



Final Report
Leibniz Competition

Quantitative Tools for the Analysis of Global Governance Issues
(QUANTAGG)

Application number: SAW-2016-ifo-4

Period under review: 1.1.2016 – 31.12.2020

Leibniz Institute in charge: ifo Institute, Leibniz Institute at the Ludwig-Maximilians-University Munich

Project leader:
Dr. Rahel Aichele

Contents

1. Achievement of objectives and milestones	1
2. Activities and obstacles	1
3. Results and successes	2
4. Equal opportunities	3
5. Quality assurance.....	4
6. Additional in-kind resources	4
7. Structures and collaboration	4
8. Outlook	5

1. Achievement of objectives and milestones

The main scientific objective of QUANTAGG was to develop quantitative tools for the analysis of some of the most pressing international cooperation issues of our times in the areas of (i) trade policy, (ii) the architecture of the international investment regime and (iii) international climate policy.

The QUANTAGG research group has achieved most of the main objectives during the project, despite the obstacles outlined in chapter 2. In particular, given our achievements and the international recognition gained by our work on research module 1: “Tariffs and non-tariff measures in new quantitative trade models”, we further focused our research in this direction during the course of the project, developing several frameworks for the analysis of pressing trade policy issues such as production networks, Brexit and Covid-19 and leading to several high impact publications. Building on our expertise, we have also developed a quantitative trade model with carbon prices and an international transportation sector for the counterfactual analysis of international climate policies in our research module 3: “Environmental externalities and Pigou taxes in quantitative trade models”. A manuscript is currently under preparation. Based on our prioritization and adaption of the research plan, we pushed our work on research module 2: “Foreign direct investment in quantitative models of the world economy” to the last year of the project. In the meantime, Anderson, Larch and Yotov (2020, Economic Journal) have developed a similar dynamic quantitative trade model, which showcases the broad interest in our planned research topics.

QUANTAGG researchers developed a solid research agenda and achieved the main milestones proposed in the project. A first important milestone was the organization of a scientific workshop in Munich that enabled QUANTAGG researchers to present their research. With five published or accepted articles, five discussion papers and two manuscripts under preparation, the number of envisioned academic papers (6 - 9) was even surpassed. A third important milestone implemented despite the Covid-19 pandemic was the timely doctoral-thesis defense of all three PhD candidates. The successful policy outreach, which further strengthened ifo’s visibility and impact in policy consulting, constitutes a fourth milestone. Lastly, all three junior team members spent at least one extended research stay at a renowned host university abroad and had ample opportunity to present their research at international conferences.

Overall, we are pleased with the successful career development of all team members and the outcome of the project, which helped the project leader to strengthen her scientific leadership skills. The project helped promote the scientific skills, networking abilities and careers of four very talented, young researchers.

2. Activities and obstacles

Two periods of parental leave of the project leader during the course of the project together with a subsequent reduction of her work contract to 50% due to childcare led to a cost-neutral prolongation of the project period. Due to these developments in the personal circumstances of the project leader, the project work was restructured. Work on module 3, a research focus of the project leader, was still implemented in part. Module 2 was postponed while module 1 was given more prominence, also reflecting the research interests of the junior team members and recent developments in the trade policy arena (see below).

Furthermore, the outbreak of the Covid-19 pandemic in 2020 and the ensuing disruption of day care for extended periods of time led to a small delay in work on module 3. A first draft of a paper on the general equilibrium trade and welfare effects of an optimal carbon tax is expected later this year.

The decision to restructure the project and extend work on module 1 was driven by recent developments like the referendum on Brexit, the rising tensions in the transatlantic trade relationship under Trump and the worldwide supply-chain disruptions during the Covid-19 pandemic. Scientific contributions to important policy debates are a central pillar of the ifo Institute, and made this adaptation in the conducted research seem justifiable and even presented an opportunity. The large attention the work of the project group received in the policy community and in the media further strengthened the ifo Center of International Economics' visibility and impact in the area of policy consulting.

3. Results and successes

Results The research highlights are a quantitative trade model for the analysis of production networks, a quantitative trade model for the analysis of the effects of the Covid-19 pandemic, the quantitative evaluation of various Brexit scenarios, the finding that rules of origin in free trade agreements are unnecessary and a documentation of the uncertainty about the EU-US current account imbalances.

A brief description of the main scientific results of the QUANTAGG project follows:

- 1) Investigation to what extent trade liberalization has contributed to global production fragmentation and the formation of production networks, taking global value chains (GVCs) into account. Derivation of structural equations for value-added trade flows and indicators of production sharing put forward in the extant literature and development of model-based measures for production networks from a multi-sector gravity model with inter-sectoral linkages. The developed model is used to perform a counterfactual analysis of China's WTO accession in 2001. The results imply that China's WTO accession was a driving force behind the strengthening of production networks with its neighbours. Publication: Aichele and Heiland (2018). The article is among the most cited articles in the Journal of International Economics (field journal) since 2018, see <https://www.journals.elsevier.com/journal-of-international-economics/most-cited-articles> .
- 2) Development of quantitative trade models to econometrically identify the partial equilibrium trade effects and to ex-ante or ex-post counterfactually simulate the general equilibrium effects of current global governance issues: (i) Brexit, i.e. the UK leaving the European Union (EU), by econometrically identifying the various layers of EU integration and simulation of various Brexit scenarios, (ii) the Covid-19 pandemic by building production barriers into a Ricardian trade model, and (iii) the adoption of the Euro with the European Monetary Union. Publications: Felbermayr et al. (2018), Felbermayr and Steininger (2019), Sforza and Steininger (2020).
- 3) Quantitative investigation of the effects of Covid-19 on trade and inequality in Europe. The main finding is that the distributional effects of the Covid-19 pandemic are heterogeneous across European regions, exacerbating the "core-periphery" divide and the inequality across the European area. A manuscript is currently under preparation.
- 4) Investigation of the necessity of rules of origin in free trade agreements (FTA). The main finding is that FTA members' external tariffs correlate strikingly, making trade deflection unprofitable and costly rules of origin unnecessary. Publication: Felbermayr et al. (2019).
- 5) Documentation of new stylized facts about tariffs that improve the understanding of countries' tariff setting with a newly developed, high-quality database on bilateral tariffs. Publication: Teti (2020).
- 6) Investigation of the EU-US trade relationship and the transatlantic trade tensions following Trump's election. Documentation of the uncertainty about the EU-US current account imbalances and investigation of its sources. Evaluation of several rounds of retaliatory tariff setting between the EU and the US. As a corollary, the attitudes towards free trade were evaluated using Eurobarometer data. Publications: Braml and Felbermayr (2019, 2020), Braml (2020).

Publications During the course of the project, the team members published four articles in international, peer-reviewed journals and one article in an academic volume. One further article has been accepted for publication in an international, peer-reviewed journal. Five additional papers have appeared in discussion paper series of the CESifo network or the ifo Institute. One of these papers is in the second round of review at an internationally recognized journal. Two manuscripts are currently under preparation.

Furthermore, the project team has presented its work at various international conferences and seminars. Amongst others at the Congress of the European Economic Association, the German Economic Association Annual Meeting, the Midwest International Trade Conference, the Econometric Society Australasia Meeting, the North American Summer Meeting of the Econometric Society, or the Annual Conference of the European Trade Study Group.

A new, high-quality database on effectively applied bilateral tariffs at the six-digit product-level for 197 importing countries and their trade partners covering 30 years (1988-2017) was developed as part of the project. This new database addresses two major issues of existing tariff datasets: missing data and misreporting. It will improve structural gravity modelling, where the econometric identification of trade elasticities is crucial for the quantification of general equilibrium effects. These parameters can be recovered from the estimates on tariffs in a structural gravity estimation. The dataset will be made available for public use upon submission of the corresponding research paper.

Completed dissertations All three former QUANTAGG PhD students successfully completed their dissertations in 2020 and 2021, respectively. Furthermore, QUANTAGG contributed to successfully promote the careers of its PhD student team members. One team member further pursues her academic career and is now assistant professor at the LMU Munich and the ifo Institute. Another team member will soon start as Analytic Consultant for Google. One further team member joined the World Trade Organization in Geneva, Switzerland, as Economist.

Funding by the Leibniz Competition has also furthered the career prospects of the project leader. She has been invited to present her work upon two calls for full professor positions, and was selected onto one of the lists, ranking third.

Scientific events With the support of the EU Trade and Investment Policy (EUTIP) Network, QUANTAGG organized the QUANTAGG-EUTIP Workshop in International Economics, held in Munich on December 13th and 14th, 2018. The workshop brought together 35 international economists specialised in international trade to give them and the QUANTAGG members the opportunity to present their work and exchange ideas. The workshop featured four keynote speeches by leading experts in the field, namely Prof. Reto Föllmi (University of St. Gallen), Prof. Esteban Rossi-Hansberg (Princeton University), Prof. Gianmarco Ottaviano (Bocconi University and London School of Economics) and Prof. Andreas Moxnes (University of Oslo).

Transfer To disseminate its findings to a larger audience, the project group has published six policy briefs in the ifo Schnelldienst, a format presenting discussions of current policy issues and ifo research findings to a broader audience. These policy briefs have been accompanied by press releases. Additionally, one article was published on voxEU.org.

4. Equal opportunities

During the recruitment period for the project, special attention was given to equal opportunities in terms of gender. Beside the position of the project leader, three PhD student positions were requested. The three researcher positions were advertised nationally and internationally and filled with the best-fitting candidates. Consequently, the research group comprised the female project leader as well as two female and one male PhD student. QUANTAGG therefore

successfully contributed towards ifo's strategic goal to promote women in science and scientific leadership positions.

At the QUANTAGG-EUTIP workshop, seven out of the 23 presentations were given by female speakers.

5. Quality assurance

All project publications have been made available in the CESifo Working Paper series or the ifo Working Paper series in advance to allow for scientific discourse. To further promote the scientific exchange of ideas and to ensure scientific quality, all scientific papers have been presented at internal seminars like the ifo brown bag seminar or the IO and trade seminar at the LMU Munich as well as at international conferences with a selection process. Furthermore, the three PhD students were given the opportunity to present their work at the QUANTAGG-EUTIP workshop featuring internationally renowned researchers in the field of international trade.

Even though none of the research articles were made available via open access, the data and code to replicate two of the project's journal articles have been made publicly available through permanent websites. This approach was chosen to ensure reproducibility and to help foster further academic research.

6. Additional in-kind resources

There has been no agreement on in-kind resources as part of the project application or approval.

7. Structures and collaboration

The QUANTAGG research group cooperated with the EUTIP network to organize a scientific workshop in 2018. The network is an interdisciplinary cooperation between academic and non-academic organizations like think-tanks to foster research into the evolving international trade policy of the European Union, funded by the EU Horizon 2020 research and innovation programme. QUANTAGG could draw on EUTIP's resources to disseminate the call for papers.

The project leader further strengthened her scientific network and intensified her collaboration with Dr. Inga Heiland (University of Oslo and Statistics Norway).

In 2019, one PhD student spent six months as a visiting academic at Stanford University, USA, invited by Prof. Kyle Bagwell. During this research stay, he worked on the EU-US trade dispute and transatlantic tariff retaliation and received valuable mentoring and advice from his host as well as the host department.

Another PhD student spent six months at the Tuck School of Business at Dartmouth College, USA, and worked on developing a new database on tariffs during this research stay. Her host Prof. Andrew Bernard later also functioned as supervisor for her PhD thesis.

The third PhD student profited from a research stay at Paris 1, Sorbonne University, France, upon invitation by Prof. Lionel Fontagné and a short research visit at the University of Bologna, Italy.

In 2018 and 2019, Prof. Yoto Yotov (Drexel University), an acknowledged expert in international trade and especially structural gravity modelling, acted as the interim head of the ifo Center of International Economics. Prof. Yotov was associated with the QUANTAGG project and provided valuable mentoring on gravity estimation and modelling.

8. Outlook

Future research is envisioned to develop a new quantitative trade framework to evaluate the effects of regional and global climate policies with and on global value chains. GVCs – in which goods are shipped back and forth multiple times, often over great distances – rely heavily on CO₂-intensive global transportation services (i.e. maritime and air transport). Consequently, CO₂ taxation is expected to affect the structure of GVCs. The model-based measures for production networks developed during the QUANTAGG project could be implemented in module 3's model with inter-sectoral linkages, carbon prices and emissions from production and the transportation sector. The framework would allow to counterfactually simulate the effects of various past, present and future climate policies that put a price on CO₂ emissions; one good candidate being a global, universal and comprehensive CO₂ tax on all carbon emissions. This allows to answer important trade policy questions such as: How much excessive trade is there when pricing in the environmental costs of CO₂ emissions? What are the effects on production fragmentation and the structure of GVCs? What are the consequences from a developmental point of view considering that developing countries are often remote?

Given the sociopolitical importance of digitalization, future research should address and quantify the trade-enhancing role of digitalization and the role of trade policy therein. The digital transformation impacts trade in several ways: Digitalization reduces the costs of engaging in trade, e.g., through shipment tracking systems that allow for route optimization and less cargo loss or through electronic documentation systems that reduce customs clearance times. It helps to connect businesses and consumers globally through online platforms, reducing search costs and raising trade in small packages. And it facilitates GVC co-ordination. The impact of digitalization on trade costs could be modelled in a new quantitative trade model. This requires the econometric identification of the effect of digitalization on trade. The structural model could then be used to quantify counterfactually how the digital transformation has shaped global trade and value chains. A next step is to investigate how trade measures, like FTA provisions on digital trade or de minimis rules, impact digital trade.