Insensitivity to Interest Rates

Let us start with a “classical” or better said textbook case of inability of central bank to influence development of economy, i.e. with cases known from the neoknesian ISLM model. There are two possible explanation of such a situation - firstly the **liquidity trap**, secondly **insensitivity of aggregate expenditures to interest rate**.

In case of a **liquidity trap** the central bank is not able to influence development of economy, even though it tries to practise expansionary monetary policy (it tries to increase the total money supply by means of increasing monetary base). But economic agents are willing to absorb increases in reserves in their money holdings and consequently they are not willing to use it for purchasing bonds<sup>4)</sup> and the central bank is unable to influence interest rates in such a way

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2) This is a very general and broad definition of the banking crisis and it identifies banking crisis basically with bank runs and bank insolvency. Another (and more “virulent” definitions) of banking crises may be found too, which use serious macroeconomic consequences as one of the criteria - according to these definitions banking crises would be much scarcer and similar to our definition of a financial crisis - e.g. Mishkin (1996) speaks of banking crises as of a “subset of financial crises”.

3) Goldstein-Turner (1996)

4) In the simple version of the model they can choose only between money and bonds (or in wider interpretation other instruments that are perfect substitutes to bonds) - interest rates are

that would bolster aggregate demand.

Analogically, there appears to be a possible relationship between a liquidity trap and a banking crises - if banks decide (or are made - e.g. by strengthened regulation) to allocate deposits into assets with high liquidity and low risk instead to credits, then an increase in their reserves caused e.g. by open market operations will not start the "traditional" multiplication process and its impact on broader monetary aggregates would be more than modest<sup>5)</sup>.

However - if the concept of liquidity trap is analysed thoroughly and in a more advanced setting than the traditional ISLM, it appears to be more interesting and more relevant for a real economy. Paul Krugman in his paper "It's baaack! Japan's slump and the return of the liquidity trap" explains some of the shortcomings of the simple textbook explanation of liquidity traps and constructs a sequence of simple models of liquidity traps that remove some of the flaws related to interpretation of the ISLM model. There are three main changes. First - the models are built dynamically (and use intertemporal optimization), second, a role played by financial intermediaries is also taken into account, and finally, international aspects are examined too.

The basic question put by Krugman is why even increase in outside money (which a central bank can always influence even if it is unable to influence broader monetary aggregates) cannot influence aggregate demand. If we take into account intertemporal optimization then a liquidity trap occurs if present desired savings exceed desired investment - even at extremely low (zero) interest rates. In other words - people are not willing to spend at present and in order to make them spend more, real interest rate would have to be negative. This is possible only if expected inflation increase.<sup>6)</sup>

However - as will be demonstrated further on, this case does not seem to be relevant for the Czech economy, even though e.g. Paul Krugman used the concept of liquidity trap to explain Japanese recession<sup>7)</sup> that shares some features with its Czech counterpart<sup>8)</sup>.

The second case (**low interest rate sensibility of expenditures**) is even simpler - the bank would be capable of influencing interest rates in this case, however expenditures would be insensitive to interest rates, which would make monetary policy ineffective again. This textbook

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so low that they are expected to rise and consequently prices of bonds are expected to decrease. It would be therefore irrational to buy bonds.

5) We should be able to identify dramatic changes in deposit multiplier in this case.

6) If we take low nominal interest rates as given.

7) More details on his description of Japanese recession in part five or in Krugman, P.: It's Baaack! Japan's Slump and the Return of Liquidity Trap

8) The most striking similarity are the problems of banking sector.

case does not seem to be of much use for a real economy, but it can be. It is necessary to realise that it is sufficient, if expenditures only appear to be insensitive to interest rate. In other words, if we analysed motivation of economic agents in such situations thoroughly, there could be situations in which we could find out that economic agents would be willing to increase their expenditures if interest rates decrease, however they would not react because some other influence would prevent them from doing so<sup>9)</sup>. This interpretation of low interest rate sensibility of aggregate expenditures does not have to be quite correct from the theoretical point of view (we omit the “ceteris paribus” condition to a certain extent), nevertheless it appears to be rather more relevant for real economy. It actually leads to explanation of macroeconomic consequences of what is otherwise described as credit rationing or credit crunch.

### 2.3. Credit Crunch or Credit Rationing?

Credit crunch belongs definitely to favourite economic concepts - at least from the point of view of usage of this term in the public. There is however one important problem - it is not easy to find any clear and unambiguous definition of this term.

Although the above mentioned case is not about credit crunch, credit crunch (as it is generally understood) may have similar effects. The concept called **credit crunch**<sup>10)</sup> is generally (and quite often) used for special situations in which banks are not willing to grant new credits, although a central bank tries to loosen its monetary policy.

What is important, it is understood that the “unwillingness” reaches such an extent that it can cause and/or protract recession. This general understanding of this term is however rather insufficient because it is too broad and can comprise too many various causes. This ambiguity is nothing specific for the Czech Republic and Czech economic terminology. Let us quote from the New Palgrave Dictionary of Banking and Finance: *The term “credit crunch” has come to be used indiscriminately in American business and journalist parlance to describe situations any and all conditions of expensive or difficult-to-obtain credit.*<sup>11)</sup>

It is not easy to find any definition that would be generally acceptable and

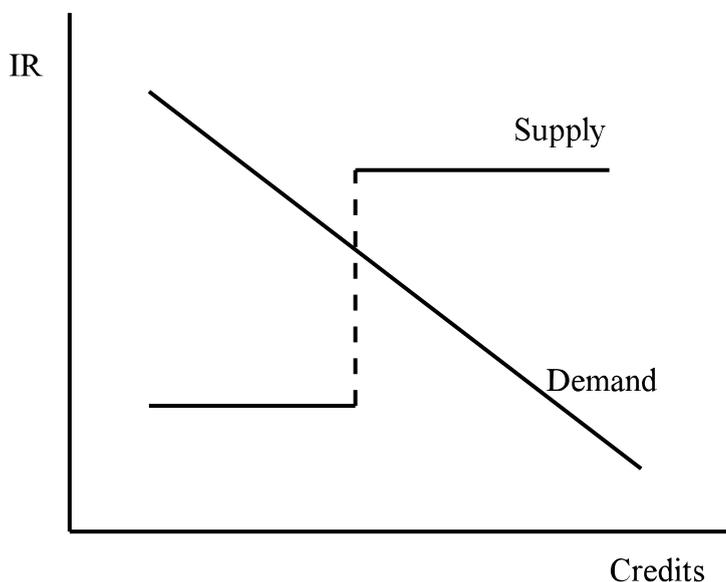
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<sup>9)</sup> The simple “textbook” interpretation speaks only about relation between interest rate and aggregate expenditures and does not examine motivation of this behaviour.

<sup>10)</sup> It got to Czech press in its original English form and it is not even clear what exactly should be its equivalent in Czech - some authors used term “zadøení úvìrù” as translation - see for instance Singer (1999).

<sup>11)</sup> Wojnilower, A.M.: “Credit Crunch” entry in the New Palgrave Dictionary of Banking and Finance, p. 525

simultaneously it would not be too general. Let us look on definitions used in several different papers on disturbances in credit markets. M. Singer in his lecture for the Czech Economic Society defined credit crunch as a situation, in which ... *interest rate does not clear the credit market and*



**Figure 1**

*it thus does not fulfil one of its functions as price of credit, consequently credits are being rationed by market subjects<sup>12)</sup>. Singer interprets this as discontinuity of credit supply curve in the credit market (see figure 1)<sup>13)</sup>.*

Singer (1999) explains causes of this state as a classical problem of asymmetric information: .. *provider of the credit has substantially worse information on quality of the financed project than the subject that asks for the credit..* This can lead to situation known as adverse selection, i.e. ...*information on the interest rate that an applicant is willing to accept (can) signal quality of project<sup>14)</sup>.*

This definition is similar to definition used in Ghosh and Ghosh (1999) where credit crunch is also understood as a specific state of credit markets which is remarkable by disequilibrium of supply and demand that is instead of a change in interest rate solved by quantitative rationing processes.

This idea looks quite simple and attractive, so does its graphical description with

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<sup>12)</sup> See Singer (1999), p. 4, from Czech translated by V.S.

<sup>13)</sup> IR = interest rate

<sup>14)</sup> See Singer (1999), p. 5

traditional demand and supply curve and interest rate as price (figure 1). However there is a catch.

Modern literature on microeconomics of banking<sup>15)</sup> does not describe credit markets in such a simplistic form. On the contrary, it shows that if we take into account imperfections of the credit market then it is quite normal that interest rate does not play the role of ideal clearing prices. Result is well known as **credit rationing** and then we have to ask - is credit crunch identical with credit rationing? Do we then need two different terms or is there any dividing line that divides credit rationing and credit crunch? Answer is again ambiguous. We can for example understand credit crunch as a steep increase of credit rationing "to infinity"<sup>16)</sup>. In order to clear this problem and to find a better definition let us look first at definitions of credit rationing, second at history of development of the term credit crunch.

### 2.3.1 Credit Rationing

Credit rationing is usually understood as a situation in which interest rate does not play its market-clearing role. This state of credit markets is understood as normal and is usually explained by market imperfections, especially by asymmetric information. Mishkin (1992) describes credit rationing as *..another way in which successful banks deal with adverse selection and moral hazard*. He also defines two different types of credit rationing:

1. A bank does not grant a credit to an applicant, even though he is willing to pay the market (or even higher) interest rate.
2. A bank does grant a credit, however it offers less than what applicants required.

Very similar but more rigorous approach is cited in Freixas-Rochet<sup>17)</sup>: *.. the discussion will speak of equilibrium credit rationing as occurring whenever some borrower's demand for credit is turned down, even if the borrower is willing to pay all the price and non-price elements of the loan contract.*

This means that if borrower is not willing or able to meet all the elements of the offered contract, it is not a case of credit rationing - e.g. if their application is turned down, because they have not got (or are not willing to offer) collateral, or their expected cash flow does not meet

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15) See e.g. Freixas-Rochet

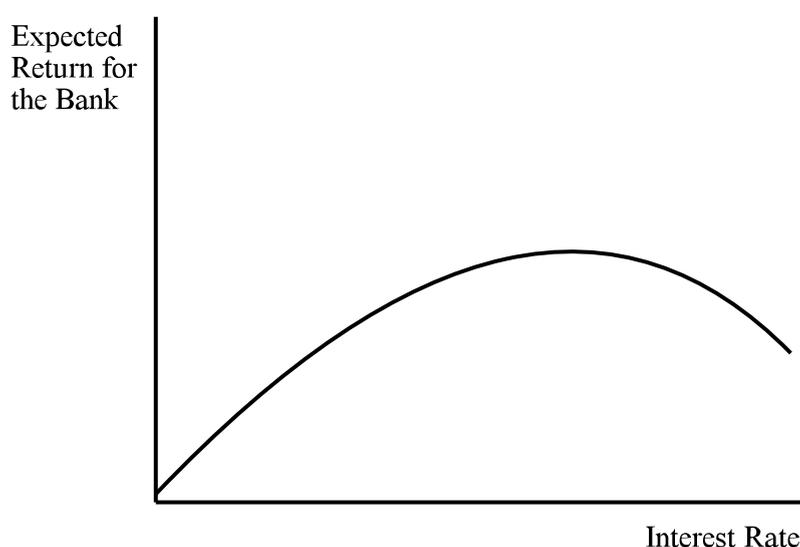
16) This definition used J. Pospíšil in discussion during the 8<sup>th</sup> seminar of Czech Economic Society.

17) These authors use original definitions set by E. Baltensperger in Baltensperger: "Credit rationing: Issues and questions", Journal of Money, Credit and Banking 10(2), 1978.

specified requirements. Freixas and Rochet also differentiate between equilibrium and disequilibrium credit rationing<sup>18)</sup>.

What is more important - rationing is a normal and rational behaviour and it can be even Pareto-improving<sup>19)</sup>. Credit rationing is a rational behaviour if expected return on a bank loan does not increase monotonically. Example of this situation is depicted in Figure 2.

In such a situation there is always a maximum interest rate that a bank will charge. There are several reasons why expected should not really be a monotonic function of interest rate, the most important is the problem of adverse selection. Relations between supply and demand in such a market is depicted in Figure 3. There are two possible situations.



**Figure 2**

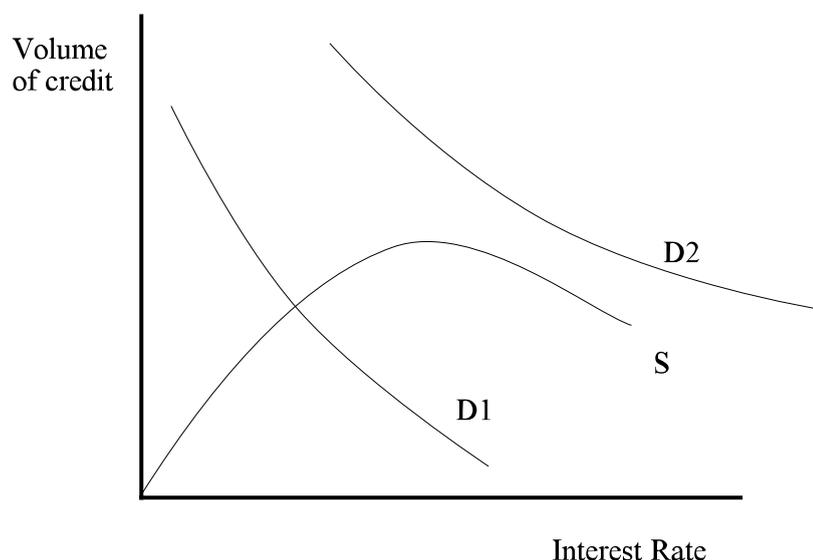
1. Demand may intersect supply in an area where supply curve is “normal”, i.e. increasing. This means that we have a “traditional” market as it is known from introductory microeconomics. Supplied and demanded volume of credit equal at an equilibrium price, that is equilibrium interest rate.
2. Demand and supply do not intersect. There will be an “equilibrium”, but equilibrium where demanded credits are higher than offered credits, there is unsatisfied excess demand and banks still have no incentive to increase interest rate and/or offer more credit. This is the equilibrium credit rationing.

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18) Disequilibrium rationing may be caused by institutional restrictions such as ceiling on interest rates or discriminatory pricing.

19) See Freixas-Rochet

The second situation corresponds more or less to what Singer (1999) explains as credit crunch, but it is a normal situation that can actually increase welfare. It therefore is not possible to identify



**Figure 3** Equilibrium credit rationing

credit crunch simply with all situations where interest rate does not play the role of market clearing price.

### 2.3.2 Credit Crunch and Alternative Terminology

We have examined problems related to defining credit crunch as situations when the supply function becomes discontinuous. However this discontinuity does not have to be the cause of negative development in credit markets. There are some alternative explanations, which are however sometimes also often generally labelled as credit crunch (or even description of these situations is taken for a definition of a typical credit crunch. What are the alternatives?

1. A negative shock in resources that banks can use of a source of their credit supply. This effect can be called **disintermediation**<sup>20)</sup> or **savings squeeze**. In this situation troubles

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<sup>20)</sup> Disintermediation is also used in a sense of a long-term process of redistribution of relative importance between banks and non-banking intermediaries, i.e. it would be a long-term process without negative economic impacts (one source of financial means would gradually be replaced by another). The definition used in this text (i.e. disintermediation as “savings squeeze”) is different - disintermediation is understood as a short-term negative development where credits offered by banks suddenly decrease but other intermediaries do not overtake the role of banks. This can occur e.g. in countries with underdeveloped capital

spread from the liabilities side of bank balance sheet. Some factor - e.g. increased expected risk related to keeping money in banks or a rise in expected return on other assets - may convince depositors that it is of no use to keep their money in banks. This will make banks stop offering new loans and roll older ones.

2. **Capital crunch.** Capital crunch happens if some shock - e.g. in prices of assets causes a sudden and unexpected deterioration of banking balance sheet. That is quality of assets (credits, tangible assets) worsens and banks have to compensate this at the expense of their own capital. This affects capital-to-asset ratios, there are only two solutions - either to raise additional capital (which is not so simple if troubles with composition of balance sheet are known to the public) or to stop lending and invest only in safe assets.
3. **Collateral Squeeze.** If the preceding two problems were related to the credit supply side of the market (i.e. to factors that influence ability and willingness of banks to lend), this effect influences primarily demand side of the credit market, because it is related mainly to problems of creditworthiness of applicants for loans. The gist of this idea is again simple - because of asymmetric information banks need a kind of guarantee that would lower risks related to credit (such as that creditors will use the financial means for quite different purpose). This “guarantee” is collateral - either in a direct form or in a form of own stake of a businessman in his firm (his own invested money). If then some shock decreases firms’ ability to offer sufficient collateral and/or decreases its net worth, they suddenly will not be creditworthy and credits will not be available for them any more, even though banks may be willing to lend!

It is apparent that these phenomena are much more clearly defined than cited “credit crunch - credit rationing” definition and it also seems that they actually tell more about disorders of credit markets. However before choosing some of them as “our” definition of credit crunch, we also ought to examine briefly development of “credit crunch” in economic terminology.

### **2.3.3 History and Empirics of Credit Crunches**

As diverse as definitions and explanations of what is and what causes credit crunch are historical circumstances and periods that were subsequently dubbed “credit crunch”.

This term was for the first time used in the USA to describe problems of credit markets

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markets where banks serve as the major source of financial resources for business.

that took place in August-November 1966<sup>21</sup>). A short term crisis of the US credit market took place at that time, which could be best described as disintermediation. There were interest rate ceilings for time and savings accounts at depository institutions (Regulation Q) at that time and the problems appeared as soon as interest rates on short-term securities reach higher levels than what banks could offer. Depositors behaved rationally and started massive withdrawals of their money from banks. Lack of liquidity made banks stop lending. Not only this - they were forced to get rid of some of their other assets (especially securities) to get some liquidity. This step led to further problems caused by decreasing prices of assets. This first “official” credit crunch was however very quickly overcome. All the Federal Reserve System had to do was to act as a lender of last resort for banks and also to push open-market interest rates downwards<sup>22</sup>).

Several more similar situations have occurred since 1966 that had negative effect on the whole economy. Wojnilower (1992) even puts forward a rather controversial idea: *...since at least 1950s, no recession in US private demand has occurred except when a credit breakdown has put into question the ability of sound entities, willing and able to pay the going interest rate, to raise funds.*

However, these credit breakdowns had different causes and looked differently. Let us shortly sum two main causes as there are described in Wojnilower (1992) for the USA:

Disintermediation - decrease of deposits and consequently also abatement of capacity for credits.

Capital crunch - sudden deterioration of quality and value of other banking assets. Problems were in these cases caused rather by lack of capital (i.e. increase in perceived risks caused by deterioration of bank balance sheets) than by lack of liquidity (i.e. lack of sources for credits). This situation was e.g. in 1953 caused by collapse of treasury bonds prices<sup>23</sup>)

What is important - these kinds of problems in the credit markets typically followed some official actions of US authorities. For instance in summer 1990 the problems were caused by *vigorous enforcement of the newly adopted international (“Basle”) standard for commercial bank capital<sup>24</sup>*). Banks suddenly had to increase their capital (relatively to more strictly assessed credits) and as this was not possible, they had to cut lending and call in loans.

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21) Wojnilower (1992)

22) Wojnilower (1992)

23) See Wojnilower (1992)

24) Wojnilower (1992)

### 2.3.4 Conclusion - What is a Credit Crunch and How Can It Be Identified?

Having in mind historical development of the “catchword” and some of its definitions, can we now stipulate some definition of credit crunch that would not suffer from the described inadequacies and which yet could be used for further analysis?

Answer again is not that simple. However, let us - at least for the purpose of this paper - leave problems of discontinuous credit supply to the sets of problems that are important, yet they are related to credit rationing and do not have to have negative macroeconomic consequences. We can then understand credit crunch - in accordance with historic development of the notion - as a state of disorder in the credit market caused either by disintermediation, capital crunch or collateral squeeze. We should then also always try to analyse which of these causes played the main role.

This more detailed look makes also testing for credit crunch easier. Let us briefly sum, what variables could be of some interest and how should they behave. There is one common factor - in all three cases we should be able to identify a change in trend of development of volume of credit. Volume of credits<sup>25)</sup> should decrease, or - at least - their rate of growth should be substantially lower. Another factors may differ:

- ! If **disintermediation** occurs, we should be able to identify abatement in the volume of deposits of banking sector. This change should precede negative changes in indicators of capital adequacy and a decrease in volume of offered credits.
- ! If **capital crunch** plays the dominant role, deposits do not have to change at all. What will change are indicators of capital adequacy and of prices (quality) of banking assets. Again this should precede decrease in lending.
- ! If **collateral squeeze** prevails, then problems will be started by lower ability of firms to offer collateralizable assets. At the beginning, there do not have to be any problems with balance sheets, these problems will however gradually arise as firms will be unable to repay their old debts (or roll them) and banks will find out that collateral that should have compensated them in case of default has much lower value than originally expected.

What is also important, the three different scenarios can have also different impact on interest rates and interest rate spreads. Generally, in all three cases we can expect decrease in lending that does not have to be accompanied by higher lending rates (because of credit rationing) - consequently some firms really do not have to get credit, even though they are willing to promise

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<sup>25)</sup> We should be of course interested - especially in high inflation countries in the real credits.

to pay the market lending rate (there is however a big difference between being willing to promise to pay and being perceived by a bank as being really able to repay a debt).

This broad definition of credit crunch has two advantages - first, it is a bit more determinate, second, it is testable. Also if we compare different opinions on what credit crunch really is, we mostly find out that authors understand it as sharp decrease in willingness of banks to lend caused by one of the three highly cited causes. It therefore seems reasonable to concretize the three causes of credit crunch and to test the three hypothesis instead of trying to identify some general and vaguely defined credit crunch.

However, before testing what actually happened in the Czech Republic, let us examine also economic theory that tries to explain and model these problems.

### **3. Credits, Money and Cycle in Theory**

The previous chapter should have helped to clear definitions of monetary and credit related phenomena, now we ought to examine their theoretical background.

Although theories that build on assumption of imperfect credit market and explicit microeconomic modelling of decision-making of representative agents appear to be quite modern, it is necessary to realize that theories that explain economic cycles by specific development of money and credits have actually very rich history. Money and credits used to be even one of the dominant explanation of economic fluctuations in pre-Keynesian macroeconomics and played important role in some non-mainstream approaches as well.

This orientation on money and credits is to a certain extent understandable, as there are not many other influences that could explain deviations in development of economy in an model environment with perfect competition and flexible prices,<sup>26)</sup> in which even the Say's law rules. Nevertheless when comparing these theories with their "younger" successors, we have to bear in mind that there are at least two basic differences:

- ! the traditional theories are much less formalized,
- ! modern versions typically build on representative agent approach and optimization.

Some other - and perhaps even more important - differences may be found when opinions on

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<sup>26)</sup> Naturally except for technology and productivity shocks, however even in this case we need some mechanism for propagation of the shocks.

influences of credit markets on economy are compared:

- ! Monetary view of credits. From this point of view credits and changes in credit markets matter only to the extent to which they are related to development of monetary aggregates. Hence changes in credit markets also influence economy in the same way as changes in money supplies - this
- ! Credits may play a special role, i.e. there can be a separate credit channel that influences economy.

The theories presented in this text are not a representative sample of economic thought on the topic - many important authors (including Keynes, Schumpeter, etc.) have not been included because the text would deviate substantially from its original topic and even the presented theories are presented here in a very sketchy form. The theories that were included were selected because they focus on similar causes and effects of credit market disorders and economic fluctuations as their modern counterparts - i.e. mainly relationships between asset prices and credits, as well as mutual relationships between credits, psychology and moral hazard.

From this point of view, we should not omit at least four of the most important strands of economic theory<sup>27)</sup>: Marshall (and Cambridge monetary thought), Wicksell, Austrian business cycle (Hayek) and post-Keynesian concept of credit driven and endogenous money supply. Let us briefly examine basic ideas of these theories because - as it will appear later, it is very interesting to compare these theories with their modern counterparts.

### **3.1. Selected Pre-Keynesian Approaches**

Analysis of money and credit was common in works of pre-Keynesian economists. Economic thinking of the time actually concentrated on these two topics - monetary and business cycle theory. In several cases they also tried to connect monetary theories with theories of economic cycle - although often in not a very coherent and complex way<sup>28)</sup>.

And yet - if we look more thoroughly, we can identify in these theories the same determinants that are at present described in complex mathematical models.

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<sup>27)</sup> Fisher's concept of debt-deflation should probably also be mentioned separately, however some of his insights are treated in part dedicated to Minsky's financial instability hypothesis.

<sup>28)</sup> Blanchard (2000) maintains that before 1940 .. *macroeconomics was not macroeconomics yet.*

### **3.1.1. Marshall**

Marshall's explanation of business cycle and its relation to credits<sup>29)</sup> is to a great extent based on psychology. According to Marshall cycle is started by a positive impulse (such as opening of foreign markets or good harvest) that contributes to increase of general confidence and that also set in motion growth of credits (both business and bank credits). This means that activity of business sector intensifies and firms register a sudden increase of new orders. As soon as producers notice the increase of demand for their goods, they will start hiring new labour force and wages will become to grow too. Marshall assumes that general confidence will spread throughout the society and results of this process will again contribute to strengthening of confidence. This process will be going on for some time - this will be the growth phase of business cycle. However, when growth of bubble based on confidence reaches some critical point, creditors will start realizing increasing risk and will try to reduce their offer of credit. This restriction of credit supply will meet collide with high demand for credits. Consequently interest rates will substantially increase. General confidence will more and more replaced by growing general distrust. Creditors will try to reduce their risks and they will refuse to renew (and roll) credits, debtors that will suddenly have to repay their debts will have to start selling their property. This sudden increase of supply will push property prices down. There is again self-promoting process - both in the asset markets, where decreasing prices will prompt other debtors to sell too, even though they are not compelled by forthcoming repayment of debt, and in the credit market, where the negative development of debtors makes creditors be even more cautious. Some of the borrowers will go bankrupt, consequently some of the otherwise "healthy" creditors may become bankrupt too. However, the process will gradually lose its strength and ground is prepared for the start of a new cycle.

Marshall's model is quite interesting and it offers very intuitive and simple explanation of relations between credits and cycles. This model actually predicts that credits will move procyclically and asset prices (as well as general price level) will lag behind the cycle. However, it is simultaneously also an explanation that suffers from many shortcomings characteristic for pre-Keynesian economics - mainly uncausality of this approach and the fact that interplay of different types of market is not analysed thoroughly.

### **3.1.2. Wicksellian Perspective**

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<sup>29)</sup> See Marshall (1924) for details.

Knut Wicksell formulated monetary theory of cycle<sup>30)</sup>, which identifies changes in money supply as a basic cause of cyclical behaviour. The key term of his concept is so-called natural interest rate given by expected rate of return from the newly invested capital. Cycles then start because central bank does not know this natural rate and causes excessive monetary expansion<sup>31)</sup> that decreases money interest rate below its natural level. This results into rise in investment. The growth of investment increases also demand for credits and this demand is also being met - actually it is in the end financed from “forced savings” created by the initial lagging of wages behind prices. This investment surge will end as soon as interest rates return to their natural level. This cuts down motivation for investment. Recession is then caused by fact that some of the investment undertaken in the boom period are problematic. They were started under influence of low interest rates when investors believed that these low money rates will hold on. They do not, hence investors have to cut them down. A new period of the cycle thus begins - a period of unemployment, decreasing demand and production<sup>32)</sup>.

Transition from boom to recession can in this framework also be caused by ill-considered behaviour of the central bank, e.g. if it maintains low interest rates at first (below the hypothetical natural level) and then it suddenly brakes and starts to practise very restrictive policy.

### **3.1.3. Austrian Monetary Theory of Cycle**

Austrian theory of monetary cycles has got some common points with Wicksell<sup>33)</sup>, and it builds on a monetary theory of economic cycle as well. According to Hayek it is money and especially bank credit that may lead to disequilibrium development of economy. The process is similar to Wicksell, what is new and characteristic of this approach is the Hayek’s concept of roundaboutness.

A central bank causes monetary expansion that spreads through banking system, volume of credits grows and interest rates decrease. Businessmen misjudge this development and perceive the decline of interest rates as a relative decrease of scarcity of capital. This leads to changes in time structure of production. However, these changes in scarcity of capital are only seeming as this “artificial” abatement of interest rates is not financed by increased savings but by forced savings caused by disharmony between growth of prices of consumption goods and development

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30) Holman (1999)

31) Additional money get into economy via credit expansion, so this model can be interpreted in terms of credit too.

32) Holman (1999)

33) Wicksell built his theories on Böhm-Bawerk and his theories conversely influenced Hayek.

of wage rates. Growth of prices of consumption goods is caused by changes in the temporal structure of production. The result is disequilibrium structure of capital which can be corrected only in a recession.

### **3.2. Money and Credit in the Post-Keynesian Perspective**

Post-Keynesian economic thought clearly describes interrelation between money and credit, according to economists sharing this perspective it is extremely important to note that money comes into existence at the same time as debt<sup>34</sup>). From this perspective ...“*credit-granting*” *institutions, especially the banking ones, are of paramount importance and therefore the way they operate must be carefully analysed*”<sup>35</sup>). This view is reversed - credits are first and is the passive factor, it is taken as some residue. *Money is credit-driven and demand-determined*<sup>36</sup>) Post-keynesian economists also acknowledge the problems related to correct credit (and capital) allocation - here they are actually nearer to the Austrians than it appears . If credit mis-allocation prevails and recipients of misallocated credits prove incapable of repaying their debts, economy can land into a financial crisis. A very interesting feature of this approach is their closer look on banking and impact of differences in banking structures on credit and deposit creation.

Post-keynesian relation of money and cycle is therefore reversed. In this system “positive animal spirits” lead to increased wage bills and increased demand for credits which is met by offer of credits. Consequently money and credits rise during the cycle and move pro-cyclically, however explanation and causality of this phenomenon is completely different from the Friedman-Schwartz analysis. Credits and money adapt to requirements of economy - credit money is endogenous because central bank always has to play the role of lender of the last resort. If it refuses, it can cause a liquidity crisis and collapse of financial system.

#### **3.2.1. Hyman Minsky - Ponzi Financing, Financial Fragility and Financial Instability**

Although Hyman Minsky took himself rather for a “financial Keynesian” than for a post-Keynesian, his theory of financial instability of capitalistic economy is rated as of the most interesting contributions of post-Keynesians to analysis of financial and banking crises.

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<sup>34</sup>) For instance Arestis (1992). If we compare this with mainstream economist, it becomes apparent that even though they speak about credit when they derive e.g. deposit multiplier, however they take credits mostly as something automatic and consequently also deposit multiplier as something stable.

<sup>35</sup>) Arestis (1992), p. 180

<sup>36</sup>) Arestis (1992), p. 201

Minsky tried to explain why a financial crises could occur in a developed capitalistic economy with expensive capital assets and a complex sophisticated financial system<sup>37)</sup>. Financial sector in such an economy takes part in “exchanges of present money for future money”, in exchanges of invested capital for future revenue. Minsky discriminates between three situations related to financing of an economic unit:

1. **Hedge finance units** - absolutely trouble-free firms that have got sufficient cash flow that is sufficient to meet all their payment obligations, these firms typically have high share of equity financing in their liability structure.
2. **Speculative finance units** - firms that can meet at least basic commitments related to their debts, but their cash-flow is not sufficient for repayment of a principle of their debt. They thus can service their debts, but they have to roll them.
3. **Ponzi units** - cash flow from their activities covers neither interests nor repayment of the principle. They therefore have to borrow to cover all the payments related to their previous debts and to stay in business, or - if they cannot borrow, they have to start selling their assets.

Minsky uses a concept of “**margins of safety**”, i.e. capacity to absorb unexpected shocks (difference between cash flow and known expenses). Hedge finance units from their definition have got more than sufficient margins of safety, whereas firms that use “Ponzi financing” have no. There are then several mechanism then can contribute to a crisis in this environment. Long-term stability and/or availability of funds negatively influences a wareness, margins of safety decrease. Then a sudden shock - increase in interest rates or depreciation of exchange rate<sup>38)</sup> - may tum hedge units into speculative and speculative into Ponzi units, in other words financial fragility of the system increases. The same may apply even to banks, that may also suddenly become Ponzi units. Consequently - they would have to restrict their lending and even completely exclude some of their previous and risky clients from lending. These Ponzi units then have to start selling their assets and thus create pressure on prices in asset markets and thus worsen the overall economic situation even further.

We may thus observe thus observe a specific cycle - at first period of long term stability

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37) Minsky (1992)

38) This effect is stressed in Kregel (1998)

and relative availability of funds will lead to increasing asset prices<sup>39)</sup> and building up of financial fragility (by means of leaner and leaner margins of safety). Then a sudden shock may lead to a sudden reversal of the trend and to self-sustaining decrease of asset prices and investment. If we interpret it in terms of modern formalized theories - there is an interplay between bubbles in prices of assets, endogenous credit constraints and investment that leads to economic cycle.

#### **4. Modern Theories and Microeconomic Foundations**

Modern theories that try to explain behaviour of credit markets and relation between credit markets and cycle have three common point - they are built on optimization, on explicit microeconomic modelling of behaviour of economic agents, and they are very formalized.

If we tried to classify these modern approaches, we could divide the resulting contributions to two main groups:

1. Models focused on problems of credit market under asymmetric information and selected aspects of intermediation, they pay less attention to macroeconomic aspects - a typical example of this approach may be Holmstrom-Tirole (1997).
2. Models that should describe relationships of economic fluctuations with specific features of credit markets. As an example we may name Kiyotaki (1998)<sup>40)</sup>

Let us briefly describe briefly some of the most interesting contributions, two of them will be analysed closer in the next section.

##### **4.1 Models of Credit Markets**

The first category of models aims primarily to describe behaviour in credit markets. It is less interested in macroeconomic implications of the processes and do not include them explicitly into the models. This group would include also already cited theories that explain credit rationing<sup>41)</sup>, as

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<sup>39)</sup> Caused by “irresponsible” demand of mainly Ponzi units and maintained by positive impacts of increasing asset prices on balance sheets of applicants for credits.

<sup>40)</sup> And of course also other Kiyotaki’s (and Moore’s) articles on this topic that present several different versions of the model..

<sup>41)</sup> A comprehensive overview of microeconomics of banking and credit markets can be found in Freixas - Rochet (1997)

far as other models are concerned, we should mention at least **Holmstrom** and **Tirole**<sup>42)</sup>. The authors try to model market of loanable funds with three types of agents - firms, intermediaries and uninformed investors. It is a simple equilibrium model that can reproduce some features of situations of distress in credit markets.

In this model a firm's net worth determines its debt capacity<sup>43)</sup>, as a result of this firms without sufficient net worth will not be able to use direct financing and they will have to depend on intermediaries (these are assumed to be able to reduce the demand for collateral by using closer monitoring. What matters is that also intermediaries must invest (and must be able to invest) some capital in monitoring in order to be credible. The model then analyses different channels through which reductions in different forms of capital influence demand and supply in credit markets - decrease in net worth (and collateral) influence demand, changes in capital of intermediaries and changes in total savings determine changes in supply. Holmstrom and Tirole classify these scenarios as credit crunch<sup>44)</sup> (decrease in lending due to abatement of capital of intermediaries), collateral squeeze and savings squeeze<sup>45)</sup>.

This class of models will not be dealt with here extensively because it is focused primarily on credit markets and less on macroeconomic consequences. Moreover, this model has been extensively analysed and applied on the Czech economy in Jaroš (2000).

## 4.2 Macroeconomic Models with Credit Markets

As far as models belonging to the second group are concerned, it is becoming a numerous and very colourful category of models. These approaches range from more traditional ones (that stem from modifications of ISLM) to "new" models that fully correspond to the "new" trends that followed Lucas' critique (they are situated somewhere between New Keynesian and New Classical Economics). Let us briefly describe some of these models (this list is of course far from being complete).

**Bernanke and Blinder** in Bernanke - Blinder (1988) present a very simple model based on ISLM. The main difference between this model and the ISLM model is a change in assumptions concerning substitutability of loans and bonds. Classical ISLM regards loans and bonds as perfect

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42) Holmstrom - Tirole (1997), brief description of the model can be also found in Singer (1999)

43) Because of asymmetric information a firm has to have a sufficient stake of its own property, in order to behave properly.

44) This conception of "credit crunch" corresponds to what was called a capital crunch.

45) It is an equivalent of disintermediation.

substitutes (i.e. we do not have to analyse credits, it is sufficient to analyse bonds market) and it also assumes that financial markets clear by interest rate (i.e. no credit rationing). When either of the two suppositions is removed, credit begins to play an important role. Bernanke and Blinder abandon the first assumption (the second is left intact). There are therefore three different assets - money, bonds and credits, and both borrowers and lenders choose between them according to interest rates. The resulting model is labelled as CCLM. The LM curve does not change, however IS curve is replaced by CC (“commodities and credit” curve<sup>46</sup>) that looks similar however behaves differently. This model behaves different in some aspects - the credit channel makes monetary policy more expansionary than in the ISLM environment, increase in reserves influences not only LM, but CC as well. What is more important - shocks in credit supply or demand have real economic effects - according to Bernanke it is possible to explain e.g. the length of Great Depression in the USA within this model as *a downward shock to credit supply stemming from the increased riskiness of loans and banks concern for liquidity in the face of possible runs*<sup>47</sup>. However, causes of the shocks in credit supply or demand are exogenous in this simple model. It can thus offer only description of propagation of these shocks and of their overall impact on economy.

**Kiyotaki and Moore**<sup>48</sup>) have designed a specific modification of the Real Business Cycle model, where imperfection of credit markets (creditors have no power to make debtors pay, unless their debts are secured by collateral) lead to imposition of credit constraints dependent of value of collateralizable assets. Kiyotaki and Moore then show that this modification adds to the RBC model a powerful mechanism that can lead to persistence and even amplification of shocks if there is interaction between prices of assets, productivity and expectations of forward looking agents.

**Bernanke, Gertler and Gilchrist (BCG)**<sup>49</sup>) model is a small scale standard dynamic new Keynesian model designed to encompass financial accelerator effects. The model allows for exogenous bubbles in asset prices and can be used for simulations of effects of alternative monetary rules in such an environment. The “economy” consists two types of optimizing and forward looking agents - infinitely living households that work, consume and save, and of business firms owned by entrepreneurs with finite expected lives. These firms own physical capital and can

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<sup>46</sup>) It does not mean that it is identical with Patinkin’s version of ISLM.

<sup>47</sup>) Bernanke - Blinder (1988). According to terminology adopted in the previous chapter this would be probably a case of capital crunch and collateral squeeze.

<sup>48</sup>) For instance in Kiyotaki - Moore (1995), Kiyotaki - Moore (1997), Kiyotaki (1998)

<sup>49</sup>) Bernanke - Gertler (1999) explains this model thoroughly and demonstrates also simulations for which it can be used.

buy new capital for their internally generated funds and by borrowing. Besides capital they hire labour and produce output. The model assumes sticky prices and monetary policy thus may have real effects on economy. A very important feature of this model is however existence of imperfect credit market. Uncollateralized external financing is therefore more expensive than internal funds, moreover the premium depends inversely on financial conditions of the borrower. Hence, procyclical movements in financial situation of borrowers lead to countercyclical movements in the premium for external finance. This effect magnifies fluctuations of investment and output. The second important feature of this model is possibility of exogenous asset price bubbles that can arise because asset prices may be influenced by non-fundamental factors. These non-fundamental factors include waves of pessimism and optimism<sup>50</sup>).

### 4.3 Kiyotaki and Moore's Model in Detail

Let us look on one of the theories - namely Kiyotaki's and Moore's credit cycles - in more detail. There is a good reason for choosing this theory - it describes an interesting hypothesis that has been put forward in relation with recessions and financial crises in several countries, i.e. hypothesis relating depth and length of the recessions with development of asset prices.

Kiyotaki and Moore described several different modifications of their model in Kiyotaki - Moore (1995), Kiyotaki - Moore (1997) and Kiyotaki (1998). This description will therefore concentrate on the common features of the models without going to too much particulars<sup>51</sup>).

The model is defined as a dynamic general equilibrium model of competitive economy that is based on the real business cycle model. There is however an important difference, the traditional real business cycle omits problems related to money and credits. Kiyotaki and Moore enrich this approach by introducing credits and show that credit markets may on certain conditions create a propagation mechanism that can cause that short term shocks persist and amplify.

Credit market is modelled as imperfect - i.e. lenders cannot make debtors to repay their debt, unless the loans are secured by collateral (some durable assets)<sup>52</sup>). Credits play a special role because there are credit constraints dependent on value of durable assets (and vice versa - value of durable assets simultaneously depends on these constraints).

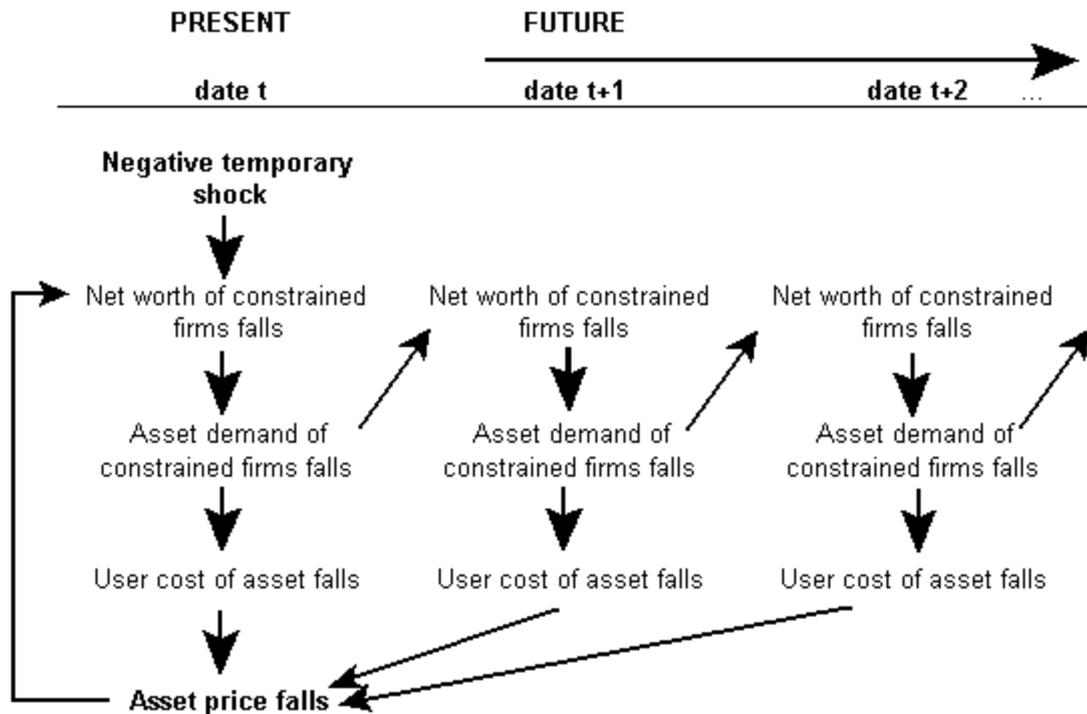
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50) Actually it is not so different from Keynes and Marshall, only a new channel was added.

51) The simplified description is based on model presented in Kiyotaki - Moore (1997)

52) Lenders therefore try to keep maximum value of debt in some proportion to value of collateral, in the simplest case it is the total value of collateral that plays the role of a maximum limit for debt.

There are two types of agents in the model economy. First, there are agents with higher



**Figure 4**

productivity which are at the same time also credit constrained, the second type of agents less productive agents without any constraints<sup>53)</sup>.

The dual role of durable goods<sup>54)</sup> combined with forward-looking expectations of economic agents is essential for working of the model. Let us suppose that there are some credit constrained firms that have in the past borrowed against value of their durable assets and that these firms experience a temporary productivity shock. The shock will decrease their net worth and

<sup>53)</sup> Less productive agents undertake projects that are not “agent-specific” that if they walk away from the project, it will not negatively influence its rate of return. More productive agents on the other hand undertake projects that on the one hand bring higher returns, on the other hand these returns depend on specific and inalienable skills of producers. If they leave the investment, it has always negative implications for their creditors - if a creditor simply takes over the project, his yields will be much lower. For we suppose that debtors can really leave their project without any punishment, more productive agents will always face with some credit constraints.

<sup>54)</sup> For instance landholdings used both as collateral and as a factor of production.

also their ability to borrow. Consequently, they will have to cut on their investment expenditures. As a result of this their revenue in the next period(s) will be lower too and the decrease in revenue will influence current price as well (via forward looking expectations). Kiyotaki and Moore thus speak of a **static effect** (immediate effect of productivity shock on asset prices) and a **dynamic effect** (based on expectations of lower demand in next periods). Difference between static and dynamic effects can be demonstrated on figure 4.

Differences in productivity<sup>55)</sup> and redistribution of credit to the detriment of the productive lead also to redistribution of productive assets and to consequent changes in total output. Therefore short shock in productivity can really lead to prolonged recession.

The initial impulse however does not have to be an exogenous shock in productivity (at least not only). The process can be also started by another influences that will have impact on other components of the chain. Let us summarize them briefly:

- ! An exogenous change in asset prices. Sudden worsening of asset prices can decrease net worth of indebted firms<sup>56)</sup> and via the same scheme cause a prolonged recession<sup>57)</sup>. The question is, what other reasons besides shocks in productivity could lead to changes in prices of assets. The most obvious reasons include speculation and resulting bubbles in asset prices<sup>58)</sup> or so-called Panglosian pricing<sup>59)</sup>. There is however also another very interesting possibility that could start this process in a small open economy - a change in prices related to a sudden opening of its market<sup>60)</sup>.
- ! A second important factor may be a change of required relation between collateral and total volume of debt of a borrower. In a real world it could be for instance a change in rules on capital adequacy requirements.

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55) Important is marginal productivity - this can be higher for the constrained just because of the constraint.

56) Negative effect of deflation on debtors is nothing surprising, what is new is again the forward looking mechanism.

57) This situation corresponds to what has been dubbed collateral squeeze.

58) There may be a problem with incorporating bubbles into this model that assumes perfect foresight and rationality, especially if we would like to use it for modelling of several consecutive recessions.

59) A term used by Krugman for description of development of Asian asset markets, this again assumes lack of rationality.

60) If we assume a small and labour-abundant country, that its opening will lead to decrease of prices of capital intensive goods and prices of capital.

What does actually this model say about cycle - by what factors should a typical recession be caused and maintained? First of all, decrease in total output should be correlated with decrease in total volume of credits (it should actually be slightly lagged). Secondly, development in total volume of credits should be closely correlated with development of asset prices.

There is however a serious problem. If we really can get reliable data on prices of collateral and collateralizable assets and development of credits, it should not be such a problem to confirm or falsify existence of some relationship between the two variables and existence of such a phenomena would not definitely be anything surprising for economists.

However, even if we find a direct correlation between asset prices, credit and business cycle - several questions still remain to be answered. For instance - whether causality of these relations really corresponds to the model, i.e. whether the mechanism described theoretically in studies by Kiyotaki and Moore has got some counterpart in the real world.

#### 4.4 Testing the Theories

If we want to compare dynamic theoretical models with real economical development in a country, we have two options. We can either try to calibrate some particular model<sup>61)</sup> and see whether its outputs are roughly similar to real economic development, or we can just “simply” take predictions made by the model and compare them with available statistical data. This second approach is used in this paper.

If we try to sum up the variables and predictions made in the models (so that we know what to look for), we should be interested in following categories of data:

- ! **Development of credits** - Correlation of credits with cycle - whether they lag or whether they behave as a leading indicator and information on role of credits in the examined economy.
- ! **Asset prices** - Especially real estate prices and prices of other collateralizable assets. We should analyze development of asset prices and changes in trends. Again - we should be interested in whether asset prices precede or lag behind credits and business cycle.
- ! **Data on structure of balance sheet of banking sector** - This data should help us to differentiate among different types of credit market disorders - this data is necessary especially for identification of capital crunch.
- ! **Data on business firms**, especially on their indebtedness, profitability and value of their holdings of collateralizable assets. These data should reveal, whether problems in credit

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<sup>61)</sup> We have to estimate parameters and coefficients that are often of rather abstract nature.

markets had rather form of a collateral squeeze or of a capital crunch.

## **5. Credit Cycles and Transition Economies - An Eclectic Approach**

Some of the most interesting theories that describe relationships between credits and economy were described in the two preceding chapters. However, these theories are built with an implicit assumption of a standard and relatively stable economy - at least as far as institutions are concerned. Cycles are also assumed to start and end more or less in equilibrium. These assumptions may be plausible for developed market economies (if ever), but if we try to analyse development in a transition economy, we should take into account a number of specific factors.

At least five such specific factors (or better said families of factors) related to asset prices and to credit cycles may be identified in emerging markets of Central and Eastern Europe:

1. Unique character of the transformation process and resulting discontinuity.
2. Problem of soft and hard budget constraints.
3. Large scale privatisation process and type of privatisation.
4. Disequilibrium in some markets at the beginning of transition.
5. Role of credits in structural changes

On top of this - we can further modify the theories by assuming open economy instead of a closed economy. When speaking about causes and course of credit cycles, an initial activity of central bank that starts the inappropriate expansion was assumed. If we instead of this assume an open economy with high degree of capital mobility then the initial impulse can come not from an independent decision of a central bank to practise expansive monetary policy, but from an exogenous inflow of foreign capital<sup>62</sup>).

### **5.1. Transition and Discontinuity**

One-off character of transition and a kind of discontinuity were very specific features of transformation processes that contributed to some of its economic impact.

Discontinuity of the process may be questionable in some respects, here we understand

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<sup>62</sup>) Matoušek-Hampel (2000) cited Macfarlane who distinguishes between traditional crises (originally started by imprudent monetary policy) and crises of a new type (where the initial impulse comes from inflow of foreign capital).

by this term discontinuity related directly to participants of credit relations. It means that banking sector in a transition economy faces extremely erratic environment - on the one hand there are applicants for credits without any relevant credit history, on the other hand there are banks with lack of experience with new and novel banking operations. This discontinuity means that many domestic applicants for credit have virtually no their own capital. This lack of personal interest creates together with lack of experience of banks' staff very stimulating environment for moral hazard.

Effects of this discontinuity are further enhanced by the one-off character of many processes. Transition may really be interpreted as a special opportunity - something absolutely unprecedented for most of the participants (who also can reasonably expect that it will not come again and if yeas, then in a different form). It is well known from the game theory that - for instance in a case known as prisoner's dilemma - situations that are viewed as one-off games can lead to different solutions than situations that "players" perceive as a part of long-term relationships with their "opponents" in the playing field. This feature of transition processes again contributes to inclination to moral hazard and to speculation.

If we return to the Kiyotaki model - if participants perceive redistribution of assets as a one-off chance to improve their position and if they can assume that their (even very "specific") acts in this period cannot negatively influence their future activities, then emergence of price bubbles in asset prices is more than probable. In a situation when one-off profit can be obtained in a speculation with costs that are not borne by the speculator it is actually quite rational to engage in this kind of activities. Moreover - if this process starts and state or other participants of these relations do not change their attitude, growing prices will attract even more speculators and the process will thus have self-sustaining character.

## **5.2. Soft and Hard Budget Constraints**

Soft and hard budget constraints are concepts originally introduced by János Kornai in his analyses of socialist economies. According to Kornai it is the character of budget constraints that determines behaviour of economic agents.

Hard budget constraints mean that a firm is always constrained by its own capital and by its profits. It can expand its production and increase its own demand for factors of production and for assets only if it has sufficient own resources. Even if it can use a bank credit then again this credit will depend on its own resources. Survival of such a firm depends on whether it offers products demanded by its customers and the whole system is determined by demand. Kornai describes the resulting state of markets as pressure - i.e. at given prices there is always more than

sufficient supply. By contrast - soft budget constraints mean that firm has got access to resources that do not depend on results of this own activities (e.g. state subsidies, cheap loans from state or semi-state banks). Survival of such a firm does not have to depend on demand for its products and its way of doing business may be much looser. Similar companies may have even completely different behaviour and priorities - Kornai described socialist state enterprises that were trying to secure their position by accumulating as much resources as possible. This results into a state of market that was called suction - i.e. there were shortages and inclination to growth of prices.

According to Kornai it is the type of budget constraint that makes behaviour of firms in market and socialist economies so different - this parameter even may influence behaviour more than type of property. If hard budget constraints are typical for market economies and soft budget constraints for socialist economies, then economic transition could also be interpreted as a transition from soft to hard budget constraint. If however some sectors of economy do not face hard budget constraints then again this can lead to price bubbles.

### **5.3. Privatisation and Moral Hazard**

Type of privatisation process that a country chooses may also contribute to probability of negative development in credit markets. If privatisation to economic agents without their own capital is enable on a large scale (such as voucher privatisation schemes), then two factors increase the risk of future problems in the credit markets.

The first reason is straightforward - firms without sufficient own capital have to rely on external funding which makes them more vulnerable if economic environment suddenly changes (e.g. if rapid and unexpected desinflation suddenly increases value of their debt).

Second reasons is related to the well-known problems of principal-agent relations and moral hazard. If owners perceive their own risk as rather low (because their own stake in the firm is low), they may be prone to undertaking transactions of a more risky and more speculative nature.

### **5.4. Initial Disequilibrium and Problems with Identification of Bubbles**

Traditional models of asset bubbles and credit cycles tacitly assume that markets were more or less in equilibrium before a bubble started. This makes it possible to estimate extent of the bubble. Situation in transition economies may however be much more complicated - shortage and disequilibrium has been typical for many markets in initial phases of transformation processes (including above all markets of collateralizable assets such as real estates).

If then rapid growth in price of such an asset starts, it may be difficult to find out which

part of the trend was caused by searching for equilibrium and when actually a bubble (if ever) started. Besides - if expectations of economic agents are static or adapt only with a lag, then an initial shortage can lead to a creation of a bubble if the economy is liberalized.

### **5.5. Structural Aspects of Credit Allocation**

It has been generally assumed that credit allocation should play its own specific role in transformation. In contrast to credit allocation in centrally planned economy, in a market (and transition) economy allocates capital according to profitability. Transition therefore means a dramatic change in functioning of credit markets and also a change in its role. Transition economies inherited specific and unsatisfactory structure of economy.

Credit allocation mechanism then should play an important role in structural changes - some sectors, existence of which is not economically founded, should logically have serious problems with obtaining new credits. It should therefore be a well-functioning credit market that should contribute to euthanasia of unviable sectors<sup>63)</sup> and to promotion of growth of perspective sectors.

These structural aspects are not taken into account in theories of credit cycles - with exception of Austrian economic thought that is build on changes in structure of capital. However, the “Austrians” are primarily interested in time structure of capital, which also does not have to be the main and primary cause of the problem in transition economies. We could describe credit cycles that would incorporate there structural aspects as follows:

Let us assume a transition economy with imperfectly functioning allocation mechanism that tends to supply credits into traditional sectors with large long-established firms and discriminates newer sectors and sectors with small and medium-sized firms. Credit expansion in such an economy would lead to expansion of traditional sectors (without long-term perspective and adequate demand) at the expense of newer prospective sectors<sup>64)</sup>. This boom part of the cycle would later again lead to bust in which the unsuitable structure of economy would have to be corrected.

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<sup>63)</sup> This is also a reason why some firms in some sectors of economy have and must have problems with obtaining credits - it is then very problematic to use “anecdotic evidence” as a proof of existence of a credit crunch.

<sup>64)</sup> The resulting pattern could be in some cases even very similar to original Hayek’s concept, if the “traditional” firms were from sectors such as heavy industry.

## **6. Economics of Boom and Bust - Empirical Evidence from Other Countries**

Bubbles, fluctuations and abrupt changes in trend of asset prices emerged in the 1980s and apparently contributed to financial instability. These “boom and bust” cycles in asset prices appeared in many industrial and emerging countries alike, USA, Japan, the United Kingdom, Sweden, the Netherlands, Finland, East Asia and Latin America are the best known and most prominent examples of such events<sup>65</sup>). It is extremely interesting to compare development in some of these countries with the Czech experience - this chapter should therefore prepare way for the following chapter that will focus on development in the Czech Republic.

### **6.1 Scandinavia - The Case of Finland**

There are very good reasons why to analyse Finland and compare its experience with the Czech Republic. Both countries have several similar features - both of them are smaller countries (measured by number of inhabitants), both suffered from collapse of trade with the Eastern Europe. Moreover, Finland has entered the European Union in 1995, the Czech Republic wants to undertake this step as soon as possible. There is one more factor that is of paramount interest in this paper - both countries experienced sharp downturn that coincided with problems of banking sector<sup>66</sup>). Let's therefore analyse this Finnish experience a little bit closer.

Let us start with correlation between Finnish GDP and credits with development of prices of durable assets. Figure 5 shows development of real estate prices (residential as well as commercial real estates)<sup>67</sup>), development of the total volume of domestic credit a total real domestic GDP<sup>68</sup>). Real estate prices were used because they appear to be the best available proxy that can be used for describing trends in prices of collateral and collateralizable assets. Annual

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<sup>65</sup>) Bernanke - Gertler (1999)

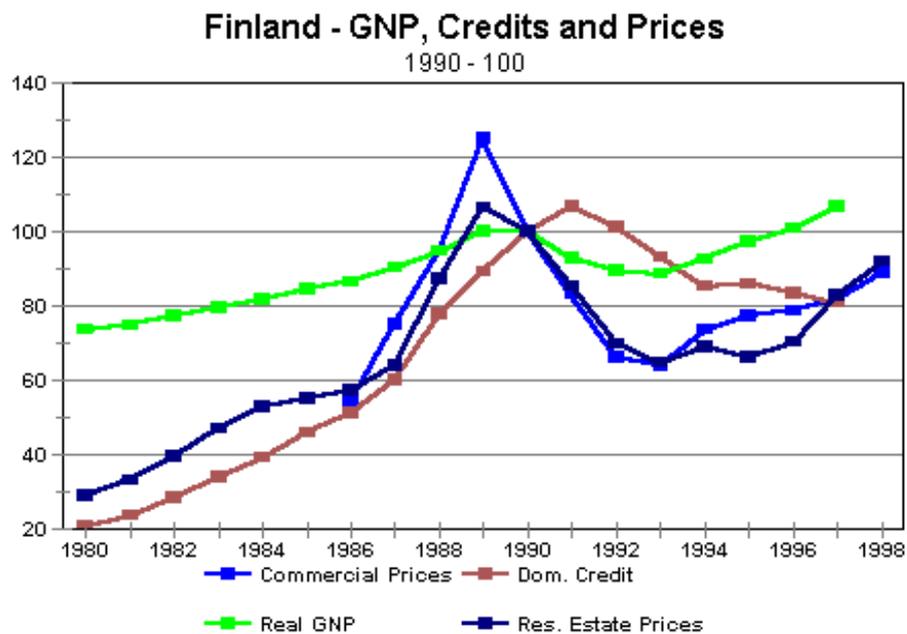
<sup>66</sup>) As far as Scandinavian countries are concerned, similar problems experienced also Sweden and Norway, although their problems were more related to price bubbles than to external problems - more details in Caprio et al. (1998)

<sup>67</sup>) Data on real estate prices come from BIS(1999), ECB (2000) and Caprio et al. (1998). The data were recalculated to common basis (1990) and used as one time series (series appear to be consistent).

<sup>68</sup>) Total credit to national residents and real GNP - annual data from International Financial Statistics.

frequency of data was dictated by availability of data on real estate prices. As it will be shown further on, it is precisely lack and poor quality of this kind of data that makes empirical analysis of Kiyotaki and Moore-like models of credit-related cycles so problematic.

Still it was possible to obtain a series of data on residential real estate prices for 18 years by merging of series from different sources<sup>69</sup>). As far as commercial real estate prices are concerned - this data appear to be more relevant for this kind of analysis, however only a shorter (12 years) time series was available in this case (it moreover roughly imitates trends in residential



**Figure 5**

real estate prices). Therefore the series of residential real estate prices was used as a representative series for analysis.

Figure 5 suggests that domestic credit could really be related to prices of real estate prices, although it seems to lag<sup>70</sup>). Moreover, the figure indicates that something as a bubble in prices of real estates could really dominate real estate markets - two abrupt breaks in the trend of residential real estates prices are clearly visible. The first one occurred in 1987, a sharp growth

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<sup>69</sup>) See footnote 53.

<sup>70</sup>) This seems to be strange - why should there be such a lag that is apparent even in annual data.

in value of real estates followed. The second and even sharper change came in 1989, when a deep downturn in both the residential and commercial price indexes started. These changes are clearly visible from figure 6 that shows annual rates of growth of real estate prices<sup>71)</sup>. It is apparent that development of real estate prices had really rather explosive character in 1987-1989 when increases were higher than 30% a year.

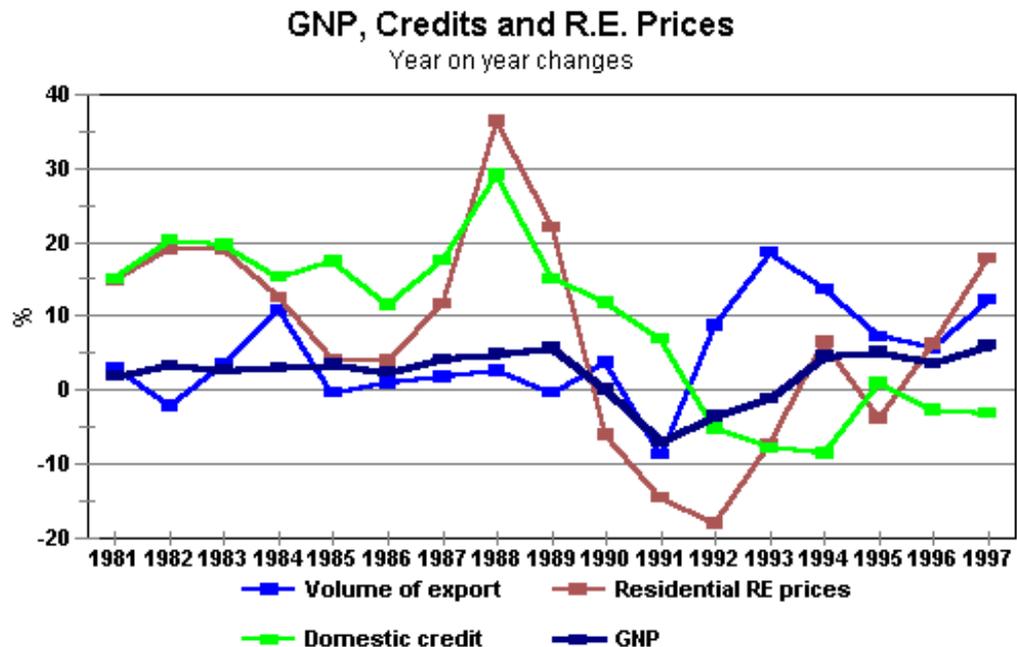


Figure 6

If we return back to figure 5, we should be also able to analyse relationships of the two time series in question in more detail. If we try to regress development of credits on index of residential real estate prices, we will find out that there appears to be a statistically significant relationship between total domestic credit and development of real estate prices.

OLS regression revealed that surprisingly good results (if original series are used) can be obtained for double reciprocal form of the relation (standard errors are given in parentheses) - model is statistically significant at standard levels of significance and correlation seems to be rather strong:

$$\text{Credit} = 1/(-0,0099502 + 1,71154/\text{Prices})$$

$$(0,00207437) \quad (0,112484)$$

<sup>71)</sup> Data used in figure 6 come from the same sources as data in figure 5.

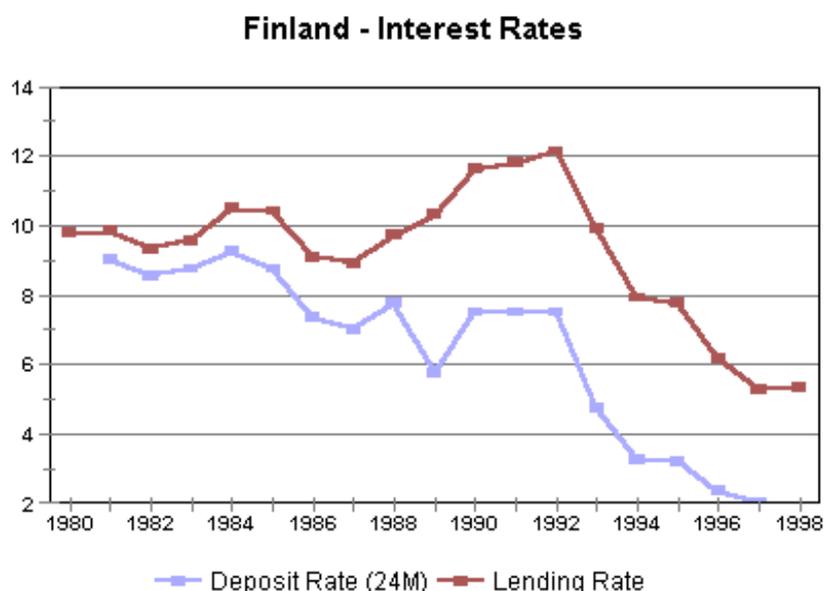
R-squared = 93,536 percent, S.E.E. = 0,00316648

However, if lag credits by one term, the results even slightly improve. Again the double reciprocal form appeared to be the most suitable:

$$\text{Credit lag 1} = 1/(-0,00680459 + 1,40401/\text{Prices}) \\ (0,00143095) \quad (0,0763227)$$

R-squared = 95,7555 percent, S.E.E. = 0,00211042

On the contrary, if prices were lagged by one term, the model was still statistically



**Figure 7**

significant, but correlation was weaker. The analysis (despite problems related to low suitability of annual data for analysis of orientation of the relationship) therefore seems to indicate that real estate prices really led development in credit markets<sup>72)</sup>.

If we look on development of interest rates<sup>73)</sup> in figure 7, it is possible (as far as lending rate is concerned) identify gradual increase both in the period that preceded the main decline in

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<sup>72)</sup> A more detailed analysis would be necessary to confirm these findings - there is some danger, that the extremely good fit of the model is in reality enhanced by increasing trend of the series in the period before 1989.

<sup>73)</sup> Data used in the graph come from International Financial Statistics, deposit rate is an average 24 month deposit rate, the lending rate is average lending rate in per cents.

total credits and during the decline, followed by an abrupt break and decrease. Except for 1989 trends in deposit rates were roughly similar. Spread between lending and deposit rates<sup>74)</sup> increased abruptly in 1989, however it was relatively stable afterwards.

Findings of the regression analysis however are not sufficient for confirming or falsifying of the thesis that asset prices started the development. Still there are at least two alternative interpretations.

The first one would more correspond to the original Kiyotaki model and it would imply that some shock in productivity (or demand<sup>75)</sup>) caused slowdown that lead via unmet expectations to changes in development in asset markets and consequently to a break of trends in the credit market. This interpretation seems to be suggested also by figure 5, where stagnation in real GNP coincides with the break in trend of real estate prices and precedes the abrupt change in development of credits. In this case therefore credits and asset prices would play a role of an additional channel that spreads and exacerbates the initial shock<sup>76)</sup>.

Second - alternative - interpretation could consist in identifying the cause of the trouble directly with development of real estate markets. Whereas in the first case it would be some exogenous influence that would prick the bubble, the bubble would burst because from some endogenous reason and it would be this bursting of the bubble that would be the main cause of the problems and credit markets would again play a role of main channel.

Further and more detailed statistical study of development of Finnish economy and credit markets would be necessary in order to either confirm or falsify some of the hypothesis. Let us briefly sum results of analyses carried out by some other authors.

According to Pazarbasioglu (1996) the second half of 1980s was connected with deregulation and fierce competition in financial markets. This contributed to creation of a sharp credit boom and resulted into generally poor quality of banks' portfolios. Banks suddenly had to face severe problems with their stability, consequently government had to intervene (early 1990s). However, banks were burdened by non-performing credits and had to change their way of operation in order to improve composition of their balance sheets - in other words they cut their lending. In order to evaluate whether something as a credit crunch really happened or not,

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<sup>74)</sup> The two rates, moreover on a yearly basis, are not of course a good indicator of banking spreads, they have been chosen because of their availability, annual frequency was dictated by an effort for comparability of figures 6 and 7.

<sup>75)</sup> Related in case of Finland to decline and turmoil in Eastern markets.

<sup>76)</sup> Nevertheless we should be interested also in the very origin of the trouble, i.e. why this bubble arose.

Pazarbasioglu uses a disequilibrium model of supply and demand for business credit. Pazarbasioglu comes however to conclusion that the marked decline in lending can be attributed to a cyclical decline in credit demand caused by lower worth (high indebtedness) of applicants for credits, i.e. something that we have previously defined as collateral squeeze. This was however also accompanied by lower willingness of banks to lend caused by banks' effort to increase their adequacy levels - i.e. something that we have previously defined as capital crunch.

## **6.2 Japan - Banking Crisis or a Liquidity Trap**

Japan was probably the most widely discussed case of an economy where problems with credit markets and recession occurred simultaneously and it was the credit market (together with development in asset prices) that was blamed for many of problems of Japanese economy and for its very slow revival. There have been many papers on this topic, this description of Japanese "illness" is based on Krugman<sup>77)</sup>, Bayoumi - Collyns (2000) and on data from the IMF International Financial Statistics and BIS annual reports.

Let us look at first at empiric evidence. Figure 8 briefly describes development of estate with basis 1994=100.

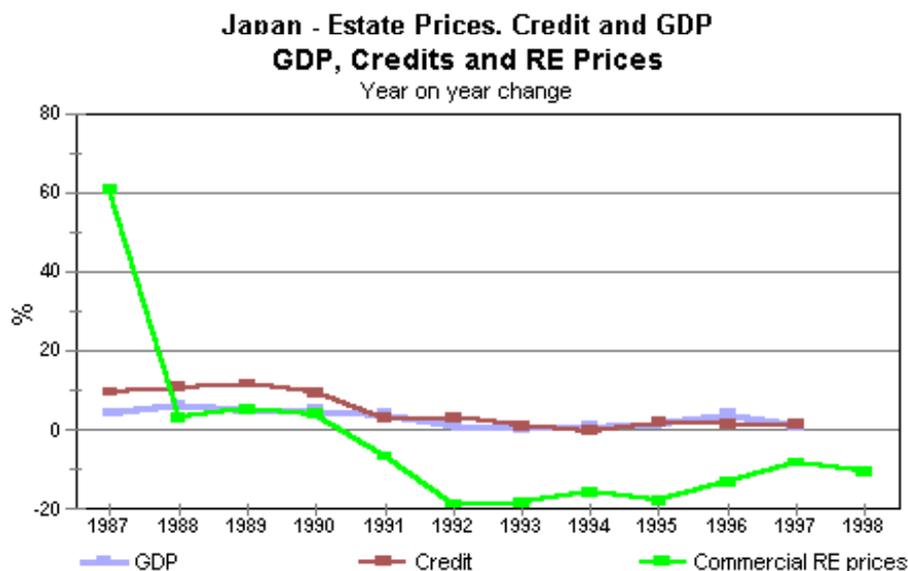
Indicators in figure 8 are far from being ideal descriptors of economic situation, however they clearly show a very high and steep growth of prices of commercial estate prices (residential real estate prices grew also rapidly, but still more moderately), followed by a sharp decline. The resulting impact on GDP appears to be however much less grave than the slump in real estate prices would suggest.

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<sup>77)</sup> Above all a paper called "It's Baaack! Japan's Slump and the Return of the Liquidity Trap".

As far as causes of the Japanese slumps are concerned, overheating of Japanese economy in the late 1980s is seen as the main factor that is at the roots of the development (e. g. in Bayoumi - Collins (2000)). It was a period of rapid growth of economy and also - what appears to be especially important from our point of view - a period in which the bubble had been blown up<sup>78)</sup>. The “boom” was interrupted (and the bubble pricked) by monetary restriction in 1991.

It therefore seems that in Japan asset prices played rather a role of a channel that lead to spreading of impacts of monetary tightening. The “transmission mechanism” worked in this way: monetary restriction lead to sudden stop of growth of real estate prices and to an abrupt change in expectations of market participants. Sharp slump of real estate prices followed that decreased both the net worth of firms and composition of banks’ balance sheets (here effect of declining prices of assets was combined with magnification of this phenomena via problems of individual firms). Therefore - if we try to classify this development by terms defined in previous parts of this



**Figure 9**

text, what happened was a collateral squeeze and a capital crunch.

Information from figure 8 is even more evident in figure 9 that depicts changes in the economic variables measured against the same month of the previous year. The change in

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<sup>78)</sup> This played a special role in case of so-called jusen companies, intermediaries that provided credit mainly for real estate - Caprio et al. (1998).

development of real estate prices was tremendous - however reaction of GDP and credit appears to be rather weak. It is however questionable, to what extent do data published in the International Financial Statistics really give a true picture of Japanese economy. The credit statistics are related to banking sector, whereas much of the problems related to collapse of real estate markets were borne by non-banking institutions.

Moreover - even statistics on GDP may underestimate the true extent of the problem. According to Paul Krugman who interpreted the Japanese case as a state of liquidity trap the real output gap is actually deeper than what the available data seem to indicate. Moreover, according to his interpretation problems of Japanese banks played only a secondary role, that's why also the aggregate development of total volume of credits may distort the overall picture. Regression analysis have not been tried in this case - available series are shorter than in the case of Finland, moreover, figures 8 and 9 indicate that we could not expect positive results if we simply estimated a model similar to the "Finnish" one.

## **7. Development of Credits and Credit Market in the Czech Republic**

We have tried to explain theoretical economic background of credit crunches and related phenomena and describe development in another countries where some similar problems took place. This and following chapters should concentrate on Czech economy and its development.

Differing opinions have been expressed on development of the Czech credit market and its relations to business cycle. Some of these ideas were very explicit and were based simply on development of the total volume of credits and changes in newly granted credits. Analysis of what actually happened in the Czech Republic is therefore divided in 4 main parts:

1. Development of credit market - to what extent was there really a decrease in credits and in which type of credits and what interest rates and spreads look like during this period. This part includes also description of development of domestic savings and deposits - this is important so that we could confirm or falsify the hypothesis of savings's squeeze (narrowly interpreted disintermediation).
2. Development of situation in the Czech banking sector - changes in balance sheets, problems with capital adequacy and bad loans. This part of analysis should help to find out whether a capital crunch could have played a role here. Decision-making of Czech banking sector is analysed here too.
3. Application of the Kiyotaki and Moore's model on the Czech economy. An attempt is

made to find out whether changes in asset prices played some role in development of the Czech Republic - e.g. in a form of a collateral squeeze.

4. Discussion of specific factors related to transformation that have influenced development of our credit markets are analysed in the fifth section.

Let us at first review ideas of other authors and compare them with available pieces of evidence on development of characteristics of the Czech credit market.

### **7.1. Opinions on Czech Banking and Czech Credit Market**

Problems of the Czech banking sector have had several stages<sup>79)</sup>. For instance Jonáš(1998) labels period 1995-96 as a banking crisis. This analysis is however focused primarily on another period on years 1998-99 that have been by several authors described as a credit crunch.

This term (“credit crunch”) have become immensely popular and it was understood simply as unwillingness of banks to grant new credits<sup>80)</sup> even though the Czech National Bank was apparently trying to ease its monetary policy. This interpretation was obvious especially in less technical and theoretical articles that were describing problems of Czech firms and tried to put it in connection with protracted recession.

Let us now look at some more rigorous interpretations of development of the Czech credit market. This term as a description of the Czech reality was for the first time used probably in summer 1998 and it has been coined above all by Patria Finance, it has also been used by economists of the IPB and in analysis published by the Czech Ministry of Trade and Industry.

**Patria Finance** expressed their view e.g. in an analysis with title “Credit Crunch: Banks do not lend”<sup>81)</sup>. The analysis is very brief and can be summed into two main ideas. First - granting of new credits had almost ceased<sup>82)</sup>, therefore credit crunch must have occurred. Second - the unwillingness of banking sector to grant new credits was caused by its own problems, mainly by high share of bad loans in their balance sheets and resulting problems with capital adequacy. If we try to use terms defined in part 2 of this text, we could conclude that Patria Finance saw capital crunch as the main cause of all problems, another possible causes - such as e.g. collateral squeeze - were not mentioned in the text. Economists from the Patria Finance returned to this topic

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79) See part on development of Czech banking sector.

80) E.g. in Dostálová (1999) that interprets in the same way also development in Hungary and Poland.

81) Patria Finance: “Credit Crunch: Banky nepůjčují”

82) This conclusion must have been deduced from statistics on changes in total credits and not from statistics on newly granted credits.

later in their regular monthly survey of macroeconomic development of the Czech economy in December 1999 with subtitle "Is credit crunch at the end?"<sup>83)</sup> Authors of this text again maintain that there had been a credit crunch in 1998 and again in 1999 after a mild revival, however according to them the credit crunch was virtually over by the end of 1999. This opinion again appears to be based mainly on changes in the rate of growth of total volume of credits, however - it had at the same time become a bit more multifaceted and detailed. The authors took into account also problems related to Czech statistics on total volume of credits - namely the fact that credits transferred to Konsolidační banka (KOB) are not included in statistics of total credits, although they still exist. They conclude that credit crunch was in the end of 1999 definitely over. Moreover problems with statistics demonstrated so vividly in their article lead to a challenging but unanswered question - whether there really was or was not a credit crunch.

Also **IPB** and its chief economist have described development in the Czech Republic as a credit crunch on several occasions - mainly in the first months of 1999. For instance in its analysis called "Unemployment - A New Phenomenon in the Czech Republic"<sup>84)</sup> the situation in the Czech credit market has been labelled a credit crunch. No closer information on what the author actually takes for a credit crunch was given, however two explanations of the development of the Czech credit market were given - the first put the blame primarily on the CNB and its requirements for credit provisioning that made access to credits very difficult, the second was to be a low confidence of Czech banks that applicants for credits would be able to repay their debts. In the IPB's Forecasts of development of the Czech economy in 1999 and 2000<sup>85)</sup> it was stated that decreasing interest rates would have only a minimal impact because banks are not willing to grant credits (it is denoted as a bank credit crunch). The same opinion was expressed also in another analysis from the same period<sup>86)</sup> - i.e. credit transmission mechanism was blocked because of credit crunch.

A more detailed and definitely more insightful analyses of this issues have been published by **Jiří Pospíšil** in Pospíšil (1999a) and Pospíšil (1999b). Pospíšil analyses causes of a drastic deceleration of growth of credits from around 10% in 1996 and 1997 to 2,7% in 1998 (he is however rather stand-offish to calling it a credit crunch). Conclusions in Pospíšil (1999b) are rather indeterminate - main factors that played some role in development of credits can be found

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83) Patria Finance: Makroekonomický přehled 12/1999 - Je credit crunch u konce?

84) IPB, Chief Economist's Team, published in January 1999.

85) Published in March 1999, similar text was also published as Křovák (1999).

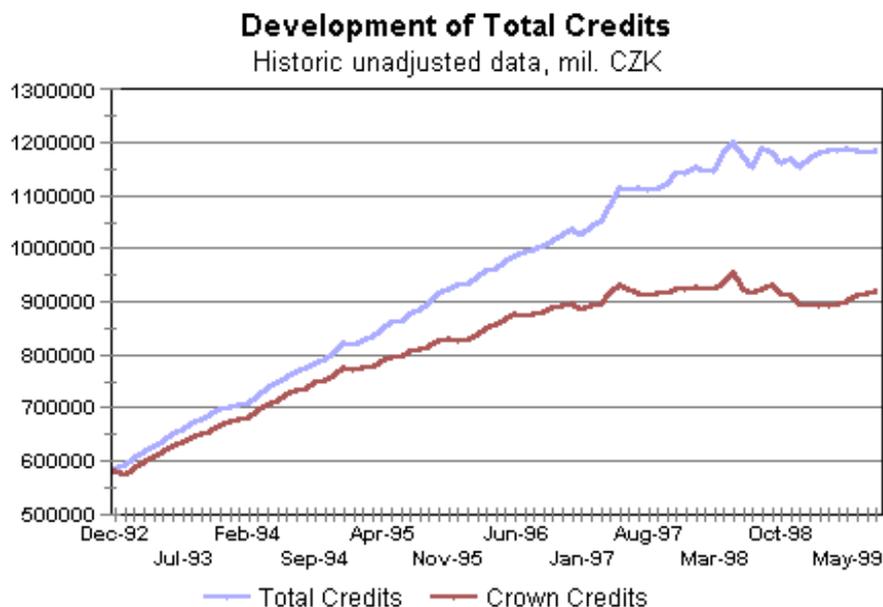
86) IPB: "Is 1999 Czech National Bank's Net Inflation Target Realistic?", March 1999.

both on supply and demand side of the market. Supply side was negatively determined by weak financial position of Czech banks, demand side was influenced by recession and by capital weakness and bad prospects of many Czech firms.

## 7.2. Main Trends in Volume of Total Credits

Before analysing the role of credits in recent economic cycle, let us look into main trends in the credit market per se. The main question is - how credits really developed and are there any symptoms that would indicate some problems.

Opinions that described situation in the Czech credit market as a credit crunch were based on two sources of information - anecdotic evidence from firms that had problems with obtaining



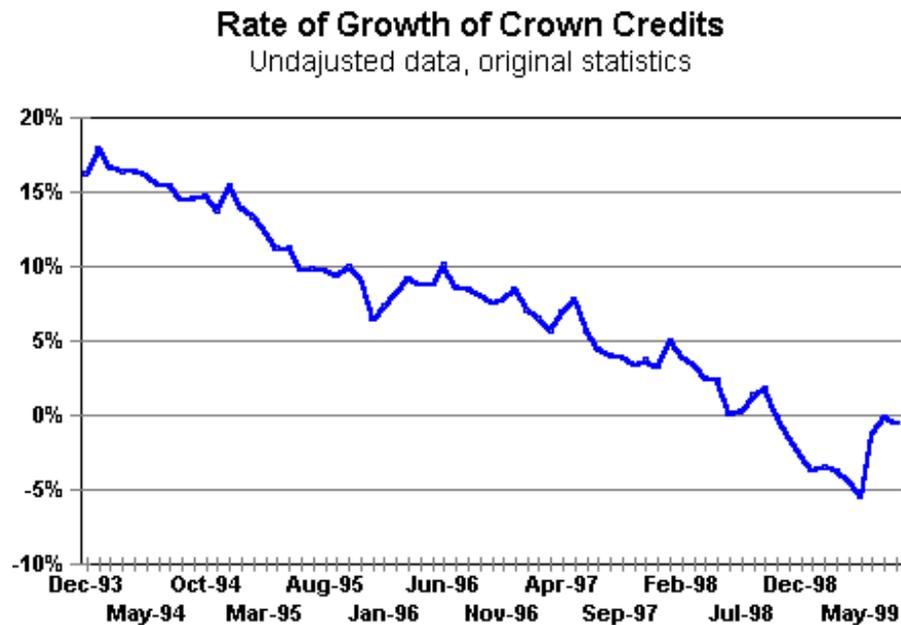
**Figure 10**

credits and on official statistics on development of total volume of credit in the Czech Republic.

As mentioned before - there has been a serious problem with reliability of the statistics. Let us consider at first original unadjusted data on development of the total volume of credits in the Czech Republic - figure 10 shows data on development of total volume of credits as they were available from official statistics<sup>87)</sup> at that time when the hypothesis of credit crunch was popular. This series really seems to indicate that there were some changes in development of the

<sup>87)</sup> ÈNB - Bankovní a mìnová statistika and Annual Reports.

credit market - total crown credits that used to grow relatively smoothly suddenly stagnate and even decrease. The situation looked even more dramatically if year-to-year growth rate were calculated - see e.g. nominal growth of crown credit in the next figure<sup>88</sup>).



**Figure 11**

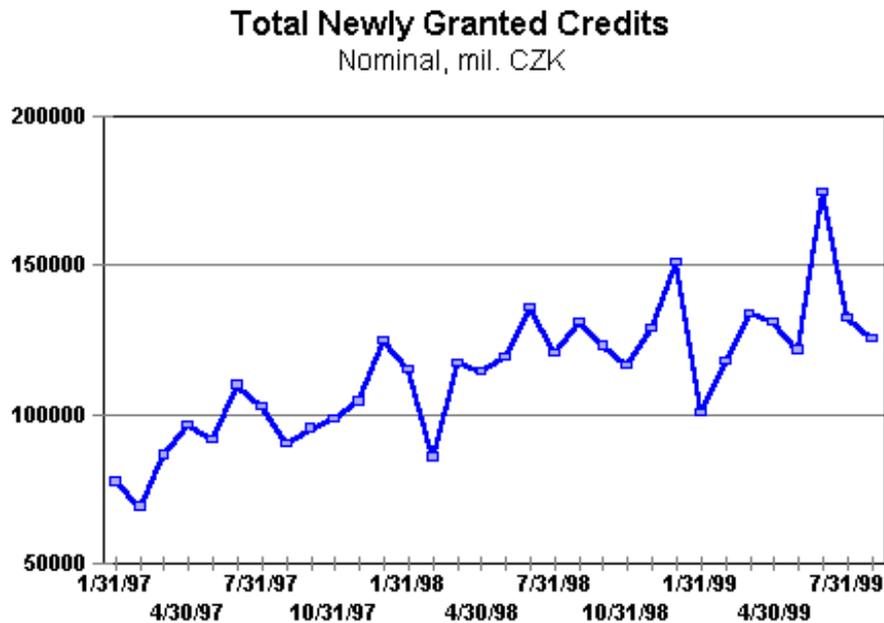
It was this series together with anecdotic evidence (read - complaints of firms that had difficulties with obtaining new credits) which was used as the main argument in favour of the hypothesis - but as it has been already explained, if credit allocation mechanism is expected to select viable firms and sectors and suppress the unviable ones, then a number of complaining firms can be found even if there are not economic problems. Therefore statistics on development of credit should definitely be taken for more reliable and more important.

There were however also another data on changes in credits at the same time - i.e. statistics of newly granted credits<sup>89</sup>). Surprisingly enough they offered contradictory information on development of credit market. There was an interesting situation - on the one hand, total credits were decreasing, on the other hand - newly granted credits were positive, i.e. it would be reasonable to expect growth of total stock of credits! (compare figures 10 and 12).

<sup>88</sup>) Of course if real rates of growth were calculated (deflated by CPI or PPI), the decrease appeared to be even worse.

<sup>89</sup>) The data again comes from official publications of the Czech National Bank (ÈNB: Bankovní a mìnová statistika). It includes all financial means that have really been withdrawn from credit accounts with banks in the Czech Republic.

Two conflicting interpretations of development of the Czech credit market were thus possible. If we use total credits as the main indicator - there really could be some problem in the market, if we use newly granted credits instead, then we can hardly speak about a serious credit



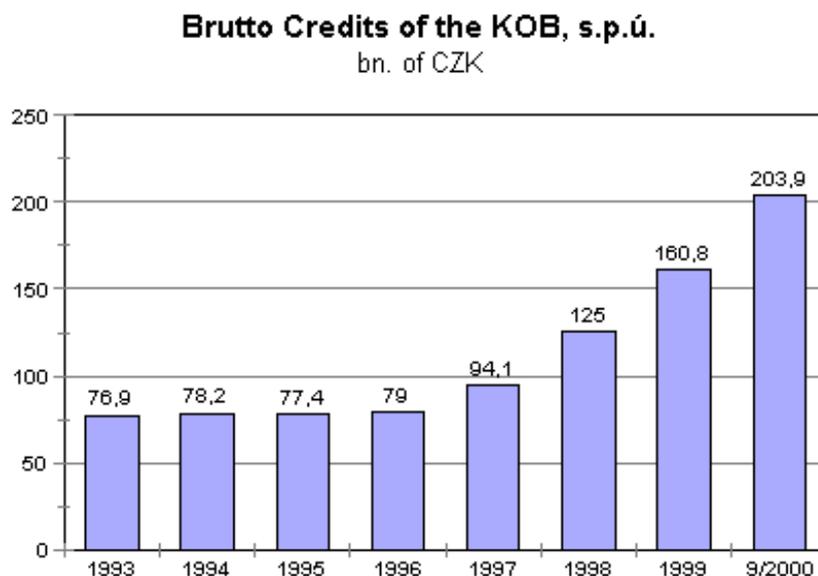
**Figure 12**

crunch.

Three main hypotheses have been proposed at that time that tried to explain the discrepancy between total and newly granted credits - first one tried to take into account possible changes in time structure of credits, the second attributed this development to possible faster repaying of old debts then obtaining of new credits and the last one put the blame on inconsistencies of the statistics.

If changes in time structure of credits were to be responsible for the discrepancy, the course of events in the particular period would have to be following - firms would not be granted new loans with longer maturity and would instead had to roll at least some of their debts by means of renewed credits with short maturity. ÈNB makes public data on the time structure of credits divided into three categories according to maturity - short (1 year and shorter), medium (less than four years) and long-term (more than four years). Yet all the three categories were however in black numbers in 1998-99. Even if look at growth rates, then we find out that long term new credits really experienced lower growth and in several months even decrease (if compared with

newly granted credits in the same period of previous year), however it was the medium category



**Figure 13**

that grew most dynamically. Most probably it therefore were not changes in time structure of credits that caused discrepancies between total and newly granted credits.

As far as the second explanation is concerned (i.e. new loans positive but lower than repayments of older loans), it appears to be a plausible explanation. Unfortunately, it is difficult to confirm this hypothesis - it seems that there are no separate statistics on repayments of loans<sup>90</sup>). In addition to this - data on financial position of debtors and on development of classified credits do not indicate that sudden and fast repayment of old loans would be probable.

The third and most relevant explanation is based on inconsistencies in the statistics. Official statistics of development of total volume of credits have got several serious shortcomings. The most distorting element is the fact that if non-performing bank credits are transferred to

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<sup>90</sup>) There are some data of this kind in the statistics on results of non-financial businesses published by the Czech Statistical Office, nevertheless this kind of data is selective and there are again problems with comparability in time.

Konsolidační banka<sup>91)</sup>, they are excluded from statistics on total volume of credits. Consequently - the official volume of credits decreases even though the credits still exist. Other workout procedures may have the same impact - e.g. if banks transfer their credits to other non-banking institutions (e.g. subsidiary companies created for this purpose) in order to alleviate their problems with provisions and capital requirements<sup>92)</sup>.

Restructuralization and workout procedures in the banking sector thus optically decrease total credits. Extent of this distortion of statistics on credits is considerable as can be demonstrated on data on development of balance sheet of the Konsolidační banka (figure 13)<sup>93)</sup>. Credit portfolio of the KOB had been relatively stable till 1996 (at that time it included primarily loans related to centrally planned economy), then its trend changed abruptly and portfolio of loans began to grow rapidly.

Czech National Bank therefore compiles series of adjusted data on total volume of both crown and foreign exchange credits in the Czech economy. The adjustment takes into account work-out operations ("operations related to restructuring of banks' portfolio"), banks without licences, capitalization of interest, depreciation and influences of changes in exchange rates. This adjusted time series gives dramatically different information of development of credit markets. Following two figures (figure 14 and 15) illustrate differences between the adjusted and unadjusted total (i.e. both crown and foreign exchange) credits<sup>94)</sup>.

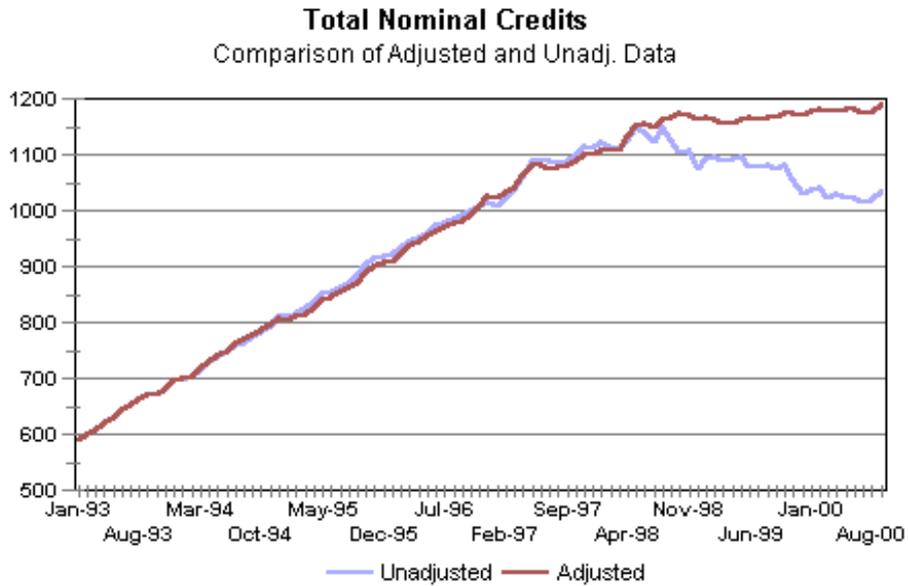
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91) Konsolidační banka, s.p.ú. is a special state bank that was founded in 1991. Originally it was to solve problematic credits that Czech banking sector inherited from the era of centrally planned economy (mainly so-called TOZ credits). Its character has gradually changed since then and now it functions as an institution that assists banks in work-out procedures.

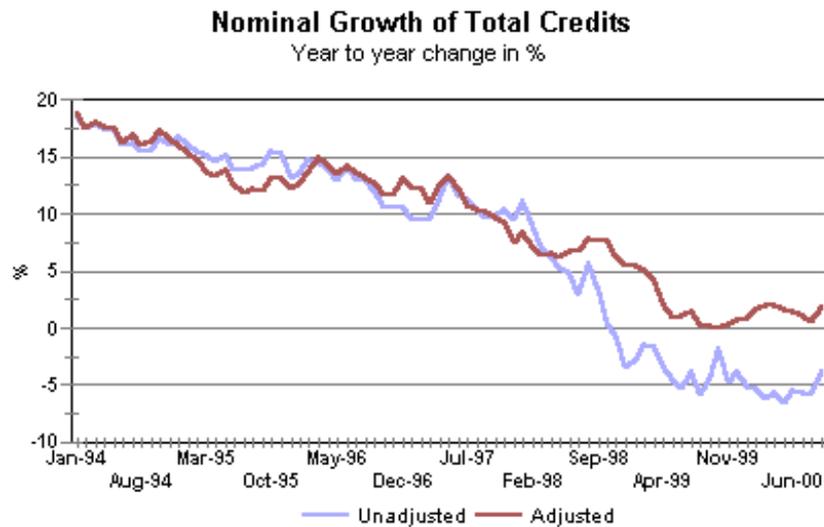
92) There is also another factor that can cause some differences - statistics on newly granted credits include credits to non-residents. This influence is however much less serious - as will be demonstrated further on, than problems caused by exclusion of some credits from statistics on total credits.

93) The data come from [www.kobp.cz](http://www.kobp.cz) (homepage of Konsolidační banka, s.p.ú.)

94) The time series were provided by Mgr. Holub from the CNB and do not have to necessarily be identical with data published in older publications of CNB.



**Figure 14**



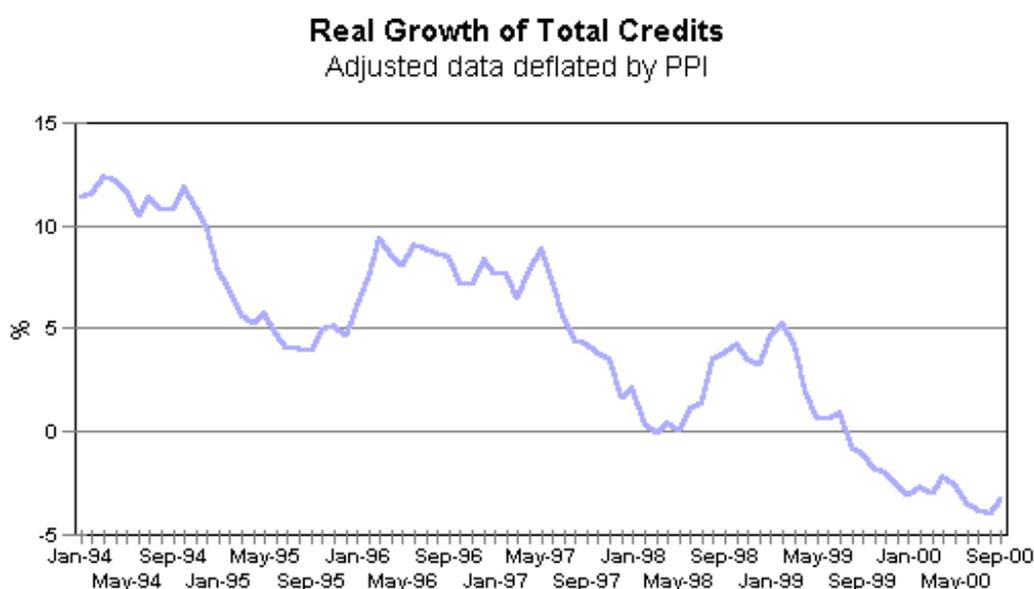
**Figure 15**

The two series had been developing in a very similar way until the beginning of 1998, then they parted and it seems that they describe a completely different economy ever since. The unadjusted data shows the same tendencies as the series depicted in figure, i.e. a marked decrease in total credits.

The adjusted data are different - there is stagnation or decrease in rate of growth instead of reduction in the total volume of credit. Figure 15 pictures year-on-year changes in volume of total credits and compares rate of growth of adjusted and unadjusted credits.

The situation suddenly looks completely different - not only the newly granted credits were positive, but even total credit were expanding or at least stagnating. This however refutes the main argument that was used to prove that something as credit crunch might have taken place in the Czech Republic. However, there still remains an abrupt change of trend from regular growth to stagnation. Moreover, the preceding series depict nominal data - if we are interested in impacts of changes in supply of credits on real economy, real growth of credits should be analysed as well.

Figure 16 shows real growth of adjusted credits (i.e. nominal growth deflated by PPI).



**Figure 16**

Three interesting periods may be identified in the chart. Firstly - there is a marked decrease of the rate of growth<sup>95)</sup> of credits in the summer 1995 from 10-12% to approximately 4% in June-August 1995. This deviation was caused simultaneously by moderate reduction in nominal growth and increase in PPI inflation (figure - decomposition of real rate of growth). Later (1996 and beginning of 1997) the real rate of growth recovered again<sup>96)</sup> and real credits were growing at some 7-9%.

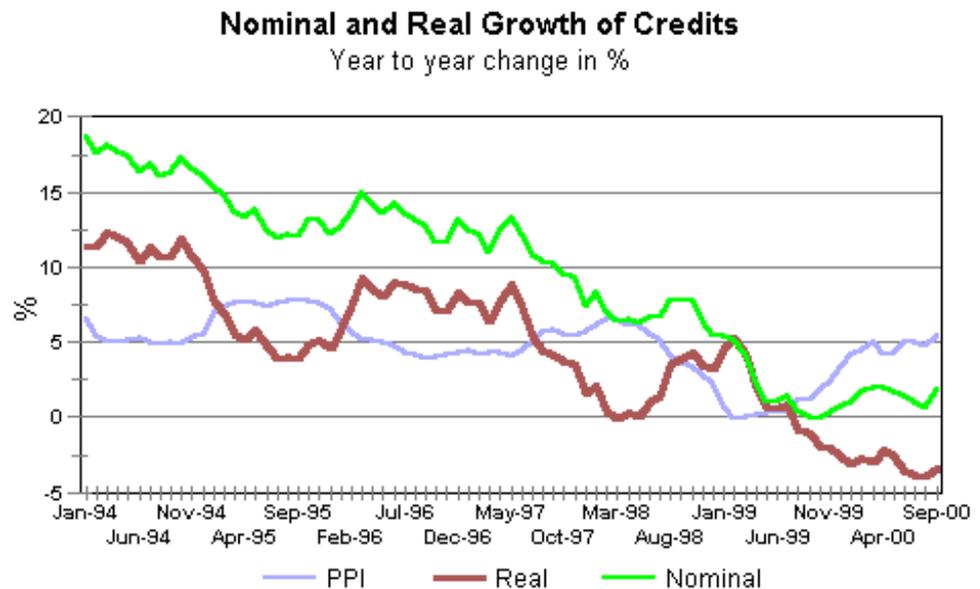
Then another deceleration came (from the July 1997 on), even a deeper one in comparison to the first case. As a result of this total credits virtually stagnated between February and May 1998. It was caused primarily by a sharp decline in rate of growth of nominal credits and a

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<sup>95)</sup> Measured as change against the same months in the previous year.

<sup>96)</sup> However mainly thanks to PPI.

moderate rise in growth of producer prices. After a short-lived revival a new (third) plunge



**Figure 17**

occurred in the first months of 2000.

This third period - the first period of a real decline in real credits occurred in the second half 1999 - real credits in these months (deflated by PPI) were by some 3% lower than a year before. What is interesting, is the fact that when the hypothesis of credit crunch gained ground (i.e. 1998 and beginning of 1999), the real credits were growing or stagnating at best, however when some economists declared the end of credit crunch (December 1999 in case of Patria Finance - see the previous part), the real credits actually indicate the worst problems!! This peculiar result should make us compare influence of the two determinants of rate of growth of real credits, i.e. nominal growth and growth of producer prices.

If we look at figure 17 (decomposition of rate of growth of real credits to nominal rate of growth and inflation), it is apparent that it was also the PPI index that was responsible for the three deviations of growth of real credits from its trend. However, the main cause of the trend per se was gradual deceleration of nominal credits. The last slump of real credit was started by rapid deceleration of nominal credits (PPI stagnated), but even after the nominal deceleration has ceased and actually reversed (the last months of 1999), the real slump continued, because producer prices were growing much faster.

From the data that has been presented so far we may therefore preliminarily conclude that even though the changes in total volume of credits observed in data from official statistics were

much moderate than they appeared, there was still a marked decrease of dynamics of nominal credits. This eventually lead up to decline in total real credit.

Some of the problems related to official statistics of credits have already been explained here - therefore we should still remain cautious when interpreting even the adjusted data. There is one more important problem left. The data on credits do not include factor that has had increasing importance in recent years - i.e. flows of foreign investment. Foreign investment may in a case of troubles in domestic credit market play a very specific role - if domestic banks cannot and/or do not want to lend to domestic firms and prefer another allocation of their financial resources - such as deposits with foreign banks and interbank market, then it may be the flows of foreign investment that can reroute flow of capital and return it back to economy. This argumentation has been used also by the Czech National Bank that “... *from this reason did not regard the stagnation of domestic credit emission as a serious obstacle for the present economic revival*”<sup>97)</sup>.

What reasons could be found for this kind of behaviour? As it will be demonstrated further on Czech banking sector is anything but a continuum of virtually identical financial intermediaries. Foreign banks (and other economic agents) that help to transfer financial means for that domestic banks cannot find proper placement back into Czech economy may have three advantages - first, knowledge of foreign investors and long-term economic relations with them, second, they may have more information and/or better screening methods at their disposal. Last but not least - if domestic banks struggle to meet capital adequacy requirements, they will have to prefer safer allocation of their financial resources.

It seems probable that this effect might have played quite an important role in the Czech economy - if we use M2 instead of credits as an indicator of development of liquidity in the economy (figure 18<sup>98)</sup>), we find out that liquidity in the business sector not only have not been decreasing, but it has been growing at a fairly reasonable rate.

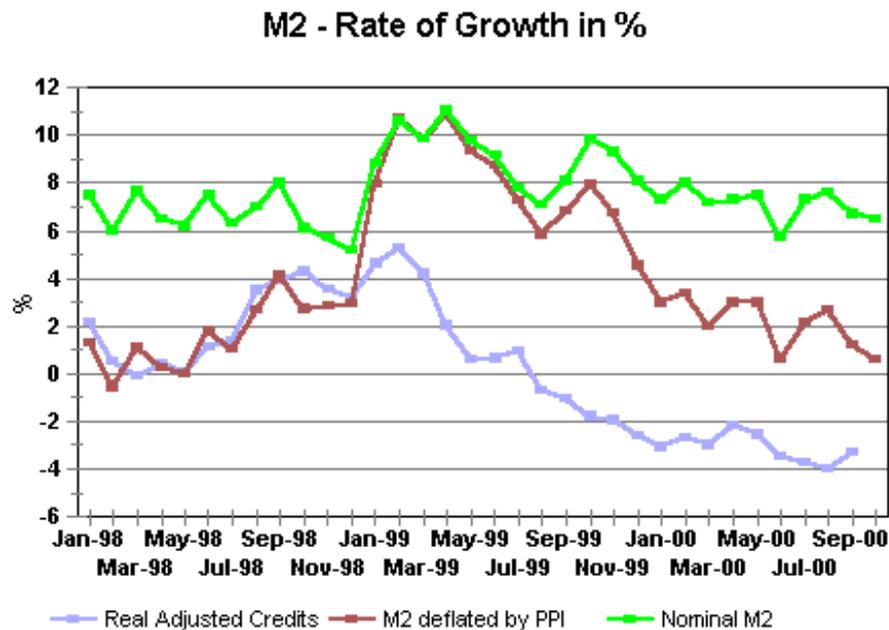
Tůma (2000) adds some estimates of importance of this effect in 1998-2000. Foreign direct investment brought some 375 billions of CZK to the business sector, domestic banks contributed to this flow by more than 130 billions of CZK (partly directly for foreign investors, partly via their foreign banks). Then it seems (and CNB uses this argument as a vindication) that as far as the flow of liquidity into the business sector is concerned, nothing serious happened.

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<sup>97)</sup> See Tůma (2000)

<sup>98)</sup> Source of data: Czech National Bank.

But it is still possible to complicate the issue even more and declare that this finding also does not have to be definite. Figure 18 compares also nominal year-on-year changes of M2 with changes in real adjusted credits and with M2 deflated by PPI<sup>99)</sup>. The deflated series has got a trend that is very similar with development of real adjusted credits (with exception of a sudden jump in January 1999). In this way we come to yet another conclusion - resources available to corporate sector decelerated and eventually even stagnated in 1999, whereas there has not been any serious



**Figure 18**

problem in 1998.

To sum it up - there are several indicators of development of credits (and liquidity): nominal and real credits from original official statistics, adjusted nominal and real credit, and broader monetary aggregates such as M2. Plausible reasons may be given for application of each of them (perhaps with exception of the original statistics). Unfortunately - findings obtained by analysis of the individual indicators are in conflict.

Anyway, do we actually know, what really happened in the Czech credit market and when? From the indeterminacy of our findings we can conclude that there were not any dramatic decrease in availability of financial resources - on average. If there were such dramatic changes (as in case of Finland), then we should be able to identify it with much less difficulty (the various indicators should coincide). Despite the fact that there was not an absolute decrease in total

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<sup>99)</sup> Year-on-year growth of M2 deflated by PPI is used here as an indicator of liquidity available to business firms (analogically to real credits).

numbers, availability of financial resources from domestic intermediaries worsened.

Could this deterioration have deeper negative impacts and why? The answer may be positive because there are at least two reasons why even relative worsening of availability of credits could have such effects. Firstly - credits play a rather specific role in the Czech economy, secondly - changes in availability of credits could afflict different sectors in a different way.

### **7.3. Role of Credit in the Czech Economy**

Influence of changes in credit market depends on role that credit plays in the particular economy. This role depends on two main factors - level of economic development attained by a country and on specific historic and institutional factors.

As far as level of economic development is concerned, there is an empiric relation between level of economic development and share of credits to GDP. Generally we can say that the more developed a country is, the higher the ratio of credits to GDP is<sup>100</sup>.

Institutional and historic factors are equally important and explain many deviations from the previously mentioned relation. These institutional factors include type and quality of relationships between depositors, financial intermediaries and investors.

Generally we can say that a developed market economy should have a high share of credits to GDP that should make it *ceteris paribus* more sensitive to shocks in credit markets<sup>101</sup>). Figure 19 displays position of Czech republic in a cross-country comparison<sup>102</sup>). It implies that Czech Republic has got lower ratio of credit to GDP than the most developed market economies (especially those in continental Europe such as Germany, this indicator would be much lower for the USA), but still substantially higher than its “copartners in transition”, i.e. Hungary and Poland

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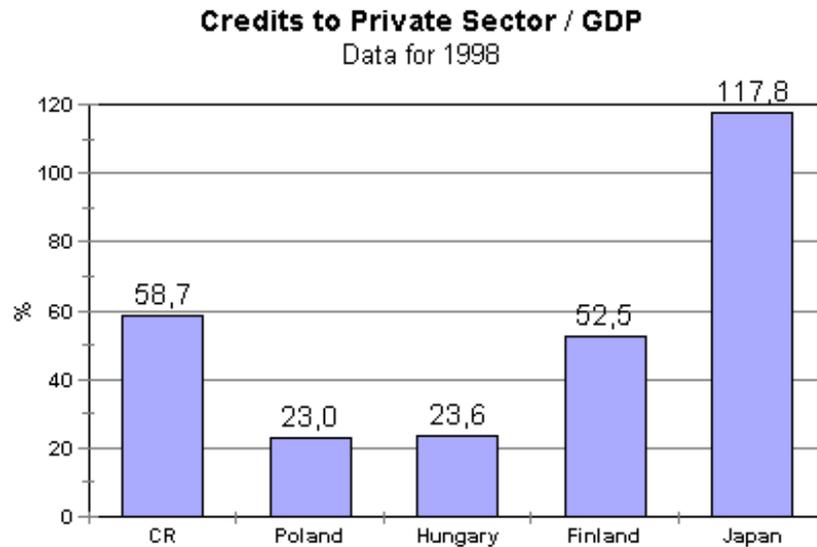
<sup>100</sup>) See Tůma (2000) for a cross-country comparison that indicates this relationship.

<sup>101</sup>) It is primarily from this reason why Minsky described his theory of financial crises as a theory suitable for developed market economies. The *ceteris paribus* condition has to be of course mentioned - there are some specific factors that cause that financial crises are not so common in developed countries and if they come, they should have less negative impacts (Minsky therefore dedicated several texts to explaining “why it can’t happen”).

<sup>102</sup>) Data used in the chart come from the International Financial Statistics - data on credits to private sector (or an equivalent of this indicator) and nominal GDP (GNP).

and even slightly higher than Finland.

We can therefore see that credits play a very important role in the Czech economy, much more important than its relative level of economic development would suggest. But why? Generally, we should not be surprised by a higher role of credit in Central European economies. This region



**Figure 19**

has got a tradition of financing of business activities by means of credit - it is clearly visible if we compare German “Rhine-capitalism” with financing in countries with Anglo-Saxon culture<sup>103</sup>). The tradition is shared also by the Czech Republic.

There are also another and more “country-specific” reasons for the high importance of credit. The “Czech way of privatization”, both in its direct form (i.e. the type of privatisation where new Czech owners took over the privatised firm) as well as in its coupon form meant that firms depended on credit heavily. New owners had generally very little own capital and they had to borrow funds for purchase of a firm as well as means for necessary investment or initial operating capital<sup>104</sup>). Czech Republic is therefore in a specific position - credit plays extremely important role in its economy, and the economy is thus much more vulnerable and sensitive to negative

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103) These differences in financing and their advantages and disadvantages are sometimes analysed in terms of the exit-voice model.

104) Moreover, Czech stock market does not offer any viable alternative for most firms. IPOs are even in comparison with Hungary and Poland extremely scarce.

changes in credit market<sup>105</sup>). Even seemingly less important shocks to the credit market thus may play an important role.

#### **7.4. Structure of Credit**

The preceding parts concentrated on development of the total volume of credits in economy (except for very brief mentions on differences in development of short-, medium- and long-term credits). Nevertheless, as it has been emphasized in the theoretical part of this paper - structural role of credits should not definitely be left out of consideration, especially in a transition economy. This section will thus briefly examine development of structure of credit.

There are several ways in which we can analyse development of structure of credit and credit allocation. There are available statistics on structure of credits by recipients, by type of credit (its purpose), by sector of economy, by expected length of duration of the credit case.

Let us start by the most important classification, i.e. by structure of credits by sector of economy to which they have been allocated<sup>106</sup>). Following table displays quarterly data on year-on-year growth of credits to main sectors of the Czech economy in 1998-2000. It is apparent that there really have been tremendous differences in growth of credits allocated to different sectors of economy (sectors by NACE classification).

Sectors placed in the top part of table 1 experienced problems - volume of credits allocated to these sectors was either decreasing (with catering and accommodation as the worst case) or its development was highly unstable (switching between growth and decline - e.g. production and distribution of electricity, gas and water). Sectors in the bottom half of the table 1 did not have on average serious problems with obtaining credits, although rate of growth of credits allocated to the categories were very low.

Although a more detailed examination of structure of credits by sector would be necessary, it seems that the worst afflicted sectors were the traditional sectors, where the "Czech way of

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105) Figure 19 even shows that credit seems to play less important role in Finland that nevertheless suffered a serious financial and banking crisis.

106) The data used in following tables comes from statistics published by the Czech National Bank (ČNB: Bankovní a měnová statistika) and they include both crown and foreign exchange credits.

Total Credits by Sector								
Year on year rate of growth, calculated from data in ČNB: Bankovní a měnová statistika								
Time	Manufacturing industry	Agriculture	Forestry, logging	Mining and quarrying	Production and distribution of electricity, gas and water	Construction	Trade, sales	Catering, accommodation
Mar-98	2,5	10,6	-32,0	-8,8	11,3	2,0	8,1	-2,3
Jun-98	2,4	22,0	-42,0	-23,4	-2,4	2,4	-1,3	-19,6
Sep-98	-3,3	-5,4	-34,1	-4,4	-8,7	-5,3	-3,4	-24,6
Dec-98	-7,9	-11,7	-23,6	-8,9	-10,7	-7,0	-10,0	-23,0
Mar-99	-6,3	-15,5	-22,1	13,6	-10,0	-2,2	-10,4	-28,8
Jun-99	-10,1	-10,6	-6,9	-7,5	-0,1	-8,2	-3,8	-16,4
Sep-99	-5,3	-3,4	-9,7	-17,1	1,4	-4,4	-8,6	-4,9
Dec-99	-10,1	-6,7	-9,4	-14,4	3,3	-11,7	-9,6	-15,2
Mar-00	-18,7	-18,4	-33,8	-18,8	10,3	-26,1	-16,7	-30,9
Jun-00	-16,7	-18,2	-0,2	-9,6	1,5	-28,8	-11,5	-33,0
Sep-00	-11,9	-17,3	-24,0	-12,6	-0,7	-28,0	-11,8	-36,3
Time	Transport, storage	Communications	Finance	Insurance	Leasing	Other market services	Others	
Mar-98	1,4	1,1	1,2	0,2	1,2	1,3	1,1	
Jun-98	1,2	1,6	1,1	1,4	1,1	1,3	1,1	
Sep-98	1,2	1,4	1,4	3,2	1,1	1,2	1,2	
Dec-98	0,9	1,4	1,1	2,5	1,1	1,0	1,4	
Mar-99	1,0	1,4	1,2	0,9	1,1	1,0	1,6	
Jun-99	0,9	0,9	1,2	0,2	1,2	0,8	1,5	
Sep-99	0,9	1,1	1,0	0,2	1,1	0,9	1,3	
Dec-99	0,9	0,8	1,1	0,4	1,2	0,9	1,1	
Mar-00	0,8	0,7	1,5	10,8	1,4	0,9	0,9	
Jun-00	0,9	0,7	1,4	8,4	1,3	0,9	0,9	
Sep-00	1,0	0,8	1,2	5,5	1,3	1,0	0,9	

Table 1

privatization” played an important role and sectors most negatively afflicted by cyclical downfall of the Czech economy (e.g. construction<sup>107</sup>). There is one more interesting property of the data - it seems as if there were two more problematic periods where several of the sectors experienced the most negative development of its credits - the middle of 1998 and middle of 2000.

Let us also examine changes in credits to manufacturing industry in more detail (table 2). It is not easy to find any clear trends in this data - it rather seems as if some of the sectors experience a wave of credit from time to time (and most probably also a wave of investment) - e.g.

<sup>107)</sup> Other possible relationships between construction and development of credits will be analysed in the part 8.

<b>Structure of Credits to the Czech Manufacturing Industry</b>						
Crown and foreign exchange credits, total manufacturing industry = 100						
Source of data: ČNB - Bankovní a měnová statistika						
	<b>Foodstuffs</b>	<b>Textile, clothing and leather products</b>	<b>Wood processing, paper and printing</b>	<b>Coking, oil processing, nuclear fuel production</b>	<b>Chemical and pharmaceutical</b>	<b>Rubber and plastics</b>
<b>Mar-97</b>	15,9	7,5	7,7	2,0	9,7	2,7
<b>Jun-97</b>	15,5	7,3	7,7	1,8	9,7	2,9
<b>Sep-97</b>	15,8	7,2	7,7	1,5	10,3	3,1
<b>Dec-97</b>	16,4	6,8	7,3	2,0	10,5	3,2
<b>Mar-98</b>	16,3	6,8	7,5	1,7	10,9	2,8
<b>Jun-98</b>	19,0	6,4	7,2	1,5	10,2	3,2
<b>Sep-98</b>	17,2	6,9	7,8	1,5	10,8	3,0
<b>Dec-98</b>	18,6	6,7	7,4	1,5	10,5	3,1
<b>Mar-99</b>	17,8	6,9	7,1	1,5	9,8	3,7
<b>Jun-99</b>	17,1	6,8	7,1	1,4	10,6	3,2
<b>Sep-99</b>	17,2	6,9	7,5	1,1	10,3	3,3
<b>Dec-99</b>	17,6	6,8	7,1	1,0	9,7	3,3
<b>Mar-00</b>	18,2	6,7	6,7	1,3	7,9	3,4
<b>Jun-00</b>	17,6	7,3	6,8	1,2	7,9	4,0
<b>Sep-00</b>	16,5	7,2	7,0	1,2	7,5	3,8
	<b>Glass, porcelain and construction materials</b>	<b>Metals and Metallurgy</b>	<b>Machines and equipment</b>	<b>Electrical engines and appliances</b>	<b>Means of transport production</b>	<b>Others</b>
<b>Mar-97</b>	5,4	15,8	13,1	4,9	9,4	5,7
<b>Jun-97</b>	5,6	15,7	13,9	4,8	9,8	5,3
<b>Sep-97</b>	5,5	16,0	13,0	5,0	9,5	5,4
<b>Dec-97</b>	5,4	16,0	12,7	5,1	9,6	5,1
<b>Mar-98</b>	5,6	15,3	12,6	5,7	9,8	5,1
<b>Jun-98</b>	5,7	14,9	12,0	5,3	9,5	5,0
<b>Sep-98</b>	5,5	15,7	13,1	5,0	8,6	4,9
<b>Dec-98</b>	5,6	15,5	11,9	5,1	8,2	5,9
<b>Mar-99</b>	5,6	16,1	12,8	4,5	8,0	6,3
<b>Jun-99</b>	5,7	16,3	12,2	4,7	8,7	6,2
<b>Sep-99</b>	6,1	17,0	12,6	4,6	8,4	4,9
<b>Dec-99</b>	6,3	17,0	12,8	4,7	8,6	5,0
<b>Mar-00</b>	6,8	16,2	12,8	5,1	9,4	5,5
<b>Jun-00</b>	6,8	17,0	12,5	5,7	8,1	5,0
<b>Sep-00</b>	6,6	16,8	12,2	5,8	10,8	4,5

**Table 2**

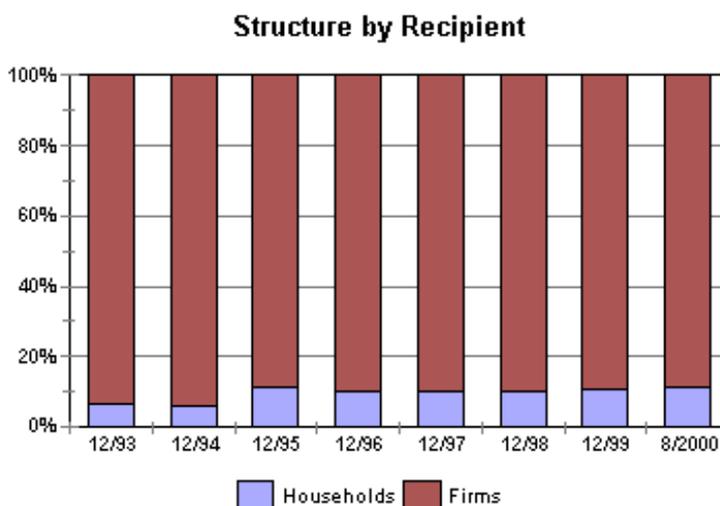
chemical and pharmaceutical industry.

We can therefore conclude that at least in 1997-2000 the changes in total volume of credits had asymmetric impact on structure of the economy. Rather surprisingly, if we look on development of shares of main sectors of manufacturing industry within the total manufacturing

industry, the situation is much less differentiated and it is actually quite difficult to identify some clear trends there.

As far as structure of credits by types of client is concerned, let us for the time being confine ourselves to changes in proportions between credits to business (firms) and credits to households - figure 20<sup>108</sup>).

Firms still receive almost 89 per cent of all credits, nevertheless the share of credits granted



**Figure 20**

to households appears to be growing (although there are some deviations from the trend). Households received only 6,7 per cent of all credits in December 1993, but 11,4 per cent in August 2000. This increase in relative weight of credits to households could be interpreted as an attempt to find an alternative placement for free financial means that banks could not allocate to business sector - but it does not have to be the sole cause of this development (and even if it were, then this effect would not be too weighty).

Development of structure of credits by their type (purpose) can offer additional information that supplements information on structure of credits by recipient - figure 21<sup>109</sup>). What we can see is a clear trend towards differentiation in credit operations of the Czech banking sector. Relative share of main types of credits used by firms (i.e. operational credits and investment credits)

108) Data from ÈNB - Inflation Report were used. Till 1996 only crown credits (without classified credits were included), since 1997 there are total credits. Data thus are not fully comparable.

109) Data in the chart are again based on information from ÈNB: Bankovní a mì nová statistika.

### Structure by Type of Credit

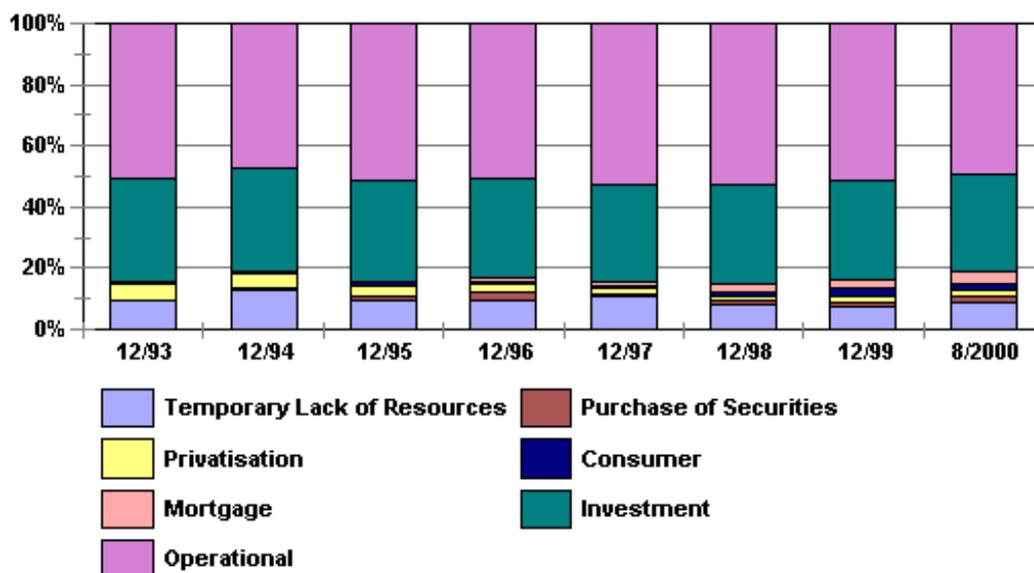


Figure 21

diminished in 1999 and 2000, whereas - rather surprisingly - it was slightly higher at the end of 1998 compared with 1997. This again indicates that on average the availability of credits did not deteriorate substantially in 1998 (when credit crunch became an accepted explanation for Czech economic woes), but there were some negative changes in 1999 and 2000. The most important decrease occurred in the case of investment credit, that had smaller share of total credits (that were moreover decreasing in real numbers). On the other hand, mortgages and consumer credits have experienced the most important increase in their market share since 1997. Importance of credits related to privatisation had been diminishing till 1998, than a small revival occurred.

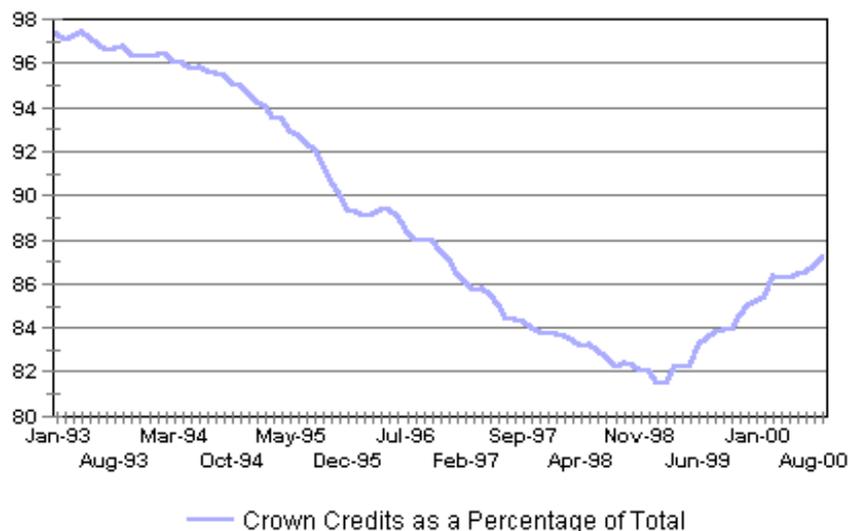
Yet another piece of evidence on development of structural aspects of the Czech credit market may be found - data on development of changes in relative share of crown credits and credits granted in foreign exchange. If we use the adjusted data<sup>110)</sup>, we find out that foreign exchange credits grew much more dynamically between 1993 and 1997 and the relative share of crown credits thus decreased from more than 95% in 1993 to less than 82 percent at the end of 1998 (see figure 22). There are two very interesting facts related to foreign exchange credits.

First and rather surprisingly, growth of their relative share went on even after exchange rate turbulences in May 1997 (the growth in the period 1993-1997 and especially 1995<sup>111)</sup>-1997 is understandable). The revised data have been - according to ÈNB - already purged from possible

110) Again the time series provided by Mgr. Holub from the ÈNB.

111) Convertibility of the Czech crown was officially introduced in October 1995.

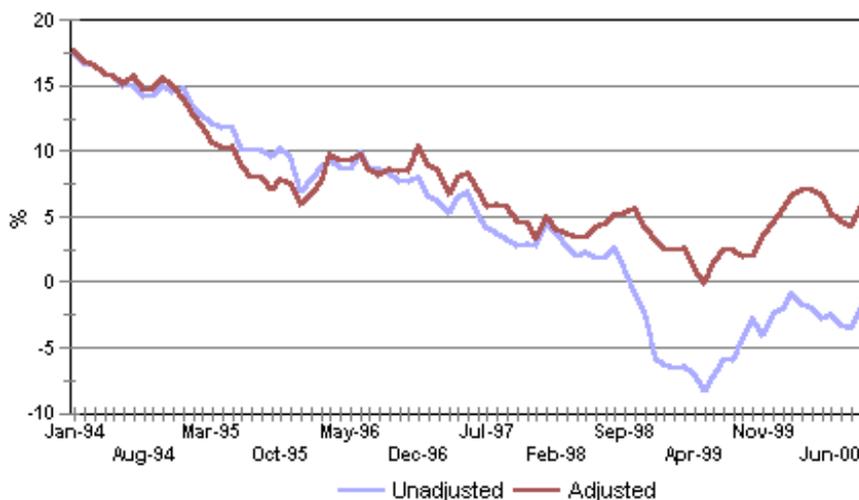
**Crown Credits as a Percentage of Total**



**Figure 22**

influence of exchange rates, so the growth after 1997 should not be caused merely by depreciation of CZK.

**Growth of Crown Credits**



**Figure 23**

Second - again we may compare adjusted and unadjusted data for both crown and foreign exchange credits. Another interesting phenomenon appears - the revision had a much more serious impact on crown credits than on the foreign exchange credits (compare figures 23 and 24).

If the main difference between the unadjusted and adjusted series has been the impact of workout procedures than it seems that foreign exchange credits were generally substantially less

problematic. A possible explanation could consist in segmentation of the Czech credit market - only some of the firms had access to foreign exchange credits and only some of the banks (probably with better screening procedures) offered such credits.

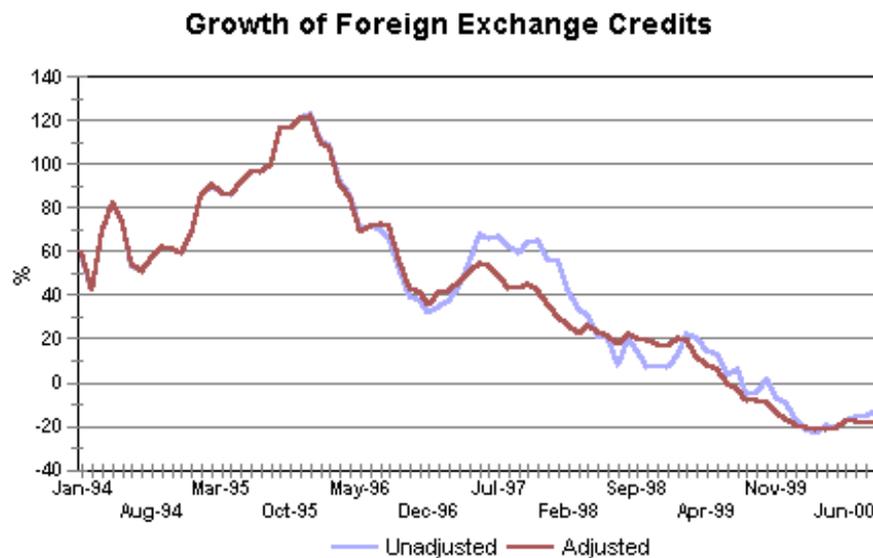


Figure 24

### 7.5. Development of Interest Rates

Looking for pieces of evidence on what has been happening with the Czech credit market, development of interest rates should not be left out. Credit market is still a market, although with some specific factors caused by asymmetric information. We should therefore try to compare development of credit with development of interest rates.

Figure 25 describes development of new credits and nominal interest rates on newly granted credits<sup>112)</sup>. There does not seem to be any specific close relationship between new credits and nominal exchange rates - new credits have been growing till the beginning of 1999, then their contribution to credit supply weakened (nevertheless it remained positive), even though nominal interest rates on new credits went on decreasing.

If we compare development of year-on-year changes in total crown credits with real interest rates<sup>113)</sup> (figure 26), again the relationship (if any) appears to be very weak.

112) Seasonal smoothing by moving averages has not been used in this case because the available consistent series was short.

113) In this case ex-post calculations of real interest rates was used, i.e. the interest rate of new credits was deflated by price index in the particular months (CPI or PPI). This approach is logical if we assume static expectations of applicants for credits.

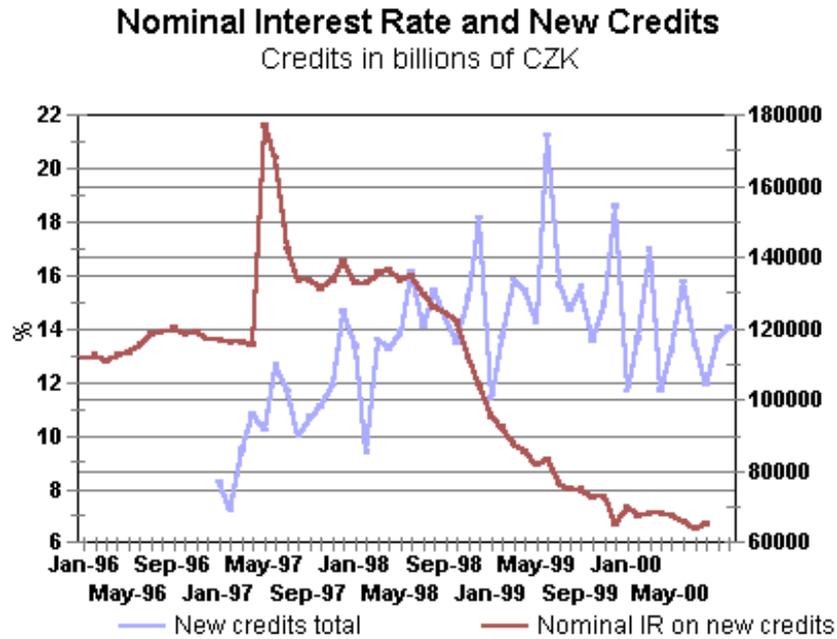


Figure 25

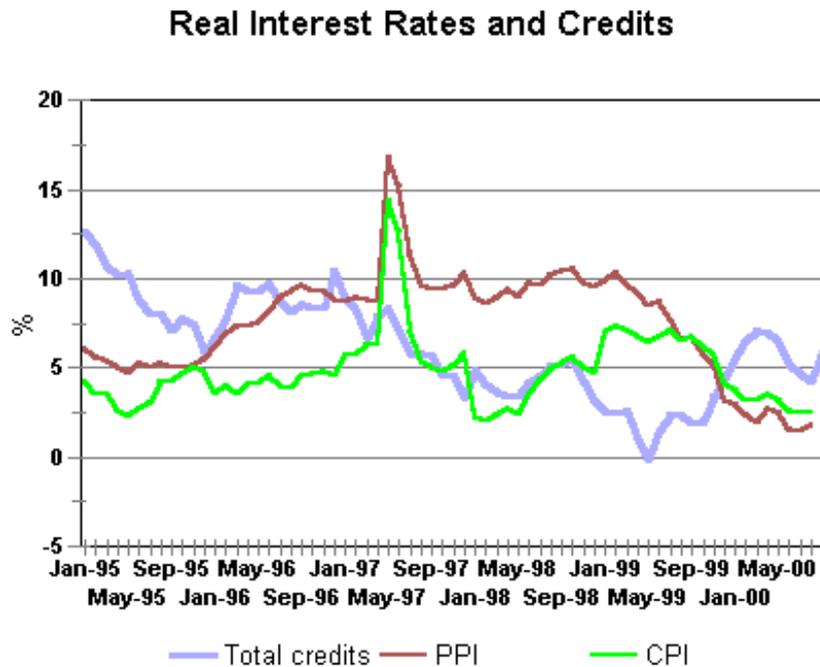


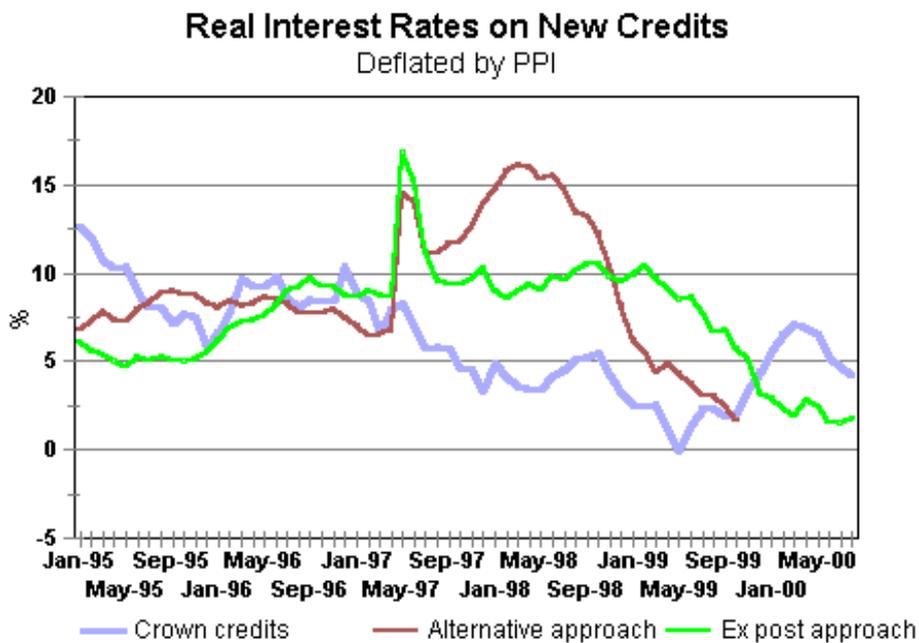
Figure 26

Simple regression analysis of relationship between changes in volume of credits and real interest rates has been carried out that confirmed this finding - regression coefficients for real interest rates had the expected sign (-), but they were not significant at the 5% confidence level. The same holds

for the models as a whole - they were not statistically significant at standard significance levels (and R-squared ratios were low). These results were roughly similar for both indicators of real interest rates (interest rates deflated by CPI or PPI), results for CPI were slightly better than for PPI, but still insignificant.

To sum it up - it is difficult to find a simple and one-way relationship between credits and real interest rates. This means that other factors (expectations, institutional factors, credit rationing) played a more important role. It is therefore not possible to describe the credit market as a standard market where decrease in total quantity of “goods” would be caused either by decreasing demand (with resulting decrease in “price”) or by decreasing supply - then we should observe increase in “price” negatively correlated with development of credits<sup>114</sup>).

One additional aspect of interplay between interest rates, prices and expectations should



**Figure 27**

be mentioned too - i.e. impact of unexpected desinflation (or even deflation) on actual real interest and financial position of debtors. It is difficult to analyse this problem rigorously - we would have to have some information on expectations of debtors at the time when they decide on application

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<sup>114</sup>) It would be possible to explain weak relationship between interest rates and credits by simultaneous shifts in demand and supply for credits. This hypothesis is however difficult to confirm or falsify with available data.

for credit and data on development of interest rates charged<sup>115</sup>). What we have instead are data on development of interest rates on newly granted credits and on total credits<sup>116</sup>), which is not sufficient for a detailed analysis.

We have chosen an alternative way how to derive an indicator that could give some information on impact of unexpected changes in inflation - a kind of “alternative” reckoning of real interest rate. Real data for inflation in corresponding periods one year ahead for deflating of the nominal interest rates - these calculations (figure 27<sup>117</sup>) thus show us what will be the real interest rate in the first year of the credit contract on the assumption that the initial interest on the new credit does not change. Results of this “alternative” approach are then confronted with traditional ex-post calculations of real interest rates that reveal expected real interest rate (on assumption that expectations are static) or actual real interest rate (provided that the nominal interest rate is perfectly indexed). If nominal interest rate is indexed “imperfectly”, i.e. they are adjusted only if cumulative inflation reaches some critical value, or if adjustments are carried out only in some predetermined intervals, then the actual real interest rate will somewhere between the traditional “ex-post” real interest rate and the “alternative” one.

Figure 27 compares results of these two ways of computation of real interest rates with year-on-year growth of crown credits. Development of the “alternative” series is interesting - there is one more peak in the series - and even more extreme than the peak in May 1997. This means that firms that received new credits in the period would have to pay substantially higher real interest rates than they could reasonably expect (the difference even exceeds 5 points). Of course this extreme result hold only for firms with credits without any indexation, for firms with some - even imperfect - indexation would the results be less extreme. Nevertheless - this second peak in real interest rates could cause serious problems to the debtors. If this impaired their creditworthiness, it could be at least a partial explanation of the slump in credit that followed.

## **7.6. Situation of the Czech Banking Sector**

Troubles of the Czech banking sector have been used as the main explanation of the “credit

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115) It depends to a great extent on exact conditions of the contract - i.e. whether indexation was used and in which way (primarily how often can the interest rates be changed).

116) ČNB now also publishes “ex ante” real interest rates - i.e. interest rates deflated by expected inflation where information on the expected inflation is obtained from a survey. However, this series is still rather short (at least in official publications).

117) Data published by ČNB in its inflation reports were used for calculations, nominal interest rates are deflated by PPI.

crunch”. Czech banking really experienced serious problems. In this section we want to expose nature of the problems and its relations to the credits and theories of credits cycles.

### 7.6.1. Development of the Czech Banking Sector

Czech banking has during transformation experienced turbulent development since 1990 when the two-tier banking system replaced the state monobank. As far as Czech credit market is concerned, the “big four” banks emerged - Komerční banka (KB) as a remainder of the former Czechoslovak State Banks (SBĚS), Česká spořitelna (ĚS), Ěskoslovenská obchodní banka (ĚSOB) and Investiční banka (later IPB). In addition there was a smaller player - Živnostenská banka (ŽB)<sup>118</sup>. These banks had some tradition, clients, information on firms and existing relationships with some of them.

What followed was a rush in the banking system, there was a real explosion of new banking institutions in 1990-1994 (and especially in 1991-1992). Table 3 illustrates this epoch, when founding a new bank was relatively easy.

We can see that banks actually multiplied in the period - there were only the five mentioned

	Banks total	- in which:								Banks without licence
		Banks with Czech majority owners					Banks with foreign majority owners			
		Total	State banking institutions	Banks with state participation	Banks with Czech majority	Banks under conservator ship	Total	Banks with foreign majority	Subsidiaries of foreign banks	
Jan-90	5	5	4	1	0	0	0	0	0	x
Dec-90	9	9	4	1	4	0	0	0	0	x
Dec-91	24	20	4	1	15	0	4	4	0	x
Dec-92	37	26	1	4	21	0	11	9	2	x
Dec-93	52	34	1	4	28	1	18	12	6	x
Dec-94	55	34	1	4	28	1	21	13	8	2
Dec-95	55	32	1	6	25	0	23	13	10	5
Dec-96	53	30	1	6	18	5	23	14	9	7
Dec-97	50	26	1	6	15	4	24	15	9	11
Dec-98	46	20	1	5	14	0	25	15	10	18
Dec-99	42	15	1	4	10	0	27	17	10	21
Sep-00	42	14	1	4	8	1	28	18	10	21

**Table 3**

banks at the beginning of 1990, but 55 banks at the end of 1994. Requirements that applicants for licences had to meet were quite lenient - at the very beginning the minimum amount of capital was

<sup>118)</sup> There was also Všeobecná úverová banka that originated in the same as the KB, however this is not mentioned here because it operated in Slovakia.

only 50 mil. CSK and banking supervision was still immature<sup>119)</sup>. Although some foreign banks came to the Czechoslovak market, the boom occurred mainly in the sector of banks with majority of Czech owners (there were 28 such banks in 1994).

What is extremely important from the economic point of view - the small banks lacked expertise as well as capital (because of small initial capital and because of significantly worse access to primary deposits). A special case were small banks founded with special intentions, such as to provide credits primarily to their own shareholders<sup>120)</sup>.

Czech banking was therefore stratified and it was far models that implicitly assume some homogenous continuum of financial intermediaries. If we forget state banks and specialized banks, we can say that there were roughly three main types of players:

1. **The big 4** - big semi-state banks with a portfolio of clients, with offices, branches and especially in case of ÈS also with access to primary deposits. They could concentrate on large firms that they regarded as relatively safe and financed also in many cases the “Czech way of privatisation” of such firms.
2. **Newly founded small Czech banks** - banks that lacked capital and portfolio of good clients, they had also problems with obtaining primary deposits. They were therefore pushed into the risky segment of market (new business, firms that were not granted credits from the large banks). Moreover - in order to raise capital and attract deposits they had to offer higher interest rates and often also acquired an important part of their resources on the interbank market. Moreover, this category had also grave problems with expertise of their employees.
3. **Foreign banks and their subsidiaries** - banks that were in a completely different situation compared with the previous two groups. They could gain capital from their mother companies and they concentrated mostly on foreign firms that came to the Czech Republic (often their traditional clients) and on the most successful Czech firms.

Moreover, even each one of the big 4 banks had its specific profile, its way of conducting business

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<sup>119)</sup> At the very beginning it was actually officially the Ministry of Finance that was in charge of bank supervision, from 1990 on the Czechoslovak State Bank started creating its own supervision department. First independent department for bank supervision in the SBÈS was created in 1991. New laws that specified the role of supervision more rigorously were passed in 1992 - see ÈNB (1999).

<sup>120)</sup> Matoušek (1998) calls this kind of banks “capture banks” or “zero banks”.

and mainly its target market<sup>121</sup>). This stratification of the Czech banking market is very important - it makes it possible to understand why problems of one category of the banks, or even of a specific bank from the big 4 group could have caused serious problems to a concrete sector of economy - without influencing another sectors or even without a correspondingly big impact on overall economic indicators.

Even though government helped to banks with problematic assets that dated from the era of planned economy<sup>122</sup>), new problems soon began to build up. It is not surprising that the first problems appeared in the category of small banks with Czech capital. ÈNB has monitored some of these problems of small banks since 1993<sup>123</sup>), the real problems surfaced in 1995-96<sup>124</sup>). ÈNB tried to alleviate the problem with another consolidation programme - Consolidation Programme II. In contrast to the first programme, this one was directed at problems of small banks and at bad loans that originated during transition and mainly in privatisation<sup>125</sup>). As a consequence of programme insolvent banks had to leave the banking sector. In order to prevent any further cases of insolvency in the sector of small banks another programme was adopted in 1996 (so called Stabilization Programme)<sup>126</sup>). From the present day point of view it however was an attempt to save unsaveable. Even though the problems of small banks were interesting from the microeconomic point of view (not speaking about criminal aspects), their macroeconomic impacts were not so important because of small share of the banks in total assets of the banking sector<sup>127</sup>). It seems that the deceleration and eventual stagnation of the total credit supply was related primarily with behaviour of the “big 4” banks that have had serious problems with their unperforming loans and which were suddenly confronted with necessity to create provisions for classified loans.

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121) Moreover - often was its target influenced rather by their investment and by investment of banking funds during the coupon privatisation than by “economic optimization”.

122) So called **Consolidation Programme I** - non-standard loans were transferred from Èeská spořitelna, a.s., Komerční banka, a.s., Investiční banka, a.s. and SBÈS (KB) and initial capital of the banks was increased.

123) ÈNB - Zpráva o činnosti bankovního dohledu v Èeské republice, 1999

124) Jonáš (1998) dubs this period a banking crisis.

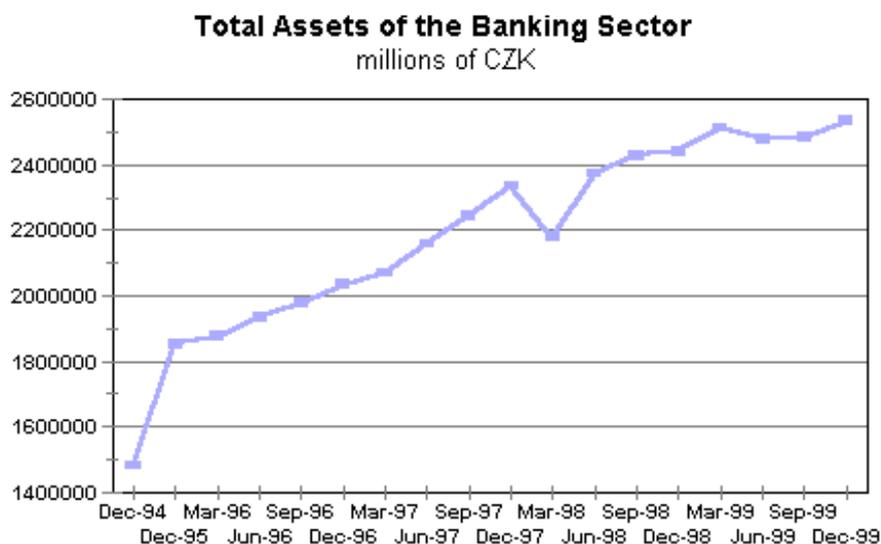
125) The gist of the programme was - to recapitalize or to close. Price of the Consolidation Programme II - some 33 billion CZK.

126) It was basically a swap operation - temporary exchange of bad loans for liquidity, that should spread the pressure of necessity to create provisions into several years.

127) As far as concentration of the banking sector is concerned, the four biggest banks alone had more than of 2/3 of share of the credit market - Matoušek-Hampl (2000).

### 7.6.2. Assets and Liabilities of the Banking Sector

Analysis of development of balance sheet of the banking sector should help us to understand better to reasons that lead to changes in the total supply of credits. More concretely - analysis of the



**Figure 28**

liability side of the balance should reveal whether something as a savings squeeze (or more generally decrease in availability of financial resources to the banking sector). By analogy - by observing of share of credits granted to clients in total assets we may found out whether the deceleration (and even real decrease) of credit supply was caused by changes in structure of total assets.

Figure 28 depicts development of total assets of the banking sector. Data used in the chart comes from CNB's reports on bank supervision. It is not completely consistent - CNB have revised its data as some banks as lost their licences. The time series therefore contains some breaks, but data in figure 28 should be completely comparable for quarters within one year and data for different years at least partially comparable. Total assets of the banking sector have been growing relatively steadily (the break at the beginning of the year 1998 can be explained by a sharp decrease of a number of "active" banks between 1997 and 1998, see table 3). Only 1999 looks rather exceptionally - however, the situation is similar here as in the case of the "original" statistics on development of credits. The statistics also do not include Konsolidační banka, s.p.ú. that

experienced high “gains” of asset (see figure 13).

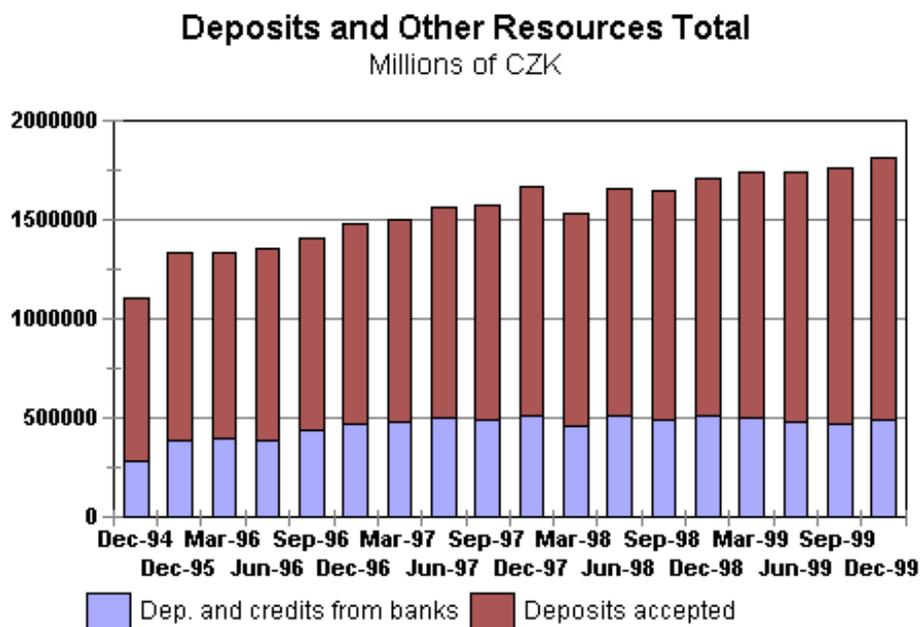
Let us move a step further and look at the liability side of the balance of the Czech banking sector. We are especially interested in development of main resources that banks can transform into supply of their credits<sup>128</sup>).

Even though there are problems with reliability of the data, it is obvious that in the 1998-1999 deposits (“deposits accepted” in figure 28) did not decrease. Deposits and credits from other banks (except for CNB), the second important source of liquidity to the banking sector, stagnated. However the total volume of external sources of liquidity grew. As far as the minimum reserve requirements are concerned (that could also negatively influence sources for creation of credit supply), there was also no negative shock in 1998 - 2000. To the contrary, the minimum reserve requirements were decreasing (they were set to 9,5% since May 1997, they were decreased to 7,5% in July 1998, then to 5,0% in January 1999 and finally to 2,0% in October 1999). To sum it up - savings squeeze (intermediation in its narrow sense) does not seem to be a probable explanation of changes in dynamics of the credit supply.

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<sup>128</sup>) The statistics used in this text come from the Czech National Bank ([www.cnb.cz](http://www.cnb.cz)) and from Bank Supervision reports. Comparability of data between years is limited because of methodology used by the CNB - it excludes banks without licence and changes the statistics correspondingly. Different values for the same indicator in the period thus may be found.

If total deposits were growing, minimum reserve requirements for primary deposits decreasing were growing, total assets were growing (if we take into account the KOB) and credits stagnated - where did the money go? If we analyse structure of assets<sup>129)</sup>, we find out that banks have been trying to allocate their resources into safe and liquid assets in 1998 and 1999 (figure 30). There is a clear trend of growth of relative shares of liquid<sup>130)</sup> and especially of quick assets<sup>131)</sup> (with exception of the third quarter of 1999).



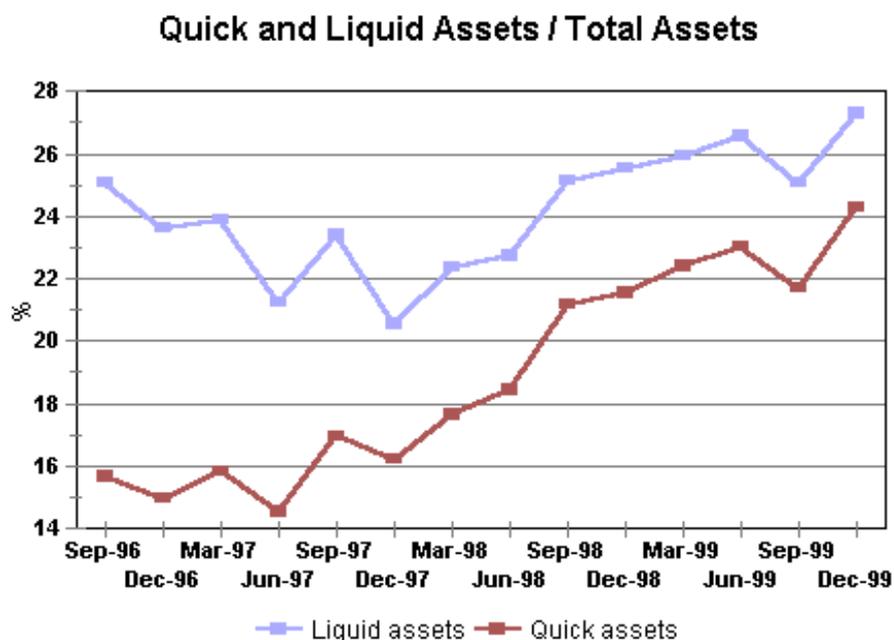
**Figure 29**

129) Sources of data are identical as in the previous case - inclusive of the shortcomings.

130) Liquid assets include quick assets + trading securities.

131) Quick assets include deposits and credits with the CNB (the most important component), holdings of T-bills and CNB bills.

To the contrary - share of clients credits really declined (figure 31), it has been well over



**Figure 30**

45% till the beginning of 1997 and diminished to almost 35% till the end of 1999 (again we should not forget that these statistics are distorted by exclusion of KOB). It was mainly the credits and deposits with the CNB (even though the compulsory part, reserves, was decreasing) and CNB-bills that grew (figures 32 and 33<sup>132)</sup>).

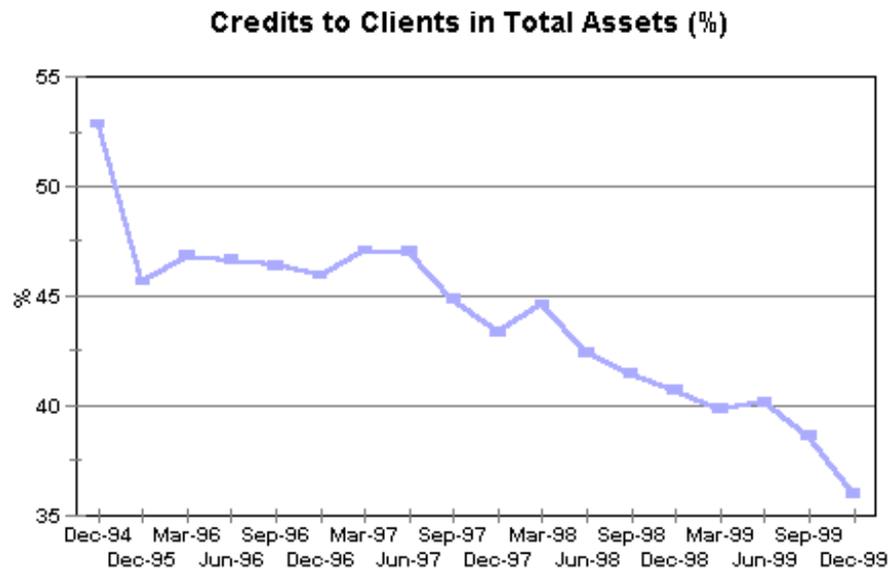
Changes in dynamics of credits had therefore their counterparts in changes in structure of assets of the Czech banking sector. The most important question still remains, though. Were these changes caused primarily by demand factors (i.e. either lack of investment opportunities and lack of applicants for credits) or primarily by supply factors - i.e. by problems of the banking sector that had to change its way of making business in order to meet capital adequacy requirements in order to be able to stay in business?

It is difficult to find the answer if direct data on decision-making in concrete cases of applications for credits are not available. Moreover, the word primarily must be stressed - credit

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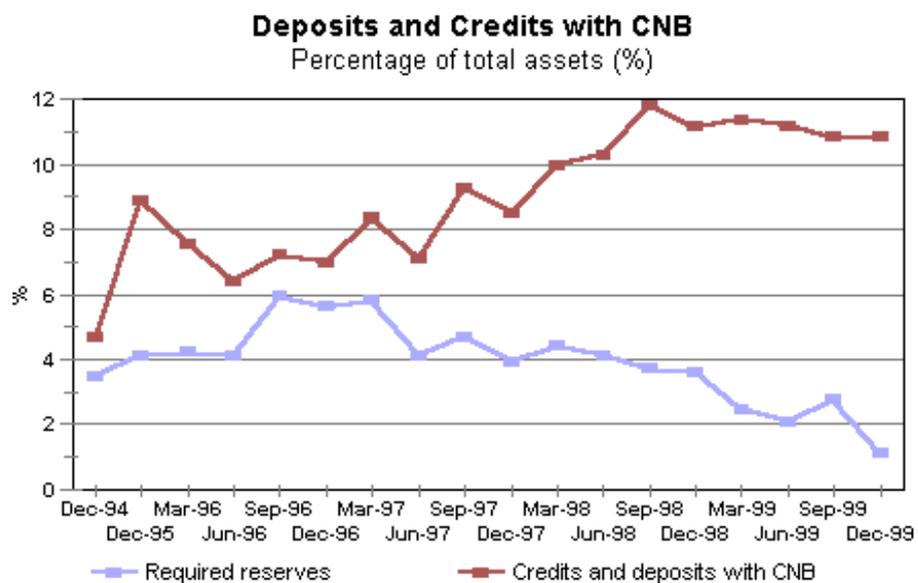
<sup>132)</sup> Source of the data - again CNB - statistics on banking supervision.

worthiness of credit applicants and banks' willingness to lend are naturally intertwined. An exogenous shock in creditworthiness will increase risk related also with older credits to the afflicted



**Figure 31**

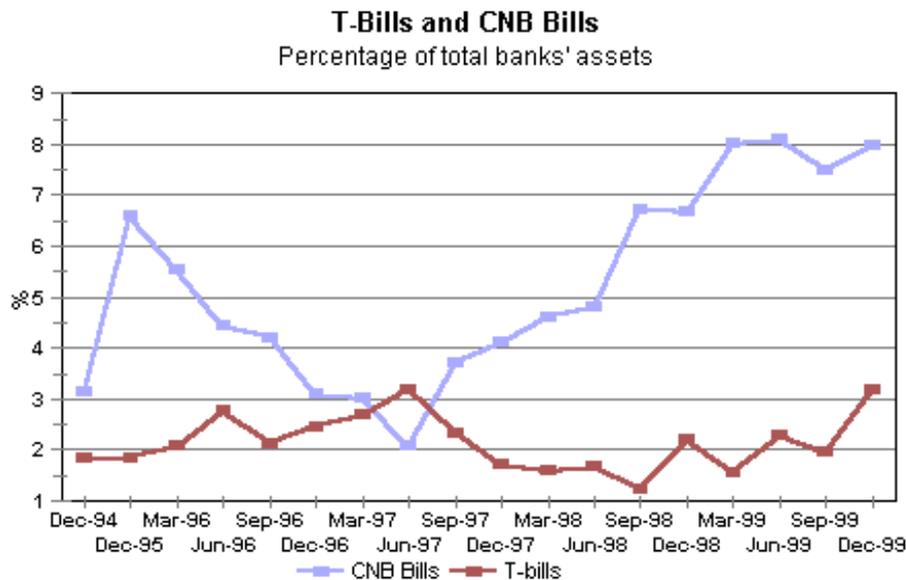
applicants and if the shock has impact on a large group of debtors, then financial position of the bank will be in serious danger too and it will try to redirect its funds into safer assets in order to



**Figure 32**

decrease the overall risk of its portfolio. And vice versa - if some exogenous shock decreases willingness of banks to lend, then firms that depended heavily on inflow of liquidity may get into trouble and their creditworthiness further decreases. This process can be even self-sustaining, if

such banks' portfolios comprise high percentage of loans to such firms. It is obvious that such a negative shock in banks willingness to lend and/or in costs related to loans will impair mainly firms that are - if use Minsky's terminology - in a speculative or in a Ponzi position (in other words if financial fragility of the system is high).



**Figure 33**

If we therefore want to find causes of changes in allocation of banks' financial resources, we should take into account both indicators that describe stability of the banking sector and data on financial situation of creditors (actual and potential).

### 7.6.3. Indicators of Stability of the Banking Sector

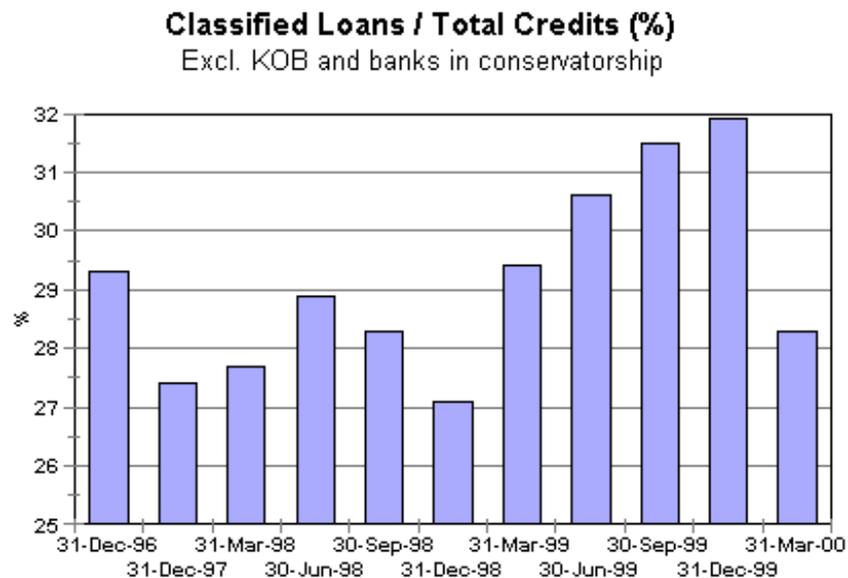
As far as problems of banking sector are concerned, they should demonstrate itself in increase of non-performing loans (both in absolute as well as in relative numbers). This increase in non-performing loans should also lead to problems with banks' capital adequacy and to deterioration of profits. The Czech National Banks publishes this type of information in its official publications (Reports on Banking Supervision) and on its webpage<sup>133</sup>).

Non-performing loans and capital adequacy developed very specifically. If classified loans

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<sup>133</sup>) Unfortunately there is again the traditional problem with comparability.

as a percentage of total loans are monitored (figure 34), then the numbers would suggest growth of classified loans in 1999 and a sharp decrease in the first quarter of 2000<sup>134</sup>). Still - the share of classified credits is extremely high<sup>135</sup>). It seems that the percentage has been growing - especially in 1999, which indicates that there really could be a relationship between problems of banks and their unwillingness to provide credits (manifested by the increase of relative importance of holdings



**Figure 34**

of liquid and safe assets).

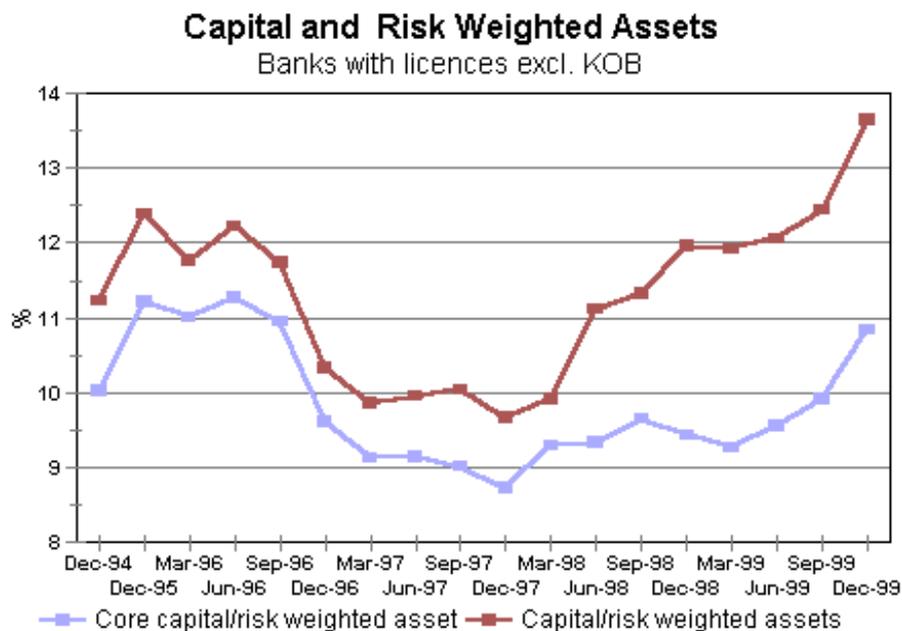
There is again a “small” problem with interpretation of available data (and especially with using the data for statistical analysis) - again the series does not appear to be consistent and stationary in time. The data has been taken from Reports on Banking Supervision for each particular year, however again conflicting numbers may be found, again credits transferred to the KOB and are not included. Moreover, even though the numbers on volume of classified credits are extremely high (more than 300 billion CZK in 1999 - official number for banking sector without banks that

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134) This decrease was caused primarily by transfer of bad loans from Komerèní banka to Konsolidaèní banka.

135) If a cross country comparison were made, this percentage would easily dwarf data on bad loans in other countries that have experienced a kind of banking crisis. Such cross-country comparisons suffer nevertheless from several inadequacies, where different standards for categorization of non-performing loans across countries are the most important factor.

had lost their licences and without credits transferred to the KOB!!), there are some signs that they still underestimate the actual situation. Banks are naturally trying to decrease volume of their bad credits in order to meet capital adequacy requirements and they use also methods similar to “creative accounting”. This problem surfaced for instance in the recent crisis related to problems of the IPB bank. It has been found out that IPB has been using several procedures that enabled it to categorize some problematic loans as standard. Typically some of the loans had been rolled, i.e. banks offered new credits that “repayed” the loans that would have to be registered as “classified” otherwise. According to some sources<sup>136)</sup>, the official bad loans amounted to 25 per cent of its credit portfolio,



**Figure 35**

whereas it is estimated that this percentage could be even as high as incredible 75 per cent, if the cover up procedures were to be taken into account.

Classified credits are divided into four categories according to risk related to them and probability of repaying. Changes in the total volume of “bad loans” were accompanied also by changes in structure of the classified credits, where the share of the fourth (the worst) category has been decreasing (out of total volume of more than 266 billion CZK in December 1997, there were

<sup>136)</sup> E.g. reports of the CTK published at website of Patria Finance ([www.patria.cz](http://www.patria.cz)).

149 billion CZK in the fourth category, where as in September 2000 credits in this category amounted only to 89 billion out of total 243 billion). The most probable explanation for the change is again exclusion of credits of banks that lost their licence and of credits administered by the KOB from the statistics - it is reasonable expect that if workout procedures were used, they have been applied primarily on the “worst” credits.

As far as development of capital adequacy and related indicators is concerned, average numbers have been actually improving substantially in 1998 and 1999 (figure 35). Superficial comparison with development of credits would indicate that the hypothesis of capital crunch can be falsified - i.e. indicators of capital adequacy have been improving in the period when credits slowed down. However - this interpretation would be really two superficial. Firstly - this improvement can be attributed at least partially to the aforesaid problems with comparability of time series. Secondly - what was the cause and what was the consequence? It has been demonstrated that share of liquid assets in total assets increased, whereas share of the worst category of classified credits declined. Positive changes in capital adequacy were thus caused by changes in attitudes of the banking sector to allocation of their financial resources. It is therefore difficult either to confirm or falsify the hypothesis of capital crunch.

### **7.7. Financial Position of Applicants for Credits**

Demand side of the credit market is determined by development of financial characteristics of applicants for credits. There are not statistics on applications for credits that would make it possible to examine risks and profitability of the refused and granted credits. However data on development of so-called “non-financial enterprises” are published by the Czech Statistical Office<sup>137)</sup> and by the Ministry of Industry and Trade<sup>138)</sup> on a quarterly basis. The data include information on structure of their assets and liabilities as well as basic information on their costs and revenues. Unfortunately (again), there are some problems with exploitation of the data for a detailed statistical analysis of dependencies and causalities between credits and health of applicants for credits. The main problem related to the data is the fact that they are calculated as sample statistics. However - the sample of enterprises does change, consequently there are problems with working with the data as with a time series. There are even differences between data published by the Ministry of Industry and Trade and data from the Czech Statistical Office.

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137) “Ekonomické výsledky nefinančních podniků”.

138) “Analýza vývoje ekonomiky ČR a odvětví v působnosti MPO” and “Finanční analýza podnikové sféry v průmyslu a stavebnictví”. Data from the two sources do not have to be fully consistent.

## Financial Analysis (organisations with 100 and more employees)

Source: Ministry of Trade and Industry of the Czech Republic

NACE	Description	ROE (%)			Bank credits+bonds/external financing + other liabilities (%)			Calculated maximum interest rates (%)		
		Year			Year			Year		
		1997	1998	1999	1997	1998	1999	1997	1998	1999
<b>C</b>	<b>Mining and quarryin</b>	<b>1,9</b>	<b>1,1</b>	<b>0,8</b>	<b>36,8</b>	<b>36,7</b>	<b>35,4</b>	<b>4,35</b>	<b>3,59</b>	<b>2,92</b>
DB	Textiles and textile products	-1,8	-1,4	-0,9	51,7	49,8	43,7	6,36	6,50	5,01
DC	Leather and leather products	-22,5	-89,2	-67,2	42,9	48,6	44,9	6,45	-8,65	-7,57
DD	Wood and wood products	0,1	-3,3	5,6	48,7	43,7	46,8	9,09	6,53	10,92
DE	Paper, publishing, printing	-4,1	-0,3	-4,3	51,9	44,2	53,4	4,32	6,70	2,60
DF	Coke, refined petroleum	10,6	9,6	5,5	40,4	47,0	40,5	16,99	15,88	9,12
DG	Chemical and pharmaceutical	0,9	2,4	0,6	24,0	35,9	18,1	6,43	7,79	5,31
DH	Rubber and plastic	5,1	7,7	13,8	57,2	59,6	49,1	12,10	14,97	20,28
DI	Non-metallic mineral products	5,5	4,1	5,6	43,3	35,5	29,1	10,45	9,03	10,00
DJ	Basic metals and metal products	-0,4	-0,7	-17,0	52,8	48,0	39,3	5,47	5,76	-4,20
DK	Machinery and equipment	-1,6	-7,5	-10,5	42,6	42,0	39,3	6,22	3,64	2,25
DL	Electrical and optic. equip.	1,3	6,5	4,2	38,7	38,3	41,7	9,66	13,91	11,46
DM	Transport equipment	-4,3	-6,1	-3,3	37,3	36,3	28,1	6,99	7,87	7,95
DN	Manufacturing n.e.c.	4,1	1,7	9,6	33,4	34,4	33,0	11,53	9,66	13,99
<b>D</b>	<b>Manufacturing</b>	<b>1,1</b>	<b>0,3</b>	<b>-1,2</b>	<b>47,6</b>	<b>48,1</b>	<b>47,4</b>	<b>8,27</b>	<b>8,10</b>	<b>6,27</b>
<b>E</b>	<b>Electricity, gas, water supply</b>	<b>3,7</b>	<b>4,5</b>	<b>3,4</b>	<b>43,4</b>	<b>43,4</b>	<b>39,2</b>	<b>6,95</b>	<b>8,02</b>	<b>6,32</b>
	<b>Total industry</b>	<b>2,0</b>	<b>1,7</b>	<b>0,6</b>	<b>36,7</b>	<b>36,4</b>	<b>35,4</b>	<b>7,59</b>	<b>7,71</b>	<b>6,01</b>
F	Construction	-1,6	-5,1	7,1	41,8	41,6	38,2	8,99	7,41	14,36
G	Trade	-3,1	-9,5	-11,3	18,7	20,5	18,9	7,76	5,82	2,26
H	Accommodation and catering	-4,4	-18,6	-5,9	39,3	39,4	35,4	8,25	-2,83	2,52
K	Services	1,8	-0,9	0,6	39,0	35,3	34,0	6,66	4,90	5,66
	Total	1,5	0,7	0,0	47,4	46,8	44,1	7,63	7,35	5,93

**Table 4**

Following table (table 4) shows some of the indicators published by the Ministry of Industry and Trade, namely return on equity (in per cents), importance of debt capital and calculations of maximum interest rates - this estimate of maximum interest rates that the firm are able to pay without problems is based on relation of EBIT to total equity, credits and bonds).

The results are very interesting and rather tragical - especially if we realise that they describe results for whole sectors. They explain why many of the sectors have got problems and mainly why they should have got problems with obtaining credits - their financial situations is in

some cases so weak that would actually need negative interest rates. Even if we look on data for 1997 (that are slightly better) then we find out that creditworthiness of many of the sectors was more than dubious<sup>139)</sup>.

From this point of view it therefore seems that it was the demand factors that played a very important role in the slow-down of credits. We could interpret it also in this way - banks have been made to return to more sensible decision-making on credits.

## **7.8. Summary - Stylized Facts on Development of the Credit Market**

Let us now try to sum up the main characteristics of development of the Czech credit market in a form of simplified “stylized facts”:

1. The changes in general trend of development of credit supply have been (especially in nominal terms) much less dramatic than it appeared from the original statistics.

It seems that although credit supply decelerated and even virtually stagnated in some periods, there has not been a significant decrease, at least not in nominal terms. Real credits have been decreasing in 1999 and 2000, however this decline was at least partially substituted by inflow of foreign capital. This “channel” of supply of liquidity into the Czech economy was rather specific, Czech banks allocated their resources to foreign intermediaries or granted credits directly to foreign investors that channelled liquidity back to the Czech economy.

2. Although development of credits was on so dramatic on the aggregate level, structural changes must also be taken into account.

Credit allocation mechanism should help to sort out profitable (and therefore also viable) businesses. Because economic transition includes also structural changes in economy, it is quite logical that some sectors will experience “lack of credits” or “unwillingness to lend”. Moreover, if problems appear (materialized e.g. in a form of stagnation of nominal credits), some sectors will be afflicted much more seriously. It has been demonstrated that whereas credits to some sectors were declining by more than 30 per cent, credits to another sectors grew.

Development of the overall volume of credit therefore contains only small part of information on impacts of changes in credit supply on economy.

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<sup>139)</sup> Especially if we compare it with calculations of sector specific risk premiums - see calculations of economic value added in materials of the Ministry of Industry and Trade.

3. Credit allocation process was negatively influenced by structure and characteristics of the banking sector.

Czech Banking sector was stratified. First problems materialized in the sector of small newly created banks with Czech owners - these banks had expensive sources of capital, they were pushed to more risky segments of credit market, expertise was often missing too. Their problems have been further exacerbated by fraudulent behaviour of some of their owners that lead to creation of so-called "zero" or "capture" banks. The second (and because of their size also much more grave) wave of problems occurred in the big 4 sector - large Czech banks. These had in many cases exclusive relations with firms privatized in the coupon privatisation or sold directly to Czech owners without sufficient capital ("the Czech way"). The firms - although in many cases very financially weak - had in the first years very good access to loans, in other words their budget constraints were rather weak. When these firms get into troubles, it had negative consequences for large banks. This made them change their behaviour.

4. Financial position of many debtors and applicants for credits was very weak - even if average economic indicators for whole sectors of economy are used! This indicates that much of the lending was done actually to firms that were actually in position of Ponzi finance.

If we consider indicators of profitability (ROE) of Czech firms and their indebtedness, it is surprising that they have even been granted credits (even though the numbers may be negatively influenced by recession). Much of the credits allocated to Czech economy was therefore of a very speculative nature - banks, especially the smaller ones - thus actually played the role typically played by risk capital funds. Moreover, many firms apparently used credits as the sole source of capital (if we do not take into account unpaid liabilities to their trade partners and to state). It seems that many of them have actually been in situation of Ponzi finance (or speculative finance at best), i.e. they would have serious problems with staying in business and repaying their debts, if the supply of credits suddenly declined or if costs of the external funds substantially increased. In other words - financial data suggest that the Czech economy was in a state of financial fragility.

5. Rapid and unexpected disinflation had marked impact on real interest rates and on their relations to expectations. This occurred moreover more or less in the same moment as banks were made pay more attention to their lending practice by growing bad loans.

This means that a twin effect took place - at the one hand structure of balance sheets of Czech banks deteriorated. This forced some of the smaller banks out of the market, the larger banks were afflicted later and had to gradually think over changes in their decision-making on credits.

On the other hand - there was sequence of negative shocks. At first there was an abrupt change in nominal and real interest rates caused by an attempt of the Czech National Bank to correct external disequilibrium and to defend Czech crown in May 1997, then sharp (although temporary) depreciation of currency and change in the exchange rate regime that increased value of debts denominated in foreign currencies and that simultaneously made it more difficult to get new such credits. Last but not least - this was followed by sharp and unexpected disinflation that also tends to have negative effect on debtors. Consequently - creditworthiness of applicants for credits deteriorated too.

6. Amount of accepted deposits have not been declining substantially, resources of capital for banks therefore did not play negative role.

Deposits on average did not react negatively to problems of the banking sector, there were shifts only within the banking sector - from banks perceived as risky to banks regarded as safe or too important to fail.

If we compare these findings with definition of different states of disorder of the credit market, we can conclude that the deceleration (and stagnation) of total credits were caused both by **collateral squeeze** (i.e. negative development of creditworthiness of Czech firms caused by negative changes in their perceived net worth) and **capital crunch**. Nevertheless, as far as capital crunch is concerned, it seems that at least part of this phenomena is actually a return to sensible decision-making in the banking sector (i.e. banking sector realised importance of sufficient “margins of safety”). To the contrary, we can exclude the hypothesis of **savings squeeze** (disintermediation in the narrow sense).

## **8. Application of the Kiyotaki and Moore’s Model on the Czech Economy**

If we want to explore whether development after 1997 corresponds to predictions of Kiyotaki’s model, we should ideally be capable of identifying a relationship between asset prices and economic cycle. We should be interested in all assets that can be and usually also are used as a collateral. We should be interested not only in prices of these assets in general, but also in specific sub-categories - it would make sense to analyse development of prices of assets that have already been used as a collateral and that influence quality of balance sheets of the banking sector, as well as development of yet non-collateralized assets. Moreover, we should ideally be able to identify direction and

strength of these dependencies.

### **8.1. Suitable Indicators of Asset Prices and Availability of Data**

When testing relevance of application of Kiyotaki's model on the Czech Republic, we need some reliable indicator of development of prices of collateral. The truly ideal situation would be, if we could analyse a time series of reliable and detailed data on prices of assets that have already been used as collaterals and of assets that are regarded generally as collateralizable<sup>140)</sup> but that have not been used for this end yet. This would make it possible not only to test Kiyotaki's and Moore's model, but to differentiate more exactly among different forms of credit market breakdowns.

The above-mentioned task may be much harder than it appears. When describing development in Finland and Japan, we could make use of statistics on real estate prices (even divided into two categories - commercial and residential) that appear to be a satisfactory indicator of prices of assets that usually play the role of collateral. It may seem strange, but in this case availability of data for domestic economy is much worse and results of the whole analysis are therefore rather dimmed.

What kind of data can and cannot be obtained and how relevant and reliable they are? First of all - neither Czech National Bank nor Czech Statistical Office offers consistent and reliable time series of prices of collateralizable assets (although their economic importance may be immense). Individual banks should have got naturally at least some information on the development of value of property that has been used as collateral for their lending operations, however they regard this kind of information as confidential and are not willing to make it public. Moreover, it seems that even though they have got some information they are not able to express it in a form of some overall index<sup>141)</sup>.

It is therefore necessary to look for some alternative indicator. Some index of real estate prices would appear to be the most useful and obvious replacement (similar to indexes used in the parts on Japan and Finland). However it seems that a similar indicator is not available for the Czech Republic - at least not in a comparable form. This issue has been discussed with experts on development of estate prices in the Czech Republic<sup>142)</sup>. According to them it is possible to find some

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<sup>140)</sup> Czech law makes it possible to use as collateral movable assets, real estates, property rights and other valuable property, e.g. shares and trademarks as collateral.

<sup>141)</sup> This issue was consulted also with Mgr. Martin Èihák.

<sup>142)</sup> E.g. Mr. Kuèera from the Ekonom weekly or experts on valuation of realties from SINDAT ÈS Consulting a.s..

short term comparison of development of estate prices for a concrete locality<sup>143</sup>), the data from such studies however cannot be expressed in a form of a reliable time series and are far from being representative (data from different localities would have to be mixed and even then the series would be far from complete). According to these sources real estate agencies have got their own databases of contracts that they helped to negotiate, however even this kind of data is not representative, moreover real estate agencies treat the data as a confidential and very valuable (better said expensive) data<sup>144</sup>). Hampl - Matoušek (2000) have come to the same conclusion on this point, however they managed to get data from surveys of the AIGLE company<sup>145</sup>) - however their data offer only modest description of trends of the real estate prices. They indicate that real estate prices have been growing or stagnating till 1996, but that there was a sharp decrease of the prices in 1997 (y-o-y change by some 10-15%) and again in 1998 (some 15-18%).

Yet there is a potential source of this kind of data - values of all transactions with real estates are reported to the Ministry of Finance - or better said to tax authorities<sup>146</sup>), because tax imposed on sales (and transfers) of realties depends on their price. However - this source of data is allegedly also unavailable.

Another source of data could be official price maps and tools for official estimates of prices of real estates. Czech Ministry of Finance publishes this official price maps in its publication "Cenový vřstník". However - again applicability of this data is questionable - these maps are related to official prices, and not to market prices (at least not directly) that matter for banks in their decision-making. On top of this - the "maps" are always relevant for a concrete region and frequency of this data for a concrete region is quite low<sup>147</sup>).

We therefore have to seek some alternative source of information - it does not have to be

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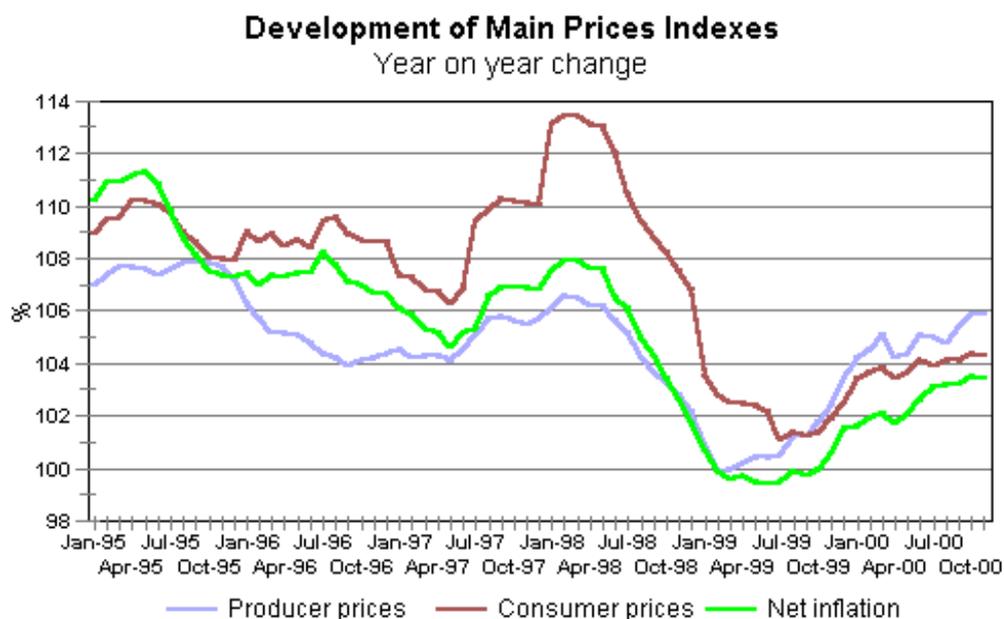
143) Such as e.g. description of development of real estate prices in Brno for two consecutive years.

144) Unfortunately their willingness to offer the data to the public is mostly low, they are not willing to do so for free, moreover this agencies are concentrated on regional markets mostly, and reliability and comparability of data is thus questionable.

145) According to Hampl-Matoušek (2000) this source is only of a limited use - the data is selective (only some types of real estates, only some cities, they are not in a form of standard statistics).

146) Selling prices are used for calculations of tax from sale (transfer) of realties (so-called "daò z pøevodu nemovitostř").

147) Several price maps of land prices are available for instance for Olomouc (maps from 1992, 1993, 1997, 1998, 1999), however another - including the most important cities - according to information from Cenový vřstník publish and update their price maps with much lower frequency. For instance Prague published its maps of land prices only twice (1999 and 2000).



**Figure 36**

an exact measure of development of prices of assets, it is sufficient if such an indicator is in some way<sup>148)</sup> correlated with development of prices of relevant assets.

We could start with general price indexes - i.e. with indexes describing development of domestic prices (CPI, PPI, deflator). These are very far from being an ideal indicator of development of prices of durable and collateralizable asset, however it is possible to find some reasons, why they could - especially if large swings of asset prices occur - contain a piece of relevant information.

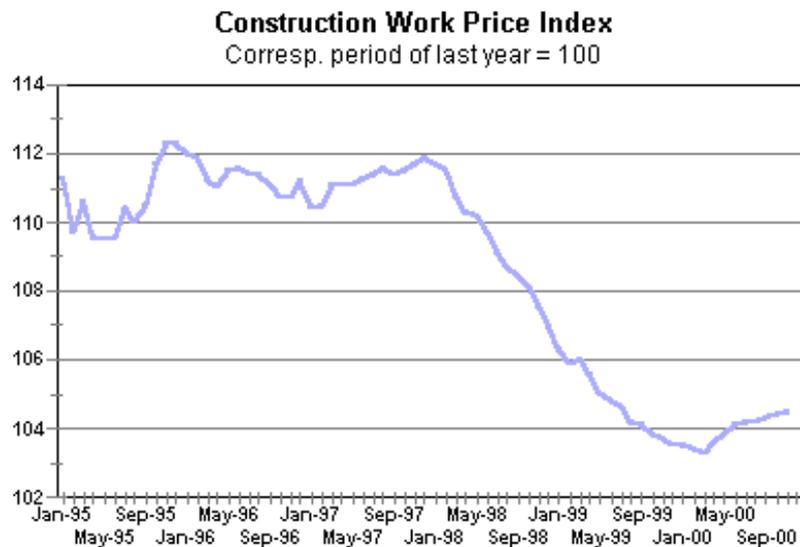
Czech Statistical Office also monitors and publishes indexes of rental costs<sup>149)</sup>, even in breakdown to three different types of rented realties - shops, offices, production facilities). If market of commercial real estates is at least approximately efficient, we can suppose that these indexes should be correlated with development of prices of real estates. Reliability of this relation seems unfortunately to be rather doubtful. Behaviour of the indexes is very specific, there is an apparent stickiness (it seems that changes in rental costs occur mostly only on a quarterly basis). Moreover the indexes even develop rather from one another. The only index of rental costs that appears to have

148) Even indicators with negative correlation may be useful from this point of view.

149) So called "Index vývoje cen pronájmů nemovitostí".

some trend really similar to the predicted development of asset prices is the index of realties used for mercantile activities (shops).

There was a gradual decrease in prices measured by this index between May and August



**Figure 37**

1998 followed by stagnation and then a sharp decrease (absolute!) in May 1999. It is interesting that rental costs for shops fell to a level that corresponded to rental costs December 1993 (and again even deeper in September 1999). As far as of rental costs for production and warehousing facilities are concerned, all we can say that stagnation or slowdown of growth is characteristic for both of the indicator.

Czech Statistical Office releases indices of prices of construction works<sup>150)</sup> too. This index could also be in a way related to prices of real estates (or more generally to prices of collateralizable assets). In this case we may identify a negative change in dynamics of the index.

Finally - even the stock exchange index could reveal some information of prices of assets. If asset prices decrease and net worth of firms fall, a fall in value of their shares should follow. Moreover, this index is relevant also per se - if stock markets are booming, banks may be willing to solve older credits (or even offer new financial resources) by capitalization of its claims. Matoušek-Hampl (2000) compare development of the PX-50 Prague Stock Exchange Index with

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150) "Index vývoje stavebních prací".

development of credits to industry and find some evidence in favour of the relation (their analysis is based on a chart, no econometric model is used)

What information on prices can we thus use? We have no reliable index, however there are several “alternative” indexes. Each of them could theoretically contain some piece of information, yet they are far from being perfect indicator. A solution to this problem could be to use a composite index or a diffusion index that would encompass the mentioned indexes as its components.

## 8.2. Composite Index as an Indicator of Real Estate Prices

Diffusion and composite index are mostly used in analyses of business cycles. Application of this type of indexes makes it possible to sum up information contained in several different indicators. It is suitable if we have several such indicators and none of them is an ideal descriptor of trend - then this kind of analysis enables to put together pieces of evidence hidden in the different series.

If we have several time series of such indicators than **diffusion index** is number describing how many (percentage) of the series used for construction of the index increased in the particular period. In order to get some reasonable results, it is better to use more than three such series<sup>151</sup>).

**Composite index** is defined in a different way - we calculate some average change in the series. That is - at first rates of growth for each of the series are computed, then rates of growth are by an indicator of volatility of the particular series<sup>152</sup>). Composite index is then calculated as an average of these “adjusted” rates of growth.

Composite index was chosen for this type of analysis in this text because fewer indicators suffice for relatively good results. The index is based on development of construction prices. The relationships between construction prices and real estate prices are relatively straight-forward. Index construction prices describes development of prices related to construction of new buildings. If prices of buildings decrease (or more widely prices of collateral - buildings are also an important part of estates used as collateral), then two things may happen - either construction prices decrease accordingly, or they do not - in this case however should the demand for new buildings go down. If we therefore construct a composite index composed of series of construction prices and of some indicator of development of production of the construction sector, we should obtain an indicator of

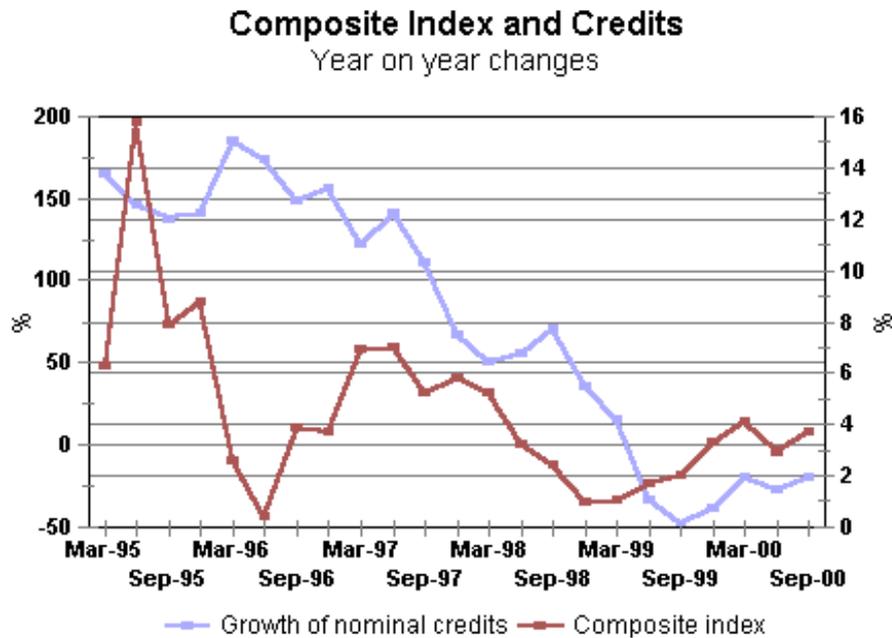
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151) Results can be than further smoothened by binomial filter - see Vošvrda (1996).

152) Mean absolute change - see Vošvrda (1996) for details.

development of real estate prices.

This approach has got however some disadvantages as well. First of all - we obtain an indicator, not a measure, that we have information on direction of the development, but we do not



**Figure 38**

know how much actually the prices increased or decreased. The second problem - production of the construction sector may be influenced by another specific exogenous influences (then the index would not describe the situation adequately). As far as this particular analysis is concerned, the biggest problems is danger of dependencies between production of construction sector and development of total credits.

Despite the disadvantages the index has been computed - the afore described index of construction prices and data on development of real gross product in the construction sectors<sup>153)</sup> have been used. Following charts show development of the index in comparison with nominal and real credits.

Figure 38 indicates that there really could be some relationship between nominal credits and the composite index, it even seems that the composite index precedes nominal credits (at least in 1997-1999). However, the relationship is rather loose (it has not got much sense to use simple regression in this case because of the character of the composite index) and development of the

<sup>153)</sup> Source of data - Czech Statistical Office, [www.czso.cz](http://www.czso.cz).

index seems to contradict to some partial information on development of real estate prices<sup>154)</sup>

As far as comparison with development of real credits is concerned, results are even worse (figure 39). Not only it seems that there is no positive relationship between real credits and the composite index, but the chart seems to indicate that the relationship is actually inverse!

Therefore we can conclude that there is either no relationship between prices of collateral and development of credit, which is more than improbable, or that we have not got a proper indicator of prices of collateral.

The Kiyotaki - Moore model therefore appears to be rather difficult to test on data for the Czech economy, because either the particular series are not available (real estate prices), or if they are available, they are not quite reliable (multitude of possible indicators of growth of credits).

### **8.3. Non-Price Influences**

Although Kiyotaki's model works primarily with prices of collateral, there are also other specific influences that could be important if we analyse real economy. These influences may include specific features of transition economies (examined further on) as well as changes in regulation of banking sector.

Such a change really took place in July 1998<sup>155)</sup> - the Czech National Bank has changed the rules for accounting of classified credits with real estates as collateral. According to this new regulation banks had to start creating provisions for this type of classified credits so that the provisions gradually amount to the full value of the outstanding credit.

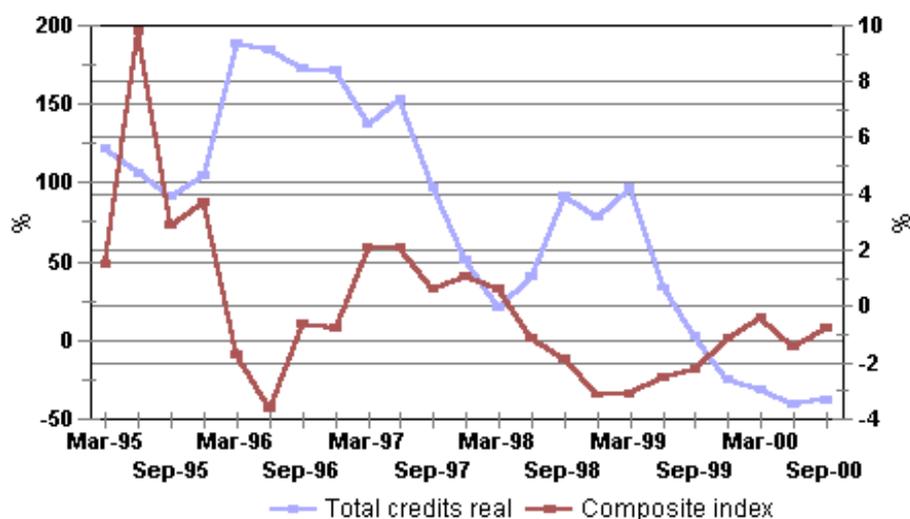
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154) Compare e.g. with the cited results obtained by Matoušek-Hampl (2000).

155) 9<sup>th</sup> July 1998

### Composite Index and Real Credits

Year on year change



**Figure 39**

#### 8.4. Specific Factors Related to Transition and Czech Credit Market

Part five of this text described some of transition-specific factors that can influence development of banking sector and creation of bubbles in asset prices. Let us now briefly mention relevance of these factors for the economic development in the Czech Republic.

##### 8.4.1. Fraud and Lack of Experience

Lack of experience and fraud - both in banks as well as by applicants for credits have played an important role in development of the Czech banking sector. It is impossible to describe here all of the cases where these two factors lead to serious problems, however it is very interesting to look into some of the most typical or most cases<sup>156)</sup>.

One of the worst problems of the Czech transformation is the question of enforcement of contracts. This question is directly connected with problems of the banking sector and with moral hazard of debtors. Czech banks have got serious problems with compensation of losses caused by bad loans. Had the legal system worked better, than the real problem would really consisted only

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<sup>156)</sup> Description of specific frauds in this section is based mainly on information by J. Kuèera from the Ekonom weekly.

in development of prices of the collateral (as in the Kiyotaki-Moore model). This is however not the case of the Czech Republic - even if a loan is secured by collateral that has some value, debtors have got a whole “portfolio of tools” that may prevent the bank from actually getting at least some partial compensation. There are many options - e.g. if family house is used as a collateral, it is sufficient to find several other people that would have their domicile there - the real estate is suddenly very difficult to sell.

Not only realization of collateral is connected with fraud, but in many cases the very decision-making on granting of a credit was afflicted by fraud too. The most typical examples are deliberate overvaluation of collateral or simultaneous use of one collateral for several different credits. The most prominent example of fraud were however small banks that were created in order to provide funding for its own owners.

#### **8.4.2. Soft Budget Constraints and the Czech Republic**

We have named soft budget constraints as one of the factors that may substantially contribute to creation of bubbles in prices of collateralizable assets. This factor and its impact is more than interesting - banks can contribute to softness of budget constraints of firms, soft constraints may lead to bubbles and the bubbles will later hurt the banks as a boomerang that punishes them for their original imprudence.

There are some signs that a similar process took place in the Czech Republic too. Most Czech banks offered credits to existing large firms rather willingly - it does not matter so much whether there really was some political pressure or whether complaints regarding political pressure are just pretext and an attempt to force state to solve their problems. What matters is the fact that some categories of firms had very good access to credits. This factor together with perceived willingness of government to help to firms in troubles contributed to the fact that many large firms privatised in a so-called “Czech way of privatization” really faced rather soft budget constraints.

Their seemingly irrational behaviour then suddenly appears to be quite logical. They had access to financial resources that they took for relatively cheap and they could also expect that banks would be willing to roll their debts. At the same time there were - thanks to privatization - wide opportunities to obtain another firms and specific assets. Then it is rational to try to buy and to hoard as many available assets as possible - these assets may later bring some profit and credits for their purchase were not so difficult to obtain (and even default was relatively painless for debtors). If such a behaviour takes place on a larger scale, it will lead to pressure on asset prices and to self-sustaining bubble.

There are several notorious examples that indicate that similar development took place in

the Czech Republic. If we look for instance at behaviour as firms such as Škoda Plzeň or Chemapol, we can really see that they were building incredible portfolios of businesses and assets that were not related to their original activities. In some cases it even seems that the only reason for an acquisition was the fact that such an asset was available and could be bought.

If we really take the analogy the analogy with János Kornai's explanation of "economics of shortage" seriously, than we should be able to identify a kind of "suction" in some of the markets. There are some signs of empirical relevance of this phenomena. One example is the Czech labour market, namely the extremely low unemployment in the "golden years of transformation" (it is especially striking in comparison with other transition economies).

### **8.5 Kiyotaki and Moore, or Minsky?**

Although it was the Kiyotaki and Moore model that originally inspired this paper, it is apparent that this model has got several problems that are particularly painful if an application on transition economies is considered. The model per se is a complex and coherent economic structure based on three types of homogeneous agents operating rationally and with perfect foresight. Although some influences can be included into the model, some other features and their impacts, such as deficient institutional background, fraud, lack of expertise may be in conflict with basic framework of the model. If the models assumptions are too abstract and even contradict reality, its relevance may be tested only by comparing predictions of the model with actual development. Moreover, if we interpret the model rather less formally and loosely (as it was done in this paper), its contents collapse to the description of relation between asset (esp. real estate) prices and aggregate product. This may be tested - if sufficient information on asset prices are available. However, as it has been already emphasized, Kiyotaki and Moore's model is not the only model that puts in connection credits, asset prices and overall economic development. The question is whether this model is really superior to its alternatives and predecessors - such as Minsky's financial instability hypothesis.

If we look into development of the Czech banking and business sector and their mutual relations, we could draw these simplified conclusions that would characterized the development in terms of the Minsky's model:

#### 1. The Czech approach to transition and mainly privatisation process was to a great extent based on owners without sufficient own resources of capital.

This means that own stake of new entrepreneurs in privatized companies was often negligible, consequently many of the businesses and banks (especially small ones) were prone to

moral hazard. Heavy reliance on external (i.e. in the Czech Republic banking) capital is still evident on empiric data.

The lack of own capital may lead to two interconnected effects - there is a danger of moral hazard and firms are probable to be in situation of a speculative or Ponzi finance unit.

2. Czech banking market has been stratified, small banks had been pushed into more risky parts of the market, the big banks had their clients to which they offered credits on relatively soft terms.

This naturally lead to increased risk in the sector of small banks that then materialized in a form of the first “banking crisis” in 1995-96.

There were categories of businesses - especially former large state enterprises privatised in the “Czech way of privatisation” that operated with relatively soft budget constraints because of special relations with some of the big Czech firms. Czech banks emphasize the issue of political pressure but it is questionable whether it was really this “pressure” that has played a dominant role.

3. Consequently the Czech way of transformation appears to be conducive to creation of overvaluation of assets and to inefficient credit allocation. This have lead to higher financial fragility.

Speculative behaviour induced by soft budget constraints for soft categories firms and existence of firms that relied on external financing to such an extent that they were in position of Ponzi (or at least speculative) units. This high degree of financial fragility caused mainly by institutional characteristics of the Czech economy then increased sensitivity to negative shocks.

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4. Then a small shock (depreciation of exchange rate, increase in real interest rates, unexpected disinflation) could really lead to Minsky-like economic problems that however can hardly be described as a full scale financial crisis.

High degree of financial fragility of the Czech economy seems to be an undisputable fact if firms' and banks' financial data are analyzed. However - the development in 1997-1999 can hardly be described as a real financial crises - credits and other indicators would have to develop much more dynamically. Moreover, the problems had also structural dimensions. An important role was probably played by foreign investment (that supplied some of the missing liquidity) and in intervention of the Central bank that took part in generous workout programmes.

## **9. Conclusion and Answers to the Questions**

Work on this paper had two main goals - firstly to define and theoretically explain what credit crunch (and related credit market breakdowns) is, secondly to analyse whether something similar has or has not occurred in the Czech Republic recently. It has originally been inspired by the Kiyotaki and Moore's explanation of credit cycles, but it ended with conclusion that other descriptions of negative impacts of developments in credit markets may be superior - at least from the point of view of analysis of a transition economy.

In order to organise the course of work on the topic, six questions were put in the introductory chapter of this paper. These questions were to delimit more concretely the field of interest which author of this paper intended to analyse. Let us therefore try to answer the questions and thus find out to what extent has work on this paper been successful.

### **Question 1: How should we define credit crunch, how it differs from behaviour known as credit rationing and how can we recognise that economy is in this situation?**

Several different definitions of credit crunch have been mentioned in this text, moreover a short "historical overview" of genesis of this notion has been presented here too. We have come to this conclusion. The definition that uses the term credit crunch indiscriminately for every situation in which problems in credit markets may play some role is too general and does not explain very much. On the other hand - if we define credit crunch as a state of discontinuity of credit supply curve, we actually describe credit rationing, not a credit crunch. That's why an alternative approach was used in the text, i.e. use rather more specific terms where problems with definitions are less pronounced. Problems of credit markets that could be labelled as credit crunches by different authors were thus classified into three phenomena - savings squeeze, collateral squeeze and capital crunch.

**Question2: How does theory explain and predicts relationships between development of credit markets and business cycle?**

Various theoretical approaches - both modern and classical - have been briefly introduced parts of this text. It was shown that economic theory can not only explain pro-cyclical development of total volume credits, but it in some cases predicts that this cyclical development in credit markets (caused e.g. by changes in expectations) can either be the main cause of this cyclical development or it at least plays a role of a channel that spreads and exacerbates impacts of other shocks (productivity or demand).

**Question3: What differences are there between the traditional “macroeconomic” theory and newer theories based on explicit modelling of microeconomic environment”?**

Traditional mainstream macroeconomic theory did not explicitly try to build its models out of formalized models of microeconomic description of behaviour of representative agents in the past. This was true also for models that try to explain consequences that sudden changes in credit markets may have. An advantage of the new models (such as Kiyotaki’s and Moore’s model) is their complexness and their aptitude for simulations. On top of that building models based on optimization makes it possible to avoid pitfalls that Lucas had in mind in his famous critique.

However - if we pass over the mathematics and analyse findings and conclusions of the model, we often find out that they are not actually too superior to some of the traditional explanations made by Hayek, Wicksell or even Marshall (something of their insight may even get lost during mathematical formalization).

Especially as far as transition economies concerned, there are many specific factors that are not taken into account in most traditional models, some of them even make application of such models inappropriate. Other approaches, especially non-mainstream models that are built with explicit or implicit assumptions of imperfect competition, uncertainty and imperfect rationality, can in such situations lead to a more adequate analysis. Minsky’s theory of financial instability is a good example of such a model that has been already used for description of Asian crisis and that can be applied on the Czech economy as well.

**Question4: What were the main features of development of credit market in other economies that are believed to come through something as credit crunch?**

As far as other economies with problems that are believed to be related to credit markets are concerned, only situation in Finland and Japan has been briefly analysed. Findings on development of credit in the two economies were quite dissimilar.

There was really an abrupt change in development of credit market in Finland that appears to be closely related to GDP and development of asset prices. Regression analysis even suggests that the shock in asset prices preceded the recession.

Situation is rather different in Japan. On the one hand, existence of an asset bubble in Japanese real estate market is an undisputable fact. On the other hand - GDP, total credits and real estate prices seem to be connected much more loosely than in the case of Finland.

Evidence on behaviour of credit markets in situations that have been dubbed as credit crunches is therefore equally wide-ranging as definition of the term per se.

**Question 5: How can we describe behaviour of the Czech credit market - especially after monetary and exchange rate disturbances in 1997?**

Description of the development depends to a great extent on sources of statistics that we use for description of the Czech credit market. Official statistics published in publications of the Czech National Bank are to a great extent biased by two factors - statistics on total volume of credit do not include credits that have been transferred to Konsolidační banka as well as credits that banks removed from their balance sheets by another means.

Therefore - if we analyse development of the Czech credit market and use the official statistics, we really come to a conclusion that there was at first a sharp deceleration of growth of credit and later even an absolute decrease of total volume of credit. However - if we use adjusted statistics, results are different - there has been deceleration of growth of credits, but much less dramatic than the original data would suggest (and also much milder than what e.g. corresponding data for Finland revealed). But, as it has been emphasized, it does not mean that some sectors of economy were not afflicted more seriously.

**Question 6: To what extent does this behaviour correspond with theoretical models and with definitions of credit crunch - was there actually something that could be described as credit crunch?**

An attempt was made to compare development in the Czech economy with findings and predictions of the Kiyotaki and Moore model and with theoretical definitions of terms related to credit crunch (disintermediation, capital crunch, collateral squeeze).

As far as Kiyotaki and Moore's model is concerned, there are serious problems with rigorous application of the model caused by lack of reliable and relevant statistics, which would reliably describe development of prices of collateral. This text offers several possibilities how to cope with the problem - instead of looking for an exact measure of development of these prices, we

could use some indicator that would at least give us some information on direction of change of prices of collateral. Several alternatives have been proposed (including diffusion and composite indexes composed of several relevant indicators). Some of these indicators together with anecdotic evidence suggest that there really could be a kind of a bubble in asset prices or that there were at least good reasons why there should be.

As far as “credit crunch” is concerned, we have tried to define problems related to functioning of credit markets a bit more rigorously in part 2. If we use the definition, we can exclude savings squeeze. As far as the two remaining causes (capital crunch and collateral squeeze) are concerned, it seems that both of them played some role. It however seems that rather than a new problem of the credit market, the situation in 1998 and 1999 could be described as a kind of sobering up from a wave of initial optimism accompanied by a sudden change in economic environment that took by surprise both borrowers and lenders. As far as relative importance of the two phenomena is concerned, it is difficult to estimate, because they are intertwined (collateral squeeze may lead to capital crunch and vice versa).

It however seems that the original cause of the problem was in inefficiency of credit allocation - many firms that could have been expected not able to repay their loans were actually granted new credits. Banks were often willingly financing firms that from today’s point of view appear to be classical Ponzi units and speculative units. Consequently financial fragility increased and the system was then negatively influenced by changes in interest rates, exchange rate and unexpected desinflation.

## 10. Literature

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