ECONSTOR
Make Your Publications Visible.

A Service of
ZBW
Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Herz, Bernhard; Wagner, Marco

Working Paper

Multilateralism versus Regionalism!?

BGPE Discussion Paper, No. 89

Provided in Cooperation with:
Friedrich-Alexander University of Erlangen-Nuremberg (FAU), Bavarian Graduate Program in Economics (BGPE)

Suggested Citation: Herz, Bernhard; Wagner, Marco (2010) : Multilateralism versus Regionalism!?, BGPE Discussion Paper, No. 89, Friedrich-Alexander-Universität Erlangen-Nürnberg, Bavarian Graduate Program in Economics (BGPE), Nürnberg

This Version is available at:
https://hdl.handle.net/10419/73398

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

BGPE Discussion Paper

No. 89

Multilateralism versus Regionalism!?

Bernhard Herz
Marco Wagner

January 2010

ISSN 1863-5733

Editor: Prof. Regina T. Riphahn, Ph.D.
Friedrich-Alexander-University Erlangen-Nuremberg
© Bernhard Herz, Marco Wagner

B G P E Discussion Paper Series

Multilateralism versus Regionalism!?

Bernhard Herz*

University of Bayreuth

Marco Wagner#

German Council of Economic Experts

January 18, 2010

*Bernhard Herz, University of Bayreuth, Economics Department, 95440 Bayreuth, Germany, e-mail address: Bernhard.Herz@uni-bayreuth.de.

#Marco Wagner, German Council of Economic Experts, 65180 Wiesbaden, Germany, e-mail address: Marco.Wagner@destatis.de.

Abstract

The well-known question whether regional trade agreements (RTAs) and the multilateral trading system (MTS) are "strangers, friends, or foes" (Bhagwati and Panagariya, 1996) has gained new importance with the widespread proliferation of RTAs in recent years. Based on an extensive data set which covers most of world trade over the past 60 years and about 240 regional trade agreements, we analyze the relationship between RTAs and the MTS by combining the gravity model framework with vector auto-regression analysis. Impulse-response-functions robustly suggest that multilateral trade liberalization responds in a significantly positive way to regional trade liberalization. We also find robust evidence that RTA liberalization Granger-causes GATT/WTO liberalization. Thus, our results indicate that RTAs do not undermine the MTS but serve as building blocs to multilateral trade liberalization.

JEL: F13

Keywords: Regionalism, multilateralism, trade agreement, gravity model.

1 Motivation

While the number of regional trade agreements (RTAs) grew only slowly until the beginning of the 1990s, it has remarkably increased since then. In December 2008, 230 RTAs were notified to the World Trade Organization (WTO) and the WTO (2009c) expects close to 400 RTAs by 2010 (also Fiorentino et al., 2008). Not only the geographic reach of today's RTAs has expanded, but also their agenda (Baldwin and Low, 2008). Besides mere tariff regulation, many RTAs now include provisions on services, investments, competition rules, as well as a bunch of other issues. How does this wide proliferation of regionalism relate to global trade liberalization? Following Bhagwati (1991) RTAs could be either stumbling or building blocs to global trade liberalization, i. e. RTAs could contribute to further multilateral liberalization by complementing GATT/WTO or they could impede multilateral trade liberalization. Bhagwati and Panagariya (1996) further refined this question and ask whether RTAs and the multilateral trading system (MTS) are "strangers, friends, or foes", adding the possibility that RTAs and the MTS develop independently from each other.

Baldwin (2004) summarizes the logic and fears which are associated with RTAs as stumbling blocs to global trade liberalization and identifies two key risks of regionalism. Firstly, regional liberalization might be a substitute for multilateral liberalization since it i) dampens nations' intentness for further multilateral liberalization and ii) diverts policy makers' attention away from WTO negotiations (e. g., Bhagwati, 1992). Secondly, regionalism might alter the division of power so that i) small nations are even more dominated by

hegemonic powers and ii) the possibility of tensions (and even trade wars) between trade blocs increases (Panagariya, 1999). According to Baldwin (2004), these fears are mainly based on the historical experience during the interwar period.

Summers (1991) rejects this pessimistic view and points out that after World War II regionalism contributed to tariff liberalization and that there is no clear evidence that regionalism has undermined multilateralism. Bergsten (1997) and Trejos (2005) emphasize that RTAs are not inherently protectionist, but instead can even help reduce political tensions between countries. Additionally, RTAs can stimulate both internal and international political dynamics by providing an experimental ground for new liberalization ideas (also Pomfret, 2006). Moreover, RTAs can improve the stability and credibility of countries which should have positive effects on multilateral negotiations (Paiva and Gazel, 2003).

In contrast to the extensive theoretical literature, empirical research has so far been rather limited. For instance, Limao (2006, 2007) studies the impact of US RTAs on the evolution of the US external multilateral tariffs before and after the Uruguay round negotiations.[1] In his regression analysis Limao (2006, 2007) finds that, the US liberalized external multilateral tariffs on products mainly traded with non-RTA partners much more than external multilateral tariffs on products traded primarily with regional trading partners. The rationale of this policy could be that the US offers preferences to

[1] While Limao (2006) incorporates North American Free Trade Agreement (NAFTA), Andean Trade Preference Act (ATPA), Caribbean Basin Initiative (CBI), Generalized System of Preferences (GSP) and US-Israel in his analysis, Limao (2007) focuses only on CBI and ATPA.

receive concessions from the recipients. Since the concessions are all the more valuable the larger the preference margin is, the US tries to prevent the erosion of preferences by resisting multilateral liberalization. Thus, he concludes that RTAs act as a stumbling bloc to US multilateral trade liberalization. Other studies also use apply this concept focussing on different countries and regions, however. Karacaovali and Limao (2008) study how RTAs affect the EU's external multilateral tariffs, Estevadeordal et al. (2008) focus on the impact of the Southern Common Market (MERCOSUR) and the Andean Community (CAN) on the multilateral tariff setting behavior of ten Latin-American countries, and Magee and Lee (2001) examine how the formation of the European Economic Community (EEC) affected external tariffs of its members. With a different concept, Foroutan (1998) carries out a descriptive analysis on the external trading behavior of 50 developing countries over the period 1965-1995. Using trade flows, import tariffs and trade liberalization indicators, she examines whether there is a systematic relationship between developing countries' membership in a RTA and the external liberalization of their trade. Her results reject such a systematic relationship. Summarizing, the empirical literature – as well as the theoretical literature – is inconclusive as RTAs are sometimes found to be stumbling blocs and in some cases to be building blocs for multilateral trade liberalization.

From a methodological point of view, these approaches are limited in several ways. The studies investigate selected countries and regions only, thereby ignoring the interactions with other RTAs these countries or their trading partners are members of. The studies cover rather limited time pe-

riods which are generally too short to account for the political dynamics between regionalism and multilateralism summarized by Baldwin (2004) and emphasized by Bhagwati (1992) as well as Summers (1991). The time periods are also too short to adequately account for the so-called first wave of regionalism in the 1950s and more importantly the new developments in regionalism since the 1990s and the 2000s (second and third wave of regionalism). The studies focus only on the external tariff setting behavior of countries engaged in regional arrangements thereby neglecting other dimensions of trade liberalization, such as non-tariff barriers. Foroutan (1998) points out that other indicators, such as actual trade flows and trade liberalization indicators, are also important.

This study adds to the literature in several ways. We examine a sample of 184 countries with 240 RTAs so that we can control for interactions between various regional arrangements and a country's membership in more than one RTA. Our data set covers the period from 1953-2006 which is long enough to adequately account for the political dynamics between regionalism and multilateralism, and to include the beginnings of regional arrangements during the 1950s as well as more recent developments. Based on the building bloc/stumbling bloc discussion, we investigate the relationship between multilateral and regional trade liberalization. The literature so far has associated trade liberalization with the countries' external tariff setting behavior. We follow Foroutan (1998) and measure trade liberalization by the actual impact of regional and multilateral trade liberalization on trade flows so that we can account for the whole range of trade liberalizing measures.

To investigate the dynamic effects of RTAs and especially the possibly causal interrelation between regional and multilateral trade liberalization, we combine a gravity model framework with vector auto-regressive (VAR) analysis. Using impulse-response-functions, our study shows that trade liberalization on the multilateral level responds significantly positive to regional trade liberalization. Additionally, we find that RTA liberalization Granger-causes multilateral liberalization. By contrast, there is no robust evidence for such an effect in the opposite direction. Thus, the results suggest that regional trade liberalization does not undermine but rather contributes to multilateral trade liberalization.

2 General Research Strategy

In our analysis, we proceed in three steps. First, we estimate the time-specific impact of both GATT/WTO and RTAs on international trade for each year using an extensive gravity model and fixed effects Poisson maximum likelihood (FE-PML) estimation to derive two time-series that measure the impact of multilateral and regional liberalization on trade. Secondly, based on the two time-series we use a vector auto-regressive (VAR) approach to estimate the effect of multilateral on regional trade liberalization and vice versa. Thirdly, we examine their causal interrelation based on impulse-response-functions and Granger-causality analysis, i. e. we investigate whether and how regional trade liberalization reacts to multilateral trade liberalization, and vice versa.

The Gravity Model

In a first step, we use a standard gravity model to obtain the time-specific effects of both multilateral (represented by GATT/WTO membership) and regional (represented by RTA membership) agreements on international trade. In particular, we regress bilateral trade flows on countries' membership in GATT/WTO and RTAs together with standard gravity control variables to estimate the time-specific impact of multilateral and regional trade liberalization on trade flows for each year.[2] In formal terms, the model is given by:

$$\begin{aligned} \text{Imports}_{ijt} &= \alpha + \sum_{t=1953}^{2006} \kappa_t D_t \textit{ both partners inside GATT/WTO}_{ijt} \quad (1) \\ &+ \sum_{t=1957}^{2006} \vartheta_t D_t \textit{ both partners inside same RTA}_{ijt} \\ &+ \beta X_{ijt} + \lambda_{ij} + \delta_t + \varepsilon_{ijt} \end{aligned}$$

where i and j denote the importing and exporting country, respectively, and t depicts time. The vector X_{ijt} represents the standard control variables in gravity models.[3] α is the common intercept, λ_{ij} and δ_t represent country pair specific and time dummies, respectively; ε_{ijt} is a white noise error term. The variable *both partners inside the GATT/WTO* is a binary dummy variable that is defined as one if both trading partners participate in GATT/WTO in year t, and zero otherwise. Similarly, *both partners inside RTA* is a binary dummy variable that equals to one if both trading partners belong to the

[2] Regarding the theoretical foundation of the gravity model see among others Anderson (1979), Bergstrand (1985), Deardorff (1998), as well as Anderson and van Wincoop (2003).

[3] See appendix for a description of the variables.

same RTA in year t. The term $\sum_{t=1953}^{2006} \kappa_t D_t$ *both partners inside GATT/-WTO*$_{ijt}$ generates 54 separate dummy variables that represent the time-specific impact of multilateral trade liberalization. As an example, the term D_{1970} *both partners inside GATT/WTO*$_{ij1970}$ generates a separate variable which is one if both trading partners are GATT/WTO members in 1970, else zero. Thus, κ_{1970} represents the impact of multilateral trade liberalization in year 1970.[4] The same transformation is undertaken for membership in RTAs using the term $\sum_{t=1957}^{2006} \vartheta_t D_t$ *both partners inside same RTA*$_{ijt}$.[5] Generally, κ_t and ϑ_t represent the estimated coefficients regarding the time-specific impact of multilateral (GATT/WTO) and regional (RTA) trade liberalization for each year in the data set, respectively.

We differentiate these time-specific effects of GATT/WTO and RTAs as these institutions are subject to a continuous change. For instance, GATT/-WTO currently regulates a much wider range of issues in more depth than in former times with RTAs having changed in a similar way (WTO, 2007). The so-called "new" regionalism goes well beyond mere tariff liberalization and features deeper forms of integration, such as economic reforms as well as factor market integration among others (Burfisher et al., 2003).

We estimate the model using fixed effect Poisson maximum likelihood

[4]Note that this specification does not consider the duration of GATT/WTO membership. We have also taken the duration of GATT/WTO membership into account and found that it does not change the results of the gravity model estimation significantly.

[5]Note that the variable both partners inside RTA only accounts for mere membership in regional trade agreements. Additionally, we have also experimented with various dimensions of regional trade agreements. In particular, we accounted for de facto RTA membership by using time lags (Tomz et al., 2007). We also accounted for the number of different RTAs one country is engaged in. Furthermore, we considered effective RTAs according to Holmes (2005). Again, we find that the results of our study do not change significantly.

(FE-PML) estimation. Since comprehensive trade data sets are typically characterized by numerous zero trade flows, we have to take them into account to avoid biased estimates.[6] As the traditional log-linearization of the gravity model cannot account for zero trade flows, we follow Verbeek (2008)[7] and apply the Poisson maximum likelihood (PML) estimator.[8] The (expected) trade flows can then be modeled using an exponential function:

$$E(y_{ijt} \mid x_{ijt}) = \exp(x'_{ijt}\beta), \tag{2}$$

where y_{ijt} represents bilateral trade flows and x_{ijt} denotes a vector of exogenous variables. The non-negativity of the exponential function ensures that the predicted values for y_{ijt} are also non-negative. As this approach does not require a log-linearization of the variables, the problem of zero trade flows can be avoided.

Step Two: The VAR-Model

In a second step, we use a vector auto-regressive (VAR) framework based on the two time-series derived from the gravity model to estimate the effect of GATT/WTO (multilateral) trade liberalization on RTA (regional) trade liberalization and vice versa.

As discussed above, the effects of multilateral and regional liberaliza-

[6] The current dataset comprises about 46% zero values.

[7] While Verbeek (2008) provides an overview of the Poisson Maximum Likelihood estimation, Cameron and Trivedi (1998) and Winkelmann (2008) discuss the econometric analysis of count data more comprehensively.

[8] Regarding the application of gravity models, several authors propose the estimation of the gravity model in its genuine multiplicative, non-linear form using Poisson maximum likelihood estimation (Henderson and Millimet, 2008, Westerlund and Wilhelmsson, 2009, Siliverstovs and Schumacher, 2009, as well as Santos Silva and Tenreyro, 2006).

tion on trade may be subject to various interrelations. In particular, we identify the following factors which might induce a dynamic political link between multilateral and regional trade liberalization. As potentially negative effects, regionalism might *dampen nations' enthusiasm* for multilateral liberalization, *divert policy makers' attention* away from multilateral liberalization and *create tensions* between trading blocs. As potentially positive effects, regionalism might *relax political resentments* between trading blocs, serve as an *experimental ground* for new or controversial issues and improve a country's international *reputation*.[9]

It is beyond the scope of this paper to solve for a full dynamic and game-theoretic equilibrium based on these factors. By contrast, we presume two *empirical reaction functions* for multilateral and regional liberalization. In particular, we are interested in the question how multilateral liberalization responds to a regional trade liberalization stimulus, and vice versa. Therefore, we construct a VAR model consisting of the auto-regressive processes of two time series, namely the yearly time-specific impact of both GATT/WTO κ_t and RTAs ϑ_t on international trade. The corresponding bivariate model can be formulated as

$$\begin{bmatrix} \kappa_t \\ \vartheta_t \end{bmatrix} = \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} + \begin{bmatrix} d_{1t} \\ d_{2t} \end{bmatrix} + \begin{bmatrix} \Theta_{11}(L) & \Theta_{12}(L) \\ \Theta_{21}(L) & \Theta_{22}(L) \end{bmatrix} \begin{bmatrix} \kappa_t \\ \vartheta_t \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \quad (3)$$

where L is the backshift-operator with $\Theta_{ij}(L) = \Theta_{ij}^1 L^1 + ... + \Theta_{ij}^p L^p$. p denotes the lag order, c_i is a constant, while $d_{i,t}$ is a time dummy, and $u_{i,t}$ represents

[9] For a discussion see e. g. Baldwin (2004), Bhagwati (1992), Panagariya (1999), Summers (1991), Pomfret (2006) and Bergsten (1997).

the error term. The time series VAR model is assumed to be covariance stationary. The error term vector is i.i.d. with mean zero and unknown non-singular residual covariance matrix $E(u_t u_t') = \sum_u$ and existing fourth moments.[10] Consequently, we allow for contemporaneous correlation in the residuals but no auto-correlation.

Evidently, this is an inherently reduced-form approach. As has been discussed above, we identify several mechanisms that can affect the interrelation between regional and multilateral trade liberalization. We cannot determine the magnitude of each effect separately, but instead estimate the net effect of the combined mechanisms. For instance, if the sum of coefficients $\Theta_{12}(L)\vartheta_t$ on κ_t is negative, then the negative effects, such as the diversion of policy makers' attention, dominate and RTAs have a negative effect on multilateral trade liberalization. If they are positive, then the positive influences, such as the generation of reputation, are more important, i. e. RTAs have a positive effect on multilateral trade liberalization.

Step Three: Impulse-Response-Functions and Granger-causality Analysis

In a third step, we analyze the causal interrelation between regional and multilateral trade liberalization. We investigate the reaction of GATT/-WTO trade liberalization on RTA liberalization and vice versa using impulse-response-functions. Impulse-response-functions trace out the expected response of y_{it+s} to a unit change in y_{jt}, holding constant all past values of y_t.[11] In particular, one can use impulse-response-functions to investigate the

[10] See Lütkepohl and Krätzig, 2004, chapter 3.2.
[11] See Lütkepohl and Krätzig, 2004, chapter 4.3.

response of one event to the impact of the other.

Additionally, we test whether trade liberalization on one institutional level causes trade liberalization on the other institutional level. That is, can we reasonably say that GATT/WTO liberalizes trade as a reaction to RTA trade liberalization, and vice versa? Our main empirical tool for doing so is the Granger-causality test. Following Granger (1969), variable X causes variable Y if the forecasting of the latter is improved by incorporating in the analysis information concerning X and its past.

Data

Our gravity model analysis is based on a sample that covers 184 countries with 240 RTAs over the period from 1953 to 2006 with annual data.[12] We define GATT/WTO membership according to Tomz et al. (2007) and include RTAs following WTO (2009c) and McGill (2009).

For the VAR analysis, we use the two series obtained from the gravity model estimation. The Akaike information criterion (AIC) suggests the endogenous lag order 3 for the bivariate model. In order to save degrees of freedom, we take advantage of sequential elimination algorithms which preselect the specific lagged variables that are to be estimated in the model (Lütkepohl and Krätzig, 2004, and Brüggemann and Lütkepohl, 2001). The specified VAR model is estimated by OLS.

[12] Data sources are reported in the appendix.

3 Empirical Results

Gravity Equation

[Table 1: Gravity model estimation.]

The gravity equation is estimated with FE-PML with the results being reported in table 1.[13] Regarding the control variables, the coefficient estimates meet the expectations and are in line with the standard gravity literature. In particular, the imports of RTA members from non-members (Importer in RTA) are stimulated by about 7% (exp(0.07)-1) while the exports of RTA members to non-participants (Exporter in RTA) are around -3% lower due to trade diversion. It should be noted that the results average out the effects of the 240 RTAs covered by the data set, where the impact of the different RTAs is likely to vary. GATT/WTO membership of only one trading partner has a significantly positive impact on bilateral trade. This result has been interpreted as a public goods or selection effect of GATT/WTO membership (Subramanian and Wei, 2007, p. 165). The Generalized System of Preferences negatively affects both the exports of GSP recipients (GSP-recipient-exports) as well as the exports of granting countries (GSP-donor-exports). This result seems to be counter-intuitive since GSP programs are intended to foster developing countries' exports (UNCTAD, 2008). However, the literature discusses several problems inherent to GSP schemes which might lead to distortions in the economic structure and trading patterns of GSP recipients (e. g., Hoekman and Özden, 2005, Dowlah, 2008).

[13] Note that the results from the FE-PML estimation are robust to FE-PML with only non-zero observations. The results differ from the traditional FE-OLS estimation due to econometric reasons discussed above.

The results for the remaining time-variant control variables are generally in line with expectations. The economic size of the trading partners substantially contributes to bilateral trade. Capital-intensive production, depicted by GDP per capita, stimulates trade. A high capital-labor ratio indicates a more differentiated economic structure which should contribute to better trading opportunities. A devaluation of the importing country's real exchange rate has a negative impact on imports, while current colonial relationships foster contemporaneous trade by about 40%. More democratic nations seem to trade significantly more than autocratic nations as both *polity* variables indicate – a result which is consistent with the findings of Decker and Lim (2008) and Eichengreen and Leblang (2007).

[Figure 1: Yearly time-specific impact of GATT/WTO and RTAs on trade.]

The yearly time-specific effects of both GATT/WTO and RTAs are displayed in figure 1 together with the 95% confidence intervals. The yearly time-specific impact of GATT/WTO (solid line) fluctuates around the average of 0.78 which indicates that trade among GATT/WTO members is about twice as large (118%) as trade between non-members. In contrast, the time-specific point estimates of RTAs (dashed line) follow a concave function with significantly negative values for the 1950s and significantly positive values since the beginning of the 1960s. The early negative effects might be explained by the fact that with the exception of the European Common Market most RTAs were ineffectively implemented and eventually failed during that period (Pomfret, 2007, and Panagariya, 1999). In addition, these first

attempts of the so-called first wave of regionalism during the 1950s/1960s were characterized by "shallow" integration which did not get beyond mere tariff liberalization and rarely took place between developed and less developed countries but rather among countries with similar income levels (Limao, 2007, WTO, 2009c, and McGill, 2009). Generally, the effects of RTAs on international trade were limited. With the ongoing process of regional liberalization and the wider scope of RTA liberalization, the effect of RTAs on members' trade increased significantly.

The time-specific impact of GATT/WTO is more volatile and has two periods with particularly strong effects, namely 1960-1973 and 1985-1992. By contrast, the point estimates of RTAs develop in a relatively steady way, except for the period 1985-1992, when the RTA-effect increased somewhat more strongly. This coincides with the so-called second wave of regionalism which was initiated at the beginning of the 1980s when the United States turned away from the multilateral approach and promoted the North American Free Trade Agreement (NAFTA). The second wave was also stimulated by the completion of the European Community's (EC) internal market in 1992 (Pomfret, 2007, and Panagariya, 1999). The third wave of regionalism started at the beginning of the 2000s and does not seem to have any major effects neither on the impact of RTAs on international trade nor on the effect of GATT/WTO.

VAR Estimation

We use the two time series obtained from the gravity analysis to estimate the effect of multilateral on regional trade liberalization and vice versa. In

particular, we set up a bivariate VAR model regressing the two variables on their past values. Due to the limited number of observations, we employ sequential elimination algorithms which preselect the specific lagged variables that are to be estimated in the model (Lütkepohl and Krätzig, 2004, and Brüggemann and Lütkepohl, 2001).[14]

[Table 2: VAR estimation, core model.]

The results of the VAR model estimated with three lags are shown in table 2. The left-hand panel shows the trade effect of multilateral trade liberalization (GATT/WTO-effect) as dependent variable, with lagged values of multilateral and regional trade liberalization as the explanatory variables. The right-hand panel displays the trade impact of regional trade liberalization as the dependent variable, with lagged values of any multilateral and regional trade liberalization as the explanatory variables. The results of the system equation regression indicate that both the net effect of previous multilateral liberalization as well as the net effect of regional liberalization on contemporaneous multilateral liberalization are significantly positive. Similarly, the net effects of multilateral and regional liberalization on subsequent regional liberalization are significantly positive.

Impulse-Response-Functions and Granger-causality analysis

We investigate the dynamic interrelations between multilateral and regional liberalization by using forecast error impulse-response-functions (IRF).

[14] According to standard residual tests, such as the Portmanteau test and the Breusch-Godfrey LM test, residual auto-correlation is not indicated. The Lomnicki-Jarque-Bera tests suggest that both u_1 and u_2 are consistent with a standard normal distribution. Additionally, the ARCH-LM tests assure heteroskedasticity-consistent estimation.

The left panel of figure 2 illustrates how the expected effect of multilateral trade liberalization under GATT/WTO reacts to a unit change of the trade effect of regional liberalization while the right panel shows the response of regional liberalization to a unit change in multilateral liberalization.[15]

[Figure 2: Impulse-response-functions.]

The results indicate that multilateral trade liberalization reacts in a statistically significant way in the first and second (and third according to Hall's percentile) year after regional trade liberalization has taken place (left-hand panel). Technically speaking, if RTAs liberalize trade so that the trade volume increases by one unit, the expected response of GATT/WTO is multilateral trade liberalization associated with a trade increase by 1.6 units. Intuitively, an RTA-induced increase in trade is followed by multilateral trade liberalization in the subsequent years, whereby this GATT/WTO driven liberalization response is even stronger in the first subsequent year than the regional liberalization stimulus. This finding might not only support the hypothesis of double trade activism, where countries use regional as well as multilateral institutions as complements to liberalize trade (Trejos, 2005), but also indicates that RTA liberalization might be a promotive impulse so that even stronger multilateral trade liberalization is possible.

[Table 3: Granger-causality tests.]

The Granger-causality test indicates that RTA liberalization Granger-causes multilateral trade liberalization under GATT/WTO (table 3). The

[15] The plots also contain the 90% Efron and Hall percentiles confidence intervals which are bootstrapped with 2000 replications (B=2000) over 10 periods (h=10).

lack of any negative and statistically significant coefficients in the impulse-response-function suggests that regional trade liberalization does not have a net negative effect on multilateral trade liberalization. This finding supports the Summers (1991)-hypothesis which emphasizes the positive impact of regional arrangements on the MTS. According to Bergsten (1997), RTAs are able to *detent political tensions* between nations, e. g. in Europe after WW II, which can also alleviate multilateral negotiations. Additionally, RTAs can stimulate both internal and international negotiation dynamics. Since RTAs provide for more flexible and efficient negotiations than multilateral agreements, RTAs can serve as *testing fields* for new liberalization ideas which can subsequently be negotiated in the multilateral setting, e. g. services or intellectual property rights (WTO, 2009c, Trejos, 2005, Pomfret, 2006, and Bergsten, 1997). Moreover, members of RTAs can gain stability and *reputation* through their commitment to regional arrangements which is likely to have positive effects for negotiations on the multilateral level, like in the case of the Southern Common Market (MERCOSUR) (Paiva and Gazel, 2003).

When analyzing possible effects of multilateral on regional trade liberalization, the right-hand panel of figure 2 to some degree suggests that regional trade liberalization might respond in a positive way to multilateral trade liberalization. However, evidence on the causality tests (table 3) indicate that GATT/WTO liberalization does not Granger-cause RTA liberalization, overall.

Taken together, the Granger-causality analyses indicate an unidirectional causality relation from GATT/WTO to RTAs. An increase in RTA trade liberalization stimulates multilateral trade liberalization by GATT/WTO,

however not vice versa. We can respond to the question of Bhagwati and Panagariya (1996) that the relationship between the multilateral system and regionalism is characterized by an asymmetric friendship.

Are the Results Robust to Models Controlling for Global Developments?

Generally, causality in a bivariate analysis could be due to omitted variables. To avoid incorrect inferences, we integrate several additional variables in our vector auto-regressive (VAR) system and test the causality relations again. In particular, we complement the VAR model with several variables controlling for the number of GATT/WTO members and the number of RTAs (model 2), and indicators of general globalization developments, such as world GDP (model 3) or the KOF globalization-index (model 4). Since the KOF globalization-index is only available for the years since 1970 and thus restricts the analysis to the period 1970-2006, we include all control variables except the globalization-index in model 5, while we incorporate all control variables together with the globalization-index in model 6. The results of the IRFs are shown in figure 3 while the corresponding Granger-causality tests are reported in table 4.[16]

[Figure 3: Impulse-response-funcions, models 2-6.]

[Table 4: Granger-causality tests for models 2-6.]

Generally, the impulse-response-fuctions support the findings obtained from the core section. If RTAs liberalize trade, the expected response of

[16] The corresponding estimation results are reported in table 5 in the appendix.

GATT/WTO is multilateral trade liberalization (left-hand panel, figure 3). According to the causality tests, we find evidence that regional trade liberalization significantly Granger-causes multilateral trade liberalization (table 4). However, two results are of particular interest. Regarding model 2, we find a significantly positive response of GATT/WTO liberalization initially, while it becomes significantly negative in periods 3-4 (figure 3). This might indicate that initially the positive implications of RTA liberalization outweigh the negative transmission mechanisms so that the net effect is positive, while the net effect becomes negative in later periods possibly because the efforts associated with double trade activism are hard to maintain over a longer time period. With respect to model 6, the reactions seem to emerge in cycles, i. e. in period 1, 4 and 8. This sawtooth pattern might indicate a liberalization process which alternates between regional and multilateral trade liberalization.

The impulse-response-functions on the right hand-side indicate a positive response of RTA liberalization on multilateral liberalization (figure 3). In contrast to the core analysis above, we find support for the hypothesis that GATT/WTO liberalization Granger-causes regional trade liberalization (table 4), although the response of GATT/WTO liberalization to RTA liberalization is much stronger than vice versa. Three findings might be of interest. The IRF of model 2 indicates that the reaction of regional liberalization on multilateral liberalization is positive in the first subsequent year, and additionally in periods 3-5 with a break in period 2. Regarding model 3, regional liberalization seems to respond to a certain degree to multilateral liberalization (figure 3), while we find no evidence of Granger-causality (table

4). Referring to model 6, we find an alternating response of regional trade liberalization on GATT/WTO liberalization – similar to the pattern in the opposite direction.

Summarizing, we find – based on Granger-causality tests – a so-called feedback relationship between multilateral and regional trade liberalization, overall. The results indicate that multilateral trade liberalization responds in a significantly positive way during the first years after regional liberalization has taken place. Likewise, RTA liberalization reactions are significantly positive during the first periods after multilateral liberalization has taken place. However, only in model 2 we find a significantly negative response of GATT/-WTO to RTA liberalization in a later period, while GATT/WTO liberalization reacts positive on RTA liberalization also in later periods. Additionally, multilateral liberalization seems not to Granger-cause RTA liberalization in model 3.

4 Conclusion

Since the first wave of regionalism until the 1980s, discussion on regionalism was characterized by static trade creation and trade diversion effects of RTAs. With the second wave of regionalism during the 1990s, the debate on regionalism turned to the dynamic interrelation between regional integration and multilateral trade liberalization. In this context, Bhagwati and Panagariya (1996) ask whether RTAs and the MTS are "strangers, friends, or foes"? We find robust evidence that multilateral trade liberalization responds in a significantly positive way during the first years after regional trade liberalization.

Additionally, we find robust evidence that RTA liberalization significantly Granger-causes GATT/WTO liberalization. A sensitivity analysis indicates that these results are robust to changes in control variables. In contrast, our results do not robustly indicate that regional trade liberalization responds in a significantly positive way to multilateral trade liberalization. Thus, our results suggest an unidirectional relationship between multilateralism and regionalism. Using the terms of Bhagwati and Panagariya (1996), we might call this relation an asymmetric friendship. At least, we can ensure that regional trade liberalization does not react in a significantly negative way to multilateral trade liberalization.

References

Anderson, J., 1979. A theoretical foundation for the gravity model. American Economic Review 69, 106–16.

Anderson, J., van Wincoop, E., 2003. Gravity with gravitas: A solution to the border puzzle. American Economic Review 93 (1), 170–92.

Baldwin, R., 2004. Stepping stones or building blocs? Regional and multilateral integration. Graduate Institute of International Studies, Geneva.

Baldwin, R., Low, P. (Eds.), 2008. Multilateralizing Regionalism – Challenges for the Multilateral Trading System. Cambridge Universtity Press, Cambridge.

Bergsten, F., 1997. Open regionalism. The World Economy 20 (5), 545–65.

Bergstrand, J., 1985. The gravity equation in international trade: Some microeconomic foundations and empirical evidence. Review of Economics and Statistics 67, 474–81.

Bhagwati, J. (Ed.), 1991. The World Trading System at risk. Harvester-Wheatsheaf, New York, London, etc.

Bhagwati, J., 1992. Regionalism versus multilateralism. The World Economy 15 (5), 535–555.

Bhagwati, J., Panagariya, A., 1996. Preferential trading areas and multilateralism: Strangers, friends or foes? In: Bhagwati, J., Panagariya, A. (Eds.), The Economics of Preferential Trading. Washington, D.C.: AEI Press, pp. 1–78.

Brüggemann, R., Lütkepohl, H., 2001. Lag selection in subset var models with an application to a U.S. monetary system. In: Friedmann, R., Knüppel, L., Lütkepohl, H. (Eds.), Econometric Studies: A Festschrift in Honor of Joachim Frohn. LIT Verlag, Münster, pp. 107–28.

Burfisher, M., Robinson, S., Thierfelder, K., 2003. Regionalism: Old and new, theory and practice. Paper prepared for presentation to The International Agricultural Trade Research Consortium (IATRC) Conference, Capri, Italy.

Cameron, C., Trivedi, P. (Eds.), 1998. Regression analysis of count data. Econometric Society Monographs No. 30, Cambridge University Press, Cambridge.

CEPII, 2008. Geodesic distances. CEPII Research Center, www.cepii.fr.

CIA, 2007. The world factbook. Central Intelligence Agency (CIA), Washington, D.C.

Deardorff, A., 1998. Does gravity work in a neoclassical world? In: Frankel, J. A. (Ed.), The Regionalization of the World Economy. The University of Chicago Press, Chicago.

Decker, J. H., Lim, J. J., 2009. Democracy and trade: An empirical study. Economics of Governance 10 (2), 165–86.

Dowlah, C., 2008. The Generalized System of Preferences of the United States: Does it promote industrialization and economic growth in least developed countries? The Law and Development Review 1 (1), 71–96.

Eichengreen, B., Leblang, D., 2007. Democracy and globalization. BISWorking Paper No. 219.

Estevadeordal, A., Freund, C., Ornelas, E., 2008. Does regionalism affect trade liberalization toward non-members? World Bank Policy Research Working Paper No. 4751.

Fiorentino, R., Crawford, D.-A., Toqueboeuf, Ch., 2008. The landscape of regional trade agreements and WTP surveillance. In: Baldwin, R., Low, P. (Eds.), Multilateralizing Regionalism – Challenges for the Global Trading System. Cambridge University Press, Cambridge.

Foroutan, F., 1998. Does membership in a regional preferential trade agreement make a country more or less protectionist? The World Bank, Policy Research Working Paper No. 1898.

Granger, C.W. J., 1969. Investigating causal relations by econometric models and cross spectral analysis. Econometrica 37 (3), 424–438.

Hamilton, J. (Ed.), 1994. Time Series Analysis. Princeton University Press, Chichester, West Sussex.

Henderson, D., Millimet, D., 2008. Is gravity linear? Journal of Applied Econometrics 23 (2), 137–72.

Heston, A., Summers, R., Aten, B. (Eds.), 2006. Pennn World Table Version 6.2. Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, University of Pennsylvania.

Hoekman, B., Özden, C., 2005. Trade preferences and differential treatment of developing countries. World Bank Policy Research Working Paper No. 3566.

Holmes, T., 2005. What drives regional trade agreements that work? Graduate Institute of International Studies, Geneva (HEI Working Paper No. 07/2005).

IMF (Ed.), 2007a. Direction of Trade Statistics. International Monetary Fund, Washington, D.C.

IMF (Ed.), 2007b. Direction of Trade Statistics Historical. International Monetary Fund, Washington, D.C.

IMF (Ed.), 2008. International Financial Statistics. International Monetary-Fund, Washington, D.C.

Karacaovali, B., Limao, N., 2008. The clash of liberalizations: Preferential vs. multilateral trade liberalization in the European Union. Journal of International Economics 74, 299–327.

KOF, 2009. KOF index of globalization 2009. KOF Swiss Economic Institute, Eidgenössische Technische Hochschule (ETH), Zürich.

Limao, N., 2006. Preferential trade agreements as stumbling blocks for multilateral trade liberalization: Evidence for the US. American Economic Review 96 (3), 896–914.

Limao, N., 2007. Are preferential trade agreements with non-trade objectives

a stumbling block for multilateral liberalization? The Review of Economic Studies 74 (3), 821–55.

Lütkepohl, H., Kätzig, M. (Eds.), 2004. Applied Time Series Econometrics. Cambridge University Press, Cambridge.

Maddison, A., 2008. World population, GDP and per capita GDP, 1-2003 ad. http://www.ggdc.net/maddison/.

Magee, P., Lee, H. L., 2001. Endogenous tariff creation and tariff diversion in a customs union. European Economic Review 45 (3), 495–518.

Marshall, M. G., Jaggers, K., 2009. Political regime characteristics and transitions, 1800-2007. Polity IV Project, Center for Systemic Peace, www.systemicpeace.org.

McGill, 2009. PTAs - preferential trade agreements database. McGill University, Montreal, Canada, http://ptas.mcgill.ca/.

Paiva, P., Gazel, R., 2003. Mercosur: past, present, and future. Economics Department, Universidade Federal de Minas Gerais (Brazil), in its journal Nova Economia 13 (2), 115–36.

Panagariya, A., 1999. The regionalism debate: An overview. The World Economy 22 (4), 477–512.

Pomfret, R., 2006. Regional trade agreements. In: Fratianni, M., Rugman, A. (Eds.), Regional Economic Integration. Elsevier, Amsterdam, Bosten, etc.

Pomfret, R., 2007. Is regionalism an increasing feature of the world economy? The World Economy 30 (6), 923–47.

Santos Silva, J. M. C., Tenreyro, S., 2006. The log of gravity. Review of Economics and Statistics 88 (4), 641–58.

Siliverstovs, B., Schumacher, D., 2009. Estimating gravity equations: To log or not to log? Empirical Economics 36 (3), 645–69.

Subramanian, A., Wei, S.-J., 2007. The WTO promotes trade, strongly but unevenly. Journal of International Economics 72 (1), 151–75.

Summers, L., 1991. Regionalism and the World Trading System. Symposium sponsored by the Federal Reserve Bank of Kansas City, 'Policy Implications of Trade and Currency Zones'.

Tomz, M., Goldstein, J., Rivers, D., 2007. Do we really know that the WTO increases trade? Comment. American Economic Review 97 (5), 2005–18.

Trejos, A., 2005. Bilateral and regional free trade agreements, and their relationship with the WTO and the Doha Development Agenda. Global Economy Journal 5 (4), Article 18.

UNCTAD (Ed.), 1973-1986. Operation and Effects of the Generalized System of Preferences. Reviews 1-10. United Nations Conference on Trade and Development, Geneva.

UNCTAD (Ed.), 2001. Generalized System of Preferences List of Beneficiaries. United Nations Conference on Trade and Development, Geneva.

UNCTAD (Ed.), 2005. Generalized System of Preferences List of Beneficiaries. United Nations Conference on Trade and Development, Geneva.

UNCTAD, 2008. About GSP. United Nations Conference on Trade and Development http://www.unctad.org.

Verbeek, M. (Ed.), 2008. A Guide to Modern Econometrics, 3rd Edition. John Wiley and Sons, Ltd., Chichester.

Westerlund, J.,Wilhelmsson, F., 2009. Estimating the gravity model without gravity using panel data. Applied Economics 41.

Winkelmann, R. (Ed.), 2008. Econometric Analysis of Count Data, 5th Edition. Springer, Berlin, Heidelberg.

World Bank (Ed.), 2007. World Development Indicators. World Bank, Washington, D.C.

WTO, 2007. The GATT years: from Havana to Marrakesh. World Trade Organization, http://www.wto.org/english/thewto_e/whatis_e/tif_e/fact4_e.htm.

WTO, 2009a. The 128 countries that had signed GATT by 1994. World Trade Organization, http://www.wto.org/English/thewto_e/gattmem_e.htm.

WTO, 2009b. Members and observers. World Trade Organization, http://www.wto.org/English/thewto_e/whatis_e/tif_e/org6_e.htm.

WTO, 2009c. Regional trade agreements. World Trade Organization, http://www.wto.org/english/tratop_e/region_e/region_e.htm.

Description of variables

The control variables of the gravity model X_{ijt} are defined as follows: *Importer in GATT/WTO* (*exporter in GATT/WTO*) equals to one if only the importing (exporting) country is a GATT/WTO member. *GSP-recipient-exports* (*GSP-donor-exports*) accounts for a bilateral relationship under the Generalized System of Preferences and is defined as one if the exporting (importing) country is granted the GSP scheme from the importing (exporting) country. *Importer in RTA* (*exporter in RTA*) is one for a pair of trading countries if only the importing (exporting) country participates in a regional trade agreement. *Log real GDP* represents the economic size of the trading partners measured as GDP in real terms. *Log real GDPPC* denotes real GDP per capita which can be interpreted as the capital-labour ratio. *Log RER* depicts the logarithm of the bilateral real exchange rate defined in price notation. *Currently colonized* is defined as one if a country is currently colonized by its trading partner. *Polity* is a measure for the polity regime and is scaled from +10 (strongly democratic) to -10 (strongly autocratic). Note that we do not include any time-invariant variables as these drop out due to the fixed effects estimation which has emerged as the preferred model.

Variable	**Source**
Bilateral exports	IMF (2007a, 2007b)
Nominal GDP (PPP)	IMF (2008), Worldbank (2007), Heston et al. (2006)
Consumer price index (CPI, 2000=100)	IMF (2008), Worldbank (2007)
Population	Maddison (2008), IMF (2008), Heston et al. (2006)
GATT/WTO-accession	WTO (2009a, 2009b), Tomz et al. (2007)
GSP programs	UNCTAD (1973-1986, 2001, 2005)
Regional trade agreements	WTO (2009c), McGill (2009)
Colonial relationships, common country	CIA (2007)
Nominal exchange rate	IMF (2008)
Geographic distance, area, borders common language, landlocked, island	CEPII (2008)
KOF Globalization-Index	KOF (2009)
Polity	Marshall and Jaggers (2009)

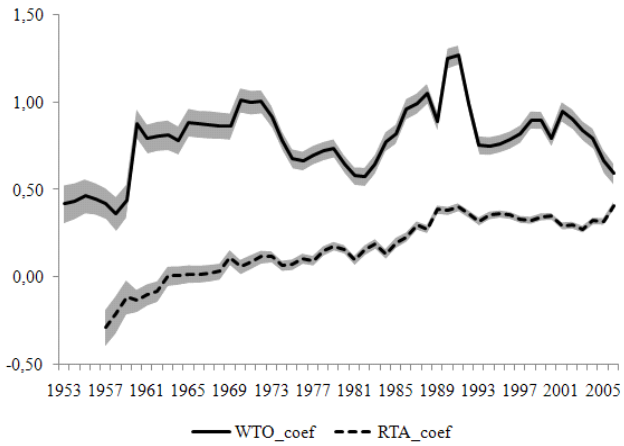

Figure 1: Yearly time-specific impact of GATT/WTO and RTAs on trade.

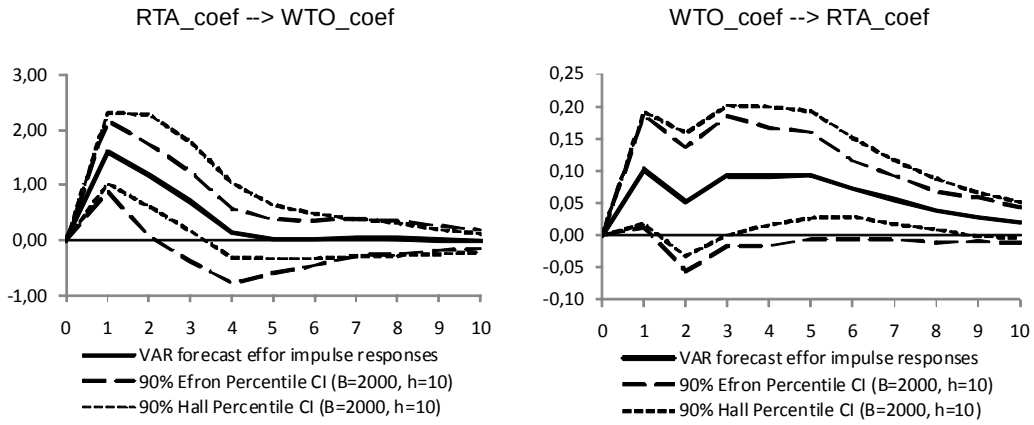

Figure 2: Impulse-response-functions.

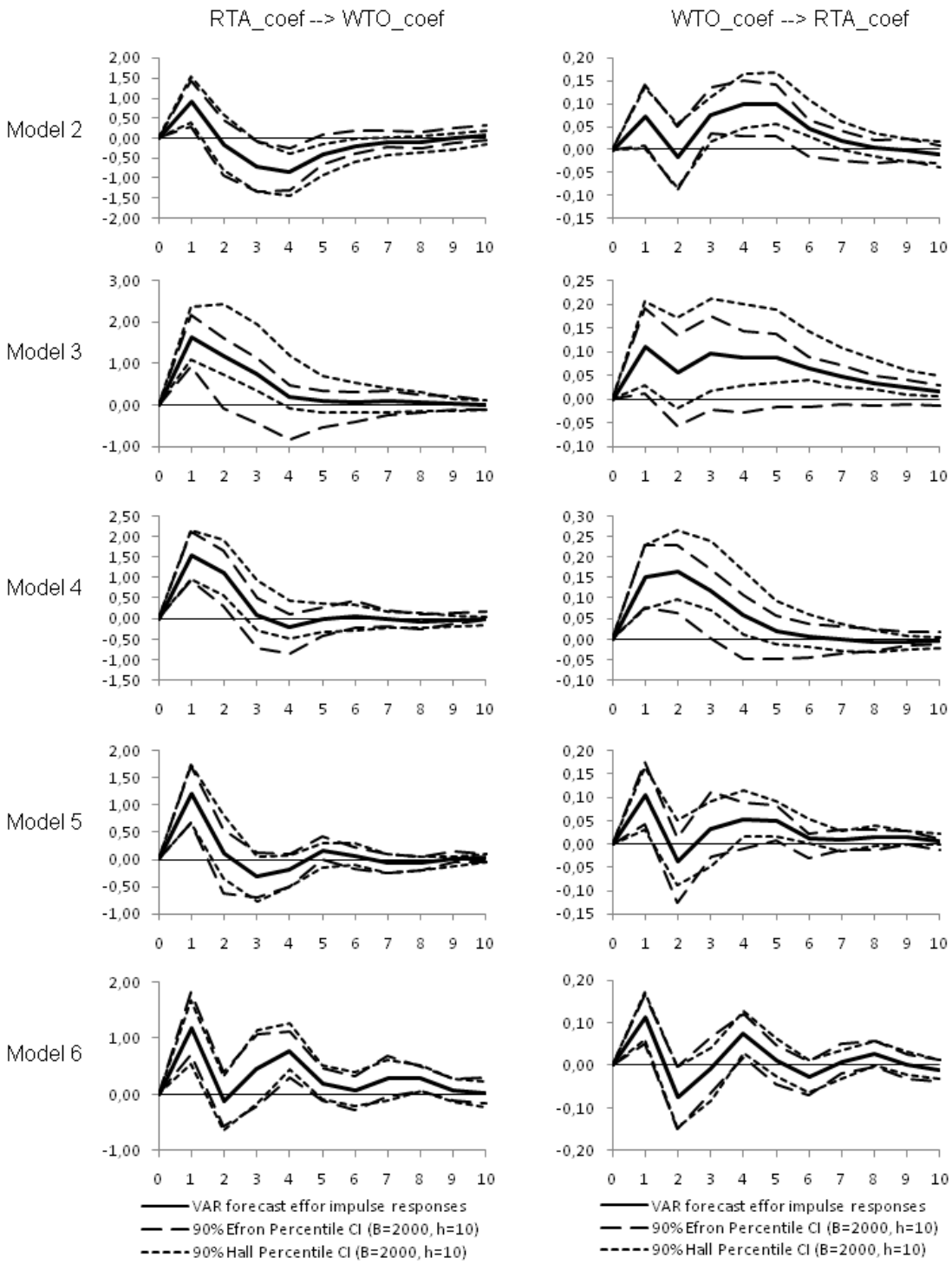

Figure 3: Impulse-response-funcions, models 2-6.

Dependent Variable:	FE-PML				
Real imports$_{ij}$	Coef.	S. E.		Coef.	S. E.
Importer in GATT/WTO	0.42***	0.02	… continued …		
Exporter in GATT/WTO	0.41***	0.02	Both in GATT/WTO 1998	0.89***	0.02
GSP-recipient-exports	-0.12***	0.01	Both in GATT/WTO 1999	0.89***	0.02
GSP-donor-exports	-0.04***	0.01	Both in GATT/WTO 2000	0.79***	0.02
Importer in RTA	0.07***	0.00	Both in GATT/WTO 2001	0.94***	0.02
Exporter in RTA	-0.03***	0.00	Both in GATT/WTO 2002	0.90***	0.02
Log real GDP$_i$	0.59***	0.01	Both in GATT/WTO 2003	0.83***	0.02
Log real GDP$_j$	0.74***	0.01	Both in GATT/WTO 2004	0.79***	0.02
Log real GDPPC$_i$	0.22***	0.01	Both in GATT/WTO 2005	0.66***	0.03
Log real GDPPC$_j$	0.41***	0.01	Both in GATT/WTO 2006	0.59***	0.10
Log RER$_{ij}$	-0.09***	0.01	Both in RTA 1957	-0.28***	0.05
Currently colonized	0.34***	0.13	Both in RTA 1958	-0.21***	0.05
Polity$_i$	0.01***	0.01	Both in RTA 1959	-0.11**	0.04
Polity$_j$	0.01***	0.01	Both in RTA 1960	-0.13***	0.03
Both in GATT/WTO 1953	0.41***	0.05	Both in RTA 1961	-0.10***	0.03
Both in GATT/WTO 1954	0.43***	0.05	Both in RTA 1962	-0.08***	0.03
Both in GATT/WTO 1955	0.46***	0.04	Both in RTA 1963	0.00	0.02
Both in GATT/WTO 1956	0.44***	0.04	Both in RTA 1964	0.01	0.02
Both in GATT/WTO 1957	0.42***	0.04	Both in RTA 1965	0.01	0.02
Both in GATT/WTO 1958	0.36***	0.04	Both in RTA 1966	0.01	0.02
Both in GATT/WTO 1959	0.43***	0.04	Both in RTA 1967	0.02	0.02
Both in GATT/WTO 1960	0.87***	0.04	Both in RTA 1968	0.03	0.02
Both in GATT/WTO 1961	0.79***	0.04	Both in RTA 1969	0.11***	0.02
Both in GATT/WTO 1962	0.80***	0.04	Both in RTA 1970	0.05***	0.02
Both in GATT/WTO 1963	0.81***	0.04	Both in RTA 1971	0.08***	0.02
Both in GATT/WTO 1964	0.78***	0.04	Both in RTA 1972	0.11***	0.01
Both in GATT/WTO 1965	0.88***	0.04	Both in RTA 1973	0.11***	0.01
Both in GATT/WTO 1966	0.87***	0.03	Both in RTA 1974	0.06***	0.01
Both in GATT/WTO 1967	0.87***	0.03	Both in RTA 1975	0.07***	0.01
Both in GATT/WTO 1968	0.86***	0.03	Both in RTA 1976	0.10***	0.01
Both in GATT/WTO 1969	0.86***	0.03	Both in RTA 1977	0.09***	0.01
Both in GATT/WTO 1970	1.00***	0.03	Both in RTA 1978	0.15***	0.01
Both in GATT/WTO 1971	0.99***	0.03	Both in RTA 1979	0.17***	0.01
Both in GATT/WTO 1972	1.00***	0.03	Both in RTA 1980	0.15***	0.01
Both in GATT/WTO 1973	0.91***	0.03	Both in RTA 1981	0.09***	0.01
Both in GATT/WTO 1974	0.78***	0.02	Both in RTA 1982	0.15***	0.01
Both in GATT/WTO 1975	0.67***	0.02	Both in RTA 1983	0.19***	0.01
Both in GATT/WTO 1976	0.66***	0.02	Both in RTA 1984	0.13***	0.01
Both in GATT/WTO 1977	0.69***	0.02	Both in RTA 1985	0.19***	0.01
Both in GATT/WTO 1978	0.72***	0.02	Both in RTA 1986	0.22***	0.01
Both in GATT/WTO 1979	0.73***	0.02	Both in RTA 1987	0.29***	0.01
Both in GATT/WTO 1980	0.64***	0.02	Both in RTA 1988	0.27***	0.01
Both in GATT/WTO 1981	0.57***	0.02	Both in RTA 1989	0.38***	0.01
Both in GATT/WTO 1982	0.57***	0.02	Both in RTA 1990	0.37***	0.01
Both in GATT/WTO 1983	0.64***	0.02	Both in RTA 1991	0.39***	0.01
Both in GATT/WTO 1984	0.77***	0.02	Both in RTA 1992	0.36***	0.01
Both in GATT/WTO 1985	0.81***	0.02	Both in RTA 1993	0.31***	0.01
Both in GATT/WTO 1986	0.96***	0.02	Both in RTA 1994	0.35***	0.01
Both in GATT/WTO 1987	0.99***	0.02	Both in RTA 1995	0.36***	0.01
Both in GATT/WTO 1988	1.00***	0.02	Both in RTA 1996	0.35***	0.01
Both in GATT/WTO 1989	0.88***	0.02	Both in RTA 1997	0.32***	0.01
Both in GATT/WTO 1990	1.02***	0.02	Both in RTA 1998	0.32***	0.01
Both in GATT/WTO 1991	1.02***	0.02	Both in RTA 1999	0.34***	0.01
Both in GATT/WTO 1992	0.99***	0.02	Both in RTA 2000	0.34***	0.01
Both in GATT/WTO 1993	0.75***	0.02	Both in RTA 2001	0.29***	0.01
Both in GATT/WTO 1994	0.75***	0.02	Both in RTA 2002	0.29***	0.01
Both in GATT/WTO 1995	0.76***	0.02	Both in RTA 2003	0.27***	0.01
Both in GATT/WTO 1996	0.78***	0.02	Both in RTA 2004	0.32***	0.01
Both in GATT/WTO 1997	0.81***	0.02	Both in RTA 2005	0.31***	0.01
… to be continued …			Both in RTA 2006	0.40***	0.01
No. of observations	526874				
No. of country-pairs	17332				
Wald-statistic	550196.08				
Log likelihood	-303290.15				

*** denotes significance on 1%-level, ** 5%-level, * 10%-level.
All estimations enclose year and country-pair dummies. Constants are not reported.

Table 1: Gravity model estimation.

	Model 1	
	GATT/WTO-effect	RTA-effect
GATT/WTO-effect$_{t-1}$	0.807***	0.102**
	(0.126)	(0.050)
GATT/WTO-effect$_{t-2}$	-0.273**	-0.095
	(0.119)	(0.062)
GATT/WTO-effect$_{t-3}$		0.081*
		(0.047)
RTA-effect$_{t-1}$	1.600***	0.635***
	(0.358)	(0.111)
RTA-effect$_{t-2}$	-1.126***	
	(0.361)	
RTA-effect$_{t-3}$		
Constant	0.417***	-0.086**
	(0.116)	(0.044)
Trend	-0.005	0.003***
	(0.003)	(0.001)

*** denotes significance on 1%-level, ** 5%-level, * 10%-level.
Sample range [1957, 2006]. SD in parentheses.

Table 2: VAR estimation, core model.

	RTA => GATT/WTO		GATT/WTO => RTA	
	Wald-test-statistic	P-value	Wald-test-statistic	P-value
Model 1	5.65***	0.01	1.32	0.27

*** denotes significance on 1%-level, ** 5%-level, * 10%-level.

Table 3: Granger-causality tests.

	RTA => GATT/WTO		GATT/WTO => RTA	
	Wald-test-statistic	P-value	Wald-test-statistic	P-value
Model 2	6.54***	0.00	5.31***	0.00
Model 3	7.42***	0.00	1.77	0.16
Model 4	7.55***	0.00	5.78***	0.00
Model 5	5.20***	0.00	3.01**	0.04
Model 6	9.09***	0.00	3.54**	0.02

*** denotes significance on 1%-level, ** 5%-level, * 10%-level.

Table 4: Granger-causality tests for models with additional explanatory variables.

	Model 2		Model 3		Model 4		Model 5		Model 6	
	GATT/WTO-effect	RTA-effect	GATT/WTO-effect	RTA-effect	GATT/WTO-effect	RTA-effect	GATT/WTO-effect	RTA-effect	GATT/WTO-effect	RTA-effect
GATT/WTO-effect$_{t-1}$	0.747***	0.072*	0.774***	0.110**	0.764***	0.153***	0.583***	0.105***	0.422**	0.112***
	(0.114)	(0.039)	(0.126)	(0.051)	(0.137)	(0.041)	(0.116)	(0.039)	(0.121)	(0.037)
GATT/WTO-effect$_{t-2}$	-0.248**	-0.105*	-0.253**	-0.095	-0.326***		-0.291**	-0.131***	-0.485***	-0.122**
	(0.112)	(0.056)	(0.117)	(0.061)	(0.127)		(0.126)	(0.049)	(0.126)	(0.056)
GATT/WTO-effect$_{t-3}$		0.135***		0.076*		0.050	0.270**	0.103**	0.264***	0.062
		(0.045)		(0.047)		(0.034)	(0.119)	(0.044)	(0.107)	(0.042)
RTA-effect$_{t-1}$	0.904***	0.491***	1.639***	0.600***	1.554***	0.316**	1.203***	0.309***	1.019***	
	(0.362)	(0.103)	(0.352)	(0.116)	(0.336)	(0.141)	(0.327)	(0.127)	(0.294)	
RTA-effect$_{t-2}$	-1.287***		-1.066***		-0.562	-0.381***	-0.966***		-0.620*	
	(0.324)		(0.355)		(404)	(0.151)	(0.318)		(0.359)	
RTA-effect$_{t-3}$		0.135***							0.949***	0.410***
		(0.045)							(0.376)	(0.163)
GATT/WTO-membership$_{t}$	0.308*						-0.398**	0.284**		
	(0.174)						(0.172)	0.115		
GATT/WTO-membership$_{t-1}$								-0.151*		
								(0.088)		
GATT/WTO-membership$_{t-2}$										
GATT/WTO-membership$_{t-3}$	0.616***						1.081***		2.455***	0.685***
	(0.180)						(0.229)		(0.432)	(0.177)
RTA-membership$_{t}$	-0.358***	-0.097***					-0.482***	-0.193***	-0.540***	-0.189***
	(0.115)	(0.025)					(0.118)	(0.044)	(0.169)	(0.057)
RTA-membership$_{t-1}$								0.085*	-0.366**	
								(0.048)	(0.164)	
RTA-membership$_{t-2}$										
RTA-membership$_{t-3}$	-0.237***							-0.101***		-0.241***
	(0.066)							(0.035)		(0.061)
Real world GDP$_{t}$			-0.381					1.055***		2.558***
			(0.272)					(0.386)		(0.413)
Real world GDP$_{t-1}$				-0.175				-0.445	3.826***	
				(0.448)				(0.371)	(1.166)	
Real world GDP$_{t-2}$				0.254			-1.562***		-4.651***	-1.497***
				(0.429)			(0.342)		(1.042)	(0.398)
Real world GDP$_{t-3}$										1.157***
										(0.410)
Globalization-Index$_{t}$					-5.236***				-6.340***	
					(1.730)				(1.172)	
Globalization-Index$_{t-1}$					4.876***					
					(1.690)					
Globalization-Index$_{t-2}$						1.690***			4.764***	2.402***
						(0.599)			(1.070)	(0.546)
Globalization-Index$_{t-3}$						-3.091***				-2.839***
						(0.628)				(0.519)
Constant	-2.570***		1.240***	-0.244	0.947*	4.880***	1.600**	-1.738***		-6.207***
	(0.8.63)		(0.598)	(0.225)	(0.542)	(0.894)	(0.703)	(0.440)		(2.264)
Trend	0.031***	0.013***	0.008	0.001		0.029***	0.073***		0.061***	-0.041***
	(0.010)	(0.003)	(0.009)	(0.004)		(0.005)	(0.015)		(0.019)	(0.016)

Sample range [1957, 2006]. SD in parenthesis.
*** denotes significance on 1%-level, ** 5%-level, * 10%-level.

Table 5: VAR estimations according to variable variation.