

Response to Referee Report 2 from February 22nd 2013

March 16, 2013

Dear Referee 2,

first of all, thank you very much for your fresh and straight-to-the-point comments on my article. I highly appreciate your comment with regards to monetary policy and banking system regulation. Personally I think that an evolutionary bottom-up approach may contribute tremendously in such a direction, because it delivers significant knowledge on the evolution of bank-lending and demand-for-loan rules and its diverse carrier populations. With regards to monetary policy, Berg et al. (2005, p. 46) conclude that *'When more than three years ago the Eurosystem decided to assess whether or not it should implement a bank lending survey for the euro area, one of the main purposes of such a survey was to provide the ECB Governing Council with new input into the monetary policy decision-making process. Almost two years after the first survey, the assessment of the whole exercise is positive.'* This position highlights the practical implications of the Bank Lending Survey (BLS) for actual monetary policy and potential banking system regulation. My paper shall show that these results provide perfect templates for modelling choices in future agent-based models of monetary economics. It is well-known that the ECB has acknowledged several times that the direction of agent-based models is the way to go for future monetary policy; a proper empirically grounded rule taxonomy for bank-lending and demand-for-loan rules may only consolidate this path.

The suggested taxonomy was crafted in a general way in the reviewed paper. As indicated in the **Appendix** (page 2-5) the revised version of my paper shall highlight the diversity and clarity of generic rules for bank-lending and demand-for-loan rules as significant templates to model artificial agents in credit markets. Furthermore and in line with your comment, it is suggested to withdraw the section on the 'accommodationist' and 'structuralist' Post-Keynesian approach, to reduce sections 1-3 where ever possible, to reduce the introductory lines in section 4 and to highlight, improve and extend the section on the rule taxonomy of bank lending as the 'core' of the paper (compare **Appendix** for a first taste).

This paper wants to contribute with potential standards for the bottom-up foundations of agent-based macroeconomic models, regarding artificial credit market modules. Thereby I derive an empirically grounded rule taxonomy going beyond mere behavioural assumptions in a concrete and realistic way, in line with the BLS. In conclusion, section 4 gets revised in the direction of the approach's potential for the design of artificial banking agents in bottom-up models. Thereby it offers a generic foundation for the heterogenization of banks, enterprises and households in credit modules of artificial monetary economies.

Many thanks for your highly constructive comments!

With kindest regards,

Manuel Wäckerle

References

Berg, J., Rixtel, A., Fernando, A., de Bondt, G. and Scopel, S. (2005), *The Bank Lending Survey for the Euro Area*, ECB Occasional Paper Series No. 23.

Appendix

In the following I introduce the planned improvements for the empirical foundation of bank-lending and demand-for-loan rules.

Rule populations

It is important for agent-based models to consider the different rule populations or meso units (Dopfer and Potts 2008) of investigation in advance. In order to model an artificial credit market module we are able to identify three different groups. Let me recall following passage of my paper:

'...within the credit categories of corporate lending (group 1), SME, short and long term rates (group 2), loans for house purchase, consumer credit and other loans to households (group 3). For credit supply, the BLS shows that group 1 is primarily affected by cost of funds balance sheet constraints, group 2 by competitive pressures and risk perception and group 3 by all three of them. For credit demand, group 1 is affected by financing needs and group 2 is affected by alternative sources of finance and group 3 by all two of them.' Wäckerle (2013, p. 23)

Now it is proposed to look deeper into these rule populations with regards to the survey data. We are able to extract rules for backward and forward looking (for every past/ahead three months since 2003). Basically there are two super-categories of rules dependent in the BLS:

- 'net percentage': difference between the share of banks reported that credit standards have been tightened and the share of banks reporting that have been eased
- 'net demand': difference between the share of banks reporting an increase in loan demand minus the share of banks reporting a decrease in loan demand

The first category relates to credit standard setting - following question (1) and (2) - and the second relates to the demand for loans - (3) and (4).

(1) General question for bank lending – credit standards for enterprises:

Past three months, credit standards as applied to approval of loans or credit lines to enterprises changed: loans to small and medium-sized enterprises, large enterprises; short-term loans, long-term loans

(2) General question for bank lending – credit standards for households:

Past three months, credit standards as applied to approval of loans or credit lines to enterprises changed: loans for house purchase, consumer credit and other lending

(3) General question for the demand for loans or changes in credit lines to enterprises:

Past three months, how has demand for loans or credit lines to enterprises changed (decreased or increased) at bank, apart from normal seasonal fluctuations: loans to small and medium-sized enterprises, large enterprises; short-term loans, long-term loans

(4) General question for the demand for loans to households:

Over past three months, decreased or increased loans for house purchase, consumer credit and other lending

If we take a deeper look into the BLS we are able to extract following specific factors as conditions/triggers for generic rules.

(A) Specific question for bank lending – credit standards: bank position

Over past three months, factors that have affected your bank's credit standards as applied to the approval of 'loans or credit lines to enterprises':

0th order rules: (Social, legal, political, cultural, and other constituent rules that underpin generic rules for economic operations)

factors for social/organizational rules (market): underpinning/constitutive market rules

- Other conditions and terms: loan covenants

factors for cognitive rules (mental schemata): underpinning/constitutive cognitive rules

- Other conditions and terms: collateral requirements, maturity

1st order rules: (Generic rules originated, adopted and retained by carriers for operations)

factors for social/organizational rules (market): requests and monitoring from agent to other agents (active and passive)

- Cost of funds and balance sheet constraints: bank's ability to access market financing
- Pressure from competition (competition from other banks, competition from non-banks, competition from market financing)

factors for behavioural rules (behavioural heuristics, norms): agent follows trend (passive)

- Perception of risk: Expectations regarding general economic activity
- Perception of risk: Industry or firm-specific outlook

Factors for cognitive rules (mental schemata): agent re-evaluates own position (active)

- Cost of funds and balance sheet constraints: costs related to bank's capital position
- Perception of risk: Risk on the collateral demanded
- Price: bank's margin on average loans, bank's margin on riskier loans
- Other conditions and terms: non-interest rate charges, size of the loan or credit

no empirical information on 2nd order generic rules

(B) Specific question for demand for loans or changes in credit lines: enterprise position (approached via bank)

Over past three months, factors that have affected the demand for loans or credit lines to enterprises at your bank:

no empirical information on 0th order rules

1st order rules: (Generic rules originated, adopted and retained by carriers for operations)

factors for social/organizational rules (market): requests and monitoring from agent to other agents (active and passive)

- Financing needs: mergers/acquisitions and corporate restructuring
- Use of alternative finance: loans from other banks, loans from other non-banks

No empirical information on factors for behavioural rules (behavioural heuristics, norms): agent follows trend (passive)

Factors for cognitive rules (mental schemata): agent re-evaluates own position (active)

- Financing needs: fixed investment, inventories and working capital, debt restructuring
- Use of alternative finance: internal financing, issuance of debt securities, issuance of equity

no empirical information on 2nd order generic rules

Same schema holds for:

- factors for generic rules with regards to expectations.
- factors for generic rules with regards to changes in the past three months for loans to households for house purchase.
- factors for generic rules with regards to changes in the past three months for consumer credit and other lending to households
- factors for generic rules with regards to changes in the past three months for loans to households for house purchase

Then we are able to declare generic rules as following, according to the BLS:

If [**loan covenants**] then [**tightened considerably**] over the past three months
(0th order social object credit standard rule)

If [**industry or firm-specific outlook**] then [**eased somewhat**] over the past three months
(1st order behavioural subject credit standard rule)

If [**debt restructuring**] then [**expect increase considerably**] in the next three months
(1st order cognitive subject demand loan rule)

If [**loans from other banks**] then [**expect decrease somewhat**] in the next three months
(1st order social object demand loan rule)

In the revised version of the paper I prepare a full rule taxonomy regarding all significant points within the BLS, but will also deliver empirical examples for meso rule trajectories over the past 10 years for specific rule-sets. The first point provides rule ensembles for banks, enterprises and

households in artificial credit markets for agent-based models and the second point provides basic prototypes for social and individual learning trajectories for agents in such artificial markets.

In particular the articulated extensions provide an empirically grounded rule taxonomy and not just a set of behavioural assumptions. This taxonomy defines rules not just by context and situation, but clarifies the nature of structured rule ensembles. On such a basis we are able to get a deeper understanding of structural change in an evolving economy, serving as a template for proper bottom-up foundations of the banking-macro nexus and resulting from the previously elaborated history of economic thought and institutional perspectives, in line with the brief survey on the two major modelling architectures.