High-impact economists

By Zakaria Babutsidze and Mark J. McCabe

This coming Monday, October 14 2013, as many as three economists will join the elite group of winners of the Sveriges Riksbanks Prize in Economic Sciences in Memory of Alfred Nobel. The Royal Swedish Academy of Sciences is responsible for the selection of the Laureates in Economic Sciences from among the candidates recommended by the Economic Sciences Prize Committee. In early October, the Academy selects the laureates through a majority vote.

Presumably, the main criterion for awarding this prize is the impact that the winner(s) have had on society.[1] Clearly the assessment of such an impact is not an easy and straightforward matter. It involves approaching the problem from a variety of perspectives, some more objective than others. It is probably safe to assume that researchers, whose work has had a large impact on society, have also influenced the discipline of economics.

In this post we report some statistics in order to assess different economists' impact on the discipline. To do this, we use data from 48 peer-reviewed journals in Economics and Finance. Each of these journals has published at least five articles authored by one or more of the prize winners between 1969 and 2012 The data is collected from Thomson Reuters' ISI Web of Science and contains all articles published in these 48 journals starting in 1956 and ending in 2012, and all citations to each of these articles up to (and including) 2012.

The impact of a researcher is often measured by the number of citations his or her work has generated, e.g. the average annual number of citations to each article, weighted by the number of authors. This measure allows us to compare (albeit

imperfectly) articles published at different points in time. However, for the case at hand, we are interested in the long run (or total) impact of the researcher. Therefore, our guiding indicator will be the total number of citations generated by the works of an economist weighted by the number of authors.

[Note: In identifying the pool of researchers eligible for the 2013 Prize, we excluded all past winners and, following the Academy's guidelines, any other scholars who are now deceased.]

To get a sense of the citation impact of individual papers, take a look at Table 1, which lists the top 10 most cited articles in economics not authored by any prior prize winners. Although this provides an incomplete picture of a researcher's total career impact, the Academy normally cites influential papers in the press releases (and explanatory materials) announcing the winners.

Table 1. Top 10 most cited articles in economics since 1956

Rank	Total Cites	Authors	Year	Journal
1	7157	Michael Jensen and William Meckling(†)	1976	Journal of Financial Economics
2	3246	Tim Bollerslev	1986	Journal of Econometrics
3	3210	Jerry Hausman	1978	Econometrica
4	3202	Soren Johansen	1988	Journal of Economic Dynamics & Control
5	3121	Whitney Newey and Kenneth West	1987	Econometrica
6	3065	Paul Romer	1986	Journal of Political Economy
7	2665	Michael Jensen	1986	American Economic Review
8	2664	Armen Alchian(†) and Harold Desmetz	1972	American Economic Review
9	2654	Manuel Arellano and Stephen Bond	1991	Review of Economic Studies
10	2645	Lars Peter Hansen	1982	Econometrica

(†) The author is deceased.

Table 1 features 11 economists that are eligible for the prize. Out of these 11 only one, Michael Jensen, has two papers in top 10. The table also demonstrates the large gap between the citation numbers of papers ranked first and second.

In what follows we present a researcher or career-level analysis. We assess the impact in two different ways. One approach utilizes all of the papers authors have written in their careers up to 2012 (this is a set comprising more than 170,000 papers). Our other approach is to utilize only the

highest-impact papers (the top 100 most cited papers ever written).[2]

Before presenting the list of the most cited economists we first attempt to assess the power of the exercise. Namely, we ask what is the chance that people with high impact, as measured by number of citations, actually get awarded the prize? To answer this we take the top 25 most cited researchers according to each of the two criteria defined above (using all articles and the top 100 most cited articles) and see how many of those 25 have actually been awarded the prize. It turns out that in each case 13 out of 25 researchers have already won the prize.[3][4] These results suggest that number of citations received by researchers is a reasonable proxy for impact as defined by the Academy.

Next, the list of top 10 economists that are eligible for the Nobel Prize this year is presented in table 2. Panel A utilizes all articles in our dataset. Panel B of the table presents results using only the top 100 most cited articles. The columns titled *Rank* report the rank of the economist in the given list. The *Total Rank* columns refer to the rank of the economist in the list of high-impact economists that includes authors who have won the prize and those who are deceased. The *Citations* columns reports the total number of citations associated with the relevant set of articles by the author, weighted by the number of authors (e.g. if an article, authored by n authors, received z citations, then each listed author is credited with z/n citations).

Table 2. Top 10 most cited economists since 1956

A				B			
Rank	Total Rank	Citations	Author	Rank	Total Rank	Citations	Author
1	1	17931.38	Eugene Fama	1	1	9179.5	Eugene Fama
2	6	11573.1	Michael Jensen	2	3	7331.5	Michael Jensen
3	7	11211.83	Robert Barro	3	5	6072.5	Soren Johansen
4	11	9745.25	Andrei Shleifer	4	10	4496	Paul Romer
5	14	7014	Soren Johansen	5	15	3277	Robert Barro
6	15	6875.5	Jerry Hausman	6	16	3246	Tim Bollerslev
7	22	6426.833	Tim Bollerslev	7	17	3210	Jerry Hausman
8	23	6079.667	Paul Romer	8	22	2645	Lars Peter Hansen
9	24	5947.25	Richard Thaler	9	26	2565.5	Stewart Myers
10	26	5901.833	Robert Vishny	10	29	2140.417	Andrei Shleifer

As one can see from the table 2, eight economists appear in both of the lists. Five out of this eight are also featured in Table 1. These eight people are outstanding researchers by our measures and will most likely be among the economists considered for the 2013 prize.

The exercise that we have reported here measures the researchers' impact on the discipline. However, the main guiding principle behind the Economic Science Prize is the impact on society. These two do not perfectly correlate. To see this, consider last year's prize winners – Alvin Roth and Lloyd Shapley. They were awarded the prize "for the theory of stable allocations and the practice of market design". Their work has generated significant social benefits. For example, Roth is a co-founder of the New England Program for Kidney Exchange, which enables organ transplantation where it otherwise could not be accomplished. However, if we apply our measures to Roth and Shapley, their performance is not outstanding. None of them have authored an article that enters the list of 100 most cited articles in economics; therefore they do not figure in our rankings using this particular methodology. When we consider all articles, Roth ranks 99th, while Shapley ranks 979th.

Postscript: In the discussion above, our primary intention is

not to predict Monday's winners. Nevertheless, it seems that the Economic Sciences Prize Committee selects a sub-discipline, or a narrow research area to recognize and only after this selects candidates who have contributed to the advancement in that area the most. Recall that we provided an analysis of total citations. We have not performed any breakdown by research areas and have not modeled the Committee's area selection process. In contrast to our work, area selection is an important component of the well-known efforts by the Intellectual Property and Sciences business of Thomson Reuters to predict winners of the Economics Science Prize. This year they predict that one of the following three areas are likely to be honored by the Academy: microeconometrics, time-series econometrics or regulation theory.[5] In each of these three areas they predict two or three winners. In the table below, without further comment, we provide the list of people they predict to win the Nobel Prize alongside with their ranks in our high-impact economists list.

Table 3. Thomson Reuters' prediction for the winners of the prize 2013

Total Rank	Author	Area
225	Joshua Angrist	Microeconometrics
127	David Card	Microeconometrics
36	Alan Krueger	Microeconometrics
211	David Hendry	Time-series econometrics
123	Hashem Pasaran	Time-series econometrics
39	Peter Phillips	Time-series econometrics
73	Sam Peltzman	Regulation theory
206	Richard Posner	Regulation theory

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[1] In selecting a winner for the Economic Science Prize, the Swedish Academy follows the same principle that is used in

awarding the five original Nobel Prizes, namely choosing those individuals, "…who have conferred the greatest benefit to mankind."

[2] Book chapters and working papers are not included in our dataset.

[3] However, the identities of the 13 prize winners is somewhat different across the two procedures. When all articles are considered, the 13 winners among the top 25 most highly cited authors are (in decreasing order of importance): Becker, Lucas, Heckman, Stiglitz, Engle, Merton, Kahneman, Solow, Arrow, Granger, Akerlof, Krugman, Williamson. When the set of the top 100 articles is considered, the 13 winners are Engle, Becker, Heckman, Kahneman, Solow, Coase, Akerlof, Lucas, Arrow, Granger, Sharpe, Black and Scholes.

[4] Note that the lists also include a number of influential economists who died without winning the prize. These include Zvi Griliches, William Meckling, Charles Tiebout, Amos Tversky and Halbert White.

[5] It is noteworthy that seven of the 10 papers listed in table 1 are in the general area of econometrics.

Setting expectations carefully

Zakaria Babutsidze

We all base certain our decisions on expectations. We buy new products because we expect that they carry certain quality, we vote for certain candidates because we expect they will do a

“good job”, etc. However, recent research suggests that our expectations affect not only decisions. They also affect the level of enjoyment we derive from taking these decisions (or from experiencing their consequences). In economic terms it means that level of utility derived from the consumption of a product is affected by the expectations of the consumer. Even more technically, we say that people possess expectation-based reference-dependent preferences.

Consider a situation where a decision maker has to make an action. The level of the satisfaction that she will extract from this action (denote this value by x) is not perfectly known to her before the action is taken. This level of satisfaction is realized afterwards. However, a decision-maker has an expectation of what that level might be before making the decision (denote this value by y). A simple interpretation of the theory suggests then that mismatch between x and y will affect the actual satisfaction derived from the action. In particular, if $y-x<0$, which means that realized satisfaction exceeded expectations then consumer gets an extra boost in satisfaction level and ultimate level of satisfaction is in fact above x. However, if consumer gets disappointed ($y-x>0$) his satisfaction will be lower than x.

How these satisfaction-affecting expectations are formed is another matter. In this respect we can imagine certain number of opportunities given to the decision-maker to decide on the final expectation that he will base his decision on. What complicates the calculation of the final impression is that early impressions actually affect the later ones. Therefore, more opportunities there are to form the impression harder it is to detect the actual pattern of expectation formation.

Experimental evidence supporting the principles underlying expectation-based reference-dependent preferences is mounting as this entry is being written (Crawford and Meng, 2011; Pope and Schweitzer, 2011; Gill and Prowse, 2012). I have discussed certain business and economic implications of these principles

in a recent OFCE working paper. For example, the mechanism implies that advertising campaigns can get wasteful not only from social, but also from individual producer's point of view as they may scare off potential customers instead of attracting them.

What is interesting is the fact that this principle seems to have been known for advertisers, media strategists and business practitioners for some time now (Parasuraman *et al.*, 1991; Dixon *et al.*, 2010). In fact, we can even speculate that this principle is known for certain politicians (or at least members of their staff).

Take a look at the current US presidential campaign. More precisely at the three debates held between the two presidential candidates (Democrat incumbent Barak Obama and Republican challenger Mitt Romney) that were held on October 3rd, 16th and 22nd. President Obama is known to have lost the first debate and won the third one, while the second debate was called a draw. Now, what is important to understand is that there is no actual score. These "scores" were simply based on the feelings of the electorate surveyed after each debate. These debates can be seen as opportunities to the voters to form their expectations based on which they will cast their votes on November 6.

Sequencing in results has been clearly beneficial for Mr Obama for few different reasons. For example, psychologists have a memory "bin" model of impression formation where the last piece of information received is the most relevant piece in determining the decision (Wyer and Srull, 1989; Babutsidze, 2012). Another reason why the sequencing favors the incumbent is that voters usually prefer voting for candidates that are on a winning streak to voting for those on a loosing streak.

However, what expectation-based reference-dependent preferences can offer is the insight into the judgment of voters on the outcome of single debates. The theory implies that voters would give higher appraisal to the positive performance of the candidate when they expect him not to do well compared to when they expect him to perform well. This means voters would judge President Obama's performance to be poorer hadn't they been "primed" by the results of the first two debates.

Presidential candidates might not know about this theory, but Mr Obama tried to use the principle (consciously or unconsciously) by saying that: "Governor Romney, he's a good debater. I'm just okay" just before the first debate. The fact is that the strategy to set voter expectations low has not been sufficient to convince enough voters that his poor performance was satisfactory. Perhaps this was the case because it indeed was very hard to set expectations lower than those set by Mr Romney who has provided meaty gaffe after gaffe throughout the campaign.

However, the lost first debate might actually benefit President Obama. Somewhat counter-intuitive suggestion of the theory is that had he performed well during the first debate, he'd have *a higher likelihood of loosing elections*.

Economic policy-making tools

for pre- and post-crisis periods

by Zakaria Babutsidze and Mauro Napoletano

The worldwide financial crisis has questioned the relevance of economic models that are currently used by central bankers and macro analysts. In contrast, the recent economic events seem to be better described by models featuring boundedly rational heterogeneous agents and wherein markets do not necessarily clear at all times. Agent Based Models (ABMs) are a new class of models that embed all the above features, and therefore qualify as a promising alternative to conventional models.

An economic crisis, such as the current one, is a clear divide between processes before and after it. For instance, economic policies can be split into two groups: pre-crises and post-crisis policies. While the latter aim at helping the economy to move out of the crises to a more favourable state, the former policies concentrate on averting it.

Currently popular economic models can (to an extent) discuss post crisis policies. These models view economies as closed systems that move along one of (few) balanced equilibria. A modeller can introduce a large external shock in the system that can be interpreted as the crisis and further discuss policies to help the system move back to the previous (or even better) equilibrium. However, there is a problem with these policies. The main assumption of modern mainstream economics is hyper-rational agents, which assumes that economic agents (including households) possess complete information about the future of the economy and by acting rationally on this information the future that was foreseen is actually realized.

Modellers argue that this is reasonable even if we know that people do not optimize. The argument is that due to market

selection only the best performing agents will survive. As optimization guarantees the best response to the current situation every agent that is present at the equilibrium has to be behaving “as if” she is optimizing. Notice that this argument rests on the notion of equilibrium and says nothing about how this equilibrium will be reached. Now recall that modellers had to assume a large shock knocking the system out of the equilibrium in order to discuss the crisis. Then the approximation with hyper-rationality cannot properly describe the agent behaviour after crisis.

Concerning pre-crises policies the problems are even greater. Current mainstream models exclude the possibility of generating the crises endogenously. While, it is a known fact that modern economic crises are rarely related to external shocks. They are generated endogenously by the system. They emerge from the factors (like non-price interactions, localized learning processes, outrageous banking and investment practices etc.) that are directly assumed away from the mainstream modelling. Therefore, these models are inherently inadequate to discuss policies directed to prevention of crises.

We believe that an economic tool that is to be successful in designing economic policy to avert the economic crises requires three characteristics. Firstly, it has to take account of the individual behaviour. Secondly, it has to model the behaviour in a way that is consistent not only with equilibrium, but also with non-equilibrium states. Finally, it has to allow for the possibility of endogenously generating crises.

Currently popular policy making tools fail in at least one of these three respects. Take for example Dynamic Stochastic General Equilibrium (DSGE) models. They represent the workhorse of modern monetary policy. This modelling strategy conforms to the first requirement listed above: DSGE is a micro-founded modelling strategy that replaced previous

techniques that were abstracting from individual agent behaviour and thus were prone to Lucas (1976) critique.[1]

Alas, DSGE fails in two other respects. Microeconomic behaviour is based on perfect foresight that requires hyper-rational agents that were mentioned above, and therefore, as argued above, does not describe well agent behaviour during the out-of-equilibrium dynamics. In addition to this, stochasticity of the system allows only for small perturbations and large shocks (such as crises) have to be exogenously injected in the system. Perhaps, these failures are the cause of difficulties that DSGE modelers are having in predicting and managing current crises, as acknowledged by some central bankers (Trichet, 2010; Kocherlakota 2010).

It is true that DSGE models take into account micro-behaviour as well as institutions (see for example Smets and Wouters 2003), which is the model widely used by European Central Bank). However, what they fail to take into account is the possibility of endogenous (co-)evolution of these structures, the heterogeneity and non-price interactions among economic agents that can lead the system to breakdown without external interference.

One promising tool for economic policy design goes under the name of Agent Based Modelling (ABM). The characteristics of this approach are discussed at greater length in a recent OFCE briefing paper by Napoletano, Gaffard and Babutsidze 2012. In contrast to mainstream economics (such as DSGE), ABM is more flexible to model relevant processes as dynamical systems of heterogeneous agents who interact through price and non-price channels. The approach treats time as the key variable. This is in contrast to orthodox models. Take the crises again. In mainstream modelling at the moment of crisis new equilibrium becomes known to everyone instantaneously and perfectly rational individuals adjust their choices accordingly. This drives the system to the new equilibrium. In ABM individuals do not get information about new equilibrium to which the

system is supposed to converge to and each individual has to navigate in its own way. This feature allows for the plethora of learning processes (which, according to Howitt 2012 are extremely scarce in modern Macroeconomic theory) to be also taken on board.

ABM concentrates on open-ended dynamics and allows for an equilibrium (defined as an ergodic state of the system) as an emergent and optional outcome (Leijonhufvud 2011). While current mainstream modelling is based on the centralized information processing structure that is fed with all the available information in the system, ABM takes a bottom-up approach that starts modelling realistic micro-foundations (in contrast to DSGE) and analyses the resulting behaviour of the model at upper levels. The dynamics of aggregate variables are the result of complex, continuously (and endogenously) changing micro-structure. This yields substantial advantages in modelling policy on macro (LeBaron and Tesfatsion 2008), as well as on industry (Chang 2009) and market (Duffy and Unver 2008) levels.

Using Agent Based tools a modeller can specify the agent's micro behaviour and understand how the dynamics of the system leads to the critical state and a subsequent breakdown (endogenously generated crisis). This is a common occurrence in physical systems and Agent Based approaches are routinely used for their analysis. Using such a model the policies to direct the path of the economy away from the critical state can be discussed. From this prospective ABM has clear advantage in discussing pre-crisis policies over orthodox approaches.

Another substantial advantage of the methodology is its easiness to be implemented in a computational environment. Behavioural rules can be passed to the agents in computer simulations and respective outcomes can be observed. This is important for two reasons. Firstly, this makes models easily understandable for policy-makers that are not necessarily

proficient in mathematics that current orthodox methods heavily rely on (Uri Wilenski, the developer of the most popular computational environment for ABM – NetLogo, is repeatedly making this point). Secondly, behavioural rules (and other settings) can be easily adjusted to fit the problem at hand. Due to their concern with the equilibrium, mainstream models are less flexible and consequently less appropriate for policy-making.

However, there are disadvantages to the approach. Detailed discussion of approach's shortcomings is presented in the above-mentioned OFCE briefing paper. Here we concentrate on the one that is shared by all non-equilibrium approaches. It is that ABM does not (cannot) provide a comprehensive analysis of all the paths the model allows for. Once you leave the equilibrium, the number of paths an economic system can take become infinite. Therefore, in most of the cases, comprehensive analysis is not feasible.

While this criticism is relevant in face of commonly accepted practice in economic science, it is irrelevant to the ABM's powers as a policy-making tool. Policy makers are not concerned with all the possible scenarios in all the possible types of economies. They have a very specific problem at hand. They operate in a specific country/region, they are given a very specific initial condition (currently existent in the economy) and they want to achieve a certain well-defined goal with a specific policy tool. Agent Based Modelling gives them the opportunity to fine-tune the model to their specific situation and then analyse the effects of a specific policy instrument. The policy instrument controls one (or very few) parameters of the model. Given a specific market/economy and specific initial conditions exhaustive analysis of these policy tool can be performed and welfare improving (if not optimal) policy can be designed.

Merits of every modelling approach can be debated. But allowing diversity in approaches is bound to make policy

discussions more stimulating and is likely to help the discipline avert the crises that are now seen as the crises of the discipline itself (Kirman 2010).

References

R. Lucas (1976) Econometric Policy Evaluation: A Critique. In K. Brunner and A. Meltzer (eds.) The Phillips Curve and Labor Market. Carnegie-Rochester Conference Series on Public Policy, 1:19–46.

J.-C. Trichet (2010) Reflections on the nature of monetary policy non-standard measures and finance theory. Opening address at the ECB Central Banking Conference.

N. Kocherlakota (2010) Modern Macroeconomic Models as Tools for Economic Policy. Banking and Policy Issues Magazine, Federal Reserve Bank of Minneapolis.

F. Smets and R. Wouters (2003) An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area. Journal of the European Economic Association, 1:1123-1175.

M. Napoletano, J-L. Gaffard and Z. Babutsidze (2012) Agent Based Models: A New Tool for Economic and Policy Analysis. OFCE briefing paper No3/March 15.

P. Howitt (2012) What the central bankers learned from modern macroeconomic theory? Journal of macroeconomics. 34:11-22.

A. Leijonhufvud (2011) Nature of the economy. CEPR Policy insight No. 53.

B. LeBaron and L. Tesfatsion (2008) Modeling macroeconomies as open-ended dynamics systems of interacting agents. American Economic Review: Papers & Proceedings, 98:246-250.

M. -H. Chang (2009) Industry Dynamics with Knowledge-Based Competition: A Computational Study of Entry and Exit Patterns. Journal of Economic Interaction and Coordination, 4:73-114.

J. Duffy and U. Unver (2008) Internet Auctions with Artificial Adaptive Agents: A Study on Market Design. Journal of Economic Behavior and Organization, 67:394-417.

A. Kirman (2010) The economic crisis is a crisis for economic theory. CESifo Economic Studies, 56:498-535.

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[1] However, DSGE models downplay the possibility of multiple equilibria. Thus, their ability to overcome the Lucas critique by introducing micro-foundations presents only a limited advantage.

Positions of French and German Banks in European interbank lending network

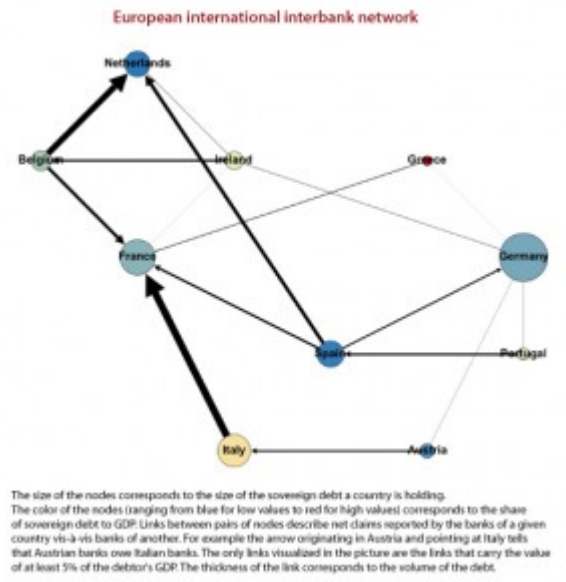
by Zakaria Babutsidze

Recent desperate cries for help from French and other European banks raise the question of exactly what type and how much trouble have they managed to get themselves into. The question can be approached from many angles. Here I try to gain insights into the topic by analyzing the cross-border interbank lending network. This is a network that facilitates the flow of much needed liquidity across the sovereign borders within the Eurozone. Due to high interconnectedness, banks in each country affect (and are affected) directly or indirectly (by) the banks in all other countries. Banks of different countries play different roles in this vital network: some are net creditors, others are net debtors. In this post I take on

the challenge of contrasting the behavior of the two largest creditors in the system (the banking sectors of France and Germany) who are often blamed for the recklessness in their lending practices.

Inspired by visualization of the network by The New York Times, I use the data on Consolidated Banking Statistics issued in December 2011 by the Bank for International Settlements. The data comprises the claims of banks in a given country filed vis-à-vis banks in other countries as of June 2011. Numbers do not include holdings of sovereign debt. The data is available only for 10 out of 17 Eurozone countries: France, Germany, Italy, Spain, The Netherlands, Austria, Ireland, Belgium, Portugal and Greece. As I am interested in the role of national financial systems in European network I cancelled out the counter-claims across the borders and proceeded with the volume of the net claims of one European country banking sector vis-à-vis others.

The resulting network connects each of the 10 countries to the other nine. Each connection has a direction that reflects the current debt balance of a country's banks vis-à-vis another country's banks. I apply simple weighted network analysis to the data in order to dissect the European interbank lending network. The volume of mismatch between the claims vis-à-vis partners is used for weighting the links in the network. To make the methodology clearer consider a hypothetical example. Banks of country A owe 100 Euros to the banks of country B. At the same time, banks of country B owe 40 Euros to banks of country A. Then the mismatch between the countries amounts to 60 Euros which country A owes to country B. This way I determine the direction of each link in our network, or who is the creditor and who is the debtor. In addition to this, I take into account the value of the mismatch in the following way. If country C owes country D 30 Euros, we say that the link between A and B, which we have discussed earlier, is twice stronger than that between C and D.



A quick glance at the network visualization on Figure 1 is enough to notice the special role French and German banks are playing in the system. Banks in these two countries are the ones that are exposed the most to the problems in other European countries.

Recognizing that European cross-border interbank lending network is tightly embedded into global interbank lending network I augment the data with the three largest global players: The United Kingdom, The United States and Japan. In what follows I report two sets of results: one – for isolated European interbank lending network (that I call a closed network), the other – for the extended (open) network that includes three large international players. In the latter case, non-Eurozone countries are taken into account in the calculations but are excluded from the presented rankings.

There are a few important characteristics of the network that we can look at. I concentrate on country rankings with respect to statistics describing country's banks' access to interbank loans, their importance in facilitating interbank liquidity flow and their overall role as lender's or receivers of the loans.

Ranking of countries with respect of different measures for closed and open European cross-border interbank networks

Panel A

	Closeness	
	Closed	Open
1	Belgium	France
2	Germany	Germany
3	Netherlands	Belgium
4	Italy	Netherlands
5	Austria	Austria

Panel B

	Betweenness	
	Closed	Open
1	Netherlands	France
2	Italy	Netherlands
3	Austria	Italy
4	Portugal	Ireland
5	Spain	Austria

Panel C

	In-Degree	
	Closed	Open
1	France	Germany
2	Germany	France
3	Netherlands	Spain
4	Italy	Netherlands
5	Spain	Italy

Panel D

	Eigenvector	
	Closed	Open
1	France	France
2	Netherlands	Germany
3	Germany	Netherlands
4	Belgium	Belgium
5	Italy	Austria

Note: **France and Germany are highlighted with uniform colors.**

The measure that allows us to rank the countries in our network with respect to their access to loans is closeness centrality. This statistic measures the distance of the country's banks to the banks of all the other countries in the network. Higher centrality implies shorter distance. This, in its turn, means that banks do not have to go far in search of financial resources. Panel A of Table 1 presents the ranking of the countries with respect to closeness centrality. When the European network is considered in isolation from the rest of the world it is Germany that has the easiest access to liquidity, while France does not appear in first half of the list. However, when European network is regarded as being embedded in global interbank lending network France tops the list leaving Germany at close second. This allows to conclude that French banks go mainly outside the Eurozone for borrowing money, while German banks balance their borrowings between European and non-European banks.

Panel B of Table 1 presents rankings with respect to betweenness centrality, which measures how much control do a country's banks have over the liquidity flow through the network. This statistic calculates the frequency with which the country appears on the routes that money has to travel from every country to every other country. Higher centrality means that the banking system of the country lies on large

number of routs between pairs of other countries. In this respect the closed European network is independent of influence of France and Germany. This points to the fact that banks in the system can reach each other without necessarily going through Germany or even France. The major brokers within the Eurozone seem to be the Dutch banks. Once extra-European links are considered French banks lead the board, while Germany does not appear in top five. France's top seat in open network implies that it plays the role of a broker between European and non-European banks.

Next measure is the in-degree of the country in the weighted network. This statistic basically measures how important of a creditor a given country is for the other members of the network. Being largest creditors France and Germany swap the places as we move from closed to open network. From here we can conclude that Germany, although being larger creditor than France, has heavier non-European presence. This, clearly, is good for German banks in such turbulent times for Europe. In contrast French banks are more exposed to European risk.

Finally, Eigenvector centrality measures the importance of the country's banks in the system more accurately. It takes into account not only creditor and debtor positions in the network but also the identity of the countries that a given country has ties with. According to this measure French banks play an absolutely central role in the network under discussion. Germany comes second once we discuss an open network. The difference between France and Germany is driven by the differences in their European/non-European credit ratio as well as by the differences in composition of European credit. The most notable difference is France's extreme exposure to troubled Italy.

A broader view at Table 1 allows us to make an additional conclusion regarding the behavior of French and German banking systems. From the table it is apparent that going from closed to open network (which adds American, British and

Japanese banking systems to the picture) affects positions of France much more than those of Germany. This implies that German banks keep balance in their activity between European and non-European partners. They diversify their risk more efficiently. While French banks put all their eggs in one basket – Europe, which might not be the best strategy to pursue.

All in all, the present analysis shows that the prize for reckless lending goes rather to French than to German banks. They are central in the network by virtually any measure. In visualization in Figure 1 French credit, directly or indirectly, can reach all countries except Germany and Netherlands, while German credit only extends to four countries. And, importantly, that list of four does include Italy.