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Bankarski rizik 35

BAZEL III - MEĐUNARODNI OKVIR ZA MERENJE IZLOŽENOSTI RIZIKU LIKVIDNOSTI (8)

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Rezime

Svetska finansijska kriza podsetila je da se politika veće profitabilnosti, kao izvora kapitalizacije i bolje kapitalne adekvatnosti banke, mora voditi na način da ne ugrozi likvidnost. Bazelski Komitet reagovao je na ovakav razvoj događaja i 2008. godine objavio **Principe supervizije i dobrog upravljanja rizikom likvidnosti**.

U nameri da kompletira ove principe i dodatno ojača okvir za upravljanje rizikom likvidnosti u banci, Komitet je definisao i Međunarodni okvir za merenje izloženosti riziku likvidnosti, standarde i monitoring ovog rizika.

Razvijena su dva minimalna standarda za merenje izloženosti riziku likvidnosti: Racio pokrića likvidnosti (Liquidity Coverage Ratio-LCR) i Racio stabilnog neto finansiranja (Net Stable Funding Ratio-NSFR).

Dokumentom su definisani i alati za uspešan monitoring likvidnosti, kao i preporuke za njihovu praktičnu primenu.

Ključne reči: likvidnost, primena standarda o likvidnosti, monitoring, izveštavanje

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Banking Risk 35

BASEL III - INTERNATIONAL FRAMEWORK FOR LIQUIDITY RISK EXPOSURE MEASUREMENT (8)

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Summary

The global financial crisis has reminded us that the policy of higher profitability, as the source of capitalization and better capital adequacy of a bank, has to be managed in such a way as not to jeopardize liquidity. Basel Committee has reacted on such developments by publishing the **Principles for Sound Liquidity Risk Management and Supervision** in 2008.

With a view to completing these principles and further strengthening the liquidity management framework in banks, the Committee has defined the international framework for liquidity risk measurement, standards and monitoring.

Two minimum standards for liquidity risk measurement have been developed: Liquidity Coverage Ratio (LCR) and Net Stable Funding Ratio (NSFR).

This document has also defined the tools for successful monitoring of liquidity, as well as the recommendations for their practical implementation.

Key words: liquidity, liquidity standards application scope, monitoring, reporting

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Međunarodni okvir za merenje izloženosti riziku likvidnosti, osim standarda, definiše i alate za monitoring ovog rizika, kao i pitanja primene standarda, koja grupiše u četiri ključna segmenta:

- učestalost obračunavanja koeficijenata likvidnosti i izveštavanja Borda,
- obuhvatnost primene - konzistentnost primene standarda o likvidnosti i monitoringu likvidnosti kod svih međunarodno aktivnih banaka na konsolidovanoj osnovi, ali i drugih banaka,
- izveštavanje o likvidnosti na konsolidovanoj osnovi i u jednoj valuti i
- period posmatranja i tranzicioni aranžmani za standarde.

Učestalost obračunavanja koeficijenata likvidnosti i izveštavanja Borda

Od banaka se očekuje da kontinuirano ispunjavaju zahteve standarda.

Preporučeni minimum učestalosti izveštavanja o raciju pokrića likvidnosti (RPL) je jednom mesečno i češće (nedeljno ili čak dnevno), a u stresnim situacijama po odluci nacionalnog supervizora.

Racio stabilnog neto finansiranja (RSNF) trebalo bi izračunavati i o njemu izveštavati najmanje jednom kvartalno.

Kašnjenje u izveštavanju o racijima likvidnosti nije prihvatljivo, i za RPL ne bi smelo biti duže od dve nedelje, odnosno, za RNSF da bude usaglašeno sa standardima o kapitalu.

Obuhvatnost primene

Obuhvatnost primene standarda o likvidnosti u smislu preporuka za njihovu primenu odnosi se na konzistentnu primenu i monitoring likvidnosti kod svih međunarodno aktivnih banaka na konsolidovanoj osnovi, ali i drugih banaka. Konsolidovana primena je u fokusu iz dva razloga:

- Iako su standardi o likvidnosti međunarodno harmonizovani, uvek postoje neke razlike između jurisdikcija zbog diskrecije nacionalnih supervizora u tretmanu likvidnosti - mogućnosti da neki parametri odstupaju od preporučenih u standardu ili da budu strožiji. U ovakvim situacijama preporuka je da se primenjuju parametri usvojeni u matičnoj jurisdikciji za sva konsolidovana pravna lica, izuzev za tretman depozita fizičkih lica i male privrede u konkretnoj jurisdikciji, koji bi trebalo da prate relevantne parametre usvojene u jurisdikcijama domaćina u kojima posluju subsidijari ili filijale banaka. Ova preporuka se ne primenjuje u slučajevima da nema zahteva zemlje domaćina za depozite fizičkih lica i male privrede, u slučaju da banke posluju u zemlji domaćina koja nije primenila standarde likvidnosti, ili kada matični supervizor odluči da se primenjuju zahtevi matične zemlje, koji su strožiji od zahteva zemlje domaćina.
- Prekogranična bankarska grupa ne treba da prizna nijedan višak likvidnosti u svoj konsolidovani racio pokrića likvidnosti (RPL) ako postoji razumna sumnja o raspoloživosti takve likvidnosti.

Izveštavanje o likvidnosti na konsolidovanoj osnovi i u jednoj valuti

U kontekstu zahteva da se izveštavanje o likvidnosti radi na konsolidovanoj osnovi i u jednoj valuti, supervizori i banke trebalo bi da budu svesni potreba za likvidnošću u svakoj značajnoj valuti, kao i da imaju u vidu da se transferabilnost i konvertibilnost valuta u periodu stresa menja bez obzira na njihovu prethodnu visoku transferabilnost i konvertibilnost.

Period posmatranja i tranzicioni aranžmani za standarde

Monitoring primene standarda u periodu posmatranja ima za cilj da utvrdi nenameravane posledice njihove primene, kao i njihov uticaj na manje institucije u odnosu na velike i na različite linije poslovanja.

Komitet je odredio dinamiku posmatranja primene racia likvidnosti i odredio:

- da se revizije za RPL sprovedu najkasnije do sredine 2013. godine, kao i da se ovako revidiran standard uvede od 01. januara 2015. godine, odnosno,
- da se revizije za RSNF sprovedu najkasnije do sredine 2016. godine, a da se ovako revidiran standard uvede od 01. januara 2018. godine.

Literatura / References

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International framework for liquidity risk measurement, in addition to the standards, also defines the tools for monitoring of this risk, as well as the issues concerning the standards' application, grouping them in four key segments:

- Frequency of liquidity ratios calculation and reporting to the Board;
- Scope of application - consistency of liquidity standards application and monitoring in all internationally active banks on a consolidated basis, as well as in other banks;
- Liquidity reporting on a consolidated basis and in a common currency;
- Observation periods and transitional arrangements for standards.

Frequency of liquidity ratios calculation and reporting to the Board

Banks are expected to meet the requirements of the standards continuously.

Recommended frequency of reporting on Liquidity Coverage Ratio (LCR) is at least once a month, and more frequently (weekly or even daily), and at the times of stress according to the decision of the national supervisor.

Net Stable Funding Ratio (NSFR) should be calculated and reported on at least quarterly.

The time lag in liquidity ratios reporting is not acceptable, and for the LCR it should not be longer than two weeks, whereas for the NSFR the allowed time lag should be in line with the capital standards.

Scope of application

Scope of application of liquidity standards, in terms of the recommendations for their implementation refers to consistent application and monitoring in all internationally active banks on a consolidated basis, as well as in other banks. Consolidated implementation is in the focus because of two reasons:

- Despite all standards have already been internationally harmonised, there are some differences between jurisdictions because of the national supervisors discretion in the treatment of liquidity - possibility that some parameters differ from the recommended or that they are more stringent. In such situations the recommendation is to apply parameters adopted in the home jurisdiction for all legal entities being consolidated except for the treatment of retail/small business deposits in the concerned jurisdiction that should follow the relevant parameters adopted in host jurisdictions in which subsidiaries or branches operate. This recommendation is not applied in cases when there are no host requirements for retail and small business deposits in the particular jurisdictions, when banks operate in the host jurisdictions that have not implemented liquidity standards or when the home supervisor decides that home requirements should be used, being stricter than the host requirements.
- No excess liquidity should be recognized by cross-border banking group in the consolidated Liquidity Coverage Ratio (LCR) if there is a reasonable doubt about the availability of such liquidity.

Liquidity reporting on a consolidated basis and in a common currency

In the context of liquidity reporting on a consolidated basis and in a common currency, supervisors and banks should be aware of the liquidity needs in each significant currency, as well as have in mind that currency transferability and convertibility change in the stress period regardless of their previous high transferability and convertibility.

Observation periods and transitional arrangements for standards

The objective of the standards implementation monitoring in the observation periods is to find out unintended consequences of their implementation, as well their impact on smaller institutions versus the larger ones, and on different business lines.

The Committee determined the liquidity ratios observation dynamic:

- The latest LCR revisions should be made by mid-2013 and the thus revised LCR should be introduced as of 1 January 2015; and
- The latest NSFR revisions should be made by mid-2016 and the thus revised NSFR should be introduced as of 1 January 2018.

2. Basel Committee on Banking Supervision, *Principles of Sound Liquidity Risk Management and Supervision*, Bank for International Settlements, Basel, Switzerland, September 2008

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UTICAJ TRGOVINSKIH I BANKARSKIH KREDITA NA SVETSKI IZVOZ

Rad je pripremljen u okviru projekta Ministarstva prosvete nauke i tehnološkog razvoja Republike Srbije (179065): "Uloga države u novom modelu privrede Srbije".

Rezime

Finansiranje trgovine se ostvaruje posredstvom trgovinskih i bankarskih kredita, pri čemu bankarski krediti imaju različite vidove. Trgovinske kredite uglavnom karakteriše kratkoročno kreditiranje izvoza u intervalu od 30 do 90 dana. Bankarski krediti podrazumevaju formalnu pozajmicu novca od finansijske institucije u cilju olakšavanja međunarodne trgovine. Prema procenama, oko 90% svetske trgovine se odvija uz podršku jednog ili više instrumenata finansiranja trgovine. Posmatrani zajedno, trgovinski i bankarski krediti omogućavaju tečno odvijanje međunarodne trgovine. U ovom radu se ispituje povezanost finansiranja trgovine i svetskog izvoza. Analizira se odnos između osiguranih kredita kod državnih i privatnih osiguravača izvoznih kredita i izvoza, kao i uloga kreditiranja izvoza na nivou preduzeća. Na kraju se ukazuje na značaj finansiranja za savremene tokove svetske trgovine.

Ključne reči: trgovinski kredit, bankarski kredit, izvoz, osiguranje kredita, finansijska kriza, Bernska unija, otvoreni račun, dokumentarni akreditiv

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IMPACT OF TRADE AND BANK LOANS ON GLOBAL EXPORT

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This paper has been written as part of the project of the Ministry of Education, Science and Technological Development of the Republic of Serbia (179065): "The Role of the State in the New Model of Economy of Serbia".

Summary

Trade finance is conducted by means of trade and bank loans, with bank loans being of various types. Trade loans are mostly characterized by short-term crediting of export in the time intervals from 30 to 90 days. Bank loans are formal loans extended by a financial institution with a view to facilitating international trade. According to some estimates, about 90% of global trade is conducted with the support of one or more instruments of trade finance. Together, trade and bank loans enable the smooth functioning of international trade. This paper examines the connection between trade finance and global export. It analyzes the relation between loans insured by public and private export loans insurers and export, as well as the role of crediting export at the corporate level. Towards the end, the paper underlines the importance of finance for the modern flows of global trade.

Key words: trade loan, bank loan, export, loan insurance, financial crisis, Berne Union, open account, documentary letter of credit.

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Uvod

Finansiranje trgovine je jedan od značajnih faktora koji podstiče rast svetske trgovine. Ostvaruje se posredstvom trgovinskih i bankarskih kredita, pri čemu bankarski krediti imaju različite vidove. Visoka zastupljenost plaćanja u okviru otvorenog računa odnosi se na trgovinske transakcije između preduzeća razvijenih zemalja. Smatra se da je ovo najjeftiniji vid plaćanja u međunarodnoj trgovini, jer podrazumeva plaćanje nakon prijema robe sa fakturom prodavca. Pošto se kod ovog oblika plaćanja uglavnom radi o poslovnim partnerima koji su dugo vremena u poslovnim odnosima, uobičajeno je kratkoročno kreditiranje izvoza u intervalu od 30 do 90 dana. Time se kupcu pruža mogućnost da ne angažuje likvidna sredstva za plaćanje robe po prijemu ili po njenoj opremi u slučaju korišćenja dokumentarnog akreditiva, već se plaćanje odlaže za kasnije. Kupac može u međuvremenu prodati robu i dobijenim sredstvima platiti račun prodavcu. Skoro da je uobičajeno da i kupac robe svoje proizvode prodaje na kredit sličnog dospeća, tako da se bilans u računu odobrenih i korišćenih kredita i kod kupca i kod prodavca javlja kao relevantan iznos za bilans stanja preduzeća. Bankarski krediti predstavljaju drugi izvor za finansiranje spoljne trgovine. Oni podrazumevaju formalnu pozajmicu novca od finansijske institucije u cilju olakšavanja međunarodne trgovine. Prema nekim procenama, oko 90% svetske trgovine se odvija uz podršku jednog ili više instrumenata finansiranja trgovine. Jedan od najrasprostranjenijih vidova finansiranja trgovine je dokumentarni akreditiv (eng. *Letter of credit*). Ostali instrumenti su: avaliranje menice, krediti kupcima ili prodavcima, kontratrgovina, forfeting, faktoring, osiguranje izvoznih kredita kod izvoznih kreditnih agencija i dr. U privrednoj aktivnosti, trgovinski krediti i bankarski krediti su komplementarni. Posmatrani zajedno, trgovinski i bankarski krediti omogućavaju tečno odvijanje međunarodne trgovine. Zastoji u finansiranju neizbežno se odražavaju na obim svetske trgovine. To se moglo videti i tokom skorašnje finansijske krize, kad je došlo do smanjivanja bankarskih kredita za izvoznu podršku. Ova nestašica delimično je nadoknađena kreditiranjem između preduzeća, kroz porast odloženih plaćanja u okviru otvorenog računa plaćanja. Time su krediti između preduzeća postali amortizer otežanog pristupa bankarskim kreditima. Značaj trgovinskih kredita treba posmatrati i iz ugla po kome jedno preduzeće u isto vreme koristi kredite od prodavca i odobrava kredite kupcima svojih proizvoda. Neto odnos korišćenih i odobrenih kredita opredeljuje performanse preduzeća. U nastojanju da ublaže posledice ograničenog finansiranja trgovine, vlade i multilateralne razvojne institucije su kreirale više programa za finansiranje trgovine, uključujući i obećanje lidera G20 na londonskom skupu 2009. godine da će obezbediti 250 milijardi dolara za pomoć trgovini. U ovom radu se ispituje povezanost finansiranja trgovine i svetskog izvoza. Analizira se odnos između osiguranih kredita kod državnih i privatnih osiguravača izvoznih kredita i izvoza, kao odgovarajuća zamena za nedostajuće podatke o ukupnom iznosu kreditiranja izvoza. Sem analize makroekonomskih posledica finansiranja izvoza, u radu se obraća pažnja na nalaze u literaturi koji se odnose na ulogu kreditiranja na nivou preduzeća. Na kraju se ukazuje na značaj finansiranja za savremene tokove svetske trgovine.

Povezanost finansiranja i kretanja svetskog izvoza na makronivou

U nedostatku obuhvatnih podataka o finansiranju svetske trgovine, u literaturi nailazimo na različite pristupe koji tragaju za odgovarajućim aproksimacijama. Koristeći podatke Berne Union[1] o osiguranju trgovinskih

1 Berne Union je vodeće udruženje osiguravača izvoznih kredita i investicija u svetu, a ujedno predstavlja i forum za razmenu iskustava između članica. U članstvu se nalaze kako privatni tako i javni osiguravači izvoznih kredita i investicija.

Introduction

Trade finance is one of the important factors facilitating the growth of global trade. It is conducted by means of trade and bank loans, with bank loans being of various types. High share of open account payments is accounted for by trading transactions among enterprises from the developed countries. This is considered the cheapest way of payment in international trade, because it implies that payment is effected upon receiving goods with the seller's invoice. Given that this mode of payment typically involves business partners that have had a steady business relationship, the common thing is short-term crediting of export in the time interval from 30 to 90 days. Thereby, the buyer is offered a possibility not to engage liquid funds to pay for the goods upon their receipt, or upon their shipment in case of a documentary letter of credit, but to defer payment until later. In the meantime, the buyer can sell the goods and use the acquired funds to pay off the seller. It is almost typical for a buyer to also sell his own products on credit, with similar maturity, so that the balances of accounts of granted and utilized loans, on the side of the buyer and the side of the seller, stand as relevant amounts in the balance sheet of the concerned enterprise. Bank loans are another source of trade finance. These are formal loans extended by a financial institution with a view to facilitating international trade. According to some estimates, around 90% of the world trade is performed with the support of one or more trade finance instruments. One of the most widespread forms of trade finance is a letter of credit. Other instruments include: guaranteed bills of exchange, loans extended to buyers or suppliers, counter-trade, forfeiting, factoring, insurance of export loans by export credit agencies, etc. In commercial activities, trade loans and bank loans complement each other. Together, trade and bank loans enable the smooth functioning of international trade. Delays in financing inevitably impact the volumes of global trade. We witnessed this during the recent financial crisis, when there was a reduction in bank loans for supporting export. This shortage was partially compensated by means of intercompany crediting, through the increase of deferred payments within open accounts payments. Thereby the intercompany loans became a buffer against the aggravated access to bank loans. The importance of trade loans should also be considered in the sense that at the same time one company uses the loans granted by the seller and grants loans to the buyers of its products. The net amount of utilized and granted loans defines the company's performance. Striving to alleviate the consequences of limited trade finance, the governments and multilateral development institutions created several trade finance programs, including the promise of G20 leaders at the London summit in 2009 that they would provide 250 billion dollars to facilitate trade. This paper examines the connection between trade finance and global export. It analyzes the relation between loans insured by public and private export loans insurers and export, as an appropriate replacement for the lack of data on total amount of export crediting. In addition to the analysis of macroeconomic consequences of export finance, the paper also focuses on the findings presented in reference literature concerning the role of export crediting at the corporate level. Towards the end, the paper underlines the importance of finance for the modern flows of global trade.

Interconnection of finance and global export trends at the macro-level

Given the lack of comprehensive data on global trade finance, in reference literature we have found the various approaches searching for appropriate approximations. Using the data of Berne Union[1]

1 Berne Union is the leading association of insurers of export loans and investments in the world, at the same time representing a forum for exchange of experiences among its members. Its members are both private and public insurers of export loans and investments.

kredita[2], Auboin and Engemann (2012) su primenili model pomoću koga su ocenili u kojoj meri trgovinski krediti utiču na izvoz. Polazeći od činjenice da krediti koje osigurava Berne Union tokom godine čine oko 10% svetske trgovine, ovi autori su, u nedostatku obuhvatne statistike trgovinskih kredita u svetu, ocenili da osigurani iznos kredita dobro aproksimira obim svetskih trgovinskih kredita. Prihvatajući procenu iznetu u *IMF-BAFT Trade Finance Survey* (2009), po kojoj se oko 80% ukupnog finansiranja trgovine odnosi na kratkoročne kredite, Auboin i Engemann (2012, str. 5) su težište svoje analize stavili na obim osiguranih kratkoročnih kredita i pokušali da utvrde uzročnost između kretanja kratkoročnih kredita i svetske trgovine. Pošto je prosečno trajanje kratkoročnih kreditnih transakcija oko 3 meseca, ovi autori su ocenili da je međuodnos između globalne privredne aktivnosti, svetske trgovine, tražnje i kredita skoro direktan. Iz toga su zaključili da se kratkoročni krediti lako dovode u vezu sa kratkoročnom privrednom aktivnošću. Za empirijska istraživanja je odabran uzorak koji čini 91 zemlja, a relevantni podaci pokrivaju period od prvog kvartala 2005. do četvrtog kvartala 2011. godine. U skupu odabranih zemalja, prema klasifikaciji Svetske banke, njih 35 pripada grupi zemalja sa visokim dohotkom, 26 je u grupi zemalja sa višim srednjim dohotkom, 21 zemlja spada u grupu sa nižim srednjim dohotkom, a 9 zemalja se svrstava u zemlje sa niskim dohotkom. Uzimajući dati uzorak zemalja kao uvoznu destinaciju (Berne Union saopštava podatke o osiguranju kredita po zemljama destinacije a ne po zemljama porekla), autori su posmatrali međuodnos između kretanja osiguranih trgovinskih kredita i međunarodne trgovine tokom novije svetske finansijske krize. Prema nalazima ovog empirijskog istraživanja, autori su ocenili da postoji jaka uzročna veza između iznosa osiguranih kratkoročnih kredita, kao mere ukupnih trgovinskih kredita, i svetske trgovine tokom celog konjunkturnog ciklusa. Ova ocena je zasnovana na empirijski utvrđenom odnosu po kome 1% rasta trgovinskih kredita odobrenih jednoj zemlji, dovodi do realnog porasta uvoza te zemlje za 0,4% (Auboin and Engemann, 2012, str. 17). Značajno je i zapažanje ovih autora da utvrđena veza ne varira između kriznih i nekriznih perioda. Ovaj nalaz baca dodatno svetlo na značaj finansiranja trgovine za kretanje međunarodne trgovine u savremenim uslovima, kad se u bankarskom sistemu odvija proces deleveridža, koji može dovesti do smanjivanja njihove prekogranične izloženosti. To je ujedno i poruka tržištu da je potrebno obezbediti dodatnu ponudu trgovinskih kredita, kako bi se nadoknadio potencijalni manjak bankarskih kredita za finansiranje trgovine[3].

O značaju kreditiranja izvoza govore i podaci o osiguranim iznosima izvoznih kredita (grafikon 1).

2 Između trgovinskih kredita i finansiranja trgovine postoji razlika. *Trgovinski kredit* je sporazum između prodavca i kupaca po kome kupac robe nije u obavezi da odmah plati prodavcu fakturni iznos, već plaćanje može izvršiti kasnije - najčešće 30, 60 i 90 dana posle isporuke robe. U literaturi se navode tri osnovna razloga zbog kojih se koriste trgovinski krediti: (1) prodavac može dobiti jeftinije kredite kojima finansira kupca; (2) koristeći svoju tržišnu snagu, kupac može postići povoljnu cenovnu diskriminaciju, i (3) kupac na ovaj način dobija garanciju za kvalitet proizvoda (Klapper, Laeven and Rajan, 2011, str. 6). *Finansiranje trgovine* (bankarski kredit) podrazumeva formalnu pozajmicu novca od finansijske institucije ili države u cilju olakšavanja međunarodne trgovine. Prema nekim procenama, oko 90% svetske trgovine se odvija uz podršku jednog ili više instrumenata finansiranja trgovine (Aubon, 2009). Jedan od najrasprostranjenijih vidova finansiranja trgovine je dokumentarni akreditiv (eng. *Letter of credit*). Ostali instrumenti su: avaliranje menice, krediti kupcima ili prodavcima, kontratrgovina, forfeting, faktoring, osiguranje izvoznih kredita kod izvoznih kreditnih agencija i dr. U privrednoj aktivnosti, trgovinski krediti i bankarski krediti su komplementarni.

3 Prodavci su zainteresovani da sačuvaju tržište, iskazujući spremnost da odobravaju veće iznose trgovinskih kredita u uslovima krize (Love, 2012). Imajući u vidu da su trgovinski krediti povezani sa dugoročnim poslovnim odnosima partnera, prodavci su zainteresovani da pomognu partnerima da ostanu u poslu (Cuñat, 2007).

on trade loans[2] insurance, Auboin and Engemann (2012) applied a model to assess the extent to which trade loans impact export. Starting from the fact that loans insured by Berne Union over the year account for about 10% of global trade, these authors, having no comprehensive statistical data on trade loans in the world, assessed that the insured amount of loans approximates the volume of global trade loans in a sound way. Having accepted the assessment presented in the *IMF-BAFT Trade Finance Survey* (2009), according to which about 80% of total trade finance is accounted for by short-term loans, Auboin and Engemann (2012, pp. 5) put the focus of their analysis on the volume of insured short-term loans, trying to determine the causality between the trends of short-term loans and global trade. Given that the average maturity of short-term credit transactions is about 3 months, these authors assessed that there is an almost direct inter-relationship among the global economic activity, global trade, demand and loans. From this they concluded that short-term loans are easily related to short-term economic activity. For their empirical research they chose a sample of 91 countries, with the relevant data covering the period from the first quarter of 2005 until the fourth quarter of 2011. Among the selected countries, according to the World Bank's classification, 35 are high-income economies, 26 fall into the category of economies with upper middle income, 21 belong to the group of economies with lower middle income, and 9 of them are classified as low-income economies. Taking the sample of countries as import destination (Berne Union discloses the data on loan insurance per destination countries, not per countries of origin), the authors observed the mutual relation between the trends of insured trade loans and international trade during the recent global economic crisis. According to the finding of this empirical research, the authors assessed that there is a strong causal relation between the amount of insured, short-term loans, as a measure of total trade loans, and the global trade during the entire conjunctural cycle. This assessment is based on the empirically determined relation, according to which 1% of growth of trade loans extended to one country causes real growth of that country's import by 0.4% (Auboin and Engemann, 2012, pp. 17). Equally significant is the observation of these authors that the determined relationship does not vary in crisis and non-crisis periods. This sheds additional light on the importance of trade finance for international trade in contemporary environment, when the process of deleveraging is taking place in the banking system, possibly leading to the reduction of cross-border exposures. At the same time, this is a message to the market, underlining that it is necessary to provide additional offer of trade loans, in order to compensate for the potential lack of bank loans for the purposes of trade finance[3].

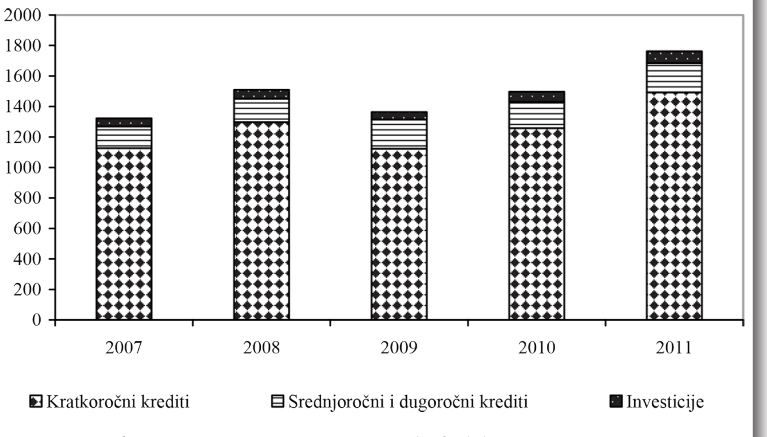
The importance of export crediting is further illustrated by the data on insured amounts of export loans (Chart 1).

2 There is a difference between trade loans and trade finance. Trade loan is an agreement between the seller and the buyer, according to which the buyer of goods is not obliged to immediately pay out the invoiced amount to the seller. Instead, the payment can be effected on a later date - most frequently 30, 60 and 90 days after the goods delivery. The literature states three main reasons for using trade loans: (1) the seller can obtain cheaper loans to finance the buyer; (2) using his market power, the buyer can achieve favorable price discrimination; and (3) this way the buyer gets a guarantee for the quality of products (Klapper, Laevan and Rajan, 2011, pp. 6). Trade finance (bank loans) implies that formal loans are extended by a financial institution or the state with a view to facilitating international trade. According to some estimates, about 90% of global trade is conducted with the support of one or more instruments of trade finance (Aubon, 2009). One of the most widespread forms of trade finance is a letter of credit. Other instruments include: guaranteed bills of exchange, loans extended to buyers or suppliers, counter-trade, forfeiting, factoring, insurance of export loans by export credit agencies, etc. In commercial activities, trade loans and bank loans complement each other.

3 The sellers are interested in keeping the market, expressing their readiness to grant higher amounts of trade loans in the times of crisis (Love, 2012). Bearing in mind that trade loans are connected to long-term business counterparty relations, the sellers are interested in helping their counterparties stay in business (Cuñat, 2007).

Grafikon 1. Ukupni iznos osiguranih kredita u periodu 2007-2011. godine

u milionima USD



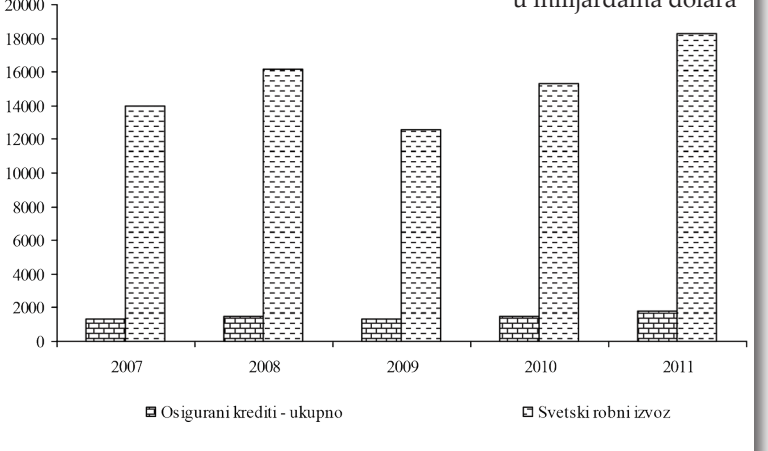
Izvor: Podaci su preuzeti iz: Berne Union, *Berne Union Statistics 2007-2011*, http://www.berneunion.org/pdf/Berne%20Union%202012%20-%20Charts%20and%20numbers%20for%20website.pdf (pristupljeno 16.12.2012. godine).

U grafikonu 1. se zapaža dominantno učešće osiguranih kratkoročnih kredita (krediti do 12 meseci) u ukupno osiguranim kreditima i investicijama. Privatni osiguravači kao i državne agencije za osiguranje i kreditiranje izvoza, pružaju usluge osiguranja trgovinskih kredita, što učesnicima u trgovini omogućava da umanje trgovinske i političke rizike. Ove kredite obezbeđuju banke, ali i sama preduzeća. Ukoliko preduzeće izvoznik odobri izvozni kredit kupcu, ono se putem osiguranja kod osiguravača izvoznog kredita štiti od potencijalne nemogućnosti da naplati svoj izvoz. Ova zaštita je u vidu obeštećenja, ako nastupi osigurani slučaj. Za preuzimanje rizika naplate potraživanja, osiguravač naplaćuje premiju. Na isti način se štite i banke koje su odobrile izvozni kredit. Na tržištu kratkoročnog osiguranja kredita dominiraju privatni osiguravači, pri čemu se ocenjuje da je njihov udeo oko 80% (Chauffour, Saborowski and Soylemezoglu, 2010, str. 5). Grafikon 1. pokazuje da je 2009. godine došlo do pada osiguranog iznosa kratkoročnih kredita, dok je iznos osiguranih srednjoročnih i dugoročnih kredita porastao. Porast tražnje za osiguranjem srednjoročnih i dugoročnih kredita je uobičajena pojava kada se u okruženju javlja visok sistemski rizik. Pri tome, na ovom segmentu tržišta izvozne kreditne agencije imaju ključnu ulogu. To se može videti i po njihovom ponašanju tokom skorašnje krize, kad su ublažile uslove osiguranja kredita i povećale ponudu u cilju smanjivanja tržišnih tenzija[4].

Posmatrajući kretanje svetskog robnog izvoza i osiguranih kredita u grafikonu 2. može se uočiti da je pad osiguranog iznosa u 2009. bio manji od pada robnog izvoza. Prema ovim globalnim podacima moglo bi se zaključiti da su i drugi faktori delovali na pad izvoza, a ne samo smanjene mogućnosti kreditiranja. Kao činilac koji je značajno uticao na smanjivanje svetske trgovine, u literaturi se navodi pad svetske uvozne tražnje ali i izbijanje krize državnih dugova u evrozoni. Osim toga, u grafikonu 2. se nalaze godišnji podaci, dok je za međupovezanost trgovine i njenog finansiranja pogodnije pratiti kretanje podataka na kvartalnom nivou.

Grafikon 2. Osigurani krediti i svetski robni izvoz u periodu 2007-2011. godine

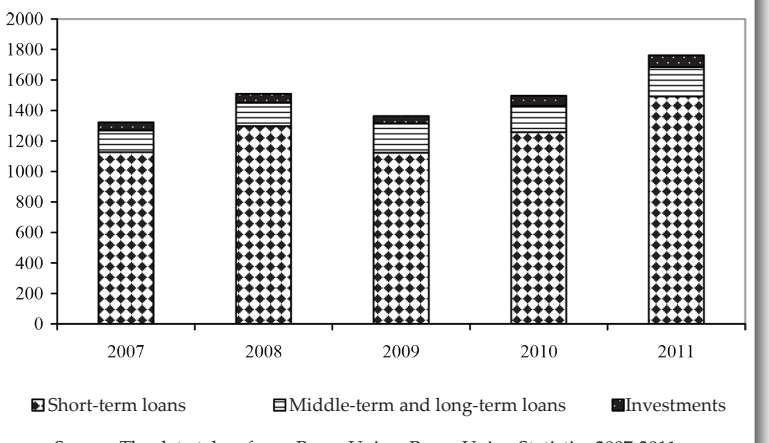
u milijardama dolara



Izvor: Podaci preuzeti iz: Berne Union, *Berne Union Statistics 2007-2011*, http://www.berneunion.org/pdf/Berne%20Union%202012%20-%20Charts%20and%20numbers%20for%20website.pdf (podaci za osigurane kredite); WTO, Website, http://stat.wto.org/Home/WSDBHome.aspx?Language=E (podaci za svetsku trgovinu) (prostupljeno 21.12.2012. godine).

4 Za potpuniji uvid u mere i aktivnosti koje su preduzele vlade i multilateralne institucije u ublažavanju krize iz 2008. godine, videti Chauffour and Farole (2009). Kriza je pokazala da je javna podrška finansiranju trgovine opravdana kada nastupe teškoće u pribavljanju ovih sredstava na tržištu (videti: Ellingson and Vlachos, 2009; Menichini, 2009).

Chart 1. Total amount of insured loans in the period 2007-2011



Source: The data taken from: Berne Union, Berne Union Statistics 2007-2011, http://www.berneunion.org/pdf/Berne%20Union%202012%20-%20Charts%20and%20numbers%20for%20website.pdf (accessed on: 16.12.2012)

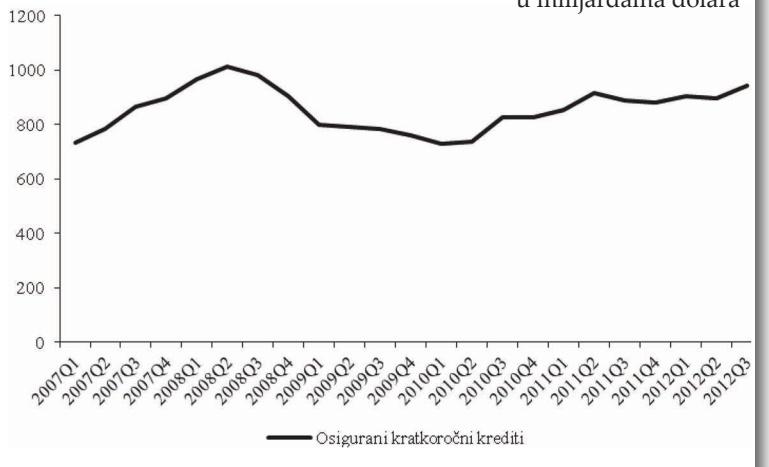
Chart 1 illustrates the dominant share of insured short-term loans (up to 12 months maturity) in total insured loans and investments. Private insurers and state agencies for export insurance and crediting provide the services of insuring trade loans, thereby enabling the trade participants to reduce the trading and political risks. These loans are provided by banks, but also by companies themselves. If an exporting company grants an export loan to the buyer, it protects itself from potential inability to charge its exports by getting its export loan insured by an insurer. This protection is in the form of indemnity, should the contractually-specified event occur. For assuming the risk of receivables repayment, the insurer charges a premium. The banks having granted an export loan protect themselves in the same way. At the market of short-term loans insurance the private insurers prevail, their share being assessed as reaching about 80% (Chauffour, Saborowski and Soylemezoglu, 2010, pp. 5). Chart 1 shows that in 2009 there was a drop in insured amounts of short-term loans, whereas the amount of insured middle-term and long-term loans increased. The growth in demand for insuring middle-term and long-term loans is a common phenomenon when there is a high systemic risk in the business environment. In this market segment, export credit agencies play the key role. This was confirmed by their behavior during the recent crisis, when they relaxed the conditions for loans insurance and increased the offer in order to alleviate the market tensions[4].

Observing the trends of global commodity export and insured loans in Chart 2, we can see that the fall of insured amounts in 2009 was lower than the fall of commodity exports. According to these global data, we could conclude that, in addition to the reduced crediting possibilities, other factors also influenced the drop in exports. As a factor which considerably impacted the decline of global trade, the reference literature specifies the drop in global import demand, but also the outbreak of the sovereign debt crisis in the Eurozone. Furthermore, Chart 2 contains the annual data, and in order to assess the mutual connectedness of trade and its financing, it is more convenient to monitor the trends demonstrated by the data at the quarterly level.

4 For a more detailed insight into the measures and activities undertaken by the governments and multilateral institutions to alleviate the 2008 crisis, see Chauffour and Farole (2009). The crisis has shown that the public support to trade finance is justified when the difficulties occur in procuring the required funds at the market (see: Ellinson and Vlachos, 2009; Menichini, 2009).

Da bismo proverili da li postoji povezanost između finansiranja izvoza i kretanja svetskog izvoza, poslužićemo se podacima o osiguranim kratkoročnim kreditima u okviru Berne Unije. Podaci su dati na kvartalnom nivou. Ilustracija se daje u grafikonu 3.

Grafikon 3. Osigurani kratkoročni krediti u periodu 2007-2012. po kvartalima



Izvor: Berne Union posredstvom the World Bank's Joint External Debt Hub. http://www.jedh.org/ (pristupljeno 20.12.2012. godine).

Prema grafikonu 3. uočava se da je osigurani iznos kratkoročnih kredita opao za 22% između drugog kvartala 2008. i istog kvartala 2009. godine. Mada su ukupni finansijski tokovi opali pre nastanka trgovinskog kolapsa, finansijska sredstva koja su neposredno povezana sa trgovinom imala su sličnu dinamiku.

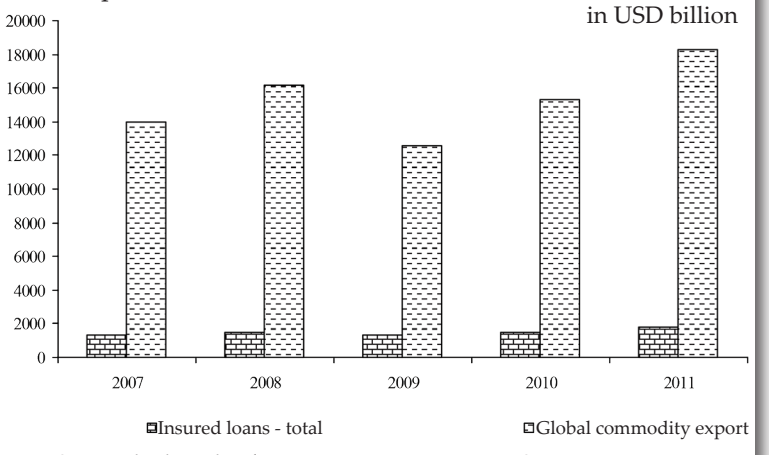
Potpunije ocene o trgovinskim kreditima u svetu mogu se videti u rezultatima istraživanja koje su finansirali MMF i Svetska trgovinska organizacija (*IMF/Bankers Association for Finance and Trade - BAFT*, 2009; IMF/BAFT, 2009a). Nalazi ovih istraživanja su pokazali da je manji iznos finansiranja trgovine direktno uticao na pad globalne trgovine u drugoj polovini 2008. i početkom 2009. godine. Banke su u okviru ovog istraživanja izvestile da je glavni udar finansijske krize na finansiranje trgovine registrovan u prvoj polovini 2009. godine. Smanjivanje kreditnog rejtinga banaka, preduzeća i zemalja posle septembra 2008. godine, znatno je uvećalo rizike izvoza i finansiranja. Ovaj izveštaj pokazuje da je od drugog kvartala 2009. godine došlo do poboljšanja uslova finansiranja trgovine. Posmatrano po regionima, Evropa i Severna Amerika su imale veće probleme u finansiranju trgovine početkom krize, dok su se ovi problemi sredinom 2009. uglavnom osećali u zemljama Istočne Evrope i Severne Afrike, kad su se prilike u Latinskoj Americi već bile stabilizovale (ICC, 2009).

U nastojanju da ublaže posledice ograničenog finansiranja trgovine, vlade i multilateralne razvojne institucije su kreirale više programa za finansiranje trgovine, uključujući i obećanje lidera G20 na londonskom skupu 2009. godine da će obezbediti 250 milijardi dolara za pomoć trgovini. Svetska Banka je zadužena za pribavljanje dodatnih garancija i osiguranje likvidnosti za finansiranje trgovine posredstvom *IFC's Global Trade Finance and Global Trade Liquidity Program* (ICC, 2010, str. 22).

Značaj osiguranja izvoznih kredita za izvoz u vreme krize ilustrativno pokazuju podaci tabele 1., u kojoj se prikazuje kretanje nemačkog izvoza i iznos garantovanih kredita kod Hermesa (*Euler Hermes* - privatni konzorcijum koji administrira javno garantovanje izvoznih kredita u korist nemačke vlade).

Nemački izvoz se, prema tabeli 1, skoro duplirao između 2000. i 2008. godine, dok je garantovani iznos (iznos za koji su date garancije) opao sa 3,3% ukupnog izvoza iz 2000. na 1,8% u 2007. godini. Zatim je usledio rast garantovanog pokrića, dostigavši 3,4% u 2010. godini. Rast pokrića izvoza poklapa se sa bankrotstvom Leman Bradersa (Lehman Brothers). Ovaj rast pokrića pokazuje da su javni izvori osiguranja zamenili privatne izvore, ublažavajući posledice opšteg pada svetske trgovine u 2008. godini. Nalazi ovog istraživanja su pokazali da su preduzeća koja su dobila garancije Hermesa imala znatno veći porast zaposlenosti i prodaje u odnosu na preduzeća bez Hermesove podrške. Izmereno je da se Hermesov doprinos porastu prodaje kretao između 4% i 4,5% u godini kad je dobijeno osiguranje, kao i da je pozitivan efekat garancija bio veći tokom finansijske krize. Na osnovu ovih nalaza, Felbermayr, Heiland, and

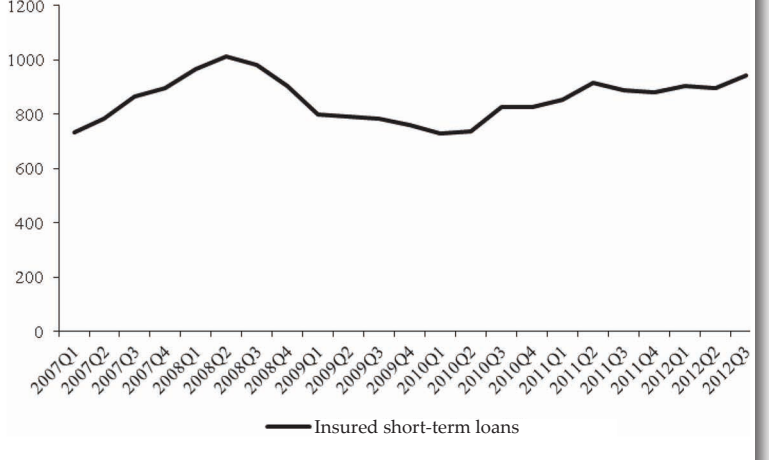
Chart 2. Insured loans and global commodity export in the period 2007-2011



Source: The data taken from: Berne Union, Berne Union Statistics 2007-2011, http://www.berneunion.org/pdf/Berne%20Union%202012%20-%20Charts%20and%20numbers%20for%20website.pdf (data for insured loans); WTO, Website, http://stat.wto.org/Home/WSDBHHome.aspx?Language=E (data for global trade) (accessed on: 21.12.2012)

In order to check whether there is a connection between export finance and trends in global export, we shall resort to the data on insured short-term loans within Berne Union. The data are presented at the quarterly level. The illustration follows below in Chart 3.

Chart 3. Insured short-term loans in the period 2007-2012 per quarters



Source: Berne Union via the World Bank's Joint External Debt Hub. http://www.jedh.org/ (accessed on 20.12.2012)

In Chart 3 it can be observed that the insured amount of short-term loans decreased by 22% between the second quarter of 2008 and the same quarter of 2009. Although the total financial flows had dropped before the trading collapsed, financial funds directly linked with trade exhibited the similar dynamics.

Some more comprehensive assessments of trade loans in the world can be seen in the results of the research financed by the IMF and the World Trade Organization (*IMF/Bankers Association for Finance and Trade - BAFT*, 2009; IMF/BAFT, 2009a). The findings of this research indicated that the reduced scope of trade finance directly impacted the fall in global trade in the second half of 2008 and in early 2009. As part of this research the banks reported that the first strike of the financial crisis on trade finance was recorded in the first half of 2009. Degrading credit rating of banks, companies and countries following September 2008 considerably increased the risks of export and finance. This report shows that starting from the second quarter of 2009 the conditions for trade finance improved. Viewed by regions, Europe and North America experienced bigger problems concerning trade finance before the crisis; in mid-2009 these problems were mostly felt in the countries of Eastern Europe and Northern Africa, when the circumstances in Latin America were already stabilized (ICC, 2009).

Striving to alleviate the consequences of limited trade finance, the governments and multilateral development institutions created several trade finance programs, including the promise of G20 leaders at the London summit in 2009 that they would provide 250 billion dollars to facilitate trade. The World Bank was in charge of procuring additional guarantees and maintaining trade finance liquidity by means of the *IFC's Global Trade Finance and Global Trade Liquidity Program* (ICC, 2010, pp. 22).

The importance of export loans insurance for export in the times of crisis has been illustrated by the data in Table 1, which shows the trends

Yalcin (2012, str. 24) su postavili hipotezu da garantovanje izvoznih kredita znatno ublažava posledice nestašice finansijskih kredita.

Prema podacima Bundesbanke (Deutsche Bundesbank, 2012, str. 56), prosečan godišnji iznos trgovinskih kredita u periodu 2002-2009. godine kretao se oko 345,2 milijarde dolara, i ujedno je predstavljao drugi najvažniji instrument spoljnog finansiranja koji su koristile nefinansijske korporacije u Nemačkoj. Mereno u odnosu prema ukupnom bilansu stanja, učešće trgovinskih kredita je dostiglo 15,8%, prema ovom izvoru. Dugoročni i kratkoročni zajmovi kod banaka bili su jedan procenat manje. Ovi nalazi takođe pokazuju značaj kreditiranje za postizanje boljih izvoznih rezultata.

Članice Berne Union su u prvoj polovini 2012. godine povećale nivo podrške za osiguranje trgovine, tako da je on dostigao pretkrizni nivo. Kapacitet za osiguranje kredita bio je preko 900 milijardi dolara, što je slično nivou pre krize[5].

U istraživanju koje su sproveli Paravisini et al. (2011, str. 32) iznosi se ocena da smanjivanje ponude kredita za 10% dovodi do smanjivanja obima (volumena) izvoza za 2,3%. Chor i Manova (2011) su istakli da su ograničene mogućnosti finansiranja trgovine imale presudan uticaj na pad svetske privrede. Van de Veer (2010, str. 20) je utvrdio da je kratkoročni prosečni multiplikator osiguranja izvoznih kredita iz privatnih izvora iznosio 2,3, što praktično znači da svaki evro osiguranog izvoza generiše 2,3 evra ukupnog izvoza. Ovi nalazi su skrenuli pažnju na značaj i ulogu privatnog osiguranja izvoznih kredita za rast trgovine.

Tabela 1. Izvoz Nemačke i iznos Hermesovih garancija u periodu 2000-2010. godine

		2000.	2001.	2002.	2003.	2004.	2005.	2006.	2007.	2008.	2009.	2010.
1.	Izvoz, u milijardama evra	597,4	638,3	651,3	664,5	731,5	786,3	893,0	965,2	984,1	803,3	959,5
2.	Izvoz / GNP (u %)	29,2	30,4	30,5	30,9	33,3	35,3	38,6	39,7	39,8	33,8	38,7
3.	Indikator kreditnog ograničenja[a]				56,0	48,4	36,5	24,2	15,9	28,6	44,4	33,8
4.	Garancije Hermesa (u milijardama evra)	19,5	16,6	16,4	16,0	21,1	19,8	20,6	16,9	20,7	22,4	32,5
5.	Pokriće (4/1) x 100 (u %)	3,3	2,6	2,5	2,4	2,9	2,5	2,3	1,8	2,1	2,8	3,4

Napomena: [a] IFO indikator kreditnog ograničenja dobijen kao udeo posmatranih industrijskih preduzeća koja su izjavila da su imala ograničen pristup kreditima.

Izvor: Felbermayr, G. J., Heiland, I. and Yalcin, E. (2012, str. 5., tabela I).

5 Preuzeto sa: http://www.berneunion.org/pdf/2012%20BU%20Press%20Release%2015%20OCT%202012.pdf (pristupljeno 20.12.2012. godine).

of the German export and the amount of Hermes guaranteed loans (*Euler Hermes* - the private consortium administrating the public guarantees for export loans in favour of the German government).

According to Table 1, the German export almost doubled between 2000 and 2008, whereas the guaranteed amount (the amount for which guarantees were issued) dropped from 3.3% of total export in 2000 to 1.8% in 2007. This was followed by the growth of guaranteed coverage, which reached 3.4% in 2010. The growth in export coverage coincides with the bankruptcy of Lehman Brothers. This growth in coverage indicates that the public sources of insurance replaced the private sources, alleviating the consequences of the general decline in global trade in 2008. The findings of this research showed that the companies which were granted the Hermes guarantees had a considerably higher growth of employment and sales compared to the companies without the Hermes support. It was measured that the Hermes's contribution to the growth in sales ranged between 4% and 4.5% in the year the concerned insurance was granted, and that the positive effect of guarantees was higher during the financial crisis. Based on these findings, Felbermayr, Heiland and Yalcin (2012, pp. 24) came up with the hypothesis that guaranteeing export loans considerably mitigates the consequences of a shortage in financial loans.

According to the data of Bundesbank (Deutsche Bundesbank, 2012, pp. 56), the average annual amount of trade loans in the period 2002-2009 amounted to about 345.2 billion dollars, at the same time representing the second most important instrument of external finance used by non-financial corporations in Germany. In comparison with the total balance sheet size, the share of trade loans reached 15.8%, according to this source. Long-term and short-term bank loans amounted to one percent less. These findings also indicate how important crediting is for the achievement of better export results.

In the first half of 2012 the Berne Union members increased the level of support to trade insurance, so that it reached the pre-crisis level. The capacity for loan insurance exceeded 900 billion dollars, which is close to the level before the crisis[5].

The research conducted by Paravisini et al. (2011, pp. 32) presents the assessment that the reduction in loan offer by 10% causes the reduction in volume of exports by 2.3%. Chor and Manova (2011) underlined that the limited possibilities of trade finance exerted the decisive impact on the decline in global economy. Van de Veer (2010, pp. 20) determined that the average short-term multiplier of export loans insurance from private sources was 2.3, which practically means that each euro of the insured export generates 2.3 euros of total exports. These findings brought attention to the role of private insurance of export loans and its significance for the growth of trade.

Table 1. Exports of Germany and the amount of Hermes covers in the period 2000-2010

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1.	Export, in EUR billion	597.4	638.3	651.3	664.5	731.5	786.3	893.0	965.2	984.1	803.3	959.5
2.	Export / GNP (in %)	29.2	30.4	30.5	30.9	33.3	35.3	38.6	39.7	39.8	33.8	38.7
3.	Credit limit indicator[a]				56.0	48.4	36.5	24.2	15.9	28.6	44.4	33.8
4.	Hermes covers (in EUR billion)	19.5	16.6	16.4	16.0	21.1	19.8	20.6	16.9	20.7	22.4	32.5
5.	Cover (4/1) x 100 (in %)	3.3	2.6	2.5	2.4	2.9	2.5	2.3	1.8	2.1	2.8	3.4

Note: [a] The IFO indicator of credit limit is obtained as a share of observed industrial companies that stated they had experienced a limited access to loans.
Source: Felbermayr, G.J., Heiland, I. and Yalcin, E. (2012, pp. 5, table I)

5 Taken from: http://www.berneunion.org/pdf/2012%20BU%20Press%20Release%2015%20OCT%202012.pdf (accessed on 20.12.2012).

Iskustva u kreditiranju na nivou preduzeća

Za dalju proveru hipoteze o uticaju finansiranja trgovine na njenu dinamiku, potrebno je ispitati ovu povezanost na nivou preduzeća. Zapravo to znači da bi na osnovu podataka iz poslovnih transakcija trebalo sagledati značaj trgovinskih kredita koje odobravaju preduzeća međusobno. Pri tome treba imati u vidu da trgovinski krediti koje prodavac (izvoznik) odobrava kupcu (uvozniku) mogu biti bez troškova ili sa troškovima (videti *Okvir 1*). U daljem tekstu ćemo ukazati na povezanost trgovinskih kredita i rasta izvoza na nivou preduzeća.

Istražujući uticaj finansiranja na izvoz pojedinih francuskih preduzeća na nivou proizvoda i zemlje destinacije, Bricongne et al. (2012) su utvrdili da je tokom skorašnje finansijske krize znatno više opao izvoz preduzeća koja su imala ograničenja u finansiranju izvoza u odnosu na ona bez tih ograničenja. Prema istom istraživanju, manji izvoznici su se našli na udaru krize pre nego što je ona pogodila veće izvoznike.

Amiti and Weinstein (2011, str. 28) su utvrdili postojanje uzročno posledične veze između izvoza preduzeća i njihovih mogućnosti da obezbede kredit, na jednoj strani, odnosno finansijskog "zdravlja" njihovih banaka, na drugoj strani. Značajan doprinos ovog istraživanja leži u uspostavljanju uzročne veze između šokova u finansijskom sektoru i izvoza, koja je imala za posledicu brži pad trgovine u odnosu na pad proizvodnje tokom bankarske krize.

Manova (2012, str. 24) je pokazao da porast troškova spoljnog finansiranja može obeshrabriti preduzeće da izvozi. Ovaj autor je utvrdio da je tokom krize kreditno ograničenje znatno više pogodilo izvoz nego privrednu aktivnost. Poremećaji trgovine bili su veći u sektorima koji više zavise od spoljnog finansiranja.

Ahn, Amiti and Weinstein (2011, str. 302) su sproveli istraživanja na nivou preduzeća i došli do saznanja da su izvoznici, čije su banke ispoljile slabost, smanjili izvoz više od ostalih preduzeća. Takođe su otkrili da je uvoz više opao u sektorima koji su bili više zavisni od spoljnih izvora finansiranja.

Tokom novije finansijske krize zapažen

Okvir 1.

Troškovi trgovinskih kredita

Trgovinski krediti koje odobravaju prodavci kupcima njihove robe mogu biti bez troškova ili sa troškovima. U slučaju kredita bez troškova, kupcu se odlaže plaćanje u određenom periodu, bez dodatnih troškova. Kod kredita sa troškovima, uobičajeno je da prodavac odobrava kupcu određen vremenski period u okviru koga se može izvršiti plaćanje uz određen popust (diskont). Ukoliko se propusti ovaj period, kupac će platiti punu cenu. Naravno, prodavac utvrđuje i krajnji rok za plaćanje pune cene. U slučaju da ne koristi diskont, kupac će imati dodatne troškove. To se može prikazati na jednom primeru.

Pretpostavimo da je prodavac A prodao kupcu B robu čija je puna cena 10.000 dolara, uz uslov *2/10, net 30*. To znači da je prodavac ponudio kupcu mogućnost da robu čija je puna cena 10.000 dolara plati u roku od 10 dana, u kom slučaju dobija popust od 2% (200 dolara). Ako ne plati u roku od 10 dana, kupac može da sačeka svih 30 dana i onda plati pun iznos od 10.000 dolara. Odlukom da sačeka sa plaćanjem 30 dana, kupac efektivno koristi sredstva u iznosu od 9.800 dolara za dodatnih 20 dana, zbog čega plaća kamatu od 10.000$ - 9.800$ = 200$. Posmatrano na godišnjem nivou, 200$ predstavlja trošak kredita. On se može prikazati kao:

Trošak kredita (TK) = (procenat diskonta/ (100 - procenat diskonta) x (360) / (period kreditiranja - period diskonta). Trošak kredita u gornjem primeru je: TK=2/ (100-2) x 360/ (30-10) =2/98x360/20=36,73%. Dakle, trošak korišćenog kredita u našem primeru u iznosu od 9.800 dolara za period od 20 dana iznosi 36,73% na godišnjem nivou. Primer pokazuje da je nekad bolje povući kreditnu liniju kod banke, da bi se koristio diskont u plaćanju, jer to može biti jeftinije od uslova trgovinskog kredita.

Experiences in crediting at the corporate level

To further confirm the hypothesis about the impact of trade finance on trade dynamics, it is necessary to examine this correlation at the corporate level. It actually means that, based on the data from business transactions, we should consider the importance of trade loans granted by companies among themselves. In this respect, it should be taken into account that trade loans granted by the seller (exporter) to the buyer (importer) can be with or without costs (see Framework 1). Below we shall illustrate the correlation of trade loans and the growth of export at the corporate level.

Having investigated the impact of finance on the export of certain French companies at the level of a product and destination country, Bricongne et al. (2012) determined that, during the recent financial crisis, there was a much bigger drop in exports of the companies with limited export financing, compared to the companies without any such limitations. According to the same study, smaller exporters were hit by the crisis before it affected the bigger exporters.

Amiti and Weinstein (2011, pp. 28) determined that there is a causal relation between the companies' export and their ability to procure loans, on the one hand, and the financial "health" of their banks, on the other hand. The considerable contribution of this study lies in the establishment of a causal relation between the shocks in the financial sector and export, which caused a quicker decline in trading compared to the decline in production during the banking crisis.

Manova (2012, pp. 24) showed that an increase in costs of external finance may discourage the company from doing export. This author discovered that, during the crisis, limited access to loans adversely affected exports to a much higher degree than it did the economic activity. Disturbances in trading were much more prominent in those sectors that are more dependent on external finance.

Ahn, Amiti and Weinstein (2011, pp. 302) conducted studies at the corporate level and found out that exporters whose banks experienced certain difficulties reduced their

Framework 1.

Costs of trade loans

Trade loans extended by sellers to the buyers of their goods can be with or without costs. In case of a no-cost loan, the buyer gets the payment postponed for a certain period of time, without any additional costs. In case of loans entailing costs, the seller typically grants to the buyer a certain period of time within which the payment can be effected with a certain discount. If he exceeds the deadline, the buyer pays the full price. Of course, the seller also determines the deadline for the payment of the full price. If he does not utilize the discount, the buyer will have additional costs. Let us illustrate this with an example.

If we assume that the seller A sold his goods to the buyer B at the full price of 10,000 dollars, under the condition 2/10, *net* 30. This means that the seller offered the buyer a possibility to pay for the goods whose full price is 10,000 dollars within 10 days, in which case he would get a 2% discount (200 dollars). If he fails to pay within 10 days, the buyer can wait for 30 days and then pay the full amount of 10,000 dollars. Having decided to wait for 30 days before executing the payment, the buyer effectively uses the funds in the amount of 9,800 dollars for additional 20 days, which is why he pays the interest of 10,000$ - 9,800$ = 200$. At the annual level, 200$ is the cost of the loan. It can be presented as:

Cost of loan (CL) = (discount percentage/ (100 - discount percentage) x (360)/ (loan maturity - discount period). In the above example, the cost of loan is: CL = 2/ (100 - 2) x 360/ (30 - 10) = 2/98x360/20 = 36.73%. So, the cost of the utilized loan in our example, in the amount of 9,800 dollars for a period of 20 days, amounts to 36.73% at the annual level. This example shows that sometimes it is better to take a credit line with a bank, in order to utilize the payment discount, because it might be cheaper than a trade loan.

je porast korišćenja trgovinskih kredita kod preduzeća iz Evropske unije (EU), posmatrano kao međusobno kreditiranje preduzeća, kao zamena za smanjivanje kratkoročnih bankarskih zajmova. Time su krediti između preduzeća postali amortizer otežanog pristupa bankarskim kreditima. Značaj trgovinskih kredita treba posmatrati i iz ugla po kome jedno preduzeće u isto vreme koristi kredite od prodavca i odobrava kredite kupcima svojih proizvoda. Neto odnos korišćenih i odobrenih kredita opredeljuje performanse preduzeća. Na osnovu istraživanja koje su sproveli Ferrando and Mulier (2012), nameće se zaključak da su trgovinski krediti posebno značajni za mala i srednja preduzeća, naročito i vreme finansijske krize kad preduzeća teško dobijaju nove bankarske kredite.

U istraživanju odnosa između kredita i izvoza, Love, Preve, and Sarria-Allende (2012, str. 21) su utvrdili da su preduzeća sa velikim udelom kratkoročnog duga, pre krize u značajnom iznosu odobravala izvozne kredite. Posle izbijanja krize, ova preduzeća su smanjila iznos odobrenih kredita, uz pojačan oslonac na kredite prodavaca.

Berman and Héricourt (2010) su ispitivali povezanost trgovine i finansiranja, koristeći podatke Svetske banke na nivou preduzeća iz devet zemalja u razvoju i tržišta u nastajanju. Došli su do zaključka da finansijsko zdravlje preduzeća ne utiče na obim izvoza, ali da pristup finansiranju povećava verovatnoću da preduzeće postane izvoznik.

Coulibaly, Sapriza and Zlate (2012) su analizirali ulogu racioniranja kredita u kontrakciji privredne aktivnosti tokom globalne finansijske krize 2008-2009. godine. Koristeći podatke na nivou preduzeća za šest azijskih zemalja sa tržištem u nastajanju, ovi autori su došli do saznanja da je manji pad trgovinskih kredita registrovan kod finansijski stabilnih preduzeća, posebno onih koja su bila više izložena kratkoročnim kreditima pre krize, iz čega su zaključili da su se mnoga preduzeća okrenula trgovinskim kreditima kao odgovor na tešku finansijsku situaciju tokom krize. Autori su takođe zaključili da je kod preduzeća, koja su tokom krize uspela da trgovinskim kreditima zamene spoljno finansiranje, registrovan manji pad prodaje nego kod preduzeća koja nisu u tome uspela.

Preovlađujući deo finansiranja međunarodne trgovine odvija se posredstvom keš plaćanja unapred i putem otvorenog računa (44,0% i 39,2%, respektivno). Plaćanje pomoću otvorenog računa (eng. *open account*) podrazumeva mogućnost odloženog plaćanja u odnosu na datum isporuke. Oko 5,8% transakcija odvija se posredstvom dokumentarnog akreditiva (eng. *Letter of Credit - L/C*), dok se 11% odnosi na dokumentarno plaćanje (Antràs and Foley, 2011, str. 1.). Plaćanje unapred se primenjuje kad je uvoznik izložen velikom kreditnom riziku ili se nalazi u zemlji velikog političkog rizika.

U literaturi se susrećemo i sa ocenama po kojima noviju finansijsku krizu nisu obeležila velika ograničenja bankarskih pozajmica, ali su troškovi zajmova uvećani zbog smanjivanja likvidnosti (ITC, 2009, str. 50). Porast ovih troškova doveo je do povećanja diskonta u tekućim plaćanjima. Ujedno je, prema spomenutom istraživanju, registrovano smanjivanje kreditiranja između preduzeća, jer su preduzeća time nastojala da zaštite svoje tokove gotovine i smanje sopstvene rizike.

Moglo bi se zaključiti da je finansiranje trgovine pokazalo visoku osetljivost u vreme ekonomskih kriza. Dokaz za to je i spoljna nelikvidnost i nesolventnost bankarskih sistema brojnih zemalja sa tržištem u nastajanju krajem 1990-ih i početkom 2000-ih (Argentina, Brazil, Tajland, Indonezija i dr.). Izvoznici su bili suočeni sa otežanim dobijanjem domaćih kredita pre i posle isporuke robe, kako u vidu dokumentarnog akreditiva, tako i u obliku sredstava za avansno plaćanje. Primera radi, u periodu 1997-98. godine, opao je iznos trgovinskih kredita koje su finansirale banke za oko 50% u Koreji i oko 80% u Indoneziji. Slične tendencije su zabeležene početkom 2000-ih, kada su trgovinski krediti u Argentini i Brazilu opali u intervalu od 30% do 50% (Allen, 2003; navedno prema: Chauffour and Farole, 2011, str. 259). Po pravilu je raslo učešće trgovinskih kredita koje odobravaju sama preduzeća kad je pristup bankarskim sredstvima bio ograničen.

Savremeni trendovi svetske trgovine i njeno finansiranje

Mada tokom skorašnje finansijske krize nije došlo do razmaha protekcionizama u svetskoj

exports to a higher extent than other companies. They also discovered that exports declined more in those sectors that were more dependent on external sources of finance.

During the recent financial crisis, it was observed that the trade loans in EU companies were increasingly utilized, in the form of intercompany crediting, as a replacement for the reduced number of short-term bank loans. Thereby, the intercompany loans became the buffer against the aggravated access to bank loans. The importance of trade loans should also be considered in the sense that at the same time one company uses the loans granted by the seller and grants loans to the buyers of its products. The net amount of utilized and granted loans defines the company's performance. Based on the research conducted by Ferrando and Mulier (2012), the conclusion can be reached that trade loans are particularly important for SMEs, especially in the times of a financial crisis when companies have difficulties to obtain new bank loans.

Having examined the relation between loans and export, Love, Preve and Sarria-Allende (2012, pp. 21) determined that companies with a large share of short-term loans before the crisis granted considerable amounts of export loans. Since the outbreak of the crisis, these companies have reduced the amount of extended loans, at the same time increasingly relying on loans granted by sellers.

Berman and Héricourt (2010) explored the connection of trade and finance, using the World Bank's data at the corporate level from nine developing countries and emerging markets. They came to the conclusion that financial health of the companies does not impact the volume of export, but that access to finance increases the probability of a company becoming an exporter.

Coulibaly, Sapriza and Zlate (2012) analyzed the role of loan rationing in the times of contracted economic activity during the global financial crisis in 2008-2009. Using the corporate data for six Asian countries with emerging markets, these authors found out that a slighter decline in trade loans was registered in financially stable companies, especially those that were more exposed to the short-term loans before the crisis, from which they concluded that many companies resorted to trade loans as a response to the difficult financial situation during the crisis. The authors also concluded that the companies which during the crisis managed to replace external finance with trade loans registered a lesser decline of sales than the companies that failed to do so.

The prevailing portion of international trade finance is conducted by means of cash advance payments and open accounts (44.0% and 39.2%, respectively). Open account payments imply the possibility of deferred payment in relation to the delivery date. About 5.8% of transactions are conducted by means of documentary letter of credit (L/C), and 11% by means of documentary payments (Antràs and Foley, 2011, pp. 1). Advance payment is used when the importer is exposed to huge credit risk or is located in a country of a high political risk.

According to some assessments in reference literature, the recent financial crisis was not marked by huge limitations in bank loans. Instead, the costs of loans increased due to lower liquidity (ITC, 2009, pp. 50). In turn, the growth of these costs led to higher discounts in current payments. At the same time, according to the above mentioned research, there was a decline in intercompany loans, given that the companies were thereby striving to protect their cash flows and reduce their own risks.

It could be concluded that trade finance has shown high sensitivity in times of economic crises. This has been proven by external illiquidity and insolvency of the banking systems of many countries with emerging markets in late 1990s and early 2000s (Argentina, Brazil, Thailand, Indonesia, etc.). Exporters were faced with difficulties when trying to obtain domestic loans before and after the delivery of goods, both in the form of documentary letters of credit and advance payment instruments. For instance, in the period 1997-1998, there was a drop of trade loans financed by banks by about 50% in Korea and by about 80% in Indonesia. Similar tendencies were recorded in early 2000s, when trade loans in Argentina and Brazil declined by 30% to 50% (Allen, 2003; according to: Chauffour and Faore, 2011, pp. 259). As a rule, there was an increased share of trade loans granted by companies themselves, whenever access to bank funds was limited.

privredi, prema izveštaju Svetske trgovinske organizacije, od izbijanja finansijske krize krajem 2008. do četvrtog kvartala 2011. godine, uvedene su 1.243 nove mere trgovinske politike. Oko ¾ ovih mera su restriktivne prirode, dok ¼ smanjuje nivo uvozne zaštite (navedeno prema: Hoekman, 2012, str. 17). Najaktivniji kreatori ovih mera bile su zemlje u razvoju i zemlje sa tržištem u nastajanju. Uprkos velikom broju novih trgovinskih mera, one su pogodile samo oko 2% svetske trgovine (Kee, Neagu and Nicita, 2010). Tokom 2009. godine registrovan je i pad carina, kao posledica jačanja vertikalne specijalizacije (Gawande, Hoekman and Cui, 2011). Kao rezultat rastuće svetske proizvodnje u okviru proizvodnih lanaca, uvozni sadržaj svetskog izvoza procenjen je na oko 30% (Daudin, Rifflart, and Schweisguth, 2011). Rezultati navedenih istraživanja pokazuju da je uprkos velikim izazovima sprečen razvoj protekcionizma većih razmera tokom novije finansijske krize.

Tekuće tendencije svetske trgovine ne daju puno osnova za veliki optimizam u 2013. godini. Prema projekcijma Međunarodnog monetarnog fonda (MMF) iz oktobra 2012. godine (tabela 2.), rast uvoza robe i usluga razvijenih zemalja u 2012. godini znatno je manji od rasta u 2011. godini. Isto tako, projektovani rast uvoza robe i usluga razvijenih zemalja za 2013. godinu manji je od ostvarenog rasta u 2011. godini. Sve to ukazuje da kriza iz 2008. godine još uvek nije prevladana. Najveće probleme, kako sa nivoom privredne aktivnosti, tako i sa dinamikom spoljne trgovine, imaju članice EU, posebno članice Evropske ekonomske i monetrane unije (EMU). Zemlje tvrdog jezgra EMU usporile su pad privredne aktivnosti zahvaljujući čvrstim vezama sa brzorastućim tržištima u nastajanju i drugim razvijenim zemljama. Tokovi kapitala, na drugoj strani, pokazuju neto odliv iz perifernih članica evrozone u sigurnije privrede ove integracije (Nemačka, Švajcarska). Zemljama periferije evrozone potrebne su strukturne reforme koje bi podstakle rast produktivnosti, i koje bi doprinele poboljšanju kvaliteta i asortimana izvoznih proizvoda. Takođe je potrebno dalje ujednačavanje troškova rada u evrozoni (Chen, Milesi-Ferretti and Tressel, 2012).

Tabela 2. Projekcije rasta svetskog uvoza

u %

	Uvoz robe i usluga (volumen)					
			Projekcije		Razlika u odnosu na projekcije iz jula 2012	
	2010.	2011.	2012.	2013.	2012.	2013.
Razvijene zemlje	11,4	4,4	1,7	3,3	-0,2	-0,9
ZUR i zemlje sa tržištem u nastajanju	14,9	8,8	7,0	6,6	-0,8	-0,4

Napomene: [1] Ne obuhvata zemlje čalanice G7 (Kanada, Francuska, Nemačka, Italija, Japan, Ujedinjeno Kraljevstvo i SAD) i zemlje članice evrozone.

Izvor: IMF (2012), *World Economic Outlook: Coping with High Debt and Sluggish Growth* (oktobar 2012), str. 2, Tabela 1. 1. Washington, DC: International Monetary Fund.

Contemporary trends in global trade and its financing

Despite the fact that during the recent financial crisis protectionism in the global economy did not gain momentum, according to the World Trade Organization's report, since the outbreak of the financial crisis in late 2008 until the fourth quarter of 2011, there have been 1,243 new trading policy measures introduced. About ¾ of these measures are of restrictive nature, whereas ¼ reduces the level of importing protection (according to: Hoekman, 2012, pp. 17). The most active creators of such measures were the developing countries and emerging markets. Despite the large number of new trading measures, they affected only 2% of global trade (Kee, Neagu and Nicita, 2010). In 2009 the customs decreased, as a consequence of strengthened vertical specialization (Gawande, Hoekman and Cui, 2011). Due to the growing world production within the production chains, the import content in global exports was estimated to about 30% (Daudin Rifflart and Schweisguth, 2011). The results of the above mentioned studies indicate that, despite the huge challenges, the development of large-scale protectionism during the recent financial crisis was prevented.

The current tendencies in global trade provide no basis for great optimism in 2013. According to the forecasts of the International Monetary Fund (IMF) as of October 2012 (Table 2), the growth of import of goods and services in the developed countries was much lower in 2012 than in 2011. Likewise, the projected growth of import of goods and services in the developed countries in 2013 has been less than the achieved growth in 2011. All this indicates that the 2008 crisis has still not been overcome. The biggest problems, both in terms of the level of economic activity and in terms of foreign trade dynamics, have been experienced by the EU member states, especially the members of the European Economic and Monetary Union (EMU). The hard core EMU countries slowed down the decline of economic activity thanks to their firm ties with the quick-growing, emerging markets and other developed countries. Capital flows, on the other hand, have exhibited a net outflow from the peripheral Eurozone members into the safer economies of this integration (Germany, Switzerland). The peripheral Eurozone countries require structural reforms that would boost the growth in productivity, and contribute to the improvement of quality and assortment of export products. It is also necessary to further harmonize the costs of labour in the Eurozone (Chen, Milesi-Ferretti and Tressel, 2012).

Table 2. Projections of global imports growth

in %

	Import of goods and services (volume)					
			Projections		Diference compared to the preojections from July 2012	
	2010	2011	2012	2013	2012	2013
Developed countries	11.4	4.4	1.7	3.3	-0.2	-0.9
Developing countries and emerging markets	14.9	8.8	7.0	6.6	-0.8	-0.4

Note: [1] Does not include the G7 member countries (Canada, France, Germany, Italy, Japan, United Kingdom and the USA) and the Eurozone countries.
Source: IMF (2012), *World Economic Outlook: Coping with High Debt and Sluggish Growth,* (October 2012), pp. 2, Table 1.1. Washington, DC: International Monetary Fund.

Prema tabeli 2. zapaža se da je MMF u oktobru 2012. godine smanjio projektovane stope rasta svetskog uvoza za 2012. i 2013. godinu u odnosu na one iz jula 2012. godine. Treba posebno skrenuti pažnju na niže projektovane stope rasta volumena uvoza robe i usluga u razvijenim zemljama (1,7% u 2012. i 3,3% u 2013. godini) u odnosu na ostvaren rast u 2011. godini. Koliko je neizvesna situacija u pogledu budućeg kretanja svetske trgovine svedoči i okolnost što su stope rasta uvoza robe i usluga u projekcijama iz oktobra 2012. umanjene u odnosu na julske projekcije iz iste godine. Revizija julskih projekcija rasta svetske trgovine nastala je zbog pojačanih sumnji u oporavak privrede članica evrozone, a posebno krizom pogođenih perifernih zemalja ove integracije. Uvoz robe i usluga razvijenih zemalja u 2011. godini je porastao za 4,4%, dok se u tabeli 2. za 2012. procenjuje rast od samo 1,7%, odnosno 3,3% u 2013. godini. Smanjivanja uvoza je posledica usporavanja privredne aktivnosti u ovim zemljama.

Otežani uslovi prodaje na inostranom tržištu će podstaći odobravanje trgovinskih kredita, kako bi se zadržali tržišni udeli. Uz postepeno oživljavanje privredne aktivnosti i svetske trgovine u narednim godinama, nameće se pitanje finansijske podrške za realizaciju rastućeg obima trgovine. Na toj liniji je i kreiranje novih instrumenata, kao što je obaveza bankarskog plaćanja (eng. *Bank Payment Obligation - BPO*). Ovaj instrument je, u pogledu rizika, kombinacija dokumentarnog akreditiva i otvorenog računa, i predstavlja neopozivu obavezu plaćanja jedne banke drugoj banci, tačno određenog dana u budućnosti, ako se desi unapred predviđen događaj. Ovaj instrument znatno olakšava međunarodnu trgovinu, jer se ublažavaju rizici povezani sa trgovinom. U suštini, BPO banka je u obavezi da izvrši plaćanje kada se u okviru SWIFT-a[6], posredstvom centralnog mehanizma za uparivanje podataka pod nazivom *Trade Service Utility-TSU*, izvrši uparivanje podataka o isporuci robe sa relevantim podacima u narudžbenici. Ako se ovi podaci uparivanjem slože, vrši se automatsko plaćanje. Prednost ovog mehanizma u odnosu na dokumentarni akreditiv je u tome što se provera dokumenata o isporuci robe vrši automatski uparivanjem sa zahtevanim dokumentima iz narudžbenice koji su uneti u TSU. Time se ceo proces ubrzava i otklanja mogućnost subjektivne greške u proveri dokumenta koja je moguća kod dokumentarnog akreditiva. Sem toga, ovaj postupak je i jeftiniji u odnosu na klasični dokumentarni akreditiv.

Najveći oslonac na trgovinske kredite u okviru EU pokazuju zemlje jugoistočne Evrope, kao rezultat nestašice kratkoročnih bankarskih zajmova (Videti: Petersen and Rajan, 1997, str. 662). Najmanji udeo ovog instrumenta finansiranja u odnosu na ukupni bilans stanja je u Nemačkoj - 6%, dok je u zemljama jugoistočne Evrope tri puta veći (u Italiji, na primer, iznosi 20%) (Deutsche Bundesbank, 2012 str. 58). Veći udeo trgovinskih kredita može nastati i zbog revolviranja kratkoročnih zajmova. Trgovinski krediti po pravilu se kreću kao i privredna aktivnost: porast prodaje prati rast trgovinskih kredita. Proizvođači opreme su posebno zainteresovani za odobravanje trgovinskih kredita kad privreda izlazi iz stagnacije, jer se time prazne zalihe nagomilane tokom krize. Na taj način prodavci smanjuju troškove uskladištenja robe, a kupci mogu da pojačaju svoju likvidnost koja je obično na niskom nivou kad se izlazi iz krize. Ukoliko se, na drugoj strani, nagomila iznos trgovinskih kredita kroz uobičajenu praksu revolvinga, prodavac može dospeti u situaciju da mora da održava nivo potraživanja, jer se kupac već navikao kao da ima dugoročni kredit. Na ovaj način se stvara mehanizam za međunarodno prenošenje šokova (videti: Choi and Kim, 2003, str. 5).

Imajući u vidu dosadašnja iskustva u kretanju trgovinskih kredita, može se očekivati njihova aktivna uloga u oživljavanju rasta izvoza u narednim godinama.

Zaključak

Prema nalazima empirijskih istraživanja,

6 *Society for Worldwide Interbank Financial Telecommunication*-SWIFT (Svetsko udruženje za međunarodne finansijske telekomunikacije) je mreža koja omogućava finansijskim institucijama širom sveta da šalju i primaju informacije o finansijskim transakcijama u pouzdanom i standardizovanom okruženju. Osnovana je 1973. godine.

In Table 2 we can observe that in October 2012 the IMF decreased the projected rates of global import growth for 2012 and 2013, compared to those from July 2012. Particular attention should be drawn to the fact that the projected growth rates of the import volume of goods and services in the developed countries (1.7% in 2012 and 3.3% in 2013) were lower than the achieved growth in 2011. How tentative the entire situation is when it comes to the future trends of global trade is also confirmed by the fact that the rates of growth of goods and services import as projected in October 2012 were lower than the projections from July that same year. The revision of July projections of the global trade growth occurred due to the increasing suspicions in the recovery of the economies of the Eurozone member states, and especially of the peripheral countries of this integration which were hit by the crisis. In 2011 the import of goods and services in the developed countries increased by 4.4%, whereas in Table 2 the estimated growth for 2012 amounts to just 1.7%, and 3.3% in 2013. Such a decline in imports has been the consequence of slowed down economic activity in these countries.

Aggravated conditions for sales at the foreign market will boost the extension of trade loans, in order for everyone to keep their market shares. Along with the gradual revival of economic activity and global trade in the forthcoming years, another issue that poses itself is financial support to the realization of growing volumes of trade. To this end, new instruments have been created, such as the *Bank Payment Obligation - BPO*. This instruments is, in terms of risk, a combination of a documentary letter of credit and an open account, and represents an irrevocable obligation of one bank to pay to another bank, on the specified date in the future, in case that the previously envisaged event actually occurs. This instrument has considerably facilitated international trade, given that it mitigates the trade-related risks. In essence, the BPO bank is obliged to effect payment at the point when, within SWIFT[6], via the central mechanism for data mapping called *Trade Service Utility - TSU*, the data concerning the delivery of goods are mapped with the relevant data stated in the purchase order. If these data are fully mapped, the payment is effected automatically. The advantage of this mechanism, compared to documentary letters of credit, lies in the fact that the documents in respect of goods delivery are checked automatically by means of their mapping with the required documents from the purchase order entered into the TSU. Thereby the entire process is accelerated and the possibility of subjective error while checking documents is eliminated, which is not the case with documentary letters of credit. Moreover, this procedure is cheaper than the classic documentary L/C.

Within the EU, the countries of South Eastern Europe have been relying to the greatest extent on trade loans, as a result of the shortage of short-term bank loans (See: Petersen and Rajan, 1997, pp. 662). The lowest share of this financing instrument in the total balance sheet is recorded in Germany - 6%, whereas in the countries of South Eastern Europe it is three times higher (in Italy, for instance, it amounts to 20%) (Deutsche Bundesbank, 2012, pp. 58). A higher share of trade loans may also occur due to revolving of short-term loans. As a rule, trade loans move in correlation with the economic activity: growth of sales is accompanied by a growth of trade loans. Equipment producers are particularly interested in granting trade loans when the economy is exiting stagnation, because thereby they can get rid of their inventory accumulated during the crisis. Thus the sellers reduce the costs of goods storage, and the buyers can strengthen their liquidity which is typically low when exiting a crisis. If, on the other hand, the amount of trade loans accumulates through regular practice of revolving, the seller may end up having to maintain the level of receivables, because the buyer already got used to having a long-term loan. This is how the mechanism for international transmission of shocks is created (See: Choi and Kim, 2003, pp. 5).

Bearing in mind the experiences so far when it comes to trends in trade loans, they might be expected to play an active role in reviving the growth of export in the forthcoming years.

6 *Society for Worldwide Interbank Financial Telecommunication - SWIFT* is a network enabling financial institutions all over the world to send and receive information concerning financial transactions in a reliable and standardized environment. It was established back in 1973.

identifikovana je jaka uzročna veza između iznosa osiguranih kratkoročnih kredita, kao mere ukupnih trgovinskih kredita, i svetske trgovine tokom celog konjunkturnog ciklusa. Ova ocena je zasnovana na empirijski utvrđenom odnosu po kome 1% rasta trgovinskih kredita odobrenih jednoj zemlji, dovodi do realnog porasta uvoza te zemlje za 0,4%. Na osnovu kretanja svetskog robnog izvoza i osiguranih kredita utvrđeno je da je pad osiguranog iznosa u 2009. bio manji od pada robnog izvoza. Prema ovim globalnim podacima moglo bi se zaključiti da su i drugi faktori delovali na pad izvoza, a ne samo smanjene mogućnosti kreditiranja. Tokom novije finansijske krize zapažen je porast korišćenja trgovinskih kredita kod preduzeća u EU, posmatrano kao međusobno kreditiranje preduzeća, kao zamena za smanjivanje kratkoročnih bankarskih zajmova. Time su krediti između preduzeća postali amortizer otežanog pristupa bankarskim kreditima. Istraživanja su pokazala da su trgovinski krediti posebno značajni za mala i srednja preduzeća, naročito u vreme finansijske krize kad preduzeća teško dobijaju nove bankarske kredite. Mada noviju finansijsku krizu nisu obeležila velika ograničenja bankarskih pozajmica, troškovi zajmova su porasli zbog smanjivanja likvidnosti. Porast ovih troškova doveo je do povećanja diskonta u tekućim plaćanjima. Projekcije kretanja svetske trgovine nagoveštavaju slabiju dinamiku rasta u 2013. godini, dok se nešto veći rast može očekivati u 2014. i narednim godinama. To je razlog zbog koga se može očekivati značajna uloga trgovinskih kredita u podsticanju izvoza u narednim godinama.

Conclusion

According to the findings of empirical studies, a strong causal relation has been identified between the amount of insured short-term loans, as the measure of total trade loans, and global trade, during the entire conjunctural cycle. This assessment is based on the empirically determined ratio according to which 1% growth of trade loans extended to a country results in the real growth of that country's export by 0.4%. Based on the trends in global commodity export and insured loans, it was determined that the decline in insured amounts in 2009 was less than the decline of commodity export. According to these global data, it could be concluded that other factors influenced the decline of export, in addition to the reduced possibilities of crediting. During the recent financial crisis, it was observed that the trade loans in EU companies were increasingly utilized, in the form of intercompany crediting, as a replacement for the reduced number of short-term bank loans. Thereby, the intercompany loans became the buffer against the aggravated access to bank loans. The studies have shown that trade loans are particularly important for SMEs, especially in the times of a financial crisis when companies have difficulties to obtain new bank loans. Although the recent financial crisis was not marked by large-scale limitation of bank loans, the costs of loans increased due to lower liquidity. The increased costs led to higher discounts in current payments. The forecasts of global trade trends suggest a slower dynamics of growth in 2013, whereas a somewhat higher growth can be expected in 2014 and onwards. This is why it is reasonable to expect a significant role of trade loans in facilitating export in the forthcoming years.

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PREGLED JEDNOFAKTORSKIH MODELA KAMATNIH STOPA SA FOKUSOM NA MODEL HAL I VAJT

Rezime

S obzirom na to da kamatne stope utiču na vrednovanje i utvrđivanje cene svih finansijskih proizvoda, velika pažnja je posvećena prognoziranju kamatnih stopa i konstruisanju krive prinosa. Međutim, derivati kamatnih stopa zavise od razvoja kamatnih stopa u smislu sadašnje i buduće vrednosti novca, kao i kroz njihovu zavisnost od od kamatne stope kao osnovne "aktive". Otuda je razvijeno nekoliko klasa modela za utvrđivanje cene derivata kamatnih stopa. Zasnivajući se na varijabilama koje pokušavaju da obuhvate, oni se u širem smislu klasifikuju kao modeli trenutne stope (kratkoročni) ili tržišni modeli. Mada su kratkoročni modeli zasnovani na nevidljivoj varijabli, dok modeli tržišne stope neposredno odražavaju tržišne stope i cene, ti kratkoročni modeli se široko koriste za utvrđivanje cene derivata, pri čemu se - zavisno od svoje složenosti i imlicitnih pretpostavki i ograničenja - dalje klasifikuju kao jednofaktorski i dvofaktorski modeli. Ovaj rad daje kratak prikaz teorije koja se nalazi u osnovi jednofaktorskog modeliranja kamatnih stopa, sa posebnim fokusom na prednosti i nedostatke Halovog i Vajtovog modela.

Ključne reči: utvrđivanje cene derivata kamatne stope, jednofaktorsko modeliranje, Hal i Vajt

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OVERVIEW OF ONE-FACTOR INTEREST RATE MODELS WITH THE FOCUS ON HULL AND WHITE

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Summary

Given that interest rates affect the valuation and pricing of any financial product, much attention has been devoted to interest rate forecasting and yield curve construction. However, interest rate derivatives depend on the evolution of interest rates both in terms of present and future value of money, as well as through their dependence on the interest rate as the underlying 'asset'. Consequently, several classes of models have been developed for pricing interest rate derivatives. Based on the variables they are attempting to capture, they are broadly classified as instantaneous rate or short-rate models, and market models. Although short-rate models are based on an unobservable variable, whilst market rate models directly reflect market rates and prices, the former are widely used in derivatives pricing, whereby - depending on their complexity and implicit assumptions and limitations - they are further classified as one-factor or two-factor models. This paper gives a brief overview of the theory underlying the one-factor interest rate modelling, with the specific focus on the advantages and disadvantages of Hull and White model.

Keywords: interest rate derivatives pricing, one-factor modelling, Hull and White

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Jednofaktorsko modeliranje kamatnih stopa

Jednofaktorski modeli kamatnih stopa imaju samo jedan izvor nasumičnosti (tj. neizvesnost ili tržišni rizik). Oni modeliraju kratkoročnu stopu (spot stopu), vodeći do parcijalne diferencijalne jednačine cena različitih klasa derivata kamatne stope. Spot stopa (poznata kao trenutna ili kratkoročna) predstavlja nevidljivu veličinu. Teoretski, slobodno se definiše kao stopa infinitezimalno kratke ročnosti (od jednog momenta do drugog). U praksi, međutim, jednaka je stopi postignutoj na najkraći mogući depozit.

Ovu trenutnu kamatntu stopu r određuje sledeća diferencijalna jednačina:

$$dr = u\,(r,\,t)\,dt + w\,(r,\,t)\,dX \qquad (1)$$

Prvi deo Jednačine 1 predstavlja otklon, tj. devijaciju od teoretskog proseka i deterministički je (jer pretpostavlja da će kamatne stope, nezavisno od toga u kojoj meri fluktuiraju, da teže nekoj srednjoj vrednosti). Nasuprot tome, drugi uslov (volatilnost) je stohastički, jer obuhvata Vinerov process dX kao izvor nasumičnosti (poznat kao standardno Braunijevsko kretanje). Funkcionalne forme $u(r,\,t)$ i $w(r,\,t)$ određuju ponašanje spot stope r. Njihov izbor vodi različitim dobro poznatim modelima, kao što su Ho & Lee, Vasiček, Hal i Vajt, itd.

Da bi gore navedeni model kratkoročne stope imao bilo kakvu praktičnu svrhu, mora biti moguće da se koristi za izvođenje cenovne jednačine proizvoda kojima se trguje na tržištu, kao što su obveznice. S obzirom na to da je obveznica derivat stope, može se posmatrati kao opcija na osnovnu akciju. Međutim, pošto kamata nije utrživa aktiva, ne postoji osnovna aktiva kojom bi se hedžovao derivat. Obveznica može da se hedžuje samo uzimanjem pozicije u drugoj obveznici različite ročnosti.

Na osnovu ovog principa i primenom Itove leme, može se izvesti sledeća jednačina određivanja cene obveznice:

$$\frac{\partial V}{\partial t} + \frac{1}{2} w^2 \frac{\partial^2 V}{\partial r^2} + (u - \lambda w)\frac{\partial V}{\partial r} - rV = 0 \qquad (2)$$

gde funkcija $\lambda(r,\,t)$ tek treba da se specifikuje i četiri uslova su respektivno:

- vremensko opadanje
- difuzija
- otklon
- diskont

Tržišna cena rizika

U Jednačini 2 napred, nepoznata funkcija $\lambda(r,\,t)$ može da se specifikuje pretpostavkom da držimo nehedžovanu poziciju ročnosti T. U infinitezimalno malom vremenskom koraku dt vrednost obveznice će se promeniti za:

$$dV = w\frac{\partial V}{\partial r}dX + (\frac{\partial V}{\partial t} + \frac{1}{2} w^2 \frac{\partial^2 V}{\partial r^2} + u\frac{\partial V}{\partial r})dt \qquad (3)$$

Korišćenjem jednačine obveznice date pod (2), možemo navedeni izraz napisati kao:

$$dV = w\frac{\partial V}{\partial r}dX + (\lambda w\frac{\partial V}{\partial r} + rV)dt \qquad (4)$$

Posle preuređenja Jednačine 4, dobijamo:

$$dV - rVdt = w\frac{\partial V}{\partial r}(dX + \lambda dt) \qquad (5)$$

U gornjem izrazu, pošto desna strana sadrži dva uslova-deterministički (u dt) i nasumični (u dX) - portfolio obveznica nije bezrizičan. Deterministički uslov može da se interpretira kao kompenzacija za prihvatanje rizika (nasumični deo). Otuda je funkcija $\lambda(r,\,t)$ *tržišna cena rizika*.

Neutralnost u odnosu na rizik

Rešenje jednačine obveznica date u Jednačini 2 može se tumačiti kao očekivana sadašnja vrednost svih gotovinskih tokova, gde se očekivanje ne odnosi na realnu nasumičnu varijablu, već na *rizično-neutralnu* varijablu. Rizično neutralna stopa neće imati otklon u, već $u - \lambda w$, kako je dato u Jednačini 2. Otuda, kada se određuje cena derivata kamatne stope, treba koristiti sledeći model rizično neutralne kamatne stope:

$$dr = (u - \lambda w)dt + wdX \qquad (6)$$

One-Factor interest rate modelling

One-factor interest rate models have only one source of randomness (i.e. uncertainty or market risk). They are modelling a short-term interest rate (spot rate), leading to a partial differential equation of the prices of various classes of interest rate derivatives. The spot rate (also known as instantaneous or short rate) is an unobservable quantity. Theoretically, it is a loosely defined as a rate of infinitesimally short maturity (from one moment to the next). In practice, however, it is equivalent to the rate achieved on the shortest possible deposit.

This instantaneous interest rate r is governed by the following differential equation:

$$dr = u\,(r,\ t)\,dt + w\,(r,\ t)\,dX \qquad (1)$$

The first part of Equation 1 represents drift, i.e. the deviation from the theoretical mean, and is deterministic (as it is assumed that interest rates, irrespective of how much they fluctuate, will converge to some mean value). In contrast, the second term (volatility) is stochastic, as it incorporates Wiener process dX as a source of randomness (also known as standard Brownian motion). The functional forms of $u(r,t)$ and $w(r,t)$ determine the behaviour of the spot rate r. Their choice leads to different well-known models, such as Ho & Lee, Vasicek, Hull & White, etc.

In order for the model of the short rate given above to have any practical purpose, it has to be possible to use it to derive a pricing equation of a market-traded product, such as bond. Given that the bond is a derivative of the rate, it can be viewed as an option on the underlying stock. However, as the rate is not a tradable asset, there is no underlying with which to hedge the derivative. A bond can only be hedged by taking a position in another bond of a different maturity.

Based on this principle, and applying Ito's lemma, the following bond pricing equation can be derived:

$$\frac{\partial V}{\partial t} + \frac{1}{2} w^2 \frac{\partial^2 V}{\partial r^2} + (u - \lambda w)\frac{\partial V}{\partial r} - rV = 0 \qquad (2)$$

where the function $\lambda(r,t)$ is yet to be specified and the four terms are respectively:

- time decay
- diffusion
- drift and
- discounting

Market Price of Risk

In Equation 2 above, the unknown function $\lambda(r,t)$ can be specified by assuming that we hold an unhedged bond position of maturity T. In an infinitesimally small time step dt the bond value will change by:

$$dV = w\frac{\partial V}{\partial r}dX + (\frac{\partial V}{\partial t} + \frac{1}{2} w^2 \frac{\partial^2 V}{\partial r^2} + u\frac{\partial V}{\partial r})dt \qquad (3)$$

Using the bond equation given in (2), we can write the above expression as:

$$dV = w\frac{\partial V}{\partial r}dX + (\lambda w\frac{\partial V}{\partial r} + rV)dt \qquad (4)$$

After rearranging Eq. 4, we obtain:

$$dV - rVdt = w\frac{\partial V}{\partial r}(dX + \lambda dt) \qquad (5)$$

In the above expression, as the right hand side contains two terms-deterministic (in dt) and random (in dX)-the bond portfolio is not riskless. The deterministic term can be interpreted as a reward for accepting the risk (random part). Hence the function $\lambda(r,t)$ is the *market price of risk.*

Risk Neutrality

The solution to the bond equation given by Eq. 2 can be interpreted as the expected present value of all the cashflows, where the expectation does not relate to the real random variable, but rather to the *risk-neutral* variable. This risk neutral rate will not have the drift u, but rather $u - \lambda w$, as given by Eq. 2. Hence, when pricing interest rate derivatives, the following risk-neutral interest rate model should be used:

$$dr = (u - \lambda w)dt + wdX \qquad (6)$$

Tractable Models

The bond pricing equation given above was based on an arbitrary model of interest rates, whereby the risk neutral drift $u - \lambda w$ and the volatility w have not yet been specified. The

Analitički transparentni modeli

Jednačina za određivanje cena obveznica zasnovana je na arbitrarnom modelu kamatnih stopa, gde rizično neutralan otklon $u - \lambda w$ i volatilnost w još nisu specificirani. Izbor tih funkcija mora da vodi do modela za koji rešenje jednačine za obveznice sa zero kuponom može da se pronađe analitički.

Pri tim datim uslovima, možemo uzeti da $u - \lambda w$ i w uzimaju oblik:

$$u(r,t) - \lambda(r,t)w(r,t) = \eta(t) - \gamma(t)r \quad (7)$$

$$w(r,t) = \sqrt{\alpha(t)r + \beta(t)} \quad (8)$$

Na odgovarajući način ograničavajući funkcije α, β, γ, η i λ možemo obezbediti da nasumičan hod za r dat jednačinom (1) ima sledeća svojstva:

- **Pozitivne kamatne stope -** izuzev u retkim slučajevima, kamatne stope su tipično pozitivne za sve valute i ročnosti. Sa navedenim modelom, spot stopa može da bude ograničena odozdo pozitivnim brojem ako je $\alpha > 0$ i $\beta \leq 0$. Mada stopa r može još uvek raste u beskonačnost, verovatnoća takvog događaja je nula.
- **Reverzija ka srednjoj vrednosti -** zbog uslova otklona, velika r bi se kretala naniže prema srednjoj vrednosti, dok bi mala stopa u proseku rasla naviše. To je tipično sagledano ponašanje kamatnih stopa na tržištu.

Razlog za izbor funkcionalnih formi datih u (7) i (8) za otklon i volatilnost, respektivno, leži u tome što što oni daju prosto rešenje za jednačinu obveznice (2):

$$Z(r,t;T) = e^{A(t:T) - B(t;T)} \quad (9)$$

Zamena (9) u jednačini za određivanje cene obveznica (2) omogućava izračunavanje parametara A i B. Dalje, integrisanje tih običnih diferencijalnih jednačina daje vrednosti za parametre α, β, γ, i η koji se koriste za specificiranje skretanja spot stope i volatilnosti. Međutim, ova integracija, generalno, ne može da se izvede eksplicitno.

Specifični jednofaktorski modeli

Stohastička diferencijalna jednačina (l) za rizično neutralnu kamatnu stopu sa rizično neutralnim otklonom i volatilnošću datih u (7) i (8) respektivno predstavljaju generalizovane verzije mnogih poznatih tržišno standardnih modela, od kojih su one najčešće korišćene ukratko date u daljem tekstu.

Vasiček

Vasiček model uvodi restrikcije $\alpha = 0$ i $\beta > 0$, dok su svi ostali parametri vremenski nezavisni. Tako, model dobija formu:

$$dr = (\eta - \gamma r)dt + \beta^{1/2}dX$$

Mada je ovaj model reverzan prema srednjoj vrednosti, kamatne stope mogu lako postati negativne, čineći njegovu primenu nepraktičnom. Spot stopa ima Normalnu distribuciju centriranu na η/γ. Moguće su krive prinosa nagnute nagore, nagnute nadole i konveksne.

Cox, Ingersoll i Ross

Kao i napred, parametri su vremenski nezavisni i $\beta = 0$. Model na taj način postaje:

$$dr = (\eta - \gamma r)dt + \sqrt{\alpha r}dX$$

Spot stopa teži srednjoj vrednosti i pozitivna je za $\eta > \alpha/2$. Funkcija gustine verovatnoće je centrirana na η/γ (kao kod Vasičeka), ali je iskrivljena, dajući manje verovatnoće stopama ispod proseka. Kao kod Vasičeka, model dozvoljava krive prinosa sa nagibom nagore, nagibom nadole i konveksne krive. Pošto su kamatne stope dužih ročnosti linearno zavisne od kratkoročne stope r, ročnu strukturu u bilo koje vreme t određuje $r(t)$. Drugim rečima, ročna struktura zavisi od $r(t)$ ali je nezavisna od t.

Ho & Lee

U ovom modelu, $\alpha = \gamma = 0$, $\beta > 0$ su konstante, ali η može biti funkcija vremena. To je dato u:

$$dr = \eta(t)dt + \beta^{1/2}dX$$

Ovaj model je poznat kao "model bez arbitraže" jer pravi izbor η može da proizvede

choice of those functions has to lead to a model for which the solution of the bond equation for zero-coupon bonds can be found analytically.

Given those conditions, we can assume that $u - \lambda w$ and w take the form:

$$u(r,t) - \lambda(r,t)w(r,t) = \eta(t) - \gamma(t)r \quad (7)$$

$$w(r,t) = \sqrt{\alpha(t)r + \beta(t)} \quad (8)$$

By suitably restricting the functions α, β, γ, η and λ, we can ensure that the random walk for r given by equation (1) has the following properties:

- **Positive interest rates -** except for the rare cases, interest rates are typically positive for all currencies and maturities. With the above model, the spot rate can be bounded from below by a positive number if $\alpha > 0$ and $\beta \leq 0$. Although the rate r can still extend to infinity, the probability of such occurrence is zero.
- **Mean reversion** - due to the drift term, a large r would move down towards the mean, whilst a small rate would on average move up. This is a typical observed behaviour of interest rates in the market.

The reason for choosing the functional forms given in (7) and (8) for drift and volatility, respectively, is that they yield a simple solution to the bond equation (2):

$$Z(r,t;T) = e^{A(t;T) - B(t;T)} \quad (9)$$

Substituting (9) into the bond pricing equation (2) allows for calculating parameters A and B. Furthermore, integration of these ordinary differential equations gives values for the parameters α, β, γ, η used to specify the spot rate drift and volatility. However, this integration, in general, cannot be done explicitly.

Specific one-factor models

The stochastic differential equation (1) for the risk-neutral interest rate with risk neutral drift and volatility given by (7) and (8) respectively are generalised versions of many familiar market-standard models, with the most frequently used ones briefly summarized below.

Vasicek

Vasicek model imposes the restrictions $\alpha = 0$ and $\beta > 0$, whist all other parameters are time-independent. Thus, the model takes the form:

$$dr = (\eta - \gamma r)dt + \beta^{1/2} dX$$

Although this model is mean-reverting, interest rates can easily become negative, making its application impractical. The spot rate is normally distributed with a mean of η/γ. Upward-sloping, downward-sloping and humped yield curves are also possible.

Cox, Ingersoll and Ross

As above, the parameters are independent of time and $\beta = 0$. The model thus becomes:

$$dr = (\eta - \gamma r)dt + \sqrt{\alpha r}\, dX$$

The spot rate is mean-reverting and is positive for $\eta > \alpha/2$. The probability density function has the mean equal to η/γ (same as Vasicek), but is skewed, assigning lower probabilities to the rates below the mean. As with the Vasicek, the model allows for upward-sloping, downward-sloping and humped yield curves. As the interest rates of longer maturity are linearly dependent on the short rate r, the term structure at any time t is determined by $r(t)$. In other words, the term structure is dependent on $r(t)$ but is independent of t.

Ho & Lee

In this model, $\alpha = \gamma = 0$, $\beta > 0$ and are constant, but η can be a function of time. It is given by:

$$dr = \eta(t)dt + \beta^{1/2} dX$$

This model is known as a 'no-arbitrage model' as the right choice of η can yield the theoretical bond prices that are equal to the observable market prices.

Hull and White

Hull and White extended the above models to incorporate time-dependent parameters. This time-dependence allows the yield curve (and sometimes volatility structure) to be fitted. This model is widely used for pricing interest rate derivatives and is thus described in more detail.

prinos teoretskih cena obveznica koje su jednake viđenim tržišnim cenama.

Hal i Vajt

Hal i Vajt su proširili navedeni model da obuhvati vremenski zavisne parametre. Ova vremenska zavisnost dozvoljava da se kriva prinosa (i ponekad struktura volatilnosti) prilagođava. Ovaj model se široko koristi za određivanje cena kamatnih derivata i zato ga opisujemo sa više detalja.

Model Hal i Vajt

Model Hal i Vajt proširuje Vasičekov model da bi η postalo vremenski zavisno. Alternativno, može se posmatrati i kao Ho i Li model sa parametrom reverzije ka srednjoj vrednosti. Njegova jednačina se daje kao:

$$dr = (\eta(t) - \gamma r)dt + \beta^{1/2} dX$$

U ovom modelu, pod pretpostavkom da su svi drugi parametri procenjeni statistički, možemo da odaberemo η(t) tako da teoretski cene obveznica budu jednake cenama viđenim na tržištu.

Model je sličan Ho i Lee u pogledu analitičke transparentnosti. U proseku, *r* približno prati nagib trenutne krive terminske stope. Ako se udaljava od te krive, vraća se stopi γ. Pošto volatilnu strukturu modela Hal i Vajt određuju β i γ, on može da predstavlja širi spektar volatilnosti u poređenju sa bilo kojim od navedenih modela. Analitički izrazi za volatilnost obveznica, standardnu devijaciju stope zero kupona i standardnu devijaciju trenutne terminske stope daju se analitički respektivno u sledećem:

$$v(t,T,\Omega_t) = \frac{w}{\gamma}\left[1 - e^{-\gamma(T-t)}\right] \quad (10)$$

$$std.dev_Z = \frac{w}{\gamma(T-t)}\left[1 - e^{-\gamma(T-t)}\right] \quad (11)$$

$$std.dev_{Fwd} = we^{-\gamma(T-t)} \quad (12)$$

Parametar reverzne stope γ određuje zakrivljenost krive volatilnosti cena obveznica i stope po kojoj standardne devijacije stope zero kupona i trenutne terminske stope opadaju sa ročnošću. Zakrivljenost i pad povećavaju se sa rastom γ. Za γ = 0 model se svodi na Ho i Li.

Analitički izrazi za cene obveznica kao i za kupovne i prodajne opcije na obveznice sa zero kuponom mogu lako da se izvedu.

Pretpostavke i ograničenja jednofaktorinih modela kamatnih stopa

Ova diskusija se odnosi na jednofaktorne modele generalno. Specifične reference na Hal i Vajta daju se gde to odgovara.

Prednosti

- **Analitička transparentnost -** lako je pratiti vezu između modela i jednačine za obveznice i videti efekte promene vrednosti parametara
- **Nedostatak arbitraže** - za razliku od ravnotežnih modela koji imaju početnu ročnu strukturu krive prinosa kao autput, modeli bez arbitraže nju uzimaju kao imput, dajući očekivani budući razvoj krive prinosa kao autput
- **Pozitivne kamatne stope -** izuzev retkih slučajeva (kao što je JPY), kamatne stope su obično pozitivne za sve valute i ročnosti. Kod modela datih u jednačinama (1), (7) i (8), spot stopa može se ograničiti naniže pozitivnim brojem ako je $\alpha > 0$ i $\beta \leq 0$. Stopa *r* i dalje može da raste u beskonačnost, ali sa nulom verovatnoće.
- **Reverzija ka srednjoj vrednosti -** zbog uslova otklona, *r* veće od proseka bi se kretalo naniže, i obrnuto. To je uobičajeno viđeno ponašanje kamatnih stopa na tržištu.

Mane

- **Hedžing** - glavne pretpostavke za jednačine određivanja cena obveznica su (a) sposobnost za delta hedž (stvaranje pozicije u derivatima koja bi neutralisala promene vrednosti osnovne aktive) i (b) odsustvo prilika za arbitražu (gde bi se garantovani profit generisao iz anomalija tržišnih cena). Međutim, da bi ostali delta neutralni, instrumenti moraju da se kupuju i prodaju i to mora da se radi po tržišnim cenama (a ne po teoretskim cenama). Pošto modeli

Hull and White model

Hull and White model extends the Vasicek model to make η time-dependent. Alternatively, it can be seen as the Ho and Lee model with a mean reversion parameter. Its equation is given by:

$$dr = (\eta(t) - \gamma r)dt + \beta^{1/2} dX$$

In this model, assuming that all other parameters are estimated statistically, we can choose $\eta(t)$ so that the theoretical bond prices are equal to the prices observed in the market.

The model has the same amount of tractability as Ho and Lee. On average, *r* approximately follows the slope of the instantaneous forward rate curve. If it moves away from that curve, it reverts back at the rate γ. As the volatility structure of Hull and White model is determined by both β and γ, it can represent a wider range of volatilities than any of the above models. The analytical expressions for bond volatility, standard deviation of zero-coupon rate and standard deviation of instantaneous forward rate are respectively given analytically by:

$$v(t,T,\Omega_t) = \frac{w}{\gamma}\left[1 - e^{-\gamma(T-t)}\right] \quad (10)$$

$$std.dev_Z = \frac{w}{\gamma(T-t)}\left[1 - e^{-\gamma(T-t)}\right] \quad (11)$$

$$std.dev_{Fwd} = we^{-\gamma(T-t)} \quad (12)$$

The reversion rate parameter γ determines the curvature in the bond price volatility curve and the rate at which standard deviations of the zero-coupon rate and instantaneous forward rate decline with maturity. Both the curvature and the decline increase with increasing γ. At γ = 0, the model reduces to Ho and Lee.

Analytical expressions for bond prices as well as call and put options on zero-coupon bonds can be easily derived.

Assumptions and limitations of one-factor interest rate models

This discussion relates to the one-factor models in general. Specific reference to Hull and White is given where appropriate.

Advantages

- **Tractability** - it is easy to follow the link between the model and the bond equation and to see the effect of changing parameter values
- **No-arbitrage -** unlike equilibrium models that have initial yield curve term structure as an output, no-arbitrage models take it as an input, providing the expected future evolution of the yield curve as the output
- **Positive interest rates -** except for the rare cases (such as JPY), interest rates are typically positive for all currencies and maturities. With the model given by equations (1), (7) and (8), the spot rate can be bounded from below by a positive number if $\alpha > 0$ and $\beta \leq 0$. The rate *r* can still extend to infinity, but with zero probability.
- **Mean reversion** - due to the drift term, an *r* greater than the mean would move down, and vice versa. This is a typical observed behaviour of interest rates in the market.

Disadvantages

- **Hedging** - The main assumptions behind the bond pricing equations are (a) ability to delta hedge (create the position in the derivative that would offset the changes in the value of the underlying asset) and (b) absence of arbitrage opportunities (whereby guaranteed profit would be generated due to market price anomalies). However, in order to stay delta neutral, instruments need to be bought and sold and this has to be done at market (rather than theoretical) prices. As the models are actually modelling rates, and bonds are just derivatives of those, in reality, their theoretical prices will be markedly different from the market bond prices. Consequently, unless hedging instruments can be priced correctly (which requires yield curve fitting), the model collapses and cannot be used.
- **Timeliness** - even if the bond market prices are correctly given by the model today, the likelihood of that being true at some point in the future is small. This is because the model assumes that the time-dependent parameters have not changed in time whilst in practice they always do.
- **Curve fitting** - using Taylor expansion, it can

u stvari modeliraju stope, a obveznice su samo izvedenice iz njih, u stvarnosti, njihove teoretske cene biće značajno različite od tržišnih cena obveznica. Otuda, ukoliko se vrednost instrumenata hedžinga ne može korektno proceniti (što zahteva podešavanje krive prinosa), model postaje beskoristan.

- **Blagovremenost** - čak i kada su tržišne cene danas date korektno, mala je verovatnoća da će biti važeće u neko vreme u budućnosti. To je tako zato što model pretpostavlja da se parametri zavisni od vremena nisu promenili vremenom mada se u praksi uvek menjaju.
- **Podešavanje krive -** koristeći Tejlorovu ekspanziju, može se pokazati da je nagib krive prinosa koje daje model jednak 0, 5 od rizično neutralnog otklona. Dalje, zakrivljenost krive prinosa na kratkoročnom kraju zavisi od vremenskog izvoda rizično neutralnog otklona i obrnuto.
  - Posledica toga je da $\eta(t)$ izračunato danas zavisi od zakrivljenosti današnje krive prinosa. Vrlo je uobičajeno da kriva prinosa ima znatan nagib na kratkoročnom kraju, kao i da razlika između kratkoročnih i dugoročnih stopa bude velika, pri čemu kriva postaje ravna prema dužim ročnostima. Zbog toga, kada se danas modelira kriva prinosa, očekujemo da se početan jaki nagib znatno smanjuje u budućnosti. Međutim, prilagođavanje krive prema tržištu na neki budući datum pokazaće da su naša očekivanja pogrešna. Prilagođena kriva izgledaće slična današnjoj (kao da je preneta kroz vreme).
  - Zato **nijedan jednofaktorski model ne može tačno da modelira celokupnu krivu prinosa.** Prihvatljivi rezultati mogu da se očekuju samo ako je kriva prinosa relativno ravna.
- **Nivoi krive naspram oblika krive** - na osnovu izloženog, možemo zaključiti da, korišćenjem jednofaktornih modela, tačno može da se predstavi jedino nivo krive prinosa. Potrebni su dodatni parametri da bi se obuhvatila njena zakrivljenost.

Zaključci

- Model Hal i Vajt (ili bilo koji jednofaktorni model) može tačno da modelira nivo krive, ali ne uspeva da prikaže njenu zakrivljenost. Zato treba da se koristi samo za određivanje cene instrumenata koji zavise od nivoa krive (na pr. digitalne opcije, bermudanske, barijere) a ne od oblika (gde je razlika između dugoročne i kratkoročne stope značajna, na pr. svopovi konstantne ročnosti, opcije na spred, itd).
- Kalibracija na tržišne cene je neophodna ako će se portfolio delta-hedžovati (stvaranje pozicije u derivatima koja bi neutralisala promene vrednosti osnovne aktive); međutim, ovaj proces je obično nepouzdan i treba da se izvodi oprezno
- Ovaj model omogućava reverziju ka srednjoj vrednosti, što je korisno, jer obuhvata generalne trendove na tržištu
- Model Hal i Vajt pretpostavlja pozitivne kamatne stope, što zahteva oprez kada se primenjuje u okruženju niskih kamatnih stopa; međutim, to ne važi za sve jednofaktorske modele
- Model je analitički transparentan i lako ga je razumeti; otuda je jedan od najpopularnijih tržišno standardnih modela. To daje poverenje za njegovo kontinuirano korišćenje.

be shown that the slope of the yield curve given by the model is equal to 0.5 of the risk-neutral drift. Moreover, the curvature of the yield curve at short end depends on the time derivative of the risk-neutral drift and vice versa.

  - The consequence of this is that $\eta(t)$ as calculated today will depend on the curvature of today's yield curve. It is very common for the yield curve to have significant slope at the short end, as well as for the difference between short and long-term rates to be large, whereby the curve flattens out towards longer maturities. As a result, when modelling the yield curve today, we will expect the initial large slope to reduce significantly in the future. However, refitting to the market at some future date will prove our expectations wrong. The refitted curve will look similarly to today's one (as if it were shifted in time).
  - Therefore ***no one-factor model will model the entire yield curve correctly.*** Reasonable results can only be expected if the yield curve is relatively flat.

- **Curve level vs. curve shape -** from the above, we can conclude that, using any of the one-factor models, only the level of the yield curve can be represented correctly. Additional parameters are required in order to capture its curvature.

Conclusions

- Hull and White model (or any one-factor model) can model the curve level correctly, but it fails to capture its curvature. Therefore, it should only be used to price instruments that depend on curve level (e.g. digital options, bermudans, barriers) rather than shape (where the difference between the long and short rate is important, e.g. constant maturity swaps, spread options, etc.).
- Calibration to market prices in necessary if the portfolio is to be delta hedged; however, this process is typically unreliable and should be performed with caution
- This model allows for mean reversion, which is useful, as it captures general trends in the market
- Hull and White model assumes positive interest rates, which requires caution when applying it in a low interest rate environment; however, this is not true for all one-factor models
- The model is tractable and easy to understand; hence, it is one of the most popular market-standard models. This gives confidence in its continued usage.

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Gari Beker

Nobelova nagrada za 1992.

EKONOMIJA JE UMETNOST ŽIVLJENJA

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Rezime

Gari S. Beker je dobio Nobelovu nagradu iz ekonomije 1992. godine za proširenje oblasti mikroekonomske analize na širok spektar ljudskog ponašanja i interakcija, uključujući netržišno ponašanje. Svoja istraživanja usmerio je na porodicu, društvo, kriminal, diskriminaciju, bolesti zavisnosti, itd. Do sada je napisao preko 12 knjiga i više od 50 članaka. Nosilac je brojnih priznanja: Džon Bejts Klark nagrade za najistaknutijeg američkog ekonomistu, priznanja Papske akademije nauka, Nacionalne medalje za nauku, nagrade Džon fon Nojman i Predsedničke medalje slobode, kao i počasnih diploma desetak univerziteta u svetu: Hebrejskog univerziteta u Jerusalimu, koledža u Ilinoisu, Prinstona, Harvarda i Kolumbija univerziteta, Hitocubaši univerziteta u Japanu, itd.

Ključne reči: ekonomija, Nobelova nagrada, Gari S. Beker, ekonomska analiza, ljudski kapital, investicije, diskriminacija, kriminal, zakon, interesne grupe, domaćinstvo, bračna zajednica, deca

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Gary S. Becker

Nobel Prize for 1992

ECONOMY IS THE ART OF MAKING THE MOST OF LIFE

scientific review article

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Summary

Gary S. Becker won the 1992 Nobel Prize in Economic Sciences for having extended the domain of microeconomic analysis to a wide range of human behaviour and interaction, including nonmarket behaviour. He directed his research at family, society, crime, discrimination, addiction diseases, etc. So far he has authored over a dozen books and more than 50 articles. He has won numerous awards and recognitions, such as: John Bates Clark Medal to the most prominent American economist; Recognition of the Pontifical Academy of Sciences; National Medal of Science; John von Neumann Award; and Presidential Medal of Freedom. Moreover, he is the recipient of honorary titles from a dozen universities worldwide: Hebrew University of Jerusalem, Illinois College, Princeton, Harvard and Columbia University, Hitotsubashi University of Japan, etc.

Key words: economy, Nobel Prize, Gary S. Becker, economic analysis, human capital, investment, discrimination, crime, law, interest groups, household, marriage, children

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Nobelovu nagradu 1992. godine iz ekonomije dobio je američki naučnik Gari Beker za proširenje oblasti mikroekonomske analize na širok spektar ljudskog ponašanja i interakcija, uključujući netržišno ponašanje. Za objašnjenje svoje metodološke filozofije Beker je pozajmio aforizam poznatog irskog pisca Bernarda Šoa: „Ekonomija je umetnost življenja".

Biografija

Gari Beker je rođen 1930. godine u Potsvilu, malom rudarskom gradu istočne Pensilvanije. Zbog očevog novog posla, nakon nekoliko godina, cela porodica se preselila u Bruklin, Njujork gde je Gari završio osnovnu školu i gimnaziju. Roditelji, koji su stekli samo obavezno, osnovno obrazovanje, imali su četvoro dece: dva sina i dve ćerke. Beker je bio dobar đak koji je pokazivao sklonost prema matematici, ali ga je najviše zanimao sport, i to rukomet.

Tokom svojih prvih godina studija na Prinston univerzitetu pohađao je više kurseva iz ekonomije, savremene algebre i diferencijalnih jednačina. Njegovo izučavanje matematike bilo je dobra priprema za buduće bavljenje ekonomijom za koju je počeo sve više da se interesuje. Na trećoj godini studija zainteresovanost za ekonomiju opada jer mu se čini da se ne bavi važnim društvenim problemima. Beker odlučuje da studije nastavi na univerzitetu u Čikagu i tamo uradi diplomski rad. Na ovom univerzitetu 1951. godine upoznaje Miltona Fridmana i zahvaljujući njegovim predavanjima o praktičnoj primeni ekonomije sa novim elanom i uzbuđenjem pronalazi oblasti koje su mu za dalji rad posebno inspirativne. Osim Fridmana, na ovom fakultetu bili su i drugi značajni ekonomisti kao što su: Greg Luis, T. V. Šulc i L. J. Sevidž. Prema Fridmanu je gajio veliko poštovanje zbog njegovih stavova i naučnih dostignuća, prihvatajući kao svoju njegovu maksimu da ekonomija nije igra koju igraju pametni intelektualci, već moćan alat za analizu stvarnog sveta.

Nakon dva članka koja je objavio 1952. godine, na osnovu doktorske disertacije 1957. godine izdaje svoju prvu knjigu pod nazivom *Ekonomija diskriminacije*, koja sadrži ekonomsku analizu efekata predrasuda na zarade i zapošljavanje. To je bio početak njegovog istraživanja socijalnih kategorija kroz primenu ekonomske teorije. Knjiga nije u javnosti pobudila veće interesovanje, iako je imala povoljne kritike u nekim većim časopisima, jer je većina ekonomista smatrala da rasna diskriminacija nema nikakve veze sa ekonomijom. Podršku je dobio od Fridmana, Šulca i Luisa kao i drugih bliskih prijatelja, saradnika i kolega koje je veoma poštovao i koji su doprineli da istraje na ovim i sličnim istraživanjima.

Nakon tri godine rada (1954-1957) kao docent na univerzitetu Čikago, odlazi na Kolumbija univerzitet na kome će ostati sve do 1969. godine. Ovih dvanaest godina Beker je, sem na univerzitetu, proveo radeći i u Nacionalnom birou za ekonomska istraživanja. Njegova sledeća knjiga o ljudskom kapitalu je plod istraživačkog projekta Nacionalnog biroa. U tom periodu napisao je i nekoliko članaka koji su naišli na veliko interesovanje i danas su veoma citirani. Na univerzitetu je sarađivao sa Džejkobom Minserom oko srodnih tema iz ekonomije, posebno o ljudskom kapitalu, što je pobudilo veliko interesovanje kod studenata.

Na Čikaški univerzitet Beker se vratio 1970. godine i tamo zatekao veoma stimulativnu atmosferu za rad zahvaljujući, pre svega, profesorima Džordžu Stajgleru i Heriju Džonsonu. Od tada, Beker će svoj dalji rad kao profesor ekonomije i sociologije obavljati na ovom fakultetu baveći se aktivno i pisanjem stručnih članaka i knjiga. Do sada je napisao preko 12 knjiga i više od 50 članaka.

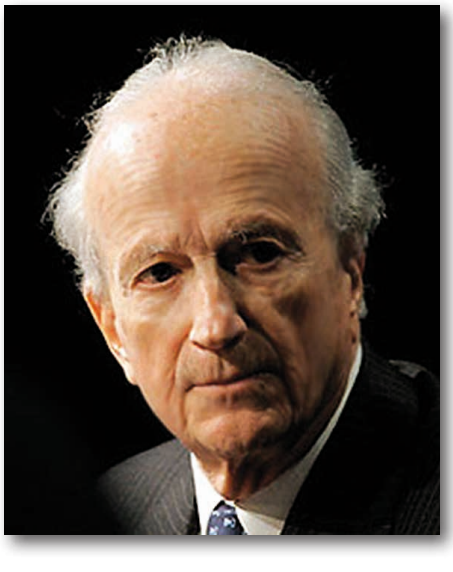
Početkom devedesetih godina prošlog veka dobio je ponudu da bude kolumnista magazina *Business Week*. Dvoumio se da li to da prihvati jer je do tada pisao samo stručne tekstove, plašeći se da to neće moći uspešno da radi. Prihvatio je ponudu magazina kao eksperiment, ali je veoma brzo shvatio da je to bila mudra odluka koja ga je naučila kako da piše o ekonomskim i socijalnim pitanjima bez upotrebe stručnih termina, odnosno da o tim temama piše jednostavnim jezikom razumljivim i za širu čitalačku publiku. Osim toga, pisanje kolumne svakog meseca učinilo je da bude uvek u toku sa aktuelnim temama koje zanimaju čitaoce magazina.

The American economist, Gary S. Becker, won the 1992 Nobel Prize in Economic Sciences for having extended the domain of microeconomic analysis to a wide range of human behaviour and interaction, including nonmarket behaviour. To describe his methodological philosophy, Becker borrowed an aphorism from the celebrated Irish writer, Bernard Shaw: "Economy is the art of making the most of life".

Biography

Gary Becker was born in 1930 in Pottsville, a small coal mining town in Eastern Pennsylvania. Due to his father's new job, after several years, the entire family moved to Brooklyn, New York, where Gary went to elementary and high school. His parents, who had acquired only the obligatory, elementary education, had four children: two sons and two daughters. Becker was a good student demonstrating his inclination towards mathematics, although at the time he was most interested in sports, handball in particular.

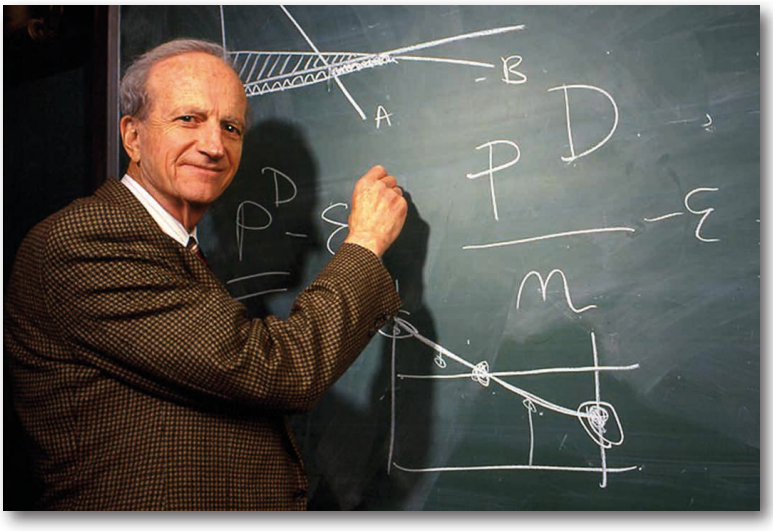
During his first years of study at the Princeton University, he attended several courses in economics, modern algebra and differential equations. His study of mathematics was a solid preparation for the future dealing with economics, in which he started to be increasingly interested. During his third year of studies, he began to lose interest in economics because it did not seem to deal with important social problems. Nevertheless, Becker decided to go to the University of Chicago for graduate work in economics. It was at this University, in 1951, that he met Milton Friedman, whose lectures on practical implementations of economics renewed his excitement and helped him discover the fields particularly inspirational for his further work. Apart from Friedman, at this University he met other important economists as well, including: Gregg Lewis, T. W. Schultz and L. J. Savage. Becker greatly respected Friedman as a result of his views and scientific achievements, having accepted his maxim that economic theory was not a game played by clever academicians, but a powerful tool to analyse the real world.



After two articles published in 1952, his first book titled *The Economics of Discrimination*, and based on his PhD dissertation, came out in 1957, featuring an economic analysis of the effects of prejudice on earnings and employment. This marked the beginning of his research of social categories by applying economic theory. The book raised no particular interest in the public, although it was favourably reviewed in a few major journals, because most economists believed racial discrimination had nothing to do with economics. Becker was supported by Friedman, Schultz and Lewis, as well as by other close friends, associates and colleagues, whom he highly respected and who contributed to his perseverance in this and similar investigations.

After three years (1954-1957) in the position of Assistant Professor at the University of Chicago, Becker left to Columbia University where he stayed until 1969. For these twelve years, in addition to his University post, he also worked at the National Bureau of Economic Research. His next book, on human capital, was the outgrowth of his research project for the National Bureau. During this period he also wrote several articles which were met with huge interest and have been frequently quoted today. At the University he cooperated with Jacob Mincer concerning the related economic topics, especially the ones about human capital, which attracted a lot of interest on the part of the students.

In 1970 Becker returned to the University of Chicago where he found a rather stimulating working atmosphere, mostly thanks to professors George Stigler and Harry Johnson. Since then, Becker has been employed at this University, as a Professor of Economics and Sociology, actively writing expert articles and books. So far he has authored over a dozen books and more than 50 articles.



Beker se ženio dva puta. Prvi put 1954. godine i iz tog braka ima dve ćerke: Džudi i Ketrin. Deset godina nakon što mu je umrla supruga ženi se ponovo 1980. godine sa Guiti Nashat koja takođe ima dvoje dece, sinove Majkla i Sajrusa. Guiti je istoričar i svoja profesionalna interesovanja usmerila je na ulogu žene u ekonomskom i društvenom životu. Kompatibilna lična i profesionalna interesovanja učinila su Bekerov život lepšim, uspešnijim i potpunijim.

Naučni rad

Konvencionalna, dobro razrađena i veoma delotvorna oruđa ekonomske analize Beker je primenio na fenomene na koje ih pre njega niko nije primenio. To je dovelo do novih saznanja o analiziranim fenomenima, a ekonomsku nauku uvelo u oblasti koje su do tada za nju bile nepristupačna zona. Bekerova ekonomska analiza se bavila ponašanjem domaćinstva, odlukama o sklapanju brakova i razvoda, fertilitetu, rasnoj, polnoj i verskoj diskriminaciji, kriminalu, političkim procesima, itd.

Stvaranje ekonomskog imperijalizma dovelo je do uspostavljanja konkurencije između različitih društvenih nauka, odnosno do konkurencije alternativnih pristupa istom posmatranom fenomenu - ljudskom ponašanju.

Beker smatra da ekonomsku nauku ne treba definisati na osnovu fenomena koje ona istražuje već na osnovu načina na koji istražuje te fenomene. Razlika između ekonomske nauke i ostalih društvenih nauka nalazi se u pristupu fenomenima koji se istražuju, a ne u njima samima. Jedini uslov koji se postavlja na planu objekta ekonomskog istraživanja jeste da postoji ljudsko ponašanje sa dva osnovna elementa: oskudni resursi i alternativni ciljevi.

Vreme je ključni resurs domaćinstva - Nov pristup Beker unosi i u istraživanje ponašanja domaćinstva. Uvodi novu kategoriju dobara - osnovna dobra koja se koriste u potrošnji, odnosno isključivo ona kao argument ulaze u funkciju korisnosti pojedinca, odnosno domaćinstva. Ova dobra se ne mogu kupiti na tržištu već predstavljaju dobra koja proizvode domaćinstva na osnovu dva inputa: vremena kao najznačajnijeg resursa kojim raspolažu i tržišnih dobara, odnosno robe koja se nabavlja na tržištu. Ključni resurs domaćinstva je vreme. Beker naziva punim dohotkom onaj koji bi domaćinstvo, odnosno pojedinac ostvario ukoliko svoje celokupno raspoloživo

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2. Beker, G. S. (1964): *Ljudski kapital*. Chicago: Chicago University Press.
3. Beker, G. S. (1965): „Teorija o alokaciji vremena“, *Ekonomski žurnal* 75 (299), str. 493-517.
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In early 1990s, Becker received an offer to write a monthly column for *Business Week* magazine. He was in two minds whether to accept it, given that until then he had only written academic texts, fearing that he would not be able to manage this successfully. Finally, he agreed to the offer on an experimental basis, but soon realized that it was a wise decision, which taught him to write about economic and social issues without using the technical jargon, i.e. to write about these topics in a simple language, understandable even to the general audience. Moreover, the writing of a column each month made him stay abreast of the current subjects that interested the readers of the magazine.

Becker married two times. For the first time in 1954, from which marriage he has two daughters: Judy and Catherine. Ten years after his first wife died, in 1980, he married for the second time to Guity Nashat, who gave him two stepsons: Michael and Cyrus. Guity is a historian who directed her professional interests at the role of women in economic and social life. The personal and professional compatibility of their interests has made Becker's life more beautiful, successful and complete.

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1. Becker, G. S. (1957): *The Economics of Discrimination*. Chicago: Chicago University Press.
2. Becker, G. S. (1964): *Human Capital*. Chicago: Chicago University Press.
3. Becker, G. S. (1965): "A Theory of the Allocation of Time", *Economic Journal* 75 (299), pp. 493-517.
4. Becker, G. S. (1968): "Crime and Punishment: An Economic Approach", *The Journal of Political Economy* 76: pp. 169-217.
5. Becker, G. S. (1974): "A Theory of Social Interactions", *Journal of Political Economy* 82(6), pp. 1063-1093.
6. Becker, G. S. (1976): *The Economic Approach to Human Behavior*. Chicago: Chicago University Press.
7. Becker, G. S. (1981): *A Treatise on the Family*. Harvard University Press.
8. Becker, G. S. (1983): "A Theory of Competition among Pressure Groups for Political Influence", *The Quarterly Journal of Economics* 98: pp. 371-400.

Scientific work

The conventional, well-developed and rather efficient tools of economic analysis were implemented by Becker on the phenomena that no one before him dealt with. This shed new light on the analysed phenomena, and introduced new fields into economics, the fields which had been formerly inaccessible to it. Becker's economic analysis focused on the behaviour of households, decisions to enter a marriage or get a divorce, fertility issues, racial, gender and religious discrimination, crime, political processes, etc.

The origination of economic imperialism led to the establishment of competition among various social sciences, i.e. to the competition of alternative approaches to the same observed phenomenon - human behaviour.

Becker believes that economic science should not be defined based on the phenomena it investigates, but based on the methods is uses to investigate those phenomena. The difference between economic science and other social sciences lies in the approach to the investigated phenomena, and not in the phenomena themselves. The only condition set in terms of the subject of economic research is that there is human behaviour with two main elements: scarce resources and alternative goals.

Time as the key resource of households - Becker introduces a new approach to the research of households' behaviour. He presents a new category of goods - basic goods used in consumption, meaning that only such goods are to be used as an argument in the function of usefulness of an individual, i.e. a household. These goods cannot be purchased in the market, but represent those goods produced by the household based on two inputs: time, as the most important resource available, and market goods, i.e. commodities procured on the market. The key resource of a household is time. Becker defines full income as the income a household, or an individual, would achieve if they spend all their available time on performing market activities. Thereby Becker indicated that time

vreme potroši u tržišnim aktivnostima. Time je pokazao da je vreme novac i da ima svoju cenu. Ljudi koji od svojih tržišnih aktivnosti ostvaruju visok dohodak, imaju i visoku cenu svog vremena.

Investicije u sopstveni ljudski kapital - Što je više investicija u ljudski kapital to su one efikasnije, a ljudski kapital veći, pa su veći i prinosi na taj kapital mereno nadnicama i drugim radnim dohocima. Odluke o investicijama u sopstveni ljudski kapital ljudi donose tako da maksimizuju neto sadašnju vrednost svojih budućih dohodaka. Ukoliko postoji nekoliko mogućih investicionih projekata, ljudi će se odlučiti za onaj koji generiše najveću neto vrednost očekivanih budućih dohodaka. Obrazovanje predstavlja najznačajniju vrstu te investicije. Što se tiče nacionalnih investicija u ovaj resurs one se u velikom delu tretiraju kao potrošnja (obrazovanje, zdravstvena zaštita, rekreacija, itd.), a u stvari to su investicije u ljudski kapital koje dovode do rasta proizvodnje za budućnost.

Deca su osnovna dobra - Odluka (van) bračnog para da imaju decu za Bekera predstavlja investicionu odluku porodice/ domaćinstva, a pri svakoj investicionoj odluci porede se sadašnje vrednosti očekivanih prinosa i očekivanih troškova koje će deca da generišu prilikom njihovog podizanja. Dohodak roditelja ima odlučujuću ulogu o veličini porodice/ broju dece. Investicije u ljudski kapital dece podrazumevaju veliko učešće vremena roditelja. Porast dohotka dovodi do efekta supstitucije dece drugim osnovnim dobrima. Odnosno, porast dohotka dovodi do opadanja tražnje za decom, pa time i veličine porodice. Ova regularnost poznata je kao Bekerova hipoteza o troškovima vremena žene, imajući u vidu njenu značajniju ulogu u podizanju dece. Druga njegova hipoteza je o interakciji kvantiteta i kvaliteta dece. Kvalitet deteta, kao novi Bekerov element u razmatranju teorije fertiliteta, podiže se uvećanim investiranjem u ljudski kapital deteta što povećava troškove podizanja svakog pojedinačnog deteta. Pri zadatom budžetskom ograničenju roditelji biraju između uvećanja sopstvene korisnosti koja proizilazi iz uvećanja broja dece i uvećanja korisnosti do koga dolazi sa uvećanjem kvaliteta svakog deteta. Raspoloživo roditeljsko vreme, kao osnovni proizvodni faktor podizanja dece, može alternativno da se upotrebi na podizanje manjeg broja dece višeg kvaliteta ili većeg broja dece nižeg kvaliteta.

Brak i njegovo tržište - Dve osobe stupaju u brak kada postignu saglasnost da očekuju da će im u braku biti bolje nego da ostanu samci. Postoji svojevrsno bračno tržište na kome se pojedinci nadmeću, odnosno konkurišu jedni drugima za dobijanje najboljeg mogućeg bračnog druga. Monogamija je optimalan oblik braka i on maksimizuje proizvodnju osnovnih dobara. Ukoliko se produktivnost muškarca razlikuje, poligamija može da bude optimalni oblik. Poligamija će biti češća u slučaju produktivnijih muškaraca i to objašnjava ciničnom opaskom Bernarda Šoa: „Materinski instinkt navodi ženu da joj više odgovara deseti deo prvorazrednog muškarca u odnosu na isključivo posedovanje jednog trećerazrednog."

Diskriminacija - Za Bekera ne postoje ekonomski uzroci diskriminacije već postoje samo njene ekonomske posledice.

Priznanja

1. 1967. godina - Džon Bejts Klark nagrada za najistaknutijeg američkog ekonomistu ispod 40 godina starosti;
2. 1992. godina - Nobelova nagrada;
3. 1997. godina - Priznanje Papske akademije nauka;
4. 2000. godina - Nacionalna medalja za nauku;
5. 2004. godina - Džon fon Nojman nagrada;
6. 2007. godina - Predsednička medalja slobode.

Beker je jedan od osnivača Nacionalne akademije za obrazovanje, saradnik američkog Udruženja za statistiku, Ekonometrijskog društva, Američke akademije nauka i umetnosti, član Nacionalne akademije nauka, Američkog filozofskog društva, Međunarodne unije za naučno istraživanje stanovništva, Američkog ekonomskog udruženja, itd.

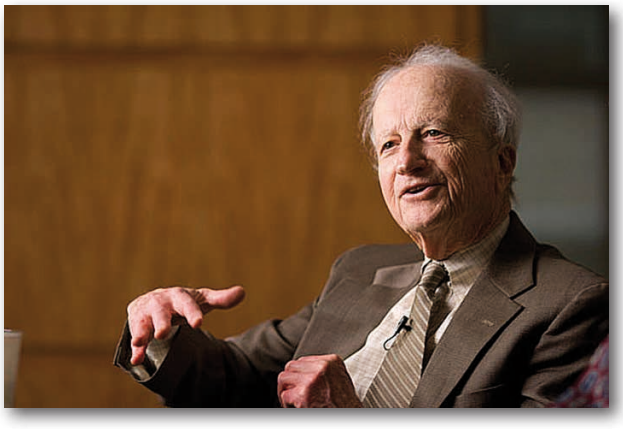
Nosilac je počasnih diploma desetak univerziteta u svetu: Hebrejskog univerziteta u Jerusalimu, koledža u Ilinoisu, Prinstona, Harvarda i Kolumbija univerziteta, Hitocubaši univerziteta u Japanu, itd.

is money and that it has its own price. People who yield high income from their market activities charge a high price for their time.

Investments into human capital - The higher the investments into human capital, the more efficient they are, and the larger the human capital, hence also the returns on this capital, measured in terms of wages and other work-related income. The decisions on investments into their own human capital are made by people maximizing the net present value of their future income. If there are several potential investment projects, people would opt for the one generating the highest net value of the expected future revenues. Education is the most significant form of such investment. As for the national investments into these resources, they are largely treated as consumption (education, healthcare protection, recreation, etc.), whereas in fact those are investments into human capital, leading towards a growth of future production.

Children are basic goods - A decision of a(n) (un)married couple to have children for Becker represents an investment decision of a family/household, and whenever there is an investment decision to be made, the present values of expected returns are compared with the expected costs generated by the children during their upbringing. The parents' income has a decisive role in the size of a family/number of children. Investment into the human capital of children demands a large input of the parents' time. A growth of income causes the effect of substituting children by other basic goods. In other words, an increased income results in a declined demand for children, and, in turn, the size of the family. This regularity is known as the Becker's cost-of-a-woman's-time hypothesis, bearing in mind that women typically play a more significant role in raising children. His second hypothesis refers to the interaction of quantity and quality of children. Quality of a child, as a new element in Becker's consideration of fertility theory, increases by means of bigger investments into the child's human capital, which heightens the costs of upbringing each individual child. With the given budget limits, parents have to choose between increasing their own usefulness by having more children, and increasing the usefulness by investing in a higher quality of each child. The available parenting time, as the main production factor in raising children, may alternatively be used for raising fewer children of a higher quality or more children of a lower quality.

Marriage and its market - Two persons enter a marriage when they reach agreement on their expectations that it would be better for them to get married than to stay single. There is a marriage market of a kind, in which individuals compete with each other for

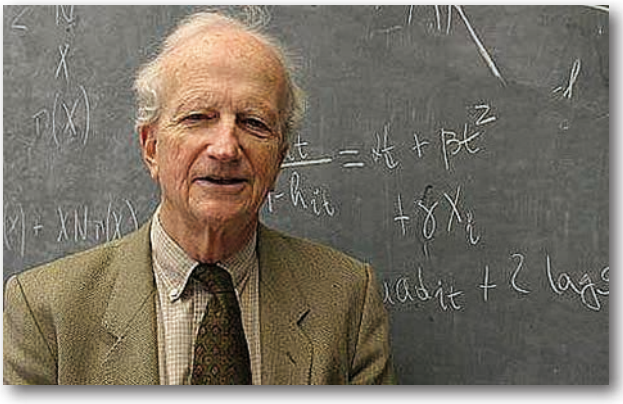


Recognitions

1. 1967 - John Bates Clark Medal to the most prominent American economist under the age of forty;
2. 1992 - Nobel Memorial Prize in Economic Sciences;
3. 1997 - Recognition of the Pontifical Academy of Sciences;
4. 2000 - National Medal of Science;
5. 2004 - John von Neumann Award;
6. 2007 - Presidential Medal of Freedom.

Becker is one of the founders of the National Academy of Education; an associate of the American Statistical Association, the Econometric Society, the American Academy of Arts and Sciences; a fellow of the National Academy of Sciences, the American Philosophical Society, the International Union for the Scientific Study of Population, the American Economic Society, etc.

Moreover, he is the recipient of honorary titles from a dozen universities worldwide: Hebrew University of Jerusalem, Illinois College, Princeton, Harvard and Columbia University, Hitotsubashi University of Japan, etc.



U slučaju vlasnika kapitala koji primenjuje diskriminaciju dolazi do promene funkcije cilja, više ne maksimizuje profit već korisnost, a lične karakteristike zaposlenih (boja kože, pripadnost nekoj etničkoj grupi ili konfesiji) kao argument ulaze u funkciju korisnosti. Diskriminacija, Bekerov je zaključak, obara ekonomsku efikasnost. Ljubav prema mržnji mora da plati pa će se tako na uverljiv način pokazati privrženost idealima rasizma ili nekim drugim idealima iz tog dijapazona.

Kriminal kao racionalna kategorija - Ponuda kriminala po Bekeru zavisi od svih onih faktora koji utiču na očekivanu korisnost koju donosi kršenje zakona. Očekivana korisnost te vrste opada sa porastom zaprećene kazne, kao i sa porastom verovatnoće otkrivanja počinioca krivičnog dela, odnosno donošenja njegove pravosnažne osuđujuće presude.

Interesne grupe - Interesne grupe u društvu se bore za uvećanje ličnog blagostanja. Tražnja za političkim uticajem zasnovana je na maksimizaciji ličnog blagostanja pripadnika interesnih grupa. Iznos blagostanja oduzetog jednoj interesnoj grupi ne mora da bude jednak iznosu prirasta blagostanja druge grupe. Prvi nalaz Bekerovog modela je da ravnoteža na političkom tržištu nije efikasna. Ona se može ostvariti uz manje apsolutno angažovanje resursa namenjenih za stvaranje političkog pritiska - isti ravnotežni politički pritisak može da se ostvari uz manje troškove. Drugi bitan nalaz Bekerovog modela je da se relativizuje značaj problema slepog putnika, budući da je bitan jedino relativni politički pritisak interesnih grupa. Najznačajniji rezultat Bekerovog modela je da konkurencija interesnih grupa za preraspodelu blagostanja dovodi do uspostavljanja državnih politika koje uvećavaju efikasnost alokacije resursa.

Literatura / References

1. Ekonomisti nobelovci 1990-2003, Centar za izdavačku delatnost Ekonomskog fakulteta u Beogradu, 2004. Boris Begović, Gary S. Becker - ekonomski imperijalista
2. www.nobelprize.org

finding the best possible marriage partner. Monogamy is the optimal form of marriage and it maximizes the production of basic goods. If a man's productivity differs, polygamy can be the optimal form. Polygamy will be more frequent in case of more productive males, which Becker explains by referring to the cynical remark of Bernard Shaw: "The maternal *instinct* leads a *woman* to *prefer a tenth* share in a *first rate man* to the exclusive possession of a *third rate one."*

Discrimination - For Becker there are no economic causes of discrimination, but only its economic consequences. In case of a capital owner practising discrimination the function of his objective changes. No longer is profit being maximized, but benefits, and the personal characteristics of the employees (skin colour, ethnical group or confession) serve as an argument in the function of such benefits. Discrimination, as Becker concludes, impedes economic efficiency. Love of hatred has to pay, hence, in a rather convincing way, the devotion to the ideals of racism or some other ideals from the same category get illustrated.

Crime as a rational category - According to Becker, the scope of crime depends on all those factors impacting the expected benefits from breaking the law. The expected benefits of such kind decrease with the growth of the threatened punishment, and with the increase of the probability that the perpetrator of a criminal offence would be detected, and his lawful, convicting sentence duly passed.

Interest groups - Interest groups in a society fight for increasing their personal welfare. Demand for political influence is based on the maximization of personal welfare of interest group members. The amount of welfare taken from one interest group does not necessarily have to equal the amount of accumulated welfare of another group. The first discovery of the Becker's model is that the equilibrium in the political market is inefficient. It can be achieved by lower absolute engagement of resources intended for causing political pressures - in other words, the same political pressure can be achieved with reduced costs. The second important discovery of the Becker's model is to relativize the importance of a "free rider" problem, given that only the relative political pressure of interest groups is truly important. The most significant outcome of the Becker's model is that the competition of interest groups for re-allocation of welfare leads to the establishment of state policies increasing the efficiency of resources allocation.